

Ever since the publication of Euclid's *Elements* and Ptolemy's *Almagest*, textbooks have had the unfortunate effect of stifling the search for the original papers cited within. In order to prevent this, I have provided a somewhat comprehensive bibliography to facilitate the readers research into the original literature. I am particularly indebted to the staff of Mann Library, Kroch Library and the University Annex, for finding, storing, and making it possible for me to read these references.

-A-

- Abdelkader, A.B., 1973. Isolement d'une fraction protéique stimulant les échanges de phospholipides entre mitochondria et microsomes de tubercule de pomme de terre (*Solanum tuberosum* L.). C. R. Hebd. Seances Acad. Sci. 277, 1455–1458.
- Abell, G.O., 1976. Realm of the Universe. Holt, Rinehart and Winston, New York.
- Abranches, R., Beven, A.F., Aragón-Alcaide, L., Shaw, P.J., 1998. Transcription sites are not correlated with chromosome territories in wheat nuclei. J. Cell Biol. 143, 5–12.
- Adachi, P., Puopolo, K., Marquez-Sterling, N., Arav, H., Forgar, M., 1990. Dissolution, cross-linking and glycosylation of the coated-vesicle proton pump. J. Biol. Chem. 265, 967–973.
- Adachi, Y., Luke, M., Laemmli, U.K., 1991. Assembly in vitro: Topoisomerase II is required for condensation. Cell 64, 137–148.
- Adair, G.S., 1937. The chemistry of the proteins and amino acids. Ann. Rev. Biochem. 6, 163–192.
- Adair, W.S., Appel, H., 1989. Identification of a highly conserved hydroxyproline-rich glycoprotein in the cell walls of *Chlamydomonas reinhardtii* and two other Volvocales. Planta 179, 381–386.
- Adam, N.K., 1941. The Physics and Chemistry of Surfaces, third ed. Oxford University Press, Oxford.
- Adams, G., Whicher, O., 1949. The Living Plant and the Science of Physical and Ethereal Spaces. Goethean Science Foundation, Clent, England.
- Adams, R.J., Pollard, T.D., 1989. Binding of myosin I to membrane lipids. Nature 340, 565–568.
- Addinall, S.G., Holland, B., 2002. The tubulin ancestor, FtsZ, draughtsman, designer and driving force for bacterial cytokinesis. J. Mol. Biol. 318, 219–236.
- Adelman, M.R., Borisy, G.G., Shelanski, M.L., Wisenberg, R.C., Taylor, E.W., 1968. Cytoplasmic filaments and tubules. Fed. Proc. 27, 1186–1193.
- Adelman, M.R., Taylor, E.W., 1969. Further purification and characterization of slime mold myosin and slime mold actin. Biochemistry 8, 4976–4988.
- Afzelius, B., 1959. Electron microscopy of the sperm tail. Results obtained with a new fixative. J. Biophys. Biochem. Cytol. 5, 269–278.
- Agar, W.E., 1920. Cytology with Special Reference to the Metazoan Nucleus. MacMillan and Co, London.
- Agassiz, L., 1863. Methods of Study in Natural History. Ticknor and Fields, Boston.
- Agne, B., Kessler, F., 2007. Protein import into plastids. Top. Curr. Genet. 19, 339–370.
- Agre, P., Brown, D., Nielsen, S., 1995. Aquaporin water channels: Unanswered questions and unresolved controversies. Curr. Opin. Cell Biol. 7, 472–483.
- Agutter, P.S., 1991. Between Nucleus and Cytoplasm. Chapman and Hall, London.
- Agutter, P.S., 1995. Intracellular structure and nucleocytoplasmic transport. Int. Rev. Cytol. 162B, 183–224.
- Ahmad, M., Cashmore, A.R., 1996. Seeing blue: The discovery of cryptochrome. Plant Mol. Biol. 30, 851–861.
- Ahmed, S.U., Bar-Peled, M., Raikhel, N.V., 1997. Cloning and subcellular location of an *Arabidopsis* receptor-like protein that shares common features with protein-sorting receptors of eukaryotic cells. Plant Physiol. 114, 325–336.
- Ahmed, S.U., Rojo, E., Kovaleva, V., Venkataraman, S., Dombrowski, J.E., Matsuoka, K., Raikhel, N.V., 2000. The plant vacuolar sorting receptor AtELP is involved in transport of NH₂-terminal propeptide-containing vacuolar proteins in *Arabidopsis thaliana*. J. Cell Biol. 149, 1335–1344.
- Ahner, B.A., Kong, S., Morel, F.M.M., 1995. Phytochelatin production in marine algae. Limnol. Oceanogr. 40, 649–657 658–665.
- Ahner, B.A., Price, N.M., Morel, F.M.M., 1994. Phytochelatin production by marine phytoplankton at low free metal ion concentrations: Laboratory studies and field data from Massachusetts Bay. Proc. Natl. Acad. Sci. USA 91, 8433–8436.
- Airy, G.B., 1876. Notes on the Early Hebrew Scriptures. Longmans, Green, and Co., London.
- Aist, J.R., 1977. Mechanically induced wall appositions of plant cells can prevent penetration by a parasitic fungus. Science 197, 568–571.
- Aist, J.R., Berns, M.W., 1981. Mechanisms of chromosome separation during mitosis in *Fusarium* (fungi imperfecti): New evidence from ultrastructural and laser microbeam experiments. J. Cell Biol. 91, 446–458.
- Aist, J.R., Bayles, C.J., Tao, W., Berns, M.W., 1991. Direct experimental evidence for the existence, structural basis and function of astral forces during anaphase B in vivo. J. Cell Sci. 100, 279–288.
- Aist, J.R., Liang, H., Berns, M.W., 1993. Astral and spindle forces in mitotic PtK₂ cells. J. Cell Sci. 104, 1207–1216.
- Aist, J.R., Williams, P.H., 1972. Ultrastructure and time course of mitosis in the fungus *Fusarium oxysporum*. J. Cell Biol. 55, 368–389.

- Akashi, T., Kawasaki, S., Shibaoka, H., 1990. Stabilization of cortical microtubules by the cell wall in cultured tobacco cells: effects of extension on the cold stability of cortical microtubules. *Planta* 182, 363–369.
- Akashi, T., Shibaoka, H., 1987. Effects of gibberellin on the arrangement and the cold stability of cortical microtubules in epidermal cells of pea internodes. *Plant Cell Physiol.* 28, 334–348.
- Akashi, T., Shibaoka, H., 1991. Involvement of transmembrane proteins in the association of cortical microtubules with the plasma membrane in tobacco BH-2 cells. *J. Cell Sci.* 98, 169–172.
- Akazawa, T., Hara-Nishimura, I., 1985. Topographic aspects of biosynthesis, extracellular secretion, and intracellular storage of proteins in plant cells. *Ann. Rev. Plant Physiol.* 36, 441–472.
- Aldini, J., 1803. An account of the late improvements in galvanism: With a series of curious and interesting experiments performed before the commissioners of the French National Institute, and repeated lately in the anatomical theatres of London. Wilks and Taylor, London.
- Akey, C.W., 1989. Interactions and structure of the nuclear pore complex revealed by cryo-electron microscopy. *J. Cell Biol.* 109, 955–970.
- Alexander, S.P., Rieder, C.L., 1991. Chromosome motion during attachment to the vertebrate spindle: Initial saltatory-like behavior of chromosomes and quantitative analysis of force production by nascent kinetochore fibers. *J. Cell Biol.* 113, 805–815.
- Alexandersson, E., Saalbach, G., Larsson, C., Kjellbom, P., 2004. *Arabidopsis* plasma membrane proteomics identifies components of transport, signal transduction and membrane trafficking. *Plant Cell Physiol.* 45, 1543–1556.
- Alexandre, J., Lassalles, J.P., Kado, R.T., 1990. Opening of Ca^{2+} channels in isolated red beet vacuole membrane by inositol (1,4,5) triphosphate. *Nature* 343, 567–570.
- Algera, L., Beijer, J.J., van Isteron, W., Karsten, W.K.H., Thung, T.H., 1947. Some data on the structure of the chloroplast, obtained by electron microscopy. *Biochem. Biophys. Acta.* 1, 517–526.
- Ali, M.S., Akazawa, T., 1985. Association of H^{+} -translocating ATPase in the Golgi membrane system from suspension-cultured cells of sycamore (*Acer pseudoplatanus* L.). *Plant Physiol.* 81, 222–227.
- Ali, M.S., Nishimura, M., Mitsui, T., Akazawa, T., Kojima, K., 1985. Isolation and characterization of Golgi membranes from suspension-cultured cells of sycamore (*Acer pseudoplatanus* L.). *Plant Cell Physiol.* 26, 1119–1133.
- Alfén, H., 1966. Worlds-Antiworlds. Antimatter in Cosmology. W. H. Freeman and Co., San Francisco.
- Allaway, W.G., Carpenter, J.L., Ashford, A.E., 1985. Amplification of inter-symbiont surface by root epidermal transfer cells in the *Pisonia mycorrhiza*. *Protoplasma* 128, 227–231.
- Allen, G.J., Kuchitsu, K., Chu, S.P., Murata, Y., Schroeder, J.I., 1999. *Arabidopsis abi1-1* and *abi2-1* phosphatase mutations reduce abscisic acid-induced cytoplasmic calcium rises in guard cells. *Plant Cell* 11, 1785–1798.
- Allen, G.J., Kwak, J.M., Chu, S.P., Llopis, J., Tsien, R.Y., Harper, J.F., Schroeder, J.I., 1999. Cameleon calcium indicator reports cytoplasmic calcium dynamics in *Arabidopsis* guard cells. *Plant J.* 19, 735–747.
- Allen, J.F., 2003. State transitions—A question of balance. *Science* 299, 1530–1532.
- Allen, N.S., Brown, D.T., 1988. Dynamics of the endoplasmic reticulum in living onion epidermal cells in relation to movement. *Cell Motil. Cytoskeleton.* 10, 153–163.
- Allen, R.D., Naitoh, Y., 2002. Osmoregulation and contractile vacuoles of protozoa. *Int. Rev. Cytol.* 215, 351–394.
- Allen, R.D., Tominaga, T., Naitoh, Y., 2009. The contractile vacuole complex and cell volume control in protozoa. pp. 69–105. In *Osmotic and Ionic Regulation. Cells and Animals.* D.H. Evans., ed. CRC Press, Boca Raton, FL.
- Allen, R.D., Kamiya, N. (Eds.), 1964. Primitive Motile Systems in Cell Biology. Academic Press, New York.
- Allen, R.D., Roslansky, J.D., 1959. The consistency of Ameba cytoplasm and its bearing on the mechanism of ameboid movement. I. An analysis of endoplasmic velocity profiles of *Chaos chaos*. *J. Biophys. Biochem. Cytol.* 6, 437–446.
- Allen, V.W., Kropf, D.L., 1992. Nuclear rotation and lineage specification in *Pelvetia* embryos. *Development* 115, 873–883.
- Alley, C.D., Scott, J.L., 1977. Unusual dictyosome morphology and vesicle formation in tetrasporangia of the marine red alga *Polysiphonia denudata*. *J. Ultrastruct. Res.* 58, 289–298.
- Allman, J.M., Hakeem, A., Erwin, J.M., Nimchinsky, E., Hof, P., 2001. The anterior cingulate cortex: The evolution of an interface between emotion and cognition. *Proc. NY Acad. Sci.* 935, 107–117.
- Allman, A.H., Watson, K., 2002. Two phylogenetic specializations in the human brain. *Neuroscientist* 8, 335–346.
- Alpher, R.A., Bethe, H., Gamow, G., 1948. The origin of chemical elements. *Phys. Rev.* 73, 803–804.
- Altmann, R., 1889. Ueber nucleinsäuren. *Arch. Anat. Physiol. Physiol. Abt.*, 524–536.
- Altmann, R., 1890. Die Elementarorganismen und ihre Beziehung zu den Zellen. Veit & Co., Leipzig.
- Altmann, S., 1990. Enzymatic cleavage of RNA by RNA. *Angew. Chem. (Int. Ed.)* 29, 749–758.
- Ambros, V., 2008. The evolution of our thinking about micro-RNAs. *Nat. Med.* 14, 10–14.
- Ambrose, J.C., Cyr, R., 2007. Mitotic spindle assembly and function. *Plant Cell Monogr.* 9, 141–167.
- Amici, G.B., 1818. Osservazioni sulla circolazione del succchio nella *Chara*. *Memorie della Società Italiana delle Scienze* 18, 183–198.
- Amino, S., Tazawa, M., 1989. Dependence of tonoplast transport of amino acids on vacuolar pH in *Chara* cells. *Proc. Jpn. Acad. Sci.* 65 (B), 34–37.
- Amoore, J.E., 1962. Participation of a non-respiratory ferrous complex during mitosis in roots. *J. Cell Biol.* 13, 373–381.
- Amoore, J.A., 1963. Non-identical mechanisms of mitotic arrest by respiratory inhibitors in pea root tips and sea urchin eggs. *J. Cell Biol.* 18, 555–567.
- Amor, Y., Mayer, R., Benziman, M., Delmer, D., 1991. Evidence for a cyclic diguanylic acid dependent cellulose synthase in plants. *Plant Cell* 3, 989–995.
- Andersen, O.M., Markham, K.R., 2006. Flavonoids: Chemistry, Biochemistry and Applications. CRC Press, Boca Raton, FL.
- Andersland, J.M., Jagendorf, A.T., Parthasarathy, M.V., 1992. The isolation of actin from pea roots by DNase I affinity chromatography. *Plant Physiol.* 100, 1716–1723.
- Andersland, J.M., Parthasarathy, M.V., 1992. Phalloidin binds and stabilizes pea root actin. *Cell Motil. Cytoskeleton.* 22, 245–249.
- Andersland, J.M., Parthasarathy, M.V., 1993. Conditions affecting depolymerization of actin in plant homogenate. *J. Cell Sci.* 104, 1273–1279.

- Anderson, E.G., 1923. Maternal inheritance of chlorophyll in maize. *Bot. Gaz.* 76, 411–418.
- Anderson, J.A., Huprikar, S.S., Kochian, L.V., Lucas, W.J., Gaber, R.F., 1992. Functional expression of a probable *Arabidopsis thaliana* potassium channel in *Saccharomyces cerevisiae*. *Proc. Natl. Acad. Sci. USA* 89, 3736–3740.
- Anderson, J.M., 1975. The molecular organization of chloroplast thylakoids. *Biochim. Biophys. Acta* 416, 191–235.
- Anderson, J.V., Li, Q.-B., Haskell, D.W., Guy, C.L., 1994. Structural organization of the spinach endoplasmic reticulum-luminal 70-kilodalton heat-shock cognate gene and expression of 70-kilodalton heat-shock genes during cold acclimation. *Plant Physiol.* 104, 1359–1370.
- Anderson, J.W., Beardall, J., 1991. *Molecular Activities of Plant Cells. An Introduction to Plant Biochemistry*. Blackwell Scientific Publications, Oxford.
- Anderson, R.G.W., 1993. Plasmalemmal caveolae and GPI-anchored membrane proteins. *Curr. Opin. Cell Biol.* 5, 647–652.
- Andre, J., Thiery, J.P., 1963. Mise évidence d'une sous-structure fibrillaire dans les filaments axonmatiques des flagelles. *J. Microscopie* 2, 71–80.
- Andrews, G.F., 1897. *The Living Substance as Such: And as Organism*. Athenaeum Press, Boston.
- Andrews, T.J., Lorimer, G.H., Tolbert, N.E., 1971. Incorporation of molecular oxygen into glycine and serine during photorespiration in spinach leaves. *Biochemistry* 10, 4777–4782.
- Anfinsen, C.B., 1973. Principles that govern the folding of protein chains. *Science* 181, 223–230.
- Angert, E.R., Brooks, A.E., Pace, N.R., 1996. Phylogenetic analysis of *Metabacterium polyspora*: Clues to the evolutionary origin of *Epulopiscium* spp., the largest bacteria. *J. Bacteriol.* 178, 1451–1456.
- Angert, E.R., Clements, K.D., Pace, N.R., 1993. The largest bacterium. *Nature* 362, 239–241.
- Aniento, F., Robinson, D.G., 2005. Testing for endocytosis in plants. *Protoplasma* 226, 3–11.
- Anonymous (perhaps F. Wöhler and J. Liebig), 1839. Das enträthselte Geheimniss der geistigen Gährung. *Ann. Pharm. (Heidelberg)* 29, 100–104.
- Anonymous, 1848. The best heat generator in the world. *Am. Phrenological J. Misc.* 10, 61–67.
- Anthon, G.E., Spanswick, R.M., 1986. Purification and properties of the H^+ -translocating ATPase from the plasma membrane of tomato roots. *Plant Physiol.* 81, 1080–1085.
- Apel, K., 1979. Phytochromeinduced appearance of mRNA activity for the apoprotein of the light-harvesting chlorophyll a/b protein of barley (*Hordeum vulgare*). *Eur. J. Biochem.* 97, 183–188.
- Apostol, I., Heinsteins, P.F., Low, P.S., 1989. Rapid stimulation of an oxidative burst during elicitation of cultured plant cells: Role in defense and signal transduction. *Plant Physiol.* 90, 109–116.
- Apostol, I., Low, P.S., Heinsteins, P.F., Stipamovic, D., Altonan, D. W., 1987. Inhibition of elicitor-induced phytoalexin formation in cotton and soybean cells by citrate. *Plant Physiol.* 84, 1276–1280.
- Apostol, M., 2007. Comment on the “Declaration of the Academic Freedom” by D. Rabounski. *Prog. Phys.* 3, 81–84.
- Apse, M.P., Aharon, G.S., Snedden, W.A., Blumwald, E., 1999. Salt tolerance conferred by overexpression of a vacuolar Na^+ / H^+ antiport in *Arabidopsis*. *Science* 285, 1256–1258.
- Arimura, S., Tsutsumi, N., 2002. A dynamin-like protein (ADL2b), rather than FtsZ, is involved in *Arabidopsis* mitochondrial division. *Proc. Natl. Acad. Sci.* 99, 5727–5731.
- Arimura, S.-i., Yamamoto, J., Aida, G.P., Nakazono, M., Tsutsumi, N., 2004. Frequent fusion and fission of plant mitochondria with unequal nucleoid distribution. *Proc. Natl. Acad. Sci.* 101, 7805–7808.
- Arimura, S., Aida, G.P., Fujimoto, M., Nakazono, M., Tsutsumi, N., 2004b. *Arabidopsis* dynamin-like protein 2a (ADL2a), like ADL2b, is involved in plant mitochondrial division. *Plant Cell Physiol.* 45, 236–242.
- Arioli, T., Peng, L., Betzner, A.S., Burn, J., Wittke, W., Herth, W., Camilleri, C., Hofte, H., Plazinski, J., Birch, R., et al., 1998. Molecular analysis of cellulose biosynthesis in *Arabidopsis*. *Science* 279, 717–720.
- Armstrong, F., Leung, J., Grabov, A., Brearley, J., Giraudat, J., Blatt, M.R., 1995. Sensitivity to abscisic acid of guard cell K^+ channels is suppressed by *abl-1*, a mutant *Arabidopsis* gene encoding a putative protein phosphatase. *Proc. Natl. Acad. Sci. USA* 92, 9520–9524.
- Armstrong, L., Snyder, J.A., 1987. Quinidine-induced changes in mitotic PtK_1 spindle microtubule organization. *Cell Motil. Cytoskel.* 7, 10–19.
- Arnon, D.I., 1951. Extracellular photosynthetic reactions. *Nature* 167, 1008–1010.
- Arnon, D.I., Allen, M.B., Whately, F.R., 1954. Photosynthesis by isolated chloroplasts. *Nature* 174, 394–396.
- Arntzen, C., Plotkin, S., Dodet, B., 2005. Plant-derived vaccines and antibodies: Potential and limitations. *Vaccine* 23, 1753–1756.
- Arrhenius, G., Sales, B., Mojzsis, S., Lee, T., 1997. Entropy and charge in molecular evolution—the case of phosphate. *J. Theoret. Biol.* 187, 503–522.
- Arrhenius, S., 1896. On the influence of carbonic acid in the air upon the temperature of the ground. *Phil. Mag.* 41, 237–276.
- Arrhenius, S., 1902. *Textbook of Electrochemistry*. Longmans, Green, and Co., London.
- Arrhenius, S., 1903. Development of the theory of electrolyte dissociation. *Nobel Lect.* December 11.
- Arrhenius, S., 1908. *Worlds in the Making*. Harper & Row, New York.
- Arrhenius, S., 1912. *Theories of Solutions*. Yale University Press, New Haven, CT.
- Arrhenius, S., 1915. *Quantitative Laws in Biological Chemistry*. G. Bell and Sons, Ltd., London.
- Arrigo, A.P., Tanaka, K., Goldberg, A.L., Welch, W.J., 1988. Identity of the 19S “prosome” particle with the large multi-functional protease complex of mammalian cells (the proteosome). *Nature* 331, 192–194.
- Arronet, N.I., 1973. *Motile Muscle and Cell Models*. Translated from the Russian by Basil Haigh. Consultants Bureau, New York.
- Araya, A., Bégu, D., Litvak, S., 1994. RNA editing in plants. *Physiol. Plant.* 91, 543–550.
- Asada, T., Sonobe, S., Shibaoka, H., 1991. Microtubule translocation in the cytokinetic apparatus of cultured tobacco cells. *Nature* 350, 238–241.
- Asada, T., Kuriyama, R., Shibaoka, H., 1997. TKRP125, a kinesin-related protein involved in the centrosome-independent organization of the cytokinetic apparatus in tobacco BY-2 cells. *J. Cell Sci.* 110, 179–189.

- Asai, D.J., Wilson, L.S., 1985. A latent activity dynein-like cytoplasmic magnesium adenosine triphosphatase. *J. Biol. Chem.* 260, 699–702.
- Asen, S., Stewart, R.N., Norris, K.H., 1975. Anthocyanin, flavonol copigments and pH responsible for larkspur flower color. *Phytochemistry* 14, 2677–2682.
- Ashby, W.R., 1958. *An Introduction to Cybernetics*. John Wiley & Sons, New York.
- Ashford, A.E., Allaway, W.E., 1985. Transfer cells and Hartig net in the root epidermis of the sheathing mycorrhiza of *Pisonia grandis* R.Br. from Seychelles. *New Phytol.* 100, 595–612.
- Ashkin, A., Dziedzic, J.M., 1987. Optical trapping and manipulation of viruses and bacteria. *Science* 235, 1517–1520.
- Ashkin, A., Dziedzic, J.M., 1989. Internal cell manipulation using infrared laser traps. *Proc. Natl. Acad. Sci. USA* 86, 7914–7918.
- Ashkin, A., Dziedzic, J.M., Yamaore, T., 1987. Optical trapping and manipulation of single cells using infrared laser beams. *Nature* 330, 769–771.
- Ashkin, A., Schuetze, K., Dziedzic, J.M., Euteneuer, U., Schliwa, M., 1990. Force generation of organelle transport measured in-vivo by an IR laser trap. *Nature* 348, 346–348.
- Asimov, I., 1971. *The Universe. From Flat Earth to Quasar*, Revised Ed. Walker and Co., New York.
- Assmann, S.M., 1993. Signal transduction in guard cells. *Ann. Rev. Cell Biol.* 9, 345–375.
- Assmann, S.M., 2002. Heterotrimeric and unconventional GTP binding proteins in plant cell signaling. *Plant Cell* 14, S355–S373.
- Assmann, S.M., 2005. G proteins go green: A plant G protein signaling FAQ sheet. *Science* 310, 71–73.
- Astburg, W.T., 1947. X-ray studies of nucleic acids. *Symp. Soc. Exp. Biol.* 1, 66–67.
- Astbury, W.T., 1950/51. *Adventures in molecular biology*. Harvey Lect. 46, 3–44.
- Astbury, W.T., Bell, F.O., 1938. X-ray studies of thymonucleic acid. *Nature* 141, 747–748.
- Aston, F.W., 1922. Mass spectra and isotopes. *Nobel Lect.* December 12.
- Astrachan, L., Volkin, E., 1958. Properties of ribonucleic acid turnover in T2-infected *Escherichia coli*. *Biochim. Biophys. Acta* 29, 536–544.
- Aubert, S., Gout, E., Bligny, R., Marty-Mazars, D., Barrieu, F., Alabouvette, J., Marty, F., Douce, R., 1996. Ultrastructural and biochemical characterization of autophagy in higher plant cells subjected to carbon deprivation: Control by the supply of mitochondria with respiratory substrates. *J. Cell Biol.* 133, 1251–1263.
- Ault, J.G., Demarco, A.J., Salmon, E.D., Rieder, C.L., 1991. Studies on the ejection properties of asters; astral microtubule turnover influences the oscillatory behavior and positioning of non-oriented chromosomes. *J. Cell Sci.* 99, 701–710.
- Avery, O.T., MacLeod, C.M., McCarty, M., 1944. Studies on the chemical nature of the substance inducing transformation of pneumococcal types. *J. Exp. Med.* 79, 137–158.
- Avogadro, A., 1837. *Fisica de' corpi ponderabili; ossia Trattato della costituzione generale de' corpi, del cavaliere Amedeo Avogadro*.
- Avron, M., 1963. A coupling factor in photophosphorylation. *Biochim. Biophys. Acta* 77, 699–702.
- Avron (Abramsky), M., Biale, J.B., 1957a. Metabolic processes in cytoplasmic particles of the avocado fruit. *Plant Physiol.* 32, 100–105.
- Avron (Abramsky), M., Biale, J.B., 1957b. Metabolic processes in cytoplasmic particles of the avocado fruit. *J. Biol. Chem.* 225, 699–708.
- Avron (Abramsky), M., Jagendorf, A.T., 1956. A TPNH diaphorase from chloroplasts. *Arch. Biochem. Biophys.* 65, 475–490.
- Avron (Abramsky), M., Jagendorf, A.T., 1957. An extractable factor in photosynthetic phosphorylation. *Nature* 179, 428–429.
- Avron, M., Krogmann, D.W., Jagendorf, A.T., 1958. The relation of photosynthetic phosphorylation to the Hill reaction. *Biochim. Biophys. Acta* 30, 144–153.
- Axelrod, D., Koppel, D.E., Schlessinger, J., Elson, E., Webb, W. W., 1976. Mobility measurements by analysis of fluorescence photobleaching recovery kinetics. *Biophys. J.* 16, 1055–1069.
- Axelsen, K.B., Palmgreen, M.G., 2001. Inventory of the superfamily of P-type ion pumps in Arabidopsis. *Plant Physiol.* 126, 696–706.
- Avisar, D., Prokhnovsky, A.I., Dolja, V.V., 2008a. Class VIII myosins are required for plasmodesmatal localization of a Closterovirus Hsp70 homolog. *J. Virology* 82, 2836–2843.
- Avisar, D., Prokhnovsky, A.I., Makarova, K.S., Koonin, E.V., Dolja, V.V., 2008b. Myosin XI-K is required for rapid trafficking of Golgi stacks, peroxisomes and mitochondria in leaf cells of *Nicotiana benthamiana*. *Plant Physiol.* 146, 1098–1108.
- Aw, T.Y., 2000. Intracellular compartmentation of organelles and gradients of low molecular weight species. *Int. Rev. Cytol.* 192, 223–253.
- Awata, J., Kashiyama, T., Ito, K., Yamamoto, K., 2003. Some motile properties of fast characean myosin. *J. Mol. Biol.* 326, 659–663.
- Awata, J., Saitoh, J.K., Shimada, K., Kashiyama, T., Yamamoto, K., 2001. Effects of Ca^{2+} and calmodulin on the motile activity of characean myosin *in vitro*. *Plant Cell Physiol.* 42, 828–834.
- Ayre, B.G., Turgeon, R., 2004. Graft Transmission of a Floral Stimulant Derived from CONSTANS. *Plant Physiol.* 135, 2271–2278.
- Ayling, S.M., Butler, R.C., 1993. Time-Series analysis of measurements on living cells illustrated by analysis of particle movement in the cytoplasm of tomato root hairs. *Protoplasma* 172, 124–131.
- Ayling, S.M., Clarkson, D.T., Brownlee, C., 1990. Cytoplasmic free calcium levels in tomato root hairs are altered by indole-3-acetic acid. *Proc. R. Micro. Soc.* 25, 275.

-B-

- Baas-Becking, I.G.M., Parks, G.S., 1927. Energy relations in the metabolism of autotrophic bacteria. *Physiol. Rev.* 7, 85–106.
- Baba, M., Takeshige, K., Baba, N., Ohsumi, Y., 1994. Ultrastructural analysis of the autophagic process in yeast: Detection of autophagosomes and their characterization. *J. Cell Biol.* 124, 903–913.
- Bacic, A., Delmer, D.P., 1981. Stimulation of membrane-associated polysaccharide synthetases by a membrane potential in developing cotton fibers. *Planta* 152, 346–351.
- Bacon, F. [1620]. 1947. *Novum Organum*. The Philosophers of Science. In: Commings, S., Linscott, R. N. (Eds.), *Man and the*

- Universe. Random House, New York. Book 1. Reprinted in *The World's Greatest Thinkers*.
- Bacon, J.S.D., 1970. Life outside the cell (or, what the biologist saw). In: Bartley, W., Kornberg, H.L., Quayle, J.R. (Eds.) *Essays in Cell Metabolism*. Hans Krebs Dedicatory Volume. Wiley-Interscience, London, pp. 45–66.
- Bada, J.L., Lazcano, A., 2003. Prebiotic soup—revisiting the Miller experiment. *Science* 300, 745–746.
- Baeyer, A. von., 1870. Ueber die Wasserentziehung und ihre Bedeutung für das Pflanzenleben und die Gärung. *Ber. d. Deutsch. Chem. Gesells.* 3, 63–73.
- Baiges, I., Schäffner, A.R., Affenzeller, M.J., Mas, A., 2002. Plant aquaporins. *Physiol. Plant.* 115, 175–182.
- Bailer, S.M., Eppenberger, H.M., Griffiths, G., Nigg, E.A., 1991. Characterization of a 54-kD protein of the inner nuclear membrane: Evidence for cell cycle dependent interaction with the nuclear lamina. *J. Cell Biol.* 114, 398–400.
- Bailey, I.W., 1930. The cambium and its derivative tissues. V. A reconnaissance of the vacuole in living cells. *Zeit. Zellf. Mikro. Anat.* 10, 651–682.
- Bailey, J., 1997. Building a plasmodium: Development in the acellular slime mould *Physarum polycephalum*. *BioEssays* 19, 985–992.
- Bailey, J.M., 1998. RNA-directed amino acid homochirality. *FASEB J.* 12, 503–507.
- Bailey, K., Sanger, F., 1951. The chemistry of amino acids and proteins. *Ann. Rev. Biochem.* 20, 103–130.
- Bailey, L.H., 1915. *The Holy Earth*. Charles Scribner's Sons, New York.
- Baitsell, G.A., 1940. The Cell Theory II. A modern concept of the cell as a structural unit. *Am. Nat.* 74, 5–24.
- Bajer, A.S., Allen, R.E., 1966. Role of phragmoplast filaments in cell plate formation. *J. Cell Sci.* 1, 455–462.
- Bajer, A.S., Jensen, C., 1969. Detectability of mitotic spindle microtubules with the light and electron microscopes. *J. de Microsc.* 8, 343–354.
- Bajer, A.S., Mole-Bajer, J., 1972. Spindle dynamics and chromosome movements. *Int. Rev. Cytol. (Suppl.)* 3, 1–273.
- Bajer, A.S., Mole-Bajer, J., 1986. Reorganization of microtubules in endosperm cells and cell fragments of the higher plant *Haemanthus in vivo*. *J. Cell Biol.* 102, 263–281.
- Baker, A., Graham, I. (Eds.), 2002. *Plant Peroxisomes. Biochemistry, Cell Biology and Biotechnological Implications*. Kluwer Academic Publishers, Dordrecht.
- Baker, J.R., 1945. *Science and the Planned State*. MacMillan, New York.
- Baker, J.R., 1957. The Golgi controversy. *Symp. Soc. Exp. Biol.* 10, 1–10.
- Baker, J.R., 1988. *The Cell Theory. A Restatement, History and Critique*. Garland Publishing, New York.
- Balch, W.E., Dunphy, W.G., Braell, W.A., Rothman, J.E., 1984a. Reconstitution of the transport of protein between successive compartments of the Golgi measured by the coupled incorporation of N-acetylglucosamine. *Cell* 39, 405–416.
- Balch, W.E., Glick, B.S., Rothman, J.E., 1984b. Sequential intermediates in the pathway of intercompartmental transport in a cell-free system. *Cell* 39, 525–536.
- Balch, W.E., Magrum, L.J., Fox, G.E., Wolfe, R.S., Woese, C.R., 1977. An ancient divergence among the bacteria. *J. Mol. Evol.* 9, 305–311.
- Ball, E.G., 1944. Energy relationships of the oxidative enzymes. *Ann. NY Acad. Sci.* 45, 363–375.
- Ball, E.G., Barnett, R.J., 1957. An integrated morphological and biochemical study of a purified preparation of the succinate and DPNH oxidase system. *J. Biochem. Biophys. Cytol.* 3, 1023–1036.
- Ball, P., 2000. *Life's Matrix: A Biography of Water*. Farrar, Straus, and Giroux, New York.
- Ballas, L.M., Lazarow, P.B., Bell, R.M., 1984. Glycerolipid synthetic capacity of rat liver peroxisomes. *Biochim. Biophys. Acta* 795, 297–300.
- Ballowitz, E., 1888. Untersuchungen über die Struktur der Spermatozoen, zugleich ein Beitrag zur Lehre vom feineren Bau der kontraktile Elemente. *Arch. Mikro. Anat.* 32, 401–473.
- Baltzer, F., 1967. Theodor Boveri. Life and Work of a Great Biologist 1862–1915. University of California Press, Berkeley.
- Balusek, K., Depta, H., Robinson, D.G., 1988. Two polypeptides (30 and 38 kDa) in plant coated vesicles with clathrin light chains properties. *Protoplasma* 146, 174–176.
- Baluska, F., Baroja-Fernandez, E., Pozueta-Romero, J., Hlavacka, A., Etcheberria, E., Samaj, J., 2005. Endocytic uptake of nutrients, cell wall molecules, and fluidized cell wall portions into heterotrophic plant cells. *Plant Cell Monogr.* 1, 19–35.
- Baluska, F., Samaj, J., Napier, R., Volkmann, D., 1999. Maize calreticulin localizes preferentially to plasmodesmata in root apex. *Plant J.* 19, 481–488.
- Baluska, F., Samaj, J., Hlavacka, A., Kendrick-Jones, J., Volkmann, D., 2004. Actin-dependent fluid-phase endocytosis in inner cortex cells of maize roots. *J. Exp. Bot.* 55, 463–473.
- Baluska, F., Volkmann, D., Barlow, P.W., 2004. Eukaryotic cells and their cell bodies: Cell theory revisited. *Ann. Bot.* 94, 9–32.
- Baluska, F., Volkmann, D., Hlavacka, A., Mancuso, S., Barlow, P.W., 2006. Neurobiological view of plants and their body plan. In: Baluska, F., Mancuso, S., Volkmann, D. (Eds.) *Communication in Plants*. Springer, Berlin, pp. 19–35.
- Bandurski, R.S., 1955. Further studies on the enzymatic synthesis of oxalacetate from phosphorylenolpyruvate and carbon dioxide. *J. Biol. Chem.* 217, 137–150.
- Bandurski, R.S., Greiner, C.M., 1953. The enzymatic synthesis of oxalacetate from phosphoryl-enolpyruvate and carbon dioxide. *J. Biol. Chem.* 204, 781–786.
- Bandurski, R.S., Greiner, C.M., Bonner, J., 1953. Enzymatic carboxylation of phosphoenolpyruvate to oxalacetate. *Fed. Proc.* 204, 781–786.
- Bandurski, R.S., Lippmann, F., 1956. Studies on an oxaloacetic carboxylase from liver mitochondria. *J. Biol. Chem.* 219, 741–752.
- Bandurski, R.S., Wilson, L.G., Squires, C.L., 1956. The mechanism of active sulfate formation. *J. Am. Chem. Soc.* 78, 6408–6409.
- Bar, R.S., Deamer, D.W., Cornwell, D.G., 1966. Surface area of human erythrocyte lipids: Reinvestigation of experiments on plasma membrane. *Science* 153, 1010–1012.
- Barak, L.S., Yocum, R.R., Nothnagel, E.A., Webb, W.W., 1980. Fluorescence staining of the actin cytoskeleton in living cells with 7-nitrobenz-2-oxa-1,3-diazole phalloidin. *Proc. Natl. Acad. Sci. USA* 77, 980–984.
- Barber, H.N., 1939. The rate of movement of chromosomes on the spindle. *Chromosoma* 1, 33–50.

- Barbour, M.G., Burk, J.H., Pitts, W.D., 1980. *Terrestrial Plant Ecology*. Benjamin/Cummings Publishing, Menlo Park, CA.
- Barlow, P.W., 1982. "The plant forms cells, not cells the plant": The origin of De Bary's aphorism. *Ann. Bot.* 49, 269–271.
- Barnes, C.R., 1893. On the food of green plants. *Bot. Gaz.* 18, 403–411.
- Barnes, C.R., 1898. So-called "Assimilation.". *Bot. Centralblatt.* 76, 257–259.
- Barnes, J. (Ed.), 1984. *The Complete Works of Aristotle*. Princeton University Press, Princeton, NJ.
- Baroja-Fernandez, E., Etxeberria, E., Muñoz, J.F., Gonzalez, P., Pozueta-Romero, J., 2006. An important pool of sucrose linked to starch biosynthesis is taken up by endocytosis in heterotrophic cells. *Plant Cell Physiol.* 47, 447–456.
- Baron, A.T., Salisbury, J.L., 1988. Identification and localization of a novel, cytoskeletal, centrosome-associated protein in PtK2 cells. *J. Cell Biol.* 107, 2669–2678.
- Baron-Epel, O., Gharayal, P.K., Schindler, M., 1988a. Pectin as mediators of wall porosity in soybean cells. *Planta* 175, 389–395.
- Baron-Epel, O., Hernandez, D., Jiang, L.-W., Meiners, S., Schindler, M., 1988b. Dynamic continuity of cytoplasmic and membrane compartments between plant cells. *J. Cell Biol.* 106, 715–721.
- Barondes, S.H., Nirenberg, M.W., 1962. Fate of a synthetic polynucleotide directing cell-free protein synthesis. *Science* 138, 810–817.
- Barritt, G.J., 1992. *Communication Within Animal Cells*. Oxford University Press, Oxford.
- Barroso, J.B., Corpas, F.J., Carreras, A., Sandalio, L.M., Valderrama, R., Palma, J.M., Lupiáñez, J.A., del Río, L.A., 1999. Localization of nitric-oxide synthase in plant peroxisomes. *J. Biol. Chem.* 274, 36729–36733.
- Barthou, H., Petitprez, M., Brière, C., Souvré, A., Alibert, G., 1999. RGD-mediated membrane-matrix adhesion triggers agarose-induced embryoid formation in sunflower protoplasts. *Protoplasma* 206, 143–151.
- Bartnik, E., Sievers, A., 1988. In-vivo observations of a spherical aggregate of endoplasmic reticulum and of Golgi vesicles in the tip of fast-growing *Chara* rhizoids. *Planta* 176, 1–9.
- Bashkirov, P.V., Akimov, S.A., Evseev, A.E., Schmid, S.L., Zimmerberg, J., Frolov, V.A., 2008. GTPase cycle of dynamin is coupled to membrane squeeze and release, leading to spontaneous fission. *Cell* 135, 1–11.
- Baskin, T.I., 2001. On the alignment of cellulose microfibrils by cortical microtubules: A review and a model. *Protoplasma* 215, 150–171.
- Baskin, T.I., 2005. Anisotropic expansion of the plant cell wall. *Annu. Rev. Cell and Develop. Biol.* 21, 203–222.
- Baskin, T.I., Cande, W.Z., 1990. The structure and function of the mitotic spindle in flowering plants. *Ann. Rev. Plant Physiol. Plant Mol. Biol.* 41, 277–315.
- Bassham, D.C., Blatt, M.R., 2008. SNAREs: Cogs and coordinators in signaling and development. *Plant Physiol.* 147, 1504–1515.
- Bassham, D.C., Gal, S., Conceicao, A.d.S., Raikhel, N.V., 1995. An arabidopsis syntaxin homologue isolated by functional complementation of a yeast pep12 mutant. *Proc. Natl. Acad. Sci.* 92, 7262–7266.
- Bassham, D.C., Raikhel, N.V., 2000. Plant cells are not just green yeast. *Plant Physiol.* 122, 999–1001.
- Bassham, J.A., 2003. Mapping the carbon reduction cycle: A personal retrospective. *Photosyn. Res.* 76, 35–52.
- Bassham, J.A., Calvin, M., 1957. *The Path of Carbon in Photosynthesis*. Prentice-Hall, Englewood Cliffs, NJ.
- Bastiansen, O., 1964. *The Law of Mass Action. A Centenary Volume 1864–1964*. Det Norske Videnskaps-Akademi I, Oslo.
- Bateson, W., 1909. *Mendel's Principles of Heredity*. Cambridge University Press, Cambridge.
- Bateson, W., Saunders, E.R., Punnett, R.C., 1906. Report III. Reports to the Evolution Committee of the Royal Society. Harrison and Sons, London.
- Batoko, H., Zheng, H.-Q., Hawes, C., Moore, I., 2000. A Rab1 GTPase is required for transport between the endoplasmic reticulum and Golgi apparatus and for normal Golgi movement in plants. *Plant Cell* 12, 2201–2218.
- Baudenbacher, F., Fong, L.E., Thiel, G., Wacke, M., Jazbinsek, V., Holzer, J.R., Stampfl, A., Trontelj, Z., 2005. Intracellular axial current in *Chara* coralline reflects the altered kinetics of ions in cytoplasm under influence of light. *Biophys. J.* 88, 690–697.
- Baudhuin, P., Beaufay, H., de Duve, C., 1965. Combined biochemical and morphological study of particulate fractions from rat liver. *J. Cell Biol.* 26, 219–243.
- Bauer, H.H., 1994. *Scientific Literacy and the Myth of the Scientific Method*. University of Illinois Press, Champaign, IL.
- Bauer, W.D., Talmadge, K.W., Keegstra, K., Albersheim, P., 1973. The structure of plant cell walls. II. The hemicellulose of the walls of suspension cultured sycamore cells. *Plant Physiol.* 51, 174–187.
- Bauerfeind, R., Huttner, W.B., 1993. Biogenesis of constitutive secretory vesicles, secretory granules and synaptic vesicles. *Curr. Opin. Cell Biol.* 5, 628–635.
- Baulcombe, D., 2008. Of maize and men, or peas and people: Case histories to justify plants and other model systems. *Nat. Med.* 14, 20–23.
- Baum, M., Appels, R., 1991. The cytogenetic and molecular architecture of chromosome 1R—one of the most widely utilized sources of alien chromatin in wheat varieties. *Chromosoma* 101, 1–10.
- Bausch, A.R., Moeller, W., Sackmann, E., 1999. Measurements of local viscoelasticity and forces in living cells by magnetic tweezers. *Biophys. J.* 76, 573–579.
- Bayer, E., Thomas, C.L., Maule, A.J., 2004. Plasmodesmata in *Arabidopsis thaliana* suspension cells. *Protoplasma* 223, 93–102.
- Bayer, E.M., Bottrill, A.R., Walshaw, J., Vigouroux, M., Nalder, M.J., Thomas, C.L., Maule, A.J., 2006. Arabidopsis cell wall proteome using multidimensional protein identification technology. *Proteomics* 6, 301–311.
- Bayley, P.M., 1990. What makes microtubules dynamic? *J. Cell Sci.* 95, 329–334.
- Beadle, G.W., 1945. *Genetics and Metabolism in Neurospora*. *Physiol. Rev.* 25, 643–663.
- Beadle, G.W., 1955. The genes of men and molds. In: *Scientific American* (Eds.), *The Physics and Chemistry of Life*. Simon and Schuster, New York, pp. 151–162.
- Beadle, G.W., 1958. Genes and chemical reactions in *Neurospora*. Nobel Lec. December 11.
- Beadle, G., Beadle, M., 1966. *The Language of Life. An Introduction to the Science of Genetics*. Doubleday & Co. Garden City, New York.

- Beadle, G.W., Tatum, E.L., 1941a. Genetic control of biochemical reactions in *Neurospora*. Proc. Natl. Acad. Sci. USA 27, 499–506.
- Beadle, G.W., Tatum, E.L., 1941b. Experimental control of development and differentiation. Genetic control of developmental reactions. Am. Nat. 75, 107–116.
- Beale, L.S., 1872. Bioplasm: An Introduction to the Study of Physiology and Medicine. J. & A. Churchill, London.
- Beale, L.S., 1878. The Microscope in Medicine. fourth ed. Much Enlarges. J. & A. Churchill, London.
- Beale, L.S., 1892. Protoplasm, fourth ed. Harrison & Sons, London.
- Beams, H.W., Kessel, R.G., 1968. The Golgi apparatus: Structure and function. Int. Rev. Cytol. 23, 209–276.
- Beams, H.W., King, R.L., 1938. An experimental study on mitosis in the somatic cells of wheat. Biol. Bull. 75, 189–207.
- Beaudoin, F., Wikinson, B.M., Striring, C.J., Napier, J.A., 2000. In vivo targeting of a sunflower oil body protein in yeast secretory (*sec*) mutants. Plant J. 23, 159–170.
- Becher, P., 1965. Emulsions. Theory and Practice, second ed. Reinhold, New York.
- Becker, W.A., 1932. Recherches expérimentales sur la cytokinèse et la formation de la plaque cellulaire dans la cellule vivante. C. R. Acad. Sci. Paris, 194, 1850–1852.
- Becker, W.A., 1938. Recent investigations in vivo on the division of plant cells. Bot. Rev. 4, 446–472.
- Becker, W.M., 1977. Energy and the Living Cell. An Introduction to Bioenergetics. J. B. Lippincott Co., Philadelphia, PA.
- Beckett, A., Heath, I.B., McLaughlin, D.J., 1974. An Atlas of Fungal Ultrastructure. Longman, London.
- Bédard, J., Jarvis, P., 2005. Recognition and envelope translocation of chloroplast proteins. J. Exp. Bot. 56, 2287–2320.
- Beebe, D.U., Evert, R.F., 1992. Photoassimilate pathway(s) and phloem loading in the leaf of *Moricandia arvensis* (L.) DC (Brassicaceae). Int. J. Plant Sci. 153, 61–77.
- Beebe, D.U., Turgeon, R., 1991. Current perspectives on plasmodesmata: Structure and function. Physiol. Plant. 83, 194–199.
- Beer, J.J., 1959. The Emergence of the German Dye Industry. University of Illinois Press, Urbana.
- Beevers, H., 1961. Respiratory Metabolism in Plants. Harper & Row, New York.
- Beevers, H., 1979. Microbodies in higher plants. Ann. Rev. Plant Physiol. 30, 159–193.
- Beevers, H., Walker, D.A., 1956. The oxidative activity of particulate fractions from germinating castor beans. Biochem. J., 114–120.
- Beevers, L., 1996. Clathrin-coated vesicles in plants. Int. Rev. Cytol. 167, 1–35.
- Begg, D.A., Ellis, G.W., 1979. Micromanipulation studies of chromosome movement. J. Cell Biol. 82, 528–541.
- Beilby, M.J., Shepherd, V.A., 1996. Turgor regulation in *Lamprothamnium papulosum*. I. I/V analysis and pharmacological dissection of the hypotonic effect. Plant Cell Environ. 19, 837–847.
- Beilby, M.J., Cherry, C.A., Shepherd, V.A., 1999. Dual turgor regulation response to hypotonic stress in *Lamprothamnium papulosum*. Plant Cell Environ. 22, 347–360.
- Belar, K., 1929. Der Formwechsel der Protistenkerne. Ergesbn. u. Fortschr. Zool. 6, 235–654.
- Benavente, R., 1991. Postmitotic nuclear reorganization events analyzed in living cells. Chromosoma 100, 215–220.
- Benda, C., 1899. Weitere Mitteilungen über die Mitochondria. Arch. Anat. Physiol. (Physiol. Abt.), 376.
- Benito, A., Rodriguez-Navarro, B., 2003. Molecular cloning and characterization of a sodium-pump ATPase of the moss *Physcomitrella patens*. Plant J. 36, 382–389.
- Bennet-Clark, T.A., Greenwood, A.D., Barker, J.W., 1936. Water relations and osmotic pressure of plant cells. New Phytol. 35, 277–291.
- Bennett, A.B., Spanswick, R.M., 1983. Optical measurements of ΔpH and $\Delta \psi$ in corn root membranes vesicles: Kinetic analysis of Cl^- effects on a proton-translocating ATPase. J. Memb. Biol. 71, 95–107.
- Bennett, A.B., Spanswick, R.M., 1984a. H^+ -ATPase activity from storage tissue of *Beta vulgaris*. I. Identification and characterization of an anion-sensitive H^+ -ATPase. Plant Physiol. 74, 538–544.
- Bennett, A.B., Spanswick, R.M., 1984b. H^+ -ATPase activity from storage tissue of *Beta vulgaris*. II. H^+ /ATP stoichiometry of an anion sensitive H^+ -ATPase. Plant Physiol. 74, 545–548.
- Bennett, A.B., O'Neill, S.D., Eilmann, N., Spanswick, R.M., 1985. H^+ -ATPase activity from storage tissue of *Beta vulgaris*. III. Modulation of ATPase activity by reaction substrates and products. Plant Physiol. 78, 495–499.
- Bennett, J., 1981. Biosynthesis of the light-harvesting chlorophyll a/b protein. Eur. J. Biochem. 118, 61–70.
- Bennett, J., 1991. Protein phosphorylation in green plant chloroplasts. Annu. Rev. Plant Physiol. Plant Mol. Biol. 42, 281–311.
- Bennett, V., 1990a. Spectrin: A structural mediation between diverse plasma membrane proteins and the cytoplasm. Curr. Opin. Cell Biol. 2, 51–56.
- Bennett, V., 1990b. Spectrin-based membrane skeleton: A multipotential adaptor between plasma membrane and cytoplasm. Physiol. Rev. 70, 1029–1065.
- Bennett, V., Gilligan, D.M., 1993. The spectrin-based membrane skeleton and micron-scale organization of the plasma membrane. Annu. Rev. Cell Biol. 9, 27–66.
- Bensley, R.R., 1951. Facts versus artefacts in cytology: The Golgi apparatus. Exp. Cell Res. 2, 1–9.
- Bensley, R.R., 1953. Introduction and greetings. Symposium: The structure and biochemistry of mitochondria. J. Histochem. Cytochem. 1, 179–182.
- Bensley, R.R., Hoerr, N.L., 1934. Studies on cell structure by the freezing-drying method. VI. The preparation and properties of mitochondria. Anat. Rec. 60, 449–455.
- Benson, A.A., 2002. Paving the path. Annu. Rev. Plant Biol. 53, 1–25.
- Benson, A.A., Calvin, M., 1947. The dark reductions of photosynthesis. Science 106, 648–652.
- Bent, H.A., 1965. The Second Law. Oxford University Press, New York.
- Bentley, R., 1978. Ogston and the development of the prochirality theory. Nature 276, 673–676.
- Bereiter-Hahn, J., 1987. Mechanical principles of architecture of Eukaryotic cells. In: Bereiter-Hahn, J., Anderson, O.R., Reif, W.E. (Eds.) Cytomechanics. Springer Verlag, Berlin, pp. 3–30.
- Berestovsky, G.N., Ternovsky, V.I., Kataev, A.A., 2001. Through pore diameter in the cell wall of *Chara*. J. Exp. Bot. 52, 1173–1177.

- Berezney, R., Mortillaro, M.J., Ma, H., Wei, X., Samarabandu, J., 1995. The nuclear matrix: A structural milieu for genomic function. *Int. Rev. Cytol.* 162A, 1–65.
- Berg, P., 2003. Moments of discovery: My favorite experiment. *J. Biol. Chem.* 278, 40417–40424.
- Bergen, L.G., Borisy, G.G., 1980. Head-to-tail polymerization of microtubules in vitro. *J. Cell Biol.* 84, 141–150.
- Berger, C., Witkus, E., 1943. A cytological study of c-mitosis in the polysomatic plant *Spinacea oleracea*, with comparative observation on *Allium cepa*. *Bull. Torrey Bot. Club* 70, 457–467.
- Berger, S., Dirk, J., von Lindern, L., Wolff, D., Mergenhagen, D., 1992. Temperature dependency of circadian period in a single cell (*Acetabularia*). *Bot. Acta* 105, 382–386.
- Berger, S., Herth, W., Franke, W.W., Falk, H., Spring, H., Schweiger, H.G., 1975. Morphology of the nucleocytoplasmic interactions during the development of *Acetabularia* cells. *Protoplasma* 84, 223–256.
- Bergey, D.R., Howe, G.A., Ryan, C.A., 1996. Polypeptide signaling for plant defensive genes exhibits analogies to defense signaling in animals. *Proc. Natl. Acad. Sci. USA* 93, 12053–12058.
- Bergfeld, R., Speth, V., Schopfer, P., 1988. Reorientation of microfibrils and microtubules at the outer epidermal wall of maize coleoptiles during auxin-mediated growth. *Bot. Acta* 101, 57–67.
- Bergman, K., Burke, P.V., Cerdá-Olmedo, E., David, C.N., Delbrück, M., Foster, K.W., Goodell, E.W., Heisenberg, M., Meissner, G., Zalokar, M., Dennison, D.S., Shropshire Jr., W., 1969. *Phycomyces*. *Bacteriol. Rev.* 33, 99–157.
- Bergmann, M., Fruton, J.S., 1944. The significance of coupled reactions for the enzymatic hydrolysis and synthesis of proteins. *Ann. NY Acad. Sci.* 45, 409–423.
- Bergmann, M., Niemann, C., 1938. The chemistry of amino acids and proteins. *Ann. Rev. Biochem.* 7, 99–124.
- Bergmans, A.C.J., De Boer, A.D., Derksen, J.W.M., van der Schoot, C., 1997. The symplasmic coupling of L-2-cells diminishes in early floral development of *Iris*. *Planta* 203, 245–252.
- Bergson, H., 1911. *Creative Evolution*. Translated by A. Mitchell. Henry Holt and Co., New York.
- Berkelman, T., Lagarias, J.C., 1990. Calcium transport in the green alga *Mesotaenium caldariorum*. *Plant Physiol.* 93, 748–757.
- Bermudes, D., Hinkle, G., Margulis, L., 1994. Do prokaryotes contain microtubules? *Microbiol. Rev.* 58, 387–400.
- Bernabeu, C., Lake, J.A., 1982. Nascent polypeptide chains emerge from the exit domain of the large ribosomal subunit. *Proc. Natl. Acad. Sci. USA* 79, 311–3115.
- Bernal, J.D., 1939. *The Social Function of Science*. George Routledge & Sons, London.
- Bernal, J.D., 1949. *The Freedom of Necessity*. Routledge & Kegan Paul, London.
- Bernal, J.D., 1951. *The Physical Basis of Life*. Routledge & Kegan Paul, London.
- Bernal, J.D., 1962. Biochemical evolution. In: Kasha, M., Pullman, B. (Eds.), *Horizons in Biochemistry*. Albert Szent-Györgyi Dedicatory Volume. Academic Press, New York, pp. 11–22.
- Bernal, J.D., 1967. *The Origin of Life*. Weidenfeld and Nicolson, London.
- Bernard, C. [1965]. 1957. *An Introduction to the Study of Experimental Medicine*. Dover Publications, New York.
- Bernat, R.L., Borisy, G.G., Rothfield, N.F., Earnshaw, W.C., 1990. Injection of anticentromere antibodies in interphase disrupts events required for chromosome movement at mitosis. *J. Cell Biol.* 111, 1519–1533.
- Bernfield, M.R., Nirenberg, M.W., 1965. RNA codewords and protein synthesis. The nucleotide sequences of multiple codewords for phenylalanine, serine, leucine, and proline. *Science* 147, 479–484.
- Bernhard, W., de Haven, E., 1956. Sur la présence dans certaines cellules de mammifères d'un organite de nature probablement centriolaire. Étude au microscope électronique. *C. R. Acad. Sci. Paris* 242, 288–290.
- Berns, M.W., Aist, J., Edwards, J., Strahs, K., Girton, J., McNeill, P., Ratner, J.B., Kitzes, M., Hammer-Wilson, M., Liaw, L.-H., Siemens, A., Koonce, M., Peterson, S., Brenner, S., Burt, J., Walter, R., Bryant, P.J., van Dyk, D., Coulombe, J., Cahill, T., Berns, G.S., 1981. Laser microsurgery in cell and developmental biology. *Science* 213, 505–513.
- Berns, M.W., Greulich, K.O. (Eds.), 2007. *Laser Manipulation of Cells and Tissues*. Volume 82. *Methods in Cell Biology*. Elsevier, Amsterdam.
- Berridge, M.J., 1987. Inositol triphosphate and diacylglycerol: Two interacting second messengers. *Ann. Rev. Biochem.* 56, 159–193.
- Berridge, M.J., Irvine, R.F., 1990. Inositol phosphates and cell signaling. *Nature* 341, 197–205.
- Berry, E.A., Hinkle, P.C., 1983. Measurements of the electrochemical proton gradient in submitochondrial particles. *J. Biol. Chem.* 258, 1474–1486.
- Berry, J.A., Osmond, C.B., Lorimer, G.H., 1978. Fixation of $^{18}\text{O}_2$ during photorespiration. Kinetic and steady state studies of the photorespiratory carbon oxidation cycle with intact leaves and isolated chloroplasts of C_3 plants. *Plant Physiol.* 62, 954–967.
- Berry, W., 2000. *Life is a Miracle. An Essay Against Modern Superstition*. Counterpoint, Washington, DC.
- Berthelot, M., 1885. *Les Origines de l'Alchimie*. Georges Steinheil, Paris.
- Berthold, G., 1886. *Studien über Protoplasmamechanik*. Verlag Arthur Felix, Leipzig.
- Bergthorsson, U., Richardson, A.O., Young, G.J., Goertzen, L.R., Palmer, J.D., 2004. Massive horizontal transfer of mitochondrial genes from diverse land plant donors to the basal angiosperm *Amborella*. *Proc. Natl. Acad. Sci.* 101, 17747–17752.
- Berthold, P., Tsunoda, S.P., Ernst, O.P., Mages, W., Gradmann, D., Hegemann, P., 2008. Channelrhodopsin-1 initiates phototaxis and photophobic responses in *Chlamydomonas* by immediate light-induced depolarization. *Plant Cell* 20, 1665–1677.
- Bertozzi, W., 1964. Speed and kinetic energy of relativistic electrons. *Am. J. Phys.* 32, 551–555.
- Bethe, A., 1930. The permeability of the surface of marine animals. *J. Gen. Physiol.* 13, 437–444.
- Bethe, H.A., 1939. Energy production in stars. *Phys. Rev.* 55, 434–456.
- Bethe, H.A., 1968. *Les Prix Nobel en 1967. Energy Production in Stars*. Nobel Foundation, Stockholm.
- Bethe, H.A., 2003. My life in astrophysics. *Annu. Rev. Astron. Astrophys.* 41, 1–14.
- Bethe, H.A., Critchfield, C.L., 1938. The formation of deuterons by proton combination. *Phys. Rev.* 54, 248–254.

- Bethke, P.C., Hwang, Y.-S., Zhu, T., Jones, R.L., 2006. Global patterns of gene expression in the aleurone of wild-type and *dwarf1* mutant rice. *Plant Physiol.* 140, 484–498.
- Betsche, T., Schaller, D., Melkonian, M., 1992. Identification and characterization of glycolate oxidase and related enzymes from the endocyanotic alga *Cyanophora paradoxa* and from pea leaves. *Plant Physiol.* 98, 887–893.
- Beven, A., Quan, Y., Pearl, J., Cooper, C., Shaw, P., 1991. Monoclonal antibodies to plant nuclear matrix reveal intermediate filament-related components within the nucleus. *J. Cell Sci.* 98, 293–302.
- Beyler, R.H., 1996. Targeting the organism. The scientific and cultural context of Pascual Jordan's quantum biology, 1932–1947. *Isis* 87, 248–273.
- Beyler, R.H., 2007. Exporting the quantum revolution: Pascual Jordan's biophysical initiatives. pp. 69–81. In: Pascual Jordan (1902–1980) Mainzer Symposium zum 100. Geburtstag. <<http://www.mpiwg-berlin.mpg.de/Preprints/P329.PDF>>
- Beznoussenko, G.V., Mironov, A.A., 2002. Models of intracellular transport and evolution of the Golgi complex. *Anat. Rec.* 268, 226–238.
- Bhaskar, V., 2003. Root Hairs. The “Gills” of Roots. Science Publishers, Enfield, NH.
- Bhat, R.A., Panstruga, R., 2005. Lipid rafts in plants. *Planta* 223, 1–15.
- Bhaya, D., Jagendorf, A.T., 1985. Synthesis of the α and β subunits of coupling factor 1 by polysomes from pea chloroplasts. *Arch. Biochem. Biophys.* 237, 217–223.
- Bi, E.F., Lutkenhaus, J., 1991. FtsZ ring structure associated with division in *Escherichia coli*. *Nature* 354, 161–164.
- Biagini, G.A., Bernard, C., 2000. Primitive anaerobic protozoa: A false concept? *Microbiology* 146, 1019–1020.
- Bialek, W., 1987. Physical limits to sensation and perception. *Ann. Rev. Biophys. Biophys. Chem.* 16, 455–478.
- Bicknese, S., Periasamy, N., Shohet, S.B., Verkman, A.S., 1993. Cytoplasmic viscosity near the cell plasma membrane: Measurement by evanescent field frequency-domain microfluorimetry. *Biophys. J.* 65, 1272–1282.
- Bidwell, R.G.S., 1974. *Plant Physiology*. MacMillan, New York.
- Bierhorst, D.W., 1971. *Morphology of Vascular Plants*. Macmillan, New York.
- Binns, D., Januszewski, T., Chen, Y., Hill, J., Markin, V.S., Zhao, Y., Gilpin, C., Chapman, K.D., Anderson, R.G.W., Goodman, J.M., 2006. An intimate collaboration between peroxisomes and lipid bodies. *J. Cell Biol.* 173, 719–731.
- Birch, J.S., Lee, J., 2007. Joseph Priestley. A Celebration of His Life and Legacy. Priestley Society, Lancaster, England.
- Bischof, M., 1996. Some remarks on the history of biophysics (and its future) Paper delivered at the 1st Hombroich Symposium on Biophysics, Neuss, Germany, October 3–6, 1995. In: Zhang, C.L., Popp, F.A., Bischof, M. (Eds.), *Current Development of Biophysics*. Hangzhou University Press, Hangzhou, China.
- Bisgrove, S.R., Kropf, D.L., 2007. Asymmetric cell divisions: Zygotes of fucoid algae as a model system. *Plant Cell Monogr.* 9, 323–341.
- Bishop, W.R., Bell, R.M., 1988. Assembly of phospholipids into cellular membranes: Biosynthesis, transmembrane movement and intracellular translocation. *Ann. Rev. Cell Biol.* 4, 579–610.
- Bisson, M.A., Kirst, G.O., 1980. *Lamprothamnium*, a euryhaline charophyte. I. Osmotic relations and membrane potential at steady state. *J. Exp. Bot.* 31, 1223–1235.
- Black, C.C., Osmond, C.B., 2003. Crassulacean acid metabolism photosynthesis: “Working the night shift.” *Photosynthesis Res.* 76, 329–341.
- Blackbourn, H.D., Jackson, A.P., 1996. Plant clathrin heavy chain: Sequence analysis and restricted localization in growing pollen tubes. *J. Cell Sci.* 109, 777–787.
- Blackett, P.M.S., 1935. The frustration of science. In: *The Frustration of Science*. Forward by F. Soddy, George Allen & Unwin, London, pp. 129–144.
- Blackford, S., Rea, P.A., Sanders, D., 1990. Voltage sensitivity of H^+/Ca^{2+} antiport in higher plant tonoplast suggests a role in vacuolar calcium accumulation. *J. Biol. Chem.* 265, 9617–9620.
- Blackman, F.F., 1905. Optima and limiting factors. *Ann. Bot.* 19, 281–295.
- Blackman, F.F., 1906. Incipient vitality: An account of some recent work throwing light upon the chemical mechanism of the cell. *New Phytol.* 5, 22–34.
- Blackman, L.M., Harper, J.D.I., Overall, R.L., 1999. Localization of a centrin-like protein to higher plant plasmodesmata. *Eur. J. Cell Biol.* 78, 297–304.
- Blackman, L.M., Overall, R.L., 1998. Immunolocalisation of the cytoskeleton to plasmodesmata in *Chara corallina*. *Plant J.* 14, 733–741.
- Blair, G.W.S., Spanner, D.C., 1974. *An Introduction to Biorheology*. Elsevier, Amsterdam.
- Blancaflor, E.B., Fasano, J.M., Gilroy, S., 1998. Mapping the functional roles of cap cells in the response of *Arabidopsis* primary roots to gravity. *Plant Physiol.* 16, 213–222.
- Blancaflor, E.B., Masson, P.H., 2003. Plant gravitropism. Unraveling the ups and downs of a complex process. *Plant Physiol.* 133, 1677–1690.
- Blankenship, R.E., 2002. *Molecular Mechanisms of Photosynthesis*. Blackwell Science, Oxford.
- Blaschek, W., 1979. Binding of exogenous DNA by chromatin from isolated plant cell nuclei. *Plant Sci. Lett.* 15, 139–149.
- Blatt, M.R., 1983. The action spectrum for chloroplast movements and evidence for blue-light photoreceptor cycling in the alga *Vaucheria*. *Planta* 159, 267–276.
- Blatt, M.R., 1987. Toward the link between membrane transport and photoreception in plants. *Photochem. Photobiol.* 45, 933–938.
- Blatt, M.R., 1991. Ion channel gating in plants: Physiological implications and integration for stomatal function. *J. Membrane Biol.* 124, 95–112.
- Blatt, M.R., 2000. Cellular signaling and volume control in stomatal movements in plants. *Ann. Rev. Cell Dev. Biol.* 16, 221–224.
- Blatt, M.R., Briggs, W.R., 1980. Blue-light-induced cortical fiber reticulation concomitant with chloroplast aggregation in the alga *Vaucheria sessilis*. *Planta* 147, 355–362.
- Blatt, M.R., Theil, G., Trentham, D.R., 1990. Reversible activation of K^+ channels of *Vicia* stomatal guard cells following photolysis of caged inositol 1,4,5-triphosphate. *Nature* 346, 766–769.
- Blatt, M.R., Weisenseel, M.H., Haupt, W., 1981. A light-dependent current associated with chloroplast aggregation in the alga *Vaucheria sessilis*. *Planta* 152, 513–526.

- Blinks, L.R., 1930. The direct current resistance of *Nitella*. *J. Gen. Physiol.* 13, 495–508.
- Blinks, L.R., 1939. The effects of current flow on bioelectric potential. III. *Nitella*. *J. Gen. Physiol.* 20, 229–265.
- Blinks, J.R., Wier, W.G., Hess, P., Predergast, F.G., 1982. Measurement of Ca^{2+} concentrations in living cells. *Prog. Biophys. Mol. Biol.* 40, 1–114.
- Blobel, G., 1980. Intracellular protein topogenesis. *Proc. Natl. Acad. Sci. USA* 77, 1496–1500.
- Blobel, G., 1985. Gene gating: A hypothesis. *Proc. Natl. Acad. Sci. USA* 82, 8527–8529.
- Blobel, G., Dobberstein, B., 1975a. Transfer of proteins across membranes. I. Presence of proteolytically processed and unprocessed nascent immunoglobulin light chains on membrane-bound ribosomes of murine myeloma. *J. Cell Biol.* 67, 835–851.
- Blobel, G., Dobberstein, B., 1975b. Transfer of proteins across membranes. II. Reconstitution of functional rough microsomes from heterologous components. *J. Cell Biol.* 67, 852–862.
- Blobel, G., Potter, V.R., 1967a. Studies on free and membrane-bound ribosomes in rat liver. I. Distribution as related to total cellular RNA. *J. Mol. Biol.* 26, 279–292.
- Blobel, G., Potter, V.R., 1967b. Studies on free and membrane-bound ribosomes in rat liver. II. Interaction of ribosomes and membranes. *J. Mol. Biol.* 26, 293–301.
- Blobel, G., Sabatini, D.D., 1970. Controlled proteolysis of nascent polypeptides in rat liver cell fractions. I. Location of the polypeptides within ribosomes. *J. Cell Biol.* 45, 130–145.
- Blobel, G., Sabatini, D.D., 1971. Ribosome-membrane interaction in eukaryotic cells. In: Manson, L.A. (Ed.), *Biomembranes*, Vol. 2. Plenum Press, New York, pp. 193–195.
- Bloch, D.P., 1986. Stages in the development of an evolutionary process. In: Cairns-Smith, A.G., Harman, H. (Eds.), *Clay Minerals and the Origin in Life*. Cambridge University Press, London, pp. 153–158.
- Bloch, D.P., 1988. Cybernetic origins of replication. *Origin of Life* 18, 87–96.
- Bloch, D.P., Godman, G.C., 1955. A microphotometric study of the syntheses of desoxyribonucleic acid and nuclear histone. *J. Biophys. Biochem. Cytol.* 1, 17–28.
- Bloch, D.P., McArthur, B., Mirrop, S., 1985. tRNA-rRNA sequence homologies: Evidence for an ancient modular format shared by tRNAs and rRNAs. *BioSystems* 17, 209–225.
- Bloch, D.P., McArthur, B., Widdowson, R.B., Spector, D., Guimaraes, R.C., Smith, J., 1983. tRNA-rRNA sequence homologies: Evidence for a common evolutionary origin? *J. Mol. Evol.* 19, 420–428.
- Bloch, D.P., Staves, M.P., 1986. Phylogenetic pedigrees marking events lying between the first Darwinian ancestors and the last common ancestor. *Origin of Life* 16, 309–310.
- Block, S.M., 1992. Biophysical Principles of Sensory Transduction. In: Corey, D.P., Roper, S.D. (Eds.), *Sensory Transduction*. The Rockefeller Press, New York, pp. 1–17.
- Block, S.M., Goldstein, L.S.B., Schnapp, B.J., 1990. Bead movement by single kinesin molecules studied with optical tweezers. *Nature* 348, 348–352.
- Blom, T.J.M., Sierra, M., van Vliet, T.B., Franke-van Dijk, M.E., De Koning, P., van Iren, F., Verpoorte, R., Libbenga, K.R., 1991. Uptake and accumulation of ajmalicine into isolated vacuoles of cultured cells of *Catharanthus roseus* (L.) G. Don. and its conversion into serpentine. *Planta* 183, 170–177.
- Bloom, K., Green, M., 1992. Nucleus and gene expression. Editorial Overview. *Curr. Opin. Cell Biol.* 4, 377–378.
- Blow, J.J., Nurse, P., 1990. A cdc2-like protein is involved in the initiation of DNA replication in *Xenopus* egg extracts. *Cell* 62, 855–862.
- Blum, H.F., 1962. *Time's Arrow and Evolution*. Harper & Brothers, New York.
- Blumwald, E., Cragoe, E.J., Poole, R.J., 1987. Inhibition of Na^+/H^+ antiport activity in sugar bean tonoplast by analogs of amiloride. *Plant Physiol.* 85, 30–33.
- Blumwald, E., Gelli, A., 1999. Secondary inorganic ion transport at the tonoplast. *Adv. Bot. Res.* 25, 401–417.
- Blumwald, E., Poole, R.J., 1985. Na^+/H^+ antiport in isolated tonoplast vesicles from storage tissues of *Beta vulgaris*. *L. Plant Physiol.* 78, 163–167.
- Blumwald, E., Poole, R.J., 1986. Kinetics of $\text{Ca}^{2+}/\text{H}^+$ antiport in isolated tonoplast vesicles from storage tissue of *Beta vulgaris*. *L. Plant Physiol.* 87, 727–731.
- Boardman, N.K., Anderson, J.M., 1964. Studies on the greening of dark-grown bean. Formation of chloroplasts from proplastids. *Aust. J. Biol. Sci.* 17, 86–92.
- Bock, G., Haupt, W., 1961. Die Chloroplastendrehung bei *Mougeotia*. III. Die Frage der Lokalisierung des Hellrot-Dunkelrot-Pigmentsystems in der Zelle. *Planta* 57, 518–530.
- Bode, J., Schlake, T., Rios-Ramírez, M., Mielke, C., Stengert, M., Kay, V., Klehr-Wirth, D., 1995. Scaffold/matrix-attached regions: Structural properties creating transcriptionally active loci. *Int. Rev. Cytol.* 162A, 389–454.
- Boevink, P., Cruz, S.S., Hawes, C., Harris, N., Oparka, K.J., 1996. Virus-mediated delivery of the green fluorescent protein to the endoplasmic reticulum of plant cells. *Plant J.* 10, 1179–1201.
- Boevink, P., Oparka, K., Santa Cruz, S., Martin, B., Betteridge, A., Hawes, C.R., 1998. Stacks on tracks: The plant Golgi apparatus traffics on an actin/ER network. *Plant J.* 15, 441–447.
- Boevink, P., Martin, B., Oparka, K., Santa Cruz, S., Hawes, C.R., 1999. Transport of virally expressed green fluorescent protein through the secretory pathway in tobacco leaves is inhibited by cold shock and brefeldin A. *Planta* 208, 392–400.
- Böhler, C., Hill Jr., A.R., Orgel, L.E., 1996. Catalysis of the oligomerization of o-phospho-serine, aspartic acid, or glutamic acid by cationic micelles. *Orig. Life*, 26, 1–5.
- Bohm, D., 1961. *Causality and Chance in Modern Physics*. Harper Torchbooks, New York.
- Bohn, M., Heinz, E., Luthje, S., 2001. Lipid composition and fluidity of plasma membranes isolated from corn (*Zea mays* L.) roots. *Arch. Biochem. Biophys.* 387, 35–40.
- Bohr, N., 1933. Light and life. *Nature* 131, 421–423, 457–459.
- Bohr, N., 1950. On the notions of causality and complementarity. *Science* 111, 51–54.
- Bohr, N., 1963. *Essays 1958–1962 on Atomic Physics and Human Knowledge*. Richard Clay and Co., Bungay, Suffolk.
- Bold, H.C., 1942. The cultivation of algae. *Bot. Rev.* 8, 69–138.
- Bold, H.C., Wynne, M.J., 1976. *Introduction to the Algae. Structure and Reproduction*. Prentice-Hall, Inc., Engelwood Cliffs, NJ.
- Boller, T., Wiemken, A., 1986. Dynamics of vacuolar compartmentation. *Ann. Rev. Plant Physiol.* 37, 137–164.
- Boltzmann, L., 1886. The second law of thermodynamics. In: McGuinness, B. (Ed.), *Ludwig Boltzmann: Theoretical Physics and Philosophical Problems*. D. Reidel Publishing Co., Dordrecht, Holland, Selected Writings, pp. 13–32.

- Boltzmann, L., 1904. Reply to a lecture on happiness given by Professor Ostwald. In: McGuinness, M. (Ed.), *Ludwig Boltzmann: Theoretical Physics and Philosophical Problems*. D. Reidel Publishing Co., Dordrecht, Holland, pp. 173–184.
- Boltzmann, L., 1964. *Lectures on Gas Theory*. Translated by S. G. Brush. University of California Press, Berkeley.
- Bolwell, G.P., 1993. Dynamic aspects of the plant extracellular matrix. *Int. Rev. Cytol.* 146, 261–324.
- Bonaventura, C., Myers, J., 1969. Fluorescence and oxygen evolution from *Chlorella pyrenoidosa*. *Biochim. Biophys. Acta.* 189, 366–383.
- Bonder, E.M., Fishkind, D.J., Mooseker, M.S., 1983. Direct measurement of critical concentrations and assembly rate constants at the two ends of an actin filament. *Cell* 34, 491–501.
- Bondi, H., 1960. *The Universe at Large*. Doubleday & Co, Garden City, NJ.
- Bondi, H., Gold, T., Hoyle, F., 1995. Origins of steady-state theory. *Nature* 373, 10.
- Bonfanti, L., Martella Jr., A.A., Fusella, A., Baldassarre, M., Buccione, R., Geuze, H.J., Mironov, A.A., Luini, A., 1998. Procollagen traverses the Golgi stack without leaving the lumen of cisternae: evidence for cisternal maturation. *Cell* 95, 993–1003.
- Bonner, J., Millerd, A., 1953. Oxidative phosphorylation by plant mitochondria. *Arch. Biochem. Biophys.* 42, 135–148.
- Bonner, J.T., 1962. *The Ideas of Biology*. Harper & Row, New York.
- Bonnet, E., Wuyts, J., Rouze, P., Van de Peer, Y., 2004. Detection of 91 potential conserved plant microRNAs in *Arabidopsis thaliana* and *Oryza sativa* identifies important target genes. *Proc. Natl. Acad. Sci. USA* 101, 11511–11516.
- Bonnett Jr., H.T., Newcomb, E.H., 1965. Polyribosomes and cisternal accumulations in root cells of radish. *J. Cell Biol.* 27, 423–432.
- Bonneville, M.A., Voeller, B.R., 1993. A new cytoplasmic component of plant cells. *J. Cell Biol.* 18, 703–708.
- Bonsignore, C.A., Hepler, P.K., 1985. Caffeine inhibition of cytokinesis: Dynamics of cell plate formation-deformation in vivo. *Protoplasma* 129, 28–35.
- Boorstin, D.J., 1948. *The Lost World of Thomas Jefferson*. H. Holt, New York.
- Borel, E., 1913. Mécanique Statistique et Irréversibilité. *J. Phys.* 5th Ser. 3, 189–196.
- Borsook, H., Deasy, C.L., Haagen-Smit, A.J., Keighley, G., Lowy, P.H., 1950. Metabolism of C^{14} -labeled glycine, L-histidine, L-leucine, and L-lysine. *J. Biol. Chem.* 187, 839–848.
- Borisy, G.G., Taylor, E.W., 1967. The mechanism of action of colchicine. Binding of colchicine- 3H to cellular protein. *J. Cell Biol.* 34, 525–548.
- Borsook, H., Schott, H.F., 1931. The role of the enzyme in the succinate-enzyme-fumarate equilibrium. *J. Biol. Chem.* 92, 535–557.
- Borner, G.H.H., Sherrier, D.J., Weimar, T., Michaelson, L.V., Hawkins, N.D., MacAskill, A., Napier, J.A., Beale, M.H., Lilley, K.S., Dupree, P., 2005. Analysis of detergent-resistant membranes in *Arabidopsis*. Evidence for plasma membrane lipid rafts. *Plant Physiol.* 137, 104–116.
- Borstlap, C., Schuurmans, J.A.M., 2001. Proton-Symport of L-Valine in plasma membrane vesicles isolated from leaves of the wild-type and the Valr-2 Mutant of *Nicotiana tabacum* L. *Plant Cell Physiol.* 41, 1210–1217.
- Bose, J.C., 1906. *Plant Response as a Means of Physiological Investigation*. Longmans, Green, and Co., London.
- Bose, J.C., 1913. *Researches on Irritability in Plants*. Longmans, Green, and Co., London.
- Bose, J.C., 1926. *The Nervous Mechanism of Plants*. Longmans, Green, and Co., London.
- Bose, J.C., 1985. *Life Movements in Plants*. B. R. Publishing Co., New Delhi.
- Boss, W.F., Massel, M.O., 1985. Polyphosphoinositides are present in plant tissue culture cells. *Biochem. Biophys. Res. Commun.* 132, 1018–1023.
- Boss, W.F., Morré, D.J., Mollenhauer, H.H., 1984. Monensin-induced swelling of Golgi apparatus cisternae mediated by a proton gradient. *Eur. J. Cell Biol.* 34, 1–8.
- Botha, C.E.J., Cross, R.H.M., Liu, L., 2005. Comparative structures of specialized monocotyledonous leaf blade plasmodesmata. In: Oparka, K.J. (Ed.), *Plasmodesmata*. Blackwell Publishing, Oxford, pp. 73–89.
- Boublik, M., 1987. Structural aspects of ribosomes. *Int. Rev. Cytol.* (Suppl. 17), 357–389.
- Bouché-Pillon, S., Fleurat-Lessard, P., Serrano, R., Bonnemain, J.L., 1994. Asymmetric distribution of plasma membrane H^+ -ATPase in embryos of *Vicia faba* L. with special reference to transfer cells. *Planta* 193, 392–397.
- Boudaoud, A., 2003. Growth of walled cells: From shells to vesicles. *Phys. Rev. Lett.* 91, 0181041–0181044.
- Bourne, G.H. (Ed.), 1942, 1951, 1964. *Cytology and Cell Physiology*. first ed. (1942), Clarendon Press, Oxford; second ed. (1951), Clarendon Press, Oxford; third ed. (1964), Academic Press, New York.
- Bourne, G.H., 1962. *Division of Labor in Cells*. Academic Press, New York.
- Bourett, T.M., Howard, R.J., 1996. Brefeldin A-induced structural changes in the endomembrane system of a filamentous fungus, *Magnaporthe grisea*. *Protoplasma* 190, 151–163.
- Bourett, T.M., Czymmek, K.J., Howard, R.J., 1999. Ultrastructure of chloroplast protuberances in rice leaves preserved by high-pressure freezing. *Planta* 208, 472–479.
- Bouvier, F., Camera, B., 2007. The role of plastids in ripening fruits. In: Wise, R.R., Hoober, J.K. (Eds.), *The Structure and Function of Plastids*. Springer, Dordrecht, pp. 419–432.
- Bovarnick, M., 1955. Rickettsiae. In: *Scientific American* (Eds.), *The Physics and Chemistry of Life*. Simon and Schuster, New York, pp. 143–149.
- Boveri, T., 1888. Die Befruchtung und Teilung des Eies von *Ascaris megalocephala*. In: *Zellen Studien* H.2. G. Fisher, Jena, pp. 1–189.
- Boveri, T., 1929. *The Origin of Malignant Tumors*. Williams & Wilkins, Baltimore.
- Bowen, R.H., 1926. The Golgi-apparatus—Its structure and functional significance. *Anat. Rec.* 32, 151–193.
- Bowen, R.H., 1927. Golgi apparatus and vacuome. *Anat. Rec.* 35, 309–335.
- Bowen, R.H., 1928. Studies on the structure of plant protoplasm. I. The osmiophilic platelets. *Zeitschrift für Zellforschung und Mikroskopische Anatomie* 6, 689–725.
- Bowen, R.H., 1929. The cytology of glandular secretion. *Q. Rev. Biol.* 4, 299–324, 484–519.
- Bower, F.O., 1883. On plasmolysis and its bearing upon the reduction between cell wall and protoplasm. *Quart. J. Microsc. Sci.* 23, 151–168.
- Bower, F.O., 1925. *Plants and Man*. MacMillan, London.

- Bowler, C., Neuhaus, G., Yamagata, H., Chua, N.-H., 1994. Cyclic GMP and calcium mediate phytochrome phototransduction. *Cell* 77, 73–81.
- Bowes, G., Ogren, W.L., 1972. Oxygen inhibition and other properties of soybean ribulose 1,5-diphosphate carboxylase. *J. Biol. Chem.* 247, 2171–2176.
- Bowes, G., Ogren, W.L., Hageman, R.H., 1971. Phosphoglycolate production catalyzed by ribulose diphosphate carboxylase. *Biochem. Biophys. Res. Commun.* 45, 716–722.
- Bowles, D.J., Marcus, S.E., Pappin, D.J.C., Findlay, J.B.C., Maycox, P.R., Burgess, J., 1986. Post-translational processing of concanavalin A precursors in jackbean cotyledons. *J. Cell Biol.* 102, 1284–1297.
- Bowling, A.J., Brown Jr., R.M., 2008. The cytoplasmic domain of the cellulose-synthesizing complex in vascular plants. *Protoplasma* 233, 115–127.
- Bowman, B.J., Uschida, W.J., Harris, T., Bowman, E.J., 1989. The vacuolar ATPase of *Neurospora crassa* contains an F₁-like structure. *J. Biol. Chem.* 264, 15606–15612.
- Boyd, C.N., Franceschi, V.R., Chuong, S.D.X., Akhani, H., Kiirats, O., Smith, M., Edwards, G.E., 2007. Flowers of *Bienertia cycloptera* and *Suaeda aralocaspica* (Chenopodiaceae) complete the life cycle performing single-cell C₄ photosynthesis. *Functional Plant Biol.* 34, 268–281. Special Issue in Memory of Vincent R. Franceschi.
- Boyer, P.D., 1997. Energy, life, and ATP. Nobel Lect. December 8.
- Boyer, J.S., Measuring the Water Status of Plants and Soils. Academic Press, San Diego.
- Boyer, J.S., Wu, G., 1978. Auxin increases the hydraulic conductivity of auxin-sensitive hypocotyl tissue. *Planta* 139, 227–237.
- Boyle, R., 1662. New Experiments Physico-Mechanical, Touching the Spring of the Air and its Effects. H. Hall, Oxford.
- Boyle, R., 1664. Experiments and Considerations Touching Colours. Henry Herringman, London.
- Boyle, R., 1665. Some Motives and Incentives to the Love of God: Pathetically Discours'd of in a Letter to a Friend, fourth ed. Henry Herringman, London.
- Boyle, W.S., 1953. Principles and Practice in Plant Cytology. Burgess Publishing Co., Minneapolis.
- Bozza, C.G., Pawlowski, W.P., 2008. The cytogenetics of homologous chromosome pairing in meiosis in plants. *Cytogenet. Genome. Res.* 120, 313–319.
- Bozzone, D., Martin, D.A., 1998. Chemotaxis in the eplasmodial slime mold, *Physarum polycephalum*: An experimental system for student exploration and investigation. *Amer. Biol. Teacher.* 60, 59–62.
- Brachet, J., 1957. Biochemical Cytology. Academic Press Inc., New York.
- Brachet, J., 1959. New observations on biochemical interactions between nucleus and cytoplasm in *Amoeba* and *Acetabularia*. *Exp. Cell Res. (Suppl. 6)*, 78–96.
- Brachet, J., 1985. Molecular Cytology. Academic Press, Orlando.
- Bradbeer, J.W., 1988. Seed Dormancy and Germination. Chapman & Hall, New York.
- Bradbury, S., 1967. The Evolution of the Microscope. Pergamon Press, Oxford.
- Brady, J.D., Fry, S.C., 1997. Formation of di-isodityrosine and loss of isodityrosine in the cell walls of tomato cell-suspension cultures treated with fungal elicitors or H₂O₂. *Plant Physiol.* 115, 87–92.
- Brady, R.A. [1937]. 1971. The Spirit and Structure of German Fascism. Citadel Press, New York.
- Bragg, L., 1922. The diffraction of X-rays by crystals. Nobel Lec. September 6.
- Bragg, W.H., Bragg, W.L., 1924. X Rays and Crystal Structure. G. Bell and Sons, London.
- Brand, E., Edsall, J.T., 1947. The chemistry of the proteins and amino acids. *Ann. Rev. Biochem.* 16, 223–272.
- Brandizzi, F., Fricker, M., Hawes, C., 2002a. A greener world: the revolution in plant bioimaging. *Nat. Rev. Mol. Cell Biol.* 3, 520–530.
- Brandizzi, F., Snapp, E.L., Roberts, A.G., Lippincott-Schwartz, J., Hawes, C., 2002b. Membrane protein transport between the endoplasmic reticulum and the Golgi in tobacco leaves is energy dependent but cytoskeleton independent: Evidence from selective photobleaching. *Plant Cell* 14, 1293–1309.
- Brandizzi, F., Frangne, N., Marc-Martin, S., Hawes, C., Neuhaus, J.-M., Paris, N., 2002c. The destination for single-pass membrane proteins is influenced markedly by the length of the hydrophobic domain. *Plant Cell* 14, 1–17.
- Branton, D., 1966. Fracture faces of frozen membranes. *Proc. Natl. Acad. Sci. USA* 55, 1048–1056.
- Braun, H.-P., Schmitz, U.K., 2006. Strategies for the investigation of protein–protein interactions in plants. *Annu. Plant Rev.* 28, 55–70.
- Braun, M., Sievers, A., 1993. Centrifugation causes adaptation of microfilaments. Studies on the transport of statoliths in gravity sensing *Chara* rhizoids. *Protoplasma* 174, 50–61.
- Bräutigam, A., Hoffmann-Benning, S., Weber, A.P.M., 2008. Comparative proteomics of chloroplast envelopes from C₃ and C₄ plants reveals specific adaptations of the plastid envelope to C₄ photosynthesis and candidate proteins required for maintaining C₄ metabolite fluxes. *Plant Physiol.* 148, 568–579.
- Brawley, S.H., Robinson, K.R., 1985. Cytochalasin treatment disrupts the endogenous currents associated with cell polarization in fucoid zygotes: Studies on the role of F-actin in embryogenesis. *J. Cell Biol.* 100, 1173–1184.
- Bray, D., 1992. Cell Movements. Garland Publishing Inc., New York.
- Breidenbach, R.W., Beevers, H., 1967. Association of the glyoxylate cycle enzymes in a novel subcellular particle from castor bean endosperm. *Biochem. Biophys. Res. Commun.* 27, 462–469.
- Brenner, D.M., Carroll, G.C., 1968. Fine-structural correlate of growth in hyphae of *Ascodesmis sphaerospora*. *J. Bact.* 95, 658–671.
- Brenner, S., 1957. On the impossibility of all overlapping triplet codes in information transfer from nucleic acid to proteins. *Proc. Natl. Acad. Sci. USA* 43, 687–694.
- Brenner, S., 1999. Theoretical biology in the third millennium. *Phil. Trans. Roy. Soc.* 354B, 1963–1965.
- Brenner, S., 2003. From genes to organisms. In: *Genes and Genomes: Impacts on Medicine and Society*. Genes, Genomes, and Evolution. Conference at Columbia University, October 16, 2003.
- Brenner, S., Jacob, F., Meselson, M., 1961. An unstable intermediate carrying information from genes to ribosomes for protein synthesis. *Nature* 190, 576–581.
- Brennicke, A., Kück, U. (Eds.), 1993. Plant Mitochondria. VCH, Weinheim.

- Bresler, V., Montgomery, W.L., Fishelson, L., Pollak, P.E., 1998. Gigantism in a bacterium, *Epulopiscium fishelsoni*, correlates with complex patterns in arrangement, quantity, and segregation of DNA. *J. Bacteriology* 180, 5601–5611.
- Bretscher, M.S., 1971. A major protein which spans the human erythrocyte membrane. *J. Mol. Biol.* 59, 351–357.
- Bretscher, M.S., Raff, M.C., 1975. Mammalian plasma membranes. *Nature* 258, 43–49.
- Bretscher, M.S., Munro, S., 1993. Cholesterol and the Golgi apparatus. *Science* 261, 1280–1281.
- Bret-Harte, M.S., 1993. Total epidermal cell walls of pea stems respond differently to auxin than does the outer epidermal wall alone. *Planta* 190, 368–379.
- Bret-Harte, M.S., Talbott, L.D., 1993. Changes in composition of the outer epidermal wall of pea stems during auxin-induced growth. *Planta* 190, 369–378.
- Breusch, F.L., 1939. The fate of oxaloacetic acid in different organs. *Biochem. J.* 33, 1757–1770.
- Breviario, D., 2008. Plant tubulin genes: Regulatory and evolutionary aspects. *Plant Cell Monogr.* 11, 207–232.
- Brewster, D., 1854. *More Worlds Than One*. Robert Carter & Bros, New York.
- Breyne, P., van Montagu, M., Depicker, A., Gheysen, G., 1992. Characterization of plant scaffold attachment region in a DNA fragment that normalizes transgene expression in tobacco. *Plant Cell* 4, 463–471.
- Brice, A.T., Jones, R.P., Smyth, J.D., 1946. Golgi apparatus by phase contrast microscopy. *Nature* 157, 553–554.
- Briggs, G.E., Haldane, J.B.S., 1925. A note on the kinetics of enzyme action. *Biochem. J.* 19, 338–339.
- Briggs, G.E., Petrie, A.H.K., 1931. Respiration as a factor in the ionic equilibria between plant tissues and external solutions. *Proc. Roy. Soc.* 108B, 317–326.
- Briggs, G.E., Robertson, R.N., 1957. Apparent free space. *Annu. Rev. Plant Physiol.* 8, 11–30.
- Briggs, W.R., 2005. Phototropin overview. In: Wada, M., Shimazaki, K., Iino, M. (Eds.), *Light Sensing in Plants*. Springer, Tokyo, pp. 139–146.
- Briggs, W.R., Beck, C.F., Cashmore, A.R., Christie, J.M., Hughes, J., Jarillo, J.A., Kagawa, T., Kanegae, H., Liscum, E., Nagatani, A., Okada, K., Salomon, M., Rüdiger, W., Sakai, T., Takano, M., Wada, M., Watson, J.C., 2001a. The phototropin family of photoreceptors. *Plant Cell* 13, 993–997.
- Briggs, W.R., Christie, J.M., Salomon, M., 2001. Phototropins: A new family of flavin-binding blue light receptors in plants. *Antiox. & Redox Sig.* 3, 775–788.
- Briggs, W.R., Christie, J.M., 2002. Phototropin 1 and phototropin 2: Two versatile plant blue-light receptors. *Trends Plant Sci.* 7, 204–210.
- Brinkley, B.R., 1990. Toward a structural and molecular definition of a kinetochore. *Cell Motil. Cytoskeleton* 16, 104–106.
- Brinkley, B.R., Valdivia, M.M., Tousson, A., Balczon, R.D., 1989. The kinetochore: Structure and molecular organization. In: Hyams, J.S., Brinkley, B.R. (Eds.), *Mitosis: Molecules and Mechanisms*. Academic Press, London, pp. 77–118.
- Briskin, D.P., Basu, S., Assmann, S.M., 1995. Characterization of the red beet plasma membrane H⁺-ATPase reconstituted in a planar bilayer system. *Plant Physiol.* 108, 393–398.
- Brisseau-Mirbel, C.F., 1808. *Exposition et Défence de Ma Théorie de L'organisation Végétale*. Chez Les Frères van Cleef, La Haye.
- Britten, C.J., Zhen, R.-G., Kim, E.J., Rea, P.A., 1992. Reconstitution of transport function of vacuolar H⁺-translocating inorganic pyrophosphatase. *J. Biol. Chem.* 267, 21850–21855.
- Britten, R.J., Kohne, D.E., 1968. Repeated sequences in DNA. *Science* 161, 529–540.
- Brock, W.H., 1985. *From Protyle to Proton*, William Prout and the Nature of Matter. 1785–1985. Adam Hilger, Bristol.
- Broda, E., 1975. *The Evolution of Bioenergetic Processes*. Pergamon Press, Oxford.
- Broda, E., 1983. Ludwig Boltzmann. Man—Physicist—Philosopher. Ox Bow Press, Woodbridge, CT.
- Broda, H., Schweiger, H.G., 1981. Long-term measurement of endogenous diurnal oscillations of electrical potential in an individual *Acetabularia* cell. *Eur. J. Cell Biol.* 26, 1–4.
- Brokaw, C.J., 1972. Flagellar movement: A sliding filament model. *Science* 178, 455–462.
- Brooks, C. McC., Cranefield, P.F., (Eds.), *The Historical Development of Physiological Thought*. Hafner Publishing Co., New York.
- Brosnan, J.M., Sanders, D., 1990. Inositol triphosphate-mediated Ca²⁺ release in beet microsomes is inhibited by heparin. *FEBS Lett.* 260, 70–72.
- Brower, D.L., Hepler, P.K., 1976. Microtubules and secondary wall deposition in xylem: The effects of isopropyl N-phenylcarbamate. *Protoplasma* 87, 91–111.
- Brower-Toland, B.D., Smith, C.L., Yeh, R.C., Lis, J.T., Peterson, C.L., Wang, M.D., 2002. Mechanical disruption of individual nucleosomes reveals a reversible multistage release of DNA. *Proc. Natl. Acad. Sci. USA* 99, 1960–1965.
- Brown, D.J., DuPont, F.M., 1989. Lipid composition of plasma membranes and endomembranes prepared from roots of barley (*Hordeum vulgare* L.). *Plant Physiol.* 90, 955–961.
- Brown, E.H., Iqbal, M.A., Stuart, S., Hatton, K.S., Valinsky, J., Schildkraut, C.L., 1987. Rate of replication of the murine immunoglobulin heavy-chain locus: Evidence that the region is part of a single replicon. *Mol. Cell. Biol.* 7, 450–457.
- Brown, J.R., Doolittle, W.F., 1995. Root of the universal tree of life based on ancient aminoacyl-tRNA synthetase gene duplications. *Proc. Natl. Acad. Sci. USA* 92, 2441–2445.
- Brown, J.W.S., Shaw, P.J., 1998. Small nucleolar RNAs and pre-RNA processing in plants. *Plant Cell* 10, 649–657.
- Brown, R., 1828. A brief account of microscopical observations made in the months of June, July, and August, 1927, on the particles contained in the pollen of plants; and on the general existence of active molecules in organic and inorganic bodies. New Series 4, 161–173. Richard Taylor, London. 1–16. Republished by the Philosophical Magazine and Annals of Philosophy.
- Brown, R., 1829. Additional Remarks on Active Molecules. Richard Taylor, London 17–20. Republished by the Ray Society 1866. 479–486.
- Brown, R., 1831. On the organs and mode of fecundation in Orchideae and Ascladiadeae. *Trans. Linn. Soc. Lond.* 16, 685–745.
- Brown Jr., R.M., 1969. Observations on the relationship of the Golgi apparatus to wall formation in the marine chrysophycean alga, *Pleurochrysis scherffellii* Pringsheim. *J. Cell Biol.* 41, 109–123.
- Brown Jr., R.M., 1985. Cellulose microfibril assembly and orientation: Recent developments. *J. Cell Sci. (Suppl. 2)*, 13–32.

- Brown Jr., R.M., 2004. Cellulose structure and biosynthesis: What is in store for the 21st century? *J. Polym. Sci. A1* 42, 487–495.
- Brown Jr., R.M., Franke, W.W., Kleinig, H., Falk, H., Sitte, P., 1970. Scale formation in chrysophycean algae. I. Cellulosic and noncellulosic wall components made by the Golgi apparatus. *J. Cell Biol.* 45, 246–271.
- Brown Jr., R.M., Montezinos, D., 1976. Cellulose microfibrils: Visualization of biosynthetic and orienting complexes in association with the plasma membrane. *Proc. Natl. Acad. Sci. USA* 73, 143–147.
- Brown Jr., R.M., Willison, J.H.M., Richardson, C.L., 1976. Cellulose biosynthesis in *Acetobacter xylinum*: Visualization of the site of synthesis and direct measurement of the in vivo process. *Proc. Natl. Acad. Sci. USA*, 73, 4565–4569.
- Brown, W.J., Goodhouse, J., Farquhar, M.G., 1986. Mannose 6-phosphate receptors for lysosomal enzymes cycle between the Golgi complex and endosomes. *J. Cell Biol.* 103, 1235–1247.
- Browne, C.A., 1944. Thomas Jefferson and the scientific trends of his time. *Chronica. Bot.* 8, 361–424.
- Brüke, E.von., 1898. Pflanzenphysiologische Abhandlungen Astwald's Klassiker der Exakten Wissenschaften. Nr. 95. Wilhelm Engelmann, Leipzig.
- Brumfeld, V., Charuvi, D., Nevo, R., Chuartzman, S., Tsabari, O., Ohad, I., Shimoni, E., Reich, Z., 2008. A note on three-dimensional models of higher-plant thylakoid networks. *Plant Cell* 20, 2546–2549.
- Brummell, D.A., Camirand, A., MacLachlan, G.A., 1990. Differential distribution of xyloglucan glycosyl transferases in pea Golgi dictyosomes and secretory vesicles. *J. Cell Sci.* 96, 705–710.
- Brummond, D.O., Burris, R.H., 1953. Transfer of C^{14} by lupine mitochondria through reactions of the tricarboxylic acid cycle. *Proc. Natl. Acad. Sci.* 39, 754–759.
- Brune, A., Gonzalez, P., Goren, R., Zehavi, U., Echeverria, E., 1998. Citrate uptake into tonoplast vesicles from acid lime (*Citrus aurantifolia*) juice cells. *J. Membrane Biol.* 166, 197–203.
- Brune, A., Müller, M., Taiz, L., Gonzalez, P., Etxeberria, E., 2002. Vacuolar acidification in citrus fruit: Comparison between acid lime (*Citrus aurantifolia*) and sweet lime (*Citrus limmentoides*) juice cells. *J. Amer. Hort. Sci.* 127, 171–177.
- Brush, S.G., 1983. Statistical Physics and the Atomic Theory of Matter from Boyle and Newton to Landau and Onsager. Princeton University Press, Princeton, NJ.
- Bryant, J.A., Moore, K., Aves, S.J., 2001. Origins and complexes: The initiation of DNA replication. *J. Exp. Bot.* 52, 193–202.
- Bubunencko, M.G., Schmidt, J., Subramanian, A.R., 1994. Protein substitution in chloroplast ribosome evolution. A eukaryotic cytosolic protein has replaced its organelle homologue (L23) in spinach. *J. Mol. Biol.* 240, 28–41.
- Buchanan, J.M., 2002. Biochemistry during the life and times of Hans Krebs and Fritz Lipmann. *J. Biol. Chem.* 277, 33531–33536.
- Buchner, E., 1897. Alkoholische Gärung ohne Hefezellen. *Ber. Dtsch. Chem. Ges.* 30, 117–124.
- Buch-Pedersen, M.J., Palmgren, M.G., 2003. Mechanism of proton transport by plant plasma membrane proton ATPases. *J. Plant Res.* 116, 507–515.
- Buchner, E., 1907. Cell-free fermentation. Nobel Lect. December 11.
- Buckhout, T.J., 1984. Characterization of Ca^{2+} transport in endoplasmic reticulum membrane vesicles from *Lepidium sativum* L. roots. *Plant Physiol.* 76, 962–967.
- Buffen, M., Hanke, D.E., 1990. Polyphosphoinositidase activity in soybean membranes is Ca^{2+} -dependent and shows no requirement for cyclic-nucleotides. *Plant Science* 69, 147–155.
- Bukrinsky, J.T., Buch-Pedersen, M.J., Larsen, S., Palmgren, M.G., 2001. A putative proton binding site of plasma membrane H^{+} -ATPase identified through homology modeling. *FEBS Lett.* 494, 6–10.
- Bull, H.B., 1964. An Introduction to Physical Biochemistry. F. A. Davis Co., Philadelphia.
- Bull, H.B., 1952. The chemistry of amino acids and proteins. *Ann. Rev. Biochem.* 21, 179–208.
- Bullock, T.H., 2003. Have brain dynamics evolved? Should we look for unique dynamics in sapient species? *Neural Comput.* 15, 2013–2027.
- Bünning, E., 1953. Entwicklungs—Und Bewegungsphysiologie der Pflanzen. Springer, Berlin.
- Bünning, E., 1988. Wilhelm Pfeffer (1845–1920). *Botanica Acta* 101, 91–92.
- Bünning, E., 1989. Ahead of His Time: Wilhelm Pfeffer. Early Advances in Plant Biology. Translated by H. W. Pfeffer. Carleton University Press, Ottawa, Canada.
- Bünning, E., Tazawa, M., 1957. Über die negativ-phototaktische Reaktion von *Euglena*. *Arch. Mikrobiol.* 27, 306–310.
- Burbulis, I.A., Winkel-Shirley, B., 1999. Interactions among enzymes of the *Arabidopsis* flavanoid biosynthetic pathway. *Proc. Natl. Acad. Sci. USA* 96, 12929–12934.
- Bures, J., Petran, M., Zachar, J., 1967. Electrophysiological Methods in Biological Research. Academia Publishing House of the Czechoslovak Academy of Sciences, Prague.
- Burgert, I., Fratzl, P., 2006. Mechanics of the expanding cell wall. *Plant Cell Monogr.* 5, 191–215.
- Burgess, J., 1985. An Introduction to Plant Cell Development. Cambridge University Press, London.
- Burke, B., 1990. The nuclear envelope and nuclear transport. *Curr. Opin. Cell Biol.* 2, 514–520.
- Burridge, K., Fath, K., Kelly, T., Nuckolls, G., Turner, C., 1988. Focal adhesions: Transmembrane junctions between the extracellular matrix and the cytoskeleton. *Annu. Rev. Cell Biol.* 4, 487–525.
- Burris, R.H., Black, C.C., 1976. CO_2 Metabolism and Plant Productivity. University Park Press, Baltimore.
- Burroughs, J., 1908. Leaf and Tendril. Houghton Mifflin, Boston.
- Burt, W.J.E., Leaver, C.J., 1994. Identification of a chaperonin-10 homologue in plant mitochondria. *FEBS Lett.* 339, 139–141.
- Burton, K., 1958. Energy of adenosine triphosphate. *Nature* 181, 1594–1595.
- Burton, M., Moore, J., 1974. The mitochondrion of the flagellate, *Polytomella agilis*. *J. Ultrastruct. Res.* 48, 414–419.
- Busch, M.B., Sievers, A., 1993. Membrane traffic from the endoplasmic reticulum to the Golgi apparatus is disturbed by an inhibitor of the Ca^{2+} -ATPase in the ER. *Protoplasma* 177, 23–31.
- Bush, D., 1993. Inhibitors of proton-sucrose symport. *Arch. Biochem. Biophys.* 307, 355–360.
- Bush, D.S., 1993. Regulation of cytosolic calcium in plants. *Plant Physiol.* 103, 7–13.

- Bush, D.S., Biswas, A.K., Jones, R.L., 1989a. Gibberellic-acid-stimulated Ca^{2+} accumulation in endoplasmic reticulum of barley aleurone: Ca^{2+} transport and steady-state levels. *Planta* 178, 411–420.
- Bush, D.S., Biswas, A.K., Jones, R.L., 1993. Hormonal regulation of Ca^{2+} transport in the endomembrane system of the barley aleurone. *Planta* 189, 507–515.
- Bush, D.S., Jones, R.L., 1990. Measuring intracellular Ca^{2+} levels in plant cells using the fluorescent probes, Indo-1 and Fura-2. Progress and prospects. *Plant Physiol.* 93, 841–845.
- Bush, D.S., Sticher, L., Huystee, R.V., Wagner, D., Jones, R.L., 1989b. The calcium requirement for stability and enzymatic activity of two isoforms of barley aleurone α -amylase. *J. Biol. Chem.* 264, 19392–19398.
- Bush, D.S., Sze, H., 1986. Calcium transport in tonoplast and endoplasmic reticulum vesicles isolated from cultured carrot cells. *Plant Physiol.* 80, 549–555.
- Bush, V., 1967. *Science is Not Enough*. William Morrow & Co., New York.
- Butcher, S.H., 1891. *Some Aspects of the Greek Genius*. MacMillan, London.
- Butler, J.A.V., 1952. The nucleic acid of the chromosomes. *Endeavour* 11, 154–158.
- Bütschli, O., 1892. Untersuchungen über mikroskopische Schäume und das Protoplasma. W. Engelmann, Leipzig.
- Bütschli, O., 1894. *Investigations on Microscopic Foams and on Protoplasm*. Adam and Charles Black, London.
- Buvat, R., 1957. Formations de Golgi dans les cellules radicales d'*Allium cepa* L. *Compte Rendus des Séances* 244, 1401–1403.
- Buvat, R., 1969. *Plant Cells. An Introduction to Plant Protoplasm*. McGraw-Hill, New York.
- Buvat, R., Carasso, N., 1957. Mise en évidence de l'ergastoplasme (réticulum endoplasmique) dans les cellules méristématiques de la racine d'*Allium cepa* L. *Compte Rendus des Séances* 244, 1532–1534.
- Buvat, R., Puissant, A., 1958. Observations sur la cytodierese et l'origine des plasmodesmes. *Comptes Rendus Acad. Sci. Paris* 247, 23–236.
- Buxbaum, R.E., Dennerll, T., Weiss, S., Heidemann, S.R., 1987. F-actin and microtubule suspensions as indeterminate fluids. *Science* 235, 1511–1514.
- Bykova, N.V., Moller, I.M., 2006. Proteomics of plant mitochondria. *Annu. Plant Rev.* 28, 211–243.
- Bywater, J., 1817. *Observations on the nature of animalcules and principles of vegetable physiology*. In: *Travels in the Interior of America by John Bradbury*. Sherwood, Neely, and Jones, London.
- Bywater, J., 1824. *Physiological Fragments*. R. Hunter, London.
- Cai, G., Bartalesi, A., Del Casino, C., Moscatelli, A., Tiezzi, A., Cresti, M., 1993. The kinesin-immunoreactive homologue from *Nicotiana tabacum* pollen tube: Biochemical properties and subcellular localization. *Planta* 191, 496–506.
- Cai, G., Romagnoli, S., Cresti, M., 2001. Microtubule motor proteins and the organization of the pollen tube cytoplasm. *Sex. Plant Reprod.* 14, 27–34.
- Cai, G., Romagnoli, S., Moscatelli, A., Olvidi, E., Gambellini, G., Tezzi, A., Cresti, M., 2000. Identification and characterization of a novel microtubule-based motor associated with membranous organelles in tobacco pollen tubes. *Plant Cell* 12, 1719–1736.
- Cairns-Smith, A.G., 1982. *Genetic Takeover and the Mineral Origins of Life*. Cambridge University Press, Cambridge.
- Cairns-Smith, A.G., 1996. *Evolving the Mind: On the Nature of Matter and the Origin of Conscienceness*. Cambridge University Press, Cambridge.
- Cairns-Smith, A.G., Hartman, H., 1986. *Clay Minerals and the Origin of Life*. Cambridge University Press, Cambridge.
- Calabrese, E.J., 2002. Hormesis: Changing view of the dose-response, a personal account of the history and current status. *Mutat. Res.* 511, 181–189.
- Calabrese, E.J., 2004. Hormesis: A revolution in toxicology, risk assessment and medicine. *EMBO Rep.* 5 (Suppl. 1), S37–S40.
- Calabrese, E.J., Baldwin, L.A., 2000a. Chemical hormesis: Its historical foundations as a biological hypothesis. *Hum. Exp. Toxicol.* 19, 2–31.
- Calabrese, E.J., Baldwin, L.A., 2000b. The marginalization of hormesis. *Hum. Exp. Toxicol.* 19, 32–40.
- Caldwell, P.C., Hodgkin, A.L., Keynes, R.D., Shaw, T.I., 1960. The effects of injecting “energy-rich” phosphorous compounds on the active transport of ions in the giant axons of *Loligo*. *J. Physiol.* 152, 561–590.
- Caliebe, A., Soll, J., 1999. News in chloroplast protein import. *Plant Mol. Biol.* 39, 641–645.
- Callendar, G.S., 1938. The artificial production of carbon dioxide and its influence on climate. *Quart. J. Roy. Meteorological Soc.* 64, 223–240.
- Callendar, G.S., 1949. Can carbon dioxide influence climate? *Weather* 4, 310–314.
- Calvin, M., 1952. The path of carbon in photosynthesis. *Harvey Lect.* 46, 218–251.
- Calvin, M., 1961. The path of carbon in photosynthesis. *Nobel Lect.* December 11.
- Calvin, M., 1969. *Chemical Evolution. Molecular Evolution Towards the Origin of Living Systems on the Earth and Elsewhere*. Clarendon Press, Oxford.
- Calvin, M., 1992. *Following the Light. A Scientific Odyssey*. American Chemical Society, Washington, DC.
- Calvin, M., Bassham, J.A., 1962. *The Photosynthesis of Carbon Compounds*. W. A. Benjamin, Inc., New York.
- Calvin, M., Benson, A.A., 1948. The path of carbon in photosynthesis. *Science* 107, 476–480.
- Calvin, M., Benson, A.A., 1949. The path of carbon in photosynthesis IV. The identity and sequence of the intermediates in sucrose synthesis. *Science* 109, 140–142.
- Calvin, M., Calvin, G.J., 1964. Atom to Adam. *Am. Sci.* 52, 163–186.

-C-

- Caderas, D., Muster, M., Vogler, H., Mandel, T., Rose, J.K.C., McQueen-Mason, S., Kuhlmeier, C., 2000. Limited correlation between expansin gene expression and elongation growth rate. *Plant Physiol.* 123, 1399–1413.
- Cahoon, E.B., Lynch, D.V., 1991. Analysis of glucocerebrosides of Rye (*Secale cereale* L. cv. Puma). Leaf and plasma membrane. *Plant Physiol.* 95, 58–68.

- Cameron, A.G.W., 1979. The origin and evolution of the solar system. In: Life. Origin and Evolution. Readings From Scientific American, W. H. Freeman and Co., San Francisco, pp. 9–17.
- Camirand, A., Brummell, D., MacLachlan, G., 1987. Fucosylation of xyloglucan: Localization of the transferase in dictyosomes of pea stem cells. *Plant Physiol.* 84, 753–756.
- Camm, E.L., Green, B.R., 2004. How the chlorophyll-proteins got their names. *Photosynthesis Res.* 80, 189–196.
- Canaani, O., Barber, J., Malkin, S., 1984. Evidence for phosphorylation and dephosphorylation regulated the distribution of excitation energy between the two photosystems of photosynthesis in vivo: Photoacoustic and fluorimetric study of an intact leaf. *Proc. Natl. Acad. Sci. USA* 81, 1614–1618.
- Cande, W.Z., 1982a. Inhibition of spindle elongation in permeabilized mitotic cells by erythron-9-[3-(hydroxynonyl)] adenine. *Nature* 295, 700–701.
- Cande, W.Z., 1982b. Nucleotide requirements for anaphase chromosome movements in permeabilized mitotic cells: Anaphase B but not Anaphase A requires ATP. *Cell* 28, 15–22.
- Cande, W.Z., McDonald, K.L., 1985. In vitro reactivation of anaphase spindle elongation using isolated diatom spindles. *Nature* 316, 168–170.
- Cande, W.Z., McDonald, K.L., 1986. Physiological and ultrastructural analysis of elongating spindles reactivated in vitro. *J. Cell Biol.* 103, 593–604.
- Cande, W.Z., Wolniak, S.M., 1978. Chromosome movement in lysed mitotic cells is inhibited by vanadate. *J. Cell Biol.* 79, 573–580.
- Canguilhem, G., 1969. *La Connaissance de la Vie*, deuxième édition revue et augmentée. Churchill, Paris.
- Canman, J., Cameron, L., Maddox, P., Straight, A., Tirnauer, J., Mitchison, T., Fang, G., Kapoor, T., Salmon, E.D., 2003. Determining the position of the cell division plane. *Nature* 424, 1074–1078.
- Cannan, R.K., Levy, M., 1950. Chemistry of amino acids and proteins. *Ann. Rev. Biochem.* 19, 125–148.
- Cannon, W.B., 1932. *The Wisdom of the Body*. W. W. Norton & Sons, New York.
- Cannon, W.B., 1941. The body physiologic and the body politic. *Science* 93, 1–11.
- Canut, H., Brightman, A.O., Boudet, A.M., Morré, D.J., 1987. Determination of sidedness of plasma membrane and tonoplast vesicles isolated from plant stems. In: Leaver, C., Sze, H. (Eds.), *Plant Membranes: Structure, Function, Biogenesis*. Alan R. Liss, New York, pp. 141–159.
- Canut, H., Carrasco, A., Galaud, J.P., Cassan, C., Bouyssou, H., Vita, N., Ferrara, P., Pont-Lezica, R., 1998. High affinity RGD-binding sites at the plasma membrane of *Arabidopsis thaliana* links the cell wall. *Plant Journal* 16, 63–71.
- Cao, Y., Crawford, N.M., Schroeder, J.I., 1995. Amino terminus and the first four membrane-spanning segments of the *Arabidopsis* K⁺ channel KAT1 confer inward-rectification property of plant-animal chimeric channels. *J. Biol. Chem.* 270, 17697–17701.
- Carrier, M.F., 1991. Nucleotide hydrolysis in cytoskeletal assembly. *Curr. Opin. Cell Biol.* 3, 12–17.
- Carlisle, M.J., 1970. Nutrition and chemotaxis in the myxomycete *Physarum polycephalum*: The effect of carbohydrates on the plasmodium. *J. Gen. Microbiol.* 63, 221–226.
- Carmo-Fonseca, M., Hurt, E.C., 1991. Across the nuclear pores with the help of nucleoporins. *Chromosoma* 101, 199–205.
- Carnoy, J.B., 1884. *La Biologie Cellulaire*. Joseph Van In & Cie, Lierre.
- Caro, L.G., Palade, G.E., 1964. Protein synthesis, storage, and discharge in the pancreatic exocrine cell. *J. Cell Biol.* 20, 473–495.
- Carothers, E.E., 1936. Components of the mitotic spindle with especial reference to the chromosomal and interzonal fibers in the Acrididae. *Biol. Bull.* 71, 469–491.
- Carpita, N.C., 1982. Limiting diameter of pores and the surface structure of plant cell walls. *Science* 218, 813–814.
- Carpita, N., 2007. Cell wall-ion interactions. In: Sattelmacher, B., Horst, W.J. (Eds.), *The Apoplast of Higher Plants: Compartments of Storage, Transport and Reactions*. Springer, Dordrecht, The Netherlands, pp. 15–18.
- Carpita, N.C., Defernez, M., Findlay, K., Wells, B., Shoue, D.A., Catchpole, G., Wilson, R.H., McCann, M.C., 2001. Cell wall architecture of the elongating maize coleoptile. *Plant Physiol.* 127, 551–565.
- Carpita, N.C., McCann, M., Griffing, L.R., 1996. The plant extracellular matrix: News from the cell's frontier. *Plant Cell* 8, 1451–1463.
- Carpita, N.C., McCann, M.C., 2002. The functions of cell wall polysaccharides in composition and architecture revealed through mutations. *Plant Soil* 274, 71–80.
- Carpita, N., Tierney, M., Campbell, M., 2001. Molecular biology of the plant cell wall: Searching for the genes that define structure, architecture and wall dynamics. *Plant Mol. Biol.* 47, 1–5.
- Carpita, N., Sabulase, D., Montezinos, D., Delmer, D.P., 1979. Determination of the pore size of cell walls of living plants cells. *Science* 205, 1144–1147.
- Carrington, J.C., Ambros, V., 2003. Role of microRNAs in plant and animal development. *Science* 301, 336–338.
- Carrington, J.C., Freed, D.D., Leinicke, A.G., 1991. Bipartate signal sequence mediates nuclear translocation of the plant potyviral N1a protein. *Plant Cell* 3, 953–962.
- Carroll, F.E., 1972. A fine-structural study of conidium initiation in *Stemphylium botryosum* Wollroth. *J. Cell Sci.* 11, 33–47.
- Carroll, G., 1967. The fine structure of the ascus septum in *Ascodesmis sphaerospora* and *Saccobolus kerverni*. *Mycologia* 59, 527–532.
- Carter, C., Pan, S., Zouhar, J., Avila, E.L., Girke, T., Raikhel, N.V., 2004. The vegetative vacuole proteome of *Arabidopsis thaliana* reveals predicted and unexpected proteins. *Plant Cell* 16, 3285–3303.
- Carter, J., 1979. State of the Union. *Vital Speeches of the Day* 45, 226–229.
- Cascante, M., Sorribas, A., Canela, E.I., 1994. Enzyme-enzyme interactions and metabolite channelling: Alternative mechanisms and their evolutionary significance. *Biochem. J.* 298, 313–320.
- Cashmore, A.R., 1997. The cryptochrome family of photoreceptors. *Plant, Cell and Environ* 20, 764–767.
- Cashmore, A.R., 1998. The cryptochrome family of blue/UV-A photoreceptors. *J. Plant Res.* 111, 267–270.
- Cashmore, A.R., 2005. Cryptochrome overview. In: Wada, M., Shimazaki, M.K., Iino, M. (Eds.), *Light Sensing in Plants*. Springer, Tokyo, pp. 121–130.

- Casper, T., Pickard, B.G., 1989. Gravitropism in a starchless mutant of *Arabidopsis*. *Planta* 177, 185–197.
- Caspersson, T.O., 1950. *Cell Growth and Cell Function. A Cytochemical Study*. Norton, New York.
- Caspi, A., McClay, J., Moffitt, A.T.E., Mill, J., Martin, J., Craig, I. W., Taylor, A., Poulton, R., 2002. Role of genotype in the cycle of violence in maltreated children. *Science* 297, 851–854.
- Cassab, G.I., Varner, J.E., 1988. Cell wall proteins. *Ann. Rev. Plant Physiol. Plant Mol. Biol.* 39, 321–353.
- Cassimeris, L., Pryer, N.K., Salmon, E.D., 1988. Real-time observations of microtubule dynamic stability in living cells. *J. Cell Biol.* 107, 2223–2231.
- Castelfranco, P.A., Beale, S.I., 1983. Chlorophyll biosynthesis: Recent advances and areas of current interest. *Ann. Rev. Plant Physiol.* 34, 241–278.
- Castellani, C., 1973. Spermatozoan biology from Leeuwenhoek to Spallanzani. *J. Hist. Biol.* 6, 37–68.
- Castle, E.S., 1937. Membrane tension and orientation of structure in the plant cell wall. *J. Cell. Comp. Physiol.* 10, 113–121.
- Castle, W.E., 1916. *Genetics and Eugenics*. Harvard University Press, Cambridge, MA.
- Castle, W.E., 1919. Is the arrangement of the genes in the chromosome linear? *Proc. Natl. Acad. Sci.* 5, 25–32.
- Caswell, A.H., 1968. Potentiometric determination of interrelationships of energy conservation and ion gradients in mitochondria. *J. Biol. Chem.* 243, 5827–5836.
- Caswell, A.H., Pressman, B.C., 1968. Electromeric analysis of cytochromes in mitochondria. *Arch. Biochem. Biophys.* 125, 318–325.
- Catalá, C., Rose, J.K.C., York, W.S., Albersheim, P., Darvill, A.G., Bennett, A.B., 2001. Characterization of a tomato xyloglucan endotransglycosylase gene that is down-regulated by auxin in etiolated hypocotyls. *Plant Physiol.* 127, 1180–1192.
- Cattell, J. (Ed.), 1940. *The Cell Theory, Biological Symposia*. The Jaques Cattell Press, Lancaster, PA.
- Catterall, W.A., 1994. Molecular properties of a super family of plasma-membrane cation channels. *Curr. Opin. Cell Biol.* 6, 607–615.
- Catterall, W.A., 1995. Structure and function of voltage-gated ion channels. *Ann. Rev. Biochem.* 64, 493–531.
- Catterall, W.A., Seagar, M.J., Takahashi, M., Nunoki, K., 1989. Molecular properties of dihydropyridine-sensitive calcium channels. *Ann. NY Acad. Sci.* 560, 1–14.
- Cavalier-Smith, T., 1975. The origin of nuclei and of eukaryotic cells. *Nature* 256, 463–468.
- Cavalier-Smith, T., 1987a. Eukaryotes with no mitochondria. *Nature* 326, 332–333.
- Cavalier-Smith, T., 1987b. The simultaneous symbiotic origin of mitochondria, chloroplasts and microbodies. *Ann. N.Y. Acad. Sci.* 503, 55–71.
- Cavalier-Smith, T., 1989a. Archaeobacteria and Archezoa. *Nature* 339, 100–101.
- Cavalier-Smith, T., 1989b. Symbiotic origin of peroxisomes. *Endocytobiology IV*, 515–521.
- Cavalier-Smith, T., 1991. Archaeobae: The ancestral eukaryote? *BioSystems* 25, 25–38.
- Cech, T.R., 1985. Self-splicing RNA. Implications for evolution. *Int. Rev. Cytol.* 93, 3–22.
- Cech, T.R., 1986a. A model for the RNA-catalyzed replication of RNA. *Proc. Natl. Acad. Sci. USA* 83, 4360–4363.
- Cech, T.R., 1986b. The generality of self-splicing RNA: Relationship to nuclear mRNA splicing. *Cell* 44, 207–210.
- Cech, T.R., 1988. Biological catalysis by RNA. *Harvey Lect.* 82, 123–144.
- Certal, A.C., Almeida, R.B., Cavalho, L.M., Wong, E., Moreno, N., Michard, E., Carneiro, J., Rodríguez-Léon, J., Wu, H.-M., Cheung, A.Y., Feijó, J.A., 2008. Exclusion of a proton ATPase from the apical membrane is associated with cell polarity and tip growth in *Nicotiana tabacum* tubes. *Plant Cell* 20, 614–634.
- Cerutti, H., Osman, M., Grandoni, P., Jagendorf, A.T., 1992. A homology of *Escherichia coli* RecA protein in plastids of higher plants. *Proc. Natl. Acad. Sci. USA* 89, 8068–8072.
- Cerutti, H., Ibrahim, H.Z., Jagendorf, A.T., 1993. Treatment of pea (*Pisum sativum* L.) protoplasts with DNA-damaging agents induces a 39-kilodalton chloroplast protein immunologically related to *Escherichia coli* RecA. *Plant Physiol.* 102, 155–163.
- Cerutti, H., Jagendorf, A.T., 1993. DNA strand-transfer activity in pea (*Pisum sativum* L.) chloroplasts. *Plant Physiol.* 102, 145–153.
- Cerutti, H., Johnson, A.M., Boynton, J.E., Gillham, N.W., 1995. Inhibition of chloroplast DNA recombination and repair by dominant negative mutants of *Escherichia coli* RecA. *Mol. Cell. Biol.* 15, 3003–3011.
- Chaen, S., Oiwa, K., Shimmen, T., Iwamoto, H., Sugi, H., 1989. Simultaneous recordings of force and sliding movement between a myosin-coated glass microneedle and actin cables in vitro. *Proc. Natl. Acad. Sci. USA* 86, 1510–1514.
- Chalfie, M., 2008. Lighting up life. *Nobel Lect.* December 8.
- Chalfie, M., Tu, Y., Euskirchen, G., Ward, W.W., Prasher, D.C., 1994. Green fluorescent protein as a marker for gene expression. *Science* 263, 802–805.
- Chamberlin, T.C., Chamberlin, R.T., 1908. Early terrestrial conditions that may have favored organic synthesis. *Science* 28, 897–911.
- Chambers, R., n.d. *Vestiges of the Natural History of Creation. With a Sequel*, Harper & Brothers, New York.
- Chambers, R., 1922. A microinjection study on the permeability of the starfish egg. *J. Gen. Physiol.* 5, 189–194.
- Chan, J., Calder, G.M., Doonan, J.H., Lloyd, C.W., 2003. EB1 reveals mobile microtubule nucleation sites in *Arabidopsis*. *Nat. Cell Biol.* 5, 967–971.
- Chance, B., 1952a. The kinetics and inhibition of cytochrome components of succinic oxidase system. I. Activity determination and purity criteria. *J. Biol. Chem.* 197, 557–565.
- Chance, B., 1952b. The kinetics and inhibition of cytochrome components of succinic oxidase system. II. Steady state properties and difference spectra. *J. Biol. Chem.* 197, 567–576.
- Chance, B., Williams, G.R., 1955. Respiratory enzymes in oxidative phosphorylation. *J. Biol. Chem.* 217, 383–393. 395–407, 409–427, 429–438.
- Chandrasekhar, S., 1995. *Newton's Principia for the Common Reader*. Clarendon Press, Oxford.
- Chandrasekharan, M.K., 1998. Biological rhythms research: A personal account. *J. Biosci.* 23, 545–555.
- Chang, S., DesMarais, D., Mack, R., Miller, S.L., Strathearn, G.E., 1983. Prebiotic Organic Syntheses and the Origin of Life. In: Schopf, J.W. (Ed.), *Earth's Earliest Biosphere*. Princeton University Press, Princeton, NJ, pp. 53–92.
- Chang-Jie, J., Sonobe, S., 1993. Identification and preliminary characterization of a 65 kDa higher-plant microtubule-associated protein. *J. Cell Sci.* 105, 891–901.

- Chanson, A., McNaughton, E., Taiz, L., 1984. Evidence for a KCl-stimulated Mg^{2+} -ATPase on the Golgi of corn coleoptiles. *Plant Physiol.* 76, 498–507.
- Chanson, A., Taiz, L., 1985. Evidence for an ATP-dependent proton pump on the Golgi of corn coleoptiles. *Plant Physiol.* 78, 232–240.
- Chantrenne, H., 1958. Newer developments in relation to protein biosynthesis. *Ann. Rev. Biochem.* 27, 35–56.
- Chapman, K.D., Trelease, R.N., 1991a. Acquisition of membrane lipids by differentiating glyoxysomes: Role of lipid bodies. *J. Cell Biol.* 115, 995–1007.
- Chapman, K.D., Trelease, R.N., 1991b. Intracellular localization of phosphatidylcholine and phosphatidyl-ethanolamine synthesis in cotyledons of cotton seedlings. *Plant Physiol.* 95, 69–76.
- Chaptal, J.A., 1836. *Chymistry Applied to Agriculture*. Hilliard, Gray Co., Boston.
- Chargaff, E., 1950. Chemical specificity of nucleic acids and mechanisms of their enzymatic degradation. *Experientia* 6, 201–209.
- Chargaff, E., 1955. Isolation and composition of the deoxypentose nucleic acids and the corresponding nucleoproteins. In: Chargaff, E., Davidson, J.N. (Eds.), *The Nucleic Acids*, Vol. 1. Academic Press, New York, pp. 307–371.
- Chargaff, E., 1958. Of nucleic acids and nucleoproteins. *Harvey Lect.* 52, 57–73.
- Chargaff, E., 1968. A quick climb up Mount Olympus. *Science* 159, 1448–1449.
- Chargaff, E., 1974. Building the tower of Babbler. *Nature* 248, 776–779.
- Chargaff, E., 1975. Voices in the labyrinth: Dialogues around the study of nature. *Perspectives in Biol. and Med.* 18, 251–285 313–330.
- Chargaff, E., 1976. Triviality in science: A brief meditation on fashions. *Perspect. Biol. Med.* 19 (Spring), 324–333.
- Chargaff, E., 1978. *Heraclitian Fire: Sketches from a Life Before Nature*. Rockefeller University Press, New York.
- Chargaff, E., 1986. *Serious Questions. An ABC of Skeptical Reflections*. Birkhäuser, Boston.
- Chargaff, E., 1997. In dispraise of reductionism. *BioScience* 47, 795–797.
- Chat, J., Chalak, L., Petit, R.J., 1999. Strict paternal inheritance of chloroplast DNA and maternal inheritance of mitochondrial DNA in intraspecific crosses of kiwi fruit. *Theoret. Appl. Genet.* 99, 314–322.
- Chau, R., Bisson, M.A., Siegel, A., Elkin, G., Klim, P., Straubinger, R. M., 1994. Distribution of charasomes in *Chara*: Re-establishment and loss in darkness and correlation with banding and inorganic carbon uptake. *Aust. J. Plant Physiol.* 21, 113–123.
- Chen, H., Zou, Y., Shang, Y., Lin, H., Wang, Y., Cai, R., Tang, X., Zhou, J.-M., 2008. Firefly luciferase complementation imaging assay for protein-protein interactions in plants. *Plant Physiol.* 146, 368–376.
- Chen, J.C.W., Kamiya, N., 1975. Localization of myosin in the internodal cell of *Nitella* as suggested by differential treatment with N-ethylmaleimide. *Cell Struct. Funct.* 1, 1–9.
- Chen, J.C.W., Kamiya, N., 1981. Differential heat treatment of the *Nitella* internodal cell and its relation to cytoplasmic streaming. *Cell Struct. Funct.* 6, 201–207.
- Chen, M.-H., Liu, L.-F., Chen, Y.-R., Wu, H.-K., Yu, S.-M., 1994. Expression of α -amylases, carbohydrate metabolism, and autophagy in cultured rice cells is coordinately regulated by sugar nutrient. *Plant J.* 6, 625–636.
- Chen, M.-H., Huang, L.-F., Li, H.-M., Chen, Y.-R., Yu, S.M., 2004. Signal peptide-dependent targeting of a rice α -amylase and cargo proteins to plastids and extracellular compartments of plant cells. *Plant Physiol.* 135, 1367–1377.
- Chen, T.-H., Jaffe, L.F., 1978. Effects of membrane potential on calcium fluxes of *Pelvetia* eggs. *Planta* 140, 63–67.
- Chen, T.-H., Jaffe, L.F., 1979. Forced calcium entry and polarized growth of *Funaria* spores. *Planta* 144, 401–406.
- Chen, T.L., Wolniak, S.M., 1987. Lithium induces cell plate dispersion during cytokinesis in *Tradescantia*. *Protoplasma* 141, 56–63.
- Chen, W., Provart, N.J., Glazebrook, J., Katagiri, F., Chang, H.-U., Eulgen, T., Mauch, F., Luan, S., Zou, G., Whitham, S.A., Budworth, P.R., Tao, Y., Xie, Z., Chen, X., Lam, S., Kreps, J.A., Harper, J.F., Si-Ammour, Z., Mauch-Mani, B., Heinlein, M., Kobayashi, K., Hohn, T., Dangl, J.L., Wang, X., Zhu, T., 2002. Expression profile matrix of Arabidopsis transcription factor genes suggests their putative functions in response to environmental stresses. *Plant Cell* 14, 559–574.
- Cheng, N.-H., Pittman, J.K., Shigaki, T., Hirschi, K.D., 2002. Characterization of CAX4, an Arabidopsis H^{+} /cation antiporter. *Plant Physiol.* 128, 1245–1254.
- Chet, I., Naveh, A., Henis, Y., 1977. Chemotaxis of *Physarum polycephalum* towards carbohydrates, amino acids and nucleotides. *J. Gen. Microbiol.* 102, 145–148.
- Cheung, A.Y., 1995. Pollen-pistil interactions in compatible pollination. *Proc. Natl. Acad. Sci. USA* 92, 3077–3080.
- Cheung, A.Y., Chen, C.Y., Glaven, R.H., de Graaf, B.H., Vidali, L., Hepler, P.K., Wu, H.M., 2002. Rab2 GTPase regulates vesicle trafficking between the endoplasmic reticulum and the Golgi bodies and is important to pollen tube growth. *Plant Cell* 14, 945–962.
- Cheung, A.Y., Wang, H., Wu, H.-M., 1995. A floral transmitting tissue-specific glycoprotein attracts pollen tubes and stimulates their growth. *Cell* 82, 383–393.
- Chibnall, A.C., 1939. *Protein Metabolism in the Plant*. Yale University Press, New Haven, CT.
- Child, F.M., 1959. The characterization of the cilia of *Tetrahymena pyriformis*. *Exp. Cell Res.* 18, 258–267.
- Chisti, Y., 2007. Biodiesel from microalgae. *Biotechnol. Adv.* 25, 294–306.
- Chisti, Y., 2008. Biodiesel from microalgae beats bioethanol. *Trends Biotechnol.* 26, 126–131.
- Cho, S.-O., Wick, S.M., 1990. Distribution and function of actin in the developing stomatal complex of winter rye (*Secale cereale* cv. Puma). *Protoplasma* 157, 154–164.
- Cho, S.-O., Wick, S.M., 1991. Actin in the developing stomatal complex of winter rye: A comparison of actin antibodies and Rh-phalloidin labelling of control and CB-treated tissues. *Cell Motil. Cytoskeleton.* 19, 25–36.
- Chollet, R., Paolillo Jr., D.J., 1972. Greening in a virescent mutant of maize. *Z. Pflanzenphysiol.* 68, 30–34.
- Chollet, R., Ogren, W.L., 1975. Regulation of photorespiration in C3 and C4 species. *Bot. Rev.* 41, 137–179.
- Cholodny, N., Sankewitsch, E., 1933. Plasmolyseform und Ionenwirkung. *Protoplasma* 20, 57–72.
- Chou, M., Krause, K.-H., Campbell, K.P., Jensen, K.G., Sjolund, R.D., 1989. Antibodies against the calcium-binding protein

- calsequestrin from *Streptanthus tortuosus* Brassicaceae. *Plant Physiol.* 91, 1259–1261.
- Chrispeels, M.J., 1969. Synthesis and secretion of hydroxyproline containing macromolecules in carrots. I. Kinetic analysis. *Plant Physiol.* 44, 1187–1193.
- Chrispeels, M.J., 1970. Synthesis and secretion of hydroxyproline containing macromolecules in carrots. *Plant Physiol.* 45, 223–227.
- Chrispeels, M.J., 1983. The Golgi apparatus mediates the transport of phytohemagglutinin to the protein bodies in bean cotyledons. *Planta* 158, 140–151.
- Chrispeels, M.J., 1984. Biosynthesis, processing and transport of storage proteins and lectins in cotyledons of developing legume seeds. *Phil. Trans. R. Soc. London. B.* 304, 309–322.
- Chrispeels, M.J., 1985. The role of the Golgi apparatus in the transport and post-translational modification of vacuolar (protein body) proteins. *Oxford Surveys of Plant Molecular & Cell Biology* 2, 43–68.
- Chrispeels, M.J., 1991. Sorting of proteins in the secretory system. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 42, 21–53.
- Chrispeels, M.J., Bollini, R., 1982. Characteristics of membrane-bound lectin in developing *Phaseolus vulgaris* cotyledons. *Plant Physiol.* 70, 1425–1428.
- Chrispeels, M.J., Staehelin, L.A., 1992. Budding, fission, transport, targeting, fusion—Frontiers in Secretion Research. *Plant Cell* 4, 1008–1015.
- Chrispeels, M.J., Varner, J.E., 1967. Gibberellic acid-enhanced synthesis and release of α -amylase and ribonuclease by isolated barley aleurone layers. *Plant Physiol.* 42, 398–406.
- Christie, J.M., Briggs, W.R., 2001. Blue light sensing in higher plants. *J. Biol. Chem.* 276, 11457–11460.
- Christie, J.M., Reymond, P., Powell, G.K., Bernasconi, P., Raibekas, A.A., Liscum, E., Briggs, W.R., 1998. Arabidopsis NPH1: A flavoprotein with the properties of a photoreceptor for phototropism. *Science* 282, 1698–1701.
- Christie, J.M., Salomon, M., Nozue, K., Wada, M., Briggs, W.R., 1999. LOV (light, oxygen, or voltage) domains of the blue-light photoreceptor phototropin (nph1): Binding sites for the chromophore flavin mononucleotide. *Proc. Natl. Acad. Sci. USA* 96, 8779–8783.
- Chua, N.-H., 1973. Attachment of chloroplast polysomes to thylakoid membranes in *Chlamydomonas reinhardtii*. *Proc. Natl. Acad. Sci. USA* 70, 1554–1558.
- Chua, N.-H., Blobel, G., Siekevitz, P., Palade, G.E., 1973. Attachment of chloroplast polysomes to thylakoid membranes in *Chlamydomonas reinhardtii*. *Proc. Natl. Acad. Sci. USA* 70, 1554–1558.
- Chua, N.-H., Blobel, G., Siekevitz, P., Palade, G.E., 1976. Periodic variations in the ratio of free to thylakoid-bound chloroplast ribosomes during the cell cycle of *Chlamydomonas reinhardtii*. *J. Cell Biol.* 71, 497–514.
- Chua, N.-H., Schmidt, G.W., 1978. Post-translational transport into intact chloroplasts of a precursor to the small subunit of ribulose-1,5-bisphosphate carboxylase. *Proc. Natl. Acad. Sci.* 75, 6110–6114.
- Chua, N.-H., Schmidt, G.W., 1979. Transport of proteins into mitochondria and chloroplasts. *J. Cell Biol.* 81, 461–483.
- Chuartzman, S.G., Nevo, R., Shimon, E., Charuvi, D., Kiss, V., Ohad, I., Brumfeld, V., Reich, Z., 2008. Thylakoid membrane remodeling during state transitions in *Arabidopsis*. *Plant Cell* 20, 1029–1039.
- Chuong, S.D.X., Franceschi, V.R., Edwards, G.E., 2006. The cytoskeleton maintains organelle partitioning required for single-cell C_4 photosynthesis in chenopodiaceae species. *Plant Cell* 18, 2207–2223.
- Church, A.H., 1908. *Types of Floral Mechanism*. Oxford University Press, Oxford.
- Church, K., Lin, H.-P.P., 1985. Kinetochore microtubules and chromosome movement during, prometaphase in *Drosophila melanogaster* spermatocytes studied in life and with the electron microscope. *Chromosoma* 92, 273–282.
- Chyba, C.F., 1990a. Impact delivery and erosion of planetary oceans in the early inner solar system. *Nature* 343, 129–133.
- Chyba, C.F., 1990b. Extraterrestrial amino acids and terrestrial life. *Nature* 348, 113–114.
- Chyba, C.F., Sagan, C., 1987. Cometary organics but no evidence for bacteria. *Nature* 329, 208.
- Chyba, C.F., Sagan, C., 1988. Cometary organic matter, still a contentious issue. *Nature* 332, 592.
- Chyba, C., Sagan, C., 1992. Endogenous production, exogenous delivery and impact-shock synthesis of organic molecules: An inventory for the origins of life. *Nature* 255, 125–132.
- Chyba, C.F., Thomas, P.J., Brookshaw, L., Sagan, C., 1990. Cometary delivery of organic molecules to the early earth. *Science* 249, 366–373.
- Ciechanover, A., Gonen, H., 1990. The ubiquitin-mediated proteolytic pathway: Enzymology and mechanisms of recognition of the proteolytic substrates. *Sem. Cell Biol.* 1, 415–422.
- Cilia, M.L., Jackson, D., 2004. Plasmodesmata form and function. *Curr. Opin. Cell Biol.* 16, 500–506.
- Clark, D.J., Felsenfeld, G., 1992. A nucleosome core is transferred out of the path of a transcribing polymerase. *Cell* 71, 11–22.
- Clark, F.L.G., 1890. *Paley's Natural Theology*. E. & J. B. Young & Co., New York.
- Clark, G., Kasten, F.H., 1983. *History of Staining*, third ed. Williams & Wilkins, Baltimore.
- Clark, G.B., Thompson Jr., G., Roux, S.J., 2001. Signal transduction mechanisms in plants: an overview. *Curr. Sci.* 80, 170–177.
- Clark, W.M., 1952. *Topics in Physical Chemistry*, second ed. Williams & Wilkins Co., Baltimore.
- Clarke, F.M., Masters, C.J., 1975. On the association between glycolytic enzymes with structural proteins of skeletal muscle. *Biochim. Biophys. Acta* 381, 37–46.
- Clarkson, D.T., Hanson, J.B., 1980. The mineral nutrition of higher plants. *Annu. Rev. Plant Physiol.* 31, 239–298.
- Claude, A., 1943a. Distribution of nucleic acids in the cell and the morphological constitution of cytoplasm. In: Hoerr, N.L. (Ed.), *Frontiers in Cytochemistry*. The Jaques Cattell Press, Lancaster, PA, pp. 111–129.
- Claude, A., 1943b. The constitution of protoplasm. *Science* 97, 451–456.
- Claude, A., 1946a. Fractionation of mammalian liver cells by differential centrifugation. I. Problems, methods, and preparation of extract. *J. Exp. Med.* 84, 51–60.
- Claude, A., 1946b. Fractionation of mammalian liver cells by differential centrifugation. II. Experimental procedures and results. *J. Exp. Med.* 84, 61–89.
- Claude, A., 1948. *Studies on cells: Morphological, chemical constitution, and distribution of biochemical functions*. Harvey Lect. 43, 121–164.

- Claude, A., 1970. Growth and differentiation of cytoplasmic membranes in the course of lipoprotein granule synthesis in the hepatic cell. *J. Cell. Biol.* 47, 745–766.
- Claude, A., 1975. The coming of age of the cell. *Science* 189, 433–435.
- Clausius, R., 1859. On the mean length of the paths described by the separate molecules of gaseous bodies on the occurrence of molecular motion: Together with some other remarks upon the mechanical theory of heat. *Phil. Mag. Fourth Ser.* 17, 81–91.
- Clausius, R., 1860. On the dynamical theory of gases. *Phil. Mag. Fourth Ser.* 19, 484–486.
- Clausius, R., 1879. *The Mechanical Theory of Heat*. MacMillan, London.
- Clawson, G.A., Feldherr, C.M., Smuckler, E.A., 1985. Nucleocytoplasmic RNA transport. *Mol. Cell. Biochem.* 67, 87–100.
- Clayton, L., Lloyd, C.W., 1985. Actin organization during the cell cycle in meristematic plant cells. *Exp. Cell Res.* 156, 231–238.
- Clayton, R.K., 1980. *Photosynthesis. Physical Mechanisms and Chemical Patterns*. Cambridge University Press, Cambridge.
- Clayton, R.K., 2002. Research on photosynthetic reaction centers from 1932 to 1987. *Photosyn. Res.* 73, 63–71.
- Cleary, A.L., Brown, R.C., Lemmon, B.E., 1992. Establishment of division plane and mitosis in monoplastidic guard mother cells of *Selaginella*. *Cell Motil. Cytoskel.* 23, 89–101.
- Cleary, A.L., Hardham, A.R., 1988. Depolymerization of microtubule arrays in root tip cells by oryzalin and the recovery by modified nucleation patterns. *Can J. Bot.* 66, 2353–2366.
- Cleary, A.L., Smith, L.G., 1998. The tangled1 gene is required for spatial control of cytoskeletal arrays associated with cell division during maize leaf development. *Plant Cell* 10, 1875–1888.
- Cleaves, H.J., Miller, S.L., 2001. The nicotinamide biosynthetic pathway is a by-product of the RNA world. *J. Mol. Evol.* 52, 73–77.
- Cleaves II, H.J., Nelson, K., Miller, S.L., 2006. The prebiotic synthesis of pyrimidines in frozen solution. *Naturwissenschaften* 93, 228–231.
- Clegg, J.S., 1991. The organization of aqueous compartments in cultured animal cells. In: Tigyí, J., Kellermayer, M., Hazlewood, C.F. (Eds.), *The Physical Aspect of the Living Cell*. Akadémiai Kiadó, Budapest, pp. 129–143.
- Cleland, R.E., 1958. A separation of auxin-induced cell wall loosening into its plastic and elastic components. *Physiol. Plant* 11, 599–609.
- Cleland, R.E., 1971a. Cell wall extension. *Annu. Rev. of Plant Physiol.* 22, 197–222.
- Cleland, R.E., 1971b. The mechanical behavior of isolated *Avena* coleoptile walls subjected to constant stress. Properties and relation to cell elongation. *Plant Physiol.* 47, 805–811.
- Cleland, R.E., 1981. Wall extensibility. In: Tanner, W., Loewus, F.A. (Eds.), *Plant carbohydrates II. Extracellular carbohydrates*. *Encycl. Plant Physiol.* 13B, 255–273.
- Cleland, R.E., 2002. The role of the apoplastic pH in cell wall extension and cell enlargement. In: *Handbook of Plant Growth. pH as the Master Variable*. Marcel Dekker, New York, pp. 131–148.
- Cleland, R.E., Rayle, D.L., 1977. Reevaluation of the effect of calcium ions on auxin-induced elongation. *Plant Physiol.* 60, 709–712.
- Cleves, A., McGee, T., Bankaitis, V.A., 1991. Phospholipid transfer proteins: A biological debut. *Trends in Cell Biol.* 1, 30–34.
- Cohen, I.B., 1997. *Science and the Founding Fathers*. W. W. Norton & Co., New York.
- Cohen, J., Garreau de Loubresse, N., Beisson, J., 1984. Actin microfilaments in *Paramecium*: Localization and role in intracellular movements. *Cell Motil.* 4, 443–468.
- Cohen, M.R., Drabkin, I.E., 1958. *A Source Book in Greek Science*. Harvard University Press, Cambridge, MA.
- Cohen, S.S., 1971. Are/were mitochondria and chloroplasts microorganisms. In: Monod, J., Borek, E. (Eds.), *Of Microbes and Life*. Columbia University Press, New York, pp. 129–149.
- Cohn, E.J., 1935. The chemistry of the proteins and amino acids. *Ann. Rev. Biochem.* 4, 93–148.
- Cohn, F., 1853. On the natural history of *Protococcus pluvialis*. In: Henfrey, A. (Ed.), *Botanical and Physiological Memoirs*. Ray Society, London, pp. 515–564.
- Cohn, S.A., Tippit, D.H., Spurck, T.P., 1986. Microtubule dynamics in the spindle. II. A thermodynamic and kinetic description. *J. Theor. Biol.* 122, 277–301.
- Colasanti, J., Cho, S.-O., Wick, S., Sundaresan, V., 1993. Localization of the functional p34^{cdc2} homology of maize in root tip and stomatal complex cells: Association with predicted division sites. *Plant Cell* 5, 1101–1111.
- Cole, F.J., 1930. *Early Theories of Sexual Generation*. Clarendon Press, Oxford.
- Cole, K.S., 1968. *Membranes, ions and impulses*. University of California Press, Berkeley.
- Cole, K.S., 1979. Mostly membranes. *Annu. Rev. Physiol.* 41, 1–24.
- Cole, K.S., Curtis, H.J., 1938. Electrical impedance of *Nitella* during activity. *J. Gen. Physiol.* 22, 37–64.
- Cole, K.S., Curtis, H.J., 1939. Electrical impedance of the squid axon during activity. *J. Gen. Physiol.* 22, 649–670.
- Cole, L., Coleman, J., Evans, D., Hawes, C., 1990. Internalization of fluorescein isothiocyanate and fluorescein isothiocyanate-dextran by suspension-cultured plant cells. *J. Cell Sci.* 96, 721–730.
- Cole, L.C., 1957. Biological clock in the unicorn. *Science* 125, 874–876.
- Coleman, A.W., Maguire, M.J., 1983. Cytological detection of the basis of uniparental inheritance of plastid DNA in *Chlamydomonas moewusii*. *Curr. Genet.* 7, 211–218.
- Coleman, J.O.D., Evans, E.D., Hawes, C., Horsley, D., Cole, L., 1987. Structure and molecular organization of higher plant coated vesicles. *J. Cell Sci.* 88, 35–45.
- Coleman, J.O.D., Evans, E.D., Horsley, D., Hawes, C.R., 1991. The molecular structure of plant clathrin and coated vesicles. In: Hawes, C.R., Coleman, J.O.D., Evans, D.E. (Eds.), *Endocytosis, Exocytosis and Vesicle Traffic in Plants*. Cambridge University Press, Cambridge, pp. 41–63.
- Collander, R., 1924. Über die Durchlässigkeit der Kupferferrozyanidniederschlagsmembran für Nichteletrolyte. *Kolloidchem. Beihefte* 19, 72–105.
- Collander, R., 1925. Über die Durchlässigkeit der Kupferferrozyanidmembran für Säuren, nebst Bemerkungen zur Ultrafilterfunktion des Protoplasmas. *Kolloidchem. Beihefte* 20, 273–287.

- Collander, R., 1937. The permeability of plant protoplasts to non-electrolytes. *Trans. Faraday Soc.* 33, 985–990.
- Collander, R., 1959. Cell membranes: Their resistance to penetration and their capacity for transport. In: Stewart, F.C. (Ed.), *Plant Physiology. A treatise. Plants in relation to water and solutes*, vol. 2. Academic Press, New York, London, pp. 3–102.
- Collander, R., Bärklund, H., 1933. Permeabilitätsstudien an *Chara ceratophylla*. *Acta Botanica Fennica* 11, 1–114.
- Colletti, K.S., Tattersall, E.A., Pyke, K.A., Froelich, J.E., Stokes, K.D., Osteryoung, K.W., 2000. A homologue of the bacterial cell division site-determining factor MinD mediates placement of the chloroplast division apparatus. *Curr. Biol.* 10, 507–516.
- Collings, D.A., Gebbie, L.K., Howles, P.A., Hurley, U.A., Birch, R. J., Cork, A.H., Hocart, C.H., Arioli, T., Williamson, R.E., 2008. Arabidopsis dynamin-like protein DRP1A: A null mutant with widespread defects in endocytosis, cellulose synthesis, cytokinesis, and cell expansion. *J. Exp. Bot.* 59, 361–376.
- Collings, D.A., Zsuppan, G., Allen, N.S., Blancaflor, E.B., 2001. Demonstration of prominent actin filaments in the root columella. *Planta* 212, 392–403.
- Collings, D.A., Harper, J.D.I., Marc, J., Overall, R.L., Mullen, R. T., 2002. Life in the fast lane: Actin-based motility of plant peroxisomes. *The Can. J. Bot.* 80, 430–441.
- Collins, K., Sellers, J.R., Matsudaira, P., 1990. Calmodulin dissociation regulates brush border myosin I 110K calmodulin mechanochemical activity in vitro. *J. Cell Biol.* 120, 1137–1148.
- Coluccio, L.M., Bretscher, A., 1987. Calcium-regulated cooperative binding of the microvillar 110K-calmodulin complex to F actin. Formation of decorated filaments. *J. Cell Biol.* 105, 325–334.
- Coman, D.R., 1940. Additional observations on positive and negative chemotaxis: Experiments with a myxomycete. *Arch. Pathol.* 29, 220–228.
- Compton, A.H., 1921a. Possible magnetic polarity of free electrons. *Phil. Mag.* 16, 279–281.
- Compton, A.H., 1921b. The magnetic electron. *J. Franklin Inst.* 192, 145–155.
- Compton, A.H., 1924. A general quantum theory of the wavelength of scattered x-rays. *Phys. Rev.* 24, 168–176.
- Compton, A.H., 1931. The uncertainty principle and free will. *Science* 74, 172.
- Compton, D.A., Yen, T.J., Cleveland, D.W., 1991. Identification of novel centromere/kinetochore-associated proteins using monoclonal antibodies generated against human mitotic chromosome scaffolds. *J. Cell. Biol.* 112, 1083–1097.
- Conant, J.B., 1947. *On Understanding Science. An Historical Approach*. Yale University Press, New Haven, CT.
- Conant, J.B., 1970. *My Several Lives. Memoirs of a Social Inventor*. Harper & Row, New York.
- Conceicao, A.d.S., Marty-Mazars, D., Bassham, D.C., Sanderfoot, A.A., Marty, F., Raikhel, N.V., 1997. The syntaxin homolog AtPEP12p resides on a late post-Golgi compartment in plants. *Plant Cell* 9, 571–582.
- Condeelis, J.S., 1974. The identification of F actin in the pollen tube and protoplast of *Amaryllis belladonna*. *Exp. Cell Res.* 88, 435–439.
- Cone, K.C., 2007. Anthocyanin synthesis in maize aleurone tissue. *Plant Cell Monogr.* 8, 121–139.
- Conklin, E.G., 1923. *Heredity and Environment in the Development of Man*, fifth ed. Revised. Princeton University Press, Princeton, NJ.
- Conklin, E.G., 1940. Cell and protoplasm concepts: Historical account. In: Moulton, F.R. (Ed.), *The Cell and Protoplasm*. The Science Press, Washington, DC, pp. 6–19.
- Conklin, P.L., Wilson, R.K., Hanson, M.R., 1991. Multiple trans-splicing events are required to produce a mature nad1 transcript in a plant mitochondrion. *Genes and Development* 5, 1407–1415.
- Conley, C.A., Hanson, M.R., 1994. Tissue-specific protein expression in plant mitochondria. *Plant Cell* 6, 85–91.
- Connolly, J.H., Berlyn, G., 1996. The plant extracellular matrix. *Can. J. Bot.* 74, 1545–1546.
- Conrad, P.A., Binari, L.L.W., Racusen, R.H., 1982. Rapidly-secreting, cultured oat cells serve as a model system for the study of cellular exocytosis. Characterization of cells and isolated secretory vesicles. *Protoplasma* 112, 196–204.
- Conrad, P.A., Steucek, G.L., Hepler, P.K., 1986. Bud formation in *Funaria*: Organelle redistribution following cytokinin treatment. *Protoplasma* 131, 211–223.
- Consden, R., Gordon, A.H., Martin, A.J.P., 1944. Qualitative analysis of proteins: A partition chromatographic method using paper. *Biochem. J.* 38, 224–232.
- Conway, E.J., 1953. A redox pump for the biological performance of osmotic work, and its relation to the kinetics of free ion diffusion across membranes. *Int. Rev. Cytol.* 2, 419–445.
- Cook, P.R., 1990. How mobile are active RNA polymerases? *J. Cell Sci.* 96, 189–192.
- Cooke, C.A., Bernat, R.L., Earnshaw, W.C., 1990. CENP-B: A major human centromere protein located beneath the kinetochore. *J. Cell Biol.* 110, 1475–1488.
- Cooke, C.A., Heck, M.M.S., Earnshaw, W.C., 1987. The inner centromere protein (INCENP) antigens: Movement from inner centromere to midbody during mitosis. *J. Cell Biol.* 105, 203–2067.
- Cooke, M.E., Graham, L.E., 1999. Evolution of plasmodesmata. In: van Bel, A.J.E., van Kesteren, W.J.P. (Eds.), *Plasmodesmata. Structure, Function, Role in Cell Communication*. Springer, Berlin, pp. 101–117.
- Cooke, M.E., Graham, L.E., Botha, C.E.J., Lavin, C.A., 1997. Comparative ultrastructure of plasmodesmata of *Chara* and selected bryophytes: Toward an elucidation of the evolutionary origin of plant plasmodesmata. *Amer. J. Bot.* 84, 1169–1178.
- Cooke, T.J., Paolillo, D.J., 1980. The control of the orientation of cell divisions in fern gametophytes. *Amer. J. Bot.* 67, 1320–1333.
- Cooke, T.J., Racusen, R.H., 1982. Cell expansion in the filamentous gametophyte of the fern *Onoclea sensibilis* L. *Planta* 155, 449–458.
- Cooper, J.A., 1987. Effects of cytochalasins and phalloidin on actin. *J. Cell Biol.* 105, 1473–1478.
- Cooper, M.S., Keller, R.E., 1984. Perpendicular orientation and directional migration of amphibian neural crest cells in DC fields. *Proc. Natl. Acad. Sci.* 81, 160–164.
- Cooper, M.S., Schliwa, M., 1985. Electrical and ionic control of tissue cell locomotion in DC electric fields. *J. Neurosci. Res.* 13, 223–244.
- Cooper, T.G., Beevers, H., 1969. β -oxidation in glyoxysomes from castor bean endosperm. *J. Biol. Chem.* 244, 3514–3520.

- Cori, C.F., 1942. Phosphorylation of carbohydrates. In: A Symposium on Respiratory Enzymes. The University of Wisconsin Press, Madison, pp. 175–189.
- Cori, C.F., 1946. Enzymatic reactions in carbohydrate metabolism. Harvey Lectures 41, 253–272.
- Corliss, J.O., 1980. Objection to “undulipodium” as an inappropriate and unnecessary term. *BioSystems* 12, 109–110.
- Cornejo, M.J., Platt-Aloia, K.A., Thomson, W.W., Jones, R.L., 1988. Effects of GA₃ and Ca²⁺ on barley aleurone protoplasts: A freeze-fracture study. *Protoplasma* 146, 157–165.
- Cornman, I., 1944. A summary of evidence in favor of the traction fiber in mitosis. *Amer. Nat.* 78, 410–422.
- Corpas, F.J., Sandalio, L.M., Brown, M.J., del Río, L.A., Trelease, R.N., 2000. Identification of porin-like polypeptide(s) in the boundary membrane of oilseed glyoxysomes. *Plant Cell Physiol.* 41, 1218–1228.
- Correa Jr., A., Staples, R.C., Hoch, H.C., 1996. Inhibition of thigmostimulated cell differentiation with RGD-peptides in *Uromyces* germlings. *Protoplasma* 194, 91–102.
- Correns, C., 1909. Vererbungsversuche mit blas (gleb) grünen und bunt blattigen sippen bei *Mirabilis*, *Urtica* und *Lunaria*. *Z. Vererbungs.* 1, 291–329.
- Corriveau, J.L., Coleman, A.W., 1988. Rapid screening method to detect potential biparental inheritance of plastid DNA and results for over 200 angiosperm species. *Amer. J. Bot.* 75, 1443–1458.
- Corthesy-Theulaz, I., Pauloin, A., Pfeffer, S.R., 1992. Cytoplasmic dynein participates in the centrosomal localization of the Golgi complex. *J. Cell Biol.* 118, 1333–1345.
- Corti, B., 1774. Osservazioni Microscopiche Sulla Tramella e Sulla Circolazione del Fluido in una Pianta Aquajuola. Lucca
- Coryell, C.D., 1940. The proposed terms “exergonic” and “endergonic” for thermodynamics. *Science* 92, 380.
- Cosgrove, D.J., 1986. Biophysical control of plant growth. *Ann. Rev. Plant Physiol.* 37, 377–405.
- Cosgrove, D.J., 1987. Wall relaxation and the driving forces for cell expansive growth. *Plant Physiol.* 84, 561–564.
- Cosgrove, D.J., 1993a. How do plant cell walls extend? *Plant Physiol.* 102, 1–6.
- Cosgrove, D.J., 1993b. Wall extensibility: Its nature measurement and relationship to plant cell growth. *New Phytol.* 124, 1–23.
- Cosgrove, D.J., 1993c. Water uptake by growing cells: An assessment of the controlling roles of wall relaxation, solute uptake, and hydraulic conductance. *Int. J. Plant Sci.* 154, 10–21.
- Cosgrove, D.J., 1997. Cellular mechanisms underlying growth asymmetry during stem gravitropism. *Planta* 203, S130–S135.
- Cosgrove, D.J., 1999. Enzymes and other agents that enhance cell wall extensibility. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 50, 391–417.
- Cosgrove, D.J., Bedinger, P.A., Durachko, D.M., 1997. Group I allergens of grass pollen as cell wall loosening agents. *Proc. Natl. Acad. Sci. USA* 94, 6559–6564.
- Cosgrove, D.J., Gilroy, S., Kao, T.-H., Ma, H., Schultz, J.C., 2000. Plant signaling 2000. Cross talk among geneticists, physiologists, and ecologists. *Plant Physiol.* 124, 499–506.
- Cosgrove, D.J., Hedrich, R., 1991. Stretch activated chloride, potassium and calcium channels coexisting in plasma membranes of guard cells of *Vicia faba*. *L. Planta* 186, 143–153.
- Cosgrove, D.J., Li, L.C., Cho, H.-T., Hoffmann-Benning, S., Moore, R.C., Blecker, D., 2002. The growing world of expansins. *Plant Cell Physiol.* 43, 1436–1444.
- Costa, M., Hilliou, F., Duarte, P., Pereira, L., Almeida, I., Leech, M., Memelink, J., Bartceló, A., Sottomayor, M., 2008. Molecular cloning and characterization of a vacuolar class III peroxidase involved in the metabolism of anticancer alkaloids in *Catharanthus roseus*. *Plant Physiol.* 146, 403–417.
- Coté, G.G., Crain, R.C., 1993. Biochemistry of phosphoinositides. *Ann. Rev. Plant Physiol. Plant Mol. Biol.* 44, 333–356.
- Coté, G.G., Morse, M.J., Crain, R.C., Satter, R.L., 1987. Isolation of soluble metabolites of the phosphatidylinositol cycle from *Samanea saman*. *Plant Cell Rep.* 6, 352–355.
- Coue, M., Lombillo, V.A., McIntosh, J.R., 1991. Microtubule depolymerization promotes particle and chromosome movement in vitro. *J. Cell Biol.* 112, 1165–1175.
- Coughlan, S.J., Hastings, C., Winfrey Jr., R.J., 1996. Molecular characterization of plant endoplasmic reticulum. Identification of protein disulfide-isomerase as the major reticuloplasm. *Eur. J. Biochem.* 235, 215–224.
- Coughlin, S.R., 1994. Expanding horizons for receptors coupled to G-proteins: Diversity and disease. *Current Opinion in Cell Biology* 6, 191–197.
- Covello, P.S., Gray, M.W., 1992. Silent mitochondria and active nuclear genes for subunit 2 of cytochrome c oxidase (cox 2) in soybean: Evidence for RNA-mediated gene transfer. *EMBO J.* 11, 3815–3820.
- Cowan, C.R., Carlton, P.M., Cande, W.Z., 2001. The polar arrangement of telomeres in interphase and meiosis. Rab1 organization and the bouquet. *Plant Physiol.* 125, 532–538.
- Cowdry, E.V., 1924. Cytological constituents—mitochondria, Golgi apparatus, and chromidial substance. In: Cowdry, E. V. (Ed.), *General Cytology*. University of Chicago Press, Chicago, pp. 313–382.
- Cox, R.P. (Ed.), 1974. *Cell Communication*. John Wiley & Sons, New York.
- Craig, S., Goodchild, D.J., 1984. Golgi-mediated vicilin accumulation in pea cotyledon cells is redirected by monensin and nigericin. *Protoplasma* 122, 91–97.
- Crain, R.C., Zilversmit, D.B., 1980. Two nonspecific exchange proteins from beef liver. *Biochemistry* 19, 1440–1447.
- Cram, W.J., 1980. Pinocytosis in plants. *New Phytol.* 84, 1–17.
- Cramer, L.P., Mitchison, T.J., Theriot, J.A., 1994. Actin-dependent motile forces and cell motility. *Current Opinion in Cell Biology* 6, 82–86.
- Cramer, W.A., Knaff, D.B., 1991. *Energy Transduction in Biological Membranes. A Textbook of Bioenergetics*. Springer-Verlag, New York.
- Crawford, K.M., Zambryski, P.C., 2000. Subcellular localization determined the availability of non-targeted proteins to plasmodesmal transport. *Curr. Biol.* 10, 1032–1040.
- Creed, R.S., Denny-Brown, D., Eccles, J.C., Liddell, E.G.T., Sherrington, C.S., 1932. *Reflex Activity of the Spinal Cord*. Clarendon Press, Oxford.
- Creelman, R.A., Mullet, J.E., 1991. Abscissic acid accumulates at positive turgor potential in excised soybean seedling growing zones. *Plant Physiol.* 95, 1209–1213.
- Creighton, H.B., McClintock, B., 1931. A correlation of cytological and genetical crossing-over in *Zea mays*. *Proc. Natl. Acad. Sci. USA* 17, 492–497.
- Crick, F.H.C., 1950. The physical properties of cytoplasm. A study by means of the magnetic particle method. Part II. Theoretical treatment. *Exp. Cell Res.* 1, 505–533.

- Crick, F.H.C., 1954. The structure of the hereditary material. *Sci. Amer.* 191, 54–61.
- Crick, F.H.C., 1955. The structure of the hereditary material. In: *Scientific American* (Eds.), In: *The Physics and Chemistry of Life*, Simon and Schuster, New York, pp. 118–142.
- Crick, F.H.C., 1958. On protein synthesis. *Soc. Exp. Biol.* 12, 138–163.
- Crick, F.H.C., 1962. On the genetic code. *Nobel Lect.* December 11.
- Crick, F.H.C., 1968. The origin of the genetic code. *J. Mol. Biol.* 38, 367–379.
- Crick, F., 1974a. Central dogma of molecular biology. *Nature* 227, 561–563.
- Crick, F., 1974b. The double helix: A personal view. *Nature* 248, 766–769.
- Crick, F., 1981. *Life Itself*. Simon and Schuster, New York.
- Crick, F., 1988. *What Mad Pursuit. A Personal View of Scientific Discovery*. Basic Books, New York.
- Crick, F., 1994. *The Astonishing Hypothesis*. Charles Scribner's Sons, New York.
- Crick, F.H.C., 1995. DNA: A cooperative discovery. *Ann. NY Acad. Sci.* 758, 198–199.
- Crick, F.H.C., Barnett, L., Brenner, S., Watts-Tobin, R.J., 1961. General nature of the genetic code for proteins. *Nature* 192, 1227–1232.
- Crick, F.H.C., Griffith, J.S., Orgel, L.E., 1957. Codes without commas. *Proc. Natl. Acad. Sci. USA* 43, 416–421.
- Crick, F.H.C., Hughes, A.F.W., 1950. The physical properties of the cytoplasm. A study by means of the magnetic particle method. *Exp. Cell Res.* 1, 37–80.
- Croft, J.A., Bridger, J.M., Boyle, S., Perry, P., Teague, P., Bickmore, W.A., 1999. Differences in the localization and morphology of chromosomes in the human nucleus. *J. Cell. Biol.* 145, 1119–1131.
- Cross, C.F., J.A., Bevan, E.J., 1895. *Cellulose. An Outline of the Chemistry of the Structural Elements of Plants with Reference to their Natural History and Industrial Uses*. Longmans, Green, and Co., London.
- Crosthwaite, S.C., MacDonald, F.M., Baydoun, E.A.-H., Brett, C. T., 1994. Properties of a protein-linked glucuronoxylan formed in the plant Golgi apparatus. *J. Exp. Bot.* 45, 471–475.
- Crowley, K.S., Reinhard, G.D., Johnson, A.E., 1993. The signal sequence moves through a ribosomal tunnel into a noncytoplasmic aqueous environment at the ER membrane early in translocation. *Cell* 73, 1101–1115.
- Crowley, K.S., Liao, S., Worrell, V.E., Reinhard, G.D., Johnson, A.E., 1994. Secretory proteins move through the endoplasmic reticulum membrane via an aqueous pore. *Cell* 78, 461–471.
- CruzCastillo, M., Martínez, C., Buchala, A., Métraux, J.-P., León, J., 2004. Gene-specific involvement of β -oxidation in wound-activated responses in *Arabidopsis*. *Plant Physiol.* 135, 85–94.
- Cullis, C.A., 1977. Molecular aspect soft h eenvironmental induction of heritable changes in flax. *Heredity* 38, 129–154.
- Cullis, C.A., 1981. Environmental induction of heritable changes in flax: Defined environments inducing changes in rDNA and peroxidase isozyme band pattern. *Heredity* 47, 87–94.
- Cullis, C.A., 1990. DNA rearrangements in response to environmental stress. *Adv. Genet.* 28, 73–97.
- Cutler, D.F., Alvin, K.L., Price, C.E. (Eds.), 1982. *The Plant Cuticle*. Academic Press, New York.
- Cutler, S.R., Ehrhardt, D.W., Griffiths, J.S., Somerville, C.R., 2000. Random GFP: cDNA fusions enable visualization of subcellular structures in cells of *Arabidopsis* at a high frequency. *Proc. Natl. Acad. Sci. USA* 97, 3718–3723.
- Cyr, R.J., 1991a. Calcium/calmodulin affects microtubule stability in lysed protoplasts. *J. Cell Sci.* 100, 311–317.
- Cyr, R.J., 1991b. Microtubule-associated proteins in higher plants. In: Lloyd, C. (Ed.), *The Cytoskeletal Basis of Plant Growth and Form*. Academic Press, London, pp. 57–67.
- Cyr, R.J., Palevitz, B.A., 1989. Microtubule-binding proteins from carrot. I. Initial characterization and microtubule bundling. *Planta* 177, 245–260.
- Czapek, F., 1911. *Chemical Phenomena in Life*. Harper & Brothers, London.

-D-

- Dainty, J., 1962. Ion transport and electrical potentials in plant cells. *Annu. Rev. Plant Physiol.* 13, 379–402.
- Dainty, J., 1968. The structure and possible function of the vacuole. In: Pridheim, J.B. (Ed.), *Plant Cell Organelles*. Academic Press, London, pp. 40–46.
- Dainty, J., 1990. Prefatory chapter. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 41, 1–20.
- Dale, H., 1936. Some recent extensions of the chemical transmission of the effects of nerve impulses. *Nobel Lect.* December 12.
- Dalrymple, G.B., 1991. *The Age of the Earth*. Stanford University Press, Stanford, CA.
- Dalton, A.J., 1961. Golgi apparatus and secretion granules. In: Brachet, J., Mirsky, A.E. (Eds.), *The Cell. Biochemistry. Physiology, Morphology. Cells and their Component Parts*, vol. 2. Academic Press, New York, pp. 603–619.
- Dalton, A.J., Felix, M.D., 1956. A comparative study of the Golgi complex. *J. Biophys. Biochem. Cytol.* 2 (Suppl.), 79–84.
- Dangeard, P.A., 1919. Sur la distinction du chondriome des auteurs en vacuome, plastidome et sphérome. *C. R. Acad. Sci.* 169, 1005–1010.
- Daniell, H., Carmona-Sanchez, O., Burns, B.B., 2004. Chloroplast-derived vaccine antibodies, biopharmaceuticals, and edible vaccines in transgenic plants engineered via the chloroplast genome. In: Schillberg, S. (Ed.), *Molecular Farming*. Wiley-VCH Verlag, Berlin, pp. 113–133.
- Daniell, H., Chebolu, S., Kumar, S., Singleton, M., Falconer, R., 2005. Chloroplast-derived vaccine antigens and other therapeutic proteins. *Vaccine* 23, 1779–1783.
- Daniell, H., Lee, S.B., Panchal, T., Wiebe, P.O., 2001. Expression of cholera toxin B subunit gene and assembly as functional oligomers in transgenic tobacco chloroplasts. *J. Mol. Biol.* 311, 1001–1009.
- Danielli, J.F., 1975. The bilayer hypothesis of membrane structure. In: Weissmann, G., Claiborne, R. (Eds.), *Cell Membranes. Biochemistry, Cell Biology & Pathology*. HP Publishing Co., New York, pp. 3–11.
- Danielli, J.F., Harvey, E.N., 1935. The tension at the surface of mackerel egg oil with remarks on the nature of the cell surface. *J. Cell. Comp. Physiol.* 5, 483–494.
- Darbishire, A.D., 1904. On the result of crossing Japanese waltzing with albino mice. *Biometrika* 3, 1–51.
- Darnsky, C.H., Werb, Z., 1992. Signal transduction by integrin receptors for extracellular matrix: Cooperative processing of

- extracellular information. *Current Opinion in Cell Biology* 4, 772–781.
- D'Arcy Thompson, W., 1959. *On Growth and Form*. Cambridge University Press, Cambridge.
- Darlington, C.D., 1932. *Recent Advances in Cytology*. P. Blakiston's Son & Co., Philadelphia.
- Darlington, C.D., 1944. Heredity, development and infection. *Nature* 154, 164–169.
- Darlington, C.D., Thomas, P.T., 1937. The breakdown of cell division in a *Festuca-Lolium* derivative. *Ann. Bot.* 1, 747–761.
- Darnowski, D.W., Valenta, R., Parthasarathy, M.V., 1996. Identification and distribution of profilin in tomato (*Lycopersicon esculentum* Mill.). *Planta* 198, 158–161.
- Darvill, A.G., Albersheim, P., 1984. Phytoalexins and their elicitors - A defense against microbial infection in plants. *Ann. Rev. Plant Physiol.* 35, 243–275.
- Darwin, C., 1860. *The Origin of Species*, second ed. John Murray, London.
- Darwin, C. [1859–1882]. 1939. *The Origin of Species*, sixth ed. J. M. Dent & Sons, London.
- Darwin, C., 1868. *The Variation of Animals and Plants Under Domestication*. J. Murray, London.
- Darwin, C. [1881]. 1966. *The Power of Movement in Plants*. Da Capo Press, New York.
- Darwin, C., 1897. *Insectivorous Plants*. D. Appleton and Co., New York.
- Darwin, F., Acton, E.H., 1894. *Practical Physiology of Plants*. Cambridge University Press, Cambridge.
- daSilva, L.L.P., Snapp, E.L., Denecke, J., Lippincott-Schwartz, J., Hawes, C., Brandizzi, F., 2004. Endoplasmic reticulum export sites and Golgi bodies behave as single mobile secretory units in plant cells. *Plant Cell* 16, 1753–1771.
- Datta, N., Chen, Y.-R., Roux, S.J., 1985. Phytochrome and calcium stimulation of protein phosphorylation in isolated pea nuclei. *Biochem. Biophys. Res. Commun.* 128, 1403–1408.
- Dauwalder, M., Whaley, W.G., 1973. Staining of cells of *Zea mays* root apices with the osmium–zinc iodide and osmium impregnation technique. *J. Ultrastruc. Res.* 45, 279–296.
- Dauwalder, M., Whaley, W.G., 1974. Patterns of incorporation of [³H] galactose of *Zea mays* root tips. *J. Cell Sci.* 14, 11–27.
- Dauwalder, M., Whaley, W.G., Kephart, J.E., 1969. Phosphatases and differentiation of the Golgi apparatus. *J. Cell Sci.* 4, 455–497.
- Davenport, C.B., 1908. *Experimental Morphology*. Macmillan, New York.
- Davenport, C.B., 1910. *Eugenics. The Science of Human Improvement by Better Breeding*. Henry Holt and Co., New York.
- Davenport, C.B., 1912. *The Trait Book*. Eugenics Record Office, Bulletin No. 6. Cold Spring Harbor, New York.
- Davidson, E.H., 1968. *Gene Activity in Early Development*. Academic Press, New York.
- Davidson, E.H., Galau, G.A., Angerer, R.C., Britten, R.J., 1975. Comparative aspects of DNA organization in metazoa. *Chromosoma* 51, 253–259.
- Davidson, J.N., 1960. *The Biochemistry of the Nucleic Acids*. Methuen & Co., London.
- Davidson, J.N., Chargaff, E., 1955. Introduction. In: Chargaff, E., Davidson, J.N. (Eds.), *The Nucleic Acids*, vol. 1. Academic Press, New York, pp. 1–8.
- Davies, D.D., 1953. The Krebs cycle enzyme system of pea seedlings. *J. Exp. Bot.* 4, 173–183.
- Davies, E., Fillingham, B.D., Oto, Y., Abe, Y., 1991. Evidence for the existence of cytoskeleton-bound polysomes in plants. *Cell Biol. Int. Rep.* 15, 973–981.
- Davies, J.M., 1999. The bioenergetics of vacuolar H⁺ pumps. *Adv. Bot. Res.* 25, 339–363.
- Davies, J.M., Poole, R.J., Sanders, D., 1993. The computed free energy change of hydrolysis of inorganic pyrophosphate and ATP: Apparent significance for inorganic-pyrophosphate-driven reactions of intermediary metabolism. *Biochim. Biophys. Acta* 1141, 29–36.
- Davies, J.M., Hunt, I., Sanders, D., 1994. Vacuolar H⁺-pumping ATPase variable transport coupling ratio controlled by pH. *Proc. Natl. Acad. Sci. USA* 91, 8547–8551.
- Davies, T.G.E., Steele, S.H., Walker, D.J., Leigh, R.A., 1996. An analysis of vacuole development in oat aleurone protoplasts. *Planta* 198, 356–364.
- Davis, B.D., Chen, J.C.W., Philpott, M., 1974. The transition from filamentous to two-dimensional growth in fern gametophytes IV. Initial events. *Amer. J. Bot.* 61, 722–729.
- Davis, C.C., Anderson, W.R., Wurdack, K.J., 2005. Gene transfer from a parasitic flowering plant to a fern. *Proc. Roy. Soc. B* 272, 2237–2242.
- Davis, J.M., Svendsgaard, D.J., 1990. U shaped dose–response curves: Their occurrence and implications for risk assessment. *J. Toxicol. Environ. Health* 30, 71–83.
- Davis, L.I., 1992. Control of nucleocytoplasmic transport. *Current Opinion in Cell Biology* 4, 424–429.
- Davis, L.I., Blobel, G., 1986. Identification and characterization of a nuclear pore complex protein. *Cell* 45, 699–709.
- Davis, L.I., Blobel, G., 1987. Nuclear pore complex contains a family of glycoproteins that includes p62: Glycosylation through a previously unidentified cellular pathway. *Proc. Natl. Acad. Sci. USA* 84, 7552–7556.
- Davis, N.P., 1968. *Lawrence and Oppenheimer*. Simon and Schuster, New York.
- Davison, E.H., 1976. *Gene Activity in Early Development*. Academic Press, New York.
- Davson, H., Danielli, J.F., 1943. *The Permeability of Natural Membranes*. Cambridge University Press, Cambridge.
- Davson, H., Danielli, J.F., 1952. *The Permeability of Natural Membranes*, second ed. Cambridge University Press, Cambridge.
- Davy, H., 1821. *Elements of Agricultural Chemistry*. B. Warner, Philadelphia.
- Davy, H., 1827. *Elements of Agricultural Chemistry*, fourth ed. Longman, Rees, Ormo, Brown and Green, London.
- Dawidowicz, E.A., 1987. Lipid exchange: Transmembrane movement, spontaneous movement, and protein-mediated transfer of lipids and cholesterol. *Curr. Top. Memb. Trans.* 29, 175–202.
- Dawson, M.H., Sia, R.H.P., 1931. *In vitro* transformations of pneumatococcal types. I. A techniques for inducing transformation of pneumatococcal types in vitro. *J. Exp. Med.* 54, 681–700.
- De, D.N., 2000. *Plant Cell Vacuoles*. CSIRO Publishing, Collingwood, Australia.
- Deamer, D.W., 1997. The first living systems: A bioenergetic perspective. *Microbiol. Mol. Biol. Reviews* 61, 239–261.
- Deamer, D.W., Fleischaker, G.R., 1994. *Origins of Life. The Central Concepts*. Jones and Bartlett Publishers, Sudbury, MA.

- de Broglie, L., 1946. Matter and Light. Dover Publications, New York.
- Debye, P., 1942. Reaction rates in ionic solutions. *Trans. Electrochem. Soc.* 82, 265–325.
- deCandolle, A.P., Sprengel, K., 1821. Elements of the Philosophy of Plants. William Blackwood, Edinburgh.
- de Carvalho, F., Gheysen, G., Kushnir, S., van Montagu, M., Inze, D., Castresana, C., 1992. Suppression of β -1,2-glucanase transgene expression in homozygous plants. *EMBO J.* 11, 2595–2602.
- Decker, J.P., 1955. A rapid, postillumination deceleration of respiration in green leaves. *Plant Physiol.* 30, 82–84.
- Decker, J.P., 1959. Comparative responses of carbohydrate outburst and uptake in tobacco. *Plant Physiol.* 34, 100–102.
- de Duve, C., 1963. Note. In: De Reuck, A.V.S., Cameron, M. P. (Eds.) *Lysosomes*. CIBA Foundation Symposium. Little, Brown, and Co., Boston, p. 126.
- de Duve, C., 1969. Evolution of the peroxisome. *Ann. N.Y. Acad. Sci.* 168, 369–381.
- de Duve, C., 1975. Exploring cells with a centrifuge. *Science* 189, 186–194.
- de Duve, C., 1981. A Guided Tour of the Living Cell. Scientific American Books, New York.
- de Duve, C., 1991. Blueprint for a Cell: The Nature and Origin of Life. Neil Patterson Publishers, Burlington, NC.
- de Duve, C., Baudhuin, P., 1966. Peroxisomes (microbodies and related particles). *Physiol. Rev.* 46, 323–357.
- de Duve, C., Pressman, B.C., Gianetto, R., Wattiaux, R., Applemans, F., 1955. Tissue fractionation studies. 6. Intracellular distribution patterns of enzymes in rat-liver tissue. *Biochem. J.* 60, 604–617.
- de Duve, C., Wattiaux, R., 1966. Functions of lysosomes. *Ann. Rev. Physiol.* 28, 435–492.
- Deisenhofer, J., Michel, H., 1988. The photosynthetic reaction centre from the purple bacterium *Rhodospseudomonas viridis*. Nobel Lect. December 8.
- Deisenhofer, J., Michel, H., 1991. Structures of bacterial photosynthetic reaction centers. *Ann. Rev. Cell Biol.* 7, 1–23.
- de Kruif, P., 1926. The Microbe Hunters. Harcourt, Brace and Co., New York.
- del Campillo, E., Lewis, L.N., 1992. Occurrence of 9.5 cellulase and other hydrolases in flow reproductive organs under going major cell wall disruption. *Plant Physiol.* 99, 1015–1020.
- Delbrück, M., 1969. A physicist's renewed look at biology—Twenty years later. Nobel Lect. December 10.
- Delbrück, M., Stent, G.S., 1957. On the mechanism of DNA replication. In: McElroy, W.D., Glass, B. (Eds.), *The Chemical Basis of Heredity*. Johns Hopkins Press, Baltimore, pp. 699–736.
- Delmer, D.P., 1987. Cellulose biosynthesis. *Ann. Rev. Plant Physiol.* 38, 259–290.
- Delmer, D.P., 1991. The biochemistry of cellulose synthesis. In: Lloyd, C.W. (Ed.), *The Cytoskeletal Basis of Plant Growth and Form*. Academic Press, London, pp. 101–107.
- Delmer, D.P., 1999. Cellulose biosynthesis: Exciting times for a difficult field. *Ann. Rev. Plant Physiol. Plant Mol. Biol.* 50, 245–276.
- Delmer, D.P., Solomon, M., Read, S.M., 1991. Direct photolabeling with [32 P] UDP-glucose for identification of a subunit of cotton fiber cellulose synthase. *Plant Physiol.* 95, 556–563.
- del Rio, L.A., Corpa, F.J., Sandalio, L.M., Palma, J.M., Gomez, M., Barroso, J.B., 2002. Reactive oxygen species, antioxidant systems and nitric oxide in peroxisomes. *J. Exp. Bot.* 53, 1255–1272.
- DeMaggio, A.E., Greene, C., Stetler, D., 1980. Biochemistry of fern spore germination. Glyoxylate and glycolate cycle activity in *Onoclea sensibilis* L. *Plant Physiol.* 66, 922–924.
- Demidchik, V., 2006. Physiological roles of nonselective cation channels in the plasma membrane of higher plants. In: Baluska, F., Mancuso, S., Volkmann, D. (Eds.), *Communication in Plants*. Springer, Berlin, pp. 235–248.
- DeMiranda, J.R., Thomas, M.A., Thurman, D.A., Tomset, A.B., 1990. Metallothionein genes from the flowering plant *Mimulus guttatus*. *FEBS Lett.* 260, 277–280.
- Denesvre, C., Malhotra, V., 1996. Membrane fusion in organelle biogenesis. *Curr. Opin. Cell Biol.* 8, 519–523.
- d'Enfert, C., Gensse, M., Gaillardin, C., 1992. Fission yeast and a plant have functional homologues of the Sar1 and Sec12 proteins involved in ER to Golgi traffic in budding yeast. *EMBO J.* 11, 4205–4211.
- Dennett, D.C., 1978. Where am I? In: *Brainstorms. Philosophical Essays on Mind and Psychology*. Brandford Books, Montgomery, VT, pp. 310–323.
- Dennison, D.S., Vogelmann, T.C., 1989. The *Phycomyces* lens: Measurement of the sporangiophore intensity profile using a fiber optic microprobe. *Planta* 179, 1–10.
- Denny, M.W., 1993. Air and Water. The Biology and Physics of Life's Media. Princeton University Press, Princeton, NJ.
- Deom, C.M., Oliver, M.J., Beachy, R.N., 1987. The 30-kilodalton gene product of tobacco mosaic virus potential virus movement. *Science* 237, 389–394.
- Deom, C.M., Schubert, K.I., Wolf, S., Holt, C., Lucas, W.J., Beachy, R.N., 1990. Molecular characterization and biological function of the movement protein of tobacco mosaic virus in transgenic plants. *Proc. Natl. Acad. Sci. USA* 87, 3284–3288.
- Deom, C.M., Wolf, S., Holt, C.A., Lucas, W.J., Beachy, R.N., 1991. Altered function of the tobacco mosaic virus movement protein in a hypersensitive host. *Virology* 180, 251–256.
- de Ruijter, N., Emons, A. Immunodetection of spectrin antigens in plant cells. *Cell Biol. Int.* 17, 169–182.
- Desai, A., Mitchison, T.J., 1995. A new role for motor proteins as couplers to depolymerizing microtubules. *J. Cell Biol.* 128, 1–4.
- de Saussure, T. [1804]. 1957. *Recherches Chimiques Sur La Végétation*. Gauthier-Villars, Paris.
- de Sitter, W., 1932. *Kosmos*. Harvard University Press, Cambridge, MA.
- Deslattes, R.D., 1980. The Avogadro Constant. *Ann. Rev. Phys. Chem.* 31, 435–461.
- Desnuelle, P., 1953. The general chemistry of amino acids and peptides. In: Neurath, H., Bailey, K. (Eds.), *The Proteins*. Academic Press, New York, pp. 87–180.
- Dessauer, C.W., Bartlett, S.G., 1994. Identification of a chaperonin binding site in a chloroplast precursor protein. *J. Biol. Chem.* 269, 19766–19776.
- Dessev, G.N., 1992. Nuclear envelope structure. *Curr. Opin. Cell Biol.* 4, 430–435.
- Dettmer, J., Hong-Hermesdorf, A., Stierhof, Y.D., Schumacher, K., 2006. Vacuolar H^+ -ATPase activity is required for

- endocytic and secretory trafficking in *Arabidopsis*. *Plant Cell* 18, 715–730.
- de Vries, H., 1884. Eine Methode zur Analyse der Turgorkraft. *Jahrb. f. wiss. Bot.* 14, 427–601.
- de Vries, H., 1885. Plasmolytische Studien über die Wand der Vacuolen. *Jahrb. f. wiss. Bot.* 16, 465–598.
- de Vries, H., 1886. Ueber die Aggregation im Protoplasma von *Drosera rotundifolia*. *Bot. Z.* 44, 57–64.
- de Vries, H., 1888a. Osmotische Versuche mit lebenden Membranen. *Z. Physikalische Chem.* 2, 415–432.
- de Vries, H., 1888b. Über eine neue Anwendung der plasmolytischen Methode. *Bot. Z.* 46, 393–397.
- de Vries, H. [1889]. 1910. *Intracellular Pangenesis*. Translated by C. Stuart Gager. The Open Court Publishing Co., Chicago.
- de Vries, H., 1905. Species and varieties, their origin by mutation: Lectures delivered at the University of California. Daniel Trembly MacDougal (Ed.), The Open Court Publishing Company, Chicago.
- de Vries, H., 1906. Species and varieties, their origin by mutation: Lectures delivered at the University of California, second ed. Daniel Trembly MacDougal (Ed.), The Open Court Publishing Company, Chicago.
- de Vries, H., 1907. Plant-Breeding. Comments on the Experiments of Nilsson and Burbank. The Open Court Publishing Company, Chicago.
- Dhonukshe, P., Aniento, F., Hwang, I., Robinson, D.G., Mravec, J., Stierhof, Y.D., Friml, J., 2007. Clathrin-mediated constitutive endocytosis of PIN auxin efflux carriers in *Arabidopsis*. *Curr. Biol.* 17, 520–527.
- Dhonukshe, P., Mathus, J., Hülskamp, M., Gadella, T.W.J., 2005. Microtubule plus-ends reveal essential links between intracellular polarization and localized modulation of endocytosis during division-plane establishment in plant cells. *BMC Biol.* 3, 11–26.
- Dhonukshe, P., Vischer, N., Gadella Jr., T.W.J., 2006. Contribution of microtubule growth polarity and flux to spindle assembly and functioning in plant cells. *J. Cell Sci.* 119, 3193–3205.
- Dice, J.F., 1990. Introduction: Pathways of intracellular proteolysis. *Sem. Cell Biol.* 1, 411–413.
- Dieter, P., Marmé, D., 1980. Ca^{2+} transport in mitochondrial and microsomal fractions from higher plants. *Planta* 150, 1–8.
- Dietrich, B., Keller, F., 1991. Carbohydrate transport in discs of storage parenchyma of celery petioles. 1. Uptake of glucose and fructose. *New Phytol.* 117, 413–422.
- Dillenschneider, M., Hetherington, A., Graziana, A., Alibert, G., Berta, P., Haiech, J., Ranjeva, R., 1986. The formation of inositol phosphate derivatives by isolated membranes from *Acer pseudoplatanus* is stimulated by guanine nucleotides. *FEBS Lett.* 208, 413–417.
- Ding, B., 1998. Intercellular protein trafficking through plasmodesmata. *Plant Mol. Biol.* 38, 279–310.
- Ding, B., Haudenschild, J.S., Hull, R.J., Wold, S., Beachy, R.N., Lucas, W.J., 1992a. Secondary plasmodesmata are specific sites of localization of the tobacco mosaic virus movement protein in transgenic tobacco plants. *The Plant Cell* 4, 915–928.
- Ding, B., Itaya, A., 2007. Control of macromolecular trafficking across specific cellular boundaries: A key to integrative plant biology. *J. Integr. Plant Biol.* 49, 1227–1234.
- Ding, B., Itaya, A., Woo, Y., 1999. Plasmodesmata and cell-to-cell communication in plants. *Int. Rev. Cytol.* 190, 251–316.
- Ding, B., Kwon, Mo.O., Warnberg, I., 1996. Evidence that actin filaments are involved in controlling the permeability of plasmodesmata in tobacco mesophyll. *Plant J.* 10, 157–164.
- Ding, B., Turgeon, R., Parthasarathy, M.V., 1991a. Microfilament organization and distribution in freeze-substituted tobacco plant tissue. *Protoplasma* 165, 96–105.
- Ding, B., Turgeon, R., Parthasarathy, M.V., 1991b. Microfilaments in preprophase band of freeze-substituted tobacco root cells. *Protoplasma* 165, 209–211.
- Ding, B., Turgeon, R., Parthasarathy, M.V., 1992b. Substructure of freeze-substituted plasmodesmata. *Protoplasma* 169, 28–41.
- Ding, D.-Q., Tazawa, M., 1989. Influence of cytoplasmic streaming and turgor pressure gradient on the transnodal transport of rubidium and electrical conductance in *Chara corallina*. *Plant Cell Physiol.* 30, 739–748.
- Ding, R., McDonald, K.L., McIntosh, J.R., 1993. Three-dimensional reconstruction and analysis of mitotic spindles from the yeast, *Schizosaccharomyces pombe*. *J. Cell Biol.* 120, 141–151.
- Dingwall, C., Laskey, R.A., 1986. Protein import into the cell nucleus. *Ann. Rev. Cell Biol.* 2, 367–390.
- Dinis, A.M., Mesquita, J.F., 1994. Ultrastructural and cytochemical evidence for the presence of peroxisomes in the generative cell of *Magnolia x Soulageana* pollen grain. *Ann. Bot.* 73, 83–90.
- Dinkins, R., Reddy, M.S., Leng, M., Collins, G.B., 2001. Overexpression of the *Arabidopsis thaliana* MinD1 gene alters chloroplast size and number in transgenic tobacco plants. *Planta* 214, 180–188.
- Diotallevi, F., Mulder, B., 2007. The cellulose synthase complex: A polymerization driven supramolecular motor. *Biophys. J.* 92, 2666–2673.
- Di Palma, J.R., Mohl, R., Best Jr., W., 1961. Action potential and contraction of *Dioaea muscipula* (Venus flytrap). *Science* 133, 878–879.
- Dixit, R., Cyr, R., 2002. Golgi secretion is not required for marking the preprophase band site in cultured tobacco cells. *Plant J.* 29, 99–108.
- Dixit, R., Cyr, R., Gilroy, S., 2006. Using intrinsically fluorescent proteins for plant cell imaging. *Plant J.* 45, 599–615.
- Dixon, H.H., 1938. The Croonian lecture: Transport of substances in plants. *Proc. Roy. Soc. Lond.* 125B, 1–25.
- Dixon, H.H., Joly, J., 1895. On the ascent of sap. *Phil. Trans. Roy. Soc. Lond.* 186B, 563–576.
- Dixon, M., 1952. *Manometric Methods as Applied to the Measurement of Cell Respiration and other Processes*, third ed. Cambridge University Press, Cambridge.
- Djerassi, C., Hoffmann, R., 2001. *Oxygen*. Wiley-VCH, Weinheim, Germany.
- Doberstein, S.K., Baines, I.C., Wiegand, G., Korn, E.D., Pollard, T.D., 1993. Inhibition of contractile vacuole function in vivo by antibodies against myosin-I. *Nature* 365, 841–843.
- Dobzhansky, T., Ayala, F.J., Stebbins, G.L., Valentine, J.W., 1977. *Evolution*. W. H. Freeman and Co., San Francisco.
- Dodge, R.A., Thompson, M.J., 1937. *Fluid Mechanics*. McGraw-Hill, New York.
- Doerner, P., 2007. Transcriptional control of the plant cell cycle. *Plant Cell Monogr.* 9, 13–32.
- Dolezel, J., Cihalikova, J., Lucretti, S., 1992. A high-yield procedure for isolation of metaphase chromosomes from root tips of *Vicia faba* L. *Planta* 188, 93–98.

- Dombrowski, J.E., Raikhel, N.V., 1995. Isolation of cDNA encoding a novel GTP-binding protein of *Arabidopsis thaliana*. *Plant Mol. Biol.* 28, 1121–1126.
- Domozych, D.S., 1989a. The endomembrane system and mechanism of membrane flow in the green alga, *Gloeomonas kupfferi* (Volvocales, Chlorophyta). I. An ultrastructural analysis. *Protoplasma* 149, 95–107.
- Domozych, D.S., 1989b. The endomembrane system and mechanism of membrane flow in the green alga, *Gloeomonas kupfferi* (Volvocales, Chlorophyta). II. A cytochemical analysis. *Protoplasma* 149, 108–119.
- Domozych, D.S., Nimmons, T.T., 1992. The contractile vacuole as an endocytic organelle of the chlamydomonal flagellate *Gloeomonas kupfferi*. *Volvocales Chlorophyta*. *J. Phycol.* 28, 809–816.
- Donaldson, I.G., 1972. The estimation of the motive force for protoplasmic streaming in *Nitella*. *Protoplasma* 74, 329–344.
- Donaldson, R.P., Beevers, H., 1977. Lipid composition of organelles from germinating castor bean endosperm. *Plant Physiol.* 59, 259–263.
- Donaldson, R.P., Tolbert, N.E., Schnarrenberger, C., 1972. A comparison of microbody membranes with microsomes and mitochondria from plant and animal tissue. *Arch. Biochem. Biophys.* 152, 199–215.
- Donaldson, R.P., Tully, R.E., Young, O.A., Beevers, H., 1981. Organelle membranes from germinating castor bean endosperm. II. Enzymes, cytochromes, and permeability of the glyoxysome membrane. *Plant Physiol.* 67, 21–25.
- Dong, X.-J., Nagai, R., Takagi, S., 1998. Microfilaments anchor chloroplasts along the outer periclinal wall in *Vallisneria* epidermal cells through cooperation of Pfr and photosynthesis. *Plant Cell Physiol.* 39, 1299–1306.
- Dong, X.-J., Ryu, J.H., Takagi, S., Nagai, R., 1996. Dynamic changes in the organization of microfilaments associated with the photocontrolled motility of chloroplasts in epidermal cells of *Vallisneria*. *Protoplasma* 195, 18–24.
- Dong, X.-J., Takagi, S., Nagai, R., 1995. Regulation of the orientation movement of chloroplasts in epidermal cells of *Vallisneria*: Cooperation of phytochrome with photosynthetic pigment under low-fluence-rate light. *Planta* 197, 257–263.
- Donnan, F.G., 1928. The mystery of life. *Nature* 122, 512–514.
- Donnan, F.G., 1937. Concerning the applicability of thermodynamics to the phenomena of life. *J. Gen. Physiol.* 8, 685–688.
- Donohue, J., 1976. Honest Jim? *Quart. Rev. Biol.* 51, 285–289.
- Doolittle, R.F., 1995. The multiplicity of domains in proteins. *Ann. Rev. Biochem.* 64, 287–314.
- Doolittle, W.F., 1998. You are what you eat: A gene transfer ratchet could account for bacterial genes in eukaryotic nuclear genomes. *Trends in Genetics* 14, 307–311.
- Doolittle, W.F., Boucher, Y., Nesbo, C.L., Douady, C.J., Andersson, J.O., Roger, A.J., 2003. How big is the iceberg of which organellar genes in nuclear genomes are but the tip? *Phil. Trans. Roy. Soc. B* 358, 39–57.
- Dorée, M., 1990. Control of M-phase by maturation-promoting factor. *Curr. Opin. in Cell Biol.* 2, 269–273.
- Dörmann, P., 2007. Lipid synthesis, metabolism and transport. In: Wise, R.R., Hooper, J.K. (Eds.), *The Structure and Function of Plastids*. Springer, Dordrecht, pp. 335–353.
- Dorn, A., Weisenseel, M.H., 1984. Growth and the current pattern around internodal cells of *Nitella flexilis* L. *J. Exp. Bot.* 35, 373–383.
- Douce, R., 1985. *Mitochondria in Higher Plants. Structure, Function, and Biogenesis*. Academic Press, Orlando.
- Douce, R., Holtz, R.B., Benson, A.A., 1973. Isolation and properties of the envelope of spinach chloroplast. *J. Biol. Chem.* 248, 7215–7222.
- Douce, R., Joyard, J., 1979. Structure and function of the plastid envelope. *Adv. Bot. Res.* 7, 1–116.
- Douce, R., Joyard, J., 1980. Plant galactolipids. In: Stumpf, P.K. (Ed.), *The Biochemistry of Plants*, vol. 4. Academic Press, New York, pp. 321–362.
- Douce, R., Joyard, J., 1990. Biochemistry and function of the plastid envelope. *Annu. Rev. Cell Biol.* 6, 173–216.
- Douce, R., Neuburger, M., 1989. The uniqueness of plant mitochondria. *Ann. Rev. Plant Physiol. Plant Mol. Biol.* 40, 371–414.
- Doudna, J.A., Szostak, J.W., 1989. RNA-catalyzed synthesis of complementary-strand RNA. *Nature* 339, 519–522.
- Dougherty, E.C., 1957. Neologisms needed for structures of primitive organisms. I. Types of nuclei. *J. Protozool.* 4 (Suppl.), 14.
- Dougherty, W.G., Parks, T.D., 1995. Transgenes and gene suppression: Telling us something new? *Curr. Opin. Cell Biol.* 7, 399–405.
- Douglass, A.D., Vale, R.D., 2005. Single-molecule microscopy reveals plasma membrane microdomains created by protein-protein networks that exclude or trap signaling molecules in T cells. *Cell* 121, 937–950.
- Dounce, A.L., 1952. Duplicating mechanism for peptide chain and nucleic acid synthesis. *Enzymologia* 15, 251–258.
- Dounce, A.L., 1956. Nucleoproteins. Round table discussion. Symposium on structure of enzymes and proteins. *J. Cell. Comp. Physiol.* 47 (Suppl. 1), 103–112.
- Dove, W.F., Dee, J., Hatano, S., Haugli, F.B., Wohlfath-Bottermann, K.E. (Eds.), 1986. *The Molecular Biology of Physarum polycephalum*. Plenum Press, New York.
- Dove, W.F., Rusch, H.P., 1980. Growth and Differentiation in *Physarum polycephalum*. Princeton University Press, Princeton, NJ.
- Dowhan, W., 1991. Phospholipid-transfer proteins. *Current Opinion in Cell Biology* 3, 621–625.
- D'Paolo, M.L., Perutto, A.D.B., Bassi, R., 1990. Immunological studies on chlorophyll-a/b proteins and their distribution in thylakoid membrane domains. *Planta* 181, 275–286.
- Draper, J.W., 1898. *History of the Conflict between Religion and Science*. D. Appleton and Co., New York.
- Draper, M.H., Hodge, A.J., 1949. Studies on muscle with the electron microscope. I. The ultrastructure of toad striated muscle. *Aust. J. Exp. Biol. and Med. Sci.* 27, 465–503.
- Dreses-Werringlowr, V., Fischer, K., Wachter, E., Link, T.A., Flüge, U.-I., 1991. cDNA sequence and deduced amino acid sequence of the precursor of the 37-kDa inner envelope membrane polypeptide from spinach chloroplasts. Its transit peptide contains an amphiphilic α -helix as the only detectable structural element. *Eur. J. Biochem.* 195, 361–368.
- Dreyer, E.M., Weisenseel, M.H., 1979. Phytochrome-mediated uptake of calcium in *Mougeotia* cells. *Planta* 146, 31–39.
- Driesch, H., 1914. *The History and Theory of Vitalism*. Translated by C. K. Ogden. MacMillan, London.
- Driesch, H., 1929. *The Science and Philosophy of the Organism*, second ed. A. & C. Black, Ltd., London.
- Driouich, A., Faye, L., Staehelin, L.A., 1993a. The plant Golgi apparatus: A factory for complex polysaccharides and glycoproteins. *Trends in Biochemical Sciences* 18, 210–214.

- Driouich, A., Zhang, G.F., Staehelin, L.A., 1993b. Effect of Brefeldin A on the structure of the Golgi apparatus and on the synthesis and secretion of proteins and polysaccharides in sycamore maple (*Acer pseudoplatanus*) suspension-cultured cells. *Plant Physiol.* 101, 1363–1373.
- Driouich, A., Levy, S., Staehelin, L.A., Faye, L., 1994. Structural and functional organization of the Golgi apparatus in plant cells. *Plant Physiol. Biochem.* 32, 731–749.
- Drøbak, B.K., 1991. Plant signal perception and transduction: The role of the phosphoinositide system. *Essays in Biochem.* 26, 27–37.
- Drøbak, B.K., Ferguson, I.B., 1985. Release of Ca^{2+} from plant hypocotyl microsomes by inositol-1,4,5-triphosphate. *Biochem. Biophys. Res. Commun.* 130, 1241–1246.
- Drøbak, B.K., Ferguson, I.B., Dawson, A.P., Irvine, R.F., 1988. Inositol-containing lipids in suspension-cultured plant cells. *Plant Physiol.* 87, 217–222.
- Drucker, M., Herkt, B., Robinson, D.G., 1995. Demonstration of a beta-type adaptin at the plant plasma membrane. *Cell Biol. Int.* 19, 191–201.
- Drucker, S.C., Knox, R.B., 1985. Pollen and pollination: A historical review. *Taxon* 34, 401–419.
- Drysdale, J., 1874. *The Protoplasmic Theory of Life*. Baillière, Tindall, and Cox, London.
- Du Bois-Reymond, E.H., 1848–84. *Untersuchungen über thierische Elektrizität*. G. Reimer, Berlin.
- DuBois-Reymond, E., 1872. *Ueber die Grenzen der Naturerkenntniss*. Leipzig.
- Duboscq, O., Grassé, P.P., 1933. L'appareil parabasal des flagellés. Avec des remarques sur le trophosome, l'appareil de Golgi, des mitochondries et le vacuome. *Arch. Zool. Exp. Et. Gén.* 73, 381–621.
- Dubos, R.J., 1939. Studies on a bacterial agent extracted from a soil bacillus. *J. Exp. Med.* 70, 1–10.
- Dubos, R., 1960. *Pasteur and Modern Science*. Anchor Books, Garden City, New York.
- Ducet, G., Gidrol, X., Richaud, P., 1983. Membrane potential changes in coupled potato mitochondria. *Physiol. Veg.* 21, 385–394.
- Duchenne, G.B., 1862. *Mécanisme de la Physionomie Humaine*. Jules Renouard, Paris.
- Duchenne, G.B., 1871. *A Treatise on Localized Electrization*. Lindsay & Blakiston, Philadelphia, PA.
- Duchenne, G.B., 1949. *Physiology of Motion*. J. B. Lippincott, Philadelphia.
- Duckett, J.G., Renzaglia, K.S., 1986. The blepharoplast of *Hypnum*. *J. Bryol.* 14, 375–385.
- Duclaux, E., 1920. *Pasteur. The History of a Mind*. W. B. Saunders, Philadelphia.
- Duden, R., Allan, V., Kreis, T., 1991. Involvement of β -COP in membrane traffic through the Golgi complex. *Trends Cell Biol.* 1, 14–19.
- Dugas, C.M., Li, Q., Kham, I.A., Nothnagel, E.A., 1989. Lateral diffusion in the plasma membrane of maize protoplasts with implications for cell culture. *Planta* 179, 387–396.
- Dugas, H., 1996. *Bioorganic Chemistry. A Chemical Approach to Enzyme Action*, third ed. Springer-Verlag, New York.
- Dujardin, F., 1835. *Recherches sur les organismes inférieurs*. *Ann. Sc. Nat. Zool. Second Series* 4, 343–377.
- Dujardin, F., 1841. *Histoire naturelle des zoophytes: Infusoires*. Librairie Encyclopédique de Roret, Paris.
- Duque, P., Sánchez, J.-P., Chua, H.-N., 2004. Signalling and the cytoskeleton in guard cells. *Annual Plant Reviews* 10, 290–317.
- Dumas, M.J., Boussingault, M.J.B., 1844. *The Chemical and Physiological Balance of Organic Nature. An Essay*. H. Baillière Publisher, London.
- Duncan, E.H., Eakin, W.R., 1981. *Thomas Reid's Lectures on Natural Theology (1780)*. University Press of America, Washington, DC.
- Dundr, M., Raska, I., 1993. Nonisotopic ultrastructural mapping of transcription sites within the nucleolus. *Exp. Cell Res.* 208, 275–281.
- Dunham, V.L., Bryant, J.A., 1988. Nuclei. In: Hall, J.L., Moore, A. L. (Eds.). *Isolation of Membranes and Organelles from Plant Cells*. Academic Press, London, pp. 237–275.
- Dunn, E.K., Shoue, D.A., Huang, X., Kline, R.E., MacKay, A.L., Carpits, N.C., Taylor, I.E.P., Mandoli, D.F., 2007. Spectroscopic and biochemical analysis of regions of the cell wall of the unicellular “mannan weed,” *Acetabularia acetabulum*. *Plant Cell Physiol.* 48, 122–133.
- Dunn, M.S., 1941. Chemistry of amino acids and proteins. *Ann. Rev. Biochem.* 10, 91–124.
- Dunn Jr., W.A., 1990. Studies on the mechanisms of autophagy: Formation of the autophagic vacuole. *J. Cell Biol.* 110, 1923–1933.
- Durham, A.C.H., Ridgway, E.B., 1976. Control of chemotaxis in *Physarum polycephalum*. *J. Cell Biol.* 69, 218–223.
- Durrant, A., 1958. Environmental conditioning of flax. *Nature* 181, 928–929.
- Durrant, A., 1962. The environmental induction of heritable changes in *Linum*. *Heredity* 17, 27–61.
- Durso, N.A., Leslie, J.D., Cyr, R.J., 1996. In situ immunocytochemical evidence that a homolog of protein translation elongation factor EF-1 α is associated with microtubules in carrot cells. *Protoplasma* 190, 141–150.
- Dustin, P., 1947. Some new aspects of mitotic poisoning. *Nature* 159, 794–797.
- Dustin, P., 1978. *Microtubules*. Springer-Verlag, Berlin.
- Dutcher, S.K., 1995. Flagellar assembly in two hundred and fifty easy-to-follow steps. *Trends Genet.* 11, 398–404.
- Dutrochet, M.H., 1824. *Recherches Anatomiques et Physiologiques sur La Structure Intime des Animaux et des Végétaux et sur Leur Motilité*. Chez J. B. Baillière, Paris.
- Dutta, R., Robinson, K.R., 2004. Identification and characterization of stretch-activated channels in pollen protoplasts. *Plant Physiol.* 135, 1398–1406.
- Duysens, L.N.M., Ames, J., Kamp, B.M., 1961. Two photochemical systems in photosynthesis. *Nature* 190, 510–511.
- Duysens, L.N.M., 1989. The discovery of the two photosystems: A personal account. *Photosyn. Res.* 21, 61–80.
- Duysens, L.N.M., 1996. Arnold's inspiring experiments. *Photosyn. Res.* 48, 25–29.
- Dworetzky, S.I., Feldherr, C.M., 1988. Translocation of RNA-coated gold particles through the nuclear pores of oocytes. *J. Cell Biol.* 106, 575–584.
- Dyer, A.F., 1979. *The Experimental Biology of Ferns*. Academic Press, London.

- Dyer, B.D., Obar, R.A., 1994. Tracing the History of Eukaryotic Cells. The Enigmatic Smile. Columbia University Press, New York.
- Dyson, F., 1985. Origins of Life. Cambridge University Press, Cambridge.
- Dyson, F., 2006. The Scientist as Rebel. New York Review Books, New York.
- Dzierszinski, F., Popescu, O., Toursel, C., Slomianny, C., Yahiaoui, B., Tomavo, S., 1999. The protozoan parasite *Toxoplasma gondii* expresses two functional plant-like glycolytic enzymes. Implications for evolutionary origin of apicomplexans. *J. Biol. Chem.* 274, 24888–24895.
- E-**
- Earnshaw, J.C., Steer, M.W., 1979. Studies of cellular dynamics by laser Doppler microscopy. *Pestic. Sci.* 10, 358–368.
- East, E.M., 1920. Population. *The Sci. Mon.* 10 (6), 603–624.
- East, E.M., 1923. Mendel and his contemporaries. *The Sci. Mon.* 16, 225–236.
- East, E.M., 1927. Heredity and Human Affairs. Charles Scribner's Sons, New York.
- East, E.M., 1931. The future of man in the light of his past: The view-point of a geneticist. *The Sci. Mon.* 32, 301–308.
- East, E.M., Jones, D.F., 1919. Inbreeding and Outbreeding. Their Genetic and Sociological Significance. J. B. Lippincott Co., Philadelphia.
- Ebashi, S., 1985. Relaxing factor, sarcoplasmic reticulum and troponin-A historical survey. In: Structure and Function of Sarcoplasmic reticulum, S. Fleisher and Y. Tonomura, eds. Academic Press, Orlando, pp. 1–18.
- Eccles, J., 1963. The ionic mechanism of postsynaptic inhibition. Nobel Lect. December 11.
- Eccles, J.C., 1964. The Physiology of Synapses. Springer-Verlag, Berlin.
- Eccles, J.C., 1979. The Human Mystery. Springer-Verlag, Berlin.
- Echeverria, E., Burns, J.K., 1989. Vacuolar acid hydrolysis as a physiological mechanism for sucrose breakdown. *Plant Physiol.* 90, 530–533.
- Echeverria, E., Burns, J.K., Felle, H., 1992. Compartmentalization and cellular conditions controlling sucrose breakdown in mature acid lime fruit. *Phytochemistry* 31, 4091–4095.
- Ecker, A., 1848. Zur Lehre vom Bau und Leben der contractilen Substanz der niedesten Thiere. *Z. wiss. Zool.* 1, 218–245.
- Eckert, R., 1988. Animal Physiology, third ed. W. H. Freeman and Co., New York.
- Eddington, A.S., 1992. The Nature of the Physical World: The Gifford Lectures, 1927. Macmillan, New York.
- Edidin, M., 1992. Patches, posts and fences: Proteins and plasma membrane domains. *Trends Cell Biol.* 2, 376–380.
- Edidin, M., 2001. Shrinking patches and slippery rafts: Scales of domains in the plasma membrane. *Trends Cell Biol.* 11, 492–496.
- Edsall, J.T., 1942. The chemistry of the proteins and amino acids. *Ann. Rev. Biochem.* 11, 151–182.
- Edsall, J.T., Gutfreund, H., 1983. Biothermodynamics. The Study of Biochemical Processes at Equilibrium. John Wiley & Sons, New York.
- Edsall, J.T., Wyman, J., 1958. Biophysical Chemistry. Academic Press, New York.
- Edwards, G.E., Franceschi, V.R., Voznesenskaya, E.V., 2004. Single cell C₄ photosynthesis versus the dual-cell (Kranz) paradigm. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 55, 173–196.
- Ehlers, K., Kollmann, R., 2000. Synchronization of mitotic activity in protoplast-derived *Solanum nigrum* L. microcalluses is correlated with plasmodesmal connectivity. *Planta* 210, 269–278.
- Ehlers, K., Kollmann, R., 2001. Primary and secondary plasmodesmata: Structure, origin, and function. *Protoplasma* 216, 1–30.
- Ehrenfest, P., Ehrenfest, T., 1959. The Conceptual Foundations of the Statistical Approach in Mechanics [1912]. Cornell University Press, Ithaca, New York.
- Eigen, M., Kruse, W., 1962. Some fast protolytic reactions of complexes. Seventh International Conference on Coordination Chemistry. Butterworths, London.
- Eigen, M., 1992. Steps Towards Life: A Perspective on Evolution. Translated by P. Woolley. Oxford University Press, Oxford.
- Eigen, M., 1993. Viral quasispecies. *Sci. Amer.* 269, 42–49.
- Eigen, M., Gardiner, W., Schuster, P., Winkler-Oswatitsch, R., 1981. The origin of genetic information. *Sci. Amer.* 244, 88–118.
- Eigen, M., Schuster, P., 1979. The Hypercycle. A Principle of Natural Self-Organization. Springer-Verlag, Berlin.
- Eigsti Jr., O.J., Dustin, P., 1955. Colchicine—In Agriculture Medicine Biology and Chemistry. Iowa State College Press, Ames.
- Eigsti Jr., O.J., Dustin, P., Gay-Winn, N., 1949. On the discovery of the action of colchicine on mitosis in 1889. *Science* 110, 692.
- Eilers, T., Schwartz, G., Brinkmann, H., Witt, C., Richter, T., Nieder, J., Koch, B., Hille, R., Hänsch, R., Mendel, R.R., 2001. Identification and biochemical characterization of Arabidopsis thaliana sulfite oxidase. *J. Biol. Chem.* 276, 46989–46999.
- Einspahr Jr., K.J., Peeler, T.C., Thompson, G.A., 1988. Rapid changes in polyphosphoinositide metabolism associated with the response of *Dunaliella salina* to hypoosmotic shock. *J. Biol. Chem.* 263, 5775–5779.
- Einspahr Jr., K.J., Peeler, T.C., Thompson, G.A., 1989. Phosphatidylinositol 4,5-bisphosphate phospholipase C and phosphomonoesterase in *Dunaliella salina* membranes. *Plant Physiol.* 90, 1115–1120.
- Einspahr Jr., K.J., Thompson, G.A., 1990. Transmembrane signaling via phosphatidylinositol 4 5-bisphosphate hydrolysis in plants. *Plant Physiol.* 93, 361–366.
- Einstein, A. [1905] 1965. Concerning a heuristic point of view toward the emission and transformation of light. *Annalen der Physik* 17: 132. Translated by A. B. Arons and M. B. Peppard. in Einstein's proposal of the photon concept—A translation of the *Annalen der Physik* paper of 1905. *Amer. J. Physics*, 33, 367–374.
- Einstein, A., 1906. Zur Theorie der Brownschen Bewegung. *Annalen der Physik* 19, 371–381.
- Einstein, A., 1926. Space-Time. *Encyclopaedia Britannica*. Thirteenth Ed. <http://preview.britannica.co.uk/classics/Einstein.html>.
- Einstein, A., 1946. $E = Mc^2$. *Science Illustrated* 1 (April), 16–17.

- Einstein, A., 1950. On the generalized theory of gravitation. *Sci. Amer.* 182 (April), 13–17.
- Einstein, A., 1956. *Investigations on the Theory of the Brownian Movement*. Dover Publications, New York.
- Einstein, A., 1961. *Relativity. The Special and the General Theory*. Translated by R. W. Lawson. Bonanza Books, New York.
- Einstein, A., Schrödinger, E., Tchernavin, V., 1936. The freedom of learning. *Science* 83, 372–373.
- Eisenberg, R.S., 1990. Channels as enzymes. *J. Membrane Biol.* 115, 1–12.
- Elbein, A.D., 1979. The role of lipid-linked saccharides in the biosynthesis of complex carbohydrates. *Ann. Rev. Plant Physiol.* 30, 239–272.
- Elgin, S.C.R., 1990. Chromatin structure and gene activity. *Curr Opin. Cell Biol.* 2, 437–445.
- Elliott, D.C., Kokke, Y.S., 1987a. Cross-reaction of a plant protein kinase with antiserum raised against a sequence from bovine brain protein kinase C regulatory subunit. *Biochem. Biophys. Res. Commun.* 145, 1043–1047.
- Elliott, D.C., Kokke, Y.S., 1987. Partial purification and properties of a protein kinase C type enzyme from plants. *Phytochemistry* 26, 2929–2935.
- Elliot, W.H., Elliot, D.C., 1997. *Biochemistry and Molecular Biology*. Oxford University Press, Oxford.
- Ellis, H., 1911. *The Problem of Race-Regeneration*. Moffat, Yard & Co, New York.
- Ellis, R., Yuan, J., Horvitz, R., 1991. Mechanisms and functions of cell death. *Ann. Rev. Cell Biol.* 7, 663–698.
- Ellis, R.J., 1977. Protein synthesis by isolated chloroplasts. *Biochim. Biophys. Acta.* 463, 185–215.
- Ellis, R.J. (Ed.), 1996. *The Chaperonins*. Academic Press, San Diego.
- Elowitz, M.B., Surette, M.G., Wolf, P.-E., Stock, J.B., Leibler, S., 1999. Protein mobility in the cytoplasm of *Escherichia coli*. *J. Bacteriology* 181, 197–203.
- Elsberg, L., 1883. *Memoirs: Plant Cells and Living Matter*. Quart. J. Microscopic. Sci. 23, 87–98.
- Elthon, T.E., Nickels, R.L., McIntosh, L., 1989. Mitochondrial events during development of thermogenesis in *Sauromatum guttatum* (Schott). *Planta* 180, 82–89.
- Elwick, J., 2003. Herbert Spencer and the disunity of the social organism. *Hist. Sci.* 16, 35–72.
- Emans, N., Zimmermann, S., Fischer, R., 2002. Uptake of a fluorescent marker in plant cells is sensitive to brefeldin A and wortmannin. *Plant Cell* 14, 71–86.
- Emanuelsson, O., Elofsson, A., von Heijne, G., Cristobal, S., 2003. In silico prediction of the peroxisomal proteome in fungi, plants and animals. *J. Mol. Biol.* 330, 443–456.
- Embden, G., F Laquer, 1914. Über die Chemie des Lactacidogens. *Z. physiol. Chem.* 94, 123.
- Emerson, A.E., 1954. Dynamic homeostasis: A unifying principle in organic, social, and ethical evolution. *The Scientific Monthly* 78, 67–85.
- Emerson, R.W., 1970. *America the Beautiful*. In the Words of Ralph Waldo Emerson. Country Beautiful Association, Waukesha, WI.
- Emerson, R.W., 1947. Compensation. In: Cummins, S., Linscott, R.N. (Eds.). *Man and Man. The Social Philosophers*. Random House, New York, pp. 427–446.
- Emerson, R., Arnold, W.A., 1932a. A separation of the reactions in photosynthesis by means of intermittent light. *J. Gen. Physiol.* 15, 391–420.
- Emerson, R., Arnold, W.A., 1932b. The photochemical reaction in photosynthesis. *J. Gen. Physiol.* 16, 191–205.
- Emerson, R., Chalmers, R., Cederstand, C., 1957. Some factors influencing the long-wave limit of photosynthesis. *Proc. Natl. Acad. Sci. USA* 43, 133–143.
- Emerson, R., Lewis, C.M., 1943. The dependence on the quantum yield of *Chlorella* photosynthesis on the wave length of light. *Amer. J. Bot.* 30, 165–178.
- Emons, A.M.C., 1985. Plasma membrane rosettes in root hairs of *Equisetum hyemale*. *Planta* 163, 350–359.
- Emons, A.M.C., 1989. Helicoidal microfibril deposition in a tip growing cell and microtubule alignment during tip morphogenesis: A dry-cleaving and freeze-substitution study. *Can. J. Bot.* 67, 2401–2408.
- Emons, A.M.C., Traas, J.A., 1986. Coated pits and coated vesicles on the plasma membrane of plant cells. *Eur. J. Cell Biol.* 41, 57–64.
- Emons, A.M.C., Wolters, A.M.C., 1983. Cortical microtubules and microfibril deposition in the cell wall of root hairs of *Equisetum hyemale*. *Protoplasma* 117, 68–81.
- Endler, A., Meyer, S., Schelbert, S., Schneider, T., Weschke, W., Peters, S.W., Keller, F., Baginsky, S., Martinoia, E., Schmidt, U.G., 2006. Identification of a vacuolar sucrose transporter in barley and Arabidopsis mesophyll cells by a tonoplast proteomic approach. *Plant Physiol.* 141, 196–207.
- Endow, S.A., Higuchi, H., 2000. A mutant of the motor protein kinesin that moves in both directions on microtubules. *Nature* 406, 913–916.
- Endow, S.A., Kang, S.J., Satterwhite, L.L., Rode, M.D., Skeen, V.P., Salmon, E.D., 1994. Yeast Kar3 is a minus-end microtubule motor protein that destabilizes microtubules preferentially at the minus end. *EMBO J.* 13, 2708–2713.
- Engel, J., 1991. Common structural motifs in proteins of the extracellular matrix. *Curr. Opin. Cell Biol.* 3, 779–785.
- Engelhardt, W.A., 1982. Life and science. *Ann. Rev. Biochem.* 51, 1–19.
- Engelhardt, W.A., Ljubimowa, M.N., 1939. Myosine and Adenosinetriphosphate. *Nature* 144, 668–669.
- Engelmann, Th.W., 1879. Physiologie der Protoplasma- und Flimmerbewegung. In: Hermann, L. (Ed.), *Handbuch der Physiologie*, Vol. I. Vogel, Leipzig, pp. 341–408.
- Engelmann, Th.W., 1881. Neue Methode zur Untersuchung der Sauerstoffausscheidung pflanzlicher und thierischer Organismen. *Bot. Z.* 39, 441–448.
- Engelmann, Th.W., [1882] 1955. On the production of oxygen by plant cells in a microspectrum. In: Gabriel, M.L., Fogel, S., (Eds.), *Great Experiments in Biology*. Prentice-Hall, Englewood Cliffs, NJ, pp. 166–170.
- Engels, F., 1934. *Dialectics of nature*. Progress Publishers, Moscow.
- Epel, B.L., van Lent, J.W.M., Cohen, L., Kotlizsky, G., Katz, A., Yahalom, A., 1996. A 41 kDa protein from maize mesocotyl cell walls immunolocalizes to plasmodesmata. *Protoplasma* 191, 70–78.
- Ephrussi, B., 1942. Chemistry of “eye color hormones” of *Drosophila*. *Quart. Rev. Biol.* 17, 327–338.
- Ephrussi, B., 1953. *Nucleo-Cytoplasmic Relations in Microorganisms*. Clarendon Press, Oxford.
- Epimashko, S., Meckel, T., Fischer-Schliebs, E., Lüttge, U., Thiel, G., 2004. Two functionally different vacuoles for static

- and dynamic purposes in one plant mesophyll leaf cell. *Plant J.* 37, 294–300.
- Epimashko, S., Fischer-Schliebs, E., Christian, A.-L., Thiel, G., Lüttge, U., 2006. Na⁺/H⁺-transporter, H⁺-pumps and an aquaporin in light and heavy tonoplast membranes from organic acid and NaCl accumulating vacuoles of the annual facultative CAM plant and halophyte *Mesembryanthemum crystallinum* L. *Planta* 224, 944–951.
- Epstein, E., 1972. *Mineral Nutrition of Plants: Principles and Perspectives*. John Wiley & Sons, New York.
- Epstein, E., 1983. Crops tolerant to salinity and other mineral stresses. In: Nugent, J., O'Connor, M. (Eds.), *Better Crops for Food*, Ciba Foundation Symposium, Vol. 97. Pitman, London, pp. 61–82.
- Epstein, E., Bloom, A.J., 2005. *Mineral Nutrition of Plants: Principles and Perspectives*, second ed. Sinauer Associates, Sunderland, MA.
- Epstein, E., Rains, D.W., Elzam, O.E., 1963. Resolution of dual mechanisms of potassium absorption by barley roots. *Proc. Natl. Acad. Sci. USA* 49, 684–692.
- Erickson, C.A., Nuccitelli, R., 1982. Embryonic cell motility can be guided by weak electric fields. *J. Cell Biol.* 95 (2. Pt. 2), 314a.
- Erickson, H.P., Taylor, D.W., Taylor, K.A., Bramhill, D., 1996. Bacterial cell division protein FtsZ assembles into protofilament sheets and minirings, structural homologs of tubulin polymers. *Proc. Natl. Acad. Sci. USA* 93, 519–523.
- Erickson, H.P., 1995. FtsZ, a prokaryotic homolog of tubulin? *Cell* 80, 367–370.
- Errera, L., 1888. Ueber Zellformen und seifenblasen. *Bot. Centralbl.* 34, 395–399.
- Ervasti, J.M., Campbell, K.P., 1993. Dystrophin and the membrane skeleton. *Curr. Opin. Cell Biol.* 5, 82–87.
- Erwee, M.G., Goodwin, P.B., 1985. Symplastic domains in extrastelar tissues of *Egeria densa* Planch. *Planta* 163, 9–19.
- Erwee, M.G., Goodwin, P.B., van Bel, A.J.E., 1985. Cell-cell communication in the leaves of *Commelina cyanea* and other plants. *Plant Cell Environ.* 8, 173–178.
- Esau, K., 1944. Anatomical and cytological studies on beet mosaic. *J. Agric. Res.* 69, 95–117.
- Esau, K., 1965. *Plant Anatomy*, second ed. John Wiley & Sons, New York.
- Esau, K., Grill, R.H., 1965. Observations on cytokinesis. *Planta* 67, 168–181.
- Esau, K., Thorsch, J., 1985. Sieve plate pores and plasmodesmata, the communication channels of the symplast: Ultrastructural aspects and developmental relations. *Amer. J. Bot.* 72, 1641–1653.
- Escobar, N.M., Haupt, S., Thow, G., Boevink, P., Chapman, S., Oparka, K., 2003. High-throughput viral expression of cDNA-green fluorescent protein fusions reveals novel subcellular addresses and identifies unique proteins that interact with plasmodesmata. *Plant Cell* 15, 1507–1523.
- Estes, J.E., Selden, L.A., Kinoshita, H.J., Gershman, L.C., 1992. Tightly-bound divalent cation of actin. *J. Musc. Res. Cell Motil.* 13, 272–284.
- Etherton, B., 1963. Relationship of cell transmembrane electropotential to potassium and sodium accumulation ratios in oat and pea seedlings. *Plant Physiol.* 38, 581–585.
- Etherton, B., Higinbotham, N., 1960. Transmembrane potential. measurements of cells of higher plants as related to salt uptake. *Science* 131, 409–410.
- Etherton, B., Rubinstein, B., 1978. Evidence for amino acid-H⁺ co-transport in oat coleoptiles. *Plant Physiol.* 61, 933–937.
- Ettinger, W.F., Theg, S.M., 1991. Physiologically active chloroplasts contain pools of unassembled extrinsic proteins of the photosynthetic oxygen-evolving enzyme complex in the thylakoid lumen. *J. Cell. Biol.* 115, 321–328.
- Ettlinger, C., Lehle, L., 1988. Auxin induces rapid changes in phosphatidylinositol metabolites. *Nature* 331, 176–178.
- Etcheberria, E., Baroja-Fernandez, E., Muñoz, F.J., Pozueta-Romero, J., 2005a. Sucrose inducible endocytosis as a mechanism for nutrient uptake in heterotrophic plant cells. *Plant Cell Physiol.* 46, 474–481.
- Etcheberria, E., Gonzalez, P.C., Pozueta-Romero, J., 2005b. Sucrose transport into the vacuole of *Citrus* juice cells: Evidence for an endocytotic transport system. *J. Amer. Soc. Hort. Sci.* 130, 269–274.
- Etcheberria, E., Gonzalez, P.C., Tomlinson, P., Pozueta-Romero, J., 2005c. Existence of two parallel mechanisms for glucose uptake in heterotrophic plant cells. *J. Exp. Bot.* 56, 1905–1912.
- Etcheberria, E., Gonzalez, P., Baroja-Fernandez, E., Pozueta-Romero, J., 2006. Fluid phase endocytotic uptake of artificial nano-spheres and fluorescent quantum dots by sycamore cultured cells. *Plant Signal Behav.* 1, 196–200.
- Etcheberria, E., Gonzalez, P.C., Pozueta-Romero, J., 2007. Mannitol-enhanced, fluid-phase endocytosis in storage parenchyma cells of celery (*Apium graveolens*; Apiaceae) petioles. *Amer. J. Bot.* 94, 1041–1045.
- Euler, H., 1912. *General Chemistry of the Enzymes*. Translated by T. H. Pope. John Wiley & Sons, New York.
- Euler-Chelpin, H. von, 1930. Fermentation of sugars and fermentative enzymes. *Nobel Lect.* May 23, 1930.
- Eun, S.-O., Bae, S.-H., Lee, Y., 2001. Cortical actin filaments in guard cells respond differently to ABA in wild type and abi-1 mutant *Arabidopsis*. *Planta* 212, 466–469.
- Eun, S.-O., Lee, Y., 1997. Actin filaments of guard cells are reorganized in response to light and abscisic acid. *Plant Physiol.* 115, 1491–1498.
- Eun, S.-O., Lee, Y., 2000. Stomatal opening by fusicoccin is accompanied by depolymerization of actin filaments in guard cells. *Planta* 210, 1014–1017.
- Euteneuer, U., Koonce, M.P., Pfister, K.K., Schliwa, M., 1988. An ATPase with properties expected for the organelle motor of the giant amoeba, *Reticulomyxa*. *Nature* 332, 176–178.
- Euteneuer, U., McIntosh, J.R., 1980. Polarity of midbody and phragmoplast microtubules. *J. Cell Biol.* 87, 509–515.
- Euteneuer, U., McIntosh, J.R., 1981. Polarity of some motility-related microtubules. *Proc. Natl. Acad. Sci. USA* 78, 372–376.
- Euteneuer, U., McIntosh, J.R., 1981. Structural polarity of kinetochore microtubules in PtK₁ cells. *J. Cell Biol.* 89, 338–345.
- Evans Jr., E.A., Slotin, L., 1940. The utilization of carbon dioxide in the synthesis of α -ketoglutaric acid. *J. Biol. Chem.* 136, 301–302.
- Evans Jr., E.A., Slotin, L., 1941. Carbon dioxide utilization by pigeon liver. *J. Biol. Chem.* 141, 439–450.
- Evans, G.M., Durrant, A., Rees, H., 1966. Associated nuclear changes in the induction of flax genotrophs. *Nature* 212, 697–699.
- Evans, I.M., Gatehouse, L.N., Gatehouse, J.A., Robinson, N.J., Croy, R.R.D., 1990. A gene from pea (*Pisum sativum* L.) with homology to metallothionein genes. *FEBS Lett.* 262, 29–32.

- Evans, M.L., Ishikawa, H., 1997. Computer based imaging and analysis of root gravitropism. *Gravitational and Space Biology Bull.* 10, 65–73.
- Evert, R.F., Eschrich, W., Heyser, W., 1977. Distribution and structure of the plasmodesmata in mesophyll and bundle-sheath cells of *Zea mays* L. *Planta* 136, 77–89.
- Ewart, A.J., 1906. The ascent of water in trees. *Phil. Trans. Roy. Soc. Lond.* 198B, 41–85.
- F-**
- Fabry, B., Maksym, G.N., Butler, J.P., Glogauer, M., Navajas, D., Fredberg, J.J., 2001. Scaling the microrheology of living cells. *Physical Rev. Lett.* 87 148102-1-4.
- Faguy, D.M., Doolittle, D.F., 1998. Cytoskeletal proteins: The evolution of cell division. *Curr. Biol.* 8, R338–R341.
- Fahn, A., 1979. *Secretory Tissues in Vascular Plants*. Academic Press, London.
- Falbel, T.G., Koch, L.M., Nadeau, J.A., Segui-Simarro, J.M., Sack, F.D., Bednarek, S.Y., 2003. SCD1 is required for cytokinesis and polarized cell expansion in *Arabidopsis*. *Development* 130, 4011–4024.
- Falconer, M.M., Donaldson, G., Seagull, R.W., 1988. MTOCs in higher plant cells: An immunofluorescent study of microtubule assembly sites following depolymerization by APM. *Protoplasma* 144, 46–55.
- Falconer, M.M., Seagull, R.W., 1988. Xylogenesis in tissue culture III. Continuing wall deposition during tracheary element development. *Protoplasma* 144, 10–16.
- Falke, L.C., Edwards, K.L., Pickard, B.G., Misler, S., 1988. A stretch-activated anion channel in tobacco protoplasts. *FEBS Lett.* 237, 141–144.
- Fambrough, D.M., Bonner, J., 1966. On the similarity of plant and animal histones. *Biochemistry* 5, 2563–2570.
- Faraday, C.D., Spanswick, R.M., 1993. Evidence for a membrane skeleton in higher plants a spectrin-like polypeptide co-isolates with rice root plasma membranes. *FEBS Lett.* 318, 313–316.
- Faraday, C.D., Thomson, W.W., 1986a. Functional aspects of the salt glands of the Plumbaginaceae. *J. Exp. Bot.* 37, 1129–1135.
- Faraday, C.D., Thomson, W.W., 1986b. Morphometric analysis of *Limonium* salt glands in relation to ion efflux. *J. Exp. Bot.* 37, 471–481.
- Faraday, C.D., Thomson, W.W., 1986c. Structural aspects of the salt glands of the Plumbaginaceae. *J. Exp. Bot.* 37, 461–470.
- Faraday, M. [1861] 1960. *On the Forces of Nature and their Relations to Each Other*. Viking Press, New York.
- Faraday, M. [1860] 1962. *The Chemical History of a Candle*. Edited by W. Crookes with the Original Illustrations and a New Introduction by L. P. Williams. Collier Books, New York.
- Farber, J., 1969. *The Student as Nigger. Essays and Stories*. Contact Books, North Hollywood, CA.
- Farley, J., 1977. *The Spontaneous Generation Controversy from Descartes to Oparin*. The Johns Hopkins University Press, Baltimore.
- Farmer, J.B., 1913. *Plant Life*. Williams & Norgate, London.
- Farmer, J.B., Moore, J.E., 1905. On the meiotic phase (reduction divisions) in animals and plants. *Quart. J. Microscop. Sci.* 48, 489–557.
- Farmer, J.B., Moore, J.E.S., Walker, C.E., 1905a. On the cytology of malignant growths. *Proc. Roy. Soc. B.* 77, 336–352.
- Farmer, J.B., Moore, J.E.S., Walker, C.E., 1905b. On the resemblances existing between the “Plimmers Bodies” of malignant growths, and certain normal constituents of reproductive cells of animals. *Proc. Roy. Soc. B.* 76, 230–234.
- Fasano, J.M., Swanson, S.J., Blancaflor, E.B., Dowd, P.E., Kao, T.-H., Gilroy, S., 2001. Changes in root cap pH are required for the gravity response of the *Arabidopsis* root. *Plant Cell* 13, 907–921.
- Fath, K.R., Burgess, D.R., 1994. Membrane motility mediated by unconventional myosin. *Curr. Opin. Cell Biol.* 6, 131–135.
- Faulkner, C., Akman, O.E., Ball, K., Jeffree, C., Oparka, K., 2008. Peeking into pit fields: A multiple twinning model of secondary plasmodesmata formation in tobacco. *Plant Cell* 20, 1504–1518.
- Faulkner, C.R., Blackman, L.M., Cordwell, S.J., Overall, R.L., 2005. Proteomic identification of putative plasmodesmatal proteins from *Chara corallina*. *Proteomics* 5, 2866–2875.
- Fawcett, D.W., Porter, K.R., 1954. A study of the fine structure of ciliated epithelia. *J. Morphol.* 94, 282.
- Faye, L., Greenwood, J.S., Herman, E.M., Sturm, A., Chrispeels, M.J., 1988. Transport and posttranslational processing of the vacuolar enzyme α -mannosidase in jack-bean cotyledons. *Planta* 174, 271–282.
- Faye, L., Daniell, H., 2006. Novel pathways for glycoprotein import into chloroplasts. *Plant Biotechnol. J.* 4, 275–279.
- Faye, L., Johnson, D.D., Stern, A., Chrispeels, M.J., 1989. Structure, biosynthesis, and function of asparagine-linked glycans on plant glycoproteins. *Physiol. Plant* 75, 309–314.
- Featherstone, C., Russell, P., 1991. Fission yeast p107^{wee1} mitotic inhibitor is a tyrosine/serine kinase. *Nature* 349, 808–811.
- Fedoroff, N., 1992. Barbara McClintock: The Geneticist, the Genius, the Woman. *Cell* 71, 181–182.
- Fedorova, E., Greenwood, J.S., Oaks, A., 1994. In situ localization of nitrate reductase in maize roots. *Planta* 194, 279–286.
- Feenberg, E., Primakoff, H., 1948. Interaction of cosmic-ray primaries with sunlight and starlight. *Phys. Rev.* 73, 449–469.
- Feher, G., 1998. Three decades of research in bacterial photosynthesis and the road leadin to it: A personal account. *Photosynth. Res.* 55, 1–40.
- Feher, G., 2002. My road to biophysics: Picking flowers on the way to photosynthesis. *Annu. Rev. Biophys. Biomol. Struct.* 31, 1–44.
- Feijó, J.A., Malhó, R., Obermeyer, G., 1995. Ion dynamics and its possible role during in vitro pollen germination and tube growth. *Protoplasma* 187, 155–167.
- Feijó, J.A., Sainhas, J., Holdaway-Clarke, T., Cordiero, S., Kunkel, J.K.G., Hepler, P.K., 2001. Cellular oscillations and the regulation of growth: The pollen tube paradigm. *BioEssays* 23, 86–94.
- Feiler, H.S., Jacobs, T.W., 1990. Cell division in higher plants; a cdc2 gene, its 34kDa product, and histone H1 kinase activity in pea. *Proc. Natl. Acad. Sci. USA* 87, 5397–5401.
- Feldherr, C.M., Kallenbach, E., Schultz, N., 1984. Movement of a karyophilic protein through the nuclear pores of oocytes. *J. Cell Biol.* 99, 2216–2222.
- Felle, H.H., 1982. Effects of fusicoccin upon membrane potential, resistance and current-voltage characteristics in root hairs of *Sinapis alba*. *Plant Sci. Lett.* 25, 219–225.

- Felle, H.H., 1989a. Ca^{2+} microelectrodes and their application to plant cells and tissues. *Plant Physiol.* 35, 397–439.
- Felle, H.H., 1989b. pH as a second messenger in plants. In: Boss, W.F., Morré, D.J. (Eds.), *Second Messengers in Plant Growth and Development*. Alan R. Liss, Inc., New York, pp. 145–166.
- Felle, H.H., 2002. pH as a signal and regulator of membrane transport. In: Rengel, Z. (Ed.), *Handbook of Plant Growth. pH as the Master Variable*. Marcel Dekker, New York, pp. 107–130.
- Fellman, J.K., Loescher, W.H., 1987. Comparative studies of sucrose and mannitol utilization in celery (*Apium graveolens*). *Physiol. Plant.* 69, 337–341.
- Fermi, L., 1954. *Atoms in the Family. My Life with Enrico Fermi*. University of Chicago Press, Chicago.
- Fermi, L., 1971. *Illustrious immigrants, second ed.* The University of Chicago Press, Chicago.
- Ferreira, P.C.G., Hemerly, A.S., Villarruel, R., van Montagu, M., Inzé, D., 1991. The *Arabidopsis* functional homolog of the $\text{p34}^{\text{cdc}2}$ protein kinase. *Plant Cell* 3, 531–540.
- Ferreira, R.M.B., Bird, B., Davies, D.D., 1989. The effect of light on the structure and organization of *Lemna* peroxisomes. *J. Exp. Bot.* 40, 1029–1035.
- Ferris Jr., J.P., Hill, A.R., Liu, R., Orgel, L.E., 1996. Synthesis of long prebiotic oligomers on mineral surfaces. *Nature* 381, 59–61.
- Ferris, T., 1997. *The Whole Shebang*. Simon & Schuster, New York.
- Ferro, M., Salvi, D., Brugière, S., Miras, S., Kowalski, S., Louwagie, M., Garin, J., Joyard, J., Rolland, N., 2003. Proteomics of the chloroplast envelope membranes from *Arabidopsis thaliana*. *Mol. Cell. Proteomics* 2, 325–345.
- Feulgen, R., 1923. *Chemie und Physiologie der Nukleinstoffe*. Borntraeger, Berlin.
- Feulgen, R., Rossenbeck, H., 1924. Mikroskopisch-chemischer Nachweis einer Nucleinsäure vom Typus der Thymonucleinsäure und die darauf beruhende elektive Färbung von Zellkernen in mikroskopischen Präparaten. *Z. Physiol. Chem.* 135, 203–248.
- Feynman, R.P., 1955. The value of science. *Engineering and Science* 19 (December), 13–15.
- Feynman, R.P., 1965. *The Character of Physical Law*. The MIT Press, Cambridge, MA.
- Feynman, R.P., 1965a. The development of the space-time view of quantum electrodynamics. Nobel Lect. December 11, 1965.
- Feynman, R.P., 1969. What is science? *The Physics Teacher* (September), 313–320.
- Feynman, R.P., 1996. *Feynman Lectures on Computation*. Addison-Wesley, Reading, MA.
- Fichmann, J., Taiz, L., Gallagher, S., Leonard, R.T., Depta, H., Robinson, D.G., 1989. Immunological comparison of the coated vesicle H^{+} -ATPases of plants and animals. *Protoplasma* 153, 117–125.
- Fick, A., 1855. On liquid diffusion. *Phil. Mag.* 10, 30–39.
- Filner, P., Varner, J.E., 1967. A test of de novo synthesis of enzymes: Density labelling with H_2O^{18} of barley α -amylase induced by gibberellic acid. *Proc. Natl. Acad. Sci. USA* 58, 1520–1526.
- Finck, H., 1968. On the discovery of actin. *Science* 160, 332.
- Findlay, A., 1948. *A Hundred Years of Chemistry*, second ed. Gerald Duckworth & Co., London.
- Finer, J.T., Simmons, R.M., Spudich, J.A., 1994. Single myosin molecule mechanics: Piconewton forces and nanometre steps. *Nature* 368, 113–119.
- Finlay, D.R., Forbes, D.J., 1990. Reconstitution of biochemically altered nuclear pores: Transport can be eliminated and restored. *Cell* 60, 17–29.
- Finley, B.B., 1990. Cell adhesion and invasion mechanisms in microbial pathogenesis. *Curr. Opin. Cell Biol.* 2, 815–820.
- Fire, A.Z., 2006. Gene silencing by double stranded RNA. Nobel Lect. December 8, 2006.
- Fire, A., Xu, S.Q., Montgomery, M.K., Kostas, S.A., Driver, S.E., Mello, C.C., 1998. Potent and specific genetic interference by double-stranded RNA in *Caenorhabditis elegans*. *Nature* 391, 806–811.
- Fischer, A., 1899. Fixierung, Färbung und Ban des Protoplasmas. Fischer, Jena.
- Fischer, E., 1902. Syntheses in the purine and sugar group. Nobel Lect. December 12, 1902.
- Fischer, E., 1923. Untersuchungen über Aminosäuren, Polypeptide und Proteine. II. 1907–1919. Springer, Berlin.
- Fischer, E.H., 1992. Protein phosphorylation and cellular regulation II. Nobel Lect. December 8, 1992.
- Fischer, H., 1930. On haemin and the relationship between haemin and chlorophyll. Nobel Lect. December 11, 1930.
- Fischer, K., Schopfer, P., 1997. Interaction of auxin, light, and mechanical stress in orienting microtubules in relation to tropic curvature in the epidermis of maize coleoptiles. *Protoplasma* 196, 108–116.
- Fischer, R.L., Bennett, A.B., 1991. Role of cell wall hydrolases in fruit ripening. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 42, 675–703.
- Fischer-Arnold, G., 1963. Untersuchungen über die Chloroplastenbewegung bei *Vaucheria sessili*. *Protoplasma* 56, 495–520.
- Fisher, D., Weisenberger, D., Scheer, U., 1991. Assigning functions to nucleolar structures. *Chromosoma* 101, 133–140.
- Fisher, D.B., 1999. The estimated pore diameter for plasmodesmatal channels in the *Abutilon* nectary trichome should be about 4 nm, rather than 3 nm. *Planta* 208, 299–300.
- Fisher Jr., D.B., Outlaw, W.H., 1979. Sucrose compartmentation in the palisade parenchyma of *Vicia faba*. *Plant Physiol.* 64, 481–483.
- Fisher, D.B., Wu, Y., Ku, M.S.B., 1992. Turnover of soluble proteins in the wheat sieve tube. *Plant Physiol.* 100, 1433–1441.
- Fisher, D.D., Cyr, R.J., 1998. Extending the microtubule/microfibril paradigm: Cellulose synthesis is required for normal cortical microtubule alignment in elongating cells. *Plant Physiol.* 116, 1043–1051.
- Fisher, J., Hodges, T.K., 1969. Monovalent ion stimulated adenosine triphosphatase from oat roots. *Plant Physiol.* 44, 385–395.
- Fiske, C.H., Subbarow, Y., 1929. Phosphorous compounds of muscle and liver. *Science* 70, 381–382.
- Fitch, W.M., Margoliasch, E., 1967. Construction of phylogenetic trees. *Science* 155, 279–284.
- Fitchette-Lainé, A.C., Gomord, V., Chekkafi, A., Faye, L., 1994. Distribution of xylosylation and fucosylation in the plant Golgi apparatus. *Plant J.* 5, 673–682.
- Fitzelle, K.J., Kiss, J.Z., 2001. Restoration of gravitropic sensitivity in starch-deficient mutants of *Arabidopsis* by hypergravity. *J. Exp. Bot.* 52, 265–275.

- Fleming, A.J., McQueen-Mason, S., Mandel, T., Kuhlemeier, C., 1997. Induction of leaf primordia by the cell wall protein expansin. *Science* 276, 1415–1418.
- Flemming, W. [1880] 1965. Contributions to the knowledge of the cell and its vital processes. *J. Cell Biol.* 25 [Suppl. on Mitosis]: 1–69.
- Flemming, W., 1882. *Zellsubstanz. Kern und Zelltheilung*. Vogel, Leipzig.
- Flexas, J., Ribas-Carbo, M., Hanson, D.T., Bota, J., Otto, B., et al., 2006. Tobacco aquaporin NtAQP1 is involved in mesophyll conductance to CO₂ in vivo. *Plant J.* 48, 427–439.
- Flores, J.J., Ponnamperna, C., 1972. Polymerization of amino acids under primitive Earth conditions. *J. Molecular Evolution* 2, 1–9.
- Flückiger, R., De Caroli, M., Piro, G., Dalessandro, G., Neuhaus, J.-M., Di Sansebastiano, G.-P., 2003. Vacuolar system distribution in *Arabidopsis* tissues, visualized using GFP-fusion proteins. *J. Exp. Bot.* 54, 1577–1584.
- Flügge, U.-I., 1990. Import of proteins into chloroplasts. *J. Cell Sci.* 96, 351–354.
- Flügge, U.-I., Benz, R., 1984. Pore-forming activity in the outer membrane of the chloroplast envelope. *FEBS Lett.* 169, 85–89.
- Flügge, U.-I., Weber, A., 1994. A rapid method for measuring organelle-specific substrate transport in homogenates from plant tissues. *Planta* 194, 181–185.
- Flynn, C.R., Mullen, R.T., Trelease, R.N., 1998. Mutational analyses of a type 2 peroxisomal targeting signal that is capable of directing oligomeric import into tobacco glyoxysomes. *Plant J.* 16, 709–720.
- Foard, D.E., Haber, A.H., 1961. Anatomic studies of gamma-irradiated wheat grown without cell division. *Amer. J. Bot.* 48, 438–446.
- Foissner, I., Wasteneys, G.O., 2007. Wide-ranging effects of eight cytochalasins and latrunculin A and B on intracellular motility and actin filament reorganization in characean internodal cells. *Plant Cell Physiol.* 48, 585–597.
- Fontes, E.B.P., Shank, B.B., Worbel, R.L., Moose, S.P., O'Brian, G.R., Wutzel, E.T., Boston, R.S., 1991. Characterization of an immunoglobulin binding protein homolog in the maize floury-2 endosperm mutant. *Plant Cell* 3, 483–496.
- Footitt, S., Slocumbe, S.P., Lerner, V., Kurup, S., Wu, Y., Larson, T., Graham, I., Baker, A., Holdsworth, M., 2002. Control of germination and lipid mobilization by COMATOSE, the *Arabidopsis* homologue of human ALDP. *EMBO J.* 21, 2912–2922.
- Forbes, R.J., 1970. *A Short History of the Art of Distillation*. E. J. Brill Leiden, The Netherlands.
- Ford, B.J., 2001. The Royal Society and the microscope. *Notes and Records of the Royal Society* 55, 29–49.
- Forer, A., 1965. Local reduction of spindle fiber birefringence in living *Nephrotoma suturalis* (Loew) spermatocytes induced by ultraviolet microbeam irradiation. *J. Cell Biol.* 25, 95–117.
- Forer, A., 1969. Chromosome movements during cell-division. In: Lima-de-Faria, A. (Ed.), *Handbook of Molecular Cytology*. North Holland Publishing Co., Amsterdam, pp. 553–601.
- Forer, A., 1978. Chromosome movements during cell-division: Possible involvement of actin filaments. In: Heath, I.B. (Ed.), *Nuclear Division in the Fungi*. Academic Press, New York, pp. 21–88.
- Forer, A., 1988. Do anaphase chromosomes chew their way to the pole or are they pulled by actin? *J. Cell Sci.* 91, 449–453.
- Forer, A., Pickett-Heaps, J.D., 1998. Cytochalasin D and latrunculin affect chromosome behaviour during meiosis in crane-fly spermatocytes. *Chromosome Research* 6, 533–549.
- Forrester, M.L., Krotkov, G., Nelson, C.D., 1966. Effect of oxygen on photosynthesis, photorespiration, and respiration in detached leaves. II. Soybean. *Plant Physiol.* 41, 422–427.
- Forscher, B.K., 1963. Chaos in the brickyard. *Science* 142, 339.
- Forti, G., 1999. Personal recollections of 40 years in photosynthesis research. *Photosynth. Res.* 60, 99–110.
- Fortman, J.L., Chhabra, S., Mukhopadhyay, A., Chou, H., Lee, T.S., Steen, E., Keasling, J.D., 2008. Biofuel alternatives to ethanol: Pumping the microbial well. *Trends Biotech.* 26, 375–381.
- Foster, A.S., 1938. Structure and growth of the shoot apex in *Ginkgo biloba*. *Bull. Torrey Bot. Club* 65, 531–556.
- Foster, K.W., Smyth, R.D., 1980. Light antennas in phototactic algae. *Microbiol. Rev.* 44, 572–630.
- Foster, K.W., Saranak, J., Zarrilli, G., 1988. Autoregulation of rhodopsin synthesis in *Chlamydomonas reinhardtii*. *Proc. Natl. Acad. Sci. USA* 85, 6379–6383.
- Foster, K.W., Saranak, J., Derguini, F., Zarrilli, G.R., Johnson, R., Okabe, M., Nakanishi, K., 1989a. Activation of *Chlamydomonas* rhodopsin in vivo does not require isomerization of retinal. *Biochemistry* 28, 819–824.
- Foster, K.W., Saranak, J., 1989b. The *Chlamydomonas* (Chlorophyceae) eye as a model of cellular structure, intracellular signaling and rhodopsin activation. In: Coleman, A., Goff, L., Stein-Taylor, J.R. (Eds.), *Algae as Experimental Systems*. Alan R. Liss, New York, pp. 215–230.
- Foster, K.W., Saranak, J., Dowben, P.A., 1991. Spectral sensitivity, structure, and activation of eukaryotic rhodopsins: Activation spectroscopy of rhodopsin analogs in *Chlamydomonas*. *J. Photochem. Photobiol. B: Biol.* 8, 385–408.
- Foster, K. W., 2001. Action spectroscopy of photomovement. In: Hader, D.-P., Lebert, M. (Eds.), *Photomovement. Comprehensive Series in the Photosciences*, 1, 51–115.
- Foster, K.W., Saranak, J., Patel, N., Zarrilli, G., Okabe, M., Kline, T., Nakanishi, K., 1984. Rhodopsin is the functional photoreceptor for phototaxis in the unicellular eukaryote *Chlamydomonas*. *Nature* 311, 756–759.
- Foth, B.J., Goedecke, M.C., Solsati, D., 2006. New insights into myosin evolution and classification. *Proc. Natl. Acad. Sci. USA* 103, 3681–3686.
- Fothergill, P.G., 1958. *Life and Its Origin*. Sheed and Ward, London.
- Fowke, L.C., Tanchak, M.A., Galway, M.E., 1991. Ultrastructural cytology of the endocytic pathway in plants. In: Hawes, C.R., Coleman, J.O.D., Evans, D.E. (Eds.), *Endocytosis, Exocytosis and Vesicle Traffic in Plants*. Cambridge University Press, Cambridge, pp. 15–40.
- Fox, D.L., Wells, J.R., 1971. Schemochromic blue lead-surfaces of *Selaginella*. *Amer. Fern. J.* 61, 137–139.
- Fox, R.F., 1988. *Energy and the Evolution of Life*. W. H. Freeman and Co., New York.
- Fox, S.W., 1959. Origin of life. *Science* 130, 1622.
- Fox, S., 1988. *The Emergence of Life*. Basic Books, New York.
- Fox, S.W., Dose, K., 1972. *Molecular Evolution and the Origin of Life*. W. H. Freeman, San Francisco.
- Frado, L.-L., Annunziato, A.T., Woodcock, C.L.F., 1977. Structural repeating units of chromatin. III. A comparison of subunits from vertebrate, ciliate and angiosperm species. *Biochem. Biophys. Acta* 475, 514–520.
- Fraenkel-Conrat, H., 1956. The chemistry of proteins and peptides. *Ann. Rev. Biochem.* 25, 291–330.

- Fraenkel-Conrat, H., 1962. Design and Function at the Threshold of Life: The viruses. Academic Press, New York.
- Fraenkel-Conrat, H., (Ed.), 1968. Molecular basis of virology. Reinhold, New York.
- Fraenkel-Conrat, H., 1969. Chemistry and Biology of Viruses. Academic Press, New York.
- Fraenkel-Conrat, H., 1985. The Viruses: Catalogue, Characterization, and Classification. Plenum Press, New York.
- Fraenkel-Conrat, H.P.C. Kimball, Levy, J.A., 1988. Virology. Plenum Press, New York.
- Francé, R.H., 1905. Germs of Mind in Plants. Translated by A. M. Simons. Charles H. Kerr & Co., Chicago.
- Francé, R.H., 1909. Pflanzenpsychologie als Arbeitshypothese der Pflanzenphysiologie. Franck'sche Verlagshandlung, Stuttgart.
- Franceschi, V.R., Ding, B., Lucas, W.J., 1994. Mechanism of plasmodesmata formation in characean algae in relation to evolution of intercellular communication in higher plants. *Planta* 192, 347–358.
- Franck, J., 1926. Transformation of kinetic energy of free electrons into excitation energy of atoms by impacts. Nobel Lect. December 11, 1926.
- Franck, J., Loomis, W. E. (Eds.), 1949. Photosynthesis in Plants. Iowa State College Press, Ames.
- Franke, W.W., 1966. Isolated nuclear membranes. *J. Cell Biol.* 31, 619–623.
- Franke, W.W., Berendonk, B., 1997. Hormonal doping and androgenization of athletes: A secret program of the German Democratic Republic government. *Clinical Chemistry* 43, 1262–1279.
- Franke, W.W., Herth, W., VanDerWoude, W.J., Morré, D.J., 1972. Tubular and filamentous structures in pollen tubes: possible involvement as guide elements in protoplasmic streaming and vectorial migration of secretory vesicles. *Planta* 105, 317–341.
- Franke, W.W., Scheer, U., Trendelenburg, M.F., Spring, H., Zentgraf, H., 1976. Absence of nucleosomes in transcriptionally active chromatin. *Cytobiologie* 13, 401–434.
- Franke, W.W., Schinko, W., 1969. Nuclear shape in muscle cells. *J. Cell. Biol.* 42, 326–331.
- Frankl, V.E., 1985. Man's Search for Meaning. Washington Square Press, New York.
- Frankel, S., Mooseker, M.S., 1996. The actin-related proteins. *Curr. Opin. Cell Biol.* 8, 30–37.
- Franklin, A., 1976. Principle of inertia in the middle ages. *Amer. J. Phys.* 44, 529–545.
- Franklin, A.E., Hoffman, N.E., 1993. Characterization of a chloroplast homologue of the 54-kDa subunit of the signal recognition particle. *J. Biol. Chem.* 268, 22175–22180.
- Franklin, R.E., Gosling, R.G., 1953. Molecular configuration in sodium thymonucleate. *Nature* 171, 740–741.
- Franklin-Tong, V.E., 1999. Signalling and the modulation of pollen tube growth. *Plant Cell* 11, 727–738.
- Franklin-Tong, V.E., Drøbak, B.K., Allan, A.C., Watkins, P.A.C., Trewavas, A.J., 1996. Growth of pollen tubes of *Papaver rhoeas* is regulated by a slow-moving calcium wave propagated by inositol 1,4,5-trisphosphate. *Plant Cell* 8, 1305–1321.
- Franklin-Tong, V.E., Ride, J.P., Read, N.D., Trewavas, A.J., Franklin, F.C.H., 1993. The self-incompatibility response in *Papaver rhoeas* is mediated by cytosolic free calcium. *Plant J.* 4, 163–177.
- Franks, F., 2000. Water: A Matrix of Life, second ed. Royal Society of Chemistry, Cambridge.
- Fraser, H.C.I., 1908. Nuclear fusions and reductions in the Ascomycetes. *Brit. Assoc. Adv. Sci. Report of the seventy-seventh meeting*, 688–689.
- Fraser, C.M., Gocayne, J.D., White, O., Adams, M.D., et al., 1995. The minimal gene complement of *Mycoplasma genitalium*. *Science* 270, 397–404.
- Fraústo da Silva, J.J.R., Williams, R.J.P., 1991. The Biological Chemistry of the Elements. The Inorganic Chemistry of Life. Clarendon Press, Oxford.
- Frederick, S.E., Gruber, P.J., Newcomb, E.H., 1975. Plant microbodies, *Protoplasma* 84, 1–29.
- Frederick, S.E., Mangan, M.E., Carey, J.B., Gruber, P.J., 1992. Intermediate filament antigens of 60 and 65 kDa in the nuclear matrix of plants: Their detection and location and localization. *Exp Cell Res.* 199, 213–222.
- Frederick, S.E., Newcomb, E., 1969. Cytochemical localization of catalase in leaf microbodies (peroxisomes). *J. Cell Biol.* 43, 343–352.
- Frederick, S.E., Newcomb, E.H., Virgil, E.L., Wergin, W.P., 1968. Fine structural characterization of plant microbodies. *Planta* 81, 229–252.
- Freitag, H., Stichler, W., 2000. A remarkable new leaf type with unusual photosynthetic tissue in a Central Asiatic genus of Chenopodiaceae. *Plant Biol.* 2, 154–160.
- Freitag, H., Stichler, W., 2002. *Bienertia cycloptera* Bunge ex Boiss., Chenopodiaceae, another C_4 plant without Kranz tissues. *Plant Biol.* 4, 121–132.
- French Jr., J.C., Paolillo, D.J., 1975. The effect of the calyptra on the plane of guard cell mother cell division in *Funaria* and *Physcomitrium* capsules. *Ann Bot.* 39, 233–236.
- Frevert, J., Koller, W., Kindl, H., 1980. Occurrence and biosynthesis of glyoxysomal enzymes in ripening cucumber seeds. *Hoppe-Seyler's Z. Physiol. Chem.* 361, 1557–1565.
- Frey-Wyssling, A., 1953. Submicroscopic Morphology of Protoplasm. Elsevier, Amsterdam.
- Frey-Wyssling, A., 1957. Macromolecules in Cell Structure. Harvard University Press, Cambridge, MA.
- Frey-Wyssling, A., 1959. Die Pflanzliche Zellwand. Springer-Verlag, Berlin.
- Frey-Wyssling, A., 1976. The Plant Cell Wall, 3rd rev. ed. Barntrceger, Berlin.
- Frey-Wyssling, A., Kreutzer, E., 1958. The submicroscopic development of chromoplasts in the fruit of *Capsicum annuum* L. *J. Ultrastruct. Res.* 1, 397–411.
- Frey-Wyssling, A., Lopez-Saez, J.F., Mühlenthaler, K., 1964. Formation and development of the cell plate. *J. Ultrastruct. Res.* 10, 422–432.
- Frey-Wyssling, A., Mülethaler, K., 1949. Über den Feinbau der Chorophyllkörner. *Vierteljahrsschr. Naturf. Gesell (Zürich)* 94, 179–183.
- Frey-Wyssling, A., Mühlethaler, K., 1965. Ultrastructural Plant Cytology. Elsevier, Amsterdam.
- Frey-Wyssling, A., Schwegler, F., 1965. Ultrastructure of the chromoplasts in the carrot root. *J. Ultrastruct. Res.* 13, 543–559.
- Frias, I., Caldeira, M.T., Perez-Castineira, J.R., Navarro-Avino, J.P., Culianez-Macia, F.A., Kuppinger, O., Stransky, H., Pages, M., Hager, A., Serrano, R., 1996. A major isoform of the maize plasma membrane H^+ -ATPase: Characterization and induction by auxin in coleoptiles. *Plant Cell* 8, 1533–1544.

- Fricke, H., 1925. The electric capacity of suspensions with special reference to blood. *J. Gen. Physiol.* 9, 137–152.
- Fricke, W., Chaumont, F., 2006. Solute and water relations of growing plant cells. *Plant Cell Monogr.* 5, 7–31.
- Friedkin, M., Lehninger, A.L., 1949. Esterification of inorganic phosphate coupled to electron transport between dihydridophosphopyridine nucleotide and oxygen. I. *J. Biol. Chem.* 178, 611–623.
- Friemann, A., Hachtel, W., 1988. Chloroplast messenger RNAs of free and thylakoid-bound polysomes from *Vicia faba* L. *Planta* 175, 50–59.
- Fries, E., Rothman, J.E., 1980. Transient activity of Golgi-like membranes as donors of vesicular stomatitis viral glycoprotein *in vitro*. *J. Cell Biol.* 90, 697–704.
- Frigerio, L., de Virgilio, M., Prada, A., Faoro, F., Vitale, A., 1998. Sorting of phaseolin to the vacuole is saturable and requires a short c-terminal peptide. *Plant Cell* 10, 1031–1042.
- Froehlich, J.E., Wilkerson, C.G., Ray, W.K., McAndrew, R.S., Osteryoung, K.W., Gage, D.A., Phinney, B.S., 2003. Proteomic study of the *Arabidopsis thaliana* chloroplastic envelope membrane utilizing alternatives to traditional two-dimensional electrophoresis. *J. Proteome Res.* 2, 413–425.
- Fromageot, L.L., Jutisz, M., 1953. Chemistry of amino acids, peptides, and proteins. *Ann. Rev. Biochem.* 22, 629–678.
- Fruton, J. S., 1955. Proteins. In: Scientific American, (Eds.), The Physics and Chemistry of Life. Simon and Schuster, New York, pp. 58–73.
- Fruton, J.S., 1957. Enzymic hydrolysis and synthesis of peptide bonds. *Harvey Lect.* 51, 64–87.
- Fruton, J.S., 1972. Molecules and Life: Historical Essays on the Interplay of Chemistry and Biology. Wiley, New York.
- Fruton, J.S., 1992. A Skeptical Biochemist. Harvard University Press, Cambridge, MA.
- Fruton, J.S., 2006. Fermentation: Vital or Chemical Process? Brill Academic Publishers, Leiden, The Netherlands.
- Fruton, J.S., Simmonds, S., 1958. General Biochemistry, second ed. Wiley, New York.
- Fry, S.C., 1986. Cross-linking of matrix polymers in the growing cell walls of angiosperms. *Ann. Rev. Plant Physiol.* 37, 165–186.
- Fry, S.C., 1988. The Growing Plant Cell Wall: Chemical and Metabolic Analysis. Longman Scientific & Technical, Harlow Essex, UK.
- Fry, S.C., 2004. Primary cell wall metabolism: Tracking the careers of wall polymers in living plant cells. *New Phytol.* 161, 641–675.
- Fuge, H., Falke, D., 1991. Morphological Aspects of chromosome spindle fibers in *Mesostoma*. “Microtubular fir-tree” structures and microtubule association with kinetochores and chromatin. *Protoplasma* 160, 39–48.
- Fujiwara, M.T., Hashimoto, H., Kazama, Y., Abe, T., Yoshida, S., Sato, N., Itoh, R.D., 2008. The assembly of the FtsZ ring at the mid chloroplast division site depends on a balance between the activities of AtMinE1 and ARC11/AtMinD1. *Plant Cell Physiol.* 49, 345–361.
- Fujiwara, T., Giesman-Cookmeyer, D., Ding, B., Lommel, S. A., Lucas, W.J., 1993. Cell-to-cell trafficking of macromolecules through plasmodesmata potentiated by the red clover necrotic mosaic virus movement protein. *The Plant Cell* 5, 1783–1794.
- Fukaki, H., Wysocka-Diller, J., Kato, T., Fujisawa, H., Benfey, P. N., Tasaka, M., 1998. Genetic evidence that the endodermis is essential for shoot gravitropism in *Arabidopsis thaliana*. *Plant J.* 14, 425–430.
- Fukuda, H., 1996. Xylogenesis: Initiation, progression, and cell death. *Ann. Rev. Plant Physiol. Plant Mol. Biol.* 47, 299–325.
- Fulcher, R.G., McCully, M.E., Setterfield, G., Sutherland, J., 1976. β -1,3-glucans may be associated with cell plate formation during cytokinesis. *Can. J. Bot.* 54, 539–542.
- Fuller, M.S., 1976. Mitosis in fungi. *Int. Rev. Cytol.* 45, 113–153.
- Fuller, M.T., Wilson, P.G., 1992. Force and counterforce in the mitotic spindle. *Cell* 71, 547–550.
- Fuller, R.C., 1999. Forty years of microbial photosynthesis research: Where it came from and what it led to. *Photosynth. Res.* 62, 1–29.
- Fulsang, A.T., Guo, Y., Cuin, T.A., Qiu, Q.-S., Song, C., Kristiansen, K.A., Bych, K., Schulz, A., Shabala, S., Schumaker, K. S., Palmgren, M.G., Zhu, J.-K., 2007. Arabidopsis protein kinase PKS5 inhibits the plasma membrane H^+ -ATPase by preventing interaction with 14-3-3 protein. *Plant Cell* 19, 1617–1634.
- Fulton, A.B., 1982. How crowded is the cytoplasm? *Cell* 30, 345–347.
- Funaki, K., Nagata, A., Akimoto, Y., Shimada, K., Ito, K., Yamamoto, K., 2004. The motility of *Chara corallina* myosin was inhibited reversibly by 2,3-butanedione monoxime (BDM). *Plant Cell Physiol.* 45, 1342–1345.
- Funatsu, T., Harada, Y., Tokunaga, M., Saito, K., Yanagida, T., 1995. Imaging of single fluorescent molecules and individual ATP turnovers by single myosin molecules in aqueous solution. *Nature* 374, 555–559.
- Furtado, J.S., 1971. The septal pore and other ultrastructural features of the pyrenomycete *Sordaria fimicola*. *Mycologia* 63, 104–113.
- Furuya, M., 1984. Cell division patterns in multicellular plants. *Ann. Rev. Plant Physiol.* 35, 349–373.
- Furuya, M., 1993. Phytochromes: Their molecular species gene families and functions. *Ann. Rev. Plant Physiol. Plant Mol. Biol.* 44, 617–645.
- Furuya, M., 2001. Differential perception of environmental light by phytochromes. In: Sopory, S.K., Oelmüller, R., Maheshwari, S.C. (Eds.), Signal Transduction in Plants. Kluwer Academic, New York, pp. 1–7.
- Furuya, M., 2005. History and insights. In: Wada, M., Shimazaki, K., Iino, M. (Eds.), Light Sensing in Plants. Springer, Tokyo, pp. 3–18.
- Fuseler, J.W., 1975. Mitosis in *Tilia americana* endosperm. *J. Cell Biol.* 64, 159–171.
- Futcher, A.B., 1990. Yeast cell cycle. *Curr. Opin. Cell Biol.* 2, 246–251.

-G-

- Gabaldón, T., Snel, B., van Zimmeren, F., Hemrika, W., Tabak, H., Huynen, M.A., 2006. Origin and evolution of the peroxisomal proteome. *Biology Direct* 1, 8.
- Gabathuler, R., Cleland, R.E., 1985. Auxin regulation of a proton translocating ATPase in pea root plasma membrane vesicles. *Plant Physiol.* 79, 1080–1085.

- Gabriel, R., Kesselmeier, J., 1999. Apoplastic solute concentrations of organic acids and mineral nutrient in the leaves of several Fabaceae. *Plant Cell Physiol.* 40, 604–612.
- Gachotte, D., Meens, R., Benveniste, P., 1995. An *Arabidopsis* mutant deficient in sterol biosynthesis: Heterologous complementation by *ERG3* encoding a Δ^7 -sterol-C5-desaturase from yeast. *Plant J.* 8, 407–416.
- Gadella, T.W.J., Van der Krogt, G.N.M., Bisseling, T., 1999. GFP-based FRET microscopy in living plant cells. *Trends Plant Sci.* 4, 287–291.
- Gadre, R.S., 2003. Century of Nobel Prizes: 1909 chemistry lecture. *Resonance* 8, 77–83.
- Gaffron, H., 1960. The Origin of Life. In: Tax, S. (Ed.), *The Evolution of Life. Its Origin, History and Future*. University of Chicago Press, Chicago, pp. 39–84.
- Galau, G.A., Lipson, E.D., Britten, R.J., Davidson, E.H., 1977. Synthesis and turnover of polysomal mRNAs in sea urchin embryos. *Cell* 10, 415–432.
- Galcheva-Gargova, Z.I., Marinova, E.L., Koleva, S.T., 1988. Isolation of nuclear shells from plant cells. *Plant Cell Environ.* 11, 819–825.
- Gale, E.F., 1957. Nucleic acids and protein synthesis. *Harvey Lect.* 51, 25–63.
- Galilei, G., 1962. Dialogue Concerning the Two Chief World Systems, Ptolemaic and Copernican. Translated by S. Drake. University of California Press, Berkeley.
- Galili, G., Shimoni, Y., Giorini-Silfen, S., Levanony, H., Altschuler, Y., Shani, N., 1996. Wheat storage proteins: Assembly, transport and deposition in protein bodies. *Plant Physiol. Biochem.* 34, 245–252.
- Gall, J.G., 1981. Chromosome structure and the C-value paradox. *J. Cell Biol.* 91, 3s–14s.
- Gall, J.G., 1991. Spliceosomes and Snurposomes. *Science* 252, 1499–1500.
- Gall, J.G., 2005. Werner Franke. *Eur. J. Cell Biol.* 84, 89–90.
- Galton, F., 1874. *English Men of Science*. MacMillan, London.
- Galton, F., 1892. *Hereditary Genius: An Inquiry into Its Laws and Consequences*. MacMillan, London.
- Galvani, L., 1953a. Commentary on the Effects of Electricity on Muscular Motion. Translated by M. G. Foley. Burndy Library, Norwalk, CT.
- Galvani, L., 1953b. Commentary on the Effects of Electricity on Muscular Motion. Translated by R. M. Green. Elizabeth Licht, Cambridge, MA.
- Gamow, G., 1952. *The Creation of the Universe*. The New American Library, New York.
- Gamow, G., 1954. Possible relation between deoxyribonucleic acid and protein structures. *Nature* 173, 318.
- Gamow, G., 1970. *My World Line. An Informal Autobiography*. Viking Press, New York.
- Gamow, G., 1988. *The Great Physicists from Galileo to Einstein*. Dover Publications, New York.
- Gamow, G., Metropolis, N., 1954. Numerology of polypeptide chains. *Science* 120, 779–780.
- Gamow, G., Rich, A., Ycas, M., 1956. The problem of information transfer from the nucleic acids to proteins. *Adv. Biol. Med. Phys.* 4, 23–68.
- Gamow, G., Ycas, M., 1955. Statistical correlation of protein and ribonucleic acid composition. *Proc. Natl. Acad. Sci. USA* 41, 1011–1019.
- Gamow, G., Ycas, M., 1967. *Mr. Tompkins Inside Himself. Adventures in the New Biology*. Viking Press, New York.
- Gant, J.R., Hendershot, L.M., 1993. The modification and assembly of proteins in the endoplasmic reticulum. *Curr. Opin. Cell Biol.* 5, 589–595.
- Gao, H.B., Kadirjan-Kalbach, D., Froehlich, J.E., Osteryoung, K.W., 2003. ARC5, a cytosolic dynamin-like protein from plants, is part of the chloroplast division machinery. *Proc. Natl. Acad. Sci. USA* 10 (0), 4328–4333.
- Gao, Q., Zhao, M., Li, F., Guo, Q., Xing, S., Wang, W., 2008. Expansins and coleoptile elongation in wheat. *Protoplasma* 233, 73–81.
- Gara, G., Mannella, C.A., 2008. Reply: On three-dimensional models of higher-plant thylakoid networks: Elements of consensus, controversies, and future experiments. *Plant Cell* 20, 2549–2551.
- Garber, E., Brush, S. G., Everitt, C. W. F. (Eds.), 1986. *Maxwell on Molecules and Gases*. MIT Press, Cambridge, MA.
- Garcia-Bustos, J., Hetman, J., Hall, M.N., 1991. Nuclear protein localization. *Biochim. Biophys. Acta* 1071, 83–101.
- Gardiner, J.C., Harper, J.D.I., Weerakoon, N.D., Collings, D.A., Ritchie, S., Gilroy, S., Cyr, R.J., Marc, J., 2001. A 90-kD phospholipase D from tobacco binds to microtubules and the plasma membrane. *Plant Cell* 13, 2143–2158.
- Gardiner, J., McGee, P., Overall, R., Marc, J., 2008. Are histones, tubulin, and actin derived from a common ancestral protein? *Protoplasma* 233, 1–5.
- Gardiner, J.C., Taylor, N.G., Turner, S.R., 2003. Control of cellulose synthase complex localization in developing xylem. *Plant Cell* 15, 1740–1748.
- Gardiner, M., Chrispeels, M.J., 1975. Involvement of the Golgi apparatus in the synthesis and secretion of hydroxyproline-rich cell wall glycoproteins. *Plant Physiol.* 55, 536–541.
- Garlid, K.D., 2000. The state of water in biological systems. *Int. Rev. Cytol.* 192, 281–302.
- Garoff, H., 1985. Using recombinant DNA techniques to study protein targeting in the eukaryotic cell. *Ann. Rev. Cell Biol.* 1, 403–445.
- Garrison, W.M., Morrison, D.H., Hamilton, J.G., Benson, A.A., Calvin, M., 1951. The reduction of carbon dioxide by ionizing radiation. *Science* 114, 416–418.
- Garrod, A.E., 1923. *Inborn Errors of Metabolism*, second ed. Oxford Medical Publishers, Oxford.
- Garwood, C., 2008. *Flat Earth. The History of an Infamous Idea*. Thomas Dunne Books, New York.
- Gatenby, A.A., Ellis, R.J., 1990. Chaperone function: The assembly of ribulose biphosphate carboxylase-oxygenase. *Annu. Rev. Cell Biol.* 6, 125–149.
- Gausman, H.W., Allen, W.A., Escobar, D.E., 1974. Refractive index of plant cell walls. *Appl. Optics* 13, 109–111.
- Gaxiola, R.A., Fink, G.R., Hirschi, K.D., 2002. Genetic manipulation of vacuolar proton pumps and transporters. *Plant Physiol.* 129, 967–973.
- Geiger, D.R., Giaquinta, R.T., Sovonick, S.A., Fellows, R.J., 1973. Solute distribution in sugar beet leaves in relation to phloem loading and translocation. *Plant Physiol.* 52, 585–589.
- Geiger, D.R., Sovonick, S.A., Shock, T.L., Fellows, R.J., 1974. Role of free space in translocation in sugar beet. *Plant Physiol.* 54, 892–898.

- Geitman, A., 2006. Experimental approaches used to quantify physical parameters at cellular and subcellular levels. *Amer. J. Bot.* 93, 1380–1390.
- Geldner, N., Anders, N., Wolters, H., Keicher, J., Kornberger, W., Muller, P., Delbarre, A., Ueda, T., Nakano, A., Jürgens, G., 2003. The Arabidopsis GNOM ARF-GEF mediates endosomal recycling, auxin transport, and auxin –dependent plant growth. *Cell* 112, 219–230.
- Geldner, N., Jürgens, G., 2006. Endocytosis in signaling and development. *Curr. Opin. Plant Biol.* 9, 589–594.
- Geldner, N., Robatzek, S., 2008. Plant receptors go endosomal: A moving view on signal transduction. *Plant Physiol.* 147, 1565–1574.
- Gell-Mann, M., 1969. Nobel Banquet Speech December 10.
- Gelli, A., Higgins, V.J., Blumwald, E., 1997. Activation of plant plasma membrane Ca^{2+} -permeable channels by race-specific fungal elicitors. *Plant Physiol.* 113, 269–279.
- Genre, A., Bonfante, P., 1997. A mycorrhizal fungus changes microtubule orientation in tobacco root cells. *Protoplasma* 199, 30–38.
- Gens, J.S., Reuzeau, C., Doolittle, K.W., McNally, J.G., Pickard, B.G., 1996. Covisualization by computational optical-sectioning microscopy of integrin and associated proteins at the cell membrane of living onion protoplasts. *Protoplasma* 194, 215–230.
- Gens, J.S., Fujiki, M., Pickard, B.G., 2000. Arabinogalactan protein and wall-associated kinase in a plasmalemmal reticulum with specialized vertices. *Protoplasma* 212, 115–134.
- Gergely, J. (Ed.), 1964. *Biochemistry of Muscle Contraction*. Little, Brown, and Co., Boston.
- Gerhardt, R., Heldt, H.W., 1984. Measurement of subcellular metabolite levels in leaves by fractionation of freeze stopped material in nonaqueous media. *Plant Physiol.* 75, 542–547.
- Gerlach, W. 1921. Die experimenteller Grundlagen der Quantentheorie. Heft. 58. Summlung, Vieweg.
- Gertel, E.T., Green, P.B., 1977. Cell growth pattern and wall microfibrillar arrangement. *Plant Physiol.* 60, 247–254.
- Gest, H., 1994. A microbiologist's odyssey: Bacterial viruses to photosynthetic bacteria. *Photosynth. Res.* 40, 129–146.
- Gest, H., 1999. Memoir of a 1949 railway journey with photosynthetic bacteria. *Photosynth. Res.* 61, 91–96.
- Gest, H., 2002. History of the word *photosynthesis* and evolution of its definition. *Photosynth. Res.* 73, 7–10.
- Gest, H., 2004. Samuel Ruben's contributions to research on photosynthesis and bacterial metabolism with radioactive carbon. *Photosynth. Res.* 80, 77–83.
- Gest, H., Kamen, M.D., 1949. Photoproduction of molecular hydrogen by *Rhodospirillum rubrum*. *Science* 109, 558–559.
- Ghanotakis, D.F., Yocum, C.F., 1990. Photosystem II and the oxygen-evolving complex. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 41, 255–276.
- Ghosh, A., Maniloff, J., Gerling, D.A., 1978. Inhibition of mycoplasma cell division by cytochalasin. *B. Cell* 13, 57–64.
- Ghoshroy, S., Lartey, R., Sheng, J., Citovsky, V., 1997. Transport of proteins and nucleic acids through plasmodesmata. *Ann. Rev. Plant Physiol. Plant Mol. Biol.* 48, 27–50.
- Giannini, J.L., Gildensoph, L.H., Reynolds-Niesman, I., Briskin, D.P., 1987a. Calcium transport in sealed vesicles from beet (*Beta vulgaris* L.) storage tissue. I. *Plant Physiol.* 85, 1129–1136.
- Giannini, J.L., Ruiz-Critin, J., Briskin, D.P., 1987b. Calcium transport in sealed vesicles from red beet (*Beta vulgaris* L.) storage tissue. II. *Plant Physiol.* 85, 1137–1142.
- Giaquinta, R., 1976. Evidence for phloem loading from the apoplast. Chemical modification of membrane sulfhydryl groups. *Plant Physiol.* 57, 872–875.
- Gibbons, I.R., 1963. Studies on the protein components of cilia from *Tetrahymena pyriformis*. *Proc. Natl. Acad. Sci. USA* 50, 1002–1010.
- Gibbons, I.R., Grimstone, A.V., 1960. On flagellar structure in certain flagellates. *J. Biophys. Biochem. Cytol.* 7, 697–716.
- Gibbons, I.R., Rowe, A.J., 1965. Dynein: A protein with adenosine triphosphatase activity from cilia. *Science* 149, 424–426.
- Gibbs, J.W. [1875–1878]. 1931. The Collected Works of J. Willard Gibbs. Volumes I and II. Longmans, Green and Co., New York.
- Gibeaut, D.M., Carpita, N.C., 1993. Synthesis of (1→3), (1→4)-β-D-glucan in the Golgi apparatus of maize coleoptiles. *Proc. Natl. Acad. Sci. USA* 90, 3850–3854.
- Gibeaut, D.M., Carpita, N.C., 1994. Improved recovery of (1→3), (1→4)-β-D-glucan synthase (MG) activity from Golgi apparatus of *Zea mays* (L.) using differential flotation centrifugation. *Protoplasma* 180, 92–97.
- Gibernau, M., Barabé, D., Moisson, M., Trombe, A., 2005. Physical constraints on temperature difference in some thermogenic aroid inflorescences. *Ann. Bot.* 96, 117–125.
- Giddings Jr., T.H., Brower, D.L., Staehelin, L.A., 1980. Visualization of particle complexes in the plasma membrane of *Micrasterias denticulata* associated with the formation of cellulose fibrils in primary and secondary cell walls. *J. Cell Biol.* 84, 327–339.
- Giddings Jr., T.H., Staehelin, L.A., 1988. Spatial relationship between microtubules and plasma-membrane rosettes during the deposition of primary wall microfibrils in *Closterium*. *Planta* 173, 22–30.
- Giehl, K., Valenta, R., Rothkegel, M., Ronsiek, M., Mannherz, H.B., Jockusch, B.M., 1994. Interaction of plant profilin with mammalian actin. *Eur. J. Biochem.* 226, 681–689.
- Gierth, M., Mäser, P., 2007. Potassium transporters in plants—Involvement in K^+ acquisition, redistribution and homeostasis. *FEBS Lett.* 581, 2348–2356.
- Gietl, C., 1990. Glyoxysomal malate dehydrogenase from watermelon is synthesized with an amino-terminal transit peptide. *Proc. Natl. Acad. Sci. USA* 87, 5773–5777.
- Gigot, C., Phillips, G., Nicolaieff, A., Hirth, L., 1976. Some properties of tobacco protoplast chromatin. *Nucleic Acids Res.* 3, 2315–2329.
- Gilbert, W., 1978. Why genes in pieces? *Nature* 271, 501.
- Gilbert, W., 1980. DNA sequencing and gene structure. Nobel Lect. December 8, 1980.
- Gilbert, W., 1981. DNA sequencing and gene structure. *Science* 214, 1305–1312.
- Gilbert, W. [1600]. 1958. On the Magnet. Basic Books, New York.
- Gillispie, C.C. 1974. Dictionary of Scientific Biography. Volume X. Charles Scribner's Sons, New York.
- Gillespie, R.J., Maw, G.A., Vernon, C.A., 1953. The concept of phosphate bond-energy. *Nature* 171, 1147–1149.
- Gilliam, M., Campbell, M., Dubos, C., Becker, D., Davenport, R., 2006. The *Arabidopsis thaliana* glutamate-like receptor family.

- In: Baluska, F., Mancuso, S., Volkmann, D. (Eds.), *Communication in Plants*. Springer, Berlin, pp. 187–204.
- Gilroy, S., Fricker, M.D., Read, N.D., Trewavas, A.J., 1991. Role of calcium in signal transduction of *Commelina* guard cells. *Plant Cell* 3, 333–344.
- Gilroy, S., Jones, R.L., 1992. Gibberellic acid and abscisic acid coordinately regulate cytoplasmic calcium and secretory activity in barley aleurone protoplasts. *Proc. Natl. Acad. Sci. USA* 89, 3591–3595.
- Gilroy, S., Jones, R.L., 1993. Calmodulin-stimulation of unidirectional calcium uptake by the endoplasmic reticulum of barley aleurone. *Planta* 190, 289–296.
- Gilroy, S., Read, N.D., Trewavas, A.J., 1990. Elevation of cytosolic calcium by caged calcium or caged inositol triphosphate inhibits closure. *Nature* 346, 768–771.
- Gimmler, H., Weiss, C., Baier, M., Hartung, W., 1990. The conductance of the epidermal membrane for carbon dioxide. *J. Exp. Bot.* 41, 785–794.
- Ginsberg, M.H., Du, X., Plow, E.F., 1992. Inside-out integrin signalling. *Curr Opin Cell Biol.* 4, 766–771.
- Ginzburg, B., 1959. Maintenance of semipermeability of plant cell membranes in the absence of metabolic energy supply. *Nature* 184, 1073.
- Ginzburg, M., Ginzburg, B., Wayne, R., 1999. Ultrarapid endocytotic uptake of large molecules in *Dunaliella* species. *Protoplasma* 206, 73–86.
- Gisel, A., Barella, S., Hempel, F.D., Zambryski, P.C., 1999. Temporal and spatial regulation of symplastic trafficking during development in *Arabidopsis thaliana* apices. *Development* 126, 1879–1889.
- Gisel, A., Hempel, F.D., Barella, A.S., Zambryski, P.C., 2001. Leaf-to-shoot apex movement of symplastic tracer is restricted coincident with flowering in *Arabidopsis*. *Proc. Natl. Acad. Sci. USA* 99, 1713–1717.
- Glass, J.R., Gerace, L., 1990. Lamins A and C bind and assembly at the surface of mitotic chromosomes. *J. Cell Biol.* 111, 1047–1057.
- Glasstone, S., Laidler, K.J., Eyring, H., 1941. *The Theory of Rate Processes*. McGraw-Hill, New York.
- Glazer, A.N., Melis, A., 1987. Photochemical reaction centers: Structure, organization, and function. *Ann. Rev. Plant Physiol.* 38, 11–45.
- Glock, E., Jensen, C.O., 1932. The colorimetric determination of plant succinic dehydrogenase. *J. Biol. Chem.* 201, 271–278.
- Glotzer, M., Murray, A.W., Kirschner, M., 1991. Cyclin is degraded by the ubiquitin pathway. *Nature* 349, 132–138.
- Glusker, J.P., Katz, A.K., Bock, C.W., 1999. Metal ions in biological systems. *Rigaku Journal* 16, 8–16.
- Goebel, K., 1920. *Die Entfaltungsbewegungen der Pflanzen und deren teleologische Deutung*. Gustav Fischer, Jena.
- Goebel, M.G., Winey, M., 1991. The yeast cell cycle. *Curr Opin Cell Biol.* 3, 242–246.
- Goebel, K. von, 1926. *Wilhelm Hofmeister. The Work and Life of a Nineteenth Century Botanist*. Ray Society, London.
- Goertzel, T., Goertzel, B., 1995. *Linus Pauling. A Life in Science and Politics*. Basic Books, New York.
- Goethe, J.W. von, [1808]. 1952. *Faust*. Translated by George Madison Priest. Great Books of the Western World. University of Chicago, Chicago.
- Goethe, J.W. von, 1952. *Goethe's Botanical Writings*. Translated by Bertha Mueller. University of Hawaii Press, Honolulu.
- Gogarten, J.P., Kiblak, H., Dittrich, P., Taiz, L., Bowman, E.J., Bowman, B.J., Manolson, N.F., Poole, R.J., Date, T., Oshima, T., Konishi, J., Denda, K., Yoshida, M., 1989. Evolution of the H⁺-ATPase: Implications for the origin of eukaryotes. *Proc. Natl. Acad. Sci. USA* 86, 6661–6665.
- Gogarten-Boekels, M., Gogarten, J.P., Bentrup, F.-W., 1988. Sugar nucleotides dissipate ATP-generated transmembrane pH gradient in Golgi vesicles from suspension-cell protoplasts of *Chenopodium rubrum* L. *Planta* 174, 349–357.
- Golbeck, J.H., 1992. Structure and function of photosystem I. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 43, 293–324.
- Gold, T., 1968. Rotating neutron stars as the origin of the pulsating radio sources. *Nature* 218, 731–732.
- Gold, T., 1969. Rotating neutron stars and the nature of pulsars. *Nature* 221, 25–27.
- Gold, T., 1989. New Ideas in Science. *Journal of Scientific Exploration* 3, 103–112.
- Gold, T., 1992. The deep, hot biosphere. *Proc. Natl. Acad. Sci. USA* 89, 6045–6049.
- Gold, T., 1999. *The Deep Hot Biosphere*. Springer, Berlin.
- Goldberg, A.D., Allis, C.D., Bernstein, E., 2007. Epigenetics: A landscape takes shape. *Cell* 128, 638–835.
- Goldberg, A.L., 1990. ATP-dependent proteases in prokaryotic and eukaryotic cells. *Sem. Cell Biol.* 1, 423–432.
- Goldberg, M.W., Allen, T.D., 1992. High resolution scanning electron microscopy of the nuclear envelope: Demonstration of a new regular, fibrous lattice attached to the baskets of the nucleoplasmic face of the nuclear pores. *J. Cell Biol.* 119, 1429–1440.
- Goldberg, R.B., 1978. DNA sequence organization in the soybean plant. *Biochem. Genet.* 16, 45–68.
- Goldberg, R.B., 2001. From Cot curves to genomics. How gene cloning established new concepts in plant biology. *Plant Physiol.* 125, 4–8.
- Goldfarb, D.S., Gariépy, J., Schoolnik, G., Kornberg, R.D., 1986. Synthetic peptides as nuclear localization signals. *Nature* 322, 641–644.
- Goldfarb, D.S., Michaud, N., 1991. Pathways for the nuclear transport of proteins and RNAs. *Trends. Cell. Biol.* 1, 20–24.
- Goldschmidt, R., 1933. Some aspects of evolution. *Science* 78, 539–547.
- Goldschmidt, R., 1940. *The Material Basis of Evolution*. Yale University Press, New Haven, CT.
- Goldschmidt, R.B., 1951. *Understanding Heredity. An Introduction to Genetics*. John Wiley & Sons, Inc., New York.
- Goldschmidt, R.B., 1955. *Theoretical Genetics*. University of California Press, Berkeley.
- Goldschmidt, R.B., 1956. *The Golden Age of Zoology*. University of Washington Press, Seattle, WA.
- Goldstein, D.A., Thomas, J.A., 2004. Biopharmaceuticals derived from genetically modified plants. *QJM.* 97, 705–716.
- Goldstein, R.E., Tuval, I., van de Meent, J.-W., 2008. Microfluidics of cytoplasmic streaming and its implications for intracellular transport. *Proc. Natl. Acad. Sci. USA* 105, 3663–3667.
- Goldsworthy, A., 1976. *Photorespiration*. Carolina Biology Readers. Carolina Biological Supply, Burlington, NC.
- Golgi, C., 1898. Sur la structure des cellules nerveuses. *Arch. Ital. de Biologie* 30, 60–71.

- Golgi, C., 1906. The neuron doctrine—theory and facts. Nobel Lect. December 11.
- Golomb, L., Abu-Abied, M., Belausov, E., Sadot, E., 2008. Different subcellular localizations and functions of *Arabidopsis* myosin VIII. *BMC Plant Biol.* 8, 3.
- Gomez, L., Chrispeels, M.J., 1994. Complementation of an *Arabidopsis thaliana* mutant that lacks complex asparagine-linked glycans with the human cDNA encoding N-acetyl glucosaminyl transferase I. *Proc. Natl. Acad. Sci. USA* 91, 1829–1833.
- Goncalves, S., Cairney, J., Rodriguez, M.P., Canovas, F., Oliveira, M., Miquel, C., 2007. PpRab1, a Rab GTPase from maritime pine is differentially expressed during embryogenesis. *Mol. Genet. Genomics* 278, 273–282.
- Gonzalez, E., 1982. Aggregated forms of malate and citrate lyase are localized in endoplasmic reticulum of endosperm of germinating castor bean. *Plant Physiol.* 69, 83–87.
- Gonzalez, E., Beevers, H., 1976. Role of the endoplasmic reticulum in glyoxysome formation in castor bean endosperm. *Plant Physiol.* 57, 406–409.
- Good, N., 1961. Photophosphorylation and the Hill reaction. *Nature* 191, 678–679.
- Good, N., Izawa, S., Hind, G., 1966. Uncoupling and energy transfer inhibition in photophosphorylation. *Current Topics in Bioenergetics* 1, 75–112.
- Goodbody, K.C., Hargreaves, A.J., Lloyd, C.W., 1989. On the distribution of microtubule-associated intermediate filament antigens in plant suspension cells. *J. Cell Sci.* 93, 427–438.
- Goodbody, K.C., Ververloo, C.J., Lloyd, C.W., 1991. Laser microsurgery demonstrates that cytoplasmic strands anchoring the nucleus across the vacuole of premitotic plant cells are under tension. Implications for division plane alignment. *Development* 113, 931–939.
- Goodin, M.M., Chakrabarty, R., Banerjee, R., Yelton, S., DeBolt, S., 2007. Update on live-cell imaging in plants. New gateways to discovery. *Plant Physiol.* 145, 1100–1109.
- Goodman, C.D., Casati, P., Walbot, V., 2004. A multidrug resistance associated protein involved in anthocyanin transport in *Zea mays*. *Plant Cell* 16, 1812–1826.
- Goodsell, D.S., 1991. Inside a living cell. *TIBS* 16, 203–206.
- Goodwin, P.B., 1983. Molecular size limit for movement in the symplast of the *Elodea* leaf. *Planta* 157, 124–130.
- Goodwin, P.B., Shepherd, V., Erwee, M.G., 1990. Compartmentation of fluorescent tracers injected into the epidermal cells of *Egeria densa* leaves. *Planta* 181, 129–136.
- Gorbsky, G.J., Ricketts, W.A., 1993. Differential expression of a phosphopeptide at the kinetochores of moving chromosomes. *J. Cell Biol.* 122, 1311–1321.
- Gore, A., 2006. *An Inconvenient Truth*. Rodale Press, New York.
- Gorgas, K., 1984. Peroxisomes in sebaceous glands. V. Complex peroxisomes in the mouse preputial gland: Serial sectioning and three-dimensional reconstruction studies. *Anat. Embryol.* 169, 261–270.
- Görlich, D., Rapoport, T.A., 1993. Protein translocation into proteoliposomes reconstituted from purified components of the endoplasmic reticulum membrane. *Cell* 75, 615–630.
- Gorshkova, T.A., Chemikosova, S.B., Lozovaya, V.V., Carpita, N. C., 1997. Turnover of galactans and other cell wall polysaccharides during development of flax plants. *Plant Physiol.* 114, 723–729.
- Gorst, J.R., John, P.C.L., Sek, F.J., 1991. Levels of p34^{cdc2}-like protein in dividing, differentiating and dedifferentiating cells of carrot. *Planta* 185, 304–310.
- Gorter, E., Grendel, F., 1925. On bimolecular layers of lipoids on the chromocytes of the blood. *J. Exp. Med.* 41, 439–443.
- Gosh, S., Dey, R., 1986. Nuclear matrix network in *Allium cepa*. *Chromosoma* 93, 429–434.
- Gottschalk, M., Dolgener, E., Xoconostle-Cázares, B., Lucas, W.J., Komor, E. and Schobert, C., 2008. *Ricinus communis* cyclophilin: Functional characterization of a sieve tube protein involved in protein folding. *Planta* 228, 687–700.
- Goud, B., McCaffrey, M., 1991. Small GTP-binding proteins and their role in transport. *Curr Opin Cell Biol.* 3, 626–633.
- Gould, K.L., Moreno, S., Owen, D.J., Sazer, S., Nurse, P., 1991. Phosphorylation at Thr161 is required for *Schizosaccharomyces pombe*. p34^{cdc2} Function. *EMBO J.* 10, 3297–3309.
- Gould, R.R., Borisy, G.G., 1978. Quantitative initiation of microtubule assembly by chromosomes from chinese hamster ovary cells. *Exp. Cell. Res.* 113, 369–374.
- Gould, S.J., Keller, G.-A., Schneider, M., Howell, S.H., Garrard, L.J., Goodman, J.M., Distel, B., Tabak, H., Subramani, S., 1990. Peroxisomal protein import is conserved between yeast, plants, insects and mammals. *EMBO J.* 9, 85–90.
- Goudsmit, S. A., 1971. The discovery of the electron spin. <http://www.lorentz.leidenuniv.nl/history/spin/goudsmit.html>.
- Gould, S.J., 1977. The return of hopeful monsters. *Natural History* (June/July), 22–30.
- Govindjee., Allen, J.F., Beatty, J.T., 2004. Celebrating the millennium: Historical highlights of photosynthesis research, Part 3. *Photosynth Res.* 80, 1–13.
- Govindjee, F., Krogmann, D., 2004. Discoveries in oxygenic photosynthesis (1727–2003): A perspective. *Photosynth Res.* 80, 15–57.
- Govindjee., Rabinowitch, E., 1960. Two forms of chlorophyll a in vivo with distinct photochemical functions. *Science* 132, 355–356.
- Govorunova, E.G., Jung, K.H., Sineshchekov, O.A., Spudich, J.L., 2004. Chlamydomonas sensory rhodopsin A and B: Cellular content and role in photophobic response. *Biophys. J.* 86, 2342–2349.
- Grabe, M., Oster, G., 2001. Regulation of organelle acidity. *J. Gen. Physiol.* 117, 329–343.
- Grabe, M., Wang, H., Oster, G., 2000. The mechanochemistry of V-ATPase proton pumps. *Biophys. J.* 78, 2796–2813.
- Grabov, A., 2007. Plant KT/KUP/HAK potassium transporters: Single family-multiple functions. *Ann. Bot.* 99, 1035–1041.
- Grabski, S., deFeijter, A.W., Schindler, M., 1993. Endoplasmic reticulum forms a dynamic continuum for lipid diffusion between contiguous soybean root cells. *The Plant Cell* 5, 25–38.
- Gradmann, D., Klempke, W., 1974. Current-voltage relationship of the electrogenic pump in *Acetabularia mediterranea*. In: Zimmermann, U., Dainty, J. (Eds.), *Membrane Transport in Plants*. Springer-Verlag, Berlin, pp. 131–138.
- Graham, T.A., Gunning, B.E.S., 1970. The localization of legumin and vicilin in bean cotyledon cells using fluorescent antibodies. *Nature* 228, 81–82.
- Graham, T., 1842. *Elements of Chemistry, including the applications of the science in the arts*. Hippolyte Bailliere, London.

- Graham, T., 1843. Elements of Chemistry, including the applications of the science in the arts With Notes and additions by Robert Bridges. M. D. Lea & Blanchard, Philadelphia.
- Graham, T., 1850–57. Elements of Chemistry, including the applications of the science in the arts. Baillière, New York.
- Granger, C.L., Cyr, R.J., 2000a. Expression of GFP-MAP4 reporter gene in a stably transformed tobacco cell line reveals dynamics of microtubule reorganization. *Planta* 210, 502–509.
- Granger, C.L., Cyr, R.J., 2000b. Microtubule reorganization in tobacco BY-2 cells stably expressing GFP-MBD. *Planta* 210, 502–509.
- Granick, S., 1957. Speculations on the origins and evolution of photosynthesis. *Ann. NY Acad. Sci.* 69, 292–308.
- Granick, S., Porter, K.R., 1947. The structure of the spinach chloroplast as interpreted with the electron microscope. *Amer. J. Bot.* 34, 545–550.
- Grant, V., 1963. The Origin of Adaptations. Columbia University Press, New York.
- Gray, J., 1928. Ciliary Movement. Cambridge University Press, Cambridge.
- Gray, J.C., Hibberd, J.M., Linley, P.J., Uijtewaal, B., 1999. GFP movement between chloroplasts. *Nat. Biotechnol.* 17, 1146–1146.
- Gray, J.C., Sullivan, J.A., Hibberd, J.M., Hansen, M.R., 2001. Stromules: Mobile protrusions and interconnections between plastids. *Plant Biology* 3, 223–233.
- Graziana, A., Fosset, M., Ranjeva, R., Hetherington, A.M., Lazdunski, M., 1988. Ca^{2+} channel inhibitors that bind to plant cell membranes block Ca^{2+} entry into protoplasts. *Biochemistry* 27, 764–768.
- Green, D.E., Baum, H., 1970. Energy and the Mitochondrion. Academic Press, New York.
- Green, J.R., 1983. The Golgi apparatus. In: Hall, J.L., Moore, A.L. (Eds.), Isolation of Membranes and Organelles from Plant Cells. Academic Press, London, pp. 135–152.
- Green, J.R., Northcote, D.H., 1978. The structure and function of glycoproteins synthesized during slime-polysaccharide production by membranes of the root-cap cells of maize (*Zea mays*). *Biochem. J.* 170, 599–608.
- Green, P.B., 1954. The spiral growth pattern in the cell wall in *Nitella axillaris*. *Amer. J. Bot.* 41, 403–409.
- Green, P.B., 1958a. Concerning the site of the addition of new wall substances to the elongating *Nitella* cell wall. *Amer. J. Bot.* 45, 111–116.
- Green, P.B., 1958b. Structural characteristics of developing *Nitella* internodal cell walls. *J. Biophys. Biochem. Cytol.* 1, 50–519.
- Green, P.B., 1960. Multinet growth in the cell wall of *Nitella*. *J. Biophys. Biochem. Cytol.* 7, 289–297.
- Green, P.B., 1961. Structural changes in growing cell walls. *Recent Advances in Botany* 8, 746–749.
- Green, P.B., 1962. Mechanism for plant cellular morphogenesis. *Science* 138, 1404–1405.
- Green, P.B., 1963. On mechanisms of elongation. In: Locke, M. (Ed.), Cytodifferentiation and Macromolecular Synthesis; A Symposium. Academic Press, New York, pp. 203–234.
- Green, P.B., 1969. Cell Morphogenesis. *Ann. Rev. Plant Physiol.* 20, 365–394.
- Green, P.B., 1988. A theory for inflorescence development and flower formation based on morphological and biophysical analysis in *Echeveria*. *Planta* 175, 153–169.
- Green, P.B., 1996. Expression of form and pattern in plants—a role for biophysical fields. *Semin. Cell Dev. Biol.* 7, 903–911.
- Green, P.B., 1997. Expansin and morphology: A role for biophysics. *Trends in Plant Science* 2, 365–366.
- Green, P.B., Chapman, G.B., 1955. On the development and structure of the cell wall in *Nitella*. *Amer. J. Bot.* 42, 685–693.
- Green, P.B., Erickson, R.O., Buggy, J., 1971. Metabolic and physical control of cell elongation rate. *Plant Physiol.* 47, 423–430.
- Greenbaum, E., Lee, J.W., Tevault, C.V., Blankenship, S.L., Mets, L.J., 1995. CO_2 fixation and photoevolution of H_2 and O_2 in a mutant of *Chlamydomonas* lacking photosystem I. *Nature* 376, 438–441.
- Greenwood, J.S., Chrispeels, M.J., 1985a. Correct targeting of the bean storage protein haseolin in the seeds of transformed tobacco. *Plant Physiol.* 79, 65–71.
- Greenwood, J.S., Chrispeels, M.J., 1985b. Immunocytochemical localization of phaseolin and phytohemagglutinin in the endoplasmic reticulum and Golgi complex of developing bean cotyledons. *Planta* 164, 295–302.
- Gregory, P.H., 1961. The Microbiology of the Atmosphere. Interscience Publishers, New York.
- Greimers, R., Deltour, R., 1981. Organization of transcribed and nontranscribed chromatin in isolated nuclei of *Zea mays* root cells. *Eur. J. Cell Biol.* 23, 303–311.
- Grennan, A.K., 2008. Arabidopsis microRNAs. *Plant Physiol.* 146, 3–4.
- Grew, N., [1682]. 1965. The Anatomy of Plants with an Idea of a Philosophical History of Plants and Several other Lectures Read before The Royal Society. Johnson Reprint Corp., New York.
- Grew, N., 1701. Cosmologia Sacra: or A Discourse of the Universe as it is the Creature and Kingdom of God. Printed for W. Rogers, S. Smith and B. Walford, London.
- Gribbin, J., 1984. In Search of Schrödinger's Cat. Bantam Books, Toronto.
- Gribbin, J., 1995. Schrödinger's Kittens and the Search for Reality. Little, Brown, and Co., Boston.
- Griessner, M., Obermeyer, G., 2003. Characterization of whole-cell K^+ currents across the plasma membrane of pollen grain and tube protoplasts of *Lilium longiflorum*. *J. Membrane Biol.* 1193, 99–108.
- Griffing, L.R., Villanueva, M.A., Taylor, J., Moon, S., 1995. Confocal epipolarization microscopy of gold probes in plant cells and protoplasts. *Meth. Cell Biol.* 49, 109–121.
- Griffiths, G., 1996. On vesicles and membrane compartments. *Protoplasma* 195, 37–58.
- Griffiths, R.B., 2008. A Review of: Quantum Physics and Theology. An Unexpected Kinship. *Physics Today* 61 (2), 65–66.
- Grigg, G.W., Hodge, A.J., 1949. Electron microscopic studies of spermatozoa. I. The morphology of the spermatozoon of the common domestic fowl (*Gallus domesticus*). *Aust. J. Sci. Res. Ser. B.* 2, 271–286.
- Grignon, C., Sentenac, H., 1991. pH and ionic conditions in the apoplast. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 42, 103–128.
- Grill, E., Christmann, A., 2007. A plant receptor with a big family. *Science* 315, 1676–1677.

- Grill, E., Loeffler, S., Winnacker, E.-L., Zenk, M.H., 1989. Phytochelatins, the heavy-metal-binding peptides of plants, are synthesized from glutathione by a specific γ -glutamylcysteine dipeptide transpeptidase (phytochelatin synthase). *Proc. Natl. Acad. Sci. USA* 86, 6838–6842.
- Grill, E., Winnacker, E.-L., Zenk, M.H., 1985. Phytochelatins: The principle heavy-metal complexing peptides of higher plants. *Science* 230, 674–676.
- Grimm, I., Sachs, H., Robinson, D.G., 1976. Structure, synthesis and orientation of microfibrils. II. The effect of colchicine on the wall of *Oocystis solitaria*. *Cytobiologie* 14, 61–74.
- Groen, A.J., de Vries, S.C., Lilley, K.S., 2008. A proteomics approach to membrane trafficking. *Plant Physiol.* 147, 1584–1589.
- Grolig, F., 1990. Actin-based organelle movements in interphase *Spirogyra*. *Protoplasma* 155, 29–42.
- Grolig, F., 2004. Organelle movements: Transport and positioning. *Annual Plant Reviews* 10, 148–175.
- Grolig, F., Williamson, R.E., Parke, J., Miller, C., Anderson, B.H., 1988. Myosin and Ca^{2+} -sensitive streaming in the alga *Chara*: Detection of two polypeptides reacting with a monoclonal antimyosin and their localization in the streaming endoplasm. *Eur. J. Cell Biol.* 47, 22–31.
- Gronegess, P., 1974. The structure of chromoplasts and their conversion to chloroplasts. *J. Microsc.* 19, 183–192.
- Groover, A., deWitt, N., Heidel, P., Jones, A., 1997. Programmed cell death of plant tracheary elements differentiating in vitro. *Protoplasma* 196, 197–211.
- Gros, F., Hiatt, H., Gilbert, W., Kurland, C.G., Risebrough, R.W., Watson, J.D., 1961. Unstable ribonucleic acid revealed by pulse labelling of *Escherichia coli*. *Nature* 190, 581–585.
- Grotewold, E., 2006. The genetics and biochemistry of floral pigments. *Annu. Rev. Plant Biol.* 57, 761–780.
- Groth, A., Rocha, W., Almouzni, G., 2007. Chromatin challenges during DNA replication and repair. *Cell* 128, 721–733.
- Grove, S.N., Bracker, C.E., Morré, D.J., 1970. An ultrastructural basis for hyphal tip growth in *Pythium ultimum*. *Amer. J. Bot.* 57, 245–266.
- Grove, W.R., Helmholtz, H., Mayer, J.R., Faraday, M., Liebig, J., Carpenter, W.B., Youmans, E.L., 1867. The Correlation and Conservation of Forces. A Series of Expositions. D. Appleton and Co., New York.
- Groves, A.K., Bögl, O., Jat, P.S., Noble, M., 1991. The cellular measurement of time. *Curr. Opin. Cell Biol.* 3, 224–229.
- Gruber, P.J., Becker, W.M., Newcomb, E.H., 1972. The occurrence of microbodies and peroxisomal enzymes in achlorophyllous leaves. *Planta* 105, 114–138.
- Gruber, P.J., Sweeney, K.A., Frederick, S.E., 1988. The detection of fucose residues in plant nuclear envelopes. *Planta* 174, 298–304.
- Gruber, P.J.R., Trelease, N., Becker, W.M., Newcomb, E.H., 1970. A correlative ultrastructural and enzymatic study of cotyledonary microbodies following germination of fat storing seeds. *Planta* 93, 269–288.
- Gruhler, A., Jensen, O.N., 2006. Proteomic analysis of post-translational modifications by mass spectrometry. *Annu. Plant Reviews* 28, 33–53.
- Grunstein, M., 1990. Nucleosomes: Regulators of transcription. *Trends Genet.* 6, 395–400.
- Gu, X., Verma, D.P.S., 1996. Phragmoplastin, a dynamin-like protein associated with cell plate formation in plants. *EMBO J.* 15, 695–704.
- Gubler, F., Jacobson, J.V., Ashford, A.E., 1986. Involvement of the Golgi apparatus in the secretion of α -amylase from gibberellin-treated barley aleurone cells. *Planta* 168, 447–452.
- Guerrero, M.G., Vega, J.M., Losada, M., 1981. The assimilatory nitrate-reducing system and its regulation. *Ann. Rev. Plant Physiol.* 32, 169–204.
- Guerrier-Takada, C., Altmann, S., 1984. Catalytic activity of an RNA molecule prepared by transcription in vitro. *Science* 223, 285–286.
- Guerrier-Takada, C., Gardiner, K., Marsh, T., Pace, N., Altmann, S., 1983. The RNA moiety of ribonuclease P is the catalytic subunit of the enzyme. *Cell* 35, 849–857.
- Guigas, G., Kalla, C., Weiss, M., 2007. Probing the nanoscale viscoelasticity of intracellular fluids of living cells. *Biophys. J.* 93, 316–323.
- Guilliermond, A., 1941. The Cytoplasm of the Plant Cell. Chronica Botanica Co., Waltham, MA.
- Guldberg, C.M., Waage, P., 1899. Untersuchungen über die Chemischen Affinitäten. W. Engelmann, Leipzig.
- Gulland, J.M., 1947. The structures of nucleic acids. *Symp. Soc. Exp. Biol.* 1, 1–14.
- Gunning, B.E.S., 1965. The greening process of plastids. I. The prolamellar body. *Protoplasma* 60, 111–130.
- Gunning, B.E.S., 1982. The cytokinetic apparatus: Its development and spatial regulation. In: Lloyd, C.W. (Ed.), *The Cytoskeleton in Plant Growth and Development*. Academic Press, London, pp. 229–292.
- Gunning, B.E.S., 1992. Use of confocal microscopy to examine transitions between successive microtubule arrays in the plant cell division cycle. In: *Cellular Basis of Growth and Development in Plants*, pp. 145–155. Proceedings of the VII International symposium in conjunction with the awarding of the International Prize of Biology. Shibaoka, H. (Ed.), Osaka University, Osaka.
- Gunning, B.E.S., 2005. Plastid stromules: video microscopy of their outgrowth, retractions, tensioning, anchoring, branching, bridging, and tip-shedding.
- Gunning, B.E.S., Hughes, J.E., Hardham, A.R., 1978a. Formative and proliferative cell divisions, cell differentiation, and developmental changes in the meristem of *Azolla* roots. *Planta* 143, 121–144.
- Gunning, B.E.S., Hardham, A.R., Hughes, J.E., 1978b. Evidence for initiation of microtubules in discrete regions of the cell cortex in *Azolla* roottip cells, and an hypothesis on the development of cortical arrays of microtubules. *Planta* 143, 161–179.
- Gunning, B.E.S., Hardham, A.R., Hughes, J.E., 1978c. Pre-prophase bands of microtubules in all categories of formative and proliferative cell division in *Azolla* roots. *Planta* 143, 145–160.
- Gunning, B.E.S., Overall, R.L., 1983. Plasmodesmata and cell-to-cell transport in plants. *Bioscience* 33, 260–265.
- Gunning, B.E.S., Pate, J.S., 1974. Transfer cells. In: Robards, A.W. (Ed.), *Dynamic Aspects of Plant Ultrastructure*. McGraw-Hill, New York, pp. 441–480.
- Gunning, B.E.S., Robards, A.W. (Eds.), 1976. *Intercellular Communication in Plants: Studies on Plasmodesmata*. Springer-Verlag, Berlin.
- Gunning, B.E.S., Steer, M.W., 1996. *Plant Cell Biology. Structure and Function*. Jones and Bartlett Publishers, Sudbury, MA.

- Gunning, B.E.S., Wick, S.M., 1985. Preprophase bands, phragmoplasts, and spatial control of cytokinesis. *J. Cell Sci. (Suppl.)* 2, 157–179.
- Gupta, A., Sharma, C.B., 1996. Purification to homogeneity and characterization of a plasma membrane and Golgi apparatus-specific 5'-adenosine monophosphatase from peanut cotyledons. *Plant Sci.* 117, 65–74.
- Gupton, S.L., Collings, D.A., Allen, N.S., 2006. Endoplasmic reticulum targeted GFP reveals ER organization in tobacco NT-1 cells during cell division. *Plant Physiol. Biochem.* 44, 95–105.
- Gurdon, J.B., 1962. Adult frogs derived from the nuclei of single somatic cells. *Develop. Biol.* 4, 256–273.
- Gurdon, J.B., Uehlinger, V., 1966. "Fertile" intestine nuclei. *Nature* 210, 1240–1241.
- Guth, A., 1997. *The Inflationary Universe*. Addison-Wesley, Reading, MA.
- Guthrie, C., 1996. The spliceosome is a dynamic ribonucleoprotein machine. *Harvey Lect.* 90, 59–80.
- Gutknecht, J., Bisson, M.A., Tosteson, D.C., 1977. Diffusion of carbon dioxide through lipid bilayer membranes: Effects of carbonic anhydrase, bicarbonate and unstirred layers. *J. Gen. Physiol.* 69, 779–794.
- Guy, R.D., Berry, J.A., Fogel, M.L., Hoering, T.C., 1989. Differential fractionation of oxygen isotopes by cyanide-resistant and cyanide-sensitive respiration in plants. *Planta* 177, 483–491.
- Guye, C. E. n.d. *Physico-Chemical Evolution*. E. P. Dutton and Co., New York.
- H-**
- Haaf, T., 1996. High-resolution analysis of DNA replication in released chromatin fibers containing 5-bromodeoxyuridine. *BioTechniques* 21, 1050–1054.
- Haas, T.A., Plow, E.F., 1994. Integrin-ligand interactions: A year in review. *Curr Opin Cell Biol.* 6, 656–662.
- Haber, A.H., Carrier, W.L., Foard, D.E., 1961. Metabolic studies of gamma-irradiated wheat growing without cell divisions. *Amer. J. Bot.* 48, 431–438.
- Haberlandt, G., 1906. *Sinnesorgane im Pflanzenreich, zur Perception mechanischer Reize*. W. Engelmann, Leipzig.
- Haberlandt, G., 1914. *Physiological Plant Anatomy*. MacMillan, London.
- Hacking, I., 1981. Do we see through a microscope? *Pacific Philosophical Quarterly* 62, 305–322.
- Häder, D.-P., Ntefidou, M., Iseki, M., Watanabe, M., 2005. Phototaxis photoreceptor in *Euglena gracilis*. In: Wada, M., Shimazaki, K., Iino, M. (Eds.), *Light Sensing in Plants*. Springer, Tokyo, pp. 223–229.
- Hadjantonakis, A.K., Nagy, A., 2001. The color of mice: In the light of GFP-variant reporters. *Histochem. Cell. Biol.* 115, 49–58.
- Haeckel, E., 1866. *Generelle Morphologie der Organismen*. Georg Reimer, Berlin.
- Haeckel, E., 1879. *The Evolution of Man. A popular Exposition of the Principle Points of Human Ontogeny and Phylogeny*. D. Appleton and Co., New York.
- Haeckel, E., 1879a. *Freedom in Science and Teaching*. D. Appleton and Co., New York.
- Hagel, J.M., Yeung, E.C., Facchini, P.J., 2008. Got milk? The secret life of laticifers. *Trends in Plant Sci.* 14, 631–639.
- Hagemann, R., Schröder, M.B., 1989. The cytological basis of the plastid inheritance in angiosperms. *Protoplasma* 152, 57–64.
- Hagendoorn, M.J.M., Poorhnga, A.M., Wong Fong Song, H.W., Van der Plas, L.H.W., van Waltrave, H.S., 1991. Effect of electrons on the plasma membrane of *Petunia hybrida* cell suspensions. Role of pH in signal transduction. *Plant Physiol.* 96, 1261–1267.
- Hager, A., Menzel, H., Krauss, A., 1971. Versuche und Hypothese zue Primärwirkung des Auxins beim Streckungswachstum. *Planta* 100, 47–75.
- Haguenau, F., 1958. The ergastoplasm: Its history, ultrastructure, and biochemistry. *Int. Rev. Cytol.* 7, 425–483.
- Hahne, G., Hoffman, F., 1984. The effect of laser microsurgery on cytoplasmic strands and cytoplasmic streaming in isolated plant protoplasts. *Eur. J. Cell Biol.* 33, 175–179.
- Haigler Jr., C.H., Brown, R.M., 1986. Transport of rosettes from the Golgi apparatus to the plasma membrane in isolated mesophyll cells of *Zinnia elegans* during differentiation to tracheary elements in suspension culture. *Protoplasma* 134, 111–120.
- Haldane, J.B.S. [1929]. 1985. On Being the Right Size and other Essays. J. Maynard Smith, ed. Oxford University Press, Oxford.
- Haldane, J.B.S., 1930. *Enzymes*. Longmans, Green and Co., London.
- Haldane, J.B.S., 1942. *New Paths in Genetics*. Harper, New York.
- Haldane, J.S., 1922. *Respiration*. Yale University Press, New Haven, CT.
- Hales, S. [1727]. 1961. *Vegetable Staticks*. Oldbourne, London.
- Hall, C.E., Jakus, M.A., Schmitt, F.O., 1946. An investigation of cross striations and myosin filaments in muscle. *Biol. Bull.* 90, 32–50.
- Hall, D.A., Saxl, H., 1960. Human and other animal cellulose. *Nature* 187, 547–550.
- Hall, D.A., Saxl, H., 1961. Studies on human and tunicate cellulose and of their relation to reticulins. *Proc. Roy. Soc. Lond.* 155B, 202–217.
- Hall Jr., G., Allen, G.C., Loer, D.S., Thompson, W.F., Spiker, S., 1991. Nuclear scaffolds and scaffold-attachment regions in higher plants. *Proc. Natl. Acad. Sci. USA*, 88, 9320–9324.
- Hall, J.L., 1983. Plasma membranes. In: Hall, J.L., Moore, A.L. (Eds.), *Isolation of Membranes and Organelles from Plant Cells*. Academic Press, London, pp. 55–81.
- Halle, F., 2002. *In Praise of Plants*. Timber Press, Portland, OR.
- Hamada, H., Mita, T., Shibaoka, H., 1994. Stabilization of cortical microtubules in maize mesocotyl cells by gibberellin A₃. *Plant Cell Physiol.* 35, 189–196.
- Hamill, O.P., Marty, A., Neher, E., Sakmann, B., Sigworth, F.J., 1981. Improved patch-clamp techniques for high-resolution current recording from cells and cell-free membrane patches. *Pflügers Arch* 391, 85–100.
- Hamilton, A., Madison, J., Jay, J., 1961. *The Federalist Papers*. New American Library, New York.
- Hamm, J., Mattaj, I.W., 1990. Monomethylated cap structures facilitate RNA export from the nucleus. *Cell* 63, 109–118.
- Hamm, J., Darzynkiewicz, E., Tahara, S.L.M., Mattaj, I.W., 1990. The trimethylquanosine cap structure of U1 snRNA is a component of a bipartite nuclear targeting signal. *Cell* 62, 569–577.

- Hamman, B.D., Chen, J.-C., Johnson, E.E., Johnson, A.E., 1997. The aqueous pore through the translocon has a diameter of 40–60 Å during cotranslational protein translocation at the ER membrane. *Cell* 89, 535–544.
- Hämmerling, J., 1953. Nucleo-cytoplasmic relationships in the development of *Acetabularia*. *Int. Rev. Cytol.* 2, 475–498.
- Hammond, C., Helenius, A., 1995. Quality control in the secretory pathway. *Curr. Opin. Cell Biol.* 7, 523–529.
- Hanba, Y.T., Shibasaki, M., Hayashi, Y., Hayakawa, T., Kasamo, K., Terashima, I., Katsuhara, M., 2004. Overexpression of the barley aquaporin HvPIP2;1 increases internal CO₂ conductance and CO₂ assimilation in the leaves of transgenic rice plants. *Plant Cell Physiol.* 45, 521–529.
- Hanczyc, M.M., Fujikawa, S.M., Szostak, J.W., 2003. Experimental model of primitive cellular compartments: Encapsulation, growth, and division. *Science* 302, 618–622.
- Hanein, D., Matlack, K.E.S., Jungnickel, B., Plath, K., Kalies, K.-U., Miller, K.R., Rapoport, T.A., Akey, C.W., 1996. Oligomeric rings of the Sec61p complex induced by ligands required for protein translocation. *Cell* 87, 721–732.
- Hangarter, R.P., Gest, H., 2004. Pictorial demonstrations of photosynthesis. *Photosynth. Res.* 80, 421–425.
- Hansen, A.K., Escobar, L.K., Gilbert, L.E., Janse, R.K., 2007. Paternal, maternal, and biparental inheritance of the chloroplast genome in *Passiflora* (Passifloraceae): Implications for phylogenetic studies. *Amer. J. Bot.* 94, 42–46.
- Hansen, J.C., Ausio, J., 1992. Chromatin dynamics and the modulation of genetic activity. *Trends in Biochem. Sci.* 17, 187–191.
- Hanson, J., Huxley, H.E., 1953. Structural basis of the cross-striations in muscle. *Nature* 172, 530–532.
- Hanson, J., Huxley, H.E., 1955. The structural basis of muscle contraction in striated muscle. *Symp. Soc. Exp. Biol.* 9, 228–264.
- Hanson, M.R., Kohler, R.H., 2001. GFP imaging: Methodology and application to investigate cellular compartmentation in plants. *J. Exp. Bot.* 52, 529–539.
- Hanstein, J., 1868. Ueber die Organe der Harz- und Schleim-Absonderung in den Laubknospen. *Bot. Z.* 26, 697, 721, 745, 769.
- Hanstein, J. von., 1870. Die Entwicklung des Keimes der Monokotylen und der Dikotylen. *Bot. Abhandl.* 1, 1–112.
- Hanstein, J. von. 1880. Das Protoplasma als Träger der pflanzlichen und thierischen Lebensverrichtungen. Für Laien und Sachgenossen dargestellt. From Sammlung von Vorträgen für das deutsche Volk. Frommel, W., Pfaff, F. (Eds.) Winter, Heidelberg.
- Hanstein, J. von. 1882. Einige Züge aus der Biologie des Protoplasmas. *Botanische Abh. Herausgeg. v. Hanstein.* Bd. 4/ Heft 2. Bonn.
- Happel, N., Höning, S., Neuhaus, J.-M., Paris, N., Robinson, D.G., Holstein, S.E.H., 2004. *Arabidopsis* μ A-adaptin interacts with the tyrosine motif of the vacuolar sorting receptor VSR-PS1. *Plant J.* 37, 678–693.
- Harden, A., 1929. The function of phosphate in alcoholic fermentation. *Nobel Lect.* December 12.
- Harden, A., 1932. *Alcoholic Fermentation*. Longmans, Green and Co., London.
- Harden, A., Young, W.J., 1906. The alcoholic ferment of yeast-juice. *Proc. Roy. Soc.* B77, 405–520.
- Hardham, A.R., Gunning, B.E.S., 1979. Interpolation of microtubules into cortical arrays during cell elongation and differentiation in roots of *Azolla pinnata*. *J. Cell Sci.* 37, 411–442.
- Hardham, A.R., Gunning, B.E.S., 1980. Some effects of colchicine on microtubules and cell division in roots of *Azolla pinnata*. *Protoplasma* 102, 31–51.
- Hardy, G.H., 1940. *A Mathematician's Apology*. Cambridge University Press, Cambridge.
- Hardy, P.M., 1985. The protein amino acids. In: Barrett, G.C. (Ed.), *Chemistry and Biochemistry of the Amino Acids*. Chapman and Hall, London, pp. 6–24.
- Hardy, W.B., 1899. On the structure of cell protoplasm. *J. Physiol.* 24, 158–210.
- Hardy, W.B., 1906. *The Physical Basis of Life*. *Science Progress* 1, 177–205.
- Hargreaves, A.J., Dawson, P.J., Butcher, G.W., Larkins, A., Goodbody, K.C., Lloyd, C.W., 1989a. A monoclonal antibody raised against cytoplasmic fibrillar bundles from carrot cells, and its cross-reaction with animal intermediate filaments. *J. Cell Sci.* 92, 371–378.
- Hargreaves, A.J., Goodbody, K.C., Lloyd, C.W., 1989b. Reconstitution of intermediate filaments from a higher plant. *Biochem. J.* 261, 679–682.
- Hargreaves, W.R., Mulvihill, S.J., Deamer, D.W., 1977. Synthesis of phospholipids and membranes in prebiotic conditions. *Nature* 266, 78–80.
- Haritatos, E., Keller, F., Turgeon, R., 1996. Raffinose oligosaccharide concentrations measured in individual cells and tissue types in *Cucumis melo* L. leaves: Implications for phloem loading. *Planta* 198, 614–622.
- Harley, S.M., Beevers, L., 1989. Isolation and partial characterization of clathrin-coated vesicles from pea (*Pisum sativum* L.) cotyledons. *Protoplasma* 150, 103–109.
- Harmon, A.C., Putnam-Evans, C., Cormier, M.J., 1987. A calcium-dependent but calmodulin-independent protein kinase from soybean. *Plant Physiol.* 83, 830–837.
- Harold, F.M., 1986. *The Vital Force: A Study of Bioenergetics*. W.H. Freeman and Co., New York.
- Harold, F.M., 1990. To shape a cell: An inquiry into the causes of morphogenesis of microorganisms. *Microbiol. Rev.* 54, 381–431.
- Harold, F.M., 2001. *The Way of the Cell. Molecules. Organisms and the Order of Life*. Oxford University Press, Oxford.
- Harper, R.A., 1919. The structure of protoplasm. *Amer. J. Bot.* 6, 273–300.
- Harris, B., 1980. The mechanical behavior of composite materials. *Soc. Exp. Biol.* 34, 37–74.
- Harris, N., 1986. Organization of the endomembrane system. *Ann. Rev. Plant Physiol.* 37, 73–92.
- Harris, N., Oparka, K.J., 1983. Connections between dictyosomes, ER and GERL in cotyledons of mung bean (*Vigna radiata* L.). *Protoplasma* 114, 93–102.
- Harris, P., Bajer, A., 1965. Fine structure studies on mitosis in endosperm metaphase of *Haemanthus katherinea* Bak. *Chromosoma* 16, 624–636.
- Harris, P.J., 1988. Cell walls. In: Hall, J.L., Moore, A.L. (Eds.), *Isolation of Membranes and Organelles from Plant Cells*. Academic Press, London, pp. 25–53.
- Harrison, E.R., 1981. *Cosmology. The Science of the Universe*. Cambridge University Press, Cambridge.
- Harryson, P., Morré, D.J., Sandelius, A.S., 1996. Cell-free transfer of phosphatidylinositol between membrane fractions isolated from soybean. *Plant Physiol.* 110, 631–637.

- Hartig, T., 1854. Über des verholten des Zellkerns bei der Zellentheilung. Bot. Z 12, 893–902.
- Hartl, F.U., Martin, J., Neupert, W., 1992. Protein folding in the cell: The role of molecular chaperones Hsp 70 and Hsp 60. Ann. Rev. Biophys. Biomol. Struct. 21, 293–322.
- Hartmann, M.-A., 1998. Plant sterols and the membrane environment. Trens in Plant Sci. 3, 170–175.
- Hartmann, M.-A., Benveniste, P., 1987. Plant membrane sterols: Isolation, identification and biosynthesis. Methods Enzymol. 148, 632–650.
- Harvey, E.N., 1952. Forward. In: Davson, H., Danielli, J.F. (Eds.), The Permeability of Natural Membranes. Cambridge University Press, Cambridge, p. vii.
- Harvey, H.J., Venis, M.A., Trewavas, A.J., 1989a. The detection and purification of a verapamil-binding protein from plant tissue. Ann. NY Acad. Sci. 560, 56–58.
- Harvey, H.J., Venis, M.A., Trewavas, A.J., 1989b. Partial purification of protein from maize (*Zea mays*) coleoptile membranes binding the Ca^{2+} -channel antagonist verapamil. Biochem. J. 257, 95–100.
- Hasegawa, Y., Nakamura, S., Katzoe, S., Sato, M., Nakamura, N., 1998. Immunocytochemical and chemical analysis of Golgi vesicles isolated from germinated pollen of *Camellia japonica*. J. Plant Res. 111, 421–429.
- Hasezawa, S., Ueda, K., Kumagai, F., 2000. Time-sequence observations of microtubule dynamics throughout mitosis in living cell suspensions of stable transgenic Arabidopsis: Direct evidence for the origin of cortical microtubules at M/G(1) interface. Plant Cell Physiol. 41, 244–250.
- Hashimoto, K., Igarashi, H., Mano, S., Takenaka, C., Shiina, T., Yamaguchi, M., Demura, T., Nishimura, M., Shimmen, T., Yokota, E., 2008. An isoform of Arabidopsis myosin XI interacts with small GTPases in its C-terminal tail region. J. Exp. Bot. 59, 3523–3531.
- Hashimoto, K., Igarashi, H., Nishimura, M., Shimmen, T., Yokota, E., 2005. Peroxisomal localization of a myosin XI isoform in *Arabidopsis thaliana*. Plant Cell Physiol. 46, 782–789.
- Haskell, G., Wills, A.B., 1968. Primer of Chromosome Practice. Oliver and Boyd, Edinburgh.
- Hasson, T., Mooseker, M.S., 1995. Molecular motors, membrane movements and physiology: Emerging roles for myosins. Curr. Opin. Cell Biol. 7, 587–594.
- Hastings, J.W., Sweeney, B.M., 1957. On the mechanism of temperature independence in a biological clock. Proc. Natl. Acad. Sci. 43, 804–811.
- Haswell, E.S., 2007. MscS-like proteins in plants. Curr. Topics in Membranes 58, 329–359.
- Haswell, E.S., Meyerowitz, E.M., 2006. MscS-like proteins control plastid size and shape in *Arabidopsis thaliana*. Curr. Biol. 16 (16), 1–11.
- Haswell, E.S., Peyronnet, R., Barbier-Brygoo, H., Meyerowitz, E.M., Frachisse, J.-M., 2008. Two MscS homologs provide mechanosensitive channel activities in the *Arabidopsis* root. Curr. Biol. 18, 730–734.
- Hatano, S., Tazawa, M., 1968. Isolation, purification and characterization of myosin B from myxomycete plasmodium. Biochim. Biophys. Acta 154, 507–519.
- Hatch, M.D., 2002. C_4 photosynthesis: Discovery and resolution. Photosynth Res. 73, 251–256.
- Hatch, M.D., Slack, C.R., 1966. Photosynthesis by sugar-cane leaves: A new carboxylation reaction and the pathway of sugar formation. Biochem. J. 101, 103–111.
- Hato, M., 1979. Membrane phenomena in chemotaxis in true slime mold *Physarum polycephalum* (II). Colloid & Polymer Sci. 257, 745–747.
- Haupt, W., 1960. Die Chloroplastendrehung bei *Mougeotia*. II. Die Induktion der Schwachlichtbewegung durch linear polarisiertes Licht. Planta 55, 465–479.
- Haupt, W., 1965. Perception of environmental stimuli orienting growth and movement in lower plants. Ann. Rev. Plant Physiol. 16, 267–290.
- Haupt, W., 1968. Die Orientierung Phytochrom-Moleküle in der *Mougeotia* Zelle: Ein neues Modell zur Deutung der experimentellen Befunde. Z. Pflanzenphysiol. 58, 331–346.
- Haupt, W., 1970. Über den Dichroismus von Phytochrom₆₆₀ und Phytochrom₇₃₀ bei *Mougeotia*. Z. Pflanzenphysiol. 62, 287–298.
- Haupt, W., 1982. Light-mediated movement of chloroplasts. Ann. Rev. Plant Physiol. 33, 204–233.
- Haupt, W., 1983a. Movement of chloroplasts under the control of light. Prog. Phycol. Res. 2, 227–281.
- Haupt, W., 1983b. The perception of light direction and orientation responses in chloroplasts. Soc. Exp. Biol. Symp. 36, 423–442.
- Haupt, W., 1999. Chloroplast movement: From phenomenology to molecular biology. Prog. Bot. 60, 3–36.
- Haupt, W., Mörtel, G., Winkelkemper, I., 1969. Demonstration of different dichroic orientation of phytochrome P_R and P_{FR} . Planta 88, 183–186.
- Haupt, W., Scheuerlein, R., 1990. Chloroplast movement. Plant Cell Environ. 13, 595–614.
- Hauri, H.P., Schweizer, A., 1992. The endoplasmic reticulum Golgi intermediate compartment. Curr. Opin. Cell Biol. 4, 600–608.
- Havaux, M., 1992. Photoacoustic measurements of cyclic electron flow around photosystem I in leaves adapted to light-states 1 and 2. Plant Cell Physiol. 33, 799–803.
- Hawes, C.R., Juniper, B.E., Horne, J.C., 1983. Electron microscopy of resin-free sections of plant cells. Protoplasma 115, 88–93.
- Hawes, C., Saint-Jore, C., Martin, B., Zheng, H.-Q., 2001. ER confirmed as the location of mystery organelles in Arabidopsis plants expressing GFP! Trends in Plant Sci. 6, 245–246.
- Hawkins, E.K., 1974. Golgi vesicles of uncommon morphology and wall formation in the red alga, *Polysiphonia*. Protoplasma 80, 1–14.
- Hayakawa, S.I., 1941. Language in Action. Harcourt, Brace and Co, New York.
- Hayashi, M., Nito, K., Takei-Hoshi, R., Yagi, M., Kondo, M., Suenaga, A., Yamaya, T., Nishimura, M., 2002. Ped3p is a peroxisomal ATP-binding cassette transporter that might supply substrates for fatty acid β -oxidation. Plant Cell Physiol. 43, 1–11.
- Hayashi, T., 1989. Xyloglucans in the primary cell wall. Ann. Rev. Plant Physiol. Plant Mol. Biol. 40, 139–168.
- Hayashi, T., 1991. Biochemistry of xyloglucans in regulating cell elongation and expansion. In: Lloyd, C.W. (Ed.), The Cytoskeletal Basis of Plant Growth and Form. Academic Press, London, pp. 131–144.

- Hayashi, T., Matsuda, K., 1981. Biosynthesis of xyloglucan in suspension-cultured soybean cells. Evidence that the enzyme system of xyloglucan synthesis does not contain β -1,4-glucan 4- β -D-glucosyltransferase activity (EC 2.4.1.12). *Plant Cell Physiol.* 22, 1571–1584.
- Hayashi, T., Sano, T., Kutsuna, N., Kumagai-Sano, F., Hasezawa, S., 2007. Contribution of anaphase B to chromosome separation in higher plant cells estimated by image processing. *Plant Cell Physiol.* 48, 1509–1513.
- Hayashi, Y., Hayashi, M., Hayashi, H., Hara-Nishimura, I., Nishimura, M., 2001. Direct interaction between glyoxysomes and lipid bodies in cotyledons of the *Arabidopsis thaliana* *ped1* mutant. *Protoplasma* 218, 83–94.
- Haydon, J.H., Bowser, S.S., Rieder, C.L., 1990. Kinetochore capture astral microtubules during chromosome attachment to the mitotic spindle: Direct visualization in live newt lung cells. *J. Cell Biol.* 111, 1039–1045.
- Haydon, S.M., Wolenski, J.S., Mooseker, M.S., 1990. Binding of brush border myosin I to phospholipid vesicles. *J. Cell Biol.* 111, 443–451.
- Hayes, J.J., Hansen, J.C., 2002. Commentary. New insights into unwrapping DNA from the nucleosome from a single-molecule optical tweezers method. *Proc. Natl. Acad. Sci. USA* 99, 1752–1754.
- Hayes, J.J., Wolffe, A.P., 1992. The interaction of transcription factors with nucleosomal DNA. *BioEssays* 14, 597–603.
- Hays, T.S., Salmon, E.D., 1990. Poleward force at the kinetochore in metaphase depends on the number of kinetochore microtubules. *J. Cell Biol.* 110, 391–404.
- He, C.Y., Shaw, M.K., Pletcher, C.H., Striepen, B., Tilney, L.G., Roos, D.S., 2001. A plastid segregation defect in the protozoan parasite *Toxoplasma gondii*. *EMBO J.* 20, 330–339.
- He, Z.H., Fujiki, M., Kohorn, B.D., 1996. A cell wall-associated, receptor-like protein kinase. *J. Biol. Chem.* 271, 19789–19793.
- Heath, I.B., 1981. Mitosis through the electron microscope. In: Zimmerman, A.M., Forer, A. (Eds.), *Mitosis/Cytokinesis*. Academic Press, New York, pp. 245–275.
- Heath, I.B., 1990. The roles of actin in tip growth of fungi. *Int. Rev. Cytol.* 123, 95–127.
- Heath, T.L., 1897. *The Works of Archimedes*. Cambridge University Press, Cambridge.
- Heazlewood, J.L., Miller, A.H., 2006. Plant proteomics: Challenges and resources. *Annual Plant Reviews* 28, 1–31.
- Heber, U., Heldt, H.W., 1981. The chloroplast envelope: Structure, function, and role in leaf metabolism. *Ann. Rev. Plant Physiol.* 32, 139–168.
- Heber, U., Wagner, V., Kaiser, W., Neimanis, S., Bailey, K., Walker, D., 1994. Fast cytoplasmic pH regulation in acid-stressed leaves. *Plant Cell Physiol.* 35, 479–488.
- Hecht, K., 1912. Studien über den vorgang der plasmolyse. *Beiträge zur Biologie der Pflanzen* 11, 133–145.
- Hedrich, R., 1995. Technical approaches to studying specific properties of ion channels in plants. In: Sakmann, B., Neher, E. (Eds.), *Single-Channel Recording*, second ed. Plenum Press, New York, pp. 277–305.
- Hedrich, R., Flüge, U.I., Fernandez, J.M., 1986. Patch-clamp studies of ion transport in isolated plant vacuoles. *FEBS Lett.* 204, 228–232.
- Hedrich, R., Neher, E., 1987. Cytoplasmic calcium regulates voltage dependent ion channels in plant vacuoles. *Nature* 329, 833–835.
- Hegde, R.S., Mastrianni, J.A., Scott, M.R., DeFea, K.A., Tremblay, P., Torchia, M., DeArmond, S.J., Prusiner, S.B., Lingappa, V.R., 1998. A Transmembrane form of the prion protein in neurodegenerative disease. *Science* 279, 827–834.
- Hegemann, P., 2008. Algal sensory photoreceptors. *Annu. Rev. Plant Biol.* 59, 167–189.
- Hegemann, P., Tsunoda, S., 2007. Light tools for neuroscience: Channelrhodopsin and light-activated enzymes. *Cell Sci. Rev.* 3, 108–123.
- Heidenhain, M., 1907. *Plasma und Zelle*. Bd. 1. Fischer, Jena.
- Heidenhain, M., 1911. *Plasma und Zelle*. Bd. 2. Fischer, Jena.
- Heidenhain, R., 1878. Ueber secretorische und trophische Drüsenerven. *Pflüger's Archiv für die gesamte Physiologie des Menschen und der Tiere* 17, 1–67.
- Hedrich, R., Kurkdjian, A., 1988. Characterization of an anion-permeable channel from sugar beet vacuoles: Effect of inhibitors. *EMBO J.* 7, 3661–3666.
- Hedrich, R., Kurkdjian, A., Guern, J., Flüge, U.I., 1989. Comparative studies on the electrical properties of the H^+ translocating ATPase and phyrophosphatase of the vacuolar-lysosomal compartment. *EMBO J.* 8, 2835–2841.
- Hedrich, R., Marten, I., 2006. 30-year progress of membrane transport in plants. *Planta* 224, 725–739.
- Heilbron, J.L., 1986. *The Dilemmas of an Upright Man*. Max Planck as Spokesman for German Science. University of California Press, Berkeley, CA.
- Heilbronn, A., 1914. Zustand des Plasmas und Reizbarkeit. Ein Beitrag zur Physiologie der lebenden Substanz. *Jahrb. für wissenschaft. Bot.* 54, 357–390.
- Heilbrunn, L.V., 1956. *The Dynamics of Living Protoplasm*. Academic Press, New York.
- Heilbrunn, L.V., 1958. *The Viscosity of Protoplasm*. *Protoplasmatologia* Bd II. Springer-Verlag, Wein.
- Heinlein, M., 2005. Systemic RNA silencing. In: Oparka, K.J. (Ed.), *Plasmodesmata*. Blackwell Publishing, Oxford, pp. 212–240.
- Heinlein, M., 2008. Microtubules and viral movement. *Plant Cell Monogr.* 11, 141–173.
- Heinlein, M., Epel, B.L., 2004. Macromolecular transport and signaling through plasmodesmata. *Int. Rev. Cytol.* 235, 93–164.
- Heitler, W., 1963. *Man and Science*. Oliver and Boyd, Edinburgh.
- Heitz, E., 1936. Untersuchung über den Bau der Plastiden. *Planta* 26, 134–163.
- Held, M.A., Boulaflos, A., Brandizzi, F., 2008. Advances in fluorescent protein-based imaging for the analysis of plant endomembranes. *Plant Physiol.* 147, 1469–1481.
- Helmholtz, H.von, 1881. *Popular Lectures on Scientific Subjects*. Longmans, Green and Co., London.
- Helmholtz, H. von. 1903. Hermann von Helmholtz. An autobiographical sketch. In: *Popular Lectures on Scientific Subjects*. pp. 266–291. Second Series by H. von Helmholtz. Longmans, Green, and Co., London.
- Helmont, J. B. van, [1683]. 1971. *Aufgang der Arznei-Kunst*. Kösel Verlag, München.
- Hemleben, V., Ermisch, N., Kimmich, D., Leber, B., Peter, G., 1975. Studies on the fate of homologous DNA applied to seedlings of *Matthiola incana*. *Eur. J. Biochem.* 56, 403–411.
- Hemmersbach, R., Braun, M., 2006. Gravity-sensing and gravity-related signaling pathways in unicellular model systems of protests and plants. *Signal Transduction* 6, 432–442.

- Henderson, L.J., 1908. Concerning the relationship between the strength of acids and their capacity to preserve neutrality. *Am. J. Physiol.* 21, 173–179.
- Henderson, L.J., 1913. *The Fitness of the Environment*. MacMillan, New York.
- Henderson, L.J., 1917. *The Order of Nature. An Essay*. Harvard University Press, Cambridge, MA.
- Henderson, S.A., Koch, C.A., 1970. Co-orientation stability by physical tension: A demonstration with experimentally interlocked bivalents. *Chromosoma* 29, 207–216.
- Hendrix, K.W., Assefa, H., Boss, W.F., 1989. The polyphosphoinositides, phosphatidylinositol monophosphate and phosphatidylinositol bisphosphate, are present in nuclei isolated from carrot protoplast. *Protoplasma* 151, 62–72.
- Heneen, W.K., Czajkowski, J., 1980. Scanning electron microscopy of the intact mitotic apparatus. *Biol. Cellulaire* 37, 13–22.
- Henry, C.A., Jordan, J.R., Kropf, D.L., 1996. Localized membrane-wall adhesions in *Pelvetia* zygotes. *Protoplasma* 190, 39–52.
- Henry, M.-F., Nyns, E.-J., 1975. Cyanide-insensitive respiration. An alternative mitochondrial pathway. *Sub-Cell. Biochem.* 4, 1–65.
- Hepler, P.K., 1976. The blepharoplast of *Marsilea*: Its de novo formation and spindle association. *J. Cell Sci.* 21, 361–390.
- Hepler, P.K., 1980. Membranes in the mitotic apparatus of barley cells. *J. Cell Biol.* 86, 490–499.
- Hepler, P.K., 1981. The structure of the endoplasmic reticulum revealed by osmium tetroxide-potassium ferricyanide staining. *Eur. J. Cell Biol.* 26, 102–110.
- Hepler, P.K., 1982. Endoplasmic reticulum in the formation of the cell plate and plasmodesmata. *Protoplasma* 111, 121–133.
- Hepler, P.K., 1985. Calcium restriction prolongs metaphase in dividing *Tradescantia* stamen hair cells. *J. Cell. Biol.* 100, 1363–1368.
- Hepler, P.K., 1989a. Calcium transients during mitosis: Observations in flux. *J. Cell Biol.* 109, 2567–2573.
- Hepler, P.K., 1989b. Membranes in the mitotic apparatus. In: Hyams, J.S., Brinkley, B.R. (Eds.), *Mitosis. Molecules and Mechanisms*. Academic Press, London, pp. 241–271.
- Hepler, P.K., 1992. Calcium and mitosis. *Int. Rev. Cytol.* 138, 239–268.
- Hepler, P.K., 1994. The role of calcium in cell division. *Cell Calcium* 16, 322–330.
- Hepler, P.K., Bonignore, L., 1990. Caffeine inhibition of cytokinesis: Ultrastructure of cell plate formation/degradation. *Protoplasma* 157, 182–192.
- Hepler, P.K., Fosket, D.E., 1971. The role of microtubules in vessel member differentiation in *Coleus*. *Protoplasma* 72, 213–236.
- Hepler, P.K., Jackson, W.T., 1968. Microtubules and early stages of cellplate formation in the endosperm of *Haemanthus Katherinae* Baker. *J. Cell Biol.* 38, 437–446.
- Hepler, P.K., Jackson, W.T., 1969. Isopropyl N-phenylcarbamate affects spindle microtubule orientation in dividing endosperm cells of *Haemanthus Katherinae*. Baker. *J. Cell Sci.* 5, 727–743.
- Hepler, P.K., McIntosh, J.R., Cleland, S., 1970. Intermicrotubule bridges in mitotic spindle apparatus. *J. Cell Biol.* 45, 438–444.
- Hepler, P.K., Newcomb, E.H., 1964. Microtubules and fibrils in the cytoplasm of *Coleus* cells undergoing secondary wall deposition. *J. Cell Biol.* 2, 529–533.
- Hepler, P.K., Newcomb, E.H., 1967. Fine structure of cell plate formation in the apical meristem of Phaseolus roots. *J. Ultrastruc. Res.* 19, 498–513.
- Hepler, P.K., Palevitz, B.A., 1986. Metabolic inhibitors block Anaphase A in vivo. *J. Cell Biol.* 102, 1995–2005.
- Hepler, P.K., Valster, A., Molchan, T., Vos, J.W., 2002. Roles for kinesin and myosin during cytokinesis. *Phil. Trans. Roy. Soc. Lond.* 357B, 761–766.
- Hepler, P.K., Vidali, L., Cheung, A.Y., 2001. Polarized cell growth in plants. *Annu. Rev. Cell Dev. Biol.* 17, 159–187.
- Hepler, P.K., Wayne, R.O., 1985. Calcium and plant development. *Ann. Rev. Plant Physiol.* 36, 397–439.
- Hepler, P.K., Wolniak, S.M., 1983. Membranous compartments and ionic transients in the mitotic apparatus. *Mod. Cell Biol.* 2, 93–112.
- Hepler, P.K., Wolniak, S.M., 1984. Membranes in the mitotic apparatus: Their structure and function. *Int. Rev. Cytol.* 90, 169–238.
- Herman, E.M., 1988. Immunocytochemical localization of macromolecules with the electron microscope. *Ann. Rev. Plant Physiol.* 39, 139–155.
- Herman, E.M., 2008. Endoplasmic reticulum bodies: Solving the insoluble. *Curr. Opin. Plant Biol.* 11, 672–679.
- Herman, E.M., Baumgartner, B., Chrispeels, M.J., 1981. Uptake and apparent digestion of cytoplasmic organelles by protein bodies. *Eur. J. Cell Biol.* 24, 226–235.
- Herman, E.M., Lamb, C.J., 1992. Arabinogalactan-rich glycoproteins are localized on the cell surface and in intravacuolar multivesicular bodies. *Plant Physiol.* 98, 264–272.
- Herman, E.M., Li, X., Su, R.T., Larsen, P., Hsu, H.T., Sze, H., 1994. Vacuolar-type H⁺-ATPases are associated with the endoplasmic reticulum and provacuoles of root tip cells. *Plant Physiol.* 106, 1313–1324.
- Herman, E.M., Shannon, L.M., 1984a. Immunocytochemical evidence for the involvement of Golgi apparatus in the deposition of seed lectin of *Bauhinia purpurea* (Leguminosae). *Protoplasma* 121, 163–170.
- Herman, E.M., Shannon, L.M., 1984b. Immunocytochemical localization of concanavalin A in developing jack bean cotyledons. *Planta* 161, 97–104.
- Herman, E.M., Shannon, L.M., 1985. Accumulation and subcellular localization of α -galactosidase in developing soybean cotyledons. *Plant Physiol.* 77, 886–890.
- Herman, E.M., Tague, B.W., Hoffman, L.M., Kjemtrup, S.E., Chrispeels, M.J., 1990. Retention of phytohemagglutinin with carboxyterminal tetrapeptide KDEL in the nuclear envelope and the endoplasmic reticulum. *Planta* 182, 305–312.
- Hernandez-Verdun, D., 1991. The nucleolus today. *J. Cell Sci.* 99, 465–471.
- Hershey, A.D., 1969. Idiosyncrasies of DNA structure. Nobel Lect. December 12.
- Hershey, A.D., Chase, M., 1952. Independent functions of viral protein and nucleic acid in growth of bacteriophage. *J. Gen. Physiol.* 36, 39–56.
- Herskowitz, J., Herslowitz, I., Cuddihy, J.G., 1993. Double Talking Helix Blues. In *Book and Tape Forms*. Cold Spring Harbor Laboratory Press, Plainview, New York.
- Herth, W., 1983. Arrays of plasmamembrane “rosettes” involved in cellulose microfibril formation of *Spirogyra*. *Planta* 159, 347–356.
- Herth, W., 1984. Oriented “rosette” alignment during cellulose formation in mung bean hypocotyl. *Naturwissenschaften* 71, 216–217.

- Herth, W., 1985. Plasmamembrane rosettes involved in localized wall thickening during xylem vessel formation of *Lepidium sativum*. L. Planta 164, 12–21.
- Herth, W., Weber, G., 1984. Occurrence of the putative cellulose-synthesizing “rosettes” in the plasma membrane of *Glycine max* suspension culture cells. Naturwissenschaften 71, 153–154.
- Hertwig, O., 1895. The Cell. Outlines of General Anatomy and Physiology. Translated by M. Campbell. Swan Sonnenschein & Co., London.
- Hertz, G., 1926. The results of the electron-impact tests in the light of Bohr’s theory of atoms. Nobel Lect. December 11.
- Heslop-Harrison, J., 1962. Evanescent and persistent modifications of chloroplast ultrastructure induced by an unnatural pyrimidine. Planta 58, 237–256.
- Heslop-Harrison, J.S., 1991. The molecular cytogenetics of plants. J. Cell. Sci. 100, 15–21.
- Heslop-Harrison, J.S., 2000. Comparaytive genome organization in plants: From sequence and markers to chromatin and chromosomes. Plant Cell 12, 617–635.
- Heslop-Harrison, J.S., Bennett, M.D., 1990. Nuclear architecture in plants. Trends Genet. 6, 401–405.
- Heslop-Harrison, J.S., Leitch, A.R., Schwarzacher, T., 1993. The physical organization of interphase nuclei. In: Heslop-Harrison, J.S., Flavell, R.B. (Eds.), The Chromosome. BIOS Scientific Publishers, Oxford, pp. 221–232.
- Heslop-Harrison, P., Osuji, J., Hull, R., Harper, G., D’Hort, A., Carreel, F., 1999. Fluorescent *in situ* Hybridization of Plant Chromosomes: Illuminating the *Musa* Genome INIBAP Annual Report 1998. INIBAP Montpellier, France pp. 26–29.
- Hess, E.L., 1970. Origins of molecular biology. Science 168, 664–669.
- Hesse, M., 1993. The Tapetum. Cytology, Function, Biochemistry and Evolution. Springer-Verlag, Wien.
- Hesse, T., Feldwisch, J., Balshüsemann, D., Puype, M., Vandekerckhove, J., Löbler, M., Klämbt, D., Schell, J., Palme, K., 1989. Molecular cloning and structural analysis of a gene from *Zea mays* (L.) coding for a putative receptor for the plant hormone auxin. EMBO J. 8, 2453–2461.
- Heupel, R., Heldt, H.W., 1994. Protein organization in the matrix of leaf peroxisomes. A multienzyme complex involved in photo respiratory metabolism. Eur. J. Biochem. 220, 165–172.
- Heupel, R., Markgraf, T., Robinson, D.G., Heldt, H.W., 1991. Compartmentation studies on spinach leaf peroxisomes. Evidence for channeling of photorespiratory metabolites in peroxisomes devoid of intact boundary membrane. Plant Physiol. 96, 971–979.
- Heuser, E., 1944. The Chemistry of Cellulose. John Wiley & Sons, New York.
- Hewish, A., Bell, S.J., Pilkington, J.D.H., Scott, P.F., Collins, R.A., 1968. Observations of a rapidly pulsating radio source. Nature 217, 709–713.
- Hewitt, L.F., Kekwick, R.A., McFarlane, A.S., 1943. The chemistry of the proteins and amino acids. Ann. Rev. Biochem. 12, 81–114.
- Hicks, G.R., Rojo, E., Hong, S., Carter, D.G., Raikhel, N.V., 2004. Geminating [*sic*] pollen has tubular vacuoles, displays highly dynamic vacuole biogenesis, and requires VACUOLESS1 for proper function. Plant Physiol. 134, 1227–1239.
- Hicks, S.J., Drysdale, J.W., Munro, H.N., 1969. Preferential synthesis of ferritin and albumin by different populations of liver polysomes. Science 164, 584–585.
- Higashi Jr., T., Peters, T., 1963. Studies on rat liver catalase. II. Incorporation of C¹⁴leucine into catalase of liver cell fractions in vivo. J. Biol. Chem. 238, 3952–3954.
- Higashi-Fujime, S., 1991. Reconstitution of active movement in vitro based on the actin-myosin interaction. Int. Rev. Cytol. 125, 95–138.
- Higashi-Fujime, S., Ishikawa, R., Ishikawa, H., Kagami, O., Kurimoto, E., Kohama, K., Hozumi, T., 1995. The fastest actin-based motor protein from the green algae, *Chara*, and its distinct mode of interaction with actin. FEBS Lett. 375, 151–154.
- High, S., Dobberstein, B., 1991. The signal sequence interacts with the methionine-rich domain of the 54-kD protein of signal recognition particle. J. Cell Biol. 113, 229–233.
- High, S., Dobberstein, B., 1992. Mechanisms that determine the transmembrane disposition of proteins. Curr. Opin. Cell Biol. 4, 581–586.
- Hill, A.V., 1923. The mechanism of muscular contraction. Nobel Lect. December 12.
- Hill, A.V., 1926. The physical environment of the living cell. In: Dale, H.H., Drummond, J.C., Henderson, L.J., Hill, A.V. (Eds.), Lectures on Certain Aspects of Biochemistry. University of London Press, Ltd, London, pp. 251–280.
- Hill, A.V., 1928. The rôle of oxidation in maintaining the dynamic equilibrium of the muscle cell. Proc. Roy. Soc. Lond. 103B, 138–162.
- Hill, A.V., 1929. The maintenance of life and irritability in isolated animal tissues. Nature Suppl. 123, 723–730.
- Hill, A.V., 1932. The revolution in muscle physiology. Physiol. Rev. 12, 56–67.
- Hill, A.V., 1949. Adenosine triphosphate and muscular contraction. Nature 163, 320.
- Hill, A.V., 1962. The Ethical Dilemma of Science and Other Writings. Scientific Book Guild, London.
- Hill, A.V., 1965. Trails and Trials in Physiology. Williams & Wilkins Co., Baltimore.
- Hill, R., 1937. Oxygen evolved by isolated chloroplasts. Nature 139, 881–882.
- Hill, R., 1954. The cytochrome b component of chloroplasts. Nature 174, 501–503.
- Hill, R., Bendall, F., 1960. Function of two cytochrome components in chloroplasts: A working hypothesis. Nature 186, 136–137.
- Hill, R., Scarisbrick, R., 1940. Production of oxygen by illuminated chloroplasts. Nature 146, 61–62.
- Hill, R., Scarisbrick, R., 1951. The haematin compounds of leaves. New Phytol. 50, 98–111.
- Hill, R., Whittingham, C.P., 1955. Photosynthesis. Methuen & Co., London.
- Hill, R.L., Kimmel, J.R., Smith, E.L., 1959. The structure of proteins. Ann. Rev. Biochem. 28, 97–144.
- Hill, T.L., Morales, M.F., 1950. Sources of the high energy content in energy-rich phosphates. Arch. Biochem. 29, 450–451.
- Hill, T.L., Morales, M.F., 1951. On “high energy phosphate bonds” of biochemical interest. J. Amer. Chem. Soc. 73, 1656–1660.
- Hille, B., 1992. Ionic Channels in Excitable Membranes, second ed. Sinauer Associates, Inc, Sunderland, MA.

- Hilliker, A.J., Appels, R., 1989. The arrangement of interphase chromosomes: Structural and functional aspects. *Exp. Cell. Res.* 185, 297–318.
- Hillman, H., 2001. Research practices in need of examination and improvement. *Sci. Eng. Ethics* 7, 7–14.
- Hillmer, S., Freundt, H., Robinson, D.G., 1988. The partially coated reticulum and its relationship to the Golgi apparatus in higher plant cells. *Eur. J. Cell Biol.* 47, 206–212.
- Himmelsbach, D.S., Khahili, S., Akin, D.E., 1999. Near-infrared-Fourier-transform Raman microspectroscopic imaging of flax stems. *Vib. Spectrosc.* 19, 361–367.
- Himmelsbach, R., Williamson, R.E., Wasteneys, G.O., 2003. Cellulose microfibril alignment recovers from DCB-induced disruption despite microtubule disorganization. *Plant J.* 36, 565–575.
- Hind, G., Jagendorf, A.T., 1963. Separation of light and dark stages in photophosphorylation. *Proc. Natl. Acad. Sci. USA* 49, 715–722.
- Hinkle, L., McCaig, C.D., Robinson, K.R., 1981. The direction of growth of differentiating neurons and myoblasts from frog embryos in an applied electric field. *J. Physiol.* 314, 121–135.
- Hinkle, P.C., Kumar, M.A., Resetar, A., Harris, D.C., 1991. Mechanistic stoichiometry of mitochondrial oxidative phosphorylation. *Biochemistry* 30, 3576–3582.
- Hinkle, P.C., McCarty, R.E., 1978. How cells make ATP. *Sci. Am.* 238, 104–123.
- Hinkle, P.C., Yu, M.L., 1979. The phosphorous/oxygen ratio of mitochondrial oxidative phosphorylation. *J. Bio. Chem.* 254, 2450–2455.
- Hinshaw, J.E., Carragher, B.O., Milligan, R.A., 1992. Architecture and design of the nuclear pore complex. *Cell* 69, 1133–1141.
- Hiramoto, Y., 1987. Evaluation of cytomachanical properties. In: Bereiter-Hahn, J., Anderson, O.R., Reif, W.E. (Eds.), *Cytomechanics*. Springer Verlag, Berlin, pp. 31–46.
- Hiramoto, Y., Kamitsubo, E., 1995. Centrifuge microscope as a tool in the study of cell motility. *Int. Rev. Cytol.* 157, 99–128.
- Hiramoto, Y., Kaneda, I., 1988. Diffusion of substances in the cytoplasm and across the nuclear envelope in egg cells. *Protoplasm (Suppl. 2)*, 88–94.
- Hiramoto, Y., Nakano, Y., 1988. Micromanipulation studies of the mitotic apparatus in sand dollar eggs. *Cell Motil. Cytoskel.* 10, 172–184.
- Hirano, T., Mitchison, T.J., 1991. Cell cycle control of higher-order chromatin assembly around naked DNA in vitro. *J. Cell Biol.* 115, 1479–1489.
- Hiraoka, L., Golden, W., Magnuson, T., 1987. Spindle pole organization during early mouse development. *Dev. Biol.* 133, 24–36.
- Hird, S.N., White, J.G., 1993. Cortical and cytoplasmic flow polarity in early embryonic cells of *Caenorhabditis elegans*. *J. Cell Biol.* 121, 1343–1355.
- Hirshfeld, A.W., 2001. *Parallax: The Race to Measure the Cosmos*. W. H., Freeman, New York.
- Hirschi, K.D., 1999. Expression of Arabidopsis CAX1 in tobacco: Altered calcium homeostasis and increased stress sensitivity. *Plant Cell* 11, 2113–2122.
- Hirschi, K., 2001. Vacuolar H⁺/Ca²⁺ transport: Who's directing the traffic? *Trends Plant Sci.* 6, 100–104.
- Hitchcock, D.I., 1940. Chemistry of amino acids and proteins. *Ann. Rev. Biochem.* 9, 173–198.
- Hitt, A.L., Luna, E.J., 1994. Membrane interactions with the actin cytoskeleton. *Curr. Opin. Cell Biol.* 6, 120–130.
- Hoagland, D.R., 1948. *Lectures on the Inorganic Nutrition of Plants*. Chronica Botanica, Waltham, MA.
- Hoagland, M., 1990. *Toward the Habit of Truth. A Life in Science*. W. W. Norton & Co., New York.
- Hoagland, M.B., Keller, E.B., Zamecnik, P.C., 1956. Enzymatic carboxyl activation of amino acids. *J. Biol. Chem.* 218, 345–358.
- Hoagland, M.B., Zamecnik, P.C., Stephenson, M.L., 1957. Intermediate reactions in protein biosynthesis. *Biochim. Biophys. Acta* 24, 215–216.
- Hoagland, M.B., Stephenson, M.L., Scott, J.F., Hecht, L.I., Zamecnik, P.C., 1958. A soluble ribonucleic acid intermediate in protein synthesis. *J. Biol. Chem.* 231, 241–257.
- Hobbes, T., 1651. *Leviathan*. <http://www.constitution.org/th/leviatha.htm>.
- Höber, R., 1930. The present conception of the structure of the plasma membrane. *Biol. Bull.* 58, 1–17.
- Höber, R., 1945. *Physical Chemistry of Cells and Tissues*. Blakiston Co., Philadelphia.
- Hobhouse, H., 1986. *Seeds of Change. Five Plants that Transformed Mankind*. Harper & Row, New York.
- Hobson, E.W., 1923. *The Domain of Natural Science*. MacMillan, New York.
- Hoch, H.C., Staples, R.C., 1983. Ultrastructural organization of the non-differentiated uredospore germling of *Uromyces phaseoli* variety typica. *Mycologia* 75, 795–824.
- Hoch, H.C., Staples, R.C., Whitehead, B., Comeau, J., Wolf, E.D., 1987. Signaling for growth orientation and cell differentiation by surface topography in *Uromyces*. *Science* 235, 1659–1662.
- Hochachka, P.W., 1999. The metabolic implications of intracellular circulation. *Proc. Natl. Acad. Sci. USA* 96, 12233–12239.
- Hodge, A.J., 1956. The fine structure of striated muscle. *J. Biophys. Biochem. Cytol.* 2 (4 Suppl.), 131–142.
- Hodges, T.K., Leonard, R.T., Bracker, C.E., Keenan, T.W., 1972. Purification of an ion-stimulated adenosine triphosphatase from plant roots: Association with plasma membranes. *Proc. Natl. Acad. Sci. USA* 69, 3307–3311.
- Hodgkin, A.L., 1963. The ionic basis of nervous conduction. *Nobel Lect.* December 11.
- Hodgkin, D.C., 1964. The X-ray analysis of complicated molecules. *Nobel Lect.* December 11.
- Hoepfner, D., Schildknecht, D., Braakman, I., Philippson, P., Tabak, H.F., 2005. Contribution of the endoplasmic reticulum to peroxisome formation. *Cell* 122, 85–95.
- Hof, P.R., Nimchinsky, E.A., Perl, D.P., Erwin, J.M., 2001. An unusual cingulate cortex of hominids contains the calcium-binding protein calretinin. *Neuroscience Lett.* 307, 139–142.
- Hoffman, B.F., Cranefield, P.F., 1960. *Electrophysiology of the Heart*. McGraw-Hill, New York.
- Hoffmann, H.-P., Avers, C.J., 1973. Mitochondrion of yeast: Ultrastructural evidence for one giant, branched organelle per cell. *Science* 181, 749–751.
- Hoffman, J.C., Vaughn, K.C., Joshi, H.C., 1994. Structural and immunocytochemical characterization of microtubule organizing centers in pteridophyte spermatogenous cells. *Protoplasma* 179, 46–60.
- Hoffmann-Berling, H., 1955. Geisselmodelle und Adenosintriphosphat (ATP). *Biochim. Biophys. Acta* 16, 146–154.

- Hofmann, A.W. von., 1876. The Life Work of Liebig in Experimental and Philosophical Chemistry. MacMillan, London.
- Hofmannová, J., Schwarzerová, K., Havelková, L., Boriková, P., Petrášek, J., Opatrný, Z., 2008. A novel, cellulose synthesis inhibitory action of ancyamidol impairs plant cell expansion. *J. Exp. Bot.* 59, 3963–3974.
- Hofmeister, W., 1849. Die Entstehung des Embryos der Phanerogamen. Wilhelm Engelmann, Leipzig.
- Hofmeister, W., 1867. Die Lehre von der Pflanzenzelle. Wilhelm Engelmann, Leipzig.
- Höftberger, M., Url, T., Meindl, U., 1995. Disturbance of the secretory pathway in *Micrasterias denticulata* by tunicamycin and cyclopiazonic acid. *Protoplasma*, 189, 173–179.
- Hogeboom, G. H., Succinic dehydrogenase of mammalian liver. *J. Biol. Chem.* 162, 739–740.
- Hogeboom, G.H., Schneider, W.C., 1955. The cytoplasm. In: Chargaff, E., Davidson, J.N. (Eds.) *The Nucleic Acids. Chemistry and Biology*. Academic Press, New York, pp. 199–246.
- Hogeboom, G.H., Schneider, W.C., Pallade, G.E., 1948. Cytochemical studies of mammalian tissues. *J. Biol. Chem.* 172, 619–636.
- Hogetsu, T., 1983. Distribution and local activity of particle complexes synthesizing cellulose microfibrils in the plasma membrane of *Closterium acerosum* (Schrank) Ehrenberg. *Plant Cell Physiol.* 24, 777–781.
- Hoh, B., Schauerermann, G., Robinson, D.G., 1991. Storage protein polypeptides in clathrin coated vesicle fractions from developing pea cotyledons are not due to endomembrane contamination. *J. Plant Physiol.* 138, 309–316.
- Holdaway-Clarke, T.L., Feijó, J.A., Hackett, G.R., Kunkel, J.G., Hepler, P.K., 1997. Pollen tube growth and the intracellular cytosolic calcium gradient oscillate in phase while extracellular calcium influx is delayed. *Plant Cell* 9, 1999–2010.
- Holdaway-Clarke, T.L., Walker, N.A., Hepler, P.K., Overall, R.L., 2000. Physiological elevations in cytoplasmic free calcium by cold or ion injection result in transient closure of higher plant plasmodesmata. *Planta* 210, 329–335.
- Holden, M.J., Norman, H.A., Britz, S.J., 1994. Spectral quality during pod development affects omega-6 desaturase activity in soybean seen endoplasmic reticulum. *Physiol. Plant.* 91, 346–351.
- Holland, N., Holland, D., Helentjaris, T., Dhugga, K.S., Xoconostle-Cazeres, B., Delmer, D.P., 2000. A comparative analysis of the plant cellulose synthase (CesA) gene family. *Plant Physiol.* 123, 1313–1323.
- Holley, R.W., 1968. Alanine transfer RNA. *Nobel Lect.* December 12.
- Holley, R.W., 1957. An alanine-dependent, ribonuclease-inhibited conversion of AMP to ATP, and its possible relationship to protein synthesis. *J. Am. Chem. Soc.* 79, 658–662.
- Holley, R.W., Apgar, J., Everett, G.A., Madison, J.T., Marquisee, M., Merrill, S.H., Penswick, J.R., Zamir, A., 1965. Structure of a ribonucleic acid. *Science* 147, 1462–1465.
- Holmes, K.C., Popp, D., Gebhard, W., Kabasch, W., 1990. Atomic model of the actin filament. *Nature* 347, 44–49.
- Holstein, S.E.H., Drucker, M., Robinson, D.G., 1994. Identification of a beta-type adaptin in plant clathrin-coated vesicles. *J. Cell Sci.* 107, 945–953.
- Holt, G.D., Snow, C.M., Senior, A., Haltiwanger, R.S., Gerace, L., Hart, G.W., 1987. Nuclear pore complex glycoproteins contain cytoplasmically disposed O-linked N-acetylglucosamine. *J. Cell Biol.* 104, 1157–1164.
- Holt, S.C., Marr, A.G., 1965. Location of chlorophyll in *Rhodospirillum rubrum*. *J. Bacteriol.* 89, 1402–1412.
- Holzwarth, G., Bonin, K., Hill, D.B., 2002. Forces required of kinesin during processive transport through cytoplasm. *Biophys. J.* 82, 1784–1790.
- Hong, Z., Verma, D.P.S., 2007. Molecular analysis of the cell plate forming machinery. *Plant Cell Monogr.* 9, 303–320.
- Honda, S.I., Hongladarom-Honda, T., Kwanyuen, P., Wildman, S.G., 1971. Interpretations on chloroplast reproduction derived from correlations between cells and chloroplasts. *Planta* 97, 1–15.
- Hooke, R., [1665]. 1961. *Micrographia or Some Physiological Descriptions of Minute Bodies Made by Manifying Glasses with Observations and Inquiries thereupon*. Dover Publications, New York.
- Hooke, R., 1726. *Philosophical Experiments and Observations of the Late Eminent Dr. Robert Hooke*. W. and J. Innys, London.
- Hooley, R., 2001. Progress towards the identification of cytokinin receptors. In: Sopory, S.K., Oelmüller, R., Maheshwari, S.C. (Eds.), *Signal Transduction in Plants*. Kluwer Academic, New York, pp. 193–199.
- Hooley, R., Beale, M.H., Smith, S.J., 1991. Gibberellin perception at the plasma membrane of *Avena fatua* aleurone protoplasts. *Planta* 183, 274–280.
- Hope, A.B., Walker, N.A., 1975. *The Physiology of Giant Algal Cells*. Cambridge University Press, Cambridge.
- Hopkins, C.R., Gibson, A., Shipman, M., Miller, K., 1990. Movement of internalized ligand-receptor complexes along a continuous endosomal reticulum. *Nature* 346, 335–339.
- Hopkins, F.G., 1913. The dynamic side of biochemistry. *Nature* 92, 213–223.
- Hopkins, M., Mark Harrison, T., Manning, C.E., 2008. Low heat flow inferred from >4 Gyr zircons suggests Hadean plate boundary interactions. *Nature* 456, 493–496.
- Horecker, B.L., 1982. Cytochrome reductase, the pentose phosphate pathway, and Schiff base mechanisms. In: Semeza, G. (Ed.), *Of Oxygen, Fuels, and Living Matter, Part 2*. John Wiley & Sons, Chichester, UK, pp. 59–172.
- Hörmann, G., 1898. *Studien über die Protoplasmaströmung bei den Characeen*. Sustav Fischer, Jena.
- Horn, M.A., Heinstein, P.F., Low, P.S., 1989. Receptor-mediated endocytosis in plant cells. *Plant Cell* 1, 1003–1009.
- Horn, M.A., Heinstein, P.F., Low, P.S., 1990. Biotin-mediated delivery of exogenous macromolecules into soybean cells. *Plant Physiol.* 93, 1492–1496.
- Horn, M.A., Heinstein, P.F., Low, P.S., 1992. Characterization of parameters influencing receptor-mediated endocytosis in cultured soybean cells. *Plant Physiol.* 98, 673–679.
- Horowitz, N.H., 1945. On the evolution of biochemical syntheses. *Proc. Natl. Acad. Sci. USA* 31, 153–157.
- Horowitz, N.H., 1958. The origin of life. In: Hutchings, Jr., E. (Ed.), *Frontiers in Science. A Survey*. Basic Books, New York, pp. 19–27.
- Horowitz, N.H., 1985. The origins of molecular genetics: One gene, one enzyme. *BioEssays* 3, 37–39.
- Horowitz, N.H., Beadle, G.W., 1943. A microbiological method for the determination of choline by use of a mutant of *Neurospora*. *J. Biol. Chem.* 150, 325–333.

- Horowitz, N.H., Bonner, D., Mitchell, H.K., Tatum, E.L., Beadle, G.W., 1945. Genic control of biochemical reactions in *Neurospora*. *Am. Nat.* 79, 304–317.
- Horowitz, P., Hill, W., 1989. *The Art of Electronics*, second ed. Cambridge University Press, Cambridge.
- Hörtensteiner, S., Martinoia, E., Amrhein, N., 1992. Reappearance of hydrolytic activities and tonoplast proteins in the regenerated vacuole of vacuolated protoplasts. *Planta* 187, 113–121.
- Hoson, T., 1991. Structure and function of plant cell walls: Immunological approaches. *Int. Rev. Cytol.* 130, 233–268.
- Hoson, T., 1992. Auxin-induced cell wall extension. In: Shibaoka, H. (Ed.), *Cellular Basis of Growth and Development*, Proc. of the VII International Symposium in Conjunction with the Awarding of the International Prize for Biology. November 26–28, 1992, Toyonaka, Osaka, pp. 27–34.
- Hoson, T., Masuda, Y., Sone, Y., Misaki, A., 1991. Xyloglucan antibodies inhibit auxin-induced elongation and cell wall loosening of azuki bean epicotyls but not oat coleoptiles. *Plant Physiol.* 96, 551–557.
- Hosy, E., Vavasseur, A., Mouline, K., Dreyer, I., Gaymard, F., Porée, F., Boucherez, J., Lebaudy, A., Bouchez, D., Véry, A.-A., Simonneau, T., Thibaud, J.-B., Sentenac, H., 2003. The *Arabidopsis* outward K^+ channel GORK is involved in regulation of stomatal movements and plant transpiration. *Proc. Natl. Acad. Sci. USA* 100, 5549–5554.
- Hotani, H., Horio, T., 1988. Dynamics of microtubules visualized by darkfield microscopy: Treadmilling and dynamic instability. *Cell Motil. Cytoskeleton* 10, 229–236.
- Hotchkiss Jr., A.T., Brown Jr., R.M., 1987. The association of rosette and globule terminal complexes with cellulose microfibril assembly in *Nitella translucens* var. *axillaris* (Charophyceae). *J. Phycol.* 23, 229–237.
- Hotchkiss, R.D., 1995. DNA in the decade before the double helix. *Ann. NY Acad. Sci.* 758, 55–73.
- Hoth, S., Geiger, D., Becker, D., Hedrich, R., 2001. The pore of plant K^+ channels is involved in voltage and pH sensing: Domain swapping between different K^+ channel α -subunits. *Plant Cell* 13, 943–952.
- Hou, G.C., Mohamalawari, D.R., Blancaflor, E.B., 2003. Enhanced gravitropism of roots with a disrupted cap actin cytoskeleton. *Plant Physiol.* 131, 1360–1373.
- Houchmandzadeh, B., Marko, J.F., Chatenay, D., Libchaber, A., 1997. Elasticity and structure of eukaryote chromosomes studied by micromanipulation and micropipette aspiration. *J. Cell Biol.* 139, 1–12.
- House, C.R., 1974. *Water Transport in Cells and Tissues*. Edward Arnold, London.
- Howard, A., Haigh, M.V., 1968. Chloroplast aberrations in irradiated fern spores. *Mutat. Res.* 6, 263–280.
- Howe, G.A., Jander, G., 2008. Plant immunity to insect herbivores. *Annu. Rev. Plant Biol.* 59, 41–66.
- Howell, S.H., Moudrianakis, E.N., 1967. Hill reaction site in chloroplast membranes: Nonparticipation of the quantasome particle in photoreduction. *J. Mol. Biol.* 27, 323–333.
- Hoyle, F., 1953. *The Nature of the Universe*. Basil Blackwell, Oxford.
- Hoyle, F., 1979. An astronomer's view of the evolution of man. In: Huff, D., Prewett, O. (Eds.), *The Nature of the Physical Universe*. 1976 Nobel Conference. John Wiley & Sons, New York, pp. 63–82.
- Hoyle, F., 1983. *The Intelligent Universe*. Holt, Reinhart and Winston, New York.
- Hoyle, F., Wickramasinghe, C., 1981. *Space Travellers. The Bringers of Life*. University College Cardiff Press, Cardiff, UK.
- Hoyt, M.A., 1994. Cellular roles of kinesin and related proteins. *Curr. Opin. Cell Biol.* 6, 63–68.
- Hoyt, M.A., He, L., Loo, K.K., Saunders, W.S., 1992. Two *Saccharomyces cerevisiae* kinesin-related gene products required for mitotic spindle assembly. *J. Cell Biol.* 118, 109–120.
- Hozak, P., Cook, P.R., Schofer, C., Mosgoller, W., Wachtler, F., 1994. Site of transcription of ribosomal RNA and intranuclear structure in HeLa cells. *J. Cell Sci.* 107, 639–648.
- Hrazdina, G., Jensen, R.A., 1992. Spatial organization of enzymes in plant metabolic pathways. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 43, 241–267.
- Hrazdina, G., Wagner, G.J., 1985. Metabolic pathways as enzyme complexes: Evidence for the synthesis of phenylpropanoids and flavonoids on membrane associated enzyme complexes. *Arch. Biochem. Biophys.* 237, 88–100.
- Hrazdina, G., Zobel, A.M., Hoch, H.C., 1987. Biochemical, immunological and immunocytochemical evidence for the association of chalcone synthase with endoplasmic reticulum membranes. *Proc. Natl. Acad. Sci. USA* 84, 8966–8970.
- Hsieh, K., Huang, A.H.C., 2004. Endoplasmic reticulum, oleosins, and oils in seeds and tapetum cells. *Plant Physiol.* 136, 3427–3434.
- Hsieh, T.-S., 1992. DNA topoisomerases. *Curr. Opin. Cell Biol.* 4, 396–400.
- Hu, J., Aguirre, M., Peto, C., Alonso, J., Ecker, J., Chory, J., 2002. A role for peroxisomes in photomorphogenesis and development of *Arabidopsis*. *Science* 297, 405–409.
- Hu, Y., Zhang, Q., Rao, G., Sodmergen, 2008. Occurrence of plastids in the sperm cells of Caprifoliaceae: Biparental plastid inheritance in angiosperms is unilaterally derived from maternal inheritance. *Plant Cell Physiol.* 49, 958–968.
- Huala, E., Oeller, P.W., Liscum, E., Han, I.S., Larsen, E., Briggs, W.R., 1997. *Arabidopsis* NPH1: A protein kinase with rutative redox-sensing domain. *Science* 278, 2120–2123.
- Huang Jr., A.H.C., Trelease, R.N., Moore, T.S., 1983. *Plant Peroxisomes*. Academic Press, New York.
- Huang, C.Y., Ayliffe, M.A., Timmis, J.N., 2003. Direct measurement of the transfer rate of chloroplast DNA into the nucleus. *Nature* 422, 72–76.
- Hubble, E., 1937. *The Observational Approach to Cosmology*. Clarendon Press, Oxford.
- Hubble, E., 1954. *The Nature of Science and Other Lectures*. The Huntington Library, San Marino, CA.
- Huber, R., 1988. A structural basis of light energy and electron transfer in biology. *Nobel Lect.* December 8.
- Hübner, R., Depta, H., Robinson, D.G., 1985. Endocytosis in maize root cap cells. Evidence obtained using heavy metal salt solutions. *Protoplasma* 129, 214–222.
- Hudson, J., 1992. *The History of Chemistry*. Chapman & Hall, New York.
- Huet, J., Schnabel, R., Sentenac, A., Zillig, W., 1983. Archaeobacteria and eukaryotes possess DNA-dependent RNA polymerases of a common type. *EMBO J.* 2, 1291–1294.
- Hughes, A., 1952. *The Mitotic Cycle*. Academic Press, New York.

- Hughes, A., 1959. A History of Cytology. Abelard-Schuman, London.
- Hughes, A.F., Swann, M.M., 1948. Anaphase movement in the living cell. *J. Exp. Biol.* 25, 45–70.
- Hughes, W.L., Sinex, F.M., 1954. Chemistry of the proteins, peptides, and amino acids. *Ann. Rev. Biochem.* 23, 177–214.
- Huisman, J.G., Moorman, A.F., Verkleij, F.N., 1978. In vitro synthesis of chloroplast ferredoxin as a high molecular weight precursor in a cell-free protein synthesizing system from wheat germs. *Biochem. Biophys. Res. Commun.* 82, 1121–1131.
- Huitorel, P., Kirschner, M.W., 1988. The polarity and stability of microtubule capture by the kinetochore. *J. Cell Biol.* 106, 151–159.
- Hulse, R.A., 1993. The discovery of the binary pulsar. Nobel Lect. December 8.
- Hume, D., [1748]. 1952. An Enquiry Concerning Human Understanding. Great Books of the Western World. Volume 35. Encyclopedia Britannica. Inc., Chicago.
- Hume, D., 1748. Essays and Treatises on Several Subjects. <http://www.constitution.org/dh/hume.htm>.
- Humphries, M.J., 1990. The molecular basis and specificity of integrin-ligand interactions. *J. Cell Sci.* 97, 585–592.
- Hunt, T., 2001. Protein synthesis, proteolysis, and cell cycle transitions. Nobel Lect. December 9.
- Hunter, P.R., Craddock, C.P., Di Benedetto, S., Roberts, L.M., Frigerio, L., 2007. Fluorescent reporter proteins for the tonoplast and the vacuolar lumen identify a single vacuolar compartment in Arabidopsis cells. *Plant Physiol.* 145, 1371–1382.
- Hunter, T., Karin, M., 1992. The regulation of transcription by phosphorylation. *Cell* 70, 375–387.
- Hurst, A.C., Mackel, T., Tayefeh, S., Thiel, G., Homann, U., 2004. Trafficking of the plant potassium inward rectifier KAT1 in guard cell protoplasts of *Vicia faba*. *Plant J.* 37, 391–397.
- Hurt, E.D., Mutvei, A., Carmo-Fonseca, M., 1992. The nuclear envelope of the yeast *Saccharomyces cerevisiae*. *Int. Rev. Cytol.* 136, 145–184.
- Hush, J.M., Overall, R.L., 1991. Electrical and mechanical fields orient cortical microtubules in higher plant tissues. *Cell Biol. Int. Rep.* 15, 551–560.
- Hush, J.M., Wadsworth, P., Callahan, D.A., Hepler, P.K., 1994. Quantification of microtubule dynamics in living plant cells using fluorescence redistribution after photobleaching. *J. Cell Sci.* 107, 775–784.
- Hussey, E., 1995. The Presocratics. Hackett Publishing, Indianapolis.
- Hussey, P.J., Allwood, E.G., Smertenko, A.P., 2002. Actin-binding proteins in the *Arabidopsis* genome database: Properties of functionally distinct actin-depolymerizing factors/cofilins. *Phil. Trans. Roy. Soc. Lond. B.* 357, 791–798.
- Hutchinson, D.W., 1964. Nucleotides and Coenzymes. Methuen & Co., London.
- Hutchison III, C.A., Peterson, S.N., Gill, S.R., Cline, R.T., White, O., Fraser, C.M., Smith, H.O., Venter, J.C., 1999. Global transposon mutagenesis and a minimal *Mycoplasma* genome. *Science* 286, 2165–2169.
- Huxley, A.F., 1963. The quantitative analysis of excitation and conduction in nerve. Nobel Lect. December 11.
- Huxley, A.F., 1980. Reflections on Muscle. Princeton University Press, Princeton, NJ.
- Huxley, A.F., 1992. Kenneth Stewart Cole. Biograph. Mem. Fellows Roy. Soc. 38, 99–110.
- Huxley, A.F., 1994. Kenneth Stewart Cole. Biograph. Mem. Natl. Acad. Sci. 70, 25–45.
- Huxley, A.F., Niedergerke, R., 1954. Structural changes in muscle during contraction. *Nature* 173, 971–973.
- Huxley, H.E., 1957. The double array of filaments in cross-striated muscle. *Biophys. Biochem. Cytol.* 3, 631–648.
- Huxley, H.E., 1958. The contraction of muscle. *Sci. Am.* 199, 66–82.
- Huxley, H.E., 1963. Electron microscope studies on the structure of natural and synthetic filaments from striated muscle. *J. Mol. Biol.* 7, 281–308.
- Huxley, H.E., 1966. The fine structure of striated muscle and its functional significance. *Harvey Lect. (1964/65)* 60, 85–118.
- Huxley, H.E., 1969. The mechanism of muscular contraction. *Science* 164, 1356–1366.
- Huxley, H.E., 1996. A personal view of muscle and motility mechanisms. *Ann. Rev. Physiol.* 58, 1–19.
- Huxley, H.E., Hanson, J., 1954. Changes in the cross-striations of muscle during contraction and stretch and their structural interpretation. *Nature* 173, 973–976.
- Huxley, H.E., Hanson, J., 1957. Quantitative studies on the structure of cross-striated myofibrils. I. Investigations by interference microscopy. *Biochim. Biophys. Acta* 23, 229.
- Huxley, J., 1912. The Individual in the Animal Kingdom. Cambridge University Press, Cambridge.
- Huxley, T.H., 1853. The cell-theory. *Brit. For. Medico-Chir. Review* 12, 285–314.
- Huxley, T.H., 1853a. Observations on the existence of *Cellulose* in the Tunic of Ascidians. *Quart. J. Microscopic. Sci.* 1, 22–24.
- Huxley, T.H., 1890. On the physical basis of life. In: *Lay Sermons, Addresses, and Reviews*. D. Appleton and Co., New York, pp. 120–146.
- Huxley, T.H., 1893. Science and Culture and Other Essays. D. Appleton and Co., New York.
- Huxley, T.H., 1898. On the identity of structure of plants and animals. *Sci. Mem.* 1, 216–220.
- Hwang, J.-U., Suh, S., Yi, H., Kim, J., Lee, Y., 1997. Actin filaments modulate both stomatal opening and inward K⁺-channel activities in guard cells of *Vicia faba*. *L. Plant Physiol.* 115, 335–342.
- Hwang, J.-U., Lee, Y., 2001. ABA-induced actin reorganization in guard cells of *Commelina communis* is mediated by cytosolic calcium levels and by protein kinase and protein phosphatase activities. *Plant Physiol.* 125, 2120–2128.
- Hwang, Y.-S., Bethke, P.C., Gubler, F., Jones, R.L., 2003. cPrG-HCl a potential H⁺/Cl⁻ symporter prevents acidification of storage vacuoles in aleurone cells and inhibits GA-dependent hydrolysis of storage protein and phytate. *Plant J.* 35, 154–163.
- Hyams, J.S., Borisy, G.G., 1978. Isolated flagellar apparatus of *Chlamydomonas*: Characterization of forward swimming and alteration of waveform and reversal of motion by calcium ions in vitro. *J. Cell Sci.* 33, 235–253.
- Hyman, A.A., Mitchison, T.J., 1990. Modulation of microtubule stability by kinetochores in vitro. *J. Cell Biol.* 110, 1607–1616.
- |-
- Igarashi, H., Vidali, L., Yokota, E., Sonobe, S., Hepler, P.K., Shimmen, T., 1999. Actin filaments purified from tobacco cultured BY-2 cells can be translocated by plant myosin. *Plant Cell Physiol.* 40, 1167–1171.

- Iino, M., Shitanishi, K., Kadota, A., Wada, M., 1990. Phytochrome-mediated phototropism in *Adiantum* protone-mata. I. Phototropism as a function of the lateral Pfr gradient. *Photochem. Photobiol.* 51, 469–476.
- Ikeuchi, M., 1992. Subunit proteins of photosystem I. *Plant Cell Physiol.* 33, 669–676.
- Imanaka, T., Small, G.M., Lazarow, P.B., 1987. Translocation of acylCoA oxidase into peroxisomes requires ATP hydrolysis but not a membrane potential. *J. Cell Biol.* 105, 897–905.
- Imlau, A., Truernit, E., Sauer, N., 1999. Cell-to-cell and long-distance trafficking of the green fluorescent protein in the phloem and symplastic unloading of the protein into sink tissues. *Plant Cell* 11, 309–322.
- Inata, S., Shimmen, T., 2001. Involvement of cortical microtubules in plastic extension regulated by gibberellin in *Lemna minor* root. *Plant Cell Physiol.* 42, 395–403.
- Inata, S., Sonobe, S., Shimmen, T., 2002. Regulation of directional expansion by the cortical microtubule array in roots of *Lemna minor*. *Funct. Plant Biol.* 29, 1273–1278.
- Ingber, D.E., 1991. Integrins as mechanochemical transducers. *Curr. Opin. Cell Biol.* 3, 841–848.
- Ingber, D.E., 1993. Cellular tensegrity: Defining new rules of biological design that govern the cytoskeleton. *J. Cell Sci.* 104, 613–627.
- Ingber, D.E., Folkman, J., 1989a. How does the extracellular matrix control capillary morphogenesis? *Cell* 58, 803–805.
- Ingber, D.E., Folkman, J., 1989b. Tension and compression as basic determinants of cell form and function: Utilization of a tensegrity mechanism. In: Stein, W.D., Bronner, F. (Eds.), *Cell Shape: Determinants, Regulation, and Regulatory Role*. Academic Press, San Diego, pp. 3–31.
- Ingber, D.E., Jamieson, J.D., 1985. Cells as tensegrity structures: Architectural regulation of histodifferentiation by physical forces transduced over basement membrane. In: Andersson, L.C., Gahmberg, C.G., Ekblom, P. (Eds.), *Gene Expression during Normal and Malignant Differentiation*. Academic Press, Orlando, pp. 13–32.
- Ingen-Housz, J., [1796] 1933. *An Essay on the Food of Plants and the Renovation of Soils*. Printed for Private Distribution by J. Christian Bay.
- Inohara, N., Shimomura, S., Fukui, T., Futai, M., 1989. Auxinbinding protein located in the endoplasmic reticulum of maize shoots: Molecular cloning and complete primary structure. *Proc. Natl. Acad. Sci. USA* 86, 3564–3568.
- Inoué, S., 1951. A method for measuring small retardations of structure in living cells. *Exp. Cell Res.* 2, 513–517.
- Inoué, S., 1952. The effect of colchicine on the microscopic and submicroscopic structure of the mitotic spindle. *Exp. Cell Res.* (Suppl. 2), 305–318.
- Inoué, S., 1953. Polarization optical studies of the mitotic spindle. I. The demonstration of spindle fibers in living cells. *Chromosoma* 5, 487–500.
- Inoué, S., 1959. Motility of cilia and the mechanism of mitosis. In: Oncley, J.L., Schmitt, F.O., Williams, R.C., Rosenberg, M.D., Holt, R.H. (Eds.), *Biophysical Science—A Study Program*. John Wiley & Sons, New York, pp. 402–408.
- Inoué, S., 1964. Organization and function of the mitotic spindle. In: Allen, R.D., Kamiya, N. (Eds.), *Primitive Motile Systems in Cell Biology*. Academic Press, New York, pp. 549–598.
- Inoué, S., 1981. Cell division and the mitotic spindle. *J. Cell Biol.* 91, 131s–147s.
- Inoué, S., Bajer, A., 1961. Birefringence in endosperm mitosis. *Chromosoma* 12, 48–63.
- Inoué, S., Dan, K., 1951. Birefringence of the dividing cell. *J. Morphol.* 89, 423–456.
- Inoué, S., Salmon, E.D., 1995. Force generation by microtubule assembly/disassembly in mitosis and related movements. *Mol. Biol. Cell* 6, 1619–1640.
- Inoué, S., Sato, H., 1967. Cell Motility by labile association of molecules. *J. Gen. Physiol.* (Suppl. 50), 259–292.
- Inoue, S.-I., Kinoshita, T., Matsumoto, M., Nakayama, K.I., Doi, M., Shimazaki, K.-I., 2008. Blue light-induced autophosphorylation of phototropin is a primary step for signaling. *Proc. Natl. Acad. Sci. USA* 105, 5626–5631.
- Inoue, T., Orgel, L.E., 1983. A nonenzymatic RNA polymerase model. *Science* 219, 859–862.
- Inouhe, M., Nevins, D.J., 1991. Inhibition of auxin-induced cell elongation of maize coleoptiles by antibodies specific for cell wall glucanases. *Plant Physiol.* 96, 426–431.
- Inzé, D. (Ed.), 2007. *Cell Cycle Control and Plant Development*. Annual Plant Reviews, Vol. 32. Blackwell Publishing, Oxford.
- Iraki, N.M., Bressan, R.A., Hasegawa, P.M., Carpita, N.C., 1989. Alteration of the physical and chemical structure of the primary cell wall of growth-limited plant cells adapted to osmotic stress. *Plant Physiol.* 91, 39–47.
- Irving, H.R., Gehring, C.A., Parish, R.W., 1992. Changes in cytosolic pH and calcium of guard cells precede stomatal movements. *Proc. Natl. Acad. Sci. USA* 89, 1790–1794.
- Isaacson, T., Rose, J.K.C., 2006. Surveying the plant cell wall proteome, or secretome. *Annu. Plant Rev.* 28, 185–209.
- Iseki, M., Matsunaga, S., Murakami, A., Ohno, K., Shiga, K., Yoshida, K., Sugai, M., Takahashi, T., Hori, T., Watanabe, M., 2002. *Nature* 415, 1047–1051.
- Ishibashi, K., Sasaki, S., Fushimi, K., Uchida, S., Kuwahara, M., Saito, H., Furukawa, T., Nakajima, K., Yamaguchi, Y., Gojobori, T., Marumo, F., 1994. Molecular cloning and expression of a member of the aquaporin family with permeability to glycerol and urea in addition to water expressed at the basolateral membrane of kidney collection duct cells. *Proc. Natl. Acad. Sci. USA* 91, 6269–6273.
- Ishida, K., Katsumi, M., 1991. Immunofluorescence microscopical observation of cortical microtubule arrangement as affected by gibberellin in d5 mutant of *Zea mays* L. *Plant Cell Physiol.* 32, 409–417.
- Ishida, M., Aihara, M.S., Allen, R.D., Fok, A.K., 1993. Osmoregulation in paramecium: The locus of fluid segregation in the contractile vacuole complex. *J. Cell Sci.* 106, 693–702.
- Ishigami, M., Nagai, R., 1980. Motile apparatus in *Vallisneria* leaf cells. II. Effects of cytochalasin B and lead acetate on the rate and direction of streaming. *Cell Struct. Funct.* 5, 13–20.
- Ishii, T., Matsunaga, T., Hayashi, N., 2001. Formation of rhamnogalacturonan II-borate dimer in pectin determined cell wall thickness of pumpkin tissue. *Plant Physiol.* 126, 1698–1705.
- Ishijima, A., Doi, T., Sakurada, K., Yanagida, T., 1991. Subpiconewton force fluctuations of actomyosin in vitro. *Nature* 352, 301–306.

- Ishijima, A., Kojima, H., Higuchi, H., Harada, Y., Funatsu, T., Yanagida, T., 1996. Multiple- and single-molecule analysis of the actomyosin motor by nanometer-piconewton manipulation with a microneedle: Unitary steps and forces. *Biophys. J.* 70, 383–400.
- Ishikawa, H., Bishoff, R., Holtzer, H., 1969. Formation of arrow-head complexes with heavy meromyosin in a variety of cell types. *J. Cell Biol.* 43, 312–328.
- Israel, H.W., Wilson, R.G., Aist, J.R., Kunoh, H., 1980. Cell wall appositions and plant disease resistance: Acoustic microscopy of papillae that block fungal ingress. *Proc. Natl. Acad. Sci. USA* 77, 2046–2049.
- Israel, H.W., Steward, F.C., 1967. The fine structure and development of plastids in cultured cells of *Daucus carota*. *Ann. Bot.* 31, 1–18.
- Itaya, A., Ma, F., Qi, Y., Matsuda, Y., Zhu, Y., Liang, G., Ding, B., 2002. Plasmodesma-mediated selective protein traffic between “symplosmally-isolated” cells probed by a viral movement protein. *Plant Cell* 14, 2071–2083.
- Ito, K., Ikebe, M., Kashiyama, T., Mogami, T., Kon, T., Yashimoto, K., 2007. Kinetic mechanism of the fastest motor protein, *Chara* myosin. *J. Biol. Chem.* 282, 19534–19545.
- Ito, K., Kashiyama, T., Shimada, K., Yamaguchi, A., Awata, J., Hachikubo, Y., Manstein, D.J., Yamamoto, K., 2003. Recombinant motor domain constructs of *Chara corallina* myosin display fast motility and high ATPase activity. *Biochem. Biophys. Res. Commun.* 312, 958–964.
- Itoh, R., Fujiwara, M., Nagata, N., Yoshida, S., 2001. A chloroplast protein homologous to the eubacterial topological specificity factor MinE plays a role in chloroplast division. *Plant Physiol.* 127, 1644–1655.
- Itoh, T., 1990. Cellulose synthesizing complexes in some giant marine algae. *J. Cell Sci.* 95, 309–319.
- Itoh, T., 1992. Assembly of cellulose microfibrils in giant marine algae. In: Shibaoka, H. (Ed.), *Cellular Basis of Growth and Development in Plants*, Proc. of the VII International symposium in conjunction with the awarding of the international prize for Biology November 26–28, 1991. Toyonaka, Osaka, pp. 35–43.
- Itoh, T., Brown Jr., R.M., 1984. The assembly of cellulose microfibrils in *Valonia macrophysa* Kütz. *Planta* 160, 372–381.
- Itoh, T., Kimura, S., 2001. Immunogold labeling of terminal cellulose-synthesizing complexes. *J. Plant Res.* 114, 483–489.
- Itoh, T., O’Neil, R.M., Brown Jr., R.M., 1984. Interference of cell wall regeneration of *Boergeria forbesii* protoplasts by Tinopal LPW, a fluorescent brightening agent. *Protoplasma* 123, 174–183.
- Ives, H.E., Stillwell, G.R., 1938. An experimental study of the rate of a moving atomic clock. *J. Opt. Soc. Am.* 28, 215–226.
- Iwabe, N., Kuma, K.-I., Hasegawa, M., Osawa, S., Miyata, T., 1989. Evolutionary relationship of archaeobacteria, eubacteria, and eukaryotes inferred from phylogenetic trees of duplicated genes. *Proc. Natl. Acad. Sci. USA* 86, 9355–9359.
- Iwabuchi, K., Kaneko, T., Kikuyama, M., 2005. Ionic mechanism of mechano-perception in characeae. *Plant Cell Physiol.* 46, 1863–1871.
- Iwabuchi, K., Kaneko, T., Kikuyama, M., 2008. Mechanosensitive ion channels in *Chara*: Influence of water channel inhibitors, HgCl₂ and ZnCl₂ on generation of receptor potential. *J. Membr. Biol.* 221, 27–37.
- Jackson, D., 2005. Transcription factor movement through plasmodesmata. In: Oparka, K.J. (Ed.), *Plasmodesmata*. Blackwell Publishing, Oxford, pp. 113–134.
- Jackson, M.E., 1991. Negative regulation of eukaryotic transcription. *J. Cell Sci.* 100, 1–7.
- Jackson, R.J., Standart, N., 1990. Do the poly(A) tail and 3-untranslated region control mRNA translation? *Cell* 62, 15–24.
- Jacob, F., 1965. Genetics of the bacterial cell. Nobel Lect. December 11.
- Jacob, F., Monod, J., 1961. Genetic regulatory mechanisms in the synthesis of proteins. *J. Mol. Biol.* 3, 318–356.
- Jacobs, A.K., Lipka, V., Burton, R.A., Panstruga, R., Strizhov, N., Schulze-Lefert, P., Fincher, G.B., 2003. An Arabidopsis callose synthase, GSL5, is required for wound and papillary formation. *Plant Cell* 15, 2503–2513.
- Jacobshagen, S., Altmüller, D., Grolig, F., Wagner, G., 1986. Calcium pools, calmodulin and light-regulated chloroplast movements in *Mougeotia* and *Mesotaenium*. In: Trewavas, A.J. (Ed.), *Molecular and Cellular Aspects of Calcium in Plant Development*. Plenum Press, New York, pp. 201–209.
- Jaffe, L.F., 1958. Tropistic responses of zygotes of the Fucaceae to polarized light. *Exp. Cell Res.* 15, 282–299.
- Jaffe, L.F., 1966. Electrical currents through the developing *Fucus* egg. *Proc. Natl. Acad. Sci. USA* 56, 1102–1109.
- Jaffe, L.F., 1977. Electrophoresis along cell membranes. *Nature* 265, 600–602.
- Jaffe, L.F., 1979. Control of development by ionic currents. In: Cone, R.A., Dowling, J.E. (Eds.), *Membrane Transduction Mechanisms*. Raven Press, New York, pp. 199–231.
- Jaffe, L.F., 1980. Control of plant development by steady ionic currents. In: Spanswick, R.M., Lucas, W.J., Dainty, J. (Eds.), *Plant Membrane Transport: Current Conceptual Issues*. Elsevier/North-Holland Biomedical Press, Amsterdam, pp. 381–388.
- Jaffe, L.F., 1981. The role of ionic currents in establishing developmental pattern. *Philos. Trans. R. Soc. Lond. [Biol]* 295, 553–566.
- Jaffe, L. F., 1990. Calcium ion currents and gradients in fucoid eggs. In: Leonard, R.T., Hepler, P.K. (Eds.), *Calcium in Plant Growth and Development*, Amer. Soc. Plant Physiol. Symp. Series Volume 4, pp. 120–126.
- Jaffe, L.F., 2004. Marine plants may polarize remote *Fucus* eggs via luminescence. *Biol. Bull.* 207, 160.
- Jaffe, L.F., 2005. Marine plants may polarize remote *Fucus* eggs via luminescence. *Luminescence* 20, 414–418.
- Jaffe, L.F., 2006. The discovery of calcium waves. *Sem. Cell Dev. Biol.* 17, 229.
- Jaffe, L.F., 2007. Stretch-activated calcium channels relay fast calcium waves propagated by calcium induced calcium influx. *Biol. Cell* 99, 175–184.
- Jaffe, L.F., Poo, M.-M., 1979. Neurites grow faster towards the cathode than the anode in a steady field. *J. Exp. Zool.* 209, 115–128.
- Jaffe, M.J., 1980. Morphogenetic responses of plants to mechanical stimuli or stress. *Bioscience* 30, 239–243.
- Jaffe, M.J., Galston, A.W., 1968. The physiology of tendrils. *Annu. Rev. Plant Physiol.* 19, 417–434.
- Jaffe, M.J., Leopold, A.C., Staples, R.C., 2002. Thigmo responses in plants and fungi. *Amer. J. Bot.* 89, 375–382.

- Jagendorf, A.T., 1956. Oxidation and reduction of pyridine nucleotides by purified chloroplasts. *Arch. Biochem. Biophys.* 62, 141–150.
- Jagendorf, A.T., 1961. Photophosphorylation and the Hill reaction. *Nature* 191, 679–680.
- Jagendorf, A.T., 1998. Chance, luck and photosynthesis research: An inside story. *Photosyn. Res.* 57, 215–229.
- Jagendorf, A.T., Michaels, A., 1990. Rough thylakoids: Translation on photosynthetic membrane. *Plant Sci.* 71, 137–145.
- Jagendorf, A.T., Neumann, J., 1965. Effect of uncouplers on the light-induced pH rise with spinach chloroplasts. *J. Biol. Chem.* 240, 3210–3214.
- Jagendorf, A.T., Uribe, E., 1966. ATP formation caused by acid-base transition of spinach chloroplasts. *Proc. Natl. Acad. Sci. USA* 55, 170–177.
- Jahn, T., Baluska, F., Michalke, W., Harper, J.F., Volkmann, D., 1998. Plasma membrane H^+ -ATPase in the maize root apex: Evidence for strong expression in xylem parenchyma and asymmetric localization within cortical and epidermis cells. *Physiol. Plant* 104, 311–316.
- Jahn, T., Palmgren, M.G., 2002. H^+ -ATPases in the plasma membrane: Physiology and molecular biology. In: Rengel, Z. (Ed.), *Handbook of Plant Growth. pH as the Master Variable*. Marcel Dekker, New York, pp. 1–22.
- Jahn, T., Fuglsang, A.T., Olsson, A., Bruntrup, I.M., Collinge, D.B., Volkmann, D., Sommarin, M., Palmgren, M.G., Larsson, C., 1997. The 14-3-3 protein interacts directly with the C terminal region of the plant plasma membrane H^+ -ATPase. *Plant Cell* 9, 1805–1814.
- Jain, M.K., 1972. *The Bimolecular Lipid Membrane*. Van Nostrand Reinhold, New York.
- Jaiswal, J.K., 2001. Calcium- how and why? *J. Biosci.* 26, 357–363.
- Jakoby, W.B., Brummond, D.O., Ochoa, S., 1956. Formation of 3-phosphoglyceric acid by carbon dioxide fixation with spinach leaf enzymes. *J. Biol. Chem.* 218, 811–822.
- Jakus, M.A., Hall, C.E., 1946. Electron microscope observations of the trichocysts and cilia of *Paramecium*. *Biol. Bull.* 91, 141–144.
- James, D.W., Jones, R.L., 1979. Intracellular localization of GDP-fucose polysaccharide fucosyl transferase in corn roots. *Plant Physiol.* 64, 914–918.
- James, H., 1962. *The Madonna of the Future, and Other Early Stories*. New American Library, New York.
- James, W.O., 1953. The use of respiratory inhibitors. *Annu. Rev. Plant Physiol.* 4, 59–90.
- James, W.O., 1957. Reaction paths in the respiration of higher plants. *Adv. Enzymol.* 18, 281–318.
- James, W.O., Beevers, H., 1950. The respiration of the *Arum spadix*. A rapid respiration, resistant to cyanide. *New Phytol.* 49, 353–374.
- Jamieson, J.D., Palade, G.E., 1966. Role of the Golgi complex in the intracellular transport of secretory proteins. *Proc. Natl. Acad. Sci. USA* 55, 424–431.
- Jamieson, J.D., Palade, G.E., 1967a. Intracellular transport of secretory proteins in the pancreatic exocrine cell. I. *J. Cell Biol.* 34, 577–596.
- Jamieson, J.D., Palade, G.E., 1967b. Intracellular transport of secretory proteins in the pancreatic exocrine cell. II. *J. Cell Biol.* 34, 597–615.
- Jamieson, J.D., Palade, G.E., 1968a. Intracellular transport of secretory proteins in the pancreatic exocrine cell. III. *J. Cell Biol.* 39, 580–588.
- Jamieson, J.D., Palade, G.E., 1968b. Intracellular transport of secretory proteins in the pancreatic exocrine cell. IV. *J. Cell Biol.* 39, 589–603.
- Jamieson, J.D., Palade, G.E., 1971a. Condensing vacuole conversion and zymogen granule discharge in pancreatic exocrine cells: Metabolic studies. *J. Cell Biol.* 48, 503–522.
- Jamieson, J.D., Palade, G.E., 1971b. Synthesis, intracellular transport, and discharge of secretory proteins in stimulated pancreatic exocrine cells. *J. Cell Biol.* 50, 135–158.
- Jan, L.Y., Jan, Y.N., 1994. Membrane permeability: Editorial overview. *Curr. Opin. Cell Biol.* 6, 569–570.
- Jang, C.S., Lee, T.G., Kim, J.Y., Park, J.H., Kim, D.S., Park, J.H., Seo, Y.W., 2005. The molecular characterization of a cDNA encoding the putative integral membrane protein, *HvSec61 α* , expressed during early stage of barley kernel development. *Plant Sci.* 168, 233–239.
- Janmey, P.A., 1991. Mechanical properties of cytoskeletal polymers. *Curr. Opin. Cell Biol.* 3, 4–11.
- Janmey, P.A., Hvidt, S., Oster, G.F., Lamb, J., Stossel, T.P., Hartwig, J.H., 1990. The effect of ATP on actin filament stiffness. *Nature* 347, 95–99.
- Jaquinod, M., Villiers, F., Kieffer-Jaquinod, S., Hugouvieux, V., Bruley, C., Garin, J., Bourguignon, J., 2007. A proteomic dissection of Arabidopsis thaliana vacuoles isolated from cell culture. *Mol. Cell Proteomics* 6, 394–412.
- Jarnet, E., Albenne, C., Boudart, G., Irshad, M., Canut, H., Pont-Lezica, R., 2008. Recent advances in plant cell wall proteomics. *Proteomics* 8, 893–908.
- Jasencakova, Z., Meister, A., Walter, J., Turner, B.M., Schubert, I., 2000. Histone H4 acetylation of euchromatin and heterochromatin is cell cycle dependent and correlated with replication rather than with transcription. *Plant Cell* 12, 2087–2100.
- Jasinski, M., Stukkens, Y., Degand, H., Purnelle, B., Marchand-Brynaert, J., Boutry, M., 2001. A plant plasma membrane ATP binding cassette-type transporter is involved in antifungal terpenoid secretion. *Plant Cell* 13, 1095–1107.
- Jeans, J., 1930. *The Mysterious Universe*. Cambridge University Press, Cambridge.
- Jeans, J., 1962. *An Introduction to the Kinetic Theory of Gases*. Cambridge University Press, Cambridge.
- Jedd, G., Chua, H.N., 2002. Visualization of peroxisomes in living plant cells reveals acto-myosin-dependent cytoplasmic streaming and peroxisome budding. *Plant Cell Physiol.* 43, 384–392.
- Jefferson, T., 1955. *Notes on the State of Virginia*. University of North Carolina Press, Chapel Hill, NC.
- Jefferson, T., [1813]. 1984. Letter to Isaac McPherson. August 13, 1813. In: *Jefferson Writings*. The Library of America, New York.
- Jeffrey, W.R., 1982. Calcium ionophore polarizes ooplasmic segregation in Ascidian eggs. *Science* 216, 545–547.
- Jeffrey, W.R., 1984a. Pattern formation by ooplasmic segregation in Ascidian eggs. *Biol. Bull.* 166, 277–298.
- Jeffrey, W.R., 1984b. Spatial distribution of messenger RNA in the cytoskeletal framework of Ascidian eggs. *Develop. Biol.* 103, 482–492.
- Jeffrey, W.R., 1985. The spatial distribution of maternal mRNA is determined by a cortical cytoskeletal domain in *Chaetopterus* eggs. *Develop. Biol.* 110, 217–229.

- Jeffrey, W.R., Meier, S., 1984. Ooplasmic segregation of the myoplasmic actin network in stratified ascidian eggs. *Roux's Arch. Dev. Biol.* 193, 257–262.
- Jeffrey, W.R., Tomlinson, C.R., Brodeur, R.D., 1983. Localization of actin messenger RNA during Ascidian development. *Develop. Biol.* 99, 408–417.
- Jeffrey, W.R., Wilson, L.J., 1983. Localization of messenger RNA in the cortex of *Chaetopterus* eggs and early embryos. *J. Embryol. Exp. Morph.* 75, 225–239.
- Jencks, W.P., 1975. Free energies of hydrolysis and decarboxylation. In: Fasman, G.D. (Ed.), *Handbook of Biochemistry and Molecular Biology*, third ed., vol. 1. CRC Press, Boca Raton, FL, pp. 296–304.
- Jennings, H.S., 1906. *Behavior of the Lower Organisms*. Columbia University Press, New York.
- Jennings, H.S., 1925. *Prometheus or Biology and the Advancement of Man*. E. P. Dutton & Co., New York.
- Jennings, H.S., 1927. Diverse doctrines of evolution, their relation to the practice of science and of life. *Science* 65, 19–25.
- Jennings, H.S., 1933. *The Universe and Life*. Yale University Press, New Haven, CT.
- Jensen, R.A., 1976. Enzyme recruitment in evolution of new function. *Annu. Rev. Microbiol.* 30, 409–425.
- Jeong, W.J., Jeong, S.K., Min, S.R., Yoo, O.J., Liu, J.R., 2002. Growth retardation of plants transformed by overexpression of NtFtsZ1-2 in tobacco. *J. Plant Biol.* 45, 107–111.
- Jiang, K., Schwarzer, C., Lally, E., Zhang, S., Ruzin, S., Machen, T., Remington, S.J., Feldman, L., 2006. Green fluorescent protein (reduction-oxidation-sensitive green fluorescent protein) in Arabidopsis. *Plant Physiol.* 141, 397–403.
- Jiang, L., Phillips, T.E., Rogers, S.W., Rogers, J.C., 2000. Biogenesis of the protein storage vacuole crystalloid. *J. Cell Biol.* 150, 755–770.
- Jiang, L., Phillips, R.C., Hamm, C.A., Drozdowicz, Y.M., Rea, P. A., Maeshima, M., Rogers, S.W., Rogers, J.C., 2001. The protein storage vacuole: A unique compound organelle. *J. Cell Biol.* 155, 991–1002.
- Johannes, E., Felle, H., 1990. Proton gradient across the tonoplast of *Riccia fluitans* as a result of the joint action of two electroenzymes. *Plant Physiol.* 93, 412–417.
- John, P., Whatley, F.R., 1975. *Paracoccus denitrificans* and the evolutionary origin of the mitochondrion. *Nature* 254, 495–498.
- John, P., Whatley, F.R., 1977. *Paracoccus denitrificans* Davis (*Micrococcus denitrificans*) as a mitochondrion. *Adv. Bot. Res.* 4, 51–115.
- John, P.C.L., Sek, F.J., Carmichael, J.P., McCurdy, D.W., 1990. p34^{cdc2} homologue level, cell division, phytohormone responsiveness and cell differentiation in wheat leaves. *J. Cell Sci.* 97, 627–636.
- John, P.C.L., Sek, F.J., Hayes, J., 1991. Association of the plant p34^{cdc2} like protein with p13^{suc1}: Implications for control of cell division cycles in plants. *Protoplasma* 161, 70–74.
- John, P.C.L., Sek, F.J., Lee, M.G., 1989. A homologue of the cell cycle control protein p34^{cdc2} participates in the cell division cycle of *Chlamydomonas* and a similar protein is detectable in higher plants and remote taxa. *Plant Cell* 1, 1185–1193.
- John, P.C.L., Wu, L., 1992. Cell cycle control proteins in division and development. In: Shibaoka, H. (Ed.), *Cellular Basis of Growth and Development*. Proc. of the VII International Symposium in Conjunction with the Awarding of the International Prize of Biology. Toyonaka, Osaka, pp. 119–126.
- Johnson, B.R., Wytenbach, R.R., Wayne, R., Hoy, R.R., 2002. Action potentials in a giant algal cell: A comparative approach to mechanisms and evolution of excitability. *J. Undergrad. Neurosci. Educ.* 1, A23–A27.
- Johnson, F.H., Eyring, H., Stover, B.J., 1974. *The Theory of Rate Processes in Biology and Medicine*. John Wiley & Sons, New York.
- Johnson, G., 2005. *Miss Leavitt's Stars: The Untold Story of the Woman Who Discovered How to Measure the Universe*. W. W. Norton & Co., New York.
- Johnson, K.A., Rosenbaum, J.L., 1992. Replication of basal bodies and centrioles. *Curr. Opin. Cell Biol.* 4, 80–85.
- Johnson, M.J., 1949. Oxidation-reduction potentials. In: Lardy, H.A. (Ed.), *Respiratory Enzymes*. Burgess Publishing Co., Minneapolis, MN, pp. 58–70.
- Johnson, T., 1934. A tropic response in germ tubes of urediospores of *Puccinia graminis tritici*. *Phytopathology* 24, 80–82.
- Johnston, C.A., Temple, B.R., Chen, J.-G., Gao, Y., Moriyama, E.N., Jones, A.M., Siderovski, D.P., Willard, F.S., 2007. Comment on “A G protein-coupled receptor is a plasma membrane receptor for the plant hormone abscisic acid.” *Science* 318, 914c.
- Jolly, J., 1920. Hamties des tylopoies. *C. R. Soc. Biol. Paris* 93, 125–127.
- Jonas, M., Huang, H., Kamm, R.D., So, P.T.C., 2008. Fast fluorescence laser tracking microrheometry. II. Quantitative studies of cytoskeletal mechanotransduction. *Biophys. J.* 95, 895–909.
- Jones, A.M., Venis, M.A., 1989. Photoaffinity labeling of indole-3-acetic acid binding proteins in maize. *Proc. Natl. Acad. Sci. USA* 86, 6153–6156.
- Jones, M.G.K., Payne, H.L., 1978. Cytokinesis in *Impatiens balsamina* and the effect of caffeine. *Cytobios* 20, 79–91.
- Jones, R.L., Bush, D.S., 1991. Gibberellic acid and abscisic acid regulate the level of a BiP cognate in the endoplasmic reticulum of barley aleurone cells. *Plant Physiol.* 97, 456–459.
- Jones, R.L., Carbonell, J., 1984. Regulation of the synthesis of barley aleurone α -amylase by gibberellic acid and calcium ions. *Plant Physiol* 76, 218–231.
- Jones, R.L., Jacobsen, J.V., 1982. The role of the endoplasmic reticulum in the synthesis and transport of α -amylase in barley aleurone layers. *Planta* 156, 421–432.
- Jones, R.L., Jacobsen, J.V., 1983. Calcium regulation of the secretion of α -amylase isozymes and other proteins from barley aleurone layers. *Planta* 158, 1–9.
- Jones, R.L., Jacobsen, J.V., 1991. Regulation of synthesis and transport of secreted proteins in cereal aleurone. *Int. Rev. Cytol.* 125, 49–88.
- Jones, R.L., Robinson, D.G., 1989. Protein secretion in plants. *New Phytol.* 111, 567–597.
- Jones, W., 1920. *Nucleic Acids*, second ed. Longmans, Green and Co., London.
- Joos, V., VanAken, J., Kristen, U., 1994. Microtubules are involved in maintaining the cellular polarity in pollen tubes of *Nicotiana glauca*. *Protoplasma* 179, 5–15.
- Jope, C.A., Atchison, B.A., Pringle, R.C., 1980. A computer analysis of a spiral string-of-grana model of the three dimensional structure of chloroplasts. *Bot. Gaz.* 141, 37–47.
- Jordan, D.O., 1960. *The Chemistry of Nucleic Acids*. Butterworths, London.
- Jordan, E.G., 1991. Interpreting nucleolar structure; where are the transcribing genes. *J. Cell Sci.* 98, 437–449.

- Jordan, E.G., Zatsepina, O.V., Shaw, P.J., 1992. Widely dispersed DNA within plant and animal nucleoli visualized 3-D fluorescence microscopy. *Chromosoma* 101, 478–482.
- Jordan, P., 1938. Die Verstärkertheorie der Organismen in ihrem gegenwärtigen Stand. *Naturwissenschaften* 26, 537–545.
- Jordan, P., 1939. Zur Quanten-Biologie. *Biologisches Zentralblatt* 59, 1–39.
- Jordan, P., 1942a. Begriff und Umgrenzung der Quantenbiologie. *Physis (Stuttgart)* 1, 13–26.
- Jordan, P., 1942b. Zukunftsaufgaben der quantenbiologischer Forschung. *Physis (Stuttgart)* 1, 64–79.
- Jordan, P., 1948. Die Physik und das Geheimnis des organischen Lebens. Friedrich Vieweg & Sohn, Braunschweig.
- Jordan, P., de L. Kronig, R., 1927. Movements of the lower jaw of cattle during mastication. *Science* 120, 807.
- Jørgensen, P.L., Pedersen, P.A., 2001. Structure-function relationships of Na⁺, K⁺, ATP, or Mg²⁺ binding and energy transduction in a Na,K-ATPase. *Biochim. Biophys. Acta* 1505, 57–74.
- Joshi, H.C., 1994. Microtubule organizing centers and γ -tubulin. *Curr. Opin. Cell Biol.* 6, 55–62.
- Jost, L., 1907. Lectures on Plant Physiology. Translated by J. H. Gibson. Clarendon Press, Oxford.
- Joubès, J., Inzé, D., Geelen, D., 2004. Improvement of the molecular toolbox for cell cycle studies in tobacco BY-2 cells. *Biotechnology in Agriculture and Forestry* 53, 7–23.
- Joule, J.P., 1943. On the calorific effects of magneto-electricity, and on the mechanical value of heat. *Phil. Mag.* 23, 263–276, 347–355, 435–443.
- Joule, J.P., 1852. On the heat disengaged in chemical combinations. *Phil. Mag. Fourth Ser.* 3 (suppl. 21), 481–504.
- Joyce, G.F., 1991. The rise and fall of the RNA world. *The New Biologist* 3, 399–407.
- Jung, G., Wernicke, W., 1990. Cell shaping and microtubules in developing mesophyll of wheat (*Triticum aestivum* L.). *Protoplasma* 153, 141–148.
- Juliano, R.L., Haskill, S., 1993. Signal transduction from the extracellular matrix. *J. Cell Biol.* 120, 577–585.
- Jung, J.-Y., Kim, Y.-W., Kwak, J.M., Hwang, J.-D., Young, J., Schroeder, J.I., Hwang, I., Lee, Y., 2002. Phosphatidylinositol 3- and 4-Phosphate Are Required for Normal Stomatal Movements. *Plant Cell* 14, 2397–2412.
- Junge, W., 2004. Protons, proteins and ATP. *Photosynth. Res.* 80, 197–221.
- Juniper, B.E., Robins, R.J., Joel, D.M., 1989. The Carnivorous Plants. Academic Press, London.
- Junker, S., 1977. Ultrastructure of tactile papillae on tendrils of *Eccremocarpus scaber* R. et P. *New Phytol.* 78, 607–610.
- Just, E.E., 1939. The Biology of the Cell Surface. P. Blakiston's Son & Co., Philadelphia.
- K-**
- Kabsch, W., Mannherz, H.G., Sock, D., Pai, E.F., Holmes, K.C., 1990. Atomic structure of the actin: DNase I complex. *Nature* 347, 37–43.
- Kadono, T., Kawano, T., Hosoya, H., Kosaka, T., 2004. Flow cytometric studies of the host-regulated cell cycle in algae symbiotic with green paramecium. *Protoplasma* 223, 133–141.
- Kadota, A., Wada, M., Furuya, M., 1982. Phytochrome-mediated phototropism and different dichroic orientation of P_{re} and P_{fr} in protonemata of the fern *Adiantum capillus-veneris* L. *Photochem. Photobiol.* 35, 533–536.
- Kadota, A., Kohyama, I., Wada, M., 1989. Polarotropism and photomovement of chloroplasts in the protonemata of the ferns *Pteris* and *Adiantum*: Evidence for the possible lack of dichroic phytochrome in *Pteris*. *Plant Cell Physiol.* 30, 523–531.
- Kadota, A., Wada, M., Furuya, M., 1985. Phytochrome-mediated polarotropism of *Adiantum capillus-veneris* L. protonemata as analyzed by microbeam irradiation with polarized light. *Planta* 165, 30–36.
- Kafatos, M., Nadreau, R., 1990. The Conscious Universe. Part and Whole in Modern Physical Theory. Springer Verlag, New York.
- Kagawa, T., Beevers, H., 1975. The development of microbodies (glyoxysomes and leaf peroxisomes) in cotyledons of germinating watermelon seedlings. *Plant Physiol.* 55, 258–264.
- Kagawa, T., McGregor, D.I., Beevers, H., 1973. Development of enzymes in the cotyledons of watermelon seedlings. *Plant Physiol.* 51, 66–71.
- Kagawa, T., Sakai, T., Suetsugu, N., Oikawa, K., Ishiguro, S., Kato, T., Tabata, S., Okada, K., Wada, M., 2001. *Arabidopsis* NPL1: A phototropin homolog controlling the chloroplast high-light avoidance response. *Science* 291, 2138–2141.
- Kahn, F., 1919. Die Zelle, Kosmos, Stuttgart, Germany.
- Kaim, G., Dimroth, P., 1999. ATP synthesis by F-type ATP synthase is obligatorily dependent on the transmembrane voltage. *EMBO J.* 18, 4118–4127.
- Kaiser, B.N., Finnegan, P.M., Tyerman, S.D., Whitehead, L.F., Bergersen, F.J., Day, D.A., Udvardi, M.K., 1998. Characterization of an ammonium transport protein from the peribacteroid membrane of soybean nodules. *Science* 281, 1202–1206.
- Kaiser, G., Heber, U., 1984. Sucrose transport into vacuoles isolated from barley mesophyll protoplasts. *Planta* 161, 562–568.
- Kaiser, G., Martinoia, E., Wiemken, A., 1982. Rapid appearance of photosynthetic products in the vacuoles isolated from barley mesophyll protoplasts by a new fast method. *Z. Pflanzenphysiol.* 107, 103–113.
- Kaiser, J., 2003. Sipping from a poisoned chalice. *Science* 302, 376–379.
- Kakimoto, T., Shibaoka, H., 1987. Actin filaments and microtubules in the preprophase band and phragmoplast of tobacco cells. *Protoplasma* 140, 151–156.
- Kakimoto, T., Shibaoka, H., 1988. Cytoskeletal ultrastructure of phragmoplast-nuclei complexes isolated from cultured tobacco cells. *Protoplasma (Suppl. 2)*, 95–103.
- Kakimoto, T., Shibaoka, H., 1992. Synthesis of polysaccharides in phragmoplasts isolated from tobacco BY-2 cells. *Plant Cell Physiol.* 33, 353–361.
- Kalanon, M., McFadden, G.I., 2008. The chloroplast protein translocation complexes of *Chlamydomonas reinhardtii*: A bioinformatic comparison of Toc and Tic components in plants, green algae and red algae. *Genetics* 179, 95–112.
- Kalckar, H., 1937. Phosphorylation in kidney tissue. *Enzymologia* 2, 47–52.
- Kalckar, H., 1939. Coupling between phosphorylations and oxidations in kidney extracts. *Enzymologia* 6, 209–212.
- Kalckar, H.M., 1941. The nature of energetic coupling in biological syntheses. *Chem. Rev.* 28, 71–178.

- Kalckar, H.M., 1942. The function of phosphate in cellular assimilations. *Biol. Rev.* 17, 28–45.
- Kalckar, H.M., 1944. The function of phosphate in enzymatic syntheses. *Ann. NY Acad. Sci.* 45, 395–408.
- Kalckar, H.M., 1966. Lipmann and the “squiggle”. In: Kaplan, N.O., Kennedy, E.P. (Eds.), *Current Aspects of Biochemical Energetics*. Fritz Lipmann Dedicatory Volume. Academic Press, New York, pp. 1–8.
- Kaldenhoff, R., 2006. Besides water: Functions of plant membrane intrinsic proteins and aquaporins. *Progress in Botany* 67, 206–218.
- Kalderon, D., Roberts, B.L., Richardson, W.D., Smith, A.E., 1984. A short amino acid sequence able to specify nuclear location. *Cell* 39, 499–509.
- Kalnins, V.I. (Ed.), 1992. *The Centrosome. Cell Biology: A Series of Monographs*. Academic Press, San Diego.
- Kamen, M. D., 1995. Nitrogen fixation. In: *Scientific American*, (Eds.), *The Physics and Chemistry of Life*. Simon and Schuster, New York, pp. 48–55.
- Kamen, M.D., 1963. *Primary Processes in Photosynthesis*. Academic Press, New York.
- Kamen, M.D., 1985. *Radiant Science, Dark Politics. A Memoir of the Nuclear Age*. University of California Press, Berkeley.
- Kamen, M.D., Gest, H., 1949. Evidence for a nitrogenase system in a photosynthetic bacterium *Rhodospirillum rubrum*. *Science* 109, 560.
- Kamimura, S., Takahashi, K., 1981. Direct measurement of the force of microtubule sliding in flagella. *Nature* 293, 566–568.
- Kaminskyj, S.G.W., Heath, I.B., 1995. Integrin and spectrin homologues, and cytoplasm-wall adhesion in tip growth. *J. Cell Sci.* 108, 849–856.
- Kamitsubo, E., 1966. Motile protoplasmic fibrils in cells of characeae. II. *Proc. Jpn. Acad. Sci.* 42, 640–643.
- Kamitsubo, E., 1972a. Destruction and restoration of the protoplasmic fibrillar structure responsible for streaming in the *Nitella* cell. *Symp. Int. Soc. Cell. Biol.* 23, 123–130.
- Kamitsubo, E., 1972b. Motile protoplasmic fibrils in cells of characeae. *Protoplasma* 74, 53–70.
- Kamitsubo, E., 1972c. Protoplasmic fibrillar structure responsible for cytoplasmic streaming in the characean cells. *The Cell* 4, 12–19.
- Kamitsubo, E., 1980. Cytoplasmic streaming in characean cells: Role of subcortical fibrils. *Can J. Bot.* 58, 760–765.
- Kamitsubo, E., 1981. Effect of supraoptimal temperatures on the function of the subcortical fibrils and an endoplasmic factor in *Nitella* internodes. *Protoplasma* 109, 3–12.
- Kamitsubo, E., Kikuyama, M., 1994. Measurement of motive force for cytoplasmic streaming in characean internodes. *Protoplasma* 180, 153–157.
- Kamitsubo, E., Kikuyama, M., Kaneda, I., 1988. Apparent viscosity of the endoplasm of characean internodal cells measured by the centrifuge method. *Protoplasma* 5 (Suppl. 1), 10–14.
- Kamitsubo, E., Ohashi, Y., Kikuyama, M., 1989. Cytoplasmic streaming in internodal cells of *Nitella* under centrifugal acceleration: A study done with a newly constructed centrifuge microscope. *Protoplasma* 152, 148–155.
- Kamiya, N., 1950. The rate of protoplasmic flow in the myxomycete plasmodium. *Cytologia* 15, 183–193, 194–204.
- Kamiya, N., 1956. In Memoriam William Seifriz. *Protoplasma* 45, 513–524.
- Kamiya, N., 1959. Protoplasmic streaming, *Protoplasmatologia*. Bd 8, 3a. Springer-Verlag, Vienna.
- Kamiya, N., Kuroda, K., 1956. Velocity distribution of the protoplasmic streaming in *Nitella* cells. *Bot. Mag. Tokyo* 69, 544–554.
- Kamiya, N., Kuroda, K., 1957. Cell operation in *Nitella* III. Specific gravity of the cell sap and endoplasm. *Proc. Jpn. Acad. Sci.* 33, 403–406.
- Kamiya, N., Kuroda, K., 1958. Measurement of the motive force of the protoplasmic rotation in *Nitella*. *Protoplasma* 50, 144–148.
- Kamiya, N., Kuroda, K., 1965. Rotational protoplasmic streaming in *Nitella* and some physical properties of the endoplasm. *Proc. of the Fourth International Congress on Rheology*. Part 4. Symposium on Biorheology. Brown University, Aug 26–30, 1963. John Wiley and Sons, New York.
- Kamiya, N., Seifriz, W., 1954. Torsion in a protoplasmic thread. *Exp. Cell Res.* 6, 1–16.
- Kamiya, N., Tazawa, M., 1956. Studies on water permeability of a single plant cell by means of transcellular osmosis. *Protoplasma* 46, 394–422.
- Kamiya, N., Tazawa, M., Takata, T., 1962. Water permeability of the cell wall in *Nitella*. *Plant Cell Physiol.* 3, 285–292.
- Kamiya, N., Tazawa, M., Takata, T., 1963. The relation of turgor pressure to cell volume in *Nitella* with special reference to mechanical properties of the cell wall. *Protoplasma* 57, 501–521.
- Kanamaru, K., Fujiwara, M., Kim, M., Nagashima, A., Nakazato, E., Tanaka, K., Takahashi, H., 2000. Chloroplast targeting, distribution and transcriptional fluctuation of AtMinD1, a eubacteria-type factor critical for chloroplast division. *Plant Cell Physiol.* 41, 1119–1128.
- Kanczewska, J., Marco, S., Vandermeeren, C., Maudoux, O., Rigaud, J.L., Boutry, M., 2005. Activation of the plant plasma membrane H⁺-ATPase by phosphorylation and binding of 14-3-3 proteins converts a dimer into a hexamer. *Proc. Natl. Acad. Sci. USA* 102, 11675–11680.
- Kandasamy, M.K., Paolillo, D.J., Faraday, C.D., Nasrallah, J.B., Nasrallah, M.E., 1989. The S-locus specific glycoproteins of *Brassica* accumulate in the cell wall of developing stigma papillae. *Develop. Biol.* 134, 426–472.
- Kandasamy, M.K., Parthasarathy, M.V., Nasrallah, M.E., 1991. High pressure freezing and freeze substitution improve immunolabeling of S-locus specific glycoproteins in the stigma papillae of *Brassica*. *Protoplasma* 162, 187–191.
- Kaneko, T., Saito, C., Shimmen, T., Kikuyama, M. Possible involvement of mechanosensitive Ca²⁺ channels of plasma membrane in mechanoperception in *Chara*. *Plant Cell Physiol.* 46, 130–135.
- Kaneko, T.S., Sato, M., Osumi, M., Muroi, M., Takahashi, A., 1996. Two isoforms of acid phosphatase secreted by tobacco protoplasts: Differential effect of brefeldin A on their secretion. *Plant Cell Rep.* 15, 409–413.
- Kang, B., Busse, J., Bednarek, S., 2003. Members of the *Arabidopsis* dynamin-like gene family, ADL1, are essential for plant cytokinesis and polarized cell growth. *Plant Cell* 15, 899–913.
- Kang, B.G., Burg, S.P., 1971. Rapid change in water flux induced by auxins. *Proc. Natl. Acad. Sci. USA* 68, 1730–1733.
- Kang, B.-H., Staehelin, L.A., 2008. ER-to-Golgi transport by COPII vesicles in *Arabidopsis* involves a ribosome-excluding scaffold that is transferred with the vesicles to the Golgi matrix. *Protoplasma* 234, 51–64.

- Kao, H.P., Abney, J.R., Verkman, A.S., 1993. Translational mobility of a small solute in cell cytoplasm. *J. Cell Biol.* 120, 613–627.
- Kao, J.P.Y., Alderton, J.M., Tsien, R.Y., Steinhardt, R.A., 1990. Active involvement of Ca^{2+} in mitotic progression of Swiss 3T3 fibroblasts. *J. Cell Biol.* 111, 183–196.
- Kaplan, D.R., 1992. The relationship of cells to organisms in plants: Problem and implications of an organismal perspective. *Int. J. Plant Sci.* 153, S28–S37.
- Kaplan, D.R., Hagemann, W., 1991. The relationship of cell and organism in vascular plants: Are cells the building blocks of plant form? *BioScience* 41, 693–703.
- Kapulnik, Y., Yalpani, N., Raskin, I., 1992. Salicylic acid induces cyanide-resistant respiration in tobacco cell-suspension cultures. *Plant Physiol.* 100, 1921–1926.
- Karling, J.S., 1939. Schleiden's contribution to the cell theory. *American Nat.* 73, 517–537.
- Karpen, G.H., Schaefer, J., Laird, C.D., 1988. A *Drosophila* rRNA gene located in euchromatin is active in transcription and nucleolus formation. *Genes Dev.* 2, 1745–1763.
- Kasahara, M., Kagawa, T., Oikawa, K., Suetsugu, N., Miyao, M., Wada, M., 2002. Chloroplast avoidance movement reduces photodamage in plants. *Nature* 420, 829–832.
- Kasamo, K., 2003. Regulation of plasma membrane H^{+} -ATPase activity by the membrane environment. *J. Plant Res.* 116, 517–523.
- Kasamo, K., Sakakibara, Y., 1995. The plasma membrane H^{+} -ATPase from higher plants: Functional reconstitution into liposomes and its regulation by phospholipids. *Plant Science* 111, 117–131.
- Kasamo, K., Yamanishi, H., Kagita, F., Saji, H., 1991. Reconstruction of tonoplast H^{+} -ATPase from mung bean (*Vigna radiata* L.) hypocotyls in liposomes. *Plant Cell Physiol.* 32, 643–651.
- Kashiyama, T., Kimura, N., Mimura, T., Yamamoto, K., 2000. Cloning and characterization of a myosin from characean alga, the fastest motor protein in the world. *Biochem J.* 127, 1065–1070.
- Kashiyama, T., Ito, K., Yamamoto, K., 2001. Functional expression of a chimeric myosin-containing motor domain of *Chara* myosin and neck and tail domains of *Dictyostelium* myosin II. *J. Mol. Biol.* 311, 461–466.
- Kass, L.B., 2003. Anecdotal, historical and critical commentaries on genetics. Records and recollections: A new look at Barbara McClintock, Nobel-prize-winning geneticist. *Genetics* 164, 1251–1260.
- Kasting, J.F., Ackerman, T.P., 1986. Climatic consequences of very high carbon dioxide levels in the early Earth's atmosphere. *Science* 234, 1383–1385.
- Katcher, B., 1985. Direct visualization of organelle movement along actin filaments dissociated from characean algae. *Science* 227, 1355–1357.
- Katcher, B., Reese, T.S., 1988. The mechanism of cytoplasmic streaming in characean algal cells: Sliding of endoplasmic reticulum along actin filaments. *J. Cell Biol.* 106, 1545–1552.
- Kato, A., Hayashi, M., Nishimura, M., 1999. Oligomeric proteins containing N-terminal targeting signals are imported into peroxisomes in transgenic *Arabidopsis*. *Plant Cell Physiol.* 40, 586–591.
- Kato, T., Tonomura, Y., 1977. Identification of myosin in *Nitella flexilis*. *J. Biochem.* 82, 777–782.
- Katoh, S., 1960. A new copper protein from *Chlorella ellipsoidea*. *Nature* 186, 533–534.
- Katoh, S., 1995. The discovery and function of plastocyanin: A personal account. *Photosynth Res.* 43, 177–189.
- Katoh, S., Takamiya, A., 1961. A new leaf copper protein “plastocyanin,” a natural Hill oxidant. *Nature* 189, 665–666.
- Katsaros, C., Kreimer, G., Melkonian, M., 1991. Localization of tubulin and a centrin-homologue in vegetative cells and developing gametangia of *Ectocarpus siliculosus* (Dillio) Lyngb. (Phaeophyceae Ectocarpales). A combined immunofluorescence and confocal laser scanning microscope study. *Bot. Acta* 104, 87–92.
- Katsuhara, M., Hanba, Y.T., Shiratake, K., Maeshima, M., 2008. Expanding roles of plant aquaporins in plasma membranes and cell organelles. *Funct. Plant Biol.* 35, 1–14.
- Katsuhara, M., Mimura, T., Tazawa, M., 1989. Patch clamp study on a Ca^{2+} -regulated K^{+} channel in the tonoplast of the brackish characeae *Lamprothamnium succinctum*. *Plant Cell Physiol.* 30, 549–555.
- Katsuta, J., Shibaoka, H., 1988. The roles of the cytoskeleton and the cell wall in nuclear positioning in tobacco BY-2 cells. *Plant Cell Physiol.* 29, 403–413.
- Kaufmann, W., 1961. *Philosophic Classics. Thales to St. Thomas*. Prentice-Hall, Engelwood Cliffs, NJ.
- Kauss, H., 1987. Some aspects of calcium-dependent regulation in plant metabolism. *Ann. Rev. Plant Physiol.* 38, 47–72.
- Kawano, S., Takano, H., Imai, J., Mori, K., Kuroiwa, T., 1993. A genetic system controlling mitochondrial fusion in the slime mould, *Physarum polycephalum*. *Genetics* 133, 213–224.
- Kawasaki, H., Kretsinger, R.H., 1995. Protein Profile. Volume 2. Calcium-Binding Proteins 1: EF-hands. Academic Press, London.
- Kawashima, I., Inokuchi, Y., Chino, M., Kimura, M., Shimizu, N., 1991. Isolation of a gene for metallothionein-like protein from soybean. *Plant Cell Physiol.* 32, 913–916.
- Kearney, E.B., Singer, T.P., 1956. Studies on succinic dehydrogenase. I. *J. Biol. Chem.* 219, 963–975.
- Kebeish, R., Niessen, M., Thiruveedhi, K., Bari, R., Hirsch, H. J., Rosenkranz, R., Stäbler, N., Schönfeld, B., Kreuzaler, F., Peterhänsel, C., 2007. Chloroplastic photorespiratory bypass increases photosynthesis and biomass production in *Arabidopsis thaliana*. *Nat. Biotechnol.* 25, 539–540.
- Keddie, F.M., Barajas, L., 1969. Three-dimensional reconstruction of *Pityosporum* yeast cells based on serial section electron microscopy. *J. Ultrastruct. Res.* 29, 260–275.
- Keegstra, K., Olsen, L.J., Theg, S.M., 1989. Chloroplastic precursors and their transport across the envelope membranes. *Ann. Rev. Plant Physiol. Mol. Biol.* 40, 471–501.
- Keegstra, K., Talmadge, K.W., Bauer, W.D., Albersheim, P., 1973. The structure of plant cell walls. III. A model of the walls of suspension cultured sycamore cells based on the inter connections of the macromolecular components. *Plant Physiol.* 51, 188–196.
- Keeling, P.J., 1998. A kingdom's progress: Archezoa and the origin of eukaryotes. *BioEssays* 20, 87–95.
- Keeling, P.J., Doolittle, W.F., 1995. Archaea: Narrowing the gap between prokaryotes and eukaryotes. *Proc. Natl. Acad. Sci. USA* 92, 5761–5764.

- Keenan, T.W., Morré, D.J., 1970. Phospholipid class and fatty acid composition of Golgi apparatus isolated from rat liver and comparison with other cell fractions. *Biochemistry* 9, 19–25.
- Keifer, D.W., Spanswick, R.M., 1978. Activity of the electrogenic pump in *Chara corallina* as inferred from measurements of the membrane potential, conductance, and potassium permeability. *Plant Physiol.* 62, 653–661.
- Keifer, D.W., Spanswick, R.M., 1979. Correlation of adenosine triphosphate levels in *Chara corallina* with the activity of the electrogenic pump. *Plant Physiol.* 64, 165–168.
- Keilin, D., 1966. *The History of Cell Respiration and Cytochrome*. Cambridge University Press, Cambridge.
- Keith, A.D., Snipes, W., 1974. Viscosity of cellular protoplasm. *Science* 183, 666–668.
- Keith, C.H., 1987. Effect of microinjected calciumcalmodulin on mitosis in PtK₂ cells. *Cell Motil. Cytoskel.* 7, 1–9.
- Keller, B.U., Hedrich, R., Raschke, K., 1989. Voltage-dependent anion channels in the plasma membrane of guard cells. *Nature* 341, 450–453.
- Keller, E.B., 1951. Turnover of proteins of adult rat liver *in vivo*. *Fed. Proc.* 10, 206.
- Keller, E.B., Zamecnik, P.C., Loftfield, R.B., 1954. The role of microsomes in the incorporation of amino acids into proteins. *J. Histochem. Cytochem.* 2, 378–386.
- Keller, E.B., Zamecnik, P.C., 1956. The effect of guanosine diphosphate and triphosphate on the incorporation of labeled amino acids into proteins. *J. Biol. Chem.* 221, 45–59.
- Keller, F., 1991. Carbohydrate transport in discs of storage parenchyma of celery petioles. 2. Uptake of glucose and fructose. *New Phytol.* 117, 413–422.
- Keller, F., 1992. Transport of stachyose and sucrose by vacuoles of Japanese artichoke (*Stachys sieboldii*) tubers. *Plant Physiol.* 98, 442–445.
- Keller, F., Matile, P., 1985. The role of the vacuole in storage and mobilization of stachyose in tubers of *Stachys sieboldii*. *J. Plant Physiol.* 119, 369–380.
- Keller, G.-A., Krisans, S., Gould, S.J., Sommer, J.M., Wang, C. C., Schliebs, W., Kunau, W., Bordy, S., Subramini, S., 1991. Evolutionary conservation of microbody targeting signal that targets proteins to peroxisomes, glyoxysomes, and glycosomes. *J. Cell Biol.* 114, 893–904.
- Keller, L.C., Romijn, E.P., Zamora, I., Yates, J.R., Marshall, W.F., 2005. Proteomic analysis of isolated Chlamydomonas centrioles reveals orthologs of ciliary-disease genes. *Curr. Biol.* 15, 1090–1098.
- Kelley, K.W., (Ed.), 1988. *The Home Planet*. Addison-Wesley Publishing Co., Reading, MA, and Mir Publishers, Moscow.
- Kelso, J.M., Turner, J.S., 1955. Protoplasmic streaming in *Tradescantia* 1. Effects of indole acetic acid and other growth promoting substances on streaming. *Aust. J. Bio. Sci.* 8, 19–35.
- Kelvin, Lord (William Thomson). 1889–1894, *Popular Lectures and Addresses*. MacMillan, London
- Kelvin, L., 1897. The age of the Earth as an abode for life. *Annual Report of the Smithsonian Institution*, pp. 337–357.
- Kendrew, J.C., 1962. Myoglobin and the structure of proteins. *Nobel Lect.* December 11.
- Kennard, J.L., Cleary, A.L., 1997. Pre-mitotic nuclear migration in subsidiary mother cells of *Tradescantia* occurs in G1 of the cell cycle and required F-actin. *Cell Motil. Cytoskeleton* 36, 55–67.
- Kennedy, E.P., 2001. Hitler's gift and the era of biosynthesis. *J. Biol. Chem.* 276, 42619–42631.
- Kennedy, E.P., Lehninger, A.L., 1949. Oxidation of fatty acids and tricarboxylic acid cycle intermediates by isolated rat liver mitochondria. *J. Biol. Chem.* 179, 957–972.
- Kennedy, J.F., 1961. For the freedom of man. We must all work together. *Vital Speeches of the Day* 27, 226–227.
- Kennedy, J.F., 1963. Commencement Address at American University in Washington on June 10, 1963. In: John Fitzgerald Kennedy... As We Remember Him. J. Meyers, ed. Athenium, New York. 1965.
- Kennedy, J.F., 1964. *A Nation of Immigrants*. Harper & Row, New York.
- Kenyon, D.H., Steinman, G., 1969. *Biochemical Predestination*. McGraw-Hill, New York.
- Kenyon, W.H., Black Jr., C.C., 1986. Electrophoretic analysis of protoplast, vacuole, and tonoplast vesicle proteins in crassulacean acid metabolism plants. *Plant Physiol.* 82, 916–924.
- Kenyon, W.H., Kringstad, R., Black, C.C., 1978. Diurnal changes in th emalic acid content of vacuoles isolated from leaves of the Crassulacean acid metabolism plant, *Sedum telephium*. *FEBS Lett.* 94, 282–283.
- Kenyon, W.H., Severson, R.F., Black Jr., C.C., 1985. Maintenance carbon cycle in crassulacean acid metabolism plant leaves. *Plant Physiol.* 77, 183–189.
- Kerkeb, L., Donaire, J.P., Venema, K., Rodriguez-Rosales, M.P., 2001. Tolerance to NaCl induces changes in plasma membrane lipid composition, fluidity and H⁺-ATPase activity of tomato calli. *Physiologia Plant.* 113, 217–224.
- Kerkut, G.A., York, B., 1971. *The Electrogenic Sodium Pump*. Scientifica Ltd., Bristol.
- Kerrebrock, A.W., Moore, D.P., Wu, J.S., Orr-Weaver, I.L., 1995. Mei-S332, a Drosophila protein required for sister-chromatid cohesion, can localize to meiotic centromere regions. *Cell* 83, 247–256.
- Kersey, Y.M., Hepler, P.K., Palevitz, B.A., Wessels, N.K., 1976. Polarity of actin filaments in characean algae. *Proc. Natl. Acad. Sci. USA*, 73, 165–167.
- Kerstiens, G. (Ed.), 1996. *Plant Cuticles: An Integrated Functional Approach*. BIOS Scientific, Oxford.
- Ketelaar, T., Galway, M.E., Mulder, B.M., Emons, A.M.C., 2008. Rates of exocytosis and endocytosis in *Arabidopsis* root hairs and pollen tubes. *J. Microscopy* 231, 265–273.
- Key, J.L., 1969. Hormones and nucleic acid metabolism. *Ann. Rev. Plant Physiol.* 20, 449–474.
- Khan, S.U.M., Al-Shahry, M., Ingler Jr., W.B., 2002. Efficient photochemical water splitting by a chemically modified n-TiO₂. *Science* 297, 2243–2245.
- Khodjakov, A., Cole, R.W., Bajer, A.S., Rieder, C.L., 1996. The force for poleward chromosome motion in *Haemanthus* cells acts along the length of the chromosome during metaphase but only at the kinetochore during anaphase. *J. Cell Biol.* 132, 1093–1104.
- Khodjakov, A., Cole, R.W., McEwen, B.F., Buttle, K.F., Rieder, C. L., 1997. Chromosome fragments possessing only one kinetochore can congress to the spindle equator. *J. Cell Biol.* 136, 229–240.
- Khodjakov, A., Rieder, C.L., 1996. Kinetochores moving away from their associated pole do not exert significant pushing force on their chromosome. *J. Cell Biol.* 135, 315–327.

- Khoo, U., Wolf, M.J., 1970. Origin and development of protein granules in maize endosperm. *Amer. J. Bot.* 57, 1042–1050.
- Khorana, H.G., 1961. Some Recent Developments in the Chemistry of Phosphate Esters of Biological Interest. John Wiley & Sons, New York.
- Khorana, H.G., 1968. Polynucleotide synthesis and the genetic code. *Harvey Lect.* 62, 79–105.
- Khorana, H.G., 1968a. Nucleic acid synthesis in the study of the genetic code. *Nobel Lect.* December 12, 1968.
- Khorana, H.G., 1976. Synthesis in the study of nucleic acids. In: Kornberg, A., Horecker, B.L., Cornudella, L., Oro, J. (Eds.), *Reflections on Biochemistry in Honour of Severo Ochoa*. Pergamon Press, Oxford, pp. 273–281.
- Kidd, J., 1852. *On the Adaptation of External Nature to the Physical Condition of Man*. H. G. Bohn, London.
- Kiebler, M., Becker, K., Pfanner, N., Neupert, W., 1993. Mitochondrial protein import: Specific recognition and membrane translocation of preproteins. *J. Membrane Biol.* 135, 191–207.
- Kieffer, W.F., 1963. *The Mole Concept in Chemistry*. Reinhold Publishing, New York.
- Kiehart, D.P., 1981. Studies on the in vivo sensitivity of spindle microtubules to calcium ions and evidence for a vesicular calcium-sequestering system. *J. Cell Biol.* 88, 604–617.
- Kieliszewski, M.J., Lamport, D.T.A., 1994. Extensin: Repetitive motifs, functional sites, post-translational codes, and phylogeny. *Plant J.* 5, 157–172.
- Kiermayer, O., 1972. Beeinflussung der postmitotischen Kernmigration von *Microsterias denticulata* Bréb. durch das Herbizid Trifluralin. *Protoplasma* 75, 421–426.
- Kiermayer, O., Hepler, P.K., 1970. Hemmung der Kernmigration von Jochalgen (*Micrasterias*) durch Isopropyl-N-phenylcarbamate. *Die Naturwissenschaften* 5, 252.
- Kiesel, A., 1930. *Chemie des Protoplasmas*. Protoplasmatologia Monograph 4, Berlin.
- Kiessling, J., Kruse, S., Rensing, S.A., Harter, K., Decker, E.L., Reski, R., 2000. Visualization of a cytoskeleton-like FtsZ network in chloroplasts. *J. Cell Biol.* 151, 945–950.
- Kikuyama, M., Hara, Y., Shimada, K., Yamamoto, K., Hiramoto, Y., 1992. Intercellular transport of macromolecules in *Nitella*. *Plant Cell Physiol.* 33, 413–417.
- Kikuyama, M., Shimmen, T., 1997. Role of Ca^{2+} on triggering tonoplast action potential in intact *Nitella flexilis*. *Plant Cell Physiol.* 38, 941–944.
- Kikuyama, M., Tazawa, M., 1972. An attempt to introduce various unicellular organisms into the cytoplasm of *Nitella flexilis*. *Proc. 37th Annual Meeting of the Botanical Society of Japan*. p. 161 (In Japanese).
- Kikuyama, M., Tazawa, M., 1982. Ca^{2+} ion reversibly inhibits the cytoplasmic streaming of *Nitella*. *Protoplasma* 113, 241–243.
- Kikuyama, M., Tazawa, M., Tominaga, Y., Shimmen, T., 1996. Membrane control of cytoplasmic streaming in characean cells. *J. Plant Res.* 109, 113–118.
- Kim, H.Y., Côté, G.G., Crain, R.C., 1996. Inositol 1,4,5-trisphosphate may mediate closure of K^{+} channels by light and darkness in *Samanea saman* motor cells. *Planta* 198, 279–287.
- Kim, I., Cho, E., Crawford, K.M., Hempel, F.D., Zambryski, P.C., 2005. Cell-to-cell movement of GFP during embryogenesis and early seedling development in *Arabidopsis*. *Proc. Natl. Acad. Sci. USA* 102, 2227–2231.
- Kim, J.Y., Yuan, Z., Jackson, D., 2003. Developmental regulation and significance of KNOX protein trafficking in *Arabidopsis*. *Development* 130, 4351–4362.
- Kim, J.-B., Olek, A.T., Carpita, N.C., 2000. Cell wall and membrane-associated exo- β -D-glucanases from developing maize seedlings. *Plant Physiol.* 123, 471–485.
- Kim, J.H., Cho, H.T., Kende, H., 2000. α -expansins in the semi-aquatic ferns *Marsilea quadrifolia* and *Regnellidium diphyllum*: Evolutionary aspects and physiological role in rachis elongation. *Planta* 212, 85–92.
- Kim, K.K., Sawa, Y., Shibata, H., 1996. Hydroxylation of entkaurenoic acid to steviol in *Stevia rebaudiana* Bertonii—Purification and partial characterization of the enzyme. *Arch. Biochem. Biophys.* 332, 223–230.
- Kim, M., Canio, W., Kessler, S., Sinha, N., 2001. Developmental changes due to long-distance movement of a homeobox fusion transcript in tomato. *Science* 293, 287–289.
- Kim, M., Hepler, P.K., Eun, S.-O., Ha, K.S., Lee, Y., 1995. Actin filaments in mature guard cells are radially distributed and involved in stomatal movement. *Plant Physiol.* 109, 1077–1084.
- Kim, T.G., Kim, M.Y., Kim, B.G., Kang, T.J., Kim, Y.S., Jang, Y. S., Arntzen, C.J., Yang, M.S., 2007. Synthesis and assembly of *Escherichia coli* heat-labile enterotoxin B subunit in transgenic lettuce (*Lactuca sativa*). *Protein expression and purification* 51, 22–27.
- Kim, W.T., Franceschi, V.R., Krishnan, H.B., Okita, T.W., 1988. Formation of wheat protein bodies: Involvement of the Golgi apparatus in gliadin transport. *Planta* 176, 173–182.
- Kimura, S., Itoh, T., 1995. Evidence for the role of the glomerulocyte in cellulose synthesis in the tunicate, *Metandrocarpa uedai*. *Protoplasma* 186, 24–33.
- Kimura, S., Itoh, T., 1996. New cellulose synthesizing complexes (terminal complexes) involved in animal cellulose biosynthesis in the tunicate *Metandrocarpa uedai*. *Protoplasma* 194, 151–163.
- Kimura, S., Kondo, T., 2002. Recent progress in cellulose biosynthesis. *J. Plant Res.* 115, 297–302.
- Kimura, S., Laosinchai, W., Itoh, T., Cui, X., Linder, C.R., Brown Jr., R.M., 1999. Immunogold labeling of rosette terminal cellulose-synthesizing complexes in the vascular plant *Vigna angularis*. *Plant Cell* 11, 2075–2085.
- Kimura, Y., Toyoshima, N., Hirakawa, N., Okamoto, K., Ishijima, A., 2003. A kinetic mechanism for the fast movement of *Chara* myosin. *J. Mol. Biol.* 328, 939–950.
- Kindl, H., 1982a. Glyoxysome biogenesis via cytoplasmic pools in cucumber. *Ann. NY Acad. Sci.* 386, 314–328.
- Kindl, H., 1982b. The biosynthesis of microbodies (peroxisomes, glyoxysomes). *Int. Rev. Cytol.* 80, 193–229.
- King, A.G., 1925. *Kelvin the Man. A Biographical Sketch by his Niece, Agnes Gardner King*. Hodder and Stoughton, London.
- King Jr., M.L., 1992. *I Have a Dream: Writing and Speeches that Changed the World*. Harper, San Francisco.
- Kingsbury, B.F., 1912. Cytoplasmic fixation. *Anat. Rec.* 6, 39–52.
- Kincaid, R.L., Mansour, T.E., 1978a. Measurement of chemotaxis in the slime mold *Physarum polycephalum*. *Exp. Cell Res.* 116, 365–375.
- Kincaid, R.L., Mansour, T.E., 1978. Chemotaxis toward carbohydrates and amino acids in *Physarum polycephalum*. *Exp. Cell Res.* 116, 377–385.

- Kinkema, M., Wang, H., Schielbein, J., 1994. Molecular analysis of the myosin gene family in *Arabidopsis thaliana*. *Plant Mol. Biol.* 26, 1139–1153.
- Kinkema, M., Schiefelbein, J., 1994. A myosin from a higher plant has structural similarities to Class V myosins. *J. Mol. Biol.* 239, 591–597.
- Kinoshita, T., Doi, M., Suetsugu, N., Kagawa, T., Wada, M., Shimazaki, K.-I., 2001. phot1 and phot2 mediate blue light regulation of stomatal opening. *Nature* 414, 656–660.
- Kinoshita, T., Emi, T., Tominaga, M., Sakamoto, K., Shigenaga, A., Doi, M., Shimazaki, K.-I., 2003. Blue-light- and phosphorylation-dependent binding of a 14-3-3 protein to phototropins in stomatal guard cells of broad bean. *Plant Physiol.* 133, 1453–1463.
- Kinoshita, T., Nishimura, M., Shimazaki, K.-I., 1995. Cytosolic concentration of Ca^{2+} regulates the phosphorylation of the C-terminus in stomatal guard cells. *EMBO J.* 18, 5548–5558.
- Kinoshita, T., Shimazaki, K.-I., 1999. Blue light activates the plasma membrane H^+ -ATPase by phosphorylation of the C-terminus in stomatal guard cells. *EMBO J.* 18, 5548–5558.
- Kinoshita, T., Shimazaki, K.-I., 2001. Analysis of the phosphorylation level in guard-cell plasma membrane H^+ -ATPase in response to Fusicoccin. *Plant Cell Physiol.* 42, 424–432.
- Kinoshita, T., Shimazaki, K.-I., 2002. Biochemical evidence for the requirement of 14-3-3 protein binding in activation of the guard cell plasma membrane H^+ -ATPase by blue light. *Plant Cell Physiol.* 43, 1359–1365.
- Kinraide, T.B., Etherton, B., 1980. Electrical evidence for different mechanisms of uptake for basic, neutral, and acidic amino acids in oat coleoptiles. *Plant Physiol.* 65, 1085–1089.
- Kirby, W., 1853. On the Power, Wisdom, and Goodness of God, as Manifested in the Creation of Animals. Henry Bohn, London.
- Kirkman, H., Severinghaus, A.E., 1938. A review of the Golgi apparatus. *Anat. Rev.* 70, 413–431, 557–573, 71, 79–103.
- Kirschner, M.W., 1978. Microtubule assembly and nucleation. *Int. Rev. Cytol.* 54, 1–71.
- Kirschner, M.W., 1980. Implications of treadmilling for the stability and polarity of actin and tubulin polymers in vivo. *J. Cell Biol.* 86, 330–334.
- Kirschner, M., 1992. The cell cycle then and now. *Trends in Biochem. Sci.* 17, 281–285.
- Kirschner, M.W., Gerhart, J.C., 2005. The Plausibility of Life. Yale University Press, New Haven, CT.
- Kishi-Kaboshi, M., Murata, T., Hasebe, M., Watanabe, Y., 2005. An extraction method for tobacco mosaic virus movement protein localizing in plasmodesmata. *Protoplasma* 225, 85–92.
- Kishimoto, U., 1958. Rhythmicity in the protoplasmic streaming of a slime mold, *Physarum polycephalum*. II. Theoretical treatment of the electric potential rhythm. *J. Gen. Physiol.* 41, 1223–1244.
- Kishimoto, U., 1968. Response of *Chara* internodes to mechanical stimulation. *Ann. Report Biol. Works. Fac. Sci. Osaka Univ.* 16, 61–66.
- Kishino, A., Yanagida, T., 1988. Force measurement by micromanipulation of a single actin filament by glass needles. *Nature* 334, 74–76.
- Kiss, J.Z., Giddings Jr., T.H., Staehelin, L.A., Sack, F., 1990. Comparison of the ultrastructure of conventionally fixed and high pressure frozen/freeze substituted root tips of *Nicotiana* and *Arabidopsis*. *Protoplasma* 157, 64–74.
- Kiss, J.Z., Hertel, R., Sack, F.D., 1989. Amyloplasts are necessary for full gravitropic sensitivity in roots of *Arabidopsis thaliana*. *Planta* 177, 198–206.
- Kitajima, T.S., Kanashima, S.A., Watanabe, Y., 2004. The conserved kinetochore protein shugushin protects centromeric cohesion during meiosis. *Nature* 427, 510–517.
- Kitasato, H., 1968. The influence of H^+ on the membrane potential and ion fluxes of *Nitella*. *J. Gen. Physiol.* 52, 60–87.
- Kitasato, H., 2003. Membrane potential genesis in *Nitella* cells, mitochondria, and thylakoids. *J. Plant Res.* 116, 401–418.
- Kiyosawa, K., Ogata, K., 1987. Influence of external osmotic pressure on water permeability and electrical conductance of *Chara* cell membrane. *Plant Cell Physiol.* 28, 1013–1022.
- Kjellbom, P., Larsson, C., 1984. Preparation and polypeptide composition of chlorophyll-free plasma membranes from leaves of light-grown spinach and barley. *Physiol. Plant.* 62, 501–509.
- Klausner, R.D., Donaldson, J.G., Lippincott-Schwartz, J., 1992. Brefeldin A: Insights into the control of membrane traffic and organelle structure. *J. Cell Biol.* 116, 1071–1080.
- Klekowski Jr., E.J., 1971. Ferns and genetics. *BioScience* 21, 317–322.
- Klekowski Jr., E.J., 1976. Mutational load in a fern population growing in a polluted environment. *Amer. J. Bot.* 63, 1024–1030.
- Klekowski Jr., E.J., Berger, B.B., 1976. Chromosome mutations in a fern population growing in a polluted environment: A bioassay for mutagens in aquatic environments. *Amer. J. Bot.* 63, 239–246.
- Klekowski Jr., E.J., Kazarinova-Fukshansky, N., 1984a. Shoot apical meristems and mutation: Fixation of selectively neutral cell genotypes. *Amer. J. Bot.* 71, 22–27.
- Klekowski Jr., E.J., Kazarinova-Fukshansky, N., 1984b. Shoot apical meristems and mutation: Selective loss of disadvantageous cell genotypes. *Amer. J. Bot.* 71, 28–34.
- Klekowski Jr., E.J., Kazarinova-Fukshansky, N., Fukshansky, L., 1989. Patterns of plant ontogeny that may influence genomic stasis. *Amer. J. Bot.* 76, 189–195.
- Klekowski Jr., E.J., Klekowski, E., 1982. Mutation in ferns growing in an environment contaminated with polychlorinated biphenyls. *Amer. J. Bot.* 69, 721–727.
- Klekowski Jr., E.J., Lovenfeld, R., Helper, P.K., 1994. Mangrove genetics. II. Outcrossing and lower spontaneous mutation rates in Puerto Rican rhizophora. *Int. J. Plant Sci.* 155, 373–381.
- Klein, K., Wagner, G., Blatt, M.R., 1980. Heavy-meromyosin-decoration of microfilaments from *Mougeotia* protoplasts. *Planta* 150, 354–356.
- Klein, M., Martinoia, E., Hoffmann-Thoma, G., Weissenböck, G., 2000. A membrane-potential dependent, ubiquitous ABC-like transporter mediates the vacuolar uptake of rye flavone glucuronides—regulation of glucuronide uptake by glutathione and its conjugates. *Plant Journal* 21, 289–304.
- Klein, M., Martinoia, E., Hoffmann-Thoma, G., Weissenböck, G., 2001. The ABC-like vacuolar transporter from rye mesophyll flavone glucuronides is not species-specific. *Phytochemistry* 56, 153–159.
- Klein, M., Martinoia, E., Weissenböck, G., 1998. Directly energized uptake of β -estradiol 17-(β -D-glucuronide) in plant vacuoles is strongly stimulated by glutathione conjugates. *J. Biol. Chem.* 273, 262–270.

- Klein, M., Weissenböck, G., Dufaud, A., Gaillard, C., Kreuz, K., Martinoia, E., 1996. Different energization mechanisms drive the vacuolar uptake of a flavonoid glucoside and a herbicide glucoside. *J. Biol. Chem.* 271, 29666–29671.
- Klein, R.R., Mullet, J.E., 1986. Regulation of chloroplast-encoded chlorophyll-binding protein translation during higher plant chloroplast biogenesis. *J. Biol. Chem.* 261, 11138–11145.
- Kleinig, H., 1989. The role of plastids in isoprenoid biosynthesis. *Ann. Rev. Plant Physiol. Mol. Biol.* 40, 39–59.
- Klima, A., Foissner, I., 2008. FM dyes label sterol-rich plasma membrane domains and are internalized independently of the cytoskeleton in characean internodal cells. *Plant Cell Physiol.* 49, 1508–1521.
- Klink, R., Lüttge, U., 1990. Electron microscope demonstration of a head and stalk structure of the leaf vacuolar ATPase in *Mesembryanthemum crystallinum* L. *Bot. Acta* 104, 122–131.
- Klionsky, D.J., Herman, P.K., Emr, S.D., 1990. The fungal vacuole: Composition, function, and biogenesis. *Microbiol. Rev.* 54, 266–292.
- Klionsky, D.J., Ohsumi, Y., 1999. Cytoplasm to vacuole protein transport. *Annu. Rev. Cell Dev. Biol.* 15, 1–32.
- Kluyver, A.J., 1931. *The Chemical Activities of Micro-Organisms*. University of London Press, London.
- Kluyver, A.J., van Niel, C.B., 1956. *The Microbe's Contribution to Biology*. Harvard University Press, Cambridge, MA.
- Knebel, W., Quader, H., Schnepf, E., 1990. Mobile and immobile endoplasmic reticulum in onion bulb epidermis cells: Short and long-term observations with a confocal laser scanning microscope. *Eur. J. Cell Biol.* 52, 328–340.
- Knight, A.E., Kendrick-Jones, J., 1993. A myosin-like protein from a higher plant. *J. Mol. Biol.* 231, 148–154.
- Knight, J., 2002. Bridging the culture gap. *Nature* 419, 244–246.
- Knight, M.R., Campbell, A.K., Smith, S.M., Trewavas, A.J., 1991. Transgenic plant aequorin reports the effect of touch and cold-shock and elicitors on cytoplasmic calcium. *Nature* 352, 524–526.
- Knight, M.R., Smith, S.M., Trewavas, A.J., 1992. Wind-induced plant motion immediately increases cytosolic calcium. *Proc. Natl. Acad. Sci. USA* 89, 4967–4971.
- Knowles, R.V., Srien, F., Phillips, R.L., 1990. Endoreduplication of nuclear-DNA in the developing maize endosperm. *Dev. Genet.* 11, 125–132.
- Knox, J.P., 1990. Emerging patterns of organization at the plant cell surface. *J. Cell Sci.* 96, 557–561.
- Knox, J.P., 1992a. Cell adhesion, cell separation and plant morphogenesis. *Plant J.* 2, 137–141.
- Knox, J.P., 1992b. Molecular probes for the plant cell surface. *Protoplasma* 167, 1–9.
- Knox, J.P., Umstead, P.J., King, J., Cooper, C., Roberts, K., 1990. Pectin esterification is spatially regulated both within cell walls and between developing tissues of root apices. *Planta* 181, 512–521.
- Knudson, L., 1940. Permanent changes of chloroplasts induced by X rays in the gametophyte of *Polypodium aureum*. *Bot. Gaz.* 101, 721–758.
- Knuetzel, J., Simpson, D., 1991. Expression and organization of antenna proteins in the light- and temperature-sensitive barley mutant chlorina⁻¹⁰⁴. *Planta* 185, 111–123.
- Knull, H.R., Bronstein, W.W., des Jardins, P., Niehaus, W.G., 1980. Interaction of selected brain glycolytic enzymes with an F-actin-tropomyosin complex. *J. Neurochem.* 34, 222–225.
- Knutson, R.M., 1974. Heat production and temperature regulation in eastern skunk cabbage. *Science* 186, 746–747.
- Knutson, R.M., 1979. Plants in heat. *Natural History* 88, 42–47.
- Kobae, Y., Sekino, T., Yoshioka, H., Nakagawa, T., Martinoia, E., Maeshima, M., 2006. Loss of AtPDR8, a plasma membrane ABC transporter of *Arabidopsis thaliana*, causes hypersensitive cell death upon pathogen infection. *Plant Cell Physiol.* 47, 309–318.
- Kobayashi, H., 1996. Changes in the relationship between actin filaments and the plasma membrane in cultured *Zinnia* cells during tracheary element differentiation investigated by using plasma membrane ghosts. *J. Plant Res.* 109, 61–65.
- Kobayashi, H., Fukuda, H., Shibaoka, H., 1988. Interrelation between the spatial disposition of actin filaments and microtubules during the differentiation of tracheary elements in cultured *Zinnia* cells. *Protoplasma* 143, 29–37.
- Kobayashi, K., Kim, I., Cho, E., Zambryski, P., 2005. Plasmodesmata and plant morphogenesis. In: Oparka, K.J. (Ed.), *Plasmodesmata*. Blackwell Publishing, Oxford, pp. 90–112.
- Kobayashi, T., Takahara, M., Miyagishima, S.Y., Kuroiwa, H., Sasaki, N., Ohta, N., Matsuzaki, M., Kuroiwa, T., 2002. Detection and localization of a chloroplast-encoded HU-like protein that organizes chloroplast nucleoids. *Plant Cell* 14, 1579–1589.
- Kobayashi, Y., Yamada, M., Kobayashi, I., Kunoh, H., 1997. Actin microfilaments are required for the expression of nonhost resistance in higher plants. *Plant Cell Physiol.* 38, 725–733.
- Koch, A., Thiemann, M., Grabenbauer, M., Yoon, Y., McNiven, M.A., Schrader, M., 2003. Dynamin-like protein 1 is involved in peroxisomal fission. *J. Biol. Chem.* 278, 8597–8605.
- Koenig, F.O., 1959. On the history of science and of the second law of thermodynamics. In: Evans, H.M. (Ed.), *Men and Moments in the History of Science*. University of Washington Press, Seattle, pp. 57–111.
- Koenig, P., Oreb, M., Muhle-Goll, C., Sinning, I., Schleiff, E., Tews, I., 2008. On the significance of the Toc-GTPase homodimers. *J. Biol. Chem.* 283, 23104–23112.
- Koenigsberger, L., 1906. Hermann von Helmholtz. Clarendon Press, Oxford.
- Köhler, P., Carr, D.J. 2006. A somewhat obscure discoverer of plasmodesmata: Eduard Tangl (1848–1905). In: M. Kokowski, (Ed.), *The Global and the Local: The History of Science and the Cultural Integration of Europe*. Proceedings of the 2nd ICESHS Cracow, Poland, September 6–9, 2006, pp. 208–211.
- Kohler, R.H., Zipfel, W.R., Webb, W.W., Hanson, M.R., 1997a. The green fluorescent protein as a marker to visualize plant mitochondria in vivo. *Plant J.* 11, 613–621.
- Kohler, R.H., Cao, J., Zipfel, W.R., Webb, W.W., Hanson, M.R. 1997b. Hanson. Exchange of protein molecules through connections between higher plant plastids. *Science* 276, 2039–2042.
- Kohno, T., Chaen, S., Shimmen, T., 1990. Characterization of the translocator associated with pollen tube organelles. *Protoplasma* 154, 179–183.
- Kohno, T., Ishikawa, R., Nagata, T., Kohama, K., Shimmen, T., 1992. Partial purification of myosin from lily pollen tubes by monitoring with in vitro motility assay. *Protoplasma* 170, 77–85.
- Kohno, T., Okagaki, T., Kohama, K., Shimmen, T., 1991. Pollen tube extract supports the movement of actin filaments in vitro. *Protoplasma* 161, 75–77.

- Kohno, T., Shimmen, T., 1988. Accelerated sliding of pollen tube organelles along characeae actin bundles regulated by Ca^{2+} . *J. Cell Biol.* 196, 1539–1543.
- Kollman, R., Glockmann, C., 1991. Studies on graft Unions. III. On the mechanism of secondary formation of plasmodesmata at the graft interface. *Protoplasma* 165, 71–85.
- Konar, R.N., Linskins, H.F., 1966. The morphology and anatomy of the stigma of *Petunia hybrida*. *Planta* 71, 356–371.
- Kondo, T., Yoshida, K., Nakagawa, A., Kawai, T., Tamura, H., Goto, T., 1992. Structure basis of blue-colour development in flower petals from *Commelina communis*. *Nature* 358, 515–518.
- Konijn, T.M., Koevenig, J.L., 1971. Chemotaxis in myxomycetes or true slime molds. *Mycologia* 63, 901–906.
- Korn, E.D., 1966. Structure of biological membranes. *Science* 153, 1491–1498.
- Korn, E.D., Carlier, M.-F., Pantaloni, D., 1987. Actin polymerization and ATP hydrolysis. *Science* 238, 638–644.
- Kornberg, A., 1950a. Enzymatic synthesis of triphosphopyridine nucleotide. *J. Biol. Chem.* 182, 805–813.
- Kornberg, A., 1950b. Reversible enzymatic synthesis of diphosphopyridine nucleotide and inorganic pyrophosphate. *J. Biol. Chem.* 182, 779–793.
- Kornberg, A., 1959. The biologic synthesis of deoxyribonucleic acid. Nobel Lect. December 11.
- Kornberg, A., 1960. Biological synthesis of deoxyribonucleic acid. *Science* 131, 1503–1508.
- Kornberg, A., 1961. Enzymatic Synthesis of DNA. John Wiley & Sons, New York.
- Kornberg, A., 1989. For the Love of Enzymes. The Odyssey of a Biochemist. Harvard University Press, Cambridge, MA.
- Kornberg, A., 2001. Remembering our teachers. *J. Biol. Chem.* 276, 3–11.
- Kornberg, A., Pricer Jr., W.E., 1953. Enzymatic synthesis of the coenzyme A derivatives of long chain fatty acids. *J. Biol. Chem.* 204, 329–343.
- Kornberg, H.L., 2003. Memoirs of a biochemical Hod carrier. *J. Biol. Chem.* 278, 9993–10001.
- Kornberg, L., Earp, H.S., Parsons, J.T., Shalla, M., Juliano, R.L., 1992. Cell adhesion of integrin clustering increases phosphorylation of a focal adhesion associated tyrosine kinase. *J. Biol. Chem.* 267, 23439–23442.
- Kornberg, L., Earp, H.S., Turner, C., Prokop, C., Juliano, R.L., 1991. Signal transduction by integrins: Increased protein tyrosine phosphorylation caused by clustering of beta 1 integrins. *Proc. Natl. Acad. Sci. USA* 88, 8392–8396.
- Koroleva, O.A., Tomlinson, M.L., Leader, D., Shaw, P., Doonan, J.H., 2005. High-throughput protein localization in *Arabidopsis* using *Agrobacterium*-mediated transient expression GFP-ORF fusions. *Plant J.* 41, 162–174.
- Kortschak, H.P., Hartt, C.E., Burr, C.O., 1965. Carbon dioxide fixation in sugar cane leaves. *Plant Physiol.* 40, 209–213.
- Kozaki, A., Takeba, G., 1996. Photorespiration protects C_3 plants from photooxidation. *Nature* 384, 557–560.
- Koshland, D.E., 2002. Case of hidden assumptions. *Biochem and Mol. Biol. Education* 30, 27–29.
- Koshland, D.E., Mitchison, T.J., Kirschner, M.W., 1988. Polewards chromosome movement driven by microtubule depolymerization in vitro. *Nature* 331, 499–504.
- Kossel, A., 1884. Über ein peptonartigen Bestandteil des Zellkerns. *Z. Physiol. Chem.* 8, 511–515.
- Kossel, A., 1910. The chemical composition of the cell nucleus. Nobel Lect. December 12.
- Kossel, A., 1928. The Protamines and Histones. Translated by W. V. Thorpe. Longmans, Green and Co., London.
- Kotlizsky, G., Shurtz, S., Yahalom, A., Malik, Z., Traub, O., Epel, B.L., 1992. An improved procedure for the isolation of plasmodesmata embedded in clean maize cell walls. *The Plant J.* 2, 623–630.
- Koulintchenki, M., Konstantinov, Y., Dietrich, A., 2003. Plant mitochondria actively import DNA via the permeability transition pore complex. *EMBO J.* 22, 1245–1254.
- Kragler, F., 2005. Plasmodesmata: Protein transport signals and receptors. In: Oparka, K.J. (Ed.), *Plasmodesmata*. Blackwell Publishing, Oxford, pp. 53–72.
- Kragler, F., Monzer, J., Xoconostle-Cázares, B., Lucas, W.J., 2000. Peptide antagonists of the plasmodesmatal macromolecular trafficking pathway. *EMBO J.* 19, 2856–2868.
- Kraml, M., Büttner, G., Haupt, W., Herrmann, H., 1988. Chloroplast orientation of *Mesotaenium*: The phytochrome effect is strongly potentiated by interaction with blue light. *Protoplasma* (Suppl. 1), 172–179.
- Krause, K.-H., Chou, M., Thomas, M.A., Sjolund, R.D., Campbell, K.P., 1989. Plant cells contain calsequestrin. *J. Biol. Chem.* 264, 4269–4272.
- Krebs, E.G., 1982. Protein phosphorylation and cellular regulation. I. Nobel Lect. December 8, 1992.
- Krebs, H.A., 1940a. The citric acid cycle. *Biochem J.* 34, 460–463.
- Krebs, H.A., 1940b. The citric acid cycle and the Szent-Györgyi cycle in pigeon breast muscle. *Biochem J.* 34, 775–779.
- Krebs, H.A., 1943. The intermediary stages in the biological oxidation of carbohydrate. *Advances in Enzymology* 3, 191–252.
- Krebs, H.A., 1950. The tricarboxylic acid cycle. *Harvey Lect.* 44, 165–199.
- Krebs, H.A., 1953. The citric acid cycle. Nobel Lect. December 11.
- Krebs, H.A., 1954. Considerations concerning the pathways of syntheses in living matter. *Bull. Johns Hopkins* 95, 19–33.
- Krebs, H.A., 1957. Control of metabolic processes. *Endeavour* 16, 125–132.
- Krebs, H.A., 1967. The making of a scientist. *Nature* 215, 1441–1445.
- Krebs, H.A., 1970. The history of the tricarboxylic acid cycle. *Perspect. Biol. Med.* 14, 154–170.
- Krebs, H.A., 1971. How the whole becomes more than the sum of the parts. *Perspect. Biol. Med.* 14, 448–457.
- Krebs, H.A., 1975. The August Krogh Principle: For many problems there is an animal on which it can be most conveniently studied. *J. Exp. Zool.* 194, 221–226.
- Krebs, H.A., 1981a. Otto Warburg. *Cell Physiologist Biochemist and Eccentric*. Oxford University Press, New York.
- Krebs, H.A., 1981b. Hans Krebs: Reminiscences and Reflections. Clarendon Press, Oxford.
- Krebs, H.A., Eggleston, L.V., 1940a. Biological synthesis of oxaloacetic acid from pyruvic acid and carbon dioxide. *Biochem. J.* 34, 1383–1395.
- Krebs, H.A., Eggleston, L.V., 1940b. The oxidation of pyruvate in pigeon breast muscle. *Biochem. J.* 34, 442–459.
- Krebs, H.A., Johnson, W.A., 1937. The role of citric acid in intermediate metabolism in animal tissues. *Enzymologia* 4, 148–156.

- Kretsinger, R. H., 1977. Evolution of the informational role of calcium in eukaryotes. In: Wassermann, R. H., Corradino, R. A., Carafoli, E., Kretsinger, R. H., MacLennan, D. H., Siegel, F. L. (Eds.), *Calcium-Binding Proteins and Calcium Function*. North Holland, NY, pp. 63–72.
- Kreuz, K., Tommasini, R., Martinoia, E., 1996. Old enzymes for a new job. *Plant Physiol.* 111, 349–353.
- Kringstad, R., Kenyon, W.H., Black, C.C., 1980. The rapid isolation of vacuoles from leaves of Crassulacean acid metabolism plants. *Plant Physiol.* 66, 379–382.
- Krishnamoorthy, G., Hinkle, P.C., 1984. Non-ohmic proton conductance of mitochondria and liposomes. *Biochemistry* 23, 1640–1645.
- Krishnamoorthy, G., Hinkle, P.C., 1988. Studies on the electron transfer pathway, topography of iron-sulfur centers, and site of coupling in NADH-Q oxidoreductase. *J. Biol. Chem.* 263, 17566–17575.
- Kristen, U., 1978. Ultrastructure and a possible function of the intercisternal elements in dictyosomes. *Planta* 138, 29–33.
- Krogh, A., 1916. *The Respiratory Exchange of Animals and Man*. Longmans, Green and Co., London.
- Krogh, A., 1929. Progress in physiology. *Am. J. Physiol.* 90, 243–251.
- Krogmann, D.W., 2000. The golden age of biochemical research in photosynthesis. *Photosynth. Res.* 653, 109–121.
- Krogmann, D.W., Jagendorf, A.T., Avron, M., 1959. Uncouplers of spinach chloroplast photosynthetic phosphorylation. *Plant Physiol.* 34, 272–277.
- Kron, S.J., Spudich, J.A., 1986. Fluorescent actin filaments move on myosin fixed to a glass surface. *Proc. Natl. Acad. Sci. USA* 83, 6272–6276.
- Kropf, D.L., Berge, S.K., Quatrano, R.S., 1989. Actin localization during *Fucus* embryogenesis. *Plant Cell* 1, 191–200.
- Kropf, D.L., Henry, C.A., Gibbon, B.C., 1995. Measurement and manipulation of cytosolic pH in polarizing zygotes. *Eur. J. Cell Biol.* 68, 297–305.
- Kropf, D.L., Kloareg, B., Quatrano, R.S., 1988. Cell wall is required for fixation of the embryonic axis in *Fucus* zygotes. *Science* 239, 187–190.
- Kropf, D.L., Williamson, R.E., Wasteny, G.O., 1997. Microtubule orientation and dynamics in elongating characean internodal cells following cytosolic acidification, induction of pH bands, or premature growth arrest. *Protoplasma* 197, 188–198.
- Kruse, C., Frevert, J., Kindl, H., 1981. Selective uptake by glyoxysomes of in vitro translated malate synthase. *FEBS Lett.* 129, 36–38.
- Kruse, C., Kindl, H., 1983. Oligomerization of malate synthase during glyoxysome biosynthesis. *Arch. Biochem. Biophys.* 223, 629–638.
- Kubai, D.F., 1975. The evolution of the mitotic spindle. *Int. Rev. Cytol.* 43, 167–227.
- Kubai, D.F., 1978. Mitosis and fungal phylogeny. In: Heath, I.B. (Ed.), *Nuclear Division in the Fungi*. Academic Press, New York, pp. 177–229.
- Kubai, D.F., Ris, H., 1969. Division in the dinoflagellate *Gyrodinium Cohnii* (Schiller). *J. Cell Biol.* 40, 508–528.
- Kubiak, J., De Brabander, M., De May, J., Tarkowska, J.A., 1986. Origin of the mitotic spindle in onion root cells. *Protoplasma* 130, 51–56.
- Kudlicka, K., Brown Jr., R.M., Li, L., Lee, J.H., Shin, H., Kuga, S., 1995. β -Glucan synthesis in the cotton fiber. IV. In vitro assembly of the cellulose 1 allomorph. *Plant Physiol.* 107, 111–123.
- Kudlicka, K., Lee, J.H., Brown Jr., R.M., 1996. A comparative analysis of in vitro cellulose synthesis from cell-free extracts of mung bean (*Vigna radiata*, Fabaceae) and cotton (*Gossypium hirsutum*, Malvaceae). *Amer. J. Bot.* 83, 274–284.
- Kudlicka, K., Brown Jr., R.M., 1997. Cellulose and callose biosynthesis in higher plants. I. Solubilization and separation of (1 $\rightarrow$ 3)- and (1 $\rightarrow$ 4)- β -glucan synthase activities from mung bean. *Plant Physiol.* 115, 643–656.
- Kühlbrandt, W., Zeelen, J., Dietrich, J., 2002. Structure, mechanism, and regulation of the *Neurospora* plasma membrane H⁺-ATPase. *Science* 297, 1692–1696.
- Kühne, W., 1864. *Untersuchungen Über Das Protoplasma Und Die Kontraktilität*. W. Engelmann, Leipzig.
- Kühn-Velten, W.N., 1993. Fusion of enzyme kinetics with quantitative cell biology constitutes a novel, synergistic approach to calculate local enzyme activities *in situ* from subcellular-site concentrations of enzymes and their substrates: An endocrinologist's contribution to the "metabolite channelling" debate. *J. Theor. Biol.* 165, 447–453.
- Kühtreiber, W.M., Jaffe, L.F., 1990. Detection of extracellular Ca²⁺ gradients with a calcium-specific vibrating electrode. *J. Cell Biol.* 110, 1565–1573.
- Kull, F.J., Sablin, E.P., Lau, R., Fletterick, R.J., Vale, R.D., 1996. Crystal structure of the kinesin motor domain reveals structural similarity to myosin. *Nature* 380, 550–554.
- Kumagai, F., Yoneda, A., Tomida, T., Sano, T., Nagata, T., Hasegawa, S., 2001. Fate of nascent microtubules organized at the M/G interface, as visualized by synchronized tobacco BY-2 cells stably expressing GFP-tubulin: Time-sequence observations of the reorganization of cortical microtubules in living plant cells. *Plant Cell Physiol.* 42, 723–732.
- Kumamaru, T., Ogawa, M., Satoh, H., Okita, T.W., 2007. Protein body biogenesis in cereal endosperms. *Plant Cell Monogr.* 8, 141–158.
- Kunau, W.H., 2005. Peroxisome biogenesis: End of the debate. *Current Biol.* 15, R774–R776.
- Kurek, I., Kawagoe, Y., Jacob-Wilk, D., Dobin, M., Delmer, D., 2003. Dimerization of cotton fiber cellulose synthase catalytic subunits occurs via oxidation of the zinc-binding domains. *Proc. Natl. Acad. Sci. USA* 99, 11109–11114.
- Kurihara, Y., Watanabe, Y., 2004. Arabidopsis micro-RNA biogenesis through Dicer-like 1 protein functions. *Proc. Natl. Acad. Sci. USA* 101, 12753–12758.
- Kuroda, K., 1983. Cytoplasmic streaming in characean cells cut open by microsurgery. *Proc. Jpn. Acad. Sci.* 59, 126–130.
- Kuroda, K., 1990. Cytoplasmic streaming in plant cells. *Int. Rev. Cytol.* 121, 267–307.
- Kuroda, K., Manabe, E., 1983. Microtubule-associated cytoplasmic streaming in *Caulerpa*. *Proc. Jpn. Acad.* 59, 131–134.
- Kuroiwa, H., Sugai, M., Kuroiwa, T., 1988. Behavior of chloroplast and chloroplast nuclei during spermatogenesis in the fern *Pteris vittata*. *Protoplasma* 146, 89–100.
- Kuroiwa, T., 1982. Mitochondrial nuclei. *Int. Rev. Cytol.* 75, 1–59.
- Kuroiwa, T., 1991. The replication, differentiation, and inheritance of plastids with emphasis on the concept of organelle nuclei. *Int. Rev. Cytol.* 128, 1–62.

- Kuroiwa, T., Fujie, M., Kuroiwa, H., 1992. Studies on the behavior of mitochondrial DNA. *J. Cell Sci.* 101, 483–493.
- Kuroiwa, T., Hori, T., 1986. Preferential digestion of male chloroplast nuclei during gametogenesis of *Bryopsis maxima* Okamura. *Protoplasma* 133, 85–87.
- Kuroiwa, T., Ishibashi, K., Takano, H., Higashiyama, T., Sasaki, N., Nishimura, Y., Matsunaga, S., 1996. Optical isolation of individual mitochondria of *Physarum polycephalum* for PCR analysis. *Protoplasma* 194, 274–279.
- Kuroiwa, T., Kawano, S., Nishibayashi, S., Sato, C., 1982. Epifluorescence microscopic evidence for maternal inheritance of chloroplast DNA. *Nature* 298, 481–484.
- Kuroiwa, T., Uchida, H., 1996. Organelle division and cytoplasmic inheritance. *BioScience* 46, 827–835.
- Küster, E. [1929]. 1996. Pathology of the Plant Cell. Part 1. Pathology of Protoplasm. Translated by E. Stadelmann, W. R. Bushnell, and A. H. Bushnell. Saad Publications, Karachi, Pakistan.
- Küster, E., 1935. Anisotropic elements of the plant cell. *J. Royal Microsc. Soc.* 55, 99–101.
- Kusumi, A., Sako, Y., 1996. Cell surface organization by the membrane skeleton. *Curr. Opin. Cell Biol.* 8, 566–574.
- Kutschera, U., 1991. Regulation of cell expansion. In: Lloyd, C.W. (Ed.), *The Cytoskeletal Basis of Plant Growth and Form*. Academic Press, London, pp. 149–158.
- Kvenvolden, K.A., Lawless, J., Perring, K., Peterson, E., Flores, J., Ponnampuruma, C., Kaplan, I., Moore, C., 1970. Evidence for extraterrestrial amino acids and hydrocarbons in the Murchison meteorite. *Nature* 228, 923–926.
- Kvenvolden, K.A., Lawless, J.G., Ponnampuruma, C., 1971. Non-protein amino acids in the Murchison meteorite. *Proc. Nat. Acad. Sci. USA* 68, 486–490.
- Kwiatkowska, M., 2003. Plasmodesmal changes are related to different developmental stages of antheridia of *Chara* species. *Protoplasma* 222, 1–11.
- Kwok, E.Y., Hanson, M.R., 2003. Microfilaments and microtubules control the morphology and movement of non-green plastids and stromules in *Nicotiana tabacum*. *Plant J.* 35, 16–26.
- Kwok, E.Y., Hanson, M.R., 2004b. Stromules and the dynamic nature of plastid morphology. *J. Microscopy* 214, 124–137.
- Kwok, E.Y., Hanson, M.R., 2004b. GFP-labeled Rubisco and aspartate aminotransferase accumulate in plastid stromules and traffic between plastids. *J. Exp. Bot.* 55, 595–604.
- Kyle, D.J., Staehelin, L.A., Arntzen, C.J., 1983. Lateral mobility of the light harvesting complex in chloroplast membranes controls excitation energy distribution in higher plants. *Arch. Biochem. Biophys.* 222, 527–541.
- Kyte, J., Doolittle, R.F., 1982. A simple method for displaying the hydropathic character of a protein. *J. Mol. Biol.* 157, 105–132.
- L-**
- Labavitch, J.M., 1981. Cell wall turnover in plant development. *Ann. Rev. Plant Physiol.* 32, 385–406.
- Lacey Jr., J.C., Hawkins, A.F., Thomas, R.D., Watkins, C.L., 1988. Differential distribution of D and L amino acids between the 2' and 3' positions of the AMP residue at the 3' terminus of transfer ribonucleic acid, *Proc. Natl. Acad. Sci. USA*, 85, 4996–5000.
- Lacey Jr., J.C., Mullins Jr., D.W., 1983. Experimental studies related to the origin of the genetic code and the process of protein synthesis—A review. *Origins of Life* 13, 3–42.
- Lacey Jr., J.C., Staves, M.P., Thomas, R.D., 1990a. Ribonucleic acids may be catalysts for the prepeptides: A minireview. *J. Mol. Evol.* 31, 244–248.
- Lacey Jr., J.C., Thomas, R.D., Wickramasinghe, N.S., Watkins, C.L., 1990b. Chemical esterification of 5'-AMP occurs predominantly at the 2' position. *J. Mol. Evol.* 31, 251–256.
- Lacey, J.C., Thomas, R.D., Staves, M.P., Watkins, C.L., 1991. Stereoselective formation of bis(alpha-aminoacyl) esters of 5'-AMP suggests a primitive peptide synthesizing system with a preference for L-amino acids. *Biochim. Biophys. Acta* 1076, 395–400.
- Lacey, J.C., Wickramasinghe, N.S., Sabatini, R.S., 1992. Preferential hydrophobic interactions are responsible for a preference of D-amino acids in the aminoacylation of 5'-AMP with hydrophobic amino acids. *Experientia* 48, 379–383.
- Lacey, J.C., Wickramasinghe, N.S., Cook, G.W., Anderson, G., 1993. Couplings of character and of chirality in the origin of the genetic system. *J. Mol. Evol.* 37, 233–239.
- Lachaud, S., Maurousset, L., 1996. Occurrence of plasmodesmata between differentiating vessels and other xylem cells in *Sorbus torminalis* L. Crantz and their fate during xylem maturation. *Protoplasma* 191, 220–226.
- LaCour, L.F., Darlington, C.D., 1975. *The Handling of Chromosomes*. John Wiley & Sons, New York.
- LaFayette, Marquis de, Jefferson, T., 1789. Declaration of the Rights of Man and the Citizen. <http://www.constitution.org/fr/fr_drm.htm>
- Lafontaine, J.G., Lord, A., 1974. An ultrastructural and radioautographic study of the evolution of the interphase nucleus in plant cells (*Allium porrum*). *J. Cell Sci.* 14, 263–287.
- Laible, P.D., Zipfel, W., Owens, T.G., 1994. Excited state dynamics in chlorophyll-based antennae: The role of transfer equilibrium. *Biophys. J.* 66, 844–860.
- Laidler, K.J., 1993. *The World of Physical Chemistry*. Oxford University Press, Oxford.
- Laine, R.O., Zeile, W., Kang, F., Purich, D.L., Southwick, F.S., 1997. Vinculin proteolysis unmasks an ActA homolog for actin-based *Shigella* motility. *J. Cell Biol.* 138, 1255–1267.
- Lakshminarayanaiah, N., 1965. Transport phenomena in artificial membranes. *Chem. Rev.* 65, 491–565.
- Lakshminarayanaiah, N., 1969. *Transport Phenomena in Membranes*. Academic Press, New York.
- Lam, S.K., Siu, C.L., Hillmer, S., Jang, S., An, G., Robinson, D.G., 2007. Rice SCAMP1 defines clathrin-coated, trans-Golgi-located tubular-vesicular structures as an early endosome in tobacco BY-2 cells. *Plant Cell* 19, 296–319.
- Lamanna, C., 1968. DNA discovery in perspective. *Science* 160, 1397–1398.
- Lamarck, J.B., 1802. (An X). *Hydrogéologie*. Lamarck, Paris.
- Lamarck, J. B., [1809]. 1914. *Zoological Philosophy*. Translated by H. Elliot. MacMillan, London.
- Lamb Jr., W.E., 1955. Fine structure of the hydrogen atom. *Nobel Lect.* December 12.
- Lambert, A.-M., Bajer, A.S., 1972. Dynamics of spindle fibers and microtubules during anaphase and phragmoplast formation. *Chromosoma* 39, 101–144.

- Lambridis, H., 1976. Empedocles. A Philosophical Investigation. University of Alabama Press, University.
- Lamont, L., 1965. Day of Trinity. Atheneum, New York.
- Lamport, D.T.A., 1965. The protein component of primary cell walls. *Adv. Bot. Res.* 2, 151–218.
- Lancelle, S.A., Callahan, D.A., Hepler, P.K., 1986. A method for rapid freeze fixation of plant cells. *Protoplasma* 131, 153–165.
- Lancelle, S.A., Cresti, M., Hepler, P.K., 1987. Ultrastructure of the cytoskeleton in freeze-substituted pollen tubes of *Nicotiana glauca*. *Protoplasma* 140, 141–150.
- Lancelle, S.A., Cresti, M., Hepler, P.K., 1997. Growth inhibition and recovery in freeze-substituted *Lilium longiflorum* pollen tubes: Structural effects of caffeine. *Protoplasma* 196, 21–33.
- Lancelle, S.A., Hepler, P.K., 1988. Cytochalasin-induced ultrastructural alterations in *Nicotiana* pollen tubes. *Protoplasma* (Suppl. 2), 65–75.
- Lancelle, S.A., Hepler, P.K., 1989. Immunogold labeling of actin on sections of freeze substituted plant cells. *Protoplasma* 150, 72–74.
- Lancelle, S.A., Hepler, P.K., 1992. Ultrastructure of freeze-substituted pollen tubes of *Lilium longiflorum*. *Protoplasma* 167, 215–230.
- Lanford, R.E., Butel, J.S., 1984. Construction and characterization of an SV40 mutant defective in nuclear transport of T antigen. *Cell* 37, 801–813.
- Lang, I., Scholz, M., Peters, R., 1986. Molecular mobility and nucleocytoplasmic flux in hepatoma cells. *J. Cell Biol.* 102, 1183–1190.
- Lang-Pauluzzi, I., 2000. The behaviour of the plasma membrane during plasmolysis: A study by UV microscopy. *J. Microscopy* 198, 188–198.
- Lang-Pauluzzi, I., Gunning, B.E.S., 2000. A plasmolytic cycle: The fate of cytoskeletal elements. *Protoplasma* 212, 174–185.
- Langan, K.J., Nothnagel, E.A., 1997. Cell surface arabinogalactan-proteins and their relation to cell proliferation and viability. *Protoplasma* 196, 87–98.
- Langhans, M., Hawes, C., Hillmer, S., Hummel, E., Robinson, D.G., 2007. Golgi regeneration after brefeldin A treatment in BY-2 cells entails stack enlargement and cisternal growth followed by division. *Plant Physiol.* 145, 527–538.
- Langley, J.N., 1921. The Autonomic Nervous System. W. Heffer & Sons, Cambridge.
- Langley, K.H., Piddington, R.W., Ross, D., Sattelle, D.B., 1976. Photon correlation analysis of cytoplasmic streaming. *Biochem. Biophys. Acta.* 444, 893–898.
- Langmuir, I., 1916. The constitution and fundamental properties of solids and liquids. Part 1. Solids. *J. Amer. Chem. Soc.* 38, 2221–2295.
- Langmuir, I., 1917. The constitution and fundamental properties of solids and liquids. Part 2. Liquids. *J. Amer. Chem. Soc.* 39, 1848–1906.
- Lao, N.T., Long, D., Kiang, S., Coupland, G., Shoue, D.A., Carpita, N.C., Kavanagh, T.A., 2003. Mutation of a family 8 glycosyl-transferase gene alters cell wall carbohydrate composition and causes a humidity-sensitive semi-sterile dwarf phenotype in *Arabidopsis*. *Plant Mol. Biol.* 53, 687–701.
- Laporte, C., Vetter, G., Loudes, A.-M., Robinson, D.G., Hillmer, S., Stussi-Garaud, C., Ritzenthaler, C., 2003. Involvement of the secretory pathway and the cytoskeleton in intracellular targeting and tubule assembly of *Grapevine fanleaf virus* movement protein in tobacco BY-2 cells. *Plant Cell* 15, 2058–2075.
- Laporte, K., Rossignol, M., Traas, J.A., 1993. Interaction of tubulin with the plasma membrane: Tubulin is present in purified plasmalemma and behaves as an integral membrane protein. *Planta* 191, 413–416.
- Lara, M.V., Offermann, S., Smith, M., Okita, T.W., Andreo, C.S., Edwards, G.E., 2008. Leaf development in the single-cell C_4 System in *Bienertia sinuspersici*: Expression of genes and peptide levels for C_4 metabolism in relation to chlorenchyma structure under different light conditions. *Plant Physiol.* 148, 593–610.
- Lardy, H.A., 1965. On the direction of pyridine nucleotide oxidation-reduction reactions in gluconeogenesis and lipogenesis. In: Chance, B., Estabrook, R.W., Williamson, J.R. (Eds.), *Control of Energy Metabolism*. Academic Press, New York, pp. 245–248.
- Lark, K.G., 1967. Nonrandom segregation of sister chromatids in *Vicia faba* and *Triticum boeoticum*. *Proc. Natl. Acad. Sci. USA* 58, 352–359.
- Lark, K.G., Consigli, R.A., Minocha, H.C., 1966. Segregation of sister chromatids in mammalian cells. *Science* 154, 1202–1205.
- Larkins, B.A., Hurkman, W.J., 1978. Synthesis and deposition of protein bodies of maize endosperm. *Plant Physiol.* 62, 256–263.
- Larmor, J., 1905. Note on the mechanics of the ascent of sap in trees. *Proc. Roy. Soc. Lond.* 76B, 460–463.
- Larsen, P.M., Chen, T.L.L., Wolniak, S.M., 1991. Neomycin reversibly disrupts mitotic progression in stamen hair cells of *Tradescantia*. *J. Cell. Sci.* 98, 159–168.
- Larsson, U., Jergil, B., Anderson, B., 1983. Changes in the lateral distribution of the light-harvesting chlorophyll *a/b*-protein complex induced by its phosphorylation. *Eur. J. Biochem.* 136, 25–29.
- Laskey, R.A., Honda, B.M., Mills, A.D., Finch, J.T., 1978. Nucleosomes are assembled by an acidic protein which binds histones and transfers then to DNA. *Nature* 275, 416–420.
- Laskowski, M.J., 1990. Microtubule orientation in pea stem cells: A change in orientation follows the initiation of growth rate decline. *Planta* 181, 44–52.
- Laties, G.G., 1959. Active transport of salt into plant tissue. *Ann. Rev. Plant Physiol.* 10, 87–112.
- Laties, G.G., 1964. Physiological aspects of membrane function in plant cells during development. In: Locke, M. (Ed.), *Cellular Membranes in Development*. Academic Press, New York, pp. 299–320.
- Laue, M. von, 1915. Concerning the detection of X-ray interferences. *Nobel Lect.* December 12.
- Läuger, P., 1991. *Electrogenic Ion Pumps*. Sinauer Associates Inc., Sunderland, MA.
- Laurent, T.C., 1995. An early look at macromolecular crowding. *Biophys. Chem.* 57, 7–14.
- Lauterborn, R., 1911. *Die biologische Selbstreinigung unserer Gewässer*.
- Laval, V., Chabannes, M., Carrié, R.E., Canut, H., Barre, A., Rougé, P., Pont-Lezica, R., Galaud, J., 1999. A family of *Arabidopsis* plasma membrane receptors presenting animal β -integrin domains. *Biochimica et Biophysica Acta* 1435, 61–70.
- Lavoisier, A., Laplace, P., 1780. *Memoir on heat*. *Memoires de l'academie des sciences*. p. 337. Translated in *Great Experiments in Biology*, Gabriel, M.L., Fogel, S. (Eds.), 1955. Prentice-Hall, Engelwood Cliffs, NJ, pp. 85–93.

- Lawrence, W.J.C., Price, J.R., 1940. The genetics and chemistry of flower color variation. *Biol. Rev.* 15, 35–38.
- Lazarow, A., Cooperstein, S.J., 1953. Studies on the enzymatic basis for the Janus Green B staining reaction. *J. Histochem. Cytochem.* 1, 234–241.
- Lazarow, P.B., 2003. Peroxisome biogenesis: Advances and conundrums. *Curr. Opin. Cell Biol.* 15, 489–497.
- Lazarow, P.B., de Duve, C., 1976. A fatty acyl-CoA oxidizing system in rat liver peroxisomes; enhancement by clofibrate, a hypolipidemic drug. *Proc. Natl. Acad. Sci.* 73, 2043–2046.
- Lazarow, P.B., Fujiki, Y., 1985. Biogenesis of peroxisomes. *Ann. Rev. Cell Biol.* 1, 489–530.
- Lazarowitz, S.G., 1999. Probing plant cell structure and function with viral movement proteins. *Curr. Opin. Plant Biol.* 2, 332–338.
- Lazarowitz, S.G., Beachy, R.N., 1999. Viral movement proteins as probes for intracellular trafficking in plants. *Plant Cell* 11, 535–548.
- Lazcano, A., Bada, J.L., 2004. The 1953 Stanley L. Miller Experiment: Fifty years of prebiotic chemistry. *Orig. Life Evol. Biosph.* 33, 235–242.
- Lea, D.E., 1947. *Actions of Radiations on Living Cells*. Cambridge University Press, Cambridge.
- Leathes, J.B., 1926. Function and design. *Science* 64, 387–394.
- Leavitt, H.S., 1908. 1777 variables in the Magellanic Clouds. *Ann. Harvard College Observatory* 60, 87–108.
- LeBel, J.A., 1874. On the relations which exist between the atomic formulas of organic compounds and the rotatory power of their solutions. *Bull. Soc. Chim.* 22, 337–347.
- Leber, B., Hemleben, V., 1979. Uptake of homologous DNA into nuclei of seedlings and by isolated nuclei of a higher plant. *Z. Pflanzenphysiol.* 91, 305–316.
- LeBorgne, N., Dupou-Cézanne, L., Teulières, C., Canut, H., Tocanne, J.-F., Boudet, A.M., 1992. Lateral and rotational mobilities of lipids in specific cellular membranes of *Eucalyptus Gunnii* cultivars exhibiting different freezing tolerance. *Plant Physiol.* 100, 246–254.
- Leckie, C.P., McAinsh, M.R., Montgomery, L., Priestley, A.J., Staxen, I., Webb, A.A.R., Hetherington, A.M., 1998. Second messengers in guard cells. *J. Exp. Bot.* 49 (special issue), 339–349.
- Lecomte du Nouy, P., 1947. *Human Destiny*. Longmans, Green and Co., London.
- Ledbetter, M.C., Porter, K.R., 1963. A “microtubule” in plant cell fine structure. *J. Cell Biol.* 19, 239–250.
- Ledbetter, M.C., Porter, K.R., 1964. Morphology of microtubules of plant cells. *Science* 144, 872–874.
- Lederberg, J., 1952. Cell genetics and hereditary symbiosis. *Physiol. Rev.* 32, 403–430.
- Lederberg, J., 1959. A view of genetics. *Nobel Lect.* May 29.
- Lederman, L., Teresi, D., 1993. *The God Particle. If the Universe is the Answer, What is the Question?* Houghton Mifflin, Boston.
- Lee, A.B., 1893. *The Microtome’s Vade-mecum*, third ed. J. & A. Churchill, London.
- Lee, C., Ferguson, M., Chen, L.B., 1989. Construction of the endoplasmic reticulum. *J. Cell Biol.* 109, 2045–2055.
- Lee, D., 2007. *Nature’s Palette. The Science of Color*. University of Chicago Press, Chicago.
- Lee, D.H., Granja, J.R., Martinez, J.A., Severin, K., Ghadiri, M.R., 1996. A self-replicating peptide. *Nature* 382, 525–528.
- Lee, R.C., Feinbaum, R.L., Ambros, V., 1993. The *C. elegans* heterochronic gene *lin-4* encodes small RNAs with antisense complementarity to *lin-14*. *Cell* 75, 843–854.
- Lee, J.W., Tevault, C.V., Owens, T.G., Greenbaum, E., 1996. Oxygenic photoautotrophic growth without photosystem I. *Science* 273, 364–367.
- Lee, J.-Y., Taoka, K.I., Yoo, B.-C., Ben-Nissan, G., Kim, D.-J., et al., 2005. Plasmodesmal-associated protein kinase in Tobacco and Arabidopsis recognizes a subset of non-cell-autonomous proteins. *Plant Cell* 17, 2817–2831.
- Lee, M.S., Mullen, R.T., Trelease, R.N., 1997. Oil seed isocitrate lyases lacking their essential type 1 peroxisomal targeting signal are piggybacked to glyoxysomes. *Plant Cell* 9, 185–197.
- Lee, R.E., 1995. *Phycology*, second ed. Cambridge University Press, Cambridge.
- Lee, Y., Choi, Y.B., Suh, S., Lee, J., Assmann, S.M., Joe, C.O., Kelleher, J.F., Crain, R.C., 1996. Abscise acid-induced phosphoinositide turnover in guard cell protoplasts of *Vicia faba*. *Plant Physiol.* 110, 987–996.
- Lee, Y.-R.J., Giang, H.M., Liu, B., 2001. A novel plant kinesin-related protein specifically associates with the phragmoplast organelles. *Plant Cell* 13, 2427–2440.
- Lee, Y.-R.J., Liu, B., 2000. Identification of a phragmoplast-associated kinesin-related protein in higher plants. *Curr. Biol.* 10, 797–800.
- Lee, Y.-R.J., Liu, B., 2007. Cytoskeletal motor proteins in plant cell division. *Plant Cell Monogr.* 9, 169–193.
- Leegood, R.C., 2007. A welcome diversion from photorespiration. *Nat. Biotechnol.* 25, 539–540.
- Leeuwenhoek, A. van, 1677. Concerning little animals observed in rain- well- sea- and snow water; as also in water wherein pepper had lain infused. *Philos. Trans. Roy. Soc. Lond.* 12, 821–831.
- Leeuwenhoek, A. van, 1678. De Natis E Semine Genitali Animalculus. *Phil. Trans.* 12 (142), 1040–1046.
- Leeuwenhoek, A. van, 1699a. Concerning his answers to objections made to his opinions concerning the animalcula semine masculine. *Phil. Trans.* 21, 270–272.
- Leeuwenhoek, A. van, 1699b. Concerning the animalcula in semine humano, etc. *Phil. Trans.* 21, 301–308.
- Leeuwenhoek, A. van, 1700. Concerning his further observations on the animalcula in semine masculine. *Phil. Trans.* 22, 739–746.
- Leeuwenhoek, A. van, 1701. Concerning the spawn of codfish, etc. *Phil. Trans.* 22, 821–824.
- Lefebvre, B., Furt, F., Hartmann, M.-A., Michaelson, L.V., Carde, J.-P., Sargueil-Boiron, F., Rossignol, M., Napier, J.A., Cullimore, J., Bessoule, J.-J., Mongrand, S., 2007. Characterization of lipid rafts from *Medicago truncatula* root plasma membranes: A proteomic study reveals the presence of a raft-associated redox system. *Plant Physiol.* 144, 402–418.
- Lefebvre, P.A., Rosenbaum, J.L., 1986. Regulation of the synthesis and assembly of ciliary and flagellar proteins during regeneration. *Ann. Rev. Cell Biol.* 2, 517–546.
- Leff, H.S., Rex, A.F., 1990. *Maxwell’s Demon: Entropy, Information, Computing*. Princeton University Press, Princeton, NJ.
- Legname, I., Baskakov, V., Nguyen, H.-O.B., Riesner, D., Cohen, F.E., DeArmond, S.J., Prusiner, S.B., 2004. Synthetic mammalian prions. *Science* 305, 673–676.

- Legrain, P., Rosbash, M., 1989. Some cis and transacting mutants for splicing target pre m-RNA to the cytoplasm. *Cell* 57, 573–583.
- Lehmann, H., 1935. Über die enzymatische Synthese der Kreatinphosphorsäure durch Umesterung der Phosphobrenztraubensäure. *Biochem. Z.* 281, 271–291.
- Lehninger, A.L., 1949. Esterification of inorganic phosphate coupled to electron transport between dihydridophosphopyridine nucleotide and oxygen. *J. Biol. Chem.* 178, 625–644.
- Lehninger, A.L., 1955. Oxidative phosphorylation. *Harvey Lect.* 49, 176–215.
- Lehninger, A.L., 1959. Respiratory-energy transformation. In: Oncley, J.L., Schmitt, F.O., Williams, R.C., Rosenberg, M.D., Holt, R.H. (Eds.), *Biophysical Science—A Study Program*. John Wiley & Sons, New York, pp. 136–146.
- Lehninger, A.L., 1964. *The Mitochondrion. Molecular Basis of Structure and Function*. W. A. Benjamin, New York.
- Lehninger, A.L., 1965. *Bioenergetics*. W. A. Benjamin, New York.
- Lehninger, A.L., 1975. *Biochemistry*, Second ed. Worth Publishers, New York.
- Leibler, S., Huse, D.A., 1991. A physical model for motor proteins. *C. R. Acad. Sci. Series III.* 313, 27–36.
- Leibler, S., Huse, D.A., 1993. Porters versus rowers. A unified stochastic model of motor proteins. *J. Cell Biol.* 121, 1357–1368.
- Leigh, R.A., 1997. The solute composition of plant vacuoles. *Adv. Bot. Res.* 25, 171–194.
- Leitz, G., Schnepf, E., Greulich, K.O., 1995. Micromanipulation of statoliths in gravi-sensing *Chara* rhizoids by optical tweezers. *Planta* 197, 278–288.
- Lenard, P.E.A. von, 1906. On cathode rays. *Nobel Lect.* May 28.
- Lenard, P., 1933. *Great Men of Science. A History of Scientific Progress*. G. Bell and Sons, London.
- Lengerova, M., Vyskot, B., 2001. Sex chromatin and nucleolar analyses in *Rumex acetosa* L. *Protoplasma* 217, 147–153.
- Leonard, D.A., Zaitlin, M., 1982. A temperature-sensitive strain of tobacco mosaic virus defective in cell-to-cell movement generates an altered viral-encoded protein. *Virology* 117, 416–424.
- Leopold, A., 1949. *A Sand County Almanac and Sketches Here and There*. Oxford University Press, Oxford.
- Leopold, A.C., 1964. *Plant Growth and Development*. McGraw-Hill, New York.
- Leopold, A.C., Kriedemann, P.E., 1975. *Plant Growth and Development*, second ed. McGraw-Hill, New York.
- Leopold, A.C., 2004. Living with the land ethic. *BioScience* 54, 149–154.
- Lepiniec, L., Debeaujon, I., Routaboul, J.-M., Baudry, A., Pourcel, I., Nesi, N., Caboche, M., 2006. Genetics and biochemistry of seed flavonoids. *Annu. Rev. Plant Biol.* 57, 405–430.
- Lerner, E. J., Griffiths, R. B. Mixing science and theology. *Two Letters, Physics Today*, (2), 61(9) 12.
- Lersten, N.R., Czlapinski, A.R., Curtis, J.D., Freckmann, R., Horner, H.T., 2006. Oil bodies in leaf mesophyll cells of angiosperms: Overview and a selected survey. *Amer. J. Bot.* 93, 1731–1739.
- Leslie, R.J., Pickett-Heaps, J.D., 1983. Ultraviolet microbeam irradiations of mitotic diatoms: Investigation of spindle elongation. *J. Cell Biol.* 96, 548–561.
- Lester, D.R., Ross, J.J., Davies, P.J., Reid, J.B., 1997. Mendel's stem length gene (*Le*) encodes a gibberellin 3- β -hydroxylase. *Plant Cell* 9, 1435–1443.
- Leuschner, A.O., 1937. The award of the Bruce Gold Medal to Professor Ejnar Hertzsprung. *Publ. Astron. Soc. Pac.* 49, 65–81.
- Leustek, T., Murillo, M., Cervantes, M., 1994. Cloning of a cDNA encoding ATP sulfurylase from *Arabidopsis thaliana* by functional expression in *Saccharomyces cerevisiae*. *Plant Physiol.* 105, 897–902.
- Levan, A., 1938. The effect of colchicine on root mitoses in *Allium*. *Hereditas* 24, 471–486.
- Levanony, H., Rubin, R., Altschuler, Y., Galili, G., 1992. Evidence for a novel route of wheat storage proteins to vacuoles. *J. Cell Biol.* 119, 1117–1128.
- Levene, P.A., 1921. On the structure of thymus nucleic acid and on its possible bearing on the structure of the plant nucleic acid. *J. Biol. Chem.* 48, 119–125.
- Levene, P.A., Bass, L.W., 1931. *Nucleic acids*. American Chemical Society Monograph Series. The Chemical Catalog Co., New York.
- Levi-Montalcini, R., 1988. *In Praise of Imperfection. My Life and Work*. Basic Books, New York.
- Levy, A., Erlanger, M., Rosenthal, M., Epel, B.L., 2007. A plasmodesmata-associated beta-1,3-glucanase in *Arabidopsis*. *Plant J.* 49, 669–682.
- Levy, J.A., Fraenkel-Conrat, H., Owens, R.A., 1994. *Virology*. Prentice-Hall, Englewood Cliffs, N.J.
- Levy, M., Miller, S.L., Brinton, K., Bada, J.L., 2000. Prebiotic synthesis of adenine and amino acids under Europa-like conditions. *Icarus* 145, 609–613.
- Levy, S., Staehelin, L.A., 1992. Synthesis, assembly and function of plant cell wall macromolecules. *Curr. Opin. Cell Biol.* 4, 856–862.
- Lew, R.R., Bushunov, N., Spanswick, R.M., 1985. ATP-dependent proton pumping activities of zucchini fruit microsomes. A study of tonoplast and plasma membrane activities. *Biochem. Biophys. Acta.* 821, 341–347.
- Lewenhoeck, A., 1678. *Observations D. Anthonii Lewenhoeck de natis é semine genitali animalculis*. *Philos. Trans. Roy. Soc. Lond.* 12, 1040–1046.
- Lewin, R.A., 1992. *Origins of Plastids. Symbiogenesis, Prochlorophytes, and the Origins of Chloroplasts*. Chapman & Hall, New York.
- Lewis, C., 2000. *The Dating Game: One Man's Search for the Age of the Earth*. Cambridge University Press, Cambridge.
- Lewis, G.N., 1908. A revision of the fundamental laws of matter and energy. *Phil. Mag. Ser. 6.* 16, 705–717.
- Lewis, G. N. [1923]. 1966. *Valence and the Structure of Atoms and Molecules*. Dover Publications, New York.
- Lewis, G.N., 1926. *The Anatomy of Science*. Yale University Press, New Haven, CT.
- Lewis, G.N., Randall, M., 1923. *Thermodynamics and the Free Energy of Chemical Substances*. McGraw-Hill, New York.
- Lewis, M.J., Pelham, H.R., 1992. Sequence of a second human KDEL receptor. *J. Mol. Biol.* 226, 913–916.
- Lewontin, R.C., 2000. *The Triple Helix: Gene, Organism, and Environment*. Harvard University Press, Cambridge, MA.
- Leydig, F., 1857. *Lehrbuch der Histologie des Menschen und der Thiere*. Meidinger, Frankfurt.

- Li, G., Chandler, S.P., Wolffe, A.P., Hall, T.C., 1998. Architectural specificity in chromatin structure at the TATA box in vivo: Nucleosome displacement upon β -phaseolin gene activation. *Proc. Natl. Acad. Sci. USA* 95, 4772–4777.
- Li, H., Roux, S.J., 1992. Casein kinase II protein kinase in bound to lamina-matrix and phosphorylates lamin-like protein in isolated pea nuclei. *Proc. Natl. Acad. Sci. USA* 89, 8434–8438.
- Li, J., Assmann, S.M., 1996. An abscisic acid-activated and calcium-independent protein kinase from guard cells of fava bean. *Plant Cell* 8, 2359–2368.
- Li, J., Assmann, S. M. 2000. Regulation of guard cell function by phosphorylation and dephosphorylation events. Walker, J.A., (Ed.), *Phosphorylation in Plant Function*, *Annal. Bot.*, pp. 459–479.
- Li, J., Lee, Y.-R., Assmann, S.M., 1998. Guard cells possess a CDPK that phosphorylates the KAT1 K⁺ channel. *Plant Physiol.* 116, 785–795.
- Li, J., Wang, X.-Q., Watson, M.B., Assmann, S.M., 2000. Regulation of abscisic acid-induced stomatal closure and anion channels by guard cell AAPK kinase. *Science* 287, 300–303.
- Li, J., Kinoshita, T., Pandey, S., et al., 2002. Modulation of an RNA-binding protein by abscisic-acid-activated protein kinase. *Nature* 418, 793–797.
- Li, J.B., Gerdes, J.M., Haycraft, C.J., Fan, Y., Teslovich, T.M., May-Simera, H., Li, H., Blacque, O.E., Li, L., Leitch, C.C., et al., 2004. Comparative genomics identifies a flagellar and basal body proteome that includes the BBS5 human disease gene. *Cell* 117, 541–552.
- Li, J.-F., Nebenführ, A., 2007. Organelle targeting of myosin XI is mediated by two globular tail subdomains with separate cargo binding sites. *J. Biol. Chem.* 282, 20593–20602.
- Li, J.Y., Wu, C.F., 2005. New symbiotic hypothesis on the origin of eukaryotic flagella. *Naturwissenschaften* 92, 305–309.
- Li, L., Brown Jr., R.M., 1993. β glucan synthesis in the cotton fiber II. Regulation and kinetic properties of β glucan synthases. *Plant Physiol. Plant Physiol.* 101, 1143–1148.
- Li, Q., Du, W., Liu, D., 2008. Perspectives of microbial oils for biodiesel production. *Appl. Microbiol. Biotechnol.* 80, 749–756.
- Li, X., Gould, S.J., 2003. The dynamin-like GTPase DLP1 is essential for peroxisome division and is recruited to peroxisomes in part by PEX11. *J. Biol. Chem.* 278, 17012–17020.
- Li, W., Chen, C., Markmann-Mulisch, U., Timofejeva, L., Schmelzer, E., Ma, H., Reiss, B., 2004. The *Arabidopsis* AtRAD51 gene is dispensible for vegetative development but required for meiosis. *Proc. Natl. Acad. Sci. USA* 101, 10596–10601.
- Li, X., Gutierrez, D. V., Hanson, M. G., Han, J., Mark, M. D., Chiel, H., Hegemann, P., Landmesser, L. T., Herlitze, S. *Proc. Natl. Acad. Sci. USA* 102, 17816–17821.
- Li, X., Nicklas, R.B., 1995. Mitotic forces control a cell-cycle checkpoint. *Nature* 373, 630–632.
- Li, X., Franceschi, V.R., Okita, T.W., 1993a. Segregation of storage protein mRNAs on the rough endoplasmic reticulum membranes of rice endosperm cells. *Cell* 72, 869–879.
- Li, X., Wu, Y., Zhang, D.-Z., Gillikin, J.W., Boston, R.S., Franceschi, V.R., Okita, T.W., 1993b. Rice prolamine protein body biogenesis: A BiP-mediated process. *Science* 262, 1054–1056.
- Li, Y., Wang, F.H., Knox, R.B., 1989. Ultrastructural analysis of the flagellar apparatus in sperm cells of *Ginkgo biloba*. *Protoplasma* 149, 57–63.
- Li, Z.C., Durachko, D.M., Cosgrove, D.J., 1993. An oat coleoptile wall protein that induces wall extension in vitro and that is antigenically related to a similar protein from cucumber hypocotyls. *Planta* 191, 349–356.
- Liao, S., Lin, J., Do, H., Johnson, A.E., 1997. Both lumenal and cytosolic gating of the aqueous ER translocon pore are regulated from inside the ribosome during membrane protein integration. *Cell* 90, 31–41.
- Liarzi, O., Epel, B.L., 2005. Development of a quantitative tool for measuring changes in the coefficient of conductivity of plasmodesmata induced by developmental, biotic and abiotic signals. *Protoplasma* 225, 67–76.
- Libby, W.F., 1952. *Radiocarbon Dating*. University of Chicago Press, Chicago.
- Lichter, P., Cremer, T., Borden, J., Manuelidis, L., Ward, D.C., 1988. Delineation of individual human chromosomes in metaphase and interphase cells by in situ suppression hybridization using recombinant DNA libraries. *Human Genetics* 80, 224–234.
- Lichtscheidl, I.K., Foissner, I., 1996. Video microscopy of dynamic plant cell organelles: Principles of the technique and practical application. *J. Microscopy* 181, 117–128.
- Lichtscheidl, I.K., Lancelle, S.A., Hepler, P.K., 1990. Actin-endoplasmic reticulum complexes in *Drosera*. Their structural relationship with the plasmalemma, nucleus, and organelles in cells prepared by high pressure freezing. *Protoplasma* 155, 116–126.
- Lichtscheidl, I.K., Url, W.G., 1990. Organization and dynamics of cortical endoplasmic reticulum in inner epidermal cells of onion bulb scales. *Protoplasma* 157, 203–215.
- Lid, S.E., Gruis, D., Jung, R., Lorentzen, J.A., Ananiev, E., Chamberlin, M.M., Niu, X., Meeley, R., Nichols, S., Olsen, O.A., 2002. The defective kernel 1 (dek1) gene required for aleurone cell development in the endosperm of maize grains encodes a membrane protein of the calpain gene superfamily. *Proc. Natl. Acad. Sci. USA* 99, 5460–5465.
- Liebe, S., Quader, H., 1994. Myosin in onion (*Allium cepa*) bulb scale epidermal cells: Involvement in dynamics of organelles and endoplasmic reticulum. *Physiol. Plant* 90, 114–124.
- Liebig, J., 1840. *Organic Chemistry in its Applications to Agriculture and Physiology*. Taylor and Walton, London.
- Liebig, J., 1841. *Organic Chemistry in its Application to Agriculture and Physiology*. John Owen, Cambridge.
- Liljas, A., 1991. Comparative biochemistry and biophysics of ribosomal proteins. *Int. Rev. Cytol.* 124, 103–135.
- Lillie, R., 1927. Physical indeterminism and vital action. *Science* 66, 139–144.
- Lima de Faria, A., Jaworska, H., 1968. Late DNA synthesis in heterochromatin. *Nature* 217, 138–142.
- Lin, C., Ahmad, M., Cashmore, A.R., 1996. *Arabidopsis* cryptochrome 1 is a soluble protein mediating blue light-dependent regulation of plant growth and development. *Plant J.* 10, 893–902.
- Lin, C., Ahmad, M., Chan, J., Cashmore, A.R., 1996. CRY2: A second member of the *Arabidopsis* cryptochrome gene family. *Plant Physiol.* 110, 1047.

- Lin, S., Fischl, A.S., Bi, X., Parce, W., 2003. Separation of phospholipids in microfluid chip device: Application to high-throughput screening assays for lipid-modifying enzymes. *Anal. Biochem.* 314, 97–107.
- Lin, Y., Cluette-Brown, J.E., Goodman, H.M., 2004. The peroxisome deficient Arabidopsis mutant sse1 exhibits impaired fatty acid synthesis. *Plant Physiol.* 135, 814–827.
- Lind, J.L., Boenig, I., Clarke, A.E., Anderson, M.A., 1996. A style-specific 120-kDa glycoprotein enters pollen tubes of *Nicotiana glauca* in vivo. *Sex. Plant. Reprod.* 9, 75–86.
- Lindbo, J.L., Silva-Rosales, L., Proebsting, W.M., Dougherty, W. G., 1993. Induction of a highly specific antiviral state in transgenic plants: Implications for regulation of gene expression and virus resistance. *Plant Cell* 5, 1749–1759.
- Lindee, M.S., 2003. Watson's world. *Science* 300, 432–434.
- Lindegren, C.C., 1966. *The Cold War in Biology*. Planarian Press, Ann Arbor, MI.
- Linderström-Lang, K.U., 1952. *Proteins and Enzymes*. Stanford University Press, Stanford, CA.
- Lindley, D., 2004. *Degrees Kelvin*. Joseph Henry Press, Washington, DC.
- Lindsey, K. (Ed.), 2004. *Polarity in Plants*. Annual Plant Reviews, Vol. 12, Blackwell Publishing, Oxford.
- Lineweaver, H., Burk, D., 1934. The determination of enzyme dissociation constants. *J. Amer. Chem. Soc.* 56, 658–666.
- Ling, G.N., 1984. *In Search of the Physical Basis of Life*. Plenum, New York.
- Ling, G.N., 2001. *At the Cell and Below-Cell Level. The Hidden History of a Fundamental Revolution in Biology*. Pacific Press, New York.
- Lintilhac, P.M., 1974. Differentiation, organogenesis, and the tectonics of cell wall orientation. *Amer. J. Bot.* 61 (135–140), 230–237.
- Lintilhac, P.M., 1999. Toward a theory of cellularity-speculations on the nature of the living cell. *BioScience* 49, 59–68.
- Lintilhac, P.M., Jensen, W.A., 1974. Differentiation, organogenesis, and the tectonics of cell wall orientation. I. Preliminary observations on the development of the ovule in cotton. *Amer. J. Bot.* 61, 129–134.
- Lintilhac, P.M., Vesecky, T.B., 1980. Mechanical stress and cell wall orientation in plants. I. Photoelastic derivation of principal stresses with a discussion of the concept of axillarity and the significance of the "accurate shell zone". *Amer. J. Bot.* 67, 1477–1483.
- Lintilhac, P.M., Vesecky, T.B., 1981. Mechanical stress and cell wall orientation in plants. III. The application of controlled directional stress to growing plants; with a discussion on the nature of the wound reaction. *Amer. J. Bot.* 68, 222–230.
- Lintilhac, P.M., Vesecky, T.B., 1984. Stress-induced alignment of division plane in plant tissues grown in vitro. *Nature* 307, 363–364.
- Lintilhac, P.M., Wei, C., Tanguay, J.J., Outwater, J.O., 2000. Ball tonometry: A rapid nondestructive method for measuring cell turgor pressure in thin-walled plant cells. *J. Plant Growth Regul.* 19, 90–97.
- Lipka, V., Kwon, C., Panstruga, R., 2007. SNARE-ware: The role of SNARE-domain proteins in plant biology. *Annu. Rev. Cell Devel. Biol.* 23, 147–174.
- Lipmann, F., 1941. Metabolic generation and utilization of phosphate bond energy. *Adv. Enzymol.* 1, 99–162.
- Lipmann, F.A., 1953. Development of the acetylation problem: A personal account. Nobel Lect. December 11.
- Lipmann, F., 1965. Projecting backward from the present stage of evolution of biosynthesis. In: Fox, S.M. (Ed.), *The Origins of Prebiological Systems*. Academic Press, New York, pp. 259–280.
- Lipmann, F., 1971. *Wanderings of a Biochemist*. Wiley-Interscience, New York.
- Lipmann, F., Kaplan, N.O., Novelli, G.D., Tuttle, L.C., Guirard, B.M., 1947. Coenzyme for acetylation, a pantothenic acid derivative. *J. Biol. Chem.* 167, 869–870.
- Lisenbee, C.S., Heinze, M., Trelease, R.N., 2003. Peroxisomal ascorbate peroxidase resides within a subdomain of rough endoplasmic reticulum in wild-type Arabidopsis cells. *Plant Physiol.* 132, 870–882.
- Lister, J.J., 1830. On some properties in achromatic object-glasses applicable to the improvement of the microscope. *Phil. Trans. R. Soc.* 120, 187–200.
- Littlefield, J.W., Keller, E.B., 1957. Incorporation of C¹⁴-amino acids into ribonucleoprotein particles from the Ehrlich mouse ascites tumor. *J. Biol. Chem.* 224, 13–30.
- Littlefield, J.W., Keller, E.B., Gross, J., Zamecnik, P.C., 1955. Studies on cytoplasmic ribonucleoprotein particles from the liver of the rat. *J. Biol. Chem.* 217, 111–123.
- Liu, B., Julie Lee, Y.R., 2001. Kinesin-related proteins in plant cytokinesis. *J. Plant Growth Regul.* 20, 141–150.
- Liu, B., Marc, J., Joshi, H.C., Palevitz, B.A., 1993. A γ -tubulin-related protein associated with the microtubule arrays of higher plants in a cell cycle-dependent manner. *J. Cell Sci.* 104, 1217–1228.
- Liu, B., Palevitz, B.A., 1991. Kinetochore fiber formation in dividing generative cells of *Tradescantia*. *J. Cell Sci.* 98, 475–482.
- Liu, L., White, M.J., MacRae, T.H., 1999. Transcription factors and their genes in higher plants. *Eur. J. Biochem.* 262, 247–257.
- Liu, X., Yen, L.F., 1992. Purification and characterization of actin from maize pollen. *Plant Physiol.* 99, 1151–1155.
- Liu, X., Yue, Y., Li, B., Nie, Y., Li, W., Wu, W.-H., Ma, L., 2007a. A G protein-coupled receptor is a plasma membrane receptor for the plant hormone abscisic acid. *Science* 315, 1712–1716.
- Liu, X., Yue, Y., Li, W., Ma, L., 2007b. Response to comment on "A G protein-coupled receptor is a plasma membrane receptor for the plant hormone abscisic acid." *Science* 318, 914d.
- Lloyd, C.W., 1987. The plant cytoskeleton: The impact of fluorescence microscopy. *Ann. Rev. Plant Physiol.* 38, 119–139.
- Lloyd, C.W., 1988. Actin in Plants. *J. Cell Sci.* 90, 185–188.
- Lloyd, C.W., 1989. The Plant Cytoskeleton. *Curr. Opin. Cell Biol.* 1, 30–35.
- Lloyd, C.W., 1991. Cytoskeletal elements of the phragmosome establish the division plane in vacuolated higher plant cells. In: Lloyd, C.W. (Ed.), *The Cytoskeletal Basis of Plant Growth and Form*. Academic Press, London, pp. 245–257.
- Lloyd, C.W., 1991b. How does the cytoskeleton read the laws of geometry in aligning the division plane of plant cells? *Development (Suppl. 1)*, 55–66.
- Lloyd, C., 2006. Microtubules make tracks for cellulose. *Science* 312, 1482–1483.
- Lloyd, C.W., Traas, J.A., 1988. The role of F-actin in determining the division plane of carrot suspension cells: Drug studies. *Development* 102, 211–222.

- Lloyd, F.E., 1942. The Carnivorous Plants. Chronica Botanica, Waltham, MA.
- Lo, Y.-S., Wang, W.-N., Jane, Y.-T., Hsiao, L.-J., Chen, L.F., Dai, H., 2003. The presence of actin-like protein filaments in higher plant mitochondria. Bot. Bull. Acad. Sci. 44, 19–24.
- Locke, J. 1690. The Second Treatise of Civil Government. <http://www.constitution.org/jl/2ndtreat.htm>.
- Locke, J., 1824. An Essay Concerning Human Understanding, twentyfourth ed. C. and J. Rivington, London.
- Lockhart, J.A., 1965. An analysis of irreversible plant cell elongation. J. Theor. Biol. 8, 264–275.
- Lockhart, J.A., 1971. An interpretation of cell growth curves. Plant Physiol. 48, 245–248.
- Lockhart, J.A., Bretz, C., Kenner, R., 1967. An analysis of cell-wall extension. Ann. NY Acad. Sci. 144, 19–33.
- Loeb, J., 1906. The Dynamics of Living Matter. Columbia University Press, New York.
- Loeb, J., 1912. The Mechanistic Conception of Life; Biological Essays. University of Chicago Press, Chicago.
- Loeb, J., 1916. The Organism as a Whole. G. P. Putnam's Sons, New York.
- Loeb, J., 1924. Regeneration. McGraw-Hill, New York.
- Loeb, L.B., 1961. The Kinetic Theory of Gases. Dover Publications, New York.
- Loening, U.E., 1962. Messenger ribonucleic acid in pea seedlings. Nature 195, 467–469.
- Loew, O., 1896. The Energy of Living Protoplasm. K. Paul, Trench, Trübner & Co., London.
- Loewi, O., 1936. The chemical transmission of nerve action. Nobel Lect. December 12, 1936.
- Loewy, A.G., 1954. An actomyosin-like substance from the plasmodium of a myxomycete. J. Cell. Comp. Physiol. 40, 127–156.
- Löffelhardt, W., Bohnert, H.J., Bryant, D.A., 1997. The cyanelles of *Cyanophora paradoxa*. Crit. Rev. Plant Sci. 16, 393–413.
- Lohmann, K., 1929. Über die pyrophosphatfraktion im Muskel. Naturwissenschaften 17, 624–625.
- Lohrmann, R., 1972. Formation of urea and guanidine by irradiation of ammonium cyanide. J. Mol. Evol. 1, 263–269.
- Lohrmann, R., Orgel, L.E., 1971. Urea-inorganic phosphate mixtures as prebiotic phosphorylating agents. Science 171, 490–494.
- Lombillo, V.A., Nislow, C., Yen, T.J., Gelfand, V.I., McIntosh, J.R., 1995a. Antibodies to the kinesin motor domain and CENP-E inhibit depolymerization-dependent motion of chromosomes *in vitro*. J. Cell Biol. 128, 107–115.
- Lombillo, V.A., Stewart, R.J., McIntosh, J.R., 1995b. Minus-end-directed motion of kinesin-coated microspheres driven by microtubule depolymerization. Nature 373, 161–164.
- Long, S.P., Humphries, S., Falkowski, P.G., 1994. Photoinhibition of photosynthesis in nature. Ann. Rev. Plant Physiol. Plant Mol. Biol. 45, 633–662.
- Loomis, W.F., Lipmann, F., 1948. Reversible inhibition of the coupling between phosphorylation and oxidation. J. Biol. Chem. 173, 807–808.
- López-García, P., Moreira, D., 2006. Selective forces for the origin of the eukaryotic nucleus. BioEssays 28, 525–533.
- Lopez-Huertas, E., Oh, J., Baker, A., 1999. Antibodies against Pex14p block ATP-independent binding of matrix proteins to peroxisomes *in vitro*. FEBS Lett. 459, 227–229.
- Lopez-Juez, E., Pyke, K.A., 2005. Plastids unleashed: Their development and their integration in plant development. Int. J. Dev. Biol. 49, 557–577.
- López-Sáez, J.F., Giménez-Martin, G., Risueno, M.C., 1966a. Fine structure of plasmodesma. Protoplasma 61, 81–84.
- López-Sáez, J.F., Risueno, M.C., Gimenez-Martin, G., 1966b. Inhibition of cytokinesis in plant cells. J. Ultrastruct. Res. 14, 85–94.
- Lord, E.M., Sanders, L.C., 1992. Roles for the extracellular matrix in plant development and pollination: A special case for cell movements in plants. Develop. Biol. 153, 16–28.
- Lord, J.M., 1983. Endoplasmic reticulum and ribosomes. In: Hall, J.L., Moore, A.L. (Eds.), Isolation of Membranes and Organelles from Plant Cells. Academic Press, London, pp. 119–134.
- Lord, J.M., 1985. Precursors of ricin and *Ricinus communis* agglutinin. Glycosylation and processing during synthesis and intracellular transport. Eur. J. Biochem. 146, 411–416.
- Lord, J.M., Roberts, L.M., 1982. Glyoxysome biogenesis via the endoplasmic reticulum in castor bean endosperm? Ann. NY Acad. Sci. 386, 362–376.
- Lord, J.M., Roberts, L.M., 1998. Toxin entry: Retrograde transport through the secretory pathway. J. Cell Biol. 140, 733–736.
- Lorentz, H.A., 1924. The radiation of light. Nature 113, 608–611.
- Lorimer, G.H., 1981. The carboxylation and oxygenation of ribulose 1,5-bisphosphate: The primary events in photosynthesis and photorespiration. Ann. Rev. Plant Physiol. 32, 349–383.
- Loros, J., Taiz, L., 1982. Auxin increases the water permeability of *Rhoeo* and *Allium* epidermal cells. Plant Sci. Lett. 26, 93–102.
- Lörz, H., Pazkowski, J., Dierks-Ventling, C., Potrykus, I., 1981. Isolation and characterization of cytoplasts and miniprotoplasts derived from protoplasts of cultured cells. Physiol. Plant. 53, 385–391.
- Loschmidt, J., 1865. On the size of the air molecules. Proc. Acad. of Sci. Vienna 52, 395–413. Translated in J. Chem. Educ. 72, 870–875.
- Lough, T.J., Lucas, W.J., 2006. Integrative plant biology: Role of phloem long-distance macromolecular trafficking. Annu. Rev. Plant Biol. 57, 203–232.
- Lovejoy, A.O., 1911. The meaning of vitalism. Science 33, 610–614.
- Low, P.S., Chandra, S., 1994. Endocytosis in plants. Ann. Rev. Plant Physiol. Plant Mol. Biol. 45, 609–631.
- Low, P.S., Heinsteins, P.F., 1986. Elicitor stimulation of the defense response in cultured plant cells monitored by fluorescent dyes. Arch. Biochem. Biophys. 249, 472–479.
- Lowey, A.G., 1952. An actomyosin-like substance from the plasmodium of a myxomycete. J. Cell Comp. Physiol. 40, 127–156.
- Lu, C., Reedy, M., Erickson, H.P., 2000. Straight and curved conformations of FtsZ are regulated by GTP hydrolysis. J. Bacteriol. 182, 164–170.
- Lu, S., Li, L., Yi, X., Joshi, C.P., Chiang, V., 2008. Differential expression of three eucalyptus secondary cell wall-related cellulose synthase genes in response to tension stress. J. Exp. Bot. 59, 681–695.
- Luan, S., 2002. Tyrosine phosphorylation in plant cell signaling. Proc. Natl. Acad. Sci. USA 99, 11567–11569.
- Lubben, T.H., Theg, S.M., Keegstra, K., 1988. Transport of proteins into chloroplasts. Photosyn. Res. 17, 173–194.

- Luby-Phelps, K., 1994. Physical properties of the cytoplasm. *Curr. Opin. Cell Biol.* 6, 3–9.
- Luby-Phelps, K., 2000. Cytoarchitecture and physical properties of cytoplasm: Volume, viscosity, diffusion, intracellular surface area. *Int. Rev. Cytol.* 192, 189–221.
- Luby-Phelps, K., Lanni, F., Taylor, D.L., 1985. Behavior of a fluorescent analogue of calmodulin in living 3T3 cells. *J. Cell Biol.* 101, 1245–1256.
- Luby-Phelps, K., Lanni, F., Taylor, D.L., 1988. The submicroscopic properties of cytoplasm as a determinant of cellular function. *Ann. Rev. Biophys. Biophys. Chem.* 17, 369–396.
- Luby-Phelps, K., Mujumdar, S., Mujumdar, R., Ernst, L., Galbraith, W., Waggoner, A., 1993. A novel fluorescence ratiometric method confirms the low solvent viscosity of the cytoplasm. *J. Biophysical.* 65, 236–242.
- Luby-Phelps, K., Ning, G., Fogerty, J., Besharse, J.C., 2003. Visualization of identified GFP-expressing cells by light and electron microscopy. *J. Histochem. Cytochem.* 51, 271–274.
- Luby-Phelps, K., Taylor, D.L., Lanni, F., 1986. Probing the structure of cytoplasm. *J. Cell Biol.* 102, 2015–2022.
- Luby-Phelps, K., Weisiger, R.A., 1996. Role of cytoarchitecture in cytoplasmic transport. *Comp. Biochem. Physiol. B.* 115, 295–306.
- Lucas, K., 1917. *The Conduction of the Nervous Impulse*. Longmans, Green and Co., London.
- Lucas, J.R., Nadeau, J.A., Sack, F.D., 2006. Microtubule arrays and *Arabidopsis* stomatal development. *J. Exp. Bot.* 57, 71–79.
- Lucas, W.J., 1999. Plasmodesmata and the cell-to-cell transport of proteins and nucleoprotein complexes. *J. Exp. Bot.* 50, 979–987.
- Lucas, W.J., Olesinski, A., Hull, R.J., Haudenschild, J.S., Deom, C.M., Beachy, R.N., Wolf, S., 1993. Influence of the tobacco mosaic virus 30-kDa movement protein on carbon metabolism and photosynthate partitioning in transgenic tobacco plants. *Planta* 190, 88–96.
- Lucas, W.J., Bouché-Pillon, S., Jackson, D.P., Nguyen, L., Baker, L., Ding, B., Hake, S., 1995. Selective trafficking of KNOTTED1 homeodomain protein and its mRNA through plasmodesmata. *Science* 270, 1980–1983.
- Ludueña, R.F., Banerjee, A., Khan, I.A., 1992. Tubulin structure and biochemistry. *Curr. Topics in Cell Biol.* 4, 53–57.
- Ludwig, J., Canvin, D.T., 1971. The rate of photorespiration during photosynthesis and the relationship of the substrate of light respiration to the products of photosynthesis in sunflower leaves. *Plant Physiol.* 48, 712–719.
- Ludwig, M., Gibbs, S., 1987. Are the nucleomorphs of cryptomonads and *Chlorachnion* vestigial nuclei of eukaryotic endosymbionts? *Ann. NY Acad. Sci.* 503, 198–211.
- Luger, K., Mäder, A.W., Richmond, R.K., Sargent, D.F., Richmond, T.J., 1997. Crystal structure of the nucleosome core particle at 2.8 Å resolution. *Nature* 389, 251–260.
- Lumière, A., 1919. *Le Myth des Symbiotes*. Mason et Cie, Paris.
- Luna, E.J., 1991. Molecular links between the cytoskeleton and membranes. *Curr. Opin. Cell Biol.* 3, 120–126.
- Luna, E.J., Hitt, A.L., 1992. Cytoskeleton-plasma membrane interactions. *Science* 258, 955–964.
- Lund, E.J., 1947. *Bioelectric Fields and Growth*. University of Texas Press, Austin.
- Lundegardh, H., 1955. Mechanisms of absorption, transport, accumulation and secretion of ions. *Ann. Rev. Plant Physiol.* 6, 1–24.
- Lundgren, K., Walworth, N., Booher, R., Dembski, N., Kirschner, M., Beach, D., 1991. Mik1 and wee1 cooperate in the inhibitory tyrosine phosphorylation of cdc2. *Cell* 64, 1111–1122.
- Lundsgaard, E., 1938. The Pasteur-Myerhof reaction in muscle metabolism. *Harvey Lect.* 33, 65–88.
- Lundgren, H.P., Ward, W.H., 1949. Chemistry of amino acids and proteins. *Ann. Rev. Biochem.* 18, 115–154.
- Lunn, J.E., 2006. Compartmentation in plant metabolism. *J. Exp. Bot.* 58, 35–47.
- Luria, S.E., 1969. Phage, colicins and macroregulatory phenomena. *Nobel Lect.* December 10, 1969.
- Luria, S.E., 1970. Molecular biology: Past, present, future. *BioScience* 20, 1289–1296.
- Luria, S.E., 1973. *Life...The Unfinished Experiment*. Charles Scribner's Sons, New York.
- Lutkenhaus, J.F., Wolf-Watz, H., Donachie, W.D., 1980. Organization of genes in the *ftsA-envA* region of the *Escherichia coli* genetic map and identification of a new *fts* locus (*ftsZ*). *J. Bacteriol.* 142, 615–620.
- Luu, D.-T., Qin, X.K., Morse, D., Cappadocia, M., 2000. S-RNase uptake by compatible pollen tubes in gametophytic self-incompatibility. *Nature* 407, 649–651.
- Lv, S., Zhang, K., Gao, Q., Lian, L., Song, Y., Zhang, J., 2008. Overexpression of an H^+ -PPase gene from *Thellungiella halophila* in cotton enhances salt tolerance and improves growth and photosynthetic performance. *Plant Cell Physiol.* 49, 1150–1164.
- Lwoff, A., 1965. Interaction among virus, cell, and organism. *Nobel Lect* December 11, 1965.
- Lye, R.J., Pfarr, C.M., Porter, M.E., 1989. Cytoplasmic dynein and microtubule translocators. In: Warner, F.D., McIntosh, J.R. (Eds.), *Cell Movement. Volume 2, Kinesin, Dynein and Microtubule Dynamics*. Alan R. Liss, Inc., New York, pp. 141–154.
- Lyell, C., 1872. *Principles of Geology*. D. Appleton & Co., New York.
- Lymm, R.W., Taylor, E.W., 1971. Mechanism of adenosine triphosphate hydrolysis by actomyosin. *Biochemistry* 10, 4617–4624.
- Lynch, D.V., Steponkis, P.L., 1987. Plasma membrane lipid alterations associated with cold acclimation of winter rye seedlings (*Secale cereale* L. cv Puma). *Plant Physiol.* 83, 761–767.
- Lynch, M.A., Staehelin, L.A., 1992. Domain-specific and cell type-specific localization of two types of cell wall matrix polysaccharides in the clover root tip. *J. Cell Biol.* 118, 467–479.
- Lynch, T.M., Lintilhac, P.M., 1997. Mechanical signals in plant development: A new method for single cell studies. *Dev. Biol.* 181, 246–256.
- Lysenko, T.D., 1946. *Heredity and its Variability*. Translated by T. Dobzhansky. King's Crown Press, Morningside Heights, New York.
- Lysenko, T., 1948. *The Science of Biology Today*. International Publishers, New York.
- Lysenko, T.D., 1954. *Agrobiology*. Foreign Languages Publishing House, Moscow.

-M-

- Ma, H., 1994. GTP-binding proteins in plants: New members of an old family. *Plant Mol. Biol.* 26, 1611–1636.

- Ma, H., 2001. Plant G proteins: The different faces of GPA1. *Curr. Biol.* 11, R869–R871.
- Ma, H., Yanofsky, M.F., Huang, H., 1991. Isolation and sequence analysis of TGA1 cDNAs encoding tomato G protein α subunit. *Gene* 107, 189–195.
- Ma, H., Yanofsky, M.F., Meyerowitz, E.M., 1990. Molecular cloning and characterization of GPA1, a G protein α subunit gene from *Arabidopsis thaliana*. *Proc. Natl. Acad. Sci. USA* 87, 3821–3825.
- Ma, J.K.-C., Drake, P.M., Christou, P., 2003. The production of recombinant pharmaceutical proteins in plants. *Nat. Rev. Genet.* 4, 794–805.
- Ma, Y.Z., Yen, L.F., 1989. Actin and myosin in pea tendril. *Plant Physiol.* 89, 586–589.
- Maathuis, F.J.M., Sanders, D., 1992. Plant membrane transport. *Curr. Opin. Cell Biol.* 4, 661–669.
- Macer, D.R.J., Koch, G.L.E., 1988. Identification of a set of calcium-binding proteins in reticuloplasm, the luminal content of the endoplasmic reticulum. *J. Cell Sci.* 91, 61–70.
- Mach, E. [1900]. 1986. Principles of the Theory of Heat. D. Reidel Publishing Co., Dordrecht.
- Machamer, C.E., 1993. Targeting and retention of Golgi membrane proteins. *Curr. Opin. Cell Biol.* 5, 606–612.
- MacKinnon, R., 2003. Potassium channels and the atomic basis of selective ion conduction. Nobel Lect. December 8.
- MacRobbie, E., 1997. Signalling in guard cells and regulation of ion channel activity. *J. Exp. Bot.* 48, 515–528.
- MacRobbie, E.A.C., 2000. ABA activates multiple Ca^{2+} fluxes in stomatal guard cells, triggering vacuolar K^+ (Rb^+) release. *Proc. Natl. Acad. Sci. USA* 97, 12361–12368.
- MacRobbie, E.A.C., 2002. Evidence for a role for protein tyrosine phosphatase in the control of ion release from the guard cell vacuole in stomatal closure. *Proc. Natl. Acad. Sci. USA* 99, 11963–11968.
- Maddox, P., Desai, A., Oegema, K., Micheson, T.J., Salmon, E.D., 2002. Poleward microtubule flux is a major component of spindle dynamics and anaphase a in mitotic *Drosophila* embryos. *Curr. Biol.* 12, 1670–1674.
- Maddox, P., Straight, A., Coughlin, P., Mitchison, T.J., Salmon, E.D., 2003. Direct observation of microtubule dynamics at kinetochores in enopus extract spindles. Implications for spindle mechanics. *J. Cell Biol.* 162, 377–382.
- Madson, M., Dunand, C., Verma, R., Vanzin, G.F., Caplan, J., Li, X., Shoue, D.A., Carpita, N.C., Reiter, W.D., 2003. Xyloglucan galactosyltransferase, a plant enzyme in cell wall biogenesis homologous to animal exostosins. *Plant Cell* 15, 1662–1670.
- Maeshima, M., Nakanishi, Y., 2002. H^+ -ATPase and H^+ -PPase in the vacuolar membrane: Physiology and molecular biology. In: Rengel, Z. (Ed.), *Handbook of Plant Growth. pH as the Master Variable*. Marcel Dekker, New York, pp. 23–47.
- Maeshima, M., Nakanishi, Y., Matsuura-Endo, C., Tanaka, Y., 1996. Proton pumps of the vacuolar membrane in growing plant cells. *J. Plant Res.* 109, 119–125.
- Magee, A.L., Buxton, R.S., 1991. Transmembrane molecular assemblies regulated by the greater cadherin family. *Curr. Opin. Cell Biol.* 3, 861–864.
- Magie, W.F., 1899. *The Second Law of Thermodynamics*. Harper & Bros, New York.
- Mahon, N., 2003. *The Man Who Changed Everything. The Life of James Clerk Maxwell*. Wiley & Sons, Chichester, West Sussex, England.
- Majeran, W., Zybaïlov, B., Ytterberg, A.J., Dunsmore, J., Sun, Q., van Wijk, K.J., 2008. Consequence of C_4 differentiation for chloroplast membrane proteomes in maize mesophyll and bundle sheath cells. *Mol. Cell. Proteomics* 7, 1609–1638.
- Malhó, R., Read, N.D., Pais, M.S., Trewavas, T.J., 1994. Role of cytosolic free calcium in the reorientation of pollen tube growth. *Plant J.* 5, 331–341.
- Malhó, R., Trewavas, A.J., 1996. Localized apical increases of cytosolic free calcium control pollen tube orientation. *Plant Cell* 8, 1935–1949.
- Malec, P., 1994. Kinetic modelling of chloroplast phototranslocations in *Lemna trisulca* L: Two rate limiting components? *J. Theor. Biol.* 169, 189–195.
- Manabe, E., Kuroda, K., 1984. Ultrastructural basis of the microtubule-associated cytoplasmic streaming in *Caulerpa*. *Proc. Jpn. Acad.* 60, 118–121.
- Mandels, M., Reese, E.T., 1965. Inhibition of cellulases. *Annu. Rev. Phytopathol.* 3, 85–102.
- Mandon, E.C., Jiang, Y., Gilmore, R., 2003. Dual recognition of the ribosome and the signal recognition particle by the SRP receptor during protein targeting to the endoplasmic reticulum. *J. Cell Biol.* 162, 575–585.
- Maniloff, J., Morowitz, H.J., 1972. Cell biology of the mycoplasmas. *Bacteriol. Rev.* 36, 263–290.
- Mano, S., Nakamori, C., Hayashi, M., Kato, A., Kondo, M., Nishimura, M., 2002. Distribution and characterization of peroxisomes in *Arabidopsis* by visualization with GFP: Dynamic morphology and actin-dependent movement. *Plant Cell Physiol.* 43, 331–334.
- Mano, E., Horiguchi, G., Tsukaya, H., 2006. Gravitropism in leaves of *Arabidopsis thaliana* (L.) Heynh. *Plant Cell Physiol.* 47, 217–223.
- Mano, S., Nakamori, C., Kondo, M., Hayashi, M., Nishimura, M., 2004. An *Arabidopsis* dynamin-related protein, DRP3A, controls both peroxisomal and mitochondrial division. *Plant J.* 38, 487–498.
- Mansfield, T.A., Hetherington, A.M., Atkinson, C.J., 1990. Some current aspects of stomatal physiology. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 41, 55–75.
- Mansour, M.M.F., Lee-Stadelmann, O.Y., Stadelmann, E.J., 1993. Solute potential and cytoplasmic viscosity in *Triticum aestivum* and *Hordeum vulgare* under salt stress. A comparison of salt resistant and salt sensitive lines and cultivars. *J. Plant Physiol.* 142, 623–628.
- Manton, I., 1950. *Problems of Cytology and Evolution in the Pteridophyta*. Cambridge University Press, Cambridge.
- Manton, I., 1957. Observations with the electron microscope on the cell structure of the antheridium and spermatozoid of *Sphagnum*. *J. Exp. Bot.* 8, 382–400.
- Manton, I., 1959. Observations on the microanatomy of the spermatozoid of the bracken fern (*Pteridium aquilinum*). *J. Biophys. and Biochem. Cytol.* 6, 413–417.
- Manton, I., 1960. On a reticular derivative from Golgi bodies in the meristem of *Anthoceros*. *J. Biophys. Biochem. Cytol.* 8, 221–231.
- Manton, I., 1962. Observations on stellate vacuoles in the meristem of *Anthoceros*. *J. Exp. Bot.* 13, 161–167.

- Many authors. 1747. An Universal History, from the Earliest Account of Time to the Present. Vol 1. T. Osborne, London.
- Maple, J., Chua, N.H., Moller, S.G., 2002. The topological specificity factor AtMinE1 is essential for correct plastid division site placement in *Arabidopsis*. *Plant J.* 31, 269–277.
- Maple, J., Fujiwara, M.T., Kitahata, N., Lawson, T., Baker, N.R., Yoshida, S., Moller, S.G., 2004. GIANT CHLOROPLAST 1 is essential for correct plastid division in *Arabidopsis*. *Curr. Biol.* 14, 776–781.
- Marateck, S.L., 2008. Alpher, Bethe, Gamow. *Physics Today*. 61(9), 11–12.
- Marc, J., Granger, C.L., Brincat, J., Fisher, D.D., Kao, T.-H., McCubbin, A.G., Cyr, R.J., 1998. Use of a GFP-MAP4 reporter gene for visualizing cortical microtubule rearrangements in living epidermal cells. *Plant Cell* 11, 1927–1939.
- Maréchal, E., Cesbron-Delauw, M.-F., 2001. The apicoplast: A new member of the plastid family. *Trends in Plant Sci.* 6, 200–205.
- Margulis, L., 1970. *Origin of Eukaryotic Cells*. Yale University Press, New Haven, CT.
- Margulis, L., 1980. Undulipodia, flagella and cilia. *Biosystems* 12, 105–108.
- Margulis, L., 1981. *Symbiosis in Cell Evolution*. W. H. Freeman and Co., San Francisco.
- Margulis, L., 2001. The conscious cell. *Ann. NY Acad. Sci.* 929, 55–70.
- Margulis, L., Ober, R., 1985. *Heliobacterium* and the origin of chloroplasts. *BioSystems* 17, 317–325.
- Margulis, L., To, L., Chase, D., 1978. Microtubules in prokaryotes. *Science* 200, 1118–1124.
- Marinos, N.G., 1963. Vacuolation in plant cells. *J. Ultrastruc. Res.* 9, 177–185.
- Marinova, K., Pourcel, L., Weder, B., Schwarz, M., Barron, D., Routaboul, J.-M., Debeaujon, I., Klein, M., 2007. The *Arabidopsis* MATE transporter TT12 acts as a vacuolar flavonoid/H⁺-antiporter active in proanthocyanidin-accumulating cells of the seed coat. *Plant Cell* 19, 2023–2038.
- Mark, R.E., 1967. *Cell Wall Mechanics of Tracheids*. Yale University Press, New Haven, CT.
- Marmagne, A., ROuet, M.-A., Ferro, M., Rolland, N., Alcon, C., Joyard, J., Garin, J., Barbier-Brygoo, H., Ephritikhine, G., 2004. Identification of new intrinsic proteins in *Arabidopsis* plasma membrane proteome. *Mol. Cell. Proteomics* 3, 675–691.
- Marmagne, A., Ferro, M., Meinel, T., Bruley, C., Kuhn, L., Garin, J., Barbier-Brygoo, H., Ephritikhine, G., 2007. A high content in lipid-modified peripheral proteins and integral receptor kinases features in the *Arabidopsis* plasma membrane proteome. *Mol. Cell. Proteomics* 6, 1980–1996.
- Marsh, B.J., Howell, K.E., 2002. The mammalian Golgi-complex debates. *Nat. Rev. Mol. Cell Biol.* 3, 789–795.
- Marsh, J., Goode, J. (Eds.), 1993. *The GTPase Superfamily*. John Wiley & Sons, Chichester.
- Marshall, E., 1982a. Security checks on USDA reviewers. *Science* 216, 600.
- Marshall, E., 1982b. USDA official defends loyalty checks. *Science* 216, 1391.
- Marston, A.L., Tham, W.H., Shah, H., Amon, A., 2004. A genome-wide screen identifies genes required for centromeric cohesion. *Science* 303, 1367–1370.
- Martell, A.E., Calvin, M., 1952. *Chemistry of the Metal Chelate Compounds*. Prentice-Hall, New York.
- Marten, H., Hedrich, R., Roelfsema, M.R.G., 2007. Blue light inhibits guard cell plasma membrane anion channels in a phototropin-dependent manner. *Plant J.* 50, 29–39.
- Marten, I., Hoshi, T., 1998. The N-terminus of the K⁺ channel KAT1 controls its voltage-dependent gating by altering the membrane electric field. *Biophys. J.* 74, 2953–2962.
- Marten, I., Lohse, G., Henrich, R., 1991. Plant growth hormones control voltage-dependent activity of anion channels in plasma membrane of guard cells. *Nature* 353, 758–762.
- Martin, A.J.P., 1952. The development of partition chromatography. Nobel Lect. December 12.
- Martin, E.M., Morton, R.K., 1956. Enzymic properties of microsomes and mitochondria from silver beet. *Biochem. J.* 62, 696–704.
- Martin, J., 1988. *To Rise Above Principle: The Memoirs of an Unreconstructed Dean*. University of Illinois Press, Champaign, IL.
- Martin, S.W., Glover, B.J., Davies, J.M., 2005. Lipid microdomains—plant membrane get organized. *Trends Plant Sci.* 10, 263–265.
- Martin, W., 2000. Primitive anaerobic protozoa: The wrong host for mitochondria and hydrogenosomes? *Microbiology* 146, 1021–1022.
- Martin, W., Müller, M., 1998. The hydrogen hypothesis for the first eukaryote. *Nature* 392, 37–41.
- Martin, W.F., Müller, M. (Eds.), 2007. *Origin of Mitochondria and Hydrogenosomes*. Springer, Berlin.
- Martinac, B., Saimi, Y., Kung, C., 2008. Ion channels in microbes. *Physiol. Rev.* 88, 1449–1490.
- Martinac, B., Zhu, H., Kubalski, A., Zhou, X., Culbertson, M., Bussey, H., Kung, C., 1990. Yeast K1 killer toxin forms ion channels insensitive yeast spheroplasts and in artificial liposomes. *Proc. Natl. Acad. Sci. USA* 87, 6228–6232.
- Martinoia, E., Grill, E., Tommasini, R., Kreuz, K., Amrhein, N., 1993. ATP-dependent glutathione S-conjugate “export” pumps in the vacuolar membrane of plants. *Nature* 364, 247–249.
- Martinoia, E., Klein, M., Geisler, M., Bovet, L., Forestier, C., et al., 2002. Multifunctionality of plant ABC transporters: More than just detoxifiers. *Planta* 214, 345–355.
- Martinoia, E., Klein, M., Geisler, M., Sánchez-Fernández, R., Rea, P.A., 2000. Vacuolar transport of secondary metabolites and xenobiotics. *ANnu. Rev. Plant Rev.* 5, 221–253.
- Martinoia, E., Maeshima, M., Neuhaus, H.E., 2007. Vacuolar transporters and their essential role in plant metabolism. *J. Exp. Bot.* 58, 83–102.
- Martinoia, E., Ratajczak, R., 1999. Transport of organic molecules across the tonoplast. *Adv. Bot. Res.* 25, 365–400.
- Martius, C., 1982. How I became a biochemist. In: Semenza, G. (Ed.), *Of Oxygen, Fuels, and Living Matter*, Part 2. John Wiley & Sons, Chichester, pp. 1–57.
- Martius, C., Knoop, F., 1937. Der physiologische Abbau der Citronensäure. *Z. Physiol. Chem.* 246, I–II.
- Martoglio, B., Hofmann, M.W., Brunner, J., Dobberstein, B., 1995. The protein-conducting channel in the membrane of the endoplasmic reticulum is open laterally toward the lipid bilayer. *Cell* 81, 207–214.
- Marty, F., 1978. Cytochemical studies on GERL, provacuoles and vacuoles in root meristematic cells of *Euphorbia*. *Proc. Natl. Acad. Sci. USA* 75, 852–856.

- Marty, F., 1997. The biogenesis of vacuoles: Insights from microscopy. *Adv. Bot. Res.* 25, 1–42.
- Marty, F., 1999. Plant vacuoles. *Plant Cell* 11, 587–599.
- Mäser, P., Thomine, S., Schroeder, J.I., Ward, J.M., Hirschi, K., Sze, H., Talke, I.N., Amtmann, A., Maathuis, F.J.M., Sanders, D., Harper, J.F., Tchieu, J., Gribskov, M., Persans, M.W., Salt, D.E., Kim, S.A., Gueriot, M.L., 2001. Phylogenetic relationships within cation transporter families of *Arabidopsis*. *Plant Physiol.* 126, 1646–1667.
- Mäser, P., Hosoo, Y., Goshima, S., Horie, T., Eckelman, B., Yamada, K., Yoshida, K., Bakker, E.P., Shinmyo, A., Oiki, S., Schroeder, J.I., Uozumi, N., 2002. Glycine residues in potassium channel-like selectivity filters determine potassium selectivity in four-loop-per-subunit HKT transporters from plants. *Proc. Natl. Acad. Sci. USA* 99, 6428–6433.
- Mason, H.S., Lam, D.M., Arntzen, C.J., 1992. Expression of hepatitis B surface antigen in transgenic plants. *Proc. Natl. Acad. Sci. USA* 89, 11745–11749.
- Mason, H.S., Warzecha, H., Mor, T., Arntzen, C.J., 2002. Edible plant vaccines: Applications for prophylactic and therapeutic molecular medicine. *Trends Mol. Med.* 8, 324–329.
- Mason, S.F., 1992. Chemical Evolution. Origin of the Elements, Molecules, and Living Systems. Clarendon Press, Oxford.
- Massalski, A., Leedale, G.F., 1969. Cytology and ultrastructure of the Xanthophyceae. *Br. Phycol. J.* 4, 159–180.
- Masson, C., Andre, C., Arnoult, J., Gerand, C., Hernandez-Verdun, D., 1990. A 116000 M_r nucleolar antigen specific for the dense fibrillar component for the nucleoli. *J. Cell Sci.* 95, 371–381.
- Mast, S.O., 1924. Structure and locomotion of *Amoeba proteus*. *Anat. Rec.* 29, 88.
- Masters, S.C., Crane, D., 1995. The Peroxisome: A Vital Organelle. Cambridge University Press, Cambridge.
- Masuda, H., Cande, W.Z., 1987. The role of tubulin polymerization during spindle elongation in vitro. *Cell* 49, 193–202.
- Masuda, Y., 1978a. Auxin-induced cell wall loosening. *Bot. Mag. (Tokyo)* 1 (Special Issue), 103–123.
- Masuda, Y., 1978b. Hormone interactions in regulation of cell wall loosening. In: Schütte, H.R., Gross, D. (Eds.) *Regulation of Developmental Processes in Plants*. Gustav Fischer Verlag, Jena, pp. 319–330.
- Masuda, Y., 1990. Auxin-induced cell elongation and cell wall changes. *Bot. Mag. Tokyo* 103, 345–370.
- Masuda, Y., Takagi, S., Nagai, R., 1991. Protease-sensitive anchoring of microfilament bundles provides tracks for cytoplasmic streaming in *Vallisneria*. *Protoplasma* 162, 151–159.
- Masumura, T., Hibino, T., Kidzu, K., Mitsukawa, N., Tanaka, K., Fujii, S., 1990. Cloning and characterization of a complementary DNA encoding a rice 13-kDa prolamin. *Mol. Gen. Genet.* 221, 1–7.
- Mather, J.C., Boslough, J., 1996. *The Very First Light*. Basic Books, New York.
- Matheson, L.A., Hanton, S.L., Rossi, M., Latijnhouwers, M., Stefano, G., Renna, L., Brandizzi, F., 2007. Multiple roles of ADP-ribosylation factor 1 in plant cells include spatially regulated recruitment of coatomer and elements of the Golgi matrix. *Plant Physiol.* 143, 1615–1627.
- Mathews, A., 1899. The changes in structure of the pancreas cell. *J. Morphol.* 15, 171–216.
- Mathews, A.P., 1916. *Physiological Chemistry*, second ed. William Wood and Co., New York.
- Mathews, C.K., 1993. The cell-Bag of enzymes or network of channels? *J. Bacteriol.* 175, 6377–6381.
- Mathur, J., Mathur, N., Hulskamp, M., 2002. Simultaneous visualization of peroxisomes and cytoskeletal elements reveals actin and not microtubule-based peroxisome motility in plants. *Plant Physiol.* 128, 1031–1045.
- Matile, P., 1975. *The Lytic Compartment of Plant Cells*. Springer-Verlag, Wein.
- Matile, P., 1987. The sap of plant cells. *New Phytol.* 105, 1–26.
- Matile, P., Moor, H., 1968. Vacuolation: Origin and development of the lysosomal apparatus in root-tip cells. *Planta* 80, 159–175.
- Matsushima, R., Hayashi, Y., Yamada, K., Shimada, T., Nishimura, M., Hara-Nishimura, I. The ER body, a novel endoplasmic reticulum-derived structure in *Arabidopsis*. *Plant Cell Physiol.* 44, 661–666.
- Mattaj, I.W., 1990. Splicing stories and poly(A) tales: An update on RNA processing and transport. *Current Opinion in Cell Biology* 2, 528–538.
- Mattoo, A.K., Marder, J.B., Edelman, M., 1989. Dynamics of the photosystem II reaction center. *Cell* 56, 241–246.
- Mauerpertuis, P.-L. M. de [1753]. 1966. *The Earthly Venus*. Johnson Reprint Corp., New York.
- Maurel, C., 1997. Aquaporins and water permeability of plant membranes. *Ann. Rev. Plant Physiol. Plant Mol. Biol.* 48, 399–429.
- Maurel, C., Reizer, J., Schroeder, J.I., Chrispeels, M.J., 1993. The vacuolar membrane protein γ -TIP creates water specific channels in *Xenopus* oocytes. *EMBO. J.* 12, 2241–2247.
- Maurel, C., Verdoucq, L., Luu, D.-T., Santoni, V., 2008. Plant aquaporins: Membrane channels with multiple integrated functions. *Annu. Rev. Plant Biol.* 59, 595–624.
- Mauseth, J.D., 2009. *Botany. An Introduction to Plant Biology*. Jones and Bartlett, Sudbury, MA.
- Maxwell, J.C., 1860. Illustrations of the dynamical theory of gases. Part I. On the motions and collisions of perfectly elastic spheres. *Phil. Mag. Fourth Ser.* 19, 19–32.
- Maxwell, J.C., 1873. Molecules. *Nature* 8, 437–441.
- Maxwell, J.C., 1875. On the dynamical evidence of the constitution of bodies. *J. Chem Soc. (Lond.)* 28, 493–508.
- Maxwell, J.C. [1877]. 1991. *Matter and Motion*. Dover Publications, New York.
- Maxwell, J.C., 1878. Diffusion. *Encyclopedia Britannica*. Ninth ed. 7, 214–221.
- Maxwell, J.C., 1891. *Theory of Heat Tenth Edition* (with corrections and additions by Lord Rayleigh). Longmans, Green, and Co., London.
- Maxwell, J.C., 1897. *Theory of Heat*, with corrections and additions by Lord Rayleigh. Longmans, Green, and Co., New York.
- May, T., Soll, J., 1999. Chloroplast precursor protein translocon. *FEBS Lett.* 452, 52–56.
- Mayer, R., Ross, P., Weinhouse, H., Amicam, D., Volmna, G., Ohana, P., Calhoon, R.D., Wong, H.C., Emerick, A.W., Benziman, M., 1991. Polypeptide composition of bacterial cyclic diguanic acid dependent cellulose synthase and the occurrence of immunologically cross reacting proteins in higher plants. *Proc. Natl. Acad. Sci. USA* 88, 5472–5476.
- Mayfield, S.P., 1991. Over-expression of the oxygen-evolving enhancer 1 protein and its consequences on photosystem II accumulation. *Planta* 185, 105–110.

- Maynard, J.W., Lucas, W.J., 1982. Sucrose and glucose uptake into *Beta vulgaris* leaf tissues. A case for general (apoplastic) retrieval systems. *Plant Physiol.* 70, 1436–1443.
- Mayow, J. [1674]. 1926. *Tractatus Quinque Medico-Physici*. Translated as *Medico-Physical Works*. Oxford University Press, Oxford.
- Mayumi, K., Shibaoka, H., 1996. The cyclic reorientation of cortical microtubules on walls with a crossed polylamellate structure: Effects of plant hormones and an inhibitor of protein kinases on the progression of the cycle. *Protoplasma* 195, 112–122.
- Mazia, D., 1956. Materials for the biophysical and biochemical study of cell division. *Adv. Biol. Med. Phys.* 4, 69–118.
- Mazia, D., 1961. Mitosis and the physiology of cell division. In: Brachet, J., Mirsky, A. (Eds.), *The Cell: Biochemistry, Physiology, Morphology*. Academic Press, New York, pp. 77–394.
- Mazia, D., 1984. Centrosomes and mitotic poles. *Exp. Cell. Res.* 153, 1–15.
- Mazia, D., 1987. The chromosome cycle and the centrosome cycle in the mitotic cycle. *Int. Rev. Cytol.* 100, 49–92.
- McAinsh, M.R., Brownlee, C., Hetherington, A.M., 1990. Absciscic acid-induced elevation of guard cell cytosolic Ca^{2+} precedes stomatal closure. *Nature* 343, 186–188.
- McAinsh, M.R., Brownlee, C., Hetherington, A.M., 1992. Visualizing changes in cytosol-free Ca^{2+} during the response of stomatal guard cells to absciscic acid. *Plant Cell* 4, 1113–1122.
- McAinsh, M.R., Gray, J.E., Hetherington, A.M., Leckie, C.P., Ng, C., 2000. Ca^{2+} signalling in stomatal guard cells. *Biochem. Soc. Trans.* 28 (4), 476–481.
- McAndrew, R.S., Froehlich, J.E., Vitha, S., Stokes, K.D., Osteryoung, K.W., 2001. Colocalization of plastid division proteins in the chloroplast stromal compartment establishes a new functional relationship between FtsZ1 and FtsZ2 in higher plants. *Plant Physiol.* 127, 1656–1666.
- McCann, M.C., Roberts, K., 1991. Architecture of the primary cell wall. In: Lloyd, C.W. (Ed.), *The Cytoskeletal Basis of Plant Growth and Form*. Academic Press, London, pp. 109–129.
- McCann, M.C., Wells, B., Roberts, K., 1990. Direct visualization of cross-links in the primary plant cell wall. *J. Cell Sci.* 96, 323–334.
- McCann, M.C., Chen, L., Roberts, K., Kemsley, E.K., Séné, C., Carpita, N.C., Stacey, N.J., H. Wilson, R., 1997. Infrared microspectroscopy: Sampling heterogeneity in plant cell wall composition and architecture. *Physiol. Plant.* 100, 729–738.
- McCarty, M., 1985. *The Transforming Principle. Discovering that Genes Are Made of DNA*. W. W. Norton & Co., New York.
- McCarty, M., 1995. A fifty-year perspective of the genetic role of DNA. *Ann. NY Acad. Sci.* 758, 48–54.
- McClendon, J.F., 1927. The permeability and the thickness of the plasma membrane as determined by electric currents of high and low frequency. *Protoplasma* 3, 71–81.
- McClintock, B., 1930. A cytological demonstration of the location of an interchange between two non-homologous chromosomes of *Zea mays*. *Proc. Natl. Acad. Sci. USA* 16, 791–796.
- McClintock, B., 1950. The origin and behavior of mutable loci in maize. *Proc. Natl. Acad. Sci. USA* 36, 344–355.
- McClintock, B., 1983. The significance of responses of the genome to challenge. Nobel Lect. December 8.
- McClintock, M., Higinbotham, N., Uribe, E.G., Cleland, R., 1982. Active, irreversible accumulation of extreme levels of H_2SO_4 in the brown alga, *Desmarestia*. *Plant Physiol.* 70, 771–774.
- McClung, C.E., 1924. The chromosome theory of heredity. In: Cowdry, E.V. (Ed.), *General Cytology*. University of Chicago Press, Chicago, pp. 609–689.
- McConkey, E.H., 1982. Molecular evolution, intracellular organization, and the quinary structure of proteins. *Proc. Natl. Acad. Sci. USA* 79, 3236–3240.
- McCormack, E., Velasquez, L., Delk, N.A., Braam, J., 2006. Touch-responsive behaviors and gene expression in plants. In: Baluska, F., Mancuso, S., Volkmann, D. (Eds.) *Communication in Plants*. Springer, Berlin, pp. 248–260.
- McCormick, A., Campisi, J., 1991. Cellular aging and senescence. *Curr. Opin. Cell Biol.* 3, 230–234.
- McDonald, A.R., Liu, B., Joshi, H.C., Palevitz, B.A., 1993. γ -tubulin is associated with a cortical-microtubule-organizing zone in the developing guard cells of *Allium cepa* L. *Planta* 191, 357–361.
- McDonald, J.A., 1988. Extracellular matrix assembly. *Annu. Rev. Cell Biol.* 4, 183–208.
- McDonald, K., 1989. Mitotic spindle ultrastructure and design. In: Hyams, J.S., Brinkley, B.R. (Eds.), *Mitosis. Molecules and Mechanisms*. Academic Press, London, pp. 1–38.
- McDonald, K.L., O'Toole, E.T., Mastronarde, D.N., McIntosh, J.R., 1992. Kinetochore microtubules in PtK₁ cells. *J. Cell Biol.* 118, 369–383.
- McElheny, V.K., 2003. *Watson and DNA. Making a Scientific Revolution*. Perseus, Cambridge, MA.
- McEwen, B.F., Arena, J.T., Frank, J., Rieder, C.L., 1993. Structure of the colcemid-treated P & K, kinetodure outer plate as determined by high voltage electron microscopic tomography. *J. Cell Biol.* 120, 301–312.
- McEwen, B.F., Heagle, A.B., Cassels, G.O., Buttle, K.F., Rieder, C.L., 1997. Kinetochore fiber maturation in PtK₁ cells and its implications for the mechanisms of chromosome congression and anaphase onset. *J. Cell Biol.* 137, 1567–1580.
- McFadden, G.I., Ralph, S.A., 2003. Dynamin: The endosymbiosis ring of power? *Proc. Natl. Acad. Sci. USA* 100, 3557–3559.
- McFadden, G.I., Roos, D.S., 1999. Apicomplexan plastids as drug targets. *Trends Microbiol.* 7, 328–333.
- McFadden, G.I., Schulze, D., Surek, B., Salisbury, J.L., Melkonian, M., 1987. Basal body reorientation mediated by a Ca^{2+} -modulated contractile protein. *J. Cell Biol.* 105, 903–912.
- McFadden, G.I., Waller, R.F., 1997. Plastids in parasites of humans. *BioEssays* 19, 1033–1040.
- McGhee, J.D., Engel, J.D., 1975. Subunit structure of chromatin is the same in plants and animals. *Nature* 254, 449–450.
- McGill, M., Brinkley, B.R., 1975. Human chromosomes and centrioles as nucleating sites for the in vitro assembly of microtubules from bovine brain tubulin. *J. Cell Biol.* 67, 189–199.
- McGregor, D.I., Beevers, H., 1969. Development of enzymes in watermelon seedlings. *Plant Physiol.* 44 S-33.
- McIntosh, J.R., Euteneuer, U., 1984. Tubulin hooks as probes for microtubule polarity: An analysis of the method and an evaluation of data on microtubule polarity in the mitotic spindle. *J. Cell Biol.* 98, 525–533.

- McIntosh, J.R., Euteneuer, U., Neighbors, B., 1980. Initial characterization of conditions for displaying polarity of microtubules. In: De Brabander, M., De May, J. (Eds.), 2nd International Symposium on Microtubules and Microtubule Inhibitors. Elsevier North-Holland, Amsterdam, pp. 357–371.
- McIntosh, J.R., Hepler, P.K., VanWie, D.G., 1969. Model for mitosis. *Nature* 244, 659–663.
- McIntosh, J.R., Koonce, M.P., 1989. Mitosis. *Science* 246, 622–628.
- McKee, M., 2005. Space radiation may select amino acids for life. *New Sci.* August 24.
- McKeekin, T.L., Warner, R.C., 1946. The chemistry of the proteins and amino acids. *Ann. Rev. Biochem.* 15, 119–154.
- McKusick, V.A., Ruddle, F.H., 1987. A new discipline, a new name, a new journal. *Genomics* 1, 1–2.
- McKusick, V.A., Kucherlapati, R.S., Ruddle, F.H., 1993. Genomics: Stock-taking after 5 years. *Genomics* 15, 1–2.
- McLaren, A.D., Babcock, K.L., 1959. Some characteristics of enzyme reactions at surfaces. In: Hayashi, T. (Ed.), *Subcellular Particles*. Ronald Press Co., New York, pp. 23–36.
- McLean, B., Juniper, B.E., 1986. The plasma membrane of young *Chara* internodal cells revealed by rapid freezing. *Planta* 169, 153–161.
- McLean, B.G., Zupan, J., Zambryski, P.C., 1995. Tobacco mosaic virus movement protein associates with the cytoskeleton in tobacco cells. *Plant Cell* 7, 2101–2114.
- McLeish, J., Snoad, B., 1958. *Looking at Chromosomes*. St. Martin's Press, London.
- McMillan, 1968. *Electron Paramagnetism*. Reinhold Book Co., New York.
- McNamara, G., 2008. *Clocks in the Sky*. Springer, Berlin.
- McNeill, P.A., Berns, M.W., 1981. Chromosome behavior after laser microirradiation of a single kinetochore in mitotic PtK₂ cells. *J. Cell Biol.* 88, 543–553.
- McNulty, A.K., Saunders, M.J., 1992. Purification and immunological detection of pea nuclear intermediate filaments: Evidence for plant nuclear lamins. *J. Cell Sci.* 103, 407–414.
- McNutt, N.S., Weinstein, R.S., 1973. Membrane ultrastructure at mammalian intercellular junctions. *Prog. Biophys. Mol. Biol.* 26, 45–101.
- McQueen-Mason, S., Durachko, D.M., Cosgrove, D.J., 1992. Endogenous proteins that induce cell wall expansion in plants. *Plant Cell* 4, 1425–1433.
- McQueen-Mason, S., Fry, S.C., Durachko, D.M., Cosgrove, D.J., 1993. The relationship between xyloglucan endotransglycosylase and in-vitro cell wall extension in cucumber hypocotyls. *Planta* 190, 327–331.
- McQueen-Mason, S., Le, N.T., Brocklehurst, D., 2006. Expansins. *Plant Cell Monogr.* 5, 117–138.
- Meagher, R.B., 1991. Divergence and differential expression of actin gene families in higher plants. *Int. Rev. Cytol.* 125, 139–163.
- Meckel, T., Hurst, A.C., Thiel, G., Homann, U., 2004. Endocytosis against high turgor: Intact guard cells of *Vicia faba* constitutively endocytose fluorescently labeled plasma membrane and GFP-tagged K-channel KAT1. *Plant J.* 39, 182–193.
- Meckel, T., Hurst, A.C., Thiel, G., Homann, U., 2005. Guard cells undergo constitutive and pressure-driven membrane turnover. *Protoplasma* 226, 23–29.
- Meeuse, A.D.J., 1957. *Plasmodesmata (Vegetable Kingdom)*. Protoplasmatologia Band II. Springer-Verlag, Wien.
- Meeuse, B.J.D., 1975. Thermogenic respiration in aroids. *Ann. Rev. Plant Physiol.* 26, 117–126.
- Meeuse, B.J.D., Raskin, I., 1988. Sexual reproduction in the arum lily family, with emphasis on thermogenicity. *Sex. Plant Reprod.* 1, 3–15.
- Meeusen, S., McCaffery, J.M., Nunnari, J., 2004. Mitochondrial fusion intermediates revealed in vitro. *Science* 305, 1747–1752.
- Mehler, A.H., 1957. *Introduction to Enzymology*. Academic Press, New York.
- Mehta, M., Sarafis, V., Critchley, C., 1999. Thylakoid membrane architecture. *Aust. J. Plant Physiol.* 26, 2039–2042.
- Meindl, U., Zhang, D., Hepler, P.K., 1994. Actin microfilaments are associated with the migrating nucleus and the cell cortex in the green alga *Micrasterias*. *J. Cell Sci.* 107, 1929–1934.
- Meiners, S., Gharyal, P.K., Schindler, M., 1991a. Permeabilization of the plasmalemma and wall of soybean root cells to macromolecules. *Planta* 184, 443–447.
- Meiners, S., Xu, A., Schindler, M., 1991b. Gap junction protein homologue from *Arabidopsis thaliana*: Evidence for connexins in plants. *Proc. Natl. Acad. Sci. USA* 88, 4119–4122.
- Meiners, S., Schindler, S., 1987. Immunological evidence for gap junction polypeptide in plant cells. *J. Biol. Chem.* 262, 951–953.
- Meirhenrich, U., 2008. *Amino Acids and the Asymmetry of Life*. Springer, Berlin.
- Melan, M.A., 1990. Taxol maintains organized microtubule patterns in protoplasts which lead to a resynthesis of organized cell wall microfibrils. *Protoplasma* 153, 169–177.
- Melcak, I., Risueno, M.C., Raska, I., 1996. Ultrastructural nonisotopic mapping of nucleolar transcription sites in onion protoplasts. *J. Struct. Biol.* 116, 253–263.
- Melin, P.M., Sommarin, M., Sandelius, A.S., Jergil, B., 1987. Identification of Ca²⁺-stimulated polyphosphoinositide phospholipase C in isolated plant plasma membranes. *FEBS Lett.* 223, 87–91.
- Melkonian, M., 1989. Centrin-mediated motility. A novel cell motility mechanism in eukaryotic cells. *Bot. Acta* 102, 3–4.
- Mellman, I., 1996. Endocytosis and molecular sorting. *Ann. Rev. Cell Biol.* 12, 575–625.
- Mellman, I., Simons, K., 1992. The Golgi complex: In vitro veritas? *Cell* 68, 829–840.
- Mello, C.C., 2006. Return to the RNAi world: Rethinking gene expression and evolution. *Nobel Lect.* December 8.
- Mellor, J.W., 1914. *Chemical Statics and Dynamics*. Longmans, Green and Co., London.
- Melroy, D., Jones, R.L., 1986. The effect of monensin on intracellular transport and secretion of α -amylase isozymes in barley aleurone. *Planta* 167, 252–259.
- Mendel, G. [1865]. 1926. *Experiments in Plant Hybridization*. Harvard University Press, Cambridge, MA.
- Mendelsohn, E., 1964. *Heat and Life. The Development of the Theory of Animal Heat*. Harvard University Press, Cambridge, MA.
- Menke, W., 1962. Structure and chemistry of plastids. *Ann. Rev. Plant Physiol.* 13, 27–44.
- Menzel, D., 1996. The role of the cytoskeleton in polarity and morphogenesis of algal cells. *Curr. Opin. Cell Biol.* 8, 38–42.
- Merdes, A., Cleveland, D.W., 1997. Pathways of spindle pole formation: Different mechanisms; conserved components. *J. Cell Biol.* 138, 953–956.

- Mereschkowsky, C., 1905. Über Natur und Ursprung der Chromatophoren im Pflanzenreiche. *Biol. Centralbl.* 25, 593–604.
- Mereschkowsky, C., 1910. Theorie der zwei Plasmaarten als Grundlage der Symbiogenese, einer neuen Lehre von der Entstehung der Organismen. *Biol. Centralbl.* 30, 278–303, 321–347, 353–367.
- Mereschkowsky, C., 1920. La plante considérée comme une complex symbiotique. *Bull. Soc. Nat. Sci. Ouest France* 6, 17–21.
- Mersey, B.G., McCully, M.E., 1978. Monitoring the course of fixation of plant cells. *J. Microsc.* 166, 43–56.
- Mesecar, A.D., Koshland, D.E., 2000. A new model for protein stereospecificity. *Nature* 403, 614–615.
- Meselson, M., Stahl, F.W., 1958. The replication of DNA in *Escherichia coli*. *Proc. Natl. Acad. Sci. USA* 44, 671–682.
- Meselson, M., Stahl, F.W., Vinograd, J., 1957. Equilibrium sedimentation of macromolecules in density gradients. *Proc. Natl. Acad. Sci. USA* 43, 581–588.
- Messerli, M., Danuser, G., Robinson, K.R., 1999. Pulsatile influxes of H^+ , K^+ and Ca^{2+} lag growth pulses of *Lilium longiflorum* pollen tubes. *J. Cell Sci.* 112, 1497–1509.
- Messerli, M., Robinson, K.R., 1997. Tip localized Ca^{2+} pulses are coincident with peak pulsatile growth rates in pollen tubes of *Lilium longiflorum*. *J. Cell Sci.* 110, 1269–1278.
- Metcalf III, T.N., Villanueva, M.A., Schindler, M., Wang, J.L., 1986a. Monoclonal antibodies directed against protoplasts of soybean cells: Analysis of lateral mobility of plasma membrane-bound antibody. *J. Cell Biol.* 102, 1350–1357.
- Metcalf III, T.N., Wang, J.L., Schindler, M., 1986b. Lateral diffusion of phospholipids in the plasma membrane of soybean protoplasts: Evidence for membrane lipid domains. *Proc. Natl. Acad. Sci. USA* 83, 95–99.
- Métraux, J.P., Richmond, P.A., Taiz, L., 1980. Control of cell elongation in *Nitella* by endogenous cell wall pH gradients. *Plant Physiol.* 65, 204–210.
- Métraux, J.P., Taiz, L., 1977. Cell wall extension in *Nitella* as influenced by acids and ions. *Proc. Natl. Acad. Sci. USA* 74, 1565–1569.
- Métraux, J.P., Taiz, L., 1978. Transverse viscoelastic extension in *Nitella*. I. Relationship to growth rate. *Plant Physiol.* 61, 135–138.
- Métraux, J.P., Taiz, L., 1979. Transverse viscoelastic extension in *Nitella*. II. Effects of acids and ions. *Plant Physiol.* 63, 657–659.
- Metz, C.W., 1936. Factors influencing chromosome movements in mitosis. *Cytologia* 7, 219–231.
- Meves, F., 1904. Ueber das Vorkommen von Mitochondrien bezw. Condriomitten in Pflanzenzellen. *Ber. d. Deut. Bot. Gesells.* 22, 284–286.
- Meves, F., 1911. Gesammelte Studien an den roten Blutkörperchen der Amphibien. *Arch. Mikrosk. Anat.* 77, 465–540.
- Meyen, F.J.F., 1837–1839. Neues System der Pflanzen-Physiologie. Haude und Spensersche Buchhandlung, Berlin.
- Meyer, A., 1883. Das Chlorophyllkorn in chemischer, morphologischer und biologischer Beziehung. Arthur Felix, Leipzig.
- Meyer, Y., Herth, W., 1978. Chemical inhibition of cell wall formation and cytokinesis, but not of nuclear division, in protoplasts of *Nicotiana tabacum* L. cultivated in vitro. *Planta* 142, 253–262.
- Meyerhof, O.F., 1923. Energy conversions in muscle. Nobel Lect. December 12.
- Meyerhof, O., 1924. Chemical Dynamics of Life Phenomena. J.B. Lippincott Co., Philadelphia.
- Meyerhof, O., 1942. Intermediate carbohydrate metabolism. In: A Symposium on Respiratory Enzymes. The University of Wisconsin Press, Madison, pp. 3–15.
- Meyerhof, O., 1944. Energy relationships on glycolysis and phosphorylation. *Ann. NY Acad. Sci.* 44, 377–393.
- Meyerhof, O., Lohmann, K., 1928. Über die natürlichen Guanidino phosphorsäuren (Phosphogene) in der quergestreiften Muskulatur. *Biochem. Z.* 196, 22–48 49–72.
- Michaelis, L., 1900. Die vitale Färbung, eine Darstellungsmethode der Zellgranula. *Arch. mikro. Anat.* 55, 558–575.
- Michaelis, L., 1925. Contribution to the theory of permeability of membranes for electrolytes. *J. Gen. Physiol.* 8, 33–59.
- Michaelis, L., 1926. Hydrogen Ion Concentration. Williams & Wilkins Co., Baltimore.
- Michaelis, L., 1926a. Die Permeabilität von Membranen. *Naturwissenschaften* 3, 33–42.
- Michaelis, L., 1930. Oxidation-Reduction Potentials. Translated by L. B. Flexner. J. B. Lippincott Co., Philadelphia.
- Michaelis, L., 1958. Leonor Michaelis. An autobiography with additions by D. A. MacInnes and S. Granick. *Bio. Mems. Proc. Natl. Acad. Sci. USA* 31, 282–321.
- Michaelis, L., Menten, M., 1913. Die Kinetik der Invertinwirkung. *Biochem. Z.* 49, 333–369.
- Michal, G. (Ed.), 1999. Biochemical Pathways. John Wiley & Sons, New York.
- Michalak, M., Milner, R.E., Burns, K., Opas, M., 1992. Calreticulin. *Biochem. J.* 285, 681–692.
- Michelet, B., Lukazewicz, M., Dupriez, V., Boutry, M., 1994. A plant plasma membrane proton-ATPase gene is regulated by development and environment and shows signs of translational regulation. *Plant Cell* 6, 1375–1389.
- Miescher, F., 1897. Die histochemischen und physiologischen Arbeiten von Friedrich Miescher. Vols I and II, F. C. W. Vogel, Leipzig.
- Migliaccio, G., Nicchitta, C.V., Blobel, G., 1992. The signal sequence receptor, unlike the signal recognition particle receptor, is not essential for protein translocation. *J. Cell Biol.* 117, 15–25.
- Millar, A.H., Whelan, J., Small, I., 2006. Recent surprises in protein targeting to mitochondria and plastids. *Curr. Opin. Plant Biol.* 9, 610–615.
- Miller, D.D., Callaham, D.A., Gross, D.J., Hepler, P.K., 1992. Free Ca gradient in growing pollen tubes of *Lilium*. *J. Cell Sci.* 101, 7–12.
- Miller, D.D., Scordilis, S.P., Hepler, P.K., 1995. Identification and localization of three classes of myosins in pollen tubes of *Lilium longiflorum* and *Nicotiana glauca*. *J. Cell Sci.* 108, 2549–2563.
- Miller, G., 2006. Optogenetics: Shining new light on neural circuits. *Science* 314, 1674–1676.
- Miller, J.H., 1968. An evaluation of specific and non-specific inhibition of 2-dimensional growth in fern gametophytes. *Physiol. Plant.* 21, 699–710.
- Miller, J.H., 1980a. Differences in the apparent permeability of spore walls and prothallial cell walls in *Onoclea sensibilis*. *Am. Fern J.* 70, 119–123.

- Miller, J.H., 1980b. Orientation of the plane of cell division in fern gametophytes: The roles of cell shape and stress. *Am. J. Bot.* 67, 534–542.
- Miller, K.R., 1980. A chloroplast membrane lacking changes in unstacked membrane regions. *Biochim. Biophys. Acta.* 592, 143–152.
- Miller, K.R., Miller, G.J., McIntyre, K.R., 1977. Organization of the photosynthetic membrane in maize mesophyll and bundle-sheath chloroplasts. *Biochim. Biophys. Acta* 459, 145–156.
- Miller, K.R., Staehelin, L.A., 1976. Analysis of the thylakoid outer surface: Coupling factor is limited to unstacked membrane regions. *J. Cell Biol.* 68, 30–47.
- Miller, S.L., 1953. A production of amino acids under possible primitive Earth conditions. *Science* 117, 528–529.
- Miller, S.L., 1955. Production of some organic compounds under possible primitive Earth conditions. *J. Am. Chem. Soc.* 77, 2351–2361.
- Miller, S.L., 1992. The prebiotic synthesis of organic compounds as a step toward the origin of life. In: Schopf, J.W. (Ed.), *Major Events in the History of Life*. Jones and Bartlett, Sudbury, MA, pp. 1–28.
- Miller, S.L., Orgel, L.E., 1974. *The Origins of Life on the Earth*. Prentice-Hall, Englewood Cliffs, NJ.
- Miller, S.L., Urey, H.C., 1959a. Letter. *Science* 130, 1622–1624.
- Miller, S.L., Urey, H.C., 1959b. Organic compound synthesis on the primitive Earth. *Science* 130, 245–251.
- Millard, A., Bonner, J., 1953. The biology of plant mitochondria. *J. Histochem. Cytochem.* 1, 254–264.
- Millard, A., Bonner, J., Axelrod, B., Bandurski, R., 1951. Oxidative and phosphorylative activity of plant mitochondria. *Proc. Natl. Acad. Sci. USA* 37, 855–862.
- Millikan, R.A., 1924. The electron and the light-quant from the experimental point of view. *Nobel Lect.* May 23.
- Millikan, R.A., 1935. *Electrons (+ and –), Protons, Photons, Neutrons, and Cosmic Rays*. University of Chicago Press, Chicago.
- Mimura, T., Dietz, K.-J., Kaiser, W., Schramm, M.J., Kaiser, G., Heber, U., 1990a. Phosphate transport across biomembranes and cytosolic phosphate homeostasis in barley leaves. *Planta* 180, 139–146.
- Mimura, T., Kirino, Y., 1984. Changes in cytoplasmic pH measured by ^{31}P -NMR in cells of *Nitellopsis obtusa*. *Plant Cell Physiol.* 25, 813–820.
- Mimura, T., Shimmen, T., Tazawa, M., 1984. Adenine-nucleotide levels and metabolism-dependent membrane potential in cells of *Nitellopsis obtusa* Groves. *Planta* 162, 77–84.
- Mimura, T., Sakano, K., Tazawa, M., 1990b. Changes in the sub-cellular distribution of free amino acids in relation to light conditions in cells of *Chara corallina* Bot. *Acta* 103, 42–47.
- Min, M.K., Kim, S.J., Miao, Y., Shin, J., Jiang, L., Hwang, I., 2007. Overexpression of Arabidopsis AGD7 causes relocation of golgi-localized proteins to the endoplasmic reticulum and inhibits protein trafficking in plant cells. *Plant Physiol.* 143, 1601–1614.
- Mineyuki, Y., 1999. The preprophase band of microtubules: Its function as a cytokinetic apparatus in higher plants. *Int. Rev. Cytol.* 187, 1–49.
- Mineyuki, Y., Furuya, M., 1985. Involvement of microtubules on nuclear positioning during apical growth in *Adiantum protone-mata*. *Plant Cell Physiol.* 26, 213–220.
- Mineyuki, Y., Marc, J., Gunning, B.E.S., 1989. Development of the preprophase band from random cytoplasmic microtubules in guard mother cells of *Allium cepa* L. *Planta* 178, 291–296.
- Mineyuki, Y., Palevitz, B.A., 1990. Relationship between the pre-prophase band organization, F-actin, and the division site in *Allium*. *J. Cell Sci.* 97, 283–295.
- Mineyuki, Y., Yamashita, M., Nagahama, Y., 1991. P34^{cdc2} kinase homologue in the preprophase band. *Protoplasma* 162, 182–186.
- Mirchev, R., Golan, D.E., 2001. Single-particle tracking and laser optical tweezers studies of the dynamics of individual protein molecules in membranes of intact human and mouse red cells. *Blood Cells* 27, 143–147.
- Mironov, A.A., Weidman, P., Luini, A., 1997. Variations on the intracellular transport theme: Maturing cisternae and trafficking tubules. *J. Cell Biol.* 138, 481–484.
- Minorsky, P.V., 2002. The hot and the classic. *Peroxisomes: Organelles of diverse function*. *Plant Physiol.* 130, 517–518.
- Minorsky, P.V., 2003. The hot and the classic. *Plant thermogenesis and thermoregulation*. *Plant Physiol.* 132, 25–26.
- Mirsky, A.E., 1953. The chemistry of heredity. *Sci. Am.* 188, 47–57.
- Mirsky, A.E., 1955. The chemistry of heredity. In: *The Physics and Chemistry of Life*. Simon and Schuster, New York, pp. 99–117.
- Mirsky, A.E., Pollister, A.W., 1946. Chromosin, a desoxyribose nucleoprotein complex of the cell nucleus. *J. Gen. Physiol.* 30, 121–148.
- Mirsky, A.E., Ris, H., 1948. The chemical composition of isolated chromosomes. *J. Gen. Physiol.* 31, 7–18.
- Mirsky, A.E., Ris, H., 1949. Variable and constant components of chromosomes. *Nature* 163, 666–667.
- Mishkind, M.L., Wessler, S.R., Schmidt, G.W., 1985. Functional determinants in transit sequences: Import and partial maturation by vascular plant chloroplasts of the ribulose-1,5-bisphosphate carboxylase small subunit of *Chlamydomonas*. *J. Cell Biol.* 100, 226–234.
- Mita, T., Kanbe, T., Tanaka, K., Kuroiwa, T., 1986. A ring structure around the dividing plane of the *Cyanidium caldarium* chloroplast. *Protoplasma* 130, 211–213.
- Mita, T., Kuroiwa, T., 1988. Division of plastids by a plastid-dividing ring in *Cyanidium caldarium*. *Protoplasma* (Suppl. 1), 133–152.
- Mita, T., Shibaoka, H., 1983. Changes in microtubules in onion leaf sheath cells during bulb development. *Plant Cell Physiol.* 29, 109–117.
- Mita, T., Shibaoka, H., 1984a. Effects of S-3307, an inhibitor of gibberellin biosynthesis on seedling of leaf sheaf cells and on the arrangement of cortical microtubules in onion seedlings. *Plant Cell Physiol.* 25, 1531–1539.
- Mita, T., Shibaoka, H., 1984b. Gibberellin stabilizes microtubules in onion leaf sheath cells. *Protoplasma* 119, 100–109.
- Mita, T., Katsumi, M., 1986. Gibberellin control of microtubule arrangements in the mesocotyl epidermal cells of the d₅ mutant of *Zea mays* L. *Plant Cell Physiol.* 27, 651–659.
- Mitchell, H., Houlahan, M., 1946. Adenine-requiring mutants of *Neurospora crassa*. *Fed. Proc.* 5, 370–381.
- Mitchell, P., 1966. Chemiosmotic coupling in oxidative and photosynthetic phosphorylation. *Biol. Rev.* 41, 445–502. An expanded version of this article was published in May 1966 by Glynn Research Ltd., Bodmin, Cornwall.

- Mitchison, T.J., 1989. Polewards microtubule flux in the mitotic spindle: Evidence from photoactivation of fluorescence. *J. Cell Biol.* 109, 637–652.
- Mitchison, T.J., Evans, L., Schulze, E., Kirschner, M., 1986. Sites of microtubule assembly and disassembly in the mitotic spindle. *Cell* 45, 515–527.
- Mitchinson, T.J., Salmon, E.D., 1992. Poleward kinetochore fiber movement occurs during both metaphase and anaphase-A in newt lung cell mitosis. *J. Cell. Biol.* 119, 569–582.
- Mitchison, T.J., Sawin, K.E., 1990. Tubulin flux in the mitotic spindle: Where does it come from, where is it going? *Cell Motil. Cytoskel.* 16, 93–98.
- Mitsui, H., Yamaguchi-Shinozaki, K., Shinozaki, K., Nishikawa, K., Takahashi, H., 1993. Identification of a gene family (Kat) encoding kinesin-like proteins in *Arabidopsis thaliana* and characterization of secondary structure of KatA. *Mol. Gen. Genet.* 238, 362–368.
- Mitsui, T., Christeller, J.T., Hara-Nishimura, I., Akazawa, T., 1984. Possible role of calcium and calmodulin in the biosyntheses and secretion of α -amylase in rice seed scutellar epithelium. *Plant Physiol.* 75, 21–25.
- Mittag, M., Kiaulehn, S., Johnson, C.H., 2005. The circadian clock in *Chlamydomonas reinhardtii*. What is it for? What is it similar to? *Plant Physiol.* 137, 399–409.
- Miyagashima, S., Froehlich, J., Osteryoung, K., 2006. PDV1 and PDV2 mediate recruitment of the dynamin-related protein ARC5 to the plastid division site. *Plant Cell* 18, 2517–2530.
- Miyagashima, S.Y., Nishida, K., Mori, T., Matsuzaki, M., Higashiyama, T., Kuroiwa, H., Kuroiwa, T., 2003. A plant-specific dynamin-related protein forms a ring at the chloroplast division site. *Plant Cell* 15, 655–665.
- Miyagashima, S.Y., Nozaki, H., Nishida, K., Matsuzaki, M., Kuroiwa, T., 2004. Two types of FtsZ proteins in mitochondria and red-lineage chloroplasts: The duplication of FtsZ is implicated in endosymbiosis. *J. Mol. Evol.* 58, 291–303.
- Miyamura, S., Kuroiwa, T., Nagata, T., 1987. Disappearance of plastid and mitochondria nucleoids during the formation of generative cells of higher plants revealed by fluorescence microscopy. *Protoplasma* 141, 149–159.
- Miyata, H., Bowers, B., Korn, E.D., 1989. Plasma membrane association of *Acanthamoeba* myosin I. *J. Cell Biol.* 109, 1519–1528.
- Mizuno, K., 1993. Microtubule-nucleation sites on nuclei of higher plant cells. *Protoplasma* 173, 77–85.
- Mizuno, K., 1995. A cytoskeletal 50kDa protein in higher plants that forms intermediate-sized filaments and stabilizes microtubules. *Protoplasma* 186, 99–112.
- Mizuta, S., 1985. Assembly of cellulose synthesizing complexes on the plasma membrane of *Buddleia coacta*. *Plant Cell Physiol.* 26, 1443–1453.
- Mizutani, I., Gall, J., 1966. Centriole replication II. Sperm formation in the fern, *Marsilea*, and the cycad, *Zamia*. *J. Cell Biol.* 29, 97–111.
- Mogelsvang, S., Gomez-Ospina, N., Soderholm, J., Glick, B.S., Staehelin, L.A., 2003. Tomographic evidence for continuous turnover of Golgi cisternae in *Pichia pastoris*. *Mol. Biol. Cell* 14, 2277–2291.
- Mogensen, H.L., 1996. The hows and whys of cytoplasmic inheritance in seed plants. *Am. J. Bot.* 83, 383–404.
- Mohl, H. von., 1852. Principles of the Anatomy and Physiology of the Vegetable Cell. Translated by A. Henfrey. John van Voorst, London.
- Mohr, H., 1972. Lectures on Photomorphogenesis. Springer-Verlag, Berlin.
- Moir, R.D., Goldman, R.D., 1993. Lamin dynamics. *Curr. Opin. Cell Biol.* 5, 408–411.
- Molchan, T.M., Valster, A.H., Hepler, P.K., 2002. Actomyosin promotes cell plate alignment and late lateral expansion in *Tradescantia* stamen hair cells. *Planta* 214, 683–693.
- Mole-Bajer, J., 1958. Cine-micrographic analysis of c-mitosis in endosperm. *Chromosoma* 9, 332–358.
- Mole-Bajer, J., Bajer, A.S., 1988. Relation of F-actin organization to microtubules in drug treated *Haemanthus* mitosis. *Protoplasma* (Suppl. 1), 91–112.
- Mole-Bajer, J., Bajer, A.S., Inoué, S., 1988. Three dimensional localization and redistribution of F-actin in higher plant mitosis and cell plate formation. *Cell Motil. Cytoskel.* 10, 217–228.
- Mole-Bajer, J., Bajer, A.S., Zenkowski, R.P., Balczon, R.D., Brinkley, B.R., 1990. Autoantibodies from a patient with scleroderma CREST recognize kinetochores of the higher plant *Haemanthus*. *Proc. Natl. Acad. Sci. USA* 87, 3599–3603.
- Molière, [Jean-Baptiste Poquelin]. [1670]. 1957. Le Bourgeois Gentilhomme. The Would-Be Gentleman. Translated by Morris Bishop. The Modern Library, New York.
- Molière, [Jean-Baptiste Poquelin]. [1673]. 1950. Le malade Imaginaire. The Would-Be Invalid. Translated and Edited by Morris Bishop. Appleton-Century-Crofts, New York.
- Molisch, H., 1916. Pflanzenphysiologie als Theorie der Gärtnerei. Gustav Fischer, Jena.
- Moll, B.A., Jones, R.L., 1982. α -amylase secretion by single barley aleurone layers. *Plant Physiol.* 70, 1149–1155.
- Moll, T., Tebb, G., Surana, U., Robitsch, H., Nasmyth, K., 1991. The role of phosphorylation and the cdc28 protein kinase in cell cycle regulated nuclear import of the *S. cerevisiae* transcription factor SW15. *Cell* 66, 743–758.
- Mollenhauer, H.H., 1965. An intercisternal structure in the Golgi apparatus. *J. Cell Biol.* 24, 504–511.
- Mollenhauer, H.H., Morré, D.J., 1966. Golgi apparatus and plant secretion. *Ann. Rev. Plant Physiol.* 17, 27–46.
- Mollenhauer, H.H., Morré, D.J., 1976a. Cytochalasin B, but not colchicine, inhibits migration of secretory vesicles in root tips of maize. *Protoplasma* 87, 39–48.
- Mollenhauer, H.H., Morré, D.J., 1976b. Transition elements between endoplasmic reticulum and Golgi apparatus in plant cells. *Cytobiologie* 13, 297–306.
- Mollenhauer, H.H., Morré, D.J., 1987. Some unusual staining properties of tannic acid in plants. *Histochemistry* 88, 17–22.
- Mollenhauer, H.H., Morré, D.J., Droleskey, R., 1983. Monensin affects the trans half of *Euglena* dictyosomes. *Protoplasma* 114, 119–124.
- Mollenhauer, H.H., Morré, D.J., Griffing, L.R., 1991. Post Golgi apparatus structures and membrane removal in plants. *Protoplasma* 162, 55–60.
- Møller, I.M., 2001. Plant mitochondria and oxidative stress: Electron transport, NADPH turnover, and metabolism of reactive oxygen species. *Annu. Rev. Plant Physiol. Plant. Mol. Biol.* 52, 561–591.

- Møller, I.M., Lin, W., 1986. Membrane-bound NAD(P)H dehydrogenases in higher plant cells. *Ann. Rev. Plant Physiol.* 37, 309–334.
- Mommaerts, W.F.H.M., 1950a. A consideration of experimental facts pertaining to the primary reaction in muscular activity. *Biochim. Biophys. Acta* 4, 50–57.
- Mommaerts, W.F.H.M., 1950b. Muscular Contraction. A Topic in Molecular Physiology. Interscience Publishers, New York.
- Mommaerts, W.F.H.M., Seraidarian, K., 1947. A study of the adenosine triphosphatase activity of myosin and actomyosin. *J. Gen. Physiol.* 30, 401–422.
- Monéger, F., Smart, C.J., Leaver, C.J., 1994. Nuclear restoration of cytoplasmic male sterility in sunflower is associated with the tissue-specific regulation of a novel mitochondrial gene. *EMBO. J.* 13, 8–17.
- Mongrand, S., Morel, J., Laroche, J., Claverol, S., Carde, J.P., Hartmann, M.A., Bonneu, M., Simon-Plas, F., Lessire, R., Bessoule, J.J., 2004. Lipid rafts in higher plant cells: Purification and characterization of Triton X-100-insoluble microdomains from tobacco plasma membrane. *J. Biol. Chem.* 279, 36277–36286.
- Monod, J., 1965. From enzymatic adaptation to allosteric transitions. Nobel Lect. December 11, 1963.
- Montezinos D., Brown, Jr., R.M., 1979. Cell wall biogenesis in *Oocystis*: Experimental alteration of microfibril assembly and orientation. *Cytobios* 23, 119–139.
- Montgomery, W.L., Pollak, P.E., 1988. *Eupoliscium fishelsoni* N. G., N. Sp., a protist of uncertain taxonomic affinities from the gut of an herbivorous reef fish. *J. Protozool.* 35, 565–569.
- Mooney, B.P., Miernyk, J.A., Randall, D.D., 2002. The complex fate of α -ketoacids. *Annu. Rev. Plant Biol.* 53, 357–375.
- Moor, H., Mühlethaler, K., 1963. Fine-structure in frozen-etched yeast cells. *J. Cell Biol.* 17, 60628.
- Moor, H., Mühlethaler, K., Waldner, H., Frey-Wyssling, A., 1961. A new freezing ultramicrotome. *J. Biophys. Biochem. Cytol.* 10, 1–14.
- Moore, A.L., Proudlove, M.O., 1988. Mitochondria and sub-mitochondrial particles. In: Hall, J.L., Moore, A.L. (Eds.), *Isolation of membranes and organelles from plant cells*. Academic Press, London, pp. 153–184.
- Moore, A.L., Rich, P.R., 1985. Organization of the respiratory chain and oxidative phosphorylation. In: Douce, R., Day, D.A. (Eds.), *Higher Plant Cell Respiration*. Springer Verlag, Berlin, pp. 134–171.
- Moore, A.L., Wood, C.K., Watts, F.Z., 1994. Protein import into plant mitochondria. *Ann. Rev. Plant Physiol. Plant Mol. Biol.* 45, 545–575.
- Moore, G.E., 1965. Cramming more components onto integrated circuits. *Electronics* 38 (8), 114–117.
- Moore, J.E.S., Arnold, A.L., 1905. On the existence of permanent forms among the chromosomes of the first meiotic division in certain animals. *Proc. Roy. Soc. B* 77, 563–570.
- Moore, J.E.S., Embleton, A.L., 1905. On the synopsis in amphibia. *Proc. Roy. Soc. B* 77, 555–562.
- Moore, J. E. S., Walker, C. E., 1905. The meiotic process in mammals. Thompson Yates and Johnston Laboratories Report, University of Liverpool, pp. 75–88.
- Moore, P.J., Sivovs, K.M.M., Lynch, M.A., Staehelin, L.A., 1991. Spatial reorganization of the assembly pathways of glycoproteins and complex polysaccharides in the Golgi apparatus of plants. *J. Cell Biol.* 112, 589–602.
- Moore, P.J., Staehelin, L.A. 1988. Immunogold localization of the cell wall matrix polysaccharides rhamnogalacturonan I and xyloglucan during cell expansion and cytokinesis in *Trifolium pratense* L. Implications for secretory pathways. *Planta* 174, 433–445.
- Moore, R., 1985. A morphometric analysis of the redistribution of organelles in columella cells in primary roots of normal seedlings and agravitropic mutants of *Hordeum vulgare*. *J. Exp. Bot.* 36, 1275–1286.
- Moore, R.T., McAlean, J.H., 1961. Fine structure of mycota. V. Lomasomes—previously uncharacterized hyphal structures. *Mycologia* 53, 194–200.
- Moore, T.S., 1982. Phospholipid biosynthesis. *Ann. Rev. Plant Physiol.* 33, 235–259.
- Moore, T.S., 1987. Phosphoglyceride synthesis in endoplasmic reticulum. *Methods Enzymol.* 148, 585–596.
- Moran, N., 2007. Osmoregulation of leaf motor cells. *FEBS Lett.* 581, 2337–2347.
- Moran, N., Ehrenstein, G., Iwasa, K., Mischke, C., Bare, C., Satter, R.L., 1988. Potassium channels in motor cells of *Samanea saman*: A patch-clamp study. *Plant Physiol.* 88, 643–648.
- Moras, D., 1992. Structural and functional relationships between aminoacyl-tRNA synthetases. *Trends in Biochem. Sci.* 17, 159–164.
- Moreau, P., Hartmann, M.-A., Perret, A.-M., Sturbois-Balcerzak, B., Cassagne, C., 1998. Transport of sterols to the plasma membrane of leek seedlings. *Plant Physiol.* 117, 931–937.
- Morejohn, L.C., Fosket, D.E., 1982. Higher plant tubulin identified by self-assembly into microtubules in vitro. *Nature* 297, 426–428.
- Morejohn, L.C., Fosket, D.E., 1984a. Inhibition of plant microtubule polymerization in vitro by the phosphoric amide herbicide amiprofos-methyl. *Science* 224, 874–876.
- Morejohn, L.C., Fosket, D.E., 1984b. Taxol-induced rose microtubule polymerization in vitro and its inhibition by colchicine. *J. Cell Biol.* 99, 141–147.
- Morejohn, L.C., Bureau, T.E., Mole-Bajer, J., Bajer, A.S., Fosket, D.E., 1987. Oryzalin, a dinitroaniline herbicide, binds to plant tubulin and inhibits microtubule polymerization in vitro. *Planta* 172, 252–264.
- Moreno Díaz de la Espina, S., 1995. Nuclear matrix isolated from plant cells. *Int. Rev. Cytol.* 162B, 75–139.
- Morgan, C.L., 1923. *Emergent Evolution*. Williams and Norgate, London.
- Morgan, C.L., 1926. *Life, Mind, and Spirit*. Williams and Norgate, London.
- Morgan, C.L., 1933. *The Emergence of Novelty*. Williams and Norgate, London.
- Morgan, T.H., 1901. *Regeneration*. MacMillan, New York.
- Morgan., 1911. Random segregation versus coupling in Mendelian inheritance. *Science* 34, 384.
- Morgan, T.H., 1924. Mendelian heredity in relation to cytology. In: Cowdry, E.V. (Ed.), *General Cytology*. University of Chicago Press, Chicago, pp. 691–734.
- Morgan, T.H., 1934. The relation of genetics to physiology and medicine. Nobel Lect. June 4.
- Morgan, T.H., Sturtevant, A.H., Muller, H.J., Bridges, C.B., 1915. *The Mechanism of Mendelian Heredity*. H. Holt and Co., New York.

- Mori, I.C., Muto, S., 1997. Absciscic acid activates a 48-kilodalton protein kinase in guard cell protoplasts. *Plant Physiol.* 113, 295–303.
- Mori, I.C., Uozumi, N., Muto, S., 2000. Phosphorylation of the inward-rectifying potassium channel KAT1 by ABR kinase in *Vicia* guard cells. *Plant Cell Physiol.* 41, 850–856.
- Mori, T., Kuroiwa, H., Takahara, M., Miyagishima, S.-Y., Kuroiwa, T., 2001. Visualization of an FtsZ ring in chloroplasts of *Lilium longiflorum* leaves. *Plant Cell Physiol.* 42, 555–559.
- Morimatsu, M., Nakamura, A., Sumiyoshi, H., Sakaba, N., Taniguchi, H., Kohama, K., Higashi-Fujime, S., 2000. The molecular structure of the fastest myosin from green algae, *Chara*. *Biochem. Biophys. Res. Commun.* 270, 147–152.
- Morita, M.T., Tasaka, M., 2004. Gravity sensing and signaling. *Curr. Opin. Plant Biol.* 7, 712–718.
- Moriyasu, Y., 1995. Examination of the contribution of vacuolar proteases to intracellular protein degradation in *Chara corallina*. *Plant Physiol.* 109, 1309–1315.
- Moriyasu, Y., Malek, L., 2004. Purification and characterization of the 20S proteasome from the alga *Chara corallina* (Charophyceae). *J. Phycol.* 40, 333–340.
- Moriyasu, Y., Ohsumi, Y., 1996. Autophagy in tobacco-suspension cultured cells in response to sucrose starvation. *Plant Physiol.* 111, 1233–1241.
- Moriyasu, Y., Sakano, K., Tazawa, M., 1987. Vacuolar/extravacuolar distribution of aminopeptidases in giant alga *Chara australis* and partial purification of one such enzyme. *Plant Physiol.* 84, 720–725.
- Moriyasu, Y., Shimmen, T., Tazawa, M., 1984. Vacuolar pH regulation in *Chara australis*. *Cell Struct. Funct.* 9, 225–234.
- Moriyasu, Y., Tazawa, M., 1986. Distribution of several proteases inside and outside the central vacuole of *Chara australis*. *Cell Struct. Funct.* 11, 37–42.
- Moriyasu, Y., Tazawa, M., 1987. Calcium-activated protease in the giant alga *Chara australis*. *Protoplasma* 140, 72–74.
- Moriyasu, Y., Tazawa, M., 1988. Degradation of proteins artificially introduced into vacuoles of *Chara australis*. *Plant Physiol.* 88, 1092–1096.
- Moriyasu, Y., Wayne, R., 2004. Presence of a novel calcium-activated protease in *Chara corallina*. *Eur. J. Phycol.* 39, 57–66.
- Morowitz, H.J., 1992. *Beginnings of Cellular Life. Metabolism Recapitulates Biogenesis*. Yale University Press, New Haven, CT.
- Morré, D.J., 1987. The Golgi apparatus. *Int. Rev. Cytol.* 17, 211–253.
- Morré, D.J., Boss, W.J., Grimes, H., Mollenhauer, H.H., 1983. Kinetics of Golgi apparatus membrane flux following monensin treatment of embryogenic carrot cells. *Eur. J. Cell Biol.* 30, 25–32.
- Morré, D.J., Keenan, T.W., 1994. Golgi apparatus buds—vesicles or coated ends of tubules? *Protoplasma* 179, 1–4.
- Morré, D.J., Keenan, T.W., 1997. Membrane flow revisited. *BioScience* 47, 489–498.
- Morré, D.J., Mollenhauer, H.H., 1976. Interactions among cytoplasm, endomembranes, and the cell surface. In: Stocking, C.R., Heber, U. (Eds.), *Transport in Plants. III. Intracellular Interactions and Transport Processes*. Springer-Verlag, Berlin, pp. 290–344.
- Morré, D.J., Nowack, D.D., Paulik, M., Brightman, A.O., Thornborough, K., Yim, J., Auderset, G., 1989a. Transitional endoplasmic reticulum membranes and vesicles isolated from animals and plants. Homologous and heterologous cell-free membrane transfer to Golgi apparatus. *Protoplasma* 153, 1–13.
- Morré, D.J., Pfaffman, H., Drøbak, B., Wilkinson, F.E., Hartmann, E., 1989b. Diacylglycerol levels unchanged during auxin-stimulated growth of excised hypocotyl segments of soybean. *Plant Physiol.* 90, 275–279.
- Morré, D.J., Ovtracht, L., 1977. Dynamics of the Golgi apparatus: Membrane differentiation and membrane flow. *Int. Rev. Cytol.* (Suppl. 5), 61–188.
- Morris, B.M., Gow, N.A.R., 1993. Mechanism of electrotoxis of zoospores of phytopathogenic fungi. *Phytopathology* 8, 877–882.
- Morris, C.E., 1990. Mechanosensitive ion channels. *J. Membrane Biol.* 113, 93–107.
- Mörschel, E., Staehelin, L.A., 1983. Reconstitution of cytochrome_{b₆-f} and CF₀/CF₁ ATP synthase complexes into phospholipid and galactolipid liposomes. *J. Cell Biol.* 97, 301–310.
- Morse, M.J., Crain, R.C., Satter, R.L., 1987a. Light-stimulated inositol phospholipid turnover in *Samanea saman* pulvini. *Proc. Natl. Acad. Sci. USA* 84, 7075–7078.
- Morse, M.J., Crain, R.C., Satter, R.L., 1987b. Phosphatidyl inositol cycle metabolites in *Samanea saman* pulvini. *Plant Physiol.* 83, 640–644.
- Morse, M.J., Crain, R.C., Coté, G.G., Satter, R.L., 1990. Light-signal transduction via accelerated inositol phospholipid turnover in *Samanea pulvini*. In: Morré, D.J., Boss, W.F., Loewus, F.A. (Eds.), *Inositol Metabolism in Plants*. Wiley-Liss, New York, pp. 201–215.
- Morse, M.J., Crain, R.C., Coté, G.G., Satter, R.L., 1989. Light stimulated inositol phospholipid turnover in *Samanea saman* pulvini. Increased levels of diacylglycerol. *Plant Physiol.* 89, 724–727.
- Morse, R.H., 1992. Transcribed chromatin. *Trends Biochem. Sci.* 17, 23–26.
- Moscatelli, A., Cai, G., Ciampolini, F., Cresti, M., 1998. Dynein heavy chain-related polypeptides are associated with organelles in pollen tubes of *Nicotiana tabacum*. *Sex. Plant Reprod.* 11, 31–40.
- Moscatelli, A., DelCasino, C., Lozzi, L., Cai, G., Scali, M., Tiezzi, A., Cresti, M., 1995. High molecular weight polypeptides related to dynein heavy chains in *Nicotiana tabacum* pollen tubes. *J. Cell Sci.* 108, 1117–1125.
- Moseyko, N., Feldman, L.J., 2001. Expression of pH-sensitive green fluorescent protein in *Arabidopsis thaliana*. *Plant Cell Environ.* 24, 557–563.
- Moshelion, M., Moran, N., 2000. K⁺-efflux in extensor and flexor cells of *Samanea saman* are not identical. Effect of cytosolic Ca²⁺. *Plant Physiol.* 124, 911–919. Correct version reprinted in February 2001.
- Moshelion, M., Becker, D., Czempinski, K., Mueller-Roeber, B., Hedrich, R., Attali, B., Moran, N., 2002. Diurnal and circadian regulation of putative potassium channels in a leaf-moving organ. *Plant Physiol.* 128, 634–642.
- Moshelion, M., Becker, D., Hedrich, R., Biela, A., Otto, B., Levi, H., Moran, N., Kaldenhoff, R., 2002. PIP aquaporins in the motor cells of *Samanea saman*. Diurnal and circadian regulation. *Plant Cell* 14, 727–739.

- Moskowitz, A.H., Hrazdina, G., 1981. Vacuolar contents of fruit subepidermal cells from *Vitis* species. *Plant Physiol.* 68, 686–692.
- Möslé Waldhauser, S.S., Baumann, T.W., 1996. Compartmentation of caffeine and related purine alkaloids depends exclusively on the physical chemistry of their vacuolar complex formation with chlorogenic acids. *Phytochemistry* 42, 985–996.
- Moss, R.W., 1988. Free Radical. Albert Szent-Gyorgyi and the Battle over Vitamin C. Paragon House, New York.
- Mottier, D.M., 1903. The behavior of the chromosomes in the spore mother cells of higher plants and the homology of the pollen and embryo sac mother cells. *Bot. Gaz.* 35, 250–282.
- Mousdale, D.M., 2008. Biofuels: Biotechnology, Chemistry, and Sustainable Development. CRC Press, Boca Raton, FL.
- Mower, J.P., Stefanovic, S., Young, G.J., Palmer, J.D., 2004. Gene transfer from parasitic to host plants. *Nature* 432, 165–166.
- Moynihan, M.R., Ordentlich, A., Raskin, I., 1995. Chilling-induced heat evolution in plants. *Plant Physiol.* 108, 995–999.
- Mu, J.H., Chua, N.-H., Ross, E.M., 1997. Expression of human muscarinic cholinergic receptors in tobacco. *Plant Mol. Biol.* 34, 357–362.
- Mueckler, M., Lodish, H.F., 1986. Post-translational insertion of the fragment of the glucose transporter into microsome requires phosphoanhydride bond cleavage. *Nature* 322, 549–552.
- Mueller Jr., S.C., Brown, R.M., 1980. Evidence for an intramembrane component associated with a cellulose microfibril-synthesizing complex in higher plants. *J. Cell Biol.* 84, 315–346.
- Mueller Jr., S.C., Brown, R.M., Scott, T.K., 1976. Cellulosic microfibrils: Nascent stages of synthesis in higher plant cell. *Science* 194, 949–951.
- Mühlenthaler, K., 1950. Electron microscopy of developing plant cell walls. *Biochim. Biophys. Acta* 5, 1–9.
- Muir, J. [1911]. 1987. My First Summer in the Sierra. Penguin Books, New York.
- Mulder, G.J., 1849. The Chemistry of Vegetable & Animal Physiology. William Blackwood and Sons, Edinburgh.
- Mullen, R.T., 2002. Targeting and import of matrix proteins into peroxisomes. In: Baker, A., Smith, I. (Eds.), *Plant Peroxisomes: Biochemistry, Cell Biology and Biotechnological Applications*. Kluwer Academic Publishers.
- Mullen, R.T., Flynn, C.R., Trelease, R.N., 2001. How are peroxisomes formed? The role of the endoplasmic reticulum and peroxins. *Trends Plant Sci.* 6, 256–261.
- Mullen, R.T., Lisenbee, C.S., Miernyk, J.A., Trelease, R.N., 1999. Peroxisomal membrane ascorbate peroxidase is sorted to a membranous network that resembles a subdomain of the endoplasmic reticulum. *Plant Cell* 11, 2167–2185.
- Mullen, R.T., Trelease, R.N., 2000. The sorting signals for peroxisomal membrane-bound ascorbate peroxidase are within its C-terminal tail. *J. Biol. Chem.* 275, 16337–16344.
- Muller, H.J., 1946. The production of mutations. *Nobel Lect.* December 12.
- Muller, H.J., 1973a. Man's Future Birthright. Essays on Science and Humanism. State University of New York Press, Albany, New York.
- Muller, H.J., 1973b. The Modern Concept of Nature. Essays on Theoretical Biology and Evolution. State University of New York Press, Albany, New York.
- Müller, J., Mettbaach, U., Menzel, D., Samaj, J., 2007. Molecular dissection of endosomal compartments in plants. *Plant Physiol.* 145, 293–304.
- Müller, M.L., Taiz, L., 2002. Regulation of the lemon-fruit V-ATPase by variable stoichiometry and organic acids. *J. Membr. Biol.* 185, 209–220.
- Müller, M.L., Irkens-Kiesecker, U., Kramer, D., Taiz, L., 1997. Purification and reconstitution of the vacuolar H⁺-ATPases from lemon fruits and epicotyls. *J. Biol. Chem.* 272, 12762–12770.
- Müller, M.L., Irkens-Kiesecker, U., Rubinstein, B., Taiz, L., 1996. On the mechanism of hyperacidification in lemon: Comparison of the vacuolar H⁺-ATPase activities of fruits and epicotyls. *J. Biol. Chem.* 271, 1916–1924.
- Müller, M.L., Jensen, M., Taiz, L., 1999. The vacuolar H⁺-ATPase of lemon fruits is regulated by variable H⁺/ATP coupling and slip. *J. Biol. Chem.* 274, 10706–10716.
- Mummert, H., Hansen, U.-P., Gradmann, D., 1981. Current voltage curve of electrogenic Cl[−] pump predicts voltage-dependent Cl efflux in *Acetabularia*. *J. Membr. Biol.* 62, 139–148.
- Munitz, M.K. (Ed.), 1957. Theories of the Universe. The Free Press, Glencoe, IL.
- Muntz, K., 2007. Protein dynamics and proteolysis in plant vacuoles. *J. Exp. Bot.* 58, 2391–2407.
- Murasugi, A., Wada, C., Hayashi, Y., 1981. Cadmium-binding peptide induced in fission yeast, *Schizosaccharomyces pombe*. *J. Biochem.* 90, 1561–1564.
- Murata, N., 1969. Control of excitation transfer in photosynthesis. I. Light-induced change of chlorophyll a fluorescence in *Porphyridium cruentum*. *Biochim. Biophys. Acta* 172, 242–251.
- Murata, T., Kadota, A., Hogetsu, T., Wada, M., 1987. Circular arrangement of cortical microtubules around the subapical part of a tipgrowing fern protonema. *Protoplasma* 141, 135–138.
- Murata, T., Sonobe, S., Baskin, T.I., Hyodo, S., Hasezawa, S., Nagata, T., Horio, T., Hasebe, M., 2005. Microtubule-dependent microtubule nucleation based on recruitment of γ -tubulin in higher plants. *Nat. Cell Biol.* 7, 961–968.
- Murata, T., Sugai, M., 2000. Protoregulation of asymmetric cell division followed by rhizoid development in the fern *Ceratopteris prothalli*. *Plant Cell Physiol.* 41, 1313–1320.
- Murata, T., Wada, M., 1989a. Effects of colchicine and amiprophos-methyl on microfibril arrangement and cell shape in *Adiantum* protonemal cells. *Protoplasma* 151, 81–87.
- Murata, T., Wada, M., 1989b. Organization of cortical microtubules and microfilament deposition in response to blue-light-induced apical swelling in a tip-growing *Adiantum* protonema cell. *Planta* 178, 334–341.
- Murata, T., Wada, M., 1991. Effects of centrifugation on preprophase-band formation in *Adiantum* protonemata. *Planta* 83, 391–398.
- Murata, T., Wada, M., 1997. Formation of a phragmosome-like structure in centrifuged protonemal cells of *Adiantum capillus-veneris*. *L. Planta* 201, 273–280.
- Murphy, D.J., 1986a. Structural properties and molecular organization of the acyl lipids of photosynthetic membranes. *Encycl. Plant Physiol. Photosyn. III.* 19, 713–725.
- Murphy, D.J., 1986b. The molecular organization of the photosynthetic membrane in higher plants. *Biochim. Biophys. Acta* 864, 33–94.

- Murphy, D.J., Vance, J., 1999. Mechanisms of lipid-body formation. *Trends Biochem. Sci.* 24, 109–115.
- Murthy, P.P.N., Renders, J.M., Keranen, L.M., 1989. Phosphoinositides in barley aleurone layers and gibberellic acid-induced changes in metabolism. *Plant Physiol.* 91, 1266–1269.
- Murray, A.W., 1992. Creative blocks: Cell cycle checkpoints and feedback controls. *Nature* 359, 599–604.
- Murray, M.G., Kennard, W.C., 1984. Altered chromatin conformation of the higher plant gene phaseolin. *Biochemistry* 23, 4225–4232.
- Mustacich, R.V., Ware, B.R., 1974. Observation of protoplasmic streaming by laser-light scattering. *Phys. Rev. Lett.* 33, 617–620.
- Mustacich, R.V., Ware, B.R., 1976. A study of protoplasmic streaming in *Nitella* by laser Doppler spectroscopy. *Biophys. J.* 16, 373–388.
- Mustacich, R.V., Ware, B.R., 1977a. Velocity distributions of the streaming protoplasm in *Nitella flexilis*. *Biophys. J.* 17, 229–241.
- Mustacich, R.V., Ware, B.R., 1977b. A study of protoplasmic streaming in *Physarum* by laser Doppler spectroscopy. *Protoplasma* 91, 351–367.
- Mustárdy, L., Buttle, K., Steinbach, G., Garab, G., 2008. The three-dimensional network of the thylakoid membranes in plants: Quasihelical model of the granum-stroma assembly. *Plant Cell* 20, 2552–2557.
- Myers, J., 1974. Conceptual developments in photosynthesis, 1924–1974. *Plant Physiol.* 54, 420–426.
- Myers, J., French, C.S., 1960. Evidences from action spectra for specific participation of chlorophyll b in photosynthesis. *J. Gen. Physiol.* 43, 723–736.
- N-**
- Nachmias, V.T., Huxley, H.E., Kessler, D., 1970. Electron microscope observations on actomyosin and actin preparations from *Physarum polycephalum*, and on their interaction with heavy meromyosin subfragment I from muscle myosin. *J. Mol. Biol.* 50, 83–90.
- Nadreau, J.A., Sack, F.D., 2003. Stomatal development: Cross talk puts mouths in place. *Trends Plant Sci.* 8, 294–299.
- Naeve, G.S., Sharma, A., Lee, A.S., 1991. Temporal events regulating the early phases of the mammalian cell cycle. *Curr. Opin. Cell Biol.* 3, 261–268.
- Nagai, R., 1993. Regulation of intracellular movements in plant cells by environmental stimuli. *Int. Rev. Cytol.* 145, 251–310.
- Nagai, R., Hayama, T., 1979. Ultrastructure of the endoplasmic factor responsible for cytoplasmic streaming in *Chara* internodal cells. *J. Cell Sci.* 36, 121–136.
- Nagai, R., Rebhun, L.I., 1966. Cytoplasmic microfilaments in streaming *Nitella* cells. *J. Ultrastruct. Res.* 14, 571–589.
- Nagata, T., 2004. When I encountered tobacco BY-2 cells. *Biotechnol. Agric. For.* 53, 1–6.
- Nagata, T., Hasegawa, S., Inzé, D. (Eds.), 2004. Tobacco BY-2 Cells. *Biotechnology in Agriculture and Forestry* 53. Springer-Verlag, Berlin.
- Nagata, T., Kumagai, F., 1999. Plant cell biology through the window of the highly synchronized tobacco BY-2 cell line. *Meth. Cell Sci.* 21, 123–127.
- Nagata, T., Matsuoka, K., Inzé, D. (Eds.), 2006. Tobacco BY-2 Cells: From Cellular Dynamics to Omics. *Biotechnology in Agriculture and Forestry* 58. Springer-Verlag, Berlin.
- Nagata, T., Nemoto, Y., Hasegawa, S., 1992. Tobacco BY-2 cell line as the “HeLa” cells in the cell biology of higher plants. *Int. Rev. Cytol.* 132, 1–30.
- Nagel, G., Brauner, M., Liewald, J.F., Adeishvili, N., Bamberg, E., Gottschalk, A., 2005. Light activation of channelrhodopsin-2 in excitable cells of *Caenorhabditis elegans* triggers rapid behavioral responses. *Curr. Biol.* 15, 2279–2284.
- Nagele, R., Freeman, T., McMorro, L., Lee, H.-Y., 1995. Precise spatial positioning of chromosomes during prometaphase: Evidence for chromosomal order. *Science* 270, 1831–1835.
- Nägeli, C. von., [1844]. 1846. Memoir on the nuclei, formation, and growth of vegetable cells. In: *Reports and Papers on Botany*, vol. 1. Ray Society, London, pp. 215–292.
- Nägeli, C. von., 1914. A Mechanico-Physiological Theory of Organic Evolution. Open Court Publishing Co., Chicago.
- Nägeli, K. von., Cramer, C., 1855. Pflanzenphysiologische Untersuchungen. F. Schulthess, Zurich.
- Nagl, W., 1978. Endopolyploidy and Polyteny in Differentiation and Evolution. North-Holland, Amsterdam.
- Nagl, W., 1982. Nuclear chromatin. In: Parthier, B., Boulter, D. (Eds.), *Nucleic Acids and Proteins in Plants. II. Structure, Biochemistry and Physiology of Nucleic Acids*. *Encycl. Plant Physiol.* Springer Verlag, Berlin, pp. 1–45.
- Nagl, W., 1985. Chromatin organization and the control of gene activity. *Int. Rev. Cytol.* 94, 21–56.
- Nagl, W., Jeanjour, M., Kling, H., Kühner, S., Michels, I., Müller, T., Stein, B., 1983. Genome and chromatin organization in higher plants. *Biol. Zbl.* 102, 129–148.
- Nagl, W., Rucker, W., 1976. Effect of phytohormones on thermal denaturation profiles of *Cymbidium* DNA: Indication of differential DNA replication. *Nuc. Acid. Res.* 3, 2033–2039.
- Nagpal, P., and Quatrano, R.S., Isolation and characterization of a cDNA clone from *Arabidopsis thaliana* with partial sequence similarity to integrins. *Gene* 230, 33–40.
- Nakajima, H., 1960. Some properties of a contractile protein in a myxomycete plasmodium. *Protoplasma* 52, 413–436.
- Nakajima, K., Sena, G., Nawy, T., Benfey, P.N., 2001. Intercellular movement of the putative transcription factor SHR in root patterning. *Nature* 413, 307–311.
- Nakamura, T., Meyer, C., Sano, H., 2002. Molecular cloning and characterization of plant genes encoding novel peroxisomal molybdoenzymes of the sulfite oxidase family. *J. Exp. Bot.* 53, 1833–1836.
- Nakano, K., Yamamoto, T., Kishimoto, T., Noji, T., Tanaka, K., 2008. Protein kinases Fpk1p and Fpk2p are novel regulators of phospholipids asymmetry. *Mol. Biol. Cell.* 19, 1783–1797.
- Nakhoul, N.L., Davis, B.A., Romero, M.F., Boron, W.F., 1998. Effect of expressing the water channel aquaporin-1 on the CO₂ permeability of *Xenopus* oocytes. *Am. J. Physiol. Cell Physiol.* 43, C543–C548.
- Nakrieko, K.A., Mould, R.M., Smith, A.G., 2004. Fidelity of targeting to chloroplasts is not affected by removal of the phosphorylation site from the transit peptide. *Eur. J. Biochem.* 271, 509–516.
- Napoli, C., Lemieux, C., Jorgensen, R., 1990. Introduction of a chimeric chalcone synthase gene into petunia results in reversible co-suppression of homologous genes in trans. *Plant Cell* 2, 279–289.

- Nass, M.M.K., Nass, S., 1963. Intramitochondrial fibers with DNA characteristics. I. Fixation and electron staining reactions. *J. Cell Biol.* 19, 593–611.
- Natali, L., Cavallini, A., Cremonini, R., Bassi, P., Cionini, P.G., 1986. Amplification of nuclear DNA sequences during induced plant cell dedifferentiation. *Cell. Differen.* 18, 157–161.
- Natali, L., Giordani, T., Cionini, G., Pugliesi, C., Fambrini, M., Cavallini, A., 1995. Heterochromatin and repetitive DNA frequency variation in regenerated plants of *Helianthus annuus* L. *Theor. Appl. Genet.* 91, 395–400.
- Navari-Izzo, F., Quartacci, M.F., Izzo, R., 1989. Lipid changes in maize seedlings in response to field water deficits. *J. Exp. Bot.* 40, 675–680.
- Nazarea, A., Bloch, D.P., Semrau, A., 1985. Detection of a principle modular format in tRNAs and rRNAs: Second order spectral analysis. *Proc. Nat. Acad. Sci. USA* 82, 5337–5341.
- Nebel, B.R., Ruttle, M.L., 1938. The cytological and genetical significance of colchicine. *J. Hered.* 29, 3–9.
- Nebenführ, A., 2003. Intra-Golgi transport: Escalator or bucket brigade? *Annu. Plant Rev.* 9, 76–89.
- Nebenführ, A., 2007. Organelle dynamics during cell division. *Plant Cell Monogr.* 9, 195–206.
- Nebenführ, A., Gallagher, L., Dunahay, T.G., Frohlick, J.A., Mazurkiewicz, A.M., Meehl, J.B., Staehelin, L.A., 1999. Stop-and-go movements of plant Golgi stacks are mediated by the acto-myosin system. *Plant Physiol.* 121, 1127–1141.
- Nebenführ, A., Frohlick, J.A., Staehelin, L.A., 2000. Redistribution of Golgi stacks and other organelles during mitosis and cytokinesis in plant cells. *Plant Physiol.* 124, 135–151.
- Nebenführ, A., Staehelin, L.A., 2001. Mobile factories: Golgi dynamics in plant cells. *Trends Plant Sci.* 6, 160–167.
- Needham, D.M., Pillai, R.K., 1937. The coupling of oxido-reductions and dismutations with esterification of phosphate in muscle. *Biochem. J.* 31, 1837–1851.
- Needham, J.T., 1749. Observations upon the Generation, Composition, and Decomposition of Animal and Vegetable Substances. London.
- Needham, J., 1930. *The Skeptical Biologist*. Yale University Press, New Haven, CT.
- Needham, J., 1936. *Order and Life*. Yale University Press, New Haven, CT.
- Needham, J. (Ed.), 1971. *The Chemistry of Life. Eight Lectures on the History of Biochemistry*. Cambridge University Press, Cambridge.
- Needham, J., Hughes, A., 1959. *A History of Embryology*, second ed. Abelard-Schuman, New York.
- Neher, E., 1991. Ion channels for communication between and within cells. *Nobel Lect.* December 9.
- Nelson, K., Levy, M., Miller, S.L., 2000. Peptide nucleic acids rather than RNA may have been the first genetic molecule. *Proc. Natl. Acad. Sci. USA* 97, 3868–3871.
- Nelson, N., 1988. Structure, function, and evolution of proton ATPases. *Plant Physiol.* 86, 1–3.
- Nelson, N., 1989. Structure, molecular genetics and evolution of vacuolar H⁺ ATPases. *J. Bioenerg. Biomembr.* 21, 553–571.
- Nemec, B., 1899. Uebuer die Karyokinetische Kerntheilung in der Wurzelsspitze von *Allium cepa*. *Jahrb. wiss. Bot.* 33, 313–336.
- Neurath, H., Bailey, K. (Eds.), 1953. *The Proteins*. Vol. 1. Part A. Academic Press, New York.
- Neurath, H., Greenstein, J.P., 1944. The chemistry of the proteins and amino acids. *Ann. Rev. Biochem.* 13, 117–154.
- Nernst, W., [1888]. 1979. On the kinetics of substances in solution. In: Kepner, G.R. (Ed.), *Cell Membranes permeability and Transport*. Dowden, Hutchinson & Ross, Inc., Stroudsburg, PA, pp. 174–183.
- Nernst, W., 1923. *Theoretical Chemistry from the Standpoint of Avogadro's Rule of Thermodynamics*. Translated by L. W. Codd. MacMillan, London.
- Nes, W.R., 1977. The biochemistry of plant sterols. *Adv. Lipid Res.* 15, 233–324.
- Neufeld, H.A., Scott, C.R., Stotz, E., 1954. Purification of heart muscle succinic dehydrogenase. *J. Biol. Chem.* 210, 869–876.
- Neuhaus, G., Bowler, C., Hiratsuka, K., Yamagata, H., Chua, N.-H., 1997. Phytochrome-regulated repression of gene expression requires calcium and cGMP. *EMBO J.* 16, 2554–2564.
- Neumann, J. von., 1958. *The Computer and the Brain*. Yale University Press, New Haven, CT.
- Neumann, J. von., Burks, A.W., 1966. *Theory of Self-Reproducing Automata*. University of Illinois Press, Urbana.
- Neumann, U., Brandizzi, F., Hawes, C., 2003. Protein transport in plant cells: In and out of the Golgi. *Ann. Bot.* 92, 167–180.
- Neutra, M., LeBlond, C.P., 1966. Synthesis of the carbohydrate of mucus in the Golgi complex as shown by electron microscope radioautography of goblet cells from rats injected with glucose-H³. *J. Cell Biol.* 30, 119–136.
- Newcomb, E.H., 1963. Cytoplasm-cell wall relationships. *Annu. Rev. Plant Physiol.* 14, 43–64.
- Newcomb, E.H., 1967. Fine structure of protein-storing plastids in bean root tips. *J. Cell Biol.* 33, 143–163.
- Newcomer, E.H., 1940. Mitochondria in plants. *Bot. Rev.* 6, 85–147.
- Newmeyer, D.D., 1993. The nuclear pore complex and nucleocytoplasmic transport. *Curr. Opin. Cell Biol.* 5, 395–407.
- Newmeyer, D.D., Forbes, D.J., 1988. Nuclear import can be separated into distinct steps in vitro: Nuclear pore binding and translocation. *Cell* 52, 641–653.
- Newton, K.J., Walbot, V., 1985. Maize mitochondria synthesize organ-specific polypeptides. *Proc. Natl. Acad. Sci. USA* 82, 6879–6883.
- Newton, I., 1728. *A Treatise of the System of the World*. Printed for F. Fayram, London.
- Newton, I., [1729]. 1960. In Sir Isaac Newton's *Mathematical Principles of Natural Philosophy and his System of the World*. Fourth Printing. University of California Press, Berkeley, CA.
- Newton, I., [1730]. 1979. *Opticks or A Treatise of the Reflections, Refractions, Inflections & Colours of Light*. fourth ed. Dover Publications, New York.
- Newton, S.A., Ford, N.C., Langley, K.H., Sattelle, D.B., 1977. Laser light-scattering analysis of protoplasmic streaming in the slime mold *Physarum polycephalum*. *Biochim. Biophys. Acta* 496, 212–224.
- Ng, D.T.W., Walter, P., 1994. Protein translocation across the endoplasmic reticulum. *Curr. Opin. Cell Biol.* 6, 510–516.
- Nicchitta, C.V., Blobel, G., 1993. Lumenal proteins of the mammalian endoplasmic reticulum are required to complete protein translocation. *Cell* 73, 989–998.
- Nicholls, D.G., Ferguson, S.J., 1992. *Bioenergetics 2*. Academic Press, London.

- Nick, P., 2000. Plant Microtubules. Potential for Biotechnology. Springer-Verlag, Berlin.
- Nick, P., 2008. Control of cell axis. *Plant Cell Monogr.* 11, 3–46.
- Nick, P., 2008a. Cellular footprints of plant evolution—news from the blepharoblast. *Protoplasma* 233, 175.
- Nick, P., Bergfeld, R., Schäfer, E., Schopfer, P., 1990. Unilateral reorientation of microtubules at the outer epidermal wall during photo- and gravitropic curvature of maize coleoptiles and sunflower hypocotyls. *Planta* 181, 162–168.
- Nickell, L.G., 1993. A tribute to Hugo Kortschak. *Photosyn. Res.* 35, 201–204.
- Nicklas, R.B., 1965. Chromosome velocity during mitosis as a function of chromosome size and position. *J. Cell Biol.* 25, 119–135.
- Nicklas, R.B., 1967. Chromosome micromanipulation. II. Induced reorientation and the experimental control of segregation in meiosis. *Chromosoma* 21, 17–50.
- Nicklas, R.B., 1975. Chromosome movement: Current models and experiments in living cells. In: Inoué, S., Stephens, R.E. (Eds.), *Molecules and Cell Movement*. Raven Press, New York, pp. 97–117.
- Nicklas, R.B., 1983. Measurement of the force produced by the mitotic spindle in anaphase. *J. Cell Biol.* 97, 542–548.
- Nicklas, R.B., 1989. The motor for poleward chromosome movement in anaphase is in or near the kinetochore. *J. Cell Biol.* 109, 2245–2255.
- Nicklas, R.B., 1997. How cells get the right chromosomes. *Science* 275, 632–637.
- Nicklas, R.B., Koch, C.A., 1969. Chromosome micromanipulation. III. Spindle fiber tension and reorientation of mal-oriented chromosomes. *J. Cell Biol.* 43, 40–50.
- Nicklas, R.B., Kubai, D.F., 1985. Microtubules, chromosome movement, and reorientation after chromosomes are detached from the spindle by micromanipulation. *Chromosoma* 92, 313–324.
- Nicklas, R.B., Staehly, C.A., 1967. Chromosome micromanipulation. I. The mechanics of chromosome attachment to the spindle. *Chromosoma* 21, 1–16.
- Nicklas, R.B., Ward, S.C., Gorbosky, G.J., 1995. Kinetochore chemistry is sensitive to tension and may link mitotic forces to a cell cycle checkpoint. *J. Cell Biol.* 130, 929–939.
- Nicolaieff, A., Phillips, G., Gigot, C., Hirth, L., 1976. Ring subunit associated with plant chromatin. *J. Microsc. Biol. Cell.* 26, 1–4.
- Nicolson, W., Carlisle, A., 1800. Account of the New Electrical or Galvanic Apparatus of Sig. Alex. Volta, and experiments performed with the same. *Nicolson's J. Nat. Philos.* 4, 179–187.
- Nicolson, S.W., Nepi, M., Pacini, E., 2007. *Nectaries and Nectar*. Springer, Dordrecht, The Netherlands.
- Nieden, U.Z., Manteuffel, R., Weber, E., Neumann, D., 1984. Dictyosomes participate in the intracellular pathway of storage proteins in developing *Vicia faba* cotyledons. *Eur. J. Cell Biol.* 34, 9–17.
- Nieden, U.Z., Neumann, D., Manteuffel, R., Weber, E., 1982. Electron microscopic immunocytochemical localization of storage proteins in *Vicia faba* seeds. *Eur. J. Cell Biol.* 26, 228–233.
- Nielsen, E., Cheung, A.Y., Ueda, T., 2008. The regulatory RAB and ARF GTPases for vesicular trafficking. *Plant Physiol.* 147, 1516–1526.
- Nielsen, S.O., Lehninger, A.L., 1954. Oxidative phosphorylation in the cytochrome system of mitochondria. *J. Amer. Chem. Soc.* 76, 3860–3861.
- Niemietz, C.M., Tyermann, S.D., 1997. Characterization of water channels in wheat root membrane vesicles. *Plant Physiol.* 115, 561–567.
- Nigg, E.A., 1988. Nuclear function and organization: The potential of immunochemical approaches. *Int. Rev. Cytol.* 110, 27–92.
- Nikaido, S.S., and Johnson, C.H., 2000. Daily and circadian variation in survival from ultraviolet radiation in *Chlamydomonas reinhardtii*. *Photochem. Photobiol.* 71, 758–765.
- Niklas, K.J., 1992. *Plant Biomechanics*. University of Chicago Press, Chicago.
- Niklas, K.J., 2004. The cell walls that bind the tree of life. *BioScience* 54, 831–841.
- Nimchinsky, E.A., Gilissen, E., Allman, J.M., Perl, D.P., Erwin, J.M., Hof, P.R., 1999. A neuronal morphologic type unique to humans and great apes. *Proc. Natl. Acad. Sci. USA* 96, 5268–5273.
- Nirenberg, M., 1968. The genetic code. Nobel Lect. December 12.
- Nirenberg, M., Leder, P., 1964. RNA codewords and protein synthesis. The effect of trinucleotides upon the binding of sRNA to ribosomes. *Science* 145L, 1399–1407.
- Nirenberg, M.W., Matthaei, J.H., 1961. The dependence of cell-free protein synthesis in *E. coli* upon naturally occurring or synthetic polynucleotides. *Proc. Natl. Acad. Sci. USA* 47, 1538–1602.
- Nishiguchi, M., Motoyoshi, F., Oshima, N., 1980. Further investigation of a temperature-sensitive strain of tobacco mosaic virus: Its behavior in tomato leaf epidermis. *J. Gen. Virol.* 45, 497–500.
- Nishihama, R., Soyano, T., Ishikawa, M., Araki, S., Tanaka, H., Asada, T., Irie, K., Ito, M., Terada, M., Banno, H., 2002. Expansion of the cell plate in plant cytokinesis requires a kinesin-like protein/MAPKKK complex. *Cell* 109, 87–99.
- Nishihama, R., Ishikawa, M., Araki, S., Soyano, T., Asada, T., Machida, Y., 2001. The NPK1 mitogen-activated protein kinase kinase kinase is a regulator of cell-plate formation in plant cytokinesis. *Genes Dev.* 15, 352–363.
- Nishihama, R., Machida, Y., 2001. Expansion of the phragmoplast during plant cytokinesis: A MAPK pathway may not MAP out. *Curr. Opin. Plant Biol.* 4, 507–512.
- Nishikawa, S., Umemoto, N., Ohsumi, Y., Nakano, A., Anraku, Y., 1990. Biogenesis of vacuolar membrane glycoproteins of yeast *Saccharomyces cerevisiae*. *J. Biol. Chem.* 265, 7440–7448.
- Nishimura, M., Beevers, H., 1978. Hydrolases in vacuoles from castor bean endosperm. *Plant Physiol.* 62, 44–48.
- Nishimura, M., Beevers, H., 1979. Hydrolysis of protein in vacuoles isolated from higher plant tissue. *Nature* 277, 412–413.
- Nishimura, M., Takeuchi, Y., DeBellis, L., Hara-Nishimura, I., 1993. Leaf peroxisomes are directly transformed to glyoxysomes during senescence of pumpkin cotyledons. *Protoplasma* 175, 131–137.
- Nishimura, M., Yamaguchi, J., Mori, H., Akazawa, T., Yokota, S., 1986. Immunocytochemical analysis shows that glyoxysomes are directly transformed to leaf peroxisomes during greening of pumpkin cotyledons. *Plant Physiol.* 81, 313–316.
- Nishimura, M.T., Stein, M., Hou, B.-H., Vogel, J.P., Edwards, H., Somerville, S.C., 2003. Loss of a callose synthase results in salicylic acid-dependent disease resistance. *Science* 301, 969–972.

- Nito, K., Kamigaki, A., Kondo, M., Hayashi, M., Nishimura, M., 2007. Functional classification of Arabidopsis peroxisome biogenesis factors proposed from analyses of knockdown mutants. *Plant Cell Physiol.* 48, 763–774.
- Niwa, Y., Kato, T., Tabata, S., Seki, M., Kobayashi, M., Shinozaki, K., Moriyasu, Y., 2004. Disposal of chloroplasts with abnormal function into the vacuole in *Arabidopsis thaliana* cotyledon cells. *Protoplasma* 223, 229–232.
- Nobel, P.S., 1974. Introduction to Biophysical Plant Physiology. W. H. Freeman and Co., New York.
- Nobel, P.S., 1983. Biophysical Plant Physiology and Ecology. W. H. Freeman and Co., New York.
- Nobel, P.S., 1991. Physicochemical and Environmental Plant Physiology. Academic Press, New York.
- Nobel, P.S., 2005. Physicochemical and Environmental Plant Physiology, third ed. Elsevier Academic Press, New York.
- Nobles Jr., D.R., Romanovicz, D.K., Brown, R.M., 2001. Cellulose in cyanobacteria. Origin of vascular plant cellulose synthase? *Plant Physiol.* 127, 529–542.
- Noe, K., Wayne, R., 1990. The phototactic response of *Dunaliella* requires nanomolar concentrations of external calcium. *Plant Physiol.* 93 S-90.
- Noguchi, T., Kakami, F., 1999. Transformation of trans-Golgi network during the cell cycle in a green alga, *Botryococcus braunii*. *J. Plant Res.* 112, 175–186.
- Noll, M., 1974. Subunit structure of chromatin. *Nature* 251, 249–251.
- Noller, H.F., Hoffarth, V., Zimniak, L., 1992. Unusual resistance of peptidyl transferase to protein extraction procedures. *Science* 256, 1416–1419.
- Nolta, K.V., Steck, T.L., 1994. Isolation and initial characterization of the bipartite contractile vacuole complex from *Dictyostelium discoideum*. *J. Biol. Chem.* 269, 2225–2233.
- Nomura, K., Saito, W., Ono, K., Moriyama, H., Takahashi, S., Inoue, M., Masuda, K., 1997. Isolation and characterization of matrix associated region DNA fragments in rice (*Oryza sativa* L.). *Plant Cell Physiol.* 38, 1060–1068.
- Norbury, C., Nurse, P., 1992. Animal cell cycles and their control. *Ann. Rev. Biochem.* 61, 441–470.
- Northcote, D.H., 1967. The Living Cell. University of Hull, Hull Printers, Hull, Yorkshire.
- Northcote, D.H., Davey, R., Lay, J., 1989. Use of antisera to localize callose, xylan and arabinogalactan in the cell-plate, primary and secondary walls of plant cells. *Planta* 178, 353–366.
- Northcote, D.H., Pickett-Heaps, J.D., 1966. A function of the Golgi apparatus in polysaccharide synthesis and transport in the root-cap cells of wheat. *Biochem. J.* 98, 159–167.
- Northrop, F.S.C., 1931. Science and First Principles. MacMillan, New York.
- Northrop, J.H., 1961. Biochemists, biologists, and William of Occam. *Ann. Rev. Biochem.* 30, 1–10.
- Northrup, J.H., Herriott, R.M., 1938. Chemistry of the crystalline enzymes. *Ann. Rev. Biochem.* 7, 37–50.
- Northrup, J.H., Kunitz, M., Herriott, R.M., 1948. Crystalline Enzymes. Columbia University Press, New York.
- Nothnagel, E.A., Barak, L.S., Sanger, J.W., Webb, W.W., 1981. Fluorescence studies on modes of cytochalasin B and phallo-toxin action on cytoplasmic streaming in *Chara*. *J. Cell Biol.* 88, 364–372.
- Nothnagel, E.A., Sanger, J.W., Webb, W.W., 1982. Effects of exogenous proteins on cytoplasmic streaming in perfused *Chara* cells. *J. Cell Biol.* 93, 735–742.
- Nothnagel, E.A., Webb, W.W., 1982. Hydrodynamic models of viscous coupling between motile myosin and endoplasm in characean cells. *J. Cell Biol.* 94, 444–454.
- Noeury, A.O., Lucas, W.J., Gilbertson, R.L., 1994. Two proteins of a plant DNA virus coordinate nuclear and plasmodesmatal transport. *Cell* 76, 925–932.
- Novick, P., Ferro, S., Schekman, R., 1981. Order of events in the yeast secretory pathway. *Cell* 25, 461–469.
- Novikoff, A.B., Shin, W.-Y., 1964. The endoplasmic reticulum in the Golgi zone and its relations to microbodies, Golgi apparatus and autophagic vacuoles in rat liver cells. *Journal de Microscopie* 3, 187–206.
- Nozue, K., Kanegae, T., Imaizumi, T., Fukuda, S., Okamoto, H., Yeh, K.-C., Lagarias, J.C., Wada, M., 1998. A phytochrome from the fern *Adiantum* with features of the putative photoreceptor NPH1. *Proc. Natl. Acad. Sci. USA* 95, 15826–15830.
- Nuccitelli, R., 1978. Ooplasmic segregation and secretion in *Pelvetia* egg is accompanied by a membrane-generated electrical current. *Dev. Biol.* 62, 13–33.
- Nuccitelli, R., Erickson, C.A., 1983. Embryonic cell motility can be guided by physiological electric fields. *Exp. Cell Res.* 147, 195–201.
- Nugent, J.M., Palmer, J.D., 1991. RNA-mediated transfer of the gene *cox II* from the mitochondrion to the nucleus during flowering plant evolution. *Cell* 66, 473–481.
- Nunokawa, S.-Y., Anan, H., Shimada, K., Hachikubo, Y., Kashiwaya, T., Ito, K., Yamamoto, K., Binding of *Chara* myosin globular tail domain to phospholipids vesicles. *Plant Cell Physiol.* 48, 1558–1566.
- Nurse, P., 1990. Universal control mechanism regulating onset of M-phase. *Nature* 344, 503–508.
- Nurse, P., 2001. Cyclin dependent kinases and cell cycle control. Nobel Lect. December 9.

-O-

- Oakley, B.R., 1992. γ -tubulin: The microtubule organizer? *Trends Cell Biol.* 2, 1–6.
- Oakley, B.R., Oakley, C.E., Yoon, Y., Jung, M.K., 1990. Gamma-tubulin is a component of the spindle pole body that is essential for microtubule function in *Aspergillus nidulans*. *Cell* 61, 1289–1301.
- Oakley, C.E., Oakley, B.R., 1989. Identification of gamma tubulin, a new member of the tubulin super family by mipA gene of *Aspergillus nidulans*. *Nature* 338, 662–664.
- O'Brien, T.P., Thimann, K.V., 1966. Intracellular fibers in oat coleoptile cells and their possible significance in cytoplasmic streaming. *Proc. Natl. Acad. Sci. USA* 56, 888–894.
- Ochiai, E.-I., 1987. General Principles of Biochemistry of the Elements. Plenum Press, New York.
- Ochoa, S., 1943. Efficiency of aerobic phosphorylation in cell-free heart extracts. *J. Biol. Chem.* 151, 493–505.
- Ochoa, S., 1952. Enzyme studies in biological oxidations and synthesis. *Harvey Lect.* 46, 153–180.
- Ochoa, S., 1959. Enzymatic synthesis of ribonucleic acid. Nobel Lect. December 11.

- Ochoa, S., 1980. The thrill of discovery. *Comp. Biochem. Physiol.* 67B, 359–365.
- Ochoa, S., Mehler, A.H., Kornberg, A., 1948. Biosynthesis of dicarboxylic acids by carbon dioxide fixation. *J. Biol. Chem.* 174, 979–1000.
- O'Driscoll, D., Hann, C., Read, S.M., Steer, M.W., 1993. Endocytotic uptake of fluorescent dextrans by pollen tubes grown in vitro. *Protoplasma* 175, 126–130.
- Oels, W., 1894. *Experimental Plant Physiology*. Translated and edited by D. T. MacDougal. Morris & Wilson, Minneapolis.
- Oettlé, A.G., 1948. Golgi apparatus of living human testicular cells seen with phase-contrast microscopy. *Nature* 162, 76–77.
- Oesper, P., 1950. Sources of the high energy content in energy-rich phosphates. *Arch. Biochem.* 27, 255–270.
- Offler, C.E., McCurdy, D.W., Patrick, J.W., Talbot, M.J., 2003. Transfer cells: Cells specialized for a special purpose. *Annu. Rev. Plant Biol.* 54, 431–454.
- Ogata, K., Nohara, H., 1957. The possible role of the ribonucleic acid (RNA) of the pH 5 enzyme in amino acid activation. *Biochim. Biophys. Acta* 25, 659–660.
- Ogren, W.L., 2003. Affixing the O to rubisco: Discovering the source of photorespiratory glycolate and its regulation. *Photosyn. Res.* 76, 53–63.
- Ogren, W.L., Bowes, G., 1971. Ribulose diphosphate carboxylase regulates soybean photorespiration. *Nat. New Biol.* 230, 159–160.
- Ogston, A.G., 1948. Interpretation of experiments on metabolic processes, using isotope tracer elements. *Nature* 162, 963.
- Ogston, A.G., 1955. Chemistry of proteins, peptides, and amino acids. *Ann. Rev. Biochem.* 24, 191–206.
- Ogston, A.G., 1995. Person reflections. *Biophys. Chem.* 57, 3–5.
- Ogston, A.G., Smithies, O., 1948. Some thermodynamic and kinetic aspects of metabolic phosphorylation. *Physiol. Rev.* 28, 283–303.
- Ohana, P., Delmer, D.P., Volman, G., Steffens, J.C., Matthews, D.E., Benizman, M., 1992. β -furfuryl- β glucoside: An endogenous activator of higher plant UDP-glucose:(1,3)- β -glucan synthase. *Plant Physiol.* 98, 708–715.
- Ohm, G. S., [1827]. 1966. Die galvanische Kette, mathematisch bearbeitet. Translated by W. Francis. The Galvanic Current investigated Mathematically. Scientific Memoirs, Selected from the Transactions of Foreign Academies of Science and Learned Societies and from Foreign Journals, R. Taylor (Ed.), vol. 2. Printed by Richard and John E. Taylor, London. Reprinted by Johnson Reprint Corp., New York, pp. 401–506.
- Ohno, T., Takamatsu, N., Meshi, T., Okada, Y., Nishiguchi, M., Kiho, Y., 1983. Single amino acid substitution in 30K protein of TMV defective in virus transport function. *Virology* 131, 255–258.
- Ohsuka, K., Inoue, A., 1979. Identification of myosin in a flowering plant *Egeria densa*. *J. Biochem.* 85, 375–378.
- Ohta, T., Kimura, M., 1971. Amino acid composition of proteins as a product of molecular evolution. *Science* 174, 150–153.
- Ohya, Y., Anraku, Y., 1989. A galactose-dependent and I mutant of *Saccharomyces cerevisiae*: Involvement of calmodulin in nuclear division. *Amer. Genet.* 15, 113–120.
- Ohyama, K., Fukuzawa, H., Kohchi, T., Shirai, H., Sano, T., Sano, S., Umesono, K., Shiki, Y., Takeuchi, M., Chang, Z., Aota, S.-I., Inokuchi, H., Ozeki, H., 1986. Chloroplast gene organization deduced from complete sequence of liverwort, *Marchantia polymorpha* chloroplast DNA. *Nature* 322, 572–574.
- Oiwa, K., Takahashi, K., 1988. The force-velocity relationship for microtubule sliding in demembrated sperm flagella of the sea urchin. *Cell Struct. Funct.* 13, 193–205.
- Okamoto-Nakazato, A., 2002. A brief note on the study of yieldin, a wall-bound protein that regulates the yield threshold of the cell wall. *J. Plant Res.* 115, 309–313.
- Okamoto-Nakazato, A., Nakamura, T., Okamoto, H., 2000a. The isolation of wall-bound proteins regulating yield threshold tension in glycerinated hollow cylinders of cowpea hypocotyl. *Plant Cell Environ.* 23, 145–154.
- Okamoto-Nakazato, A., Takahashi, K., Kido, N., Owaribe, K., Katou, K., 2000b. Molecular cloning of yieldins regulating the yield threshold of cowpea cell walls: cDNA cloning and characterization of recombinant yieldin. *Plant, Cell Environ.* 23, 155–164.
- Okamoto-Nakazato, A., Takahashi, K., Katoh-Semba, R., Katou, K., 2001. Distribution of yieldin, a regulatory protein of the cell wall yield threshold, in etiolated cowpea seedlings. *Plant Cell Physiol.* 42, 952–958.
- Okazaki, Y., 1996. Turgor regulation in a brackish water charophyte, *Lamprothamnium succinctum*. *J. Plant Res.* 109, 107–112.
- Okazaki, Y., 2002. Blue light inactivates plasma membrane H(+)-ATPase in pulvinar motor cells of *Phaseolus*. *Plant Cell Physiol.* 43, 860–868.
- Okazaki, Y., Ishigami, M., Iwasaki, N., 2002. Temporal relationship between cytosolic free Ca^{2+} and membrane potential during hypotonic turgor regulation in a brackish water charophyte *Lamprothamnium succinctum*. *Plant Cell Physiol.* 43, 1027–1035.
- Okazaki, Y., Iwasaki, N., 1991. Injection of a Ca^{2+} chelating agent into the cytoplasm retards the progress of turgor regulation upon hypotonic treatment in the alga, *Lamprothamnium*. *Plant Cell Physiol.* 32, 185–194.
- Okazaki, Y., Shimmen, T., Tazawa, M., 1984a. Turgor regulation in a brackish water charophyte, *Lamprothamnium succinctum*. I. Artificial modification of intracellular osmotic pressure. *Plant Cell Physiol.* 25, 565–571.
- Okazaki, Y., Shimmen, T., Tazawa, M., 1984b. Turgor regulation in a brackish water charophyte, *Lamprothamnium succinctum*. II. Changes in K^+ , Na^+ and Cl^- concentrations, membrane potential and membrane resistance during turgor regulation. *Plant Cell Physiol.* 25, 573–581.
- Okazaki, Y., Tazawa, M., 1986a. Ca^{2+} antagonist nifedipine inhibits turgor regulation upon hypotonic treatment in internodal cells of *Lamprothamnium*. *Protoplasma* 134, 65–66.
- Okazaki, Y., Tazawa, M., 1986b. Effect of calcium ion on cytoplasmic streaming during turgor regulation in a brackish water charophyte *Lamprothamnium*. *Plant Cell Environ.* 9, 491–494.
- Okazaki, Y., Tazawa, M., 1986c. Involvement of calcium ion in turgor regulation upon hypotonic treatment in *Lamprothamnium succinctum*. *Plant Cell Environ.* 9, 185–190.
- Okazaki, Y., Tazawa, M., 1987a. Dependence of plasmalemma conductance and potential on intracellular free Ca^{2+} in tonoplast-removed cells of a brackish water characeae *Lamprothamnium*. *Plant Cell Physiol.* 28, 703–708.
- Okazaki, Y., Tazawa, M., 1987b. Increase in cytoplasmic calcium content in internodal cells of *Lamprothamnium* upon hypotonic treatment. *Plant Cell Environ.* 10, 619–621.

- Okazaki, Y., Tazawa, M., 1990. Calcium ion and turgor regulation in plant cells. *J. Membr. Biol.* 114, 189–194.
- Okazaki, Y., Yoshimoto, Y., Hiramoto, Y., Tazawa, M., 1987. Turgor regulation and cytoplasmic free Ca^{2+} in the alga *Lamprothamnium*. *Protoplasma* 140, 67–71.
- Okihara, K., Kiyosawa, K., 1988. Ion composition of the *Chara* internode. *Plant Cell Physiol.* 29, 21–25.
- Okuda, K., 2002. Structure and phylogeny of cell coverings. *J. Plant Res.* 115, 283–288.
- Okuda, K., Brown Jr., R.M., 1992. A new putative cellulose-synthesizing complex of *Coleochaete scutata*. *Protoplasma* 168, 51–63.
- Okuda, K., Li, L., Kudlicka, K., Kuga, S., Brown Jr., R.M., 1993. β glucan synthesis in the cotton. Identification of β -1,4 and β -1,3 glucans synthesized in vitro. *Plant Physiol.* 101, 1131–1142.
- Okuda, K., Sekida, S., Yoshinaga, S., Suetomo, Y., 2004. Cellulose-synthesizing complexes in some chromophyte algae. *Cellulose* 11, 365–376.
- Okuwaki, T., Takahashi, H., Itoh, R., Toda, K., Kawazu, T., Kuroiwa, H., Kuroiwa, T., 1996. Ultrastructures of the Golgi body and cell surface in *Cyanidioschyzon merolae*. *Cytologia* 61, 69–74.
- Olby, R., 1972. Francis Crick, DNA, and the central dogma. In: Holton, G. (Ed.), *The Twentieth-Century Sciences*. W. W. Norton & Co., New York, pp. 227–280.
- Olins, A.L., Olins, D.E., 1974. Spheroid chromatin units (v bodies). *Science* 183, 330–332.
- Olive, J., Wollman, F.A., Bennoun, P., Recouvreur, M., 1983. Localization of the core and peripheral antennae of photosystem I in the thylakoid membranes of *Chlamydomonas reinhardtii*. *Biol. Cell.* 48, 81–84.
- Oliver, D.F., 1994. The glycine decarboxylase complex from plant mitochondria. *Ann. Rev. Plant Physiol. Plant Mol. Biol.* 45, 323–327.
- Olmedilla, A., Testillano, P.S., Vincente, O., Delseny, M., Risueño, M.C., 1993. Ultrastructural rRNA localization in plant cell nuclei. *J. Cell Sci.* 106, 1333–1346.
- Olesen, P., 1979. The neck construction in plasmodesmata: Evidence for a peripheral sphincter-like structure revealed by fixation with tannic acid. *Planta* 144, 349–358.
- Olsen, L.J., Ettinger, W.F., Damsz, B., Matsudaira, K., Webb, M.A., Harada, J.J., 1993. Targeting of glyoxysomal proteins to peroxisomes in leaves and roots of a higher plant. *Plant Cell* 5, 941–952.
- Olsen, L.J., Harada, J.J., 1995. Peroxisomes and their assembly in higher plants. *Ann. Rev. Plant Physiol. Plant Mol. Biol.* 46, 123–146.
- Olson, E.C., 1965. *The Evolution of Life*. Weidenfeld and Nicolson, London.
- O'Neill, M.A., Eberhard, S., Albersheim, P., Darvill, A.G., 2001. Requirement of borate cross-linking of cell wall rhamnogalacturonan II. For *Arabidopsis* growth. *Science* 294, 846–849.
- O'Neill, M.A., Warrenfetz, D., Kates, K., Pellerin, P., Doco, T., Darvill, A.G., Albersheim, P., 1996. Rhamnogalacturonan-II, a pectic polysaccharide in the walls of growing plant cells, forms a dimer that is covalently cross-linked by borate ester. In vitro conditions for the formation and hydrolysis of the dimer. *J. Biol. Chem.* 271, 22923–22930.
- Onslow, M.W., 1916. *The Anthocyanin Pigments of Plants*. Cambridge University Press, Cambridge.
- Oparin, A.I., 1924. *The Origin of Life*. Reprinted in *The Origin of Life* by J. D. Bernal. 1967. The World Publishing Co., Cleveland, OH.
- Oparin, A. I., [1938]. 1953. *Origin of Life*. Dover Publications, New York.
- Oparin, A.I., 1964. *The Chemical Origin of Life*. Charles E. Thomas Publisher, Springfield, IL.
- Oparka, K.J., 1994. Plasmolysis: New insights into an old process. *New Phytol.* 126, 571–591.
- Oparka, K., Boevink, P., 2005. Techniques for imaging intercellular transport. In: Oparka, K.J. (Ed.), *Plasmodesmata*. Blackwell Publishing, Oxford, pp. 241–262.
- Oparka, K.J., Prior, D.A.M., 1992. Direct evidence for pressure-generated closure of plasmodesmata. *Plant J.* 2, 741–750.
- Oparka, K.J., Prior, D.A.M., Harris, N., 1990. Osmotic induction of fluid phase endocytosis in onion epidermal cells. *Planta* 180, 555–561.
- Oparka, K.J., Roberts, A.G., 2001. Plasmodesmata. A not so open and shut case. *Plant Physiol.* 125, 123–126.
- Oparka, K.J., Roberts, A.G., Boevink, P., SantaCruz, S., Roberts, I.M., Pradel, K.S., Imlau, A., Kotlizky, G., Sauer, N., Epel, B., 1999. Simple, but not branched, plasmodesmata allow the nonspecific trafficking of proteins in developing tobacco leaves. *Cell* 97, 743–754.
- Oparka, K.J., Turgeon, R., 1999. Sieve elements and companion cells—traffic control centers of the phloem. *Plant Cell* 11, 739–750.
- Opas, M., Tharin, S., Milner, R.E., Michalak, M., 1996. Identification and localization of calreticulin in plant cells. *Protoplasma* 191, 164–171.
- Orci, L., Glick, B.S., Rothman, J.E., 1986. A new type of coated vesicular carrier that appears not to contain clathrin: Its possible role in protein transport within the Golgi stack. *Cell* 46, 171–184.
- Orci, L., Malholtra, V., Amherdt, M., Serafini, T., Rothman, J.E., 1989. Dissection of a single round of vesicular transport: Sequential intermediates for intercisternal movement in the Golgi stack. *Cell* 56, 357–368.
- Ordentlich, A., Linzer, R.A., Raskin, I., 1991. Alternative respiration and heat evolution in plants. *Plant Physiol.* 97, 1545–1550.
- Orgel, L.E., 1973. *The Origins of Life: Molecules and Natural Selection*. John Wiley & Sons, New York.
- Orgel, L., 2004. Prebiotic adenine revisited: Eutectics and photochemistry. *Orig. Life Evol. Biosph.* 34, 361–369.
- Ormenese, S., Bernier, G., Périlleux, C., 2006. Cytokinin application to the shoot apical meristem of *Sinapis alba* enhances secondary plasmodesmata formation. *Planta* 224, 1481–1484.
- Oró, J., 1960. Synthesis of adenine from ammonium cyanide. *Biochem. Biophys. Res. Commun.* 2, 407–412.
- Oró, J., 1976. Prebiological chemistry and the origin of life. A personal account. In: Kornberg, A., Horecker, B.L., Cornudella, L., Oró, J. (Eds.), *Reflections on Biochemistry*. In Honour of Severo Ochoa. Pergamon Press, Oxford, pp. 423–443.
- Ortega, J.K.E., 1985. Augmented growth equation for cell wall expansion. *Plant Physiol.* 79, 318–320.
- Ortega, J.K.E., 1990. Governing equations for plant cell growth. *Physiol. Plant.* 79, 116–121.
- O'Neill, J., Carlson, R.W., Francis, D., Stevenson, R.K., 2008. Neodymium-142 evidence for hadean mafic crust. *Science* 321, 1828–1831.

- O'Neill, S.D., Bennett, A.B., Spanswick, R.M., 1983. Characterization of a NO₃-sensitive H⁺-ATPase from corn roots. *Plant Physiol.* 72, 837–846.
- Onelli, E., Prescianotto-Baschong, C., Caccianiga, M., Moscatelli, A., 2008. Clathrin-dependent and independent endocytotic pathways in tobacco protoplasts revealed by labeling with charged nanogold. *J. Exp. Bot.* 59, 3051–3068.
- O'Rourke, A.M., Mescher, M.F., 1990. T-cell receptor-activated adhesion systems. *Curr. Opin. Cell Biol.* 2, 850–856.
- Osborne, S.G., 1857. Vegetable cell-structure and its formation, as seen in the early stages of the growth of the wheat plant. *Quart. J. Microscop. Sci.* 5, 104–122.
- Osborne, T.B., 1924. *The Vegetable Proteins*, second ed. Longmans, Green and Co., New York.
- Östergren, G., 1949. *Luzula* and the mechanism of chromosome movements. *Hereditas* 35, 445–468.
- Östergren, G., 1951. The mechanism of co-orientation in bivalents and multivalents. The theory of orientation by pulling. *Hereditas* 37, 85–156.
- Östergren, G., Molè-Bajer, J., Bajer, A., 1960. An interpretation of transport phenomena at mitosis. *Ann. NY Acad. Sci.* 90, 381–408.
- Osterhout, W.J.V., 1924. *The Nature of Life. The Colver Lectures in Brown University. 1922.* Henry Holt, New York.
- Osterhout, W.J.V., 1949. Movements of water in cells of *Nitella*. *J. Gen. Physiol.* 32, 553–557.
- Osteryoung, K.W., Nunnari, J., 2003. The division of endosymbiotic organelles. *Science* 302, 1698–1704.
- Osteryoung, K.W., McAndrew, R.S., 2001. The plastid division machine. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 52, 315–333.
- Osteryoung, K.W., Stokes, K.D., Rutherford, S.M., Percival, A.L., Lee, W.Y., 1998. Chloroplast division in higher plants requires members of two functionally divergent gene families with homology to bacterial FtsZ. *Plant Cell* 10, 1991–2004.
- Osteryoung, K.W., Vierling, E., 1995. Conserved cell and organelle division. *Nature* 376, 473–474.
- Ostwald, W., 1891. *Solutions*. Translated by M. M. Pattison Muir. Longmans, Green, and Co., London.
- Ostwald, W., 1900. *The Scientific Foundations of Analytical Chemistry*. MacMillan and Co., London.
- Ostwald, W., 1906. The historical development of general chemistry. *School of Mines Quarterly* 27, 1–84.
- Ostwald, W., 1910. *Natural Philosophy*. Translated by T. Seltzer. Henry Holt and Co., New York.
- Ostwald, W., 1980. *Electrochemistry. History and Theory. Volumes I and II.* Amerind Publishing Co., New Delhi.
- Ostwald, W., 1922. *An Introduction to Theoretical and Applied Colloid Chemistry The World of Neglected Dimensions*. John Wiley & Sons, New York.
- Otegui, M.S., 2007. Endosperm cell walls: Formation, composition, and functions. *Plant Cell Monogr.* 8, 159–177.
- Otegui, M.S., Mastroratte, D.N., Kang, B.-H., Bednarek, S.Y., Staehelin, L.A., 2001. Three-dimensional analysis of syncytial-type cell plates during endosperm cellularization visualized by high resolution electron tomography. *Plant Cell* 13, 2033–2051.
- Ovádi, J., 1991. Physiological significance of metabolite channeling. *J. Theor. Biol.* 152, 1–22.
- Ovádi, J., Srere, P.A., 2000. Macromolecular compartmentation and channeling. *Int. Rev. Cytol.* 192, 255–280.
- Overall, R.L., Gunning, B.E.S., 1982. Intercellular communication in *Azolla* roots. II. Electrical coupling. *Protoplasma* 111, 151–160.
- Overall, R.L., Wolfe, J., Gunning, B.E.S., 1982. Intercellular communication in *Azolla* roots I. Ultrastructure of plasmodesmata. *Protoplasma* 111, 134–150.
- Overton, E., 1893. On the reduction of the chromosomes in the nuclei of plants. *Ann. Bot.* 7, 139–143.
- Overton, E., 1899. Ueber die allgemeinen osmotischen Eigenschaften der Zelle, ihre vermutlichen Ursachen und ihre Bedeutung für die Physiologie. *Vierteljahrsschrift der Naturforsch. Ges. (Zürich)* 44, 88–135. Translated by R. B. Park in: *Papers on Biological Membrane Structure. 1968.* Selected by D. Branton and R. B. Park. Little, Brown, and Co., Boston.
- Overton, E., 1900. Studien über die Aufnahme der Anilinfarben durch die lebende Zelle. *Jahr. wiss. Bot.* 34, 669–701.
- Owen, J.D., Eyring, E.M., 1975. Reflection coefficients of permeant molecules in human red cell suspensions. *J. Gen. Physiol.* 66, 251–265.
- Oxford English Dictionary, 1933. *A New English Dictionary on Historical Principles*. Clarendon Press, Oxford.

-P-

- Pabo, C.O., Sauer, R.T., 1992. Transcription factors: Structural families and principles of DNA recognition. *Annu. Rev. Biochem.* 61, 1053–1095.
- Paecht-Horowitz, M., 1976. Clays as possible catalysts for peptide formation in the prebiotic era. *Orig. Life* 7, 369–381.
- Paecht-Horowitz, M., Berger, J., Katchalsky, A., 1970. Prebiotic synthesis of polypeptides by heterogenous polycondensation of amino-acid adenylates. *Nature* 228, 636–639.
- Paecht-Horowitz, M., Eirich, F.R., 1988. The polymerization of amino acid adenylates on sodium montmorillonite with preadsorbed polypeptides. *Orig. Life* 18, 359–388.
- Pagliari, L., 1993. Glycolysis revisited—A funny thing happened on the way to the Krebs cycle. *News Physiol. Sci.* 8, 219–223.
- Pagliari, L., 2000. Mechanisms for cytoplasmic organization: An overview. *Int. Rev. Cytol.* 192, 303–318.
- Pagliari, L., Taylor, D.L., 1988. Aldolase exists in both the fluid and solid phases of cytoplasm. *J. Cell Biol.* 107, 981–992.
- Pagliari, L., Taylor, D.L., 1992. 2-deoxyglucose and cytochalasin D modulate aldolase mobility in living 3T3 cells. *J. Cell Biol.* 118, 859–863.
- Pain, D., Kanwar, Y.S., Blobel, G., 1988. Identification of a receptor for protein import into chloroplasts and its localization to envelope contact zones. *Nature* 331, 232–237.
- Paine, T., 1880. Letter to Mr. Erskine. In: Blanchard, C. (Ed.), *Complete Works of Thomas Paine*. Belford, Clarke & Co., Chicago, pp. 237–265.
- Painter, T. S., Recent developments in our knowledge of chromosome structure and their application to genetics. In: Baitsell, G.A. (Ed.), *Science in Progress*. Yale University Press, New Haven, CT, pp. 210–232.
- Palade, G.E., 1952. The fine structure of mitochondria. *Anat. Rec.* 114, 427–451.
- Palade, G.E., 1953. An electron microscope study of the mitochondria structure. *J. Histochem. Cytochem.* 1, 188–211.

- Palade, G.E., 1955. A small particulate component of the cytoplasm. *J. Biophys. Biochem. Cytol.* 1, 59–68.
- Palade, G.E., 1956. The endoplasmic reticulum. *J. Biophys. Biochem. Cytol.* 2 (Suppl.), 85–97.
- Palade, G.E., 1958. Microsomes and ribonuclear particles. In: Roberts, R.B. (Ed.), *Microsomal Particles and Protein Synthesis*. Pergamon Press, New York, pp. 36–61.
- Palade, G.E., 1959. Functional changes in the structure of cell components. In: Hayashi, T. (Ed.), *Subcellular Particles*. Ronald Press Co., New York, pp. 64–83.
- Palade, G.E., 1963. The organization of living matter. In: *The Scientific Endeavor*. The Rockefeller Press, New York, pp. 179–203.
- Palade, G.E., 1975. Intracellular aspects of the processing of protein synthesis. *Science* 189, 347–358.
- Palade, G.E., Claude, A., 1949. The nature of the Golgi apparatus. *J. Morph.* 85, 35–70 71–112.
- Palade, G.E., Porter, K.R., 1954. Studies on the endoplasmic reticulum. I. Its identification in cells in situ. *J. Exp. Med.* 100, 641–656.
- Palade, G.E., Siekevitz, P., 1956. Liver microsomes. An integrated morphological and biochemical study. *J. Biophys. Biochem. Cytol.* 2, 171–199.
- Palay, S.L., Palade, G.E., 1955. The fine structure of neurons. *J. Biophys. Biochem. Cytol.* 1, 69–88.
- Paleg, L.G., 1965. Physiological effects of gibberellins. *Ann. Rev. Plant Physiol.* 16, 291–322.
- Palevitz, B.A., 1980. Comparative effects of phalloidin and cytochalasin B on motility and morphogenesis in *Allium*. *Can. J. Bot.* 58, 773–785.
- Palevitz, B.A., 1987a. Accumulation of F-actin during cytokinesis in *Allium*. Correlation with microtubule distribution and the effects of drugs. *Protoplasma* 141, 24–32.
- Palevitz, B.A., 1987b. Actin in the preprophase band of *Allium cepa*. *J. Cell Biol.* 104, 1515–1519.
- Palevitz, B.A., 1988a. Cytochalasin-induced reorganization of actin in *Allium* root cells. *Cell Motil. Cytoskel.* 9, 283–298.
- Palevitz, B.A., 1988b. Microtubular fir-trees in mitotic spindles of onion roots. *Protoplasma* 142, 74–78.
- Palevitz, B.A., Cresti, M., 1989. Cytoskeletal changes during generative cell division and sperm formation in *Tradescantia virginiana*. *Protoplasma* 150, 54–71.
- Palevitz, B.A., Hepler, P.K., 1974a. The control of the plane of cell division during stomatal differentiation in *Allium*. I. Spindle reorientation. *Chromosoma* 46, 297–341.
- Palevitz, B.A., Hepler, P.K., 1974b. The control of the plane of division during stomatal differentiation in *Allium*. II. Drug studies. *Chromosoma* 46, 327–341.
- Palevitz, B.A., Hepler, P.K., 1975. Identification of actin in situ at the ectoplasm-endoplasm interface of *Nitella*. *J. Cell Biol.* 65, 29–38.
- Palevitz, B.A., Hepler, P.K., 1976. Cellulose microfibril orientation and cell shaping in developing guard cells of *Allium*: The role of microtubules and ion accumulation. *Planta* 132, 71–93.
- Palevitz, B.A., Hepler, P.K., 1985. Changes in dye coupling of stomatal cells of *Allium* and *Commelina* demonstrated by microinjection of Lucifer yellow. *Planta* 164, 473–479.
- Palevitz, B.A., O'Kane, D.J., 1981. Epifluorescence and video analysis of vacuole motility and development in stomatal cells of *Allium*. *Science* 214, 443–445.
- Palevitz, B.A., O'Kane, D.J., Kobres, R.E., Railhel, N.V., 1981. The vacuole system in stomatal cells of *Allium*. Vacuole movements and changes in morphology in differentiating cells as revealed by epifluorescence, video and electron microscopy. *Protoplasma* 109, 23–55.
- Paller, M.S., 1994. Lateral mobility of Na,K-ATPase and membrane lipids in renal cells. Importance of cytoskeletal integrity. *J. Membr. Biol.* 142, 127–135.
- Palmer, A.E., Jin, C., C Reed, J., Tsien, R.Y., 2004. Bcl-2-mediated alterations in endoplasmic reticulum Ca^{2+} analyzed with an improved genetically encoded fluorescent sensor. *Proc. Natl Acad. Sci. USA* 101, 17404–17409.
- Palmer, J.D., Deleiche, C.F., 1996. Second-hand chloroplasts and the case of the disappearing nucleus. *Proc. Natl. Acad. Sci. USA* 93, 7432–7435.
- Palmer, J.D. Organelle genomes: Going, going, gone! *Science* 275, 790–791.
- Palmer, J.D., Shields, C.R., 1984. Tripartite structure of the *Brassica campestris* mitochondrial genome. *Nature* 307, 437–440.
- Palmgren, M.G., Sommarin, M., Serrano, R., Larsson, C., 1991. Identification of an autoinhibitory domain in the C-terminal region of the plant plasma membrane H^{+} -ATPase. *J. Biol. Chem.* 266, 20470–20475.
- Palmieri, M., Kiss, J.Z., 2005. Disruption of the F-actin cytoskeleton limits statolith movement in *Arabidopsis* hypocotyls. *J. Exp. Bot.* 56, 2539–2550.
- Palmieri, M., Schwind, M.A., Stevens, M.H.H., Edelmann, R.E., Kiss, J.Z., 2007. Effects of the myosin ATPase inhibitor 2,3-butanedione monoxime on amyloplast kinetics and gravitropism of *Arabidopsis* hypocotyls. *Physiologia Plant* 130, 613–626.
- Pandey, S., Chen, J.G., Jones, A.M., Assmann, S.M., 2006. G-protein complex mutants are hypersensitive to ABA-regulation of germination and post-germination development. *Plant Physiol.* 141, 243–256.
- Panteris, E., Apostolakis, P., Galatis, B., 1993. Microtubule organization, mesophyll cell morphogenesis, and intercellular space formation in *Adiantum capillus veneris* leaflets. *Protoplasma* 172, 97–110.
- Panteris, E., Apostolakis, P., Quader, H., Galatis, B., 2004. A cortical ring predicts the division plane in vacuolated cells of *Coleus*: The role of actomyosin and microtubules in the establishment and function of the division site. *New Phytol.* 163, 271–286.
- Paolillo Jr., D.J., 1962. The plastids of *Isoetes Howellii*. *Amer. J. Bot.* 49, 590–598.
- Paolillo Jr., D.J., 1967. On the structure of the axoneme in flagella of *Polytrichum juniperinum*. *Trans. Amer. Microsc. Soc.* 86, 428–433.
- Paolillo Jr., D.J., 1970. The threedimensional arrangement of intergranular lamellae in chloroplasts. *J. Cell Sci.* 6, 243–255.
- Paolillo Jr., D.J., 1981. The swimming sperms of land plants. *BioScience* 31, 367–373.
- Paolillo Jr., D.J., 2000. Axis elongation can occur with net longitudinal orientation of wall microfibrils. *New Phytol.* 145, 449–455.
- Paolillo Jr., D.J., Falk, R.H., 1966. The ultrastructure of grana in mesophyll plastids of *Zea mays*. *Amer. J. Bot.* 53, 173–180.
- Paolillo Jr., D.J., MacKay, N.C., Reighard, J.A., 1969. The structure of grana in flowering plants. *Amer. J. Bot.* 56, 344–347.

- Paolillo Jr., D.J., Reighard, J.A., 1967. On the relationship between mature structure and ontogeny in the grana of chloroplasts. *Can. J. Bot.* 45, 773–782.
- Paolillo Jr., D.J., Rubin, G., 1980. Reconstruction of the grana-fretwork system of a chloroplast. *Amer. J. Bot.* 67, 575–584.
- Pardee, A.B., 1989. G₁ events and regulation of cell proliferation. *Science* 246, 603–608.
- Paredez, A.R., Persson, S., Ehrhardt, D.W., Somerville, C.R., 2008. Genetic evidence that cellulose synthase activity influences microtubule cortical array organization. *Plant Physiol.* 147, 1723–1734.
- Paredez, A.R., Somerville, C.R., Ehrhardt, D.W., 2006. Visualization of cellulose synthase demonstrates functional association with microtubules. *Science* 312, 1491–1495.
- Paris, N., Stanley, C.M., Jones, R.L., Rogers, J.C., 1996. Plant cells contain two functionally distinct vacuolar compartments. *Cell* 85, 563–572.
- Parker, J., Miller, C., Anderson, B.H., 1986. Higher plant myosin heavy-chain identified using a monoclonal antibody. *Eur. J. Cell Biol.* 41, 9–13.
- Parker, M.L., Hawes, C.R., 1982. The Golgi apparatus in developing endosperm of wheat (*Triticum aestivum* L.). *Planta* 154, 277–283.
- Parnas, J.K., 1910. Ueber fermentative Beschleunigung der Cannizzaroschen Aldehydulagerung durch Gewebssäfte. *Biochem. Z.* 28, 274–294.
- Parpart, A.K., Dziemian, A.J., 1940. The chemical composition of the red cell membrane. *Cold Spring Harb. Symp. Quant. Biol.* 8, 17–24.
- Parsons, M., Karnataki, A., Feagin, J.E., DeRocher, A., 2007. Protein trafficking to the Apicoplast. Deciphering the apicomplexan solution to secondary endosymbiosis. *Eukaryotic Cell* 6, 1081–1088.
- Parthasarathy, M.V., 1974. Ultrastructure of phloem in palms. III. Mature phloem. *Protoplasma* 79, 265–315.
- Parthasarathy, M.V., 1985. F-actin architecture in coleoptile epidermal cells. *Eur. J. Cell Biol.* 39, 1–12.
- Parthasarathy, M.V., Mühlethaler, K., 1972. Cytoplasmic microfilaments in plant cells. *J. Ultrastruc. Res.* 38, 46–62.
- Parthasarathy, M.V., Perdue, T.D., Witztum, A., Alvernaz, J., 1985. Actin network as a normal component of the cytoskeleton in many vascular plant cells. *Am. J. Bot.* 72, 1318–1323.
- Partikian, A., Ölveczky, B., Swaminathan, R., Li, Y., Verkman, A.S., 1998. Rapid diffusion of green fluorescent protein in the mitochondrial matrix. *J. Cell Biol.* 140, 821–829.
- Parton, R.M., Fischer-Parton, S., Watahiki, M.K., Trewavas, A.J., 2001. Dynamics of the apical vesicle accumulation and the rate of growth are related in individual pollen tubes. *J. Cell Sci.* 114, 2685–2695.
- Paschal, B.M., Shpetner, H.S., Vallee, R.B., 1987. MAP 1C is a microtubule-activated ATPase which translocates microtubules in vitro and has dynein-like properties. *J. Cell Biol.* 105, 1273–1282.
- Pascual, D.W., 2007. Vaccines are for dinner. *Proc. Natl. Acad. Sci. USA* 104, 10757–10758.
- Pastan, I., Willingham, M.C., 1985. *Endocytosis*. Plenum Press, New York.
- Pasternak, C.A., 1993. A glance back over 30 years. *Bioscience Reports* 13, 191–212.
- Pasteur, L., [1879] 1910. The physiological theory of fermentation. In: *Scientific Papers. The Harvard Classics* 38, 275–363.
- Pate, J.S., Gunning, B.E.S., 1972. Transfer cells. *Annu. Rev. Plant Physiol.* 23, 173–196.
- Patel, N.B., Poo, M.-M., 1984. Orientation of neurite growth by extracellular electric fields. *J. Neurosci.* 2, 483–496.
- Patient, R.K., Allan, J., 1989. Active chromatin. *Curr. Opin. Cell Biol.* 1, 454–459.
- Patterson, S.D. 2004a. How much of the proteome do we see with discovery-based proteomics methods and how much do we need to see? *Curr. Proteom.* 1, 3–12.
- Patterson, S.D. 2004b. Proteomics: Beginning to realize its promise? *Arthritis Rheum.* 50, 3741–3744.
- Pattison Muir, M.M., 1909. *A History of Chemical Theories and Laws*. John Wiley & Sons, New York.
- Paul, D.C., Goff, S.C., 1973. Comparative effects of caffeine, its analogues and calcium deficiency on cytokinesis. *Exp. Cell Res.* 78, 399–413.
- Pauli, W., 1907. *Physical Chemistry in the Service of Medicine*. Translated by Martin H. Fischer. John Wiley & Sons, New York.
- Pauli, W., 1934. The chemistry of the amino acids and the proteins. *Ann. Rev. Biochem.* 3, 111–132.
- Pauli, W., 1958. *Theory of Relativity*. Dover Publications, New York.
- Paulik, M.A., Collignon, C.M., Keenan, T.W., Morré, D.J., 1987. Transition vesicle-enriched fractions isolated from rat liver exhibit a unique peptide pattern. *Protoplasma* 141, 180–184.
- Pauling, L., 1932. The nature of the chemical bond. IV. The energy of single bonds and the relative electronegativity of atoms. *J. Am. Chem. Soc.* 54, 3570–3582.
- Pauling, L., 1940. *The Nature of the Chemical Bond*, second ed. Cornell University Press, Ithaca, New York.
- Pauling, L., 1954. Modern structural chemistry. *Nobel Lect.* December 11.
- Pauling, L., 1954a. *General Chemistry*, second ed. W. H. Freeman and Co., San Francisco.
- Pauling, L., 1970. *General Chemistry*. Dover Publications, New York.
- Pauling, L., 1972. Fifty years of progress in structural chemistry and molecular biology. In: Holton, G. (Ed.), *The Twentieth-Century Sciences*. W. W. Norton & Co., New York, pp. 281–307.
- Pauling, L., 1963. Science and Peace. *Nobel Lect.* December 11.
- Pauling, L., Corey, R.B., 1953. A proposed structure for the nucleic acids. *Proc. Natl. Acad. Sci. USA* 39, 84–97.
- Pauling, L., Corey, R.B., Hayward, R., 1955. The structure of proteins. In: *The Physics and Chemistry of Life*. Simon and Schuster, New York, pp. 74–86.
- Pauling, L., Delbruck, M., 1940. The nature of the intermolecular forces operative in biological processes. *Science* 92, 77–79.
- Pauling, L., Itano, H.A., Singer, S.J., Wells, I.C., 1949. Sickle cell anemia, a molecular disease. *Science* 110, 543–548.
- Pauling, L., Wilson Jr., E.B., 1935. *Introduction to Quantum Mechanics with Applications to Chemistry*. McGraw-Hill, New York.
- Pauling, P., 1973. DNA—The race that never was? *New Sci.* 58, 558–560.
- Paves, H., Truve, E., 2004. Incorporation of mammalian actin into microfilaments in plant cell nucleus. *BMC Plant Biol.* 4, 7–15.
- Paweletz, N., 1967. Zur Funktion des “Flemming-Körpers” bei der Teilung tierischer Zellen. *Naturwissenschaften* 54, 533–535.

- Pawlowski, W.P., Cande, W.Z., 2005. Coordinating the events of the meiotic prophase. *Trends Cell Biol.* 15, 674–681.
- Pawlowski, W.P., Harper, L.C., Cande, W.Z., 2004. Meiosis. *Encyclopedia of Plant and Crop Science*. Marcel Dekker, New York, pp. 711–713.
- Pawlowski, W.P., Sheehan, M.J., Ronceret, A., 2007. In the beginning: The initiation of meiosis. *BioEssays* 29, 511–514.
- Pazour, G.J., Agrin, N., Lesyk, J., Whitman, G.B., 2005. Proteomic analysis of a eukaryotic cilium. *J. Cell Biol.* 170, 103–113.
- Pazour, G.J., Witman, G.B., 2003. The vertebrate primary cilium is a sensory organelle. *Curr. Opin. Cell Biol.* 15, 105–110.
- Pearse, B.M.F., Robinson, M.S., 1990. Clathrin, adaptors and sorting. *Annu. Rev. Cell Biol.* 6, 151–171.
- Pease, D.C., 1946. Hydrostatic pressure effects upon the spindle figure and chromosome movement. II. Experiments on the meiotic divisions of *Tradescantia* pollen mother cells. *Biol. Bull.* 91, 145–169.
- Pease, D.C., 1963. The ultrastructure of flagellar fibrils. *J. Cell Biol.* 18, 313–326.
- Pearson, K., 1905. *National Life from the Standpoint of Science*. Adam and Charles Black, London.
- Pearson, K., Moul, M., 1925. The problem of alien immigration into Great Britain, illustrated by an examination of Russian and Polish Jewish children. *Ann. Eugenics* 1, 5–127.
- Pedersen, K.O., 1948. The chemistry of the proteins and amino acids. *Ann. Rev. Biochem.* 17, 169–200.
- Pederson, D.S., Thomas, F., Simpson, R.T., 1986. Core particle, fiber, and transcriptionally active chromatin structure. *Ann. Rev. Cell Biol.* 2, 117–147.
- Peebles, P.J.E., 1993. *Principles of Physical Cosmology*. Princeton University Press, Princeton, N.J.
- Peeler T.C., Stephenson, M.B., Einspar, K.J., Thompson Jr., G.A., 1989. Lipid characterization of an enriched plasma membrane fraction of *Dunaliella salina* grown in media of varying salinity. *Plant Physiol.* 89, 970–976.
- Pei, Z.-M., Kuchitsu, K., Ward, J.M., Schwartz, M., Schroeder, J.I., 1997. Differential abscisic acid regulation of guard cell slow anion channels in *Arabidopsis* wild-type and *abi1* and *abi2* mutants. *Plant Cell* 9, 409–423.
- Pei, Z.-M., Baizabal-Aguirre, V.W., Allen, G.J., Schroeder, J.I., 1998a. A transient outward-rectifying K^+ channel current down-regulated by cytosolic Ca^{2+} in *Arabidopsis thaliana* guard cells. *Proc. Natl. Acad. Sci. USA* 95, 6548–6553.
- Pei, Z.-M., Ghassemian, M., Kwak, C.M., McCourt, P., Schroeder, J.I., 1998b. Role of farnesyltransferase in ABA regulation of guard cell anion channels and plant water loss. *Science* 282, 287–290.
- Pelham, H.R.B., 1989a. Control of protein exit from the endoplasmic reticulum. *Annu. Rev. Cell Biol.* 5, 1–23.
- Pelham, H.R.B., 1989b. Heat shock and the sorting of luminal ER proteins. *EMBO J.* 8, 3171–3176.
- Pelham, H.R.B., 1991. Recycling of proteins between the endoplasmic reticulum and Golgi complex. *Curr. Opin. Cell Biol.* 3, 585–591.
- Pelham, H.R.B., 1994. About turn for the COPs? *Cell* 79, 1125–1127.
- Pelham, H.R.B., 1995. Sorting and retrieval between the endoplasmic reticulum and Golgi apparatus. *Curr. Opin. Cell Biol.* 7, 530–535.
- Pelletier, F., Caventou, J.B., 1818. Sur la Matière verte des Feuilles. *Ann. Chim. Phys.* 9, 194–196.
- Peltier, J.B., Emanuelsson, O., Kalume, D.E., Ytterberg, J., Friso, G., Rudella, A., Liberles, D.A., Soderberg, L., Roepstorff, P., von Heije, G., van Wijk, K.J., 2002. Central functions of the luminal and peripheral thylakoid proteome of *Arabidopsis* determined by experimentation and genome-wide prediction. *Plant Cell* 14, 211–236.
- Peltier, J.B., Ytterberg, A.J., Sun, Q., van Wijk, K.J., 2004. New functions of the thylakoid membrane proteome of *Arabidopsis thaliana* revealed by a simple, fast and versatile fractionation strategy. *J. Biol. Chem.* 279, 49367–49383.
- Pelzer, D., Grant, A.O., Cavalie, A., Sieber, M., Hofmann, F., Trautwein, W., 1989. Calcium channels reconstituted from the skeletal muscle dihydropyridine receptor protein complex and its α_1 peptide subunit in lipid bilayers. *Ann. NY Acad. Sci.* 560, 138–154.
- Peña, M.J., Carpita, N.C., 2004. Loss of highly branched arabinans and debranching of rhamnogalacturonan I accompany loss of firm texture and cell separation during prolonged storage of apple. *Plant Physiol.* 135, 1305–1313.
- Peña, M.J., Ryden, P., Madson, M., Smith, A., Reiter, W.-D., Carpita, N.C., 2004. Galactosylation of xyloglucans is essential for maintenance of cell wall tensile strength during cell growth in plants. *Plant Physiol.* 134, 443–451.
- Peng, H.B., Jaffe, L.F., 1976. Cell-wall formation in *Pelvetia* embryos. A freeze-fracture study. *Planta* 133, 57–71.
- Peng, L., Xiang, F., Roberts, E., Kawagoe, Y., Greve, L.C., Kreuz, K., Delmer, D.P., 2001. The experimental herbicide CGA 325'615 inhibits synthesis of crystalline cellulose and causes accumulation of non-crystalline β -1,4-glucan associated with CesaA protein. *Plant Physiol.* 126, 981–992.
- Pennell, R.L., Knox, J.P., Scofield, G.N., Selvendra, R.R., Roberts, K., 1989. A family of abundant plasma membrane-associated glycoproteins related to the arabinogalactan proteins is unique to flowering plants. *J. Cell Biol.* 108, 1967–1977.
- Penrose, R., 1994. *Shadows of the Mind. A Search for the Missing Science of Consciousness*. Oxford University Press, Oxford.
- Penzias, A.A., Wilson, R.W., 1965. A Measurement of Excess Antenna Temperature at 4080 Mc/s. *Astrophys. J.* 142, 419–421.
- Pepper, D.A., Brinkley, B.R., 1979. Microtubule initiation at kinetochores and centrosomes in lysed mitotic cells. *J. Cell Biol.* 82, 585–591.
- Perbal, G., Driss-Ecole, D., 2003. Mechanotransduction in gravisensing cells. *Trends Plant Sci.* 8, 498–504.
- Percival, E.G.V., 1950. *Structural Carbohydrate Chemistry*. Prentice-Hall, New York.
- Peremyslov, V.V., Prokhnevsky, A.I., Avisar, D., Dolja, V.V., 2008. Two class XI myosins function in organelle trafficking and root hair development in *Arabidopsis*. *Plant Physiol.* 146, 1109–1116.
- Pererra-Leal, J.B., Seabra, M.C., 2001. Evolution of the Rab family of small GTP-binding proteins. *J. Mol. Biol.* 313, 889–901.
- Pereira-Smith, O.M., Smith, J.R., 1988. Genetic analysis of indefinite division in human cells: Identification of four complementation groups. *Proc. Natl. Acad. Sci. USA* 85, 6042–6046.
- Perez-Prats, E., Narasimhan, M.L., Niu, X., Botella, M.A., Bressan, R.A., Valpuesta, V., Hasegawa, P.M., Binzel, M.L., 1994. Growth-cycle stage-dependent NaCl induction of plasma membrane H^+ -ATPase messenger-RNA accumulation in deadapted tobacco cells. *Plant Cell Environ.* 17, 327–333.

- Perfus-Barbeoch, L., Jones, A.M., Assmann, S.M., 2004. Plant heterotrimeric G protein function: Insights from Arabidopsis and rice mutants. *Curr. Opin. Plant Biol.* 7, 719–731.
- Perkins, D.D., 1992. Neurospora: The organism behind the molecular revolution. *Genetics* 130, 687–701.
- Perlmann, G.E., Diringer, R., 1960. The structure of proteins. *Ann. Rev. Biochem.* 29, 151–182.
- Perner, E.S., 1957. Zum elektromikroskopischen Nachweis des “Golgi apparatus” in Zellen höherer Pflanzen. *Naturwissenschaften* 44, 336.
- Pernice, B., 1889. Sulla cariocinesi della cellule epiteliali e dell’endotelio dei vasi della mucosa dello stomaco e dell’intestino, nelle studio della gastroenterite sperimentale (nell’avvelenamento per colchico). *Sicilia Med.* 1, 265–279.
- Perrin, J.B., 1926. Discontinuous structure of matter. Nobel Lect December 11, 1926.
- Perrin, R.M., Young, L.-S., N. Murthy, U.M., Harrison, B.R., Wang, Y., Will, J.L., Masson, P.H., 2005. Gravity signal transduction in primary roots. *Ann. Bot.* 96, 737–743.
- Perroncito, A., 1910. Contribution à l’étude de la biologie cellulaire. Mitochondres, chromidies et appareil réticulaire interne dans les cellules spermatiques. Le phénomène de la dictyokinèse. *Arch. Ital. de Biol.* 54, 307–345.
- Perry, J., 1978. A Dialogue on Personal Identity and Immortality. Hackett Publishing, Indianapolis.
- Perry, R.P., 1969. Nucleoli: The cellular sites of ribosome production. In: Lima-de-Faria, A. (Ed.), *Handbook of Molecular Cytology*. North Holland Publishing Co., Amsterdam, pp. 620–636.
- Perry, S.V., Reed, R., Astbury, W.T., Spark, L.C., 1948. An electron microscope and X-ray diffraction study of the synaeresis of actomyosin. *Biochim Biophys. Acta* 2, 674–694.
- Perutz, M.F., 1962a. X-ray analysis of haemoglobin. Nobel Lect December 11, 1962.
- Perutz, M.F., 1962b. Proteins and Nuclei Acids. Structure and Function. Elsevier, Amsterdam.
- Pesacreta, T.C., Lucas, W.J., 1984. Plasma membrane coat and a coated vesicle-associated reticulum of membranes: Their structure and possible interrelationship in *Chara corallina*. *J. Cell Biol.* 98, 1537–1545.
- Pesacreta, T.C., Lucas, W.J., 1985. Presence of a partially-coated reticulum in angiosperms. *Protoplasma* 125, 173–184.
- Peterhänsel, C., Niessen, M., Kebeish, R.M., 2008. Metabolic engineering towards the enhancement of photosynthesis. *Photochem. Photobiol.* DOI: 10.1111/j.1751-1097.2008.00427.x.
- Peters, J.M., 2002. The anaphase-promoting complex: Proteolysis in mitosis and beyond. *Mol. Cell* 9, 931–943.
- Peters, R.A., 1929. Co-ordinative bio-chemistry of the cell and tissues. *J. State Med.* 37, 683–709.
- Peters, R.A., 1937. Biochemical conception of cell organization. *Proc. Roy. Soc.* 121B, 587–592.
- Peterson, D.G., Schulze, S.R., Sciara, E.B., Lee, S.A., Bowers, J.E., Negel, A., Jiang, N., Tibbits, D.C., Wessler, S.R., Paterson, A.H., 2002. Integration of Cot analysis, DNA cloning, and high-throughput sequencing facilitates genome characterization and gene discovery. *Genome Res.* 12, 795–807.
- Pfaffmann, H., Hartmann, E., Brightman, A.O., Morré, D.J., 1987. Phosphatidylinositol specific phospholipase C of plant stems. *Plant Physiol.* 85, 1151–1155.
- Pfanner, N., Craig, E.A., Meyer, M., 1994. The protein import machinery of the mitochondrial inner membrane. *TIBS* 19, 368–372.
- Pfanzagl, B., Löffelhardt, W., 1999. In vitro synthesis of peptidoglycan precursors modified with N-acetylputrescine by *Cyanophora paradoxa* cyanelle envelope membranes. *J. Bacteriol.* 181, 2643–2647.
- Pfarr, C.M., Cove, M., Grissom, P.M., Hays, T.S., Porter, M.E., McIntosh, J.R., 1990. Cytoplasmic dynein is localized to kinetochores during mitosis. *Nature* 345, 263–265.
- Pfeiffer, J., 1955. Enzymes. In: Simon, M., Schuster, M. (Eds.) *The Physics and Chemistry of Life. A Scientific American Book*. New York, pp. 163–180.
- Pfeffer, W., 1875. Die Periodischen Bewegungen der Blattoorgane. Engelmann, Leipzig.
- Pfeffer, W., 1886. Kritische Besprechung von de Vries: Plasmolytische Studien über Wand der Vakuolen. *Bot. Z.* 44, 114–125.
- Pfeffer, W., 1877. Osmotische Untersuchungen: Studien zur Zell-Mechanik. Engelmann, Leipzig.
- Pfeffer, W., 1900–1906. *The Physiology of Plants*. Translated by A. J. Ewart. Clarendon Press, Oxford.
- Pfisterer, J., Lachmann, P., Kloppstech, K., 1982. Transport of proteins into chloroplasts. Binding of nuclear-coded chloroplast proteins to the chloroplast envelope. *Eur. J. Biochem.* 126, 143–148.
- Pflüger, E., 1872. Ueber die Diffusion des Sauerstoffs, den Ort und die Gesetze der Oxydationsprocesse im thierischen Organismen. *Pflügers Arch* 6, 43–64.
- Philipp, E.-I., Franke, W.W., Keenan, T.W., Stadler, J., Jarasch, E.-D., 1976. Characterization of nuclear membranes and endoplasmic reticulum isolated from plant tissue. *J. Cell Biol.* 68, 11–29.
- Phillips, C.S.G., Williams, R.J.P., 1965. *Inorganic Chemistry. I. Principles and Non-Metals*. Oxford University Press, Oxford.
- Phillips, C.S.G., Williams, R.J.P., 1966. *Inorganic Chemistry. II. Metals*. Oxford University Press, Oxford.
- Phillipson, B.A., Pimpl, P., Lamberti Pinto da Silva, L., Crofts, A.J., Taylor, J.P., Movafeghi, A., Robinson, D.G., Denecke, J., 2001. Secretory bulk flow of soluble proteins is efficient and COP II dependent. *Plant Cell* 13, 2005–2020.
- Piccirilli, J.A., McConnell, T.S., Zaug, A.J., Noller, H.F., Cech, T.R., 1992. Aminoacyl esterase activity of the *Tetrahymena* ribozyme. *Science* 256, 1420–1424.
- Pickard, B.G., 2008. “Second extrinsic organizational mechanism” for orienting cellulose: Modeling a role for the plasmalemmal reticulum. *Protoplasma* 233, 29–67.
- Pickard, B.G., Ding, J.-P., 1992. Gravity sensing by higher plants. *Adv. Comparative and Environmental Physiol.* 10, 81–110.
- Pickard, B.G., Ding, J.-P., 1993. The mechanosensory calcium-selective ion channel: Key component of a plasmalemmal control centre? *Aust. J. Plant Physiol.* 20, 439–459.
- Pickard, W.F., 1972. Further Observations on Cytoplasmic Streaming in *Chara braunii*. *Can. J. Bot.* 50, 703–711.
- Pickard, W.F., 1974. Hydrodynamic aspects of protoplasmic streaming in *Chara braunii*. *Protoplasma* 82, 321–339.
- Pickart, C.M., 2004. Back to the future with ubiquitin. *Cell* 116, 181–190.
- Picken, L., 1960. *The Organization of Cells*. Clarendon Press, Oxford.

- Pickering, E. C., 1912. Periods of 26 variable stars in the small Magellanic Clouds. Harvard College Observatory. Circular 173. March 3, 1912.
- Pickett-Heaps, J.D., 1967a. The effects of colchicine on the ultrastructure of dividing plant cells, xylem wall differentiation and distribution of cytoplasmic microtubules. *Develop. Biol.* 15, 206–236.
- Pickett-Heaps, J.D., 1967b. The use of radioautography for investigating wall secretion in plant cells. *Protoplasma* 64, 49–66.
- Pickett-Heaps, J.D., 1969a. The evolution of the mitotic apparatus: An attempt at comparative ultrastructural cytology in dividing cells. *Cytobios* 1, 257–280.
- Pickett-Heaps, J.D., 1969b. Preprophase microtubules and stomatal differentiation in *Commelina cyanea*. *Aust. J. Biol. Sci.* 22, 375–391.
- Pickett-Heaps, J.D., 1970. The behavior of the nucleolus during mitosis in plants. *Cytobios* 6, 69–78.
- Pickett-Heaps, J.D., 1971. The autonomy of the centriole: Fact or falacy. *Cytobios* 3, 205–214.
- Pickett-Heaps, J.D., 1972. Variation in mitosis and cytokinesis in plant cells: Its significance in the phylogeny and evolution of ultrastructural systems. *Cytobios* 5, 59–77.
- Pickett-Heaps, J.D., 1975. *Green Algae. Structure, Reproduction and Evolution in Selected Genera*. Sinauer Associates, Inc., Sunderland, MA.
- Pickett-Heaps, J.D., 1991. Cell division in Diatoms. *Int. Rev. Cytol.* 128, 63–108.
- Pickett-Heaps, J.D., Forer, A., 2001. Pac-man does not resolve the enduring problem of anaphase chromosome movement. *Protoplasma* 215, 16–20.
- Pickett-Heaps, J.D., Forer, A., Spurck, T., 1996. Rethinking anaphase: Where “Pac-Man” fails and why a role for the sprinkle matrix is likely. *Protoplasma* 192, 1–10.
- Pickett-Heaps, J.D., Forer, A., Spurck, T., 1997. Traction Fibre: Toward a “Tensegral” model of the spindle. *Cell Motility and the Cytoskeleton* 37, 1–6.
- Pickett-Heaps, J.D., Gunning, B.E.S., Brown, R.C., Lemmon, B.E., Cleary, A.L., 1999. The cytoplasm concept in dividing plant cells: Cytoplasmic domains and the evolution of spatially organized cell division. *Amer. J. Bot.* 86, 153–172.
- Pickett-Heaps, J.D., Northcote, D.H., 1966a. Cell division in the formation of the stomatal complex of the young leaves of wheat. *J. Cell Sci.* 1, 121–128.
- Pickett-Heaps, J.D., Northcote, D.H., 1966b. Organization of microtubules and endoplasmic reticulum during mitosis and cytokinesis in wheat meristems. *J. Cell Sci.* 1, 109–120.
- Pickett-Heaps, J.D., Tippet, D.H., Leslie, R., 1980. Light and electron microscopic observations in two large pennate diatoms: *Hantzschia* and *Nitzschia*. *Eur. J. Cell Biol.* 21, 1–11, 12–27.
- Picton, J.M., Steer, M.W., 1982. A model for the mechanism of tip extension in pollen tubes. *J. Theoret. Biol.* 98, 15–20.
- Pien, S., Wyrzykowska, J., McQueen-Mason, S., Smart, C., Fleming, A., 2001. Local expression of expansin induces the entire process of leaf development and modifies leaf shape. *Proc. Natl. Acad. Sci. USA* 98, 11812–11817.
- Pierson, E.S., Miller, D.D., Callaham, D.A., Shipley, A.M., Rivers, B.A., Cresti, M., Hepler, P.K., 1994. Pollen tube growth is coupled to the extracellular calcium ion flux and the intracellular calcium gradient: Effect of BAPTA-type buffers and hypertonic media. *Plant Cell* 6, 1815–1828.
- Pierson, E.S., Miller, D.D., Callaham, D.A., van Aken, J., Hackett, G., Hepler, P.K., 1996. Tip-localized calcium entry fluctuates during pollen tube growth. *Dev. Biol.* 174, 160–173.
- Pigott, G.H., Carr, N., 1972. Homology between nucleic acids of blue-green algae and chloroplast of *Euglena gracilis*. *Science* 175, 1259–1261.
- Pimpl, P., Denecke, J., 2000. ER retention of soluble proteins: Retrieval, retention, or both? *Plant Cell* 12, 1517–1519.
- Pimpl, P., Hanton, S.L., Taylor, J.P., Pinto-daSilva, L.L., Denecke, J., 2003. The GTPase ARF1p controls the sequence-specific vacuolar sorting route to the lytic vacuole. *Plant Cell* 15, 1242–1256.
- Pimpl, P., Movafeghi, A., Coughlan, S., Denecke, J., Hillmer, S., Robinson, D.G., 2000. In situ localization and in vitro induction of plant COP I-coated vesicles. *Plant Cell* 12, 2219–2236.
- Pinnavaia, T.H., 1983. Intercalated clay catalysts. *Science* 220, 365–371.
- Pinto da Silva, P., Branton, D., 1970. Membrane splitting in freeze-etching. *J. Cell Biol.* 45, 598–605.
- Piperno, G., 1984. Monoclonal antibodies to dynein subunits reveal the existence of cytoplasmic antigens in sea urchin egg. *J. Cell Biol.* 98, 1842–1850.
- Pirie, N.W., 1938. The meaninglessness of the terms life and living. In: Needham, J., Green, D.E. (Eds.), *Perspectives in Biochemistry*. Cambridge University Press, Cambridge, pp. 11–22.
- Pittman, J.K., Shigaki, T., Cheng, N.-H., Hirschi, K.D., 2002. Mechanism of N-terminal autoinhibition in the Arabidopsis $\text{Ca}^{+2}/\text{H}^{+}$ antiporter CAX1. *J. Biol. Chem.* 277, 26452–26459.
- Planck, M., 1906. Das Prinzip der Relativität und die Grundgleichungen der Mechanik, *Verh. der Deutschen Physikalische Gesellschaft* 8, 136–141.
- Planck, M., 1920. The genesis and present state of development of the quantum theory. *Nobel Lect.* June 2, 1920.
- Planck, M., 1932. Where is Science Going? W. W. Norton & Co., New York.
- Planck, M., 1949. *Scientific Autobiography, and Other Papers*. Philosophical Library, New York.
- Planck, M., 1949a. *Theory of Heat. Introduction to Theoretical Physics*. Macmillan, London.
- Plaxton, W.C., 1996. The organization and regulation of plant glycolysis. *Ann. Rev. Plant Physiol. Plant Mol. Biol.* 47, 185–214.
- Plazinski, J., Elliot, J., Hurley, U.A., Burch, J., Arioli, T., Williamson, R.E., 1997. Myosins from angiosperms, ferns, and algae. *Protoplasma* 196, 78–86.
- Plowe, J.Q., 1931. Membranes in the plant cell. II. Localization of differential permeability in the plant protoplast. *Protoplasma* 12, 221–240.
- Poiseuille, J.L.M., 1940. *Experimental Investigations upon the Flow of Liquids in Tubes of Very Small Diameter*. Translated by W.H. Herschel. *Rheological Memoirs*. Bingham, E.C. (Ed.) Vol. 1, No 1. Lancaster Press, Easton, PA.
- Polizzi, E., Natali, L., Muscio, A.M., Giordani, T., Cionini, G., Cavallini, A., 1998. Analysis of chromatin and DNA during chromosome endoreduplication in the endosperm of *Triticum durum*. *Desf. Protoplasma* 203, 175–185.
- Pollister, A.W., Pollister, P.F., 1943. The relation between centriole and centromere in atypical spermatogenesis of viviparid snails, *Ann. NY Acad. Sci.* 45, 1–48.

- Polya, G.M., Jagendorf, A.T., 1971. Wheat leaf RNA polymerases. I. Partial purification and characterization of nuclear, chloroplast and soluble DNA-dependent enzymes. *Arch. Biochem. Biophys.* 146, 635–648.
- Polya, G.M., Davies, J.R., Micucci, V., 1983. Properties of a calmodulin-activated Ca^{2+} -dependent protein kinase from wheat germ. *Biochem. Biophys. Acta* 761, 1–12.
- Polya, G.M., Klucis, E., Haritou, M., 1987. Resolution and characterization of two soluble calcium-dependent protein kinases from silver beet leaves. *Biochem. Biophys. Acta* 931, 68–77.
- Polya, G.M., Morrice, N., Wettenhall, R.E.H., 1989. Substrate specificity of wheat embryo calcium-dependent protein kinase. *FEBS Lett.* 253, 137–140.
- Polya, G.M., Nott, R., Lucis, E., Minichiello, J., Chandra, S., 1990. Inhibition of plant calcium-dependent protein kinases by basic polypeptides. *Biochem. Biophys. Acta* 1037, 259–2623.
- Ponnamperuma, C., 1972. *The Origins of Life*. E.P. Dutton, New York.
- Ponnamperuma, C., Lemmon, R.M., Mariner, R., Calvin, M., 1963a. Formation of adenine by electron irradiation of methane, ammonia and water. *Proc. Natl. Acad. Sci. USA* 49, 737–740.
- Ponnamperuma, C., Mack, R., 1965. Nucleotide synthesis under possible primitive Earth Conditions. *Science* 148, 1221–1223.
- Ponnamperuma, C., Mariner, R., Sagan, C., 1963b. Formation of adenosine by ultra-violet irradiation of a solution of adenine and ribose. *Nature* 198, 1199–1200.
- Ponnamperuma, C., Sagan, C., Mariner, R., 1963c. Synthesis of adenosine triphosphate under possible primitive Earth conditions. *Nature* 199, 222–226.
- Poo, M.-M., 1981. In situ electrophoresis of membrane components. *Annu. Rev. Biophys. Bioeng.* 10, 245–276.
- Poo, M.-M., Robinson, K.R., 1977. Electrophoresis of concanavalin A receptors along embryonic muscle cell membrane. *Nature* 297, 602–605.
- Pool, M.R., Lopez-Huertas, E., Hong, J.-T., Baker, A., 1998a. NADPH is a specific inhibitor of protein import into glyoxysomes. *Plant J.* 15, 1–14.
- Pool, M.R., Stumm, J., Fulga, T.A., Sinning, I., Dobberstein, B., 2002. Distinct modes of signal recognition particle interaction with the ribosome. *Science* 297, 1345–1348.
- Pool, M.R., Lopez-Huertas, E., Baker, A., 1998b. Characterization of intermediates in the process of plant peroxisomal protein import. *EMBO J.* 17, 6854–6862.
- Pope, A. 1745. *An Essay on Man*. Enlarged and improved by the author with notes by William Warburton. John and Paul Knapton, London.
- Popp, F.-A., Belousov, V. (Eds.), 2003. *Integrative Biophysics. Biophotonics*. Kluwer Academic Publishers Group, Dordrecht.
- Popper, K.R., Eccles, J.C., 1977. *The Self and Its Brain*. Springer-Verlag, Berlin.
- Popper, Z.A., Fry, S.C., 2003. Primary cell wall composition of bryophytes and charophytes. *Ann. Bot.* 91, 1–12.
- Porter, K.R., 1957. The submicroscopic morphology of protoplasm. *Harvey Lectures 1955/1956* 51, 175–228.
- Porter, K.R., 1984. The cytomatrix: A short history of its study. *J. Cell Biol.* 99, 3s–12s.
- Porter, K.R., Kawakami, N., Ledbetter, M.C., 1965. Structural basis of streaming in *Physarum polycephalum*. *J. Cell Biol.* 27, 78A.
- Porter, K.R., Anderson, K.L., 1982. The structure of the cytoplasmic matrix preserved by freeze-drying and freeze substitution. *Eur. J. Cell Biol.* 29, 83–96.
- Porter, K.R., Caulfield, J.B., 1958. The formation of the cell plate during cytokinesis in *Allium cepa* L. *Proc. 4th Int. Cong. Electron Microscopy (Berlin)*. 2, 503–507.
- Porter, K.R., Claude, A., Fullam, E., 1945. A study of tissue culture cells by electron microscopy. *J. Exp. Med.* 81, 233–241.
- Porter, K.R., Machado, R.D., 1960. Studies on the endoplasmic reticulum IV. Its form and distribution during mitosis in cells of onion root tip. *J. Biophys. Biochem. Cytol.* 7, 167–180.
- Porter, K.R., Thompson, H.P., 1948. A particulate body associated with epithelial cells cultured from mammary carcinomas of mice of a milk-factor strain. *J. Exp. Med.* 88, 15–24.
- Porter, K.R., Tilney, L.G., 1965. Microtubules and intracellular motility. *Science* 150, 382.
- Porter, K.R., Tucker, J.B., 1981. The ground substance of the living cell. *Scientific American* 244 (no. 3, March), 41–51.
- Portier, P., 1918. *Les Symbiotes*. Masson et Cie, Paris.
- Portillo, F., 2000. Regulation of plasma membrane H^+ -ATPase in fungi and plants. *Biochim. Biophys. Acta* 1469, 31–42.
- Portis Jr., A.R., 1992. Regulation of ribulose 1,5-bisphosphate carboxylase/oxygenase activity. *Ann. Rev. Plant Physiol. Plant Mol. Biol.* 43, 415–437.
- Pottosin, I.I., Schnöcknecht, G., 2007. Vacuolar calcium channels. *J. Exp. Bot.* 58, 1559–1569.
- Poustka, F., Irani, N.G., Feller, A., Lu, Y., Pourcel, L., Frame, K., Grotewold, E., 2007. A trafficking pathway for anthocyanins overlaps with the endoplasmic reticulum-to-vacuole protein-sorting route in Arabidopsis and contributes to the formation of vacuolar inclusions. *Plant Physiol* 145, 1323–1335.
- Power, H. [1664] 1966. *Experimental Philosophy in Three Books*. Johnson Reprint Corporation, New York.
- Pozueta-Romero, D., Gonzalez, P., Etxeberria, E., Pozueta-Romero, J., 2008. The hyperbolic and linear phases of the sucrose accumulation curve in turnip storage cells denote carrier-mediated and fluid phase endocytotic transport, respectively. *J. Amer. Soc. Hort. Sci.* 133, 612–618.
- Pratelli, R., Sutter, J.U., Blatt, M.R., 2004. A new catch in the SNARE. *Trends Plant Sci.* 9, 187–195.
- Pratt, M.M., 1980. The identification of a dynein ATPase in unfertilized sea urchin eggs. *Dev. Biol.* 74, 364–378.
- Prebble, J.N., 1981. *Mitochondria Chloroplasts and Bacterial Membranes*. Longmans, London.
- Prénant, A., 1913. Les appareils ciliés et leurs dérivés. *J. de l'Anat. et Physiol.* 49, 88–108 344–382, 506–553, 565–617.
- Presig-Müller, R., Muster, G., Kindl, H., 1994. Heat shock enhances the amount of pietylated Dnaj protein at membranes of glyoxysomes. *Eur. J. Biochem.* 219, 57–63.
- Preston, R.D., 1939. The molecular chain structure of cellulose and its botanical significance. *Biol. Rev.* 14, 281–313.
- Preston, R.D., 1952. *The Molecular Architecture of Plant Cell Walls*. John Wiley & Sons, New York.
- Preston, R.D., 1988. Cellulose-microfibril-orienting mechanisms in plant cell walls. *Planta* 174, 67–74.
- Priestley, J., 1771. *Essay on the First Principles of Government*. J. Johnson, London.

- Priestley, J., 1974. Experiments and Observations on Different Kinds of Air. J. Johnson, London.
- Priestley, J., [1809] 1893. Memoirs of Dr. Joseph Priestley Written by Himself (to the Year 1795) with a Continuation to the Time of his Decease by His Son, Joseph Priestley. City Road, London.
- Principe, L.M., 2006. Science and Religion. The Teaching Company, Chantilly, VA.
- Pringsheim, E.G., 1928. Physiologische Untersuchungen an *Paramecium bursaria*. Archiv f. Protistenkunde 64, 289–418.
- Pringsheim, E.G., 1972. Pure Cultures of Algae. Hafner Publishing Co., New York.
- Pringsheim, N., 1854. Untersuchungen über den Bau und die Bildung der Pflanzenzelle. Hirschwald, Berlin.
- Pringsheim, N., 1879–1881. Ueber Lichtwirkung und Chlorophyllfunktion in der Pflanzen. Jahrbuch. wiss. Bot. 12, 288–437.
- Pritchard, J., Wyn-Jones, R.G., Tomos, A.D., 1991. Turgor, growth and rheological gradients of wheat roots following osmotic stress. J. Exp. Bot. 42, 1043–1049.
- Probine, M.C., Barber, N.F., 1966. The structure and plastic properties of the cell wall of *Nitella* in relation to extension growth. Aust. J. Biol. Sci. 19, 439–457.
- Probine, M.C., Preston, R.D., 1961. Cell growth and the structure and mechanical properties of the wall in internodal cells of *Nitella opaca*. I. Wall structure and growth. J. Exp. Bot. 121, 261–282.
- Probine, M.C., Preston, R.D., 1962. Cell growth and the structure and mechanical properties of the wall in internodal cells of *Nitella opaca* II. Mechanical properties of the walls. J. Exp. Bot. 13, 111–127.
- Proseus, T.E., Boyer, J.S., 2005. Turgor pressure move polysaccharides into growing cell walls of *Chara corallina*. Ann. Bot. 95, 967–979.
- Proseus, T.E., Boyer, J.S., 2006a. Calcium pectate chemistry controls growth rate of *Chara corallina*. J. Exp. Bot. 57, 3989–4002.
- Proseus, T.E., Boyer, J.S., 2006b. Identifying cytoplasmic input to the cell wall of growing *Chara corallina*. J. Exp. Bot. 57, 3231–3242.
- Proseus, T.E., Boyer, J.S., 2006c. Periplasm turgor pressure controls wall deposition and assembly in growing *Chara corallina* cells. Ann. Bot. 98, 93–105.
- Proseus, T.E., Boyer, J.S., 2007. Tension required for pectate chemistry to control growth in *Chara corallina*. J. Exp. Bot. 58, 4283–4292.
- Proseus, T.E., Ortega, J.K.E., Boyer, J.S., 1999. Separating growth from elastic deformation during cell enlargement. Plant Physiol. 119, 775–784.
- Proctor, R.A., 1896. Other Worlds than Ours. D. Appleton and Co., New York.
- Prout, W., 1815. On the relation between the specific gravities of bodies in their gaseous state and the weights of their atoms. Ann. Phil. 6, 321–330.
- Prout, W., 1816. Correction of a mistake in the essay on the relation between the specific gravities of bodies in their gaseous state and the weights of their atoms. Ann. Phil. 7, 111–113.
- Provance, D.W., MacDowall, A., Marko, M., Luby-Phelps, K., 1993. Cytoarchitecture of size-excluding compartments in living cells. J. Cell Sci. 106, 565–578.
- Provasoli, L., Hutner, S.H., Schatz, A., 1948. Streptomycin-induced chlorophyll-less races of *Euglena*. Proc. Soc. Exp. Biol. Med. 69, 279–282.
- Pruitt, K.D., Hanson, M.R., 1991. Splicing of the petunia cytochrome oxidase subunit II intron. Curr. Genetics 19, 191–198.
- Prusiner, S.B., 1997a. Prions. Nobel Lecture December 8, 1997.
- Prusiner, S.B., 1997b. Prion diseases and the BSE crisis. Science 278, 245–251.
- Prymakowska-Bosak, M., Przewłoka, M.R., Slusarczyk, J., Kuras, M., Lichota, J., Kilianczyk, B., Jerzmanowski, A., 1999. Linker histones play a role in male meiosis and the development of pollen grains in tobacco. Plant Cell 11, 2317–2329.
- Ptolemy. [2nd Century], 1984. The Almagest. Translated by G.J. Toomer. Springer-Verlag, New York.
- Pucadyil, T.J., Schmid, S.L., 2008. Real-time visualization of dynamin-catalyzed membrane fission and vesicle release. Cell 135, 1–13.
- Pucher, G.W., Leavenworth, C.S., Ginter, W.D., Vickery, H.B., 1947. Studies in the metabolism of crassulacean plants: The diurnal variation in organic acid and starch content of *Bryophyllum calycinum*. Plant Physiol. 22, 360–376.
- Purcell, E.M., 1977. Life at low Reynolds number. Amer. J. Phys. 45, 3–11.
- Pyke, K.A., Howells, C.A., 2002. Plastid and stromule morphogenesis in tomato. Ann. Bot. 90, 559–566.
- Pyke, K.A., Leech, R.M., 1992. Chloroplast division and expansion is radically altered by nuclear mutations in *Arabidopsis thaliana*. Plant Physiol. 99, 1005–1008.
- Pyke, K.A., Leech, R.M., 1994. A genetic analysis of chloroplast division and expansion in *Arabidopsis thaliana*. Plant Physiol. 104, 201–207.
- Pyke, K.A., Rutherford, S.M., Robertson, E.J., Leech, R.M., 1994. Arc6, a fertile *Arabidopsis* mutant with only two mesophyll cell chloroplasts. Plant Physiol. 106, 1169–1177.

-Q-

- Qi, Y., Pelissier, T., Itaya, A., Hunt, E., Wassenegger, M., Ding, B., 2004. Direct role of a viroid RNA motif in mediating directional RNA trafficking across a specific cellular boundary. Plant Cell 16, 1741–1752.
- Qi, Z., Kishigami, A., Nakagawa, Y., Iida, H., Sokabe, M., 2004. A mechanosensitive anion channel in *Arabidopsis thaliana* mesophyll cells. Plant Cell Physiol. 45, 1704–1708.
- Qiao, L., Grolig, F., Jablonsky, P.P., Williamson, R.E., 1989. Myosin heavy chains: Detection by immunoblotting in higher plants and localization by immunofluorescence in the alga, *Chara*. Cell Biol. Int. Rep. 13, 107–117.
- Quader, H., 1986. Cellulose microfibril orientation in *Oocystis solitaria*: Proof that microtubules control the alignment of the terminal complexes. J. Cell Sci. 83, 223–234.
- Quader, H., 1990. Formation and disintegration of cisternae of the endoplasmic reticulum visualized in live cells by conventional fluorescence and confocal laser scanning microscopy: Evidence for the involvement of calcium and the cytoskeleton. Protoplasma 155, 166–175.

- Quader, H., Fast, H., 1990. Influence of cytosolic pH changes on the organization of the endoplasmic reticulum in epidermal cells of onion bulb scales: Acidification by loading with weak organic acids. *Protoplasma* 157, 216–224.
- Quader, H., Hofmann, A., Schnepf, E., 1987. Shape and movement of the endoplasmic reticulum in onion bulb epidermis cells: Possible involvement of actin. *Eur. J. Cell Biol.* 44, 17–26.
- Quader, H., Robinson, D.G., 1979. Structure, synthesis, and orientation of microfibrils. VI. The role of ions in microfibril deposition in *Oocystis solitaria*. *Eur. J. Cell Biol.* 20, 51–56.
- Quader, H., Robinson, D.G., 1981. *Oocystis solitaria*: A model organism for understanding the organization of cellulose synthesis. *Ber. Dtsch. Bot. Ges.* 94, 75–84.
- Quader, H., Schnepf, E., 1986. Endoplasmic reticulum and cytoplasmic streaming: Fluorescence microscopical observations in adaxial epidermis cells of onion bulb scales. *Protoplasma* 131, 250–252.
- Quader, H., Wagenbreth, I., Robinson, D.G., 1978. Structure, synthesis and orientation of microfibrils. V. On the recovery of *Oocystis solitaria*. *Cytobiologie* 15, 463–474.
- Quail, P.H., 1979. Plant cell fractionation. *Ann. Rev. Plant Physiol.* 30, 425–484.
- Quail, P.H., 2005. Phytochrome overview. In: Wada, M., Shimazaki, K., Iino, M. (Eds.), *Light Sensing in Plants*. Springer, Tokyo, pp. 21–35.
- Quatrano, R.S., 1990. Polar axis fixation and cytoplasmic localization in *Fucus*. In: Mahowald, A.P. (Ed.), *Genetics of Pattern Formation and Growth control*. Wiley-Liss, Inc., New York, pp. 31–46.
- Quaranto, V., Jones, J.C.R., 1991. The internal affairs of an integrin. *Trends in Cell Biol.* 1, 2–4.
- Quartacci, M.F.O., Glisic, B., Stevanovic, Navari-Izzo, F., 2002. Plasma membrane lipids in the resurrection plant *Ramonda serbica* following dehydration and rehydration. *J. Exp. Bot.* 53, 2159–2166.
- Quastel, J.H., Wheatley, A.H.M., 1930. Biological oxidations in the succinic acid series. *Biochem. J.* 25, 117–128.
- Quayle, J.R., Fuller, R.C., Benson, A.A., Calvin, M., 1954. Enzymatic carboxylation of ribulose diphosphate. *A. Am. Chem. Soc.* 76, 3610–3612.
- Queckett, J., 1852–1854. *Lectures on Histology*. Volumes I and II, Hippolyte Balliere, London.
- Quélo, A.-H., Verbelen, J.-P., 2004. Bromodeoxyuridine DNA fiber technology in plants: Replication origins and DNA synthesis in tobacco BY-2 cells under prolonged treatment with aphidocolin. *Protoplasma* 223, 197–202.
- Quincke, G., 1888. Ueber periodische Ausbreitung von Flüssigkeitsoberflächen und dadurch hervorgerufene Bewegungerscheinungen Sitzb. D. kgl. Preuss. Akad. D. Wiss. Zu. Berlin 34, 791–804.
- Rabounski, D., 2006. Declaration of Academic Rights. (Scientific Human Rights). *Prog. Phys.* 1, 57–60.
- Rachmilevitch, S., Cousins, A.B., Bloom, A.J., 2004. Nitrate assimilation in plant shoots depends on photorespiration. *Proc. Natl. Acad. Sci. USA*, 101, 11506–11510.
- Racker, E., 1955. Synthesis of carbohydrates from carbon dioxide and hydrogen in a cell-free system. *Nature* 175, 249–251.
- Racker, E., 1957. Micro- and macrocycles in carbohydrate metabolism. *Harvey Lect.* 51, 143–174.
- Racker, E., 1965. *Mechanisms in Bioenergetics*. Academic Press, New York.
- Racker, E., 1985. *Reconstitution of Transporters, Receptors, and Pathological States*. Academic Press, Orlando, FL.
- Racusen, R.H., 1976. Phytochrome control of electrical potentials and intracellular coupling in oat-coleoptile tissue. *Planta* 132, 25–29.
- Racusen, R.H., 2002. Early development in fern gametophytes: Interpreting the transition to prothallial architecture in terms of coordinated photosynthate production and osmotic ion uptake. *Ann. Bot.* 89, 227–240.
- Racusen, R.H., Cooke, T.J., 1982. Electrical changes in the apical cell of the fern gametophyte during irradiation with photomorphogenetically active light. *Plant Physiol* 70, 331–334.
- Racusen, R.H., Ketchum, K.A., Cooke, T.J., 1988. Modifications of extracellular electric and ionic gradients preceding the transition from tip growth to isodiametric expansion in the apical cell of the fern gametophyte. *Plant Physiol* 87, 69–77.
- Radford, J.E., Vesik, M., Overall, R.L., 1998. Callose deposition at plasmodesmata. *Protoplasma* 201, 30–37.
- Radford, J.E., White, R.G., 1998. Localization of a myosin-like protein to plasmodesmata. *Plant J.* 14, 743–750.
- Radford, J.E., White, R.G., 2001. Effect of tissue-preparation-induced callose synthesis on estimates of plasmodesma size exclusion limits. *Protoplasma* 216, 47–55.
- Raghavan, V., 1979. *Developmental Biology of Fern Gametophytes*. Cambridge University Press, Cambridge.
- Raghavendra, A., Reumann, S., Heldt, H.W., 1998. Participation of mitochondrial metabolism in photorespiration. *Plant Physiol.* 116, 1333–1337.
- Rahim, G., Bischof, S., Kessler, F., Agne, B., 2008. In vivo interaction between atToc33 and atToc159 GTP-binding domains demonstrated in a plant split-ubiquitin system. *J. Exp. Bot.* doi:10.1093/jxb/ern283. Published online November 14, 2008.
- Rahn, O., 1945. *Microbes of Merit*. The Jaques Cattell Press, Lancaster, PA.
- Rajangam, A.S., Kumar, M., Aspeborg, H., Guerriero, G., Arvestad, L., Pansri, P., Brown, C.J.-L., Hober, S., Blomqvist, K., Divne, C., Ezcurra, I., Mellerowicz, E., Sundberg, B., Bulone, V., Teeri, T.T., 2008. MAP20, a microtubule-associated protein in the secondary cell walls of hybrid aspen, is a target of the cellulose synthesis inhibitor 2,6-dichlorobenzonitrile. *Plant Physiol.* 148, 1283–1294.
- Rajjou, L., Gallardo, K., Job, C., Job, D., 2006. Proteome analysis for the study of developmental processes in plants. *Annu. Plant Rev.* 28, 152–184.
- Ralph, S.A., Foth, B.J., Hall, N., McFadden, G.I., 2004. Evolutionary pressures on apicoplast transit peptides. *Mol. Biol. Evol.* 21, 2183–2194.

-R-

- Rabinowitch, E.I., 1945. *Photosynthesis and Related Processes*. Interscience Publishers, New York.
- Rabinowitch, E., 1955. Photosynthesis. In: Simon and Schuster (Eds.), *The Physics and Chemistry of Life*. New York, pp. 27–47.
- Rabinowitch, E., Govindjee., 1969. *Photosynthesis*. John Wiley & Sons, New York.

- Ramirez-Weber, F.A., Kornberg, T.B., 1999. Cytonemes: Cellular processes that project to the principal signaling center in *Drosophila* imaginal discs. *Cell* 97, 599–607.
- Rambourg, A., Clermont, Y., 1990. Three-dimensional electron microscopy: Structure of the Golgi apparatus. *Eur. J. Cell Biol.* 51, 189–200.
- Ramón y Cajal, S., 1906. The structure and connexions of neurons. Nobel Lect. December 12, 1906.
- Ramón y Cajal, S., 1937. Recollections of My Life. Translated by E. Horne Craigie. MIT Press, Cambridge, MA.
- Ramón y Cajal, S., 1999. Advice for a Young Investigator. Translated by N. Swanson and L. W. Swanson. MIT Press, Cambridge, MA.
- Rancour, D.M., Dickey, C.E., Park, S., Bednarek, S.Y., 2002. Characterization of AtCDC48. Evidence for multiple membrane fusion mechanisms at the plane of cell division in plants. *Plant Physiol.* 130, 1241–1253.
- Randolph, L.F., 1922. Cytology of chlorophyll types of maize. *Bot. Gaz.* 73, 337–375.
- Ranjeva, R., Carrasco, A., Boudet, A.M., 1988. Inositol triphosphate stimulates the release of calcium from intact vacuoles isolated from *Acer* cells. *FEBS Lett.* 230, 137–141.
- Ranvier, L., 1875. Recherches sur les l'ments du sang. *Arch. Physiol.* 2, 1–15.
- Rapoport, A., 1975. Semantics. Thomas Y. Crowell Co., New York.
- Rapp, S., Saffrich, R., Anton, M., Jaekle, U., Ansorge, W., Gorgas, K., Just, W.-W., 1996. Microtubule-based peroxisomal movement. *J. Cell Sci.* 109, 837–849.
- Raschke, K., Hedrich, R., Rechmann, U., Schroeder, J.I., 1988. Exploring biophysical and biochemical components of the osmotic motor that drives stomatal movements. *Botanica Acta* 101, 283–294.
- Rasi-Caldogno, F., DeMichelis, M.I., Pugliarello, M.C., Marrè, E., 1986. H⁺-pumping driven by the plasma membrane ATPase in membrane vesicles from radish: Stimulation by fusicoccin. *Plant Physiol.* 82, 121–125.
- Raskin, I., 1992a. Role of salicylic acid in plants. *Annu. Rev. Plant Physiol. Mol. Biol.* 43, 439–463.
- Raskin, I., 1992b. Salicylate, a new plant hormone. *Plant Physiol.* 99, 799–803.
- Raskin, I., Ehmann, A., Melander, W.R., Meeuse, B.J.D., 1987. Salicylic acid—a natural inducer of heat production in *Arum* lilies. *Science* 237, 1601–1602.
- Raskin, I., Ribnicky, D.M., Komarnytsky, S., Ilic, N., Poulev, A., Borisjuk, N., Brinker, A., Moreno, D.A., Ripoll, C., Yakoby, N., et al., 2002. Plants and human health in the twenty-first century. *Trends Biotech.* 20, 522–531.
- Raskin, I., Skubatz, H., Tang, W., Meeuse, B.J.D., 1990. Salicylic acid levels in thermogenic and non-thermogenic plants. *Ann. Bot.* 66, 373–376.
- Raskin, I., Turner, I.M., Melander, W.R., 1989. Regulation of heat production in the inflorescences of an *Arum* lily by endogenous salicylic acid. *Proc. Natl. Acad. Sci. USA* 86, 2214–2218.
- Rasmussen, H., 1981. Calcium and cAMP as Synarchic Messengers. John Wiley & Sons, New York.
- Rasmussen, U., Munck, L., Ullrich, S.E., 1990. Immunogold localization of chymotrypsin inhibitor-2, a lysine-rich protein in developing barley endosperm. *Planta* 150, 272–277.
- Ratajczak, R., 2000. Structure, function and regulation of the plant vacuolar H⁺-translocating ATPase. *Biochim. Biophys. Acta* 1465, 17–36.
- Ratajczak, R., Lüttge, U., Gonzalez, P., Etxeberria, E., 2003. Malate and malate-channel antibodies inhibit electrogenic and ATP-dependent citrate transport across the tonoplast of citrus juice cells. *J. Plant Physiol.* 160, 1313–1317.
- Rathore, K.S., Cork, R.J., Robinson, K.R., 1991. A cytoplasmic gradient of calcium is correlated with the growth of lily pollen tubes. *Dev. Biol.* 148, 612–619.
- Rausser, W.E., 1990. Phytochelatin. *Annu. Rev. Biochem.* 59, 61–86.
- Ravanel, S., Block, M.A., Rippert, P., Jabrin, S., Curien, G., Rébeillé, F., Douce, R., 2004. Methionine metabolism in plants. *J. Biol. Chem.* 279, 22548–22557.
- Raven, J.A., 1984. Energetics and Transport in Aquatic Plants. Alan R. Liss, Inc., New York.
- Raven, J.A., 1997. Multiple origins of plasmodesmata. 1997. *Eur. J. Phycol.* 32, 95–101.
- Raven, J.A., 2005. Evolution of plasmodesmata. In: Oparka, K.J. (Ed.), *Plasmodesmata*. Blackwell, Oxford, pp. 33–52.
- Raven, P.H., 1970. A multiple origin for plastids and mitochondria. *Science* 169, 641–646.
- Rawlins, D.J., Highett, M.I., Shaw, P.J., 1991. Localization of telomeres in plant interphase nuclei by in situ hybridization and 3D confocal microscopy. *Chromosoma* 100, 424–431.
- Ray, J., 1691. The Wisdom of God Manifested in the Works of the Creation. Printed for S. Smith, London.
- Ray, J., 1962. Miscellaneous Discourses Concerning the Dissolution and Changes of the World Wherein the Primitive Chaos and Creation, the General Deluge, Fountains, Formed Stones, Sea-Shell Found in the Earth, Subterranean Trees, Mountains, Earthquakes, Vulcanoes, the Universal Conflagration and Future State, are Largely Discussed and Examined. Printed for S. Smith, London.
- Ray, P.M., 1977. Auxin binding sites of maize coleoptiles are localized on membranes of the endoplasmic reticulum. *Plant Physiol.* 59, 594–599.
- Ray, P.M., 1980. Cooperative action of β -glucan synthetase and UDPxylose xylosyl transferase of Golgi membranes in the synthesis of xyloglucan-like polysaccharide. *Biochim. Biophys. Acta* 629, 431–444.
- Ray, P.M., Eisinger, W.R., Robinson, D.G., 1976. Organelles involved in cell wall polysaccharide formation and transport in pea cells. *Ber. Dtsch. Bot. Ges.* 89, 121–146.
- Ray, P.M., Shininger, T.L., Ray, M.M., 1969. Isolation of glucan synthetase particles from plant cells and identification with Golgi membranes. *Proc. Natl. Acad. Sci. USA* 64, 605–612.
- Rayle, D.L., Cleland, R., 1977. Control of plant cell enlargement by hydrogen ions. *Curr. Top. Developmental Biol.* 11, 187–214.
- Rayleigh, Lord., 1893. On the flow of viscous liquids, especially in two dimensions. *Phil. Mag.* 36, 354–372.
- Rayment, I., Holden, H.M., Whittaker, M., Yohn, C.B., Lorenz, M., Holmes, K.C., Milligan, R.A., 1993. Structure of the actin-myosin complex and its implications for muscle contraction. *Science* 261, 58–65.
- Rea, P.A., 2007. Plant ATP-binding cassette transporters. *Annu. Rev. Plant Biol.* 58, 347–375.
- Rea, P.A., Griffith, C.J., Manolson, M.F., Sanders, D., 1987a. Irreversible inhibition of H⁺ ATPase of higher plant tonoplast by chaotropic anions: Evidence for peripheral location of nucleotide-binding subunits. *Biochem Biophys. Acta* 904, 1–12.

- Rea, P.A., Griffith, C.J., Sanders, D., 1987b. Purification of the N,N'-dicyclohexylcarbodiimide-binding proteolipid of a higher plant tonoplast H⁺-ATPase. *J. Biol. Chem.* 262, 14745–14752.
- Rea, P.A., Poole, R.J., 1986. Chromatographic resolution of H⁺-translocating pyrophosphatase from H⁺-translocating ATPase of higher plant tonoplast. *Plant Physiol.* 81, 126–129.
- Rea, P.A., Poole, J., 1993. Vacuolar H⁺-translocating pyrophosphatase. *Ann. Rev. Plant Physiol. Plant Mol. Biol.* 44, 157–180.
- Rea, P.A., Li, Z.-S., Lu, Y.-P., Drozdowicz, Y.M., Martinoia, E., 1998. From vacuolar GS-X pumps to multispecific ABC transporters. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 49, 727–760.
- Rea, P.A., Sanders, D., 1987. Tonoplast energization: Two H⁺ pumps, one membrane. *Physiol. Plant* 71, 131–141.
- Read, S.H., Bacic, A., 1996. Cell wall porosity and its determination. *Modern Methods Plant Anal.* 17, 63–80.
- Read, S.M., Bacic, T., 2002. Prime time for cellulose. *Science* 295, 59–60.
- Rechsteiner, M., 1987. Ubiquitin-mediated pathways for intracellular proteolysis. *Annu. Rev. Cell. Biol.* 3, 1–30.
- Record, R.D., Griffing, L.R., 1988. Convergence of the endocytotic and lysosomal pathways in soybean protoplasts. *Planta* 176, 425–432.
- Reddy, A.S., 2001. Calcium: Silver bullet in signaling. *Plant Sci.* 160, 381–404.
- Reddy, A.S.N., Carrasco, A., Boudet, A.M., 1988. Inositol 1,4,5-triphosphate induced calcium release from corn coleoptile microsomes. *J. Biochem.* 101, 569–573.
- Reddy, A.S.N., Safadi, F., Beyette, J.R., Mykles, D.L., 1994. Calcium-dependent proteinase activity in root cultures of *Arabidopsis*. *Biochem. Biophys. Res. Comm.* 199, 1089–1095.
- Reddy, M.S., Dinkins, R., Collins, G.B., 2002. Overexpression of the *Arabidopsis thaliana* MinE1 bacterial division inhibitor homologue gene alters chloroplast size and morphology in transgenic *Arabidopsis* and tobacco plants. *Planta* 215, 167–176.
- Redman, C.M., 1969. Biosynthesis of serum proteins and ferritin by free and attached ribosomes of rat liver. *J. Biol. Chem.* 244, 4308–4315.
- Reed, D.W., 1969. Isolation and composition of a photosynthetic reaction center complex from *Rhodospseudomonas spheroides*. *J. Biol. Chem.* 244, 4936–4941.
- Reed, D.W., Clayton, R.K., 1968. Isolation of a reaction center fraction from *Rhodospseudomonas spheroides*. *Biochem. Biophys. Res. Commun.* 30, 471–475.
- Reed, L.J., 2001. A trail of research from lipoic acid to α -keto acid dehydrogenase complexes. *J. Biol. Chem.* 276, 38329–38336.
- Reed, R., Griffith, J., Maniatis, T., 1988. Purification and visualization of native spliceosomes. *Cell* 53, 949–961.
- Reese, E.T., 1976. History of the cellulase program at the U.S. Army Natick Development Center. *Biotechnol. Bioeng. Symp.* 6, 9–20.
- Reeves, R., 1992. Chromatin changes during the cell cycle. *Curr Opin. Cell Biol.* 4, 413–423.
- Reichle, R.E., Alexander, J.V., 1965. Multiporate septations, Woronin bodies, and septal plugs in *Fusarium*. *J. Cell Biol.* 24, 489–496.
- Reichert, S., Knight, A.E., Hodge, T.P., Baluska, F., Samaj, J., Volkmann, D., Kendrick-Jones, J., 1999. Characterization of the unconventional myosin VIII in plant cells and its localization at the post-cytokinetic cell wall. *Plant J* 19, 555–567.
- Reichert, E.T., 1919. A Biochemic Basis for the Study of Problems of Taxonomy, Heredity, Evolution, etc., with Especial Reference to the Starches and Tissues of Parent-Stocks and Hybrid-Stocks and the Starches and Hemoglobins of Varieties, Species, and Genera. Parts I and II. Carnegie Institution of Washington, Washington, DC.
- Reil, J. C., [1796] 1992. On the vital force. *Archiv für die Physiologie* 1: 8. Translated by K. Teich, In: A Documentary History of Biochemistry, 1770–1940. Farleigh Dickenson University Press, Rutherford, NJ.
- Reinhart, B.J., Slack, F.J., Basson, M., Pasquinelli, A.E., Bettinger, J.C., Rougvie, A.E., Horvitz, H.R., Ruvkun, G., 2000. The 21-nucleotide let-7 RNA regulates developmental timing in *Caenorhabditis elegans*. *Nature* 403, 901–906.
- Reiss, C., Beale, S.I., 1995. External calcium requirements for light induction of chlorophyll accumulation and its enhancement by red light and cytokinin pretreatments in excised etiolated cucumber cotyledons. *Planta* 196, 635–641.
- Reiss, H.D., Schnepf, E., Herth, W., 1984. The plasma membrane of the *Funaria* caulonema tip cell: Morphology and distribution of particle rosettes, and the kinetics of cellulose synthesis. *Planta* 160, 428–435.
- Reisser, W., 1992. Green ciliates: Principles of symbiosis formation between autotrophic and heterotrophic partners. In: Lewin, R.A. (Ed.), *Origins of Plastids. Symbiogenesis, Prochlorophytes, and the Origins of Chloroplasts*. Chapman & Hall, New York, pp. 27–43.
- Restrepo, M.A., Freed, D.D., Carrington, J.C., 1990. Nuclear transport of plant potyviral proteins. *Plant Cell* 2, 987–998.
- Reumann, S., 2000. The structural properties of plant peroxisomes and their metabolic significance. *Biol. Chem.* 381, 639–648.
- Reumann, S., 2004. Specification of the peroxisome targeting signals type 1 and type 2 of plant peroxisomes by bioinformatics analyses. *Plant Physiol.* 135, 783–800.
- Reumann, S., Maier, E., Heldt, H.W., Benz, R., 1998. Permeability properties of the porin of spinach leaf peroxisomes. *Eur. J. Biochem.* 251, 359–366.
- Reumann, S., Heupel, R., Heldt, H.W., 1994. Compartmentation studies on spinach leaf peroxisomes. II. Evidence for the transfer of a reductant from the cytosol to the peroxisomal compartment via a malate shuttle. *Planta* 193, 167–173.
- Reumann, S., Ma, C., Lemke, S., Babujee, L., 2004. AraPerox. A database of putative *Arabidopsis* proteins from plant peroxisomes. *Plant Physiol.* Preview August 27, 2004.
- Revel, J.P., Karnovsky, M.J., 1967. Hexagonal arrays of subunits in intercellular junctions of the mouse heart and liver. *J. Cell Biol.* 33, C7–C12.
- Reyes, J.C., Hennig, L., Gruissem, W., 2002. Chromatin-remodeling and memory factors. New regulators of plant development. *Plant Physiol.* 130, 1090–1101.
- Reynolds, A., 2007. The theory of the cell state and the question of cell autonomy in nineteenth and early twentieth-century biology. *Science in Context* 20, 71–95.
- Reynolds, O., 1885. On the dilatancy of media composed of rigid particles in contact. With experimental illustrations. *Phil. Mag. Ser. 5* 20, 469–481.

- Reynolds, O., 1886. Dilatancy. *Nature* 33, 429–430.
- Reynolds, O., 1892. *Memoir of James Prescott Joule*. Manchester Literary and Philosophical Society, Manchester.
- Reynolds, O., 1901. An experimental investigation of the circumstances which determine whether the notion of water shall be direct or sinuous, and of the law of resistance in parallel channels. In: Reynolds, O. (Ed.), *Papers on Mechanical and Physical Subjects*, Vol. II (1881–1900). Cambridge University Press, Cambridge, pp. 51–105.
- Rhea, R.P., 1966. Electron microscopic observations on the slime mold *Physarum polycephalum* with special reference to fibrillar structures. *J. Ultrastruct. Res.* 15, 349–379.
- Rhoades, D.M., McIntosh, L., 1993. The salicylic acid-inducible alternative oxidase gene *aox1* and genes encoding pathogenesis-related proteins share regions of sequence similarity in their promoters. *Plant Mol. Biol.* 21, 615–624.
- Rhodin, J., 1954. Correlation of ultrastructural organization and function in normal and experimentally changed proximal convoluted tubule cells of mouse kidney. *Aktiebolaget Godvil*, Stockholm.
- Rich, A.R., 1926. The place of R.-J.-H. Dutrochet in the development of the cell theory. *Bull. Johns Hopkins Hospital* 39, 330–365.
- Richards, T.W., 1919. Atomic weights. Nobel Lecture, December 6, 1919.
- Richardson, A.O., Palmer, J.D., 2007. Horizontal gene transfer in plants. *J. Exp. Bot.* 58, 1–9.
- Richardson, D.N., Simmons, M.P., Reddy, A.S., 2006. Comprehensive comparative analysis of kinesins in photosynthetic organisms. *BMC Genomics* 7, 18.
- Richmond, T.A., Somerville, C.R., 2000. The cellulose synthase superfamily. *Plant Physiol.* 124, 495–498.
- Richter, J.B. [1792–1794] 1968. *Anfangsgründe der Stöchiometrie; oder, Messkunst chemischer Elemente*. Reproduction of the edition by Ausg. Breslau und Hirschberg. G. Olms, Hildesheim.
- Ridge, R.W., Emons, A.M.C. (Eds.), 2000. *Root Hairs*. Cell and Molecular Biology. Springer, Tokyo.
- Rieder, C.L., 1991. Mitosis: Towards a molecular understanding of chromosome behavior. *Curr. Opin. Cell Biol.* 3, 59–66.
- Rieder, C.L., Alexander, S.P., 1990. Kinetochore are transported poleward along single astral microtubule during chromosome attachment to the spindle in newt lung cells. *J. Cell Biol.* 110, 81–95.
- Rieder, C.L., Khodjakov, A., 2003. Mitosis through the microscope: Advances in seeing inside live dividing cells. *Science* 300, 91–96.
- Rieder, C.L., Khodjakov, A., Paliulis, L.V., Fortier, T.M., Cole, R.W., Sluder, G., 1997. Mitosis in vertebrate somatic cells with two spindles: Implications for the metaphase/anaphase transition checkpoint and cleavage. *Proc. Natl. Acad. Sci. USA* 94, 5107–5112.
- Riederer, M., Muller, C. (Eds.), 2006. *Biology of the Plant Cuticle*. Wiley-Blackwell, Oxford.
- Riens, B., Lohaus, G., Heineke, D., Heldt, H.W., 1991. Amino acid and sucrose content determined in the cytosolic, chloroplastic, and vacuolar compartment and in the phloem sap of spinach leaves. *Plant Physiol.* 97, 227–233.
- Reisen, D., Hanson, M.R., 2007. Association of six YFP-myosin XI-tail fusions with mobile plant cell organelles. *BMC Plant Biol.* 7, 6.
- Riezman, H., Weir, E.M., Leaver, C.J., Titus, D.E., Becker, W.M., 1980. Regulation of glyoxysomal enzymes during germination of cucumber. 3. In vitro translation and characterization of four glyoxysomal enzymes. *Plant Physiol.* 65, 4046.
- Riley, M., Pardee, A.B., Jacob, F., Monod, J., 1960. On the expression of a structural gene. *J. Mol. Biol.* 2, 216–225.
- Rimington, C., 1936. The chemistry of the proteins and amino acids. *Ann. Rev. Biochem.* 5, 117–158.
- Rincon, M., Boss, W.F., 1987. Myoinositol triphosphate mobilizes calcium from fusogenic carrot (*Daucus carota* L.) protoplasts. *Plant Physiol.* 83, 395–398.
- Ris, H., 1943. A quantitative study of anaphase movement in the aphid *Tamalia*. *Biol. Bull.* 85, 164–178.
- Ris, H., 1949. The anaphase movement of chromosomes in the spermatocytes of the grasshopper. *Biol. Bull.* 96, 90–106.
- Ris, H., 1961. Ultrastructure and molecular organization of genetic systems. *Can. J. Genet. Cytol.* 3, 95–120.
- Ris, H., 1962. Interpretation of ultrastructure in the cell nucleus. In: Harris, R.J.C. (Ed.), *The Interpretation of Ultrastructure*, Vol. 1. Academic Press, New York, pp. 69–88.
- Ris, H., Mirsky, A.E., 1950. Quantitative cytochemical determination of desoxyribonucleic acid with the feulgen nucleal reaction. *J. Gen. Physiol.* 3, 125–146.
- Ris, H., Plaut, W., 1962. Ultrastructure of DNA-containing areas in the chloroplast of *Chlamydomonas*. *J. Cell Biol.* 13, 383–391.
- Ris, H., Witt, P., 1981. Structure of the mammalian kinetochore. *Chromosoma* 82, 153–170.
- Risebrough, R.W., Tissières, A., Watson, J.D., 1962. Messenger-RNA attachment to active ribosomes. *Proc. Natl. Acad. Sci. USA* 48, 4300–4436.
- Ritter, W.E., 1911. The controversy between materialism and vitalism: Can it be ended?. *Science* 33, 437–441.
- Ritter Jr., H., Inoué, S., Kubai, D., 1978. Mitosis in *Barbulanympha*. I. Spindle structure, formation, and kinetochore engagement. *J. Cell Biol.* 77, 638–654.
- Ritter, W.E., 1919. *The Unity of the Organism, or the Organismal Conception of Life*. Volumes I and II, Gorham Press, Boston.
- Robards, A.W., 1976. Plasmodesmata in higher plants. In: Gunning, B.E.S., Robards, A.W. (Eds.), *Intercellular Communication in Plants: Studies on Plasmodesmata*. Springer Verlag, Berlin, pp. 15–57.
- Robards, A.W., Lucas, W.J., 1990. Plasmodesmata. *Annu. Rev. Plant Physiol. Plant Mol. Bio.* 41, 369–419.
- Robatzek, S., 2007. Vesicle trafficking in plant immune responses. *Cell Microbiol.* 9, 1–8.
- Robatzek, S., Chinchilla, D., Boller, T., 2006. Ligand-induced endocytosis of the pattern recognition receptor FLS2 in *Arabidopsis*. *Genes Dev.* 20, 537–542.
- Robbins, E., Gonatas, N.K., 1964. Histochemical and ultrastructural studies on HeLa cell cultures exposed to spindle inhibitors with special reference to the interphase cell. *J. Histochem. Cytochem.* 12, 704–711.
- Robbins, J., Dilworth, S.N., Laskey, R.A., Dingwall, C., 1991. Two interdependent basic domains in nucleoplasmin nuclear targeting sequence: Identification of a class of bipartite nuclear targeting sequence. *Cell* 64, 615–623.
- Robenek, H., Peveling, E., 1977. Ultrastructure of the cell wall regeneration of isolated protoplasts of *Skimmia japonica* Thumb. *Planta* 136, 135–145.

- Roberson, R.W., Fuller, M.S., 1988. Ultrastructural aspects of the hyphal tip of *Sclerotium rolfii* preserved by freeze substitution. *Protoplasma* 146, 143–149.
- Roberts, A.G., 2005. Plasmodesmal structure and development. In: Oparka, K.J. (Ed.), *Plasmodesmata*. Blackwell, Oxford, pp. 1–32.
- Roberts, A.G., Oparka, K.J., 2003. Plasmodesmata and the control of symplastic transport. *Plant, Cell and Environ.* 26, 103–124.
- Roberts, A.W., Roberts, E.M., 2004. Cellulose synthase (CesA) genes in algae and seedless plants. *Cellulose* 11, 419–435.
- Roberts, A.W., Roberts, E.M., Delmer, D.P., 2002. Cellulose synthase (CesA) genes in the green alga *Mesotaenium caldariarum*. *Eukaryotic Cell* 1, 847–855.
- Roberts, D.M., 1989. Detection of a calcium-activated protein kinase in *Mougeotia* by using synthetic peptide substrates. *Plant Physiol.* 91, 1613–1619.
- Roberts, I.M., Boevink, P., Roberts, A.G., Sauer, N., Reichel, C., Oparka, K.J., 2001. Dynamic changes in the frequency and architecture of plasmodesmata during sink-source transition in tobacco leaves. *Protoplasma* 218, 31–44.
- Roberts, K., 1989. The plant extracellular matrix. *Curr. Opin. Cell Biol.* 1, 1020–1027.
- Roberts, K., 1990. Structures at the plant cell surface. *Curr. Opin. Cell Biol.* 2, 920–928.
- Roberts, K., 1994. The plant extracellular matrix: In a new expansive mood. *Curr. Opin. Cell Biol.* 6, 688–694.
- Roberts, L., Baba, S., 1968. IAA induced xylem differentiation in the presence of colchicine. *Plant Cell Physiol.* 9, 315–321.
- Roberts, M., 1938. *Bio-Politics. An Essay on the Physiology Pathology & Politics of the Social and Somatic Organism*. J. Dent & Sons, London.
- Roberts, R.B. (Ed.), 1958. *Microsomal Particles and Protein Synthesis*. Pergamon Press, New York.
- Roberts, R. J., 1993. An amazing distortion in DNA induced by a methyltransferase. Nobel Lecture, December 8, 1993.
- Roberts, R.M., 1989. *Serendipity. Accidental Discoveries in Science*. John Wiley & Sons, New York.
- Roberts, S.K., Fischer, M., Dixon, G.K., Sanders, D., 1999. Divalent cation block of inward currents and low-affinity K⁺ uptake in *Saccharomyces cerevisiae*. *J. Bacteriol.* 181, 291–297.
- Robertson, D., Mitchell, G.P., Gilroy, J.S., Gerrish, C., Bolwell, G.P., Slabas, A.R., 1997. Differential extraction and protein sequencing reveals major differences in patterns of primary cell wall proteins from plants. *J. Biol. Chem.* 272, 15841–15848.
- Robertson, E.J., Pyke, K.A., Leech, R.M., 1995. Arc6, an extreme chloroplast division mutant of *Arabidopsis* also alters proplastid proliferation and morphology in shoot and root apices. *J. Cell Sci.* 108, 2937–2944.
- Robertson, E.J., Rutherford, S.M., Leech, R.M., 1996. Characterization of chloroplast division using the *Arabidopsis* mutant arc5. *Plant Physiol.* 112, 149–159.
- Robertson, J.D., 1959. The ultrastructure of cell membranes and their derivatives. *Biochem. Soc. Symp.* 16, 3–43.
- Robertson, J.D., 1964. Unit membranes: A review with recent new studies of experimental alterations and a new subunit structure in synaptic membranes. In: Locke, M. (Ed.), *Cellular Membranes in Development*. Academic Press, New York, pp. 1–81.
- Robertson, J.D., 1987. The early days of electron microscopy of nerve tissues and membranes. *Int. Rev. Cytol.* 100, 129–201.
- Robinow, C., Angert, E.R., 1998. Nucleoids and coated vesicles of “*Epulopiscium*” spp. *Arch. Microbiol.* 170, 227–235.
- Robins, R.D., Juniper, B.E., 1983. The secretory cycle of *Dionaea muscipula*. Ellis. I, II, III, IV, and V. *New Phytol.* 86 279–296, 297–311, 313–327, 402–412, 413–422.
- Robinson, D.G., 1980. Dictyosome-endoplasmic reticulum associations in higher plant cells? A serial section analysis. *Eur. J. Cell Biol.* 23, 22–36.
- Robinson, D.G., 1991. What is a plant cell? The last word. *The Plant Cell* 3, 1145–1146.
- Robinson, D.G., 2003. Vesicle trafficking in plants. *Zellbiologie aktuell* 29 (2), 29–32.
- Robinson, D.G., Balusek, K., Depta, H., Hoh, B., Hostein, S.E.H., 1991. Isolation and characterization of plant coated vesicles. In: Hawes, C.R., Coleman, J.O.D., Evans, D.E. (Eds.), *Endocytosis, Exocytosis and Vesicle Traffic in Plants*. Cambridge University Press, Cambridge, pp. 65–79.
- Robinson, D.G., Balusek, K., Freundt, H., 1989. Legumin antibodies recognize polypeptides in coated vesicles isolated from developing pea cotyledons. *Protoplasma* 150, 79–82.
- Robinson, D.G., Depta, H., 1988. Coated vesicles. *Ann. Rev. Plant Physiol.* 39, 53–99.
- Robinson, D.G., Eisinger, W.R., Ray, P.M., 1976a. Dynamics of the Golgi system in wall matrix polysaccharide synthesis and secretion by pea cells. *Ber. Dtsch. Bot. Ges.* 89, 147–161.
- Robinson, D.G., Glas, R., 1982. Secretion kinetics of hydroxyproline-containing macromolecules in carrot root disks. *Plant Cell Rep.* 1, 197–198.
- Robinson, D.G., Grimm, I., Sachs, H., 1976b. Colchicine and microfibril orientation. *Protoplasma* 89, 375–380.
- Robinson, D.G., Haschke, H.-P., Hinz, G., Hoh, B., Maeshima, M., Marty, F., 1996. Immunological detection of tonoplast polypeptides in the plasma membrane of pea cotyledons. *Planta* 198, 95–103.
- Robinson, D.G., Herranz, A.-C., Bubeck, J., Pepperkok, R., Ritzenthaler, C., 2007. Membrane dynamics in the early secretory pathway. *Crit. Rev. Plant Sci.* 26, 199–225.
- Robinson, D.G., Herzog, W., 1977. Structure, synthesis and orientation of microfibrils. III. A survey of the action of microtubule inhibitors on microtubules and microfibril orientation in *Oocystis solitaria*. *Cytobiologie* 15, 463–474.
- Robinson, D.G., Hillmer, S., 1990. Endocytosis in plants. *Physiol. Plant.* 79, 96–104.
- Robinson, D.G., Hinz, G., 1996. Multiple mechanisms of protein body formation in pea cotyledons. *Plant Physiol. Biochem.* 34, 155–163.
- Robinson, D.G., Hinz, G., 1997. Vacuole biogenesis and proton transport to the plant vacuole: A comparison with the yeast vacuole and the mammalian lysosome. *Protoplasma* 197, 1–25.
- Robinson, D.G., Jiang, L., Schumacher, K., 2008. The endosomal system in plants: Charting new and familiar territories. *Plant Physiol.* 147, 1482–1492.
- Robinson, D.G., Preston, R.D., 1972. Plasmalemma structure in relation to microfibril biosynthesis in *Oocystis*. *Planta* 104, 234–246.
- Robinson, D.G., Quader, H., 1981. Structure, synthesis, and orientation of microfibrils. IX. A freeze-fracture investigation of the *Oocystis* plasma membrane after inhibitor treatment. *Eur. J. Cell Biol.* 25, 278–288.

- Robinson, D.G., Quader, H., 1982. The microtubule-microfibril syndrome. In: Lloyd, C.W. (Ed.), *The Cytoskeleton in Plant Growth and Development*. Academic Press, London, pp. 109–126.
- Robinson, D.G., Rogers, J.C., 2000. *Vacuolar Compartments*. Sheffield Academic Press and CRC Press, Boca Raton, FL.
- Robinson, K.R., 1985. The responses of cells to electric fields: A review. *J. Cell Biol.* 101, 2023–2027.
- Robinson, K.R., Cone, R., 1980. Polarization of fucoid eggs by a calcium ionophore gradient. *Science* 207, 77–78.
- Robinson, K.R., Jaffe, L.F., 1973. Ion movements in a developing Fucoid egg. *Develop. Biol.* 35, 349–361.
- Robinson, K.R., Jaffe, L.F., 1975. Polarizing fucoid eggs drive a calcium current through themselves. *Science* 187, 70–72.
- Robinson, K.R., Messerli, M.A., 2002. Left/Right, up/down: The role of endogenous electrical fields as directional signals in development, repair and invasion. *BioEssays* 25, 759–766.
- Robinson, K.R., Muller, B.J., 1997. The coupling of cyclic GMP and photopolarization of *Pelvetia* zygotes. *Dev. Biol.* 187, 125–130.
- Robinson, R., 1947. Some polycyclic natural products. Nobel Lecture, December 12, 1947.
- Robinson, R., 1955. *The Structural Relations of Natural Products*. Clarendon Press, Oxford.
- Robinson, R.A., Stokes, R.H., 1959. *Electrolyte Solutions*. Butterworths Scientific Publications, London.
- Rockwell, N.C., Su, Y.-S., Lagarias, J.C., 2006. Phytochrome structure and signaling mechanisms. *Annu. Rev. Plant Biol.* 57, 837–858.
- Roelfsema, M.R.G., Hedrich, R., 2002. Studying guard cells in the intact plant: Modulation of stomatal movement by apoplastic factors. *New Phytol.* 153, 425–431.
- Roger, J., 1997. *Buffon. A Life in Natural History*. Cornell University Press, Ithaca, New York.
- Rogers, H.J., 2005. Cytoskeletal regulation of the plane of cell division: An essential component of plant development and reproduction. *Adv. in Bot.* 42, 69–111.
- Roget, P.M., 1834. *Animal and Vegetable Physiology, Considered with Reference to Natural Theology*. W. Pickering, London.
- Roelofsen, P.A., 1958. Cell wall structure as related to surface growth. *Acta Bot. Neerl.* 7, 77–89.
- Rojo, E., Denecke, J., 2008. What is moving in the secretory pathway of plants? *Plant Physiol.* 147, 1493–1503.
- Rolland, R., 1926. *The Game of Love and Death*. Translated by E. S. Brooks. Henry Holt and Co., New York.
- Römling, U., 2002. Molecular biology of cellulose production in bacteria. *Res. Microbiol.* 153, 205–212.
- Romagnoli, S., Cai, G., Cresti, M., 2003. In vitro assays demonstrate that pollen tube organelles use kinesin-related motor proteins to move along microtubules. *Plant Cell* 15, 251–269.
- Ronceret, A., Sheehan, M.J., Pawlowski, W.P., 2007. Chromosome dynamics in meiosis. *Plant Cell Monogr.* 9, 103–124.
- Roof, D.M., Meluh, P.B., Rose, M.D., 1992. Kinesin-related proteins required for assembly of the mitotic spindle. *J. Cell Biol.* 118, 95–108.
- Rosamond, J., 1987. Structure and function of mitochondria. *Int. Rev. Cytol. Suppl.* 17, 121–147.
- Rose, A., 2007. Open mitosis: Nuclear envelope dynamics. *Plant Cell Monogr.* 9, 207–230.
- Rose, J.K., Doms, R.W., 1988. Regulation of protein transport from the endoplasmic reticulum. *Ann. Rev. Cell Biol.* 4, 257–288.
- Rose, J.K., Bennett, A.B., 1999. Cooperative disassembly of the cellulose-xyloglucan network of plant cell walls: Parallels between cell expansion and fruit ripening. *Trends Plant Sci.* 4, 176–183.
- Rose, J.K.C., Cosgrove, D.J., Albersheim, P., Darvill, A.G., Bennett, A.B., 2000. Detection of expansin proteins and activity during tomato fruit ontogeny. *Plant Physiol.* 123, 1583–1592.
- Rosen, G., 1959. The conservation of energy and the study of metabolism. In: Brooks, C.M.C., Crane, P.F. (Eds.), *The Historical Development of Physiological Thought*. Hafner Publishing Co, New York, pp. 245–263.
- Rosen, W.G., 1968. Ultrastructure and physiology of pollen. *Ann. Rev. Plant Physiol.* 19, 435–462.
- Rosen, W.G., Gawlik, S.R., Dashek, W.V., Siegesmund, K.A., 1964. Fine structure and cytochemistry of *Lilium* pollen tubes. *Am. J. Bot.* 51, 61–71.
- Rosenbaum, J.L., Carlson, K., 1969. Cilia regeneration in *Tetrahymena* and its inhibition by colchicine. *J. Cell. Biol.* 40, 415–425.
- Rosenberg, J.L., 2004. The contributions of James Franck to photosynthesis research: A tribute. *Photosynthesis Res.* 80, 71–76.
- Rosenberger, R.F., Kessel, M., 1968. Nonrandom sister chromatid segregation and nuclear migration in hyphae of *Aspergillus nidulans*. *J. Bacteriol.* 96, 1208–1213.
- Roshchina, V.V., 2001. *Neurotransmitters in Plant Life*. Science Publishers, Enfield, NH.
- Roshchina, V.V., 2008. *Fluorescing World of Plant Secreting Cells*. Science Publishers, Enfield, NH.
- Roshchina, V.V., Roshchina, V.D., 1993. *The Excretory Function of Higher Plants*. Springer-Verlag, Berlin.
- Rosing, J., Slater, E.C., 1972. The value of ΔG° for the hydrolysis of ATP. *Biochim. Biophys. Acta* 267, 275–290.
- Roth, L.E., Daniels, E.W., 1962. Electron microscopic studies of mitosis in amebae. II. The giant ameba *Pelomyxa carolinensis*. *J. Cell Biol.* 12, 57–78.
- Rothman, J.E., 1992. The reconstruction of intracellular protein transport in cell-free systems. *Harvey Lect.* 86, 65–85.
- Rothman, J.E., Miller, R.L., Urbani, L.J., 1984a. Intercompartmental transport in the Golgi complex is a dissociative process: Facile transfer of membrane proteins between two Golgi populations. *J. Cell Biol.* 99, 260–271.
- Rothman, J.E., Urbani, L.J., Brands, R., 1984b. Transport of protein between cytoplasmic membranes of fused cells: Correspondence to processes reconstituted in a cell-free system. *J. Cell Biol.* 99, 248–259.
- Rouiller, C., Bernhard, W., 1956. “Microbodies” and the problem of mitochondrial regeneration in liver cells. *J. Biophys. Biochem. Cytol.* 2 (no. 4) Suppl. 355.
- Rousseau, J. J. 1762. *The Social Contract or Principles of Political Right*. <http://www.constitution.org/jjr/socon.htm>
- Roux, W., 1883. Ueber die Bedeutung der Kerntheilungsfiguren. Eine hypothetische Erörterung. Wilhelm Engelmann, Leipzig.
- Roux, W., [1888] 1974. Contributions to the developmental mechanics of the embryo. On the artificial production of half-embryos by destruction of one of the first two blastomeres, and the later development (postgeneration) of the missing half of the body. In: *Foundations of Experimental Embryology*, second ed, pp. 2–37. Willier, B.H. Oppenheimer, J.M. (Eds.), Hafner Press, New York.

- Roy, S., Vian, B., 1991. Transmural exocytosis in maize root cap. Visualization by simultaneous use of a cellulose-probe and a fucose-probe. *Protoplasma* 161, 181–191.
- Royo, J., Gómez, E., Hueros, G., 2007. Transfer cells. *Plant Cell Monogr.* 8, 73–89.
- Ruan, Y.-L., Llewellyn, D.J., Furbank, R.T., 2001. The control of single-celled cotton fiber elongation by developmentally reversible gating of plasmodesmata and coordinated expression of sucrose and K⁺ transporters and expansin. *Plant Cell* 13, 47–60.
- Ruben, S., 1943. Photosynthesis and phosphorylation. *J. Amer. Chem. Soc.* 65, 279–282.
- Ruben, S., Kamen, M.D., 1940a. Radioactive carbon in the study of respiration in heterotrophic systems. *Proc. Natl. Acad. Sci. USA* 26, 418–422.
- Ruben, S., Kamen, M.D., 1940b. Radioactive carbon of long half-life. *Phys. Rev.* 57, 549.
- Ruben, S., Kamen, M.D., 1941. Long-lived radioactive carbon: C¹⁴. *Phys. Rev.* 59, 349–354.
- Rubin, E.M., 2008. Genomics of cellulosic biofuels. *Nature* 454, 841–845.
- Rubinstein, B., Luster, D.G., 1993. Plasma membrane redox activity: Components and role in plant processes. *Ann. Rev. Plant Physiol. Plant Mol. Biol.* 44, 131–155.
- Rubio, F., Gassmann, W., Schroeder, J.I., 1995. Sodium-driven potassium uptake by the plant potassium transporter HKT1 and mutations conferring salt tolerance. *Science* 270, 1660–1663.
- Rüdiger, W., 2005. Prototropin phosphorylation. In: Wada, M., Shimazaki, K., Iino, M. (Eds.), *Light Sensing in Plants*. Springer, Tokyo, pp. 171–177.
- Ruestow, E.G., 1983. Images and ideas: Leeuwenhoek's perception of the spermatozoa. *J. Hist. Biol.* 16, 185–224.
- Ruestow, E.G., 1996. *The Microscope in the Dutch Republic. The Shaping of Discovery*. Cambridge University Press, Cambridge.
- Runnström, J., 1911. Untersuchungen über die Permeabilität des Seeigeleies für Farbstoffe. *Arkiv. f. Zool.* 7, 1–17.
- Ruoslahti, E., 1988. Structures at the plant cell surface. *Curr. Opin. Cell Biol.* 4, 229–255.
- Russ, V., Grolig, F., Wanger, G., 1991. Changes of cytoplasmic free Ca²⁺ in the green alga *Mougeotia scalaris* as monitored with indo-1, and their effect on the velocity of chloroplast movements. *Planta* 184, 105–112.
- Russell, J.B., 1991. *Inventing the Flat Earth. Columbus and Modern Historians*. Praeger, New York.
- Rustom, A., Saffrich, R., Markovic, I., Walther, P., Gerdes, H.-H., 2004. Nanotubular highways for intercellular organellar transport. *Science* 303, 1007–1010.
- Rutherford, E., 1909. *Radioactive Transformations*. Yale University Press, New Haven, CT.
- Rutherford, Rutherford of Nelson, The Society for the Protection of Science and Learning 1936. *Science* 83, 372.
- Ryabov, E.V., van Wezel, R., Walsh, J., Hong, Y., 2004. Cell-to-Cell, but not long-distance, spread of RNA silencing that is induced in individual epidermal cells. *J. Virol.* 78, 3149–3154.
- Rutherford, S., Moore, I., 2002. The Arabidopsis Rab GTPase family: Another enigma variation. *Curr. Opin. Plant Biol.* 5, 518–528.
- Ryan, C.A., Farmer, E.E., 1991. Oligosaccharide signals in plants: A current assessment. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 42, 651–674.
- Ryu, J.-H., Takagi, S., Nagai, R., 1995. Stationary organization of the actin cytoskeleton in *Vallisneria*: The role of stable microfilaments at the end walls. *J. Cell Sci.* 108, 1531–1539.
- Ryu, J.-H., Mizuno, K., Takagi, S., Nagai, R., 1997. Extracellular components implicated in the stationary organization of the actin cytoskeleton in mesophyll cells of *Vallisneria*. *Plant Cell Physiol.* 38, 420–432.

-S-

- Sabatini, D.D., Blobel, G., 1970. Controlled proteolysis of nascent polypeptides in rat liver cell fractions. II. Location of the polypeptides in rough microsomes. *J. Cell Biol.* 45, 146–157.
- Sabatini, D.D., Louvard, D., Adesnik, M., 1991. Membranes. Editorial overview. *Curr. Opin. Cell Biol.* 3, 575–579.
- Sabelli, P.A., Larkins, B.A., 2007. The endoreduplication cell cycle: Regulation and function. *Plant Cell Monogr.* 9, 75–100.
- Sabelli, P.A., Larkins, B.A., 2009. The development of endosperm in grasses. *Plant Physiol.* 149, 14–26.
- Sablin, E.P., case, R.B., Dai, S.C., Hart, C.L., Ruby, A., Vale, R.D., Fletterick, R.J., 1998. Direction determination in the minus-end-directed kinesin motor ncd. *Nature* 395, 813–816.
- Sablin, E.P., Kull, F.J., Cooke, R., Vale, R.D., Fletterick, R.J., 1996. Crystal structure of the motor domain of the kinesin motor ncd. *Nature* 380, 555–559.
- Sachs, H., Grimm, I., Robinson, D.G., 1976. Structure, synthesis and orientation of microfibrils. I. Architecture and development of the wall of *Oocystis solitaria*. *Cytobiologie* 14, 49–60.
- Sachs, J., 1882. *Text-book of Botany*, second Edition. Clarendon Press, Oxford.
- Sachs, J. von., 1887. *Lectures on the Physiology of Plants*. Translated by H. Marshall Ward. Clarendon Press, Oxford.
- Sachs, J. von., 1892. *Physiologische Notizen. II. Beiträge zur Zellentheorie*. *Flora* 75, 57–67.
- Sachs, J. von., 1906. *History of Botany. (1530–1860)*. Translated by H. E. F. Garnsey. Revised by I. B. Balfour. Clarendon Press, Oxford.
- Sachs, T., 2006. How can plants choose the most promising organs? In: Baluska, F., Mancuso, S., Volkmann, D. (Eds.), *Communication in Plants*. Springer, Berlin, pp. 53–63.
- Sack, F.D., 1991. What is a plant cell? Continued. *Plant Cell* 3, 844.
- Sack, F.D., 1997. Plastids and gravitropic sensing. *Planta* 203, S63–S68.
- Sack, F.D., 2004. Yoda would be proud: Valves for land plants. *Science* 304, 1461–1462.
- Safstrom, J.P., Staehelin, L.A., 1988. Antibody localization of extensin in cell walls of carrot storage roots. *Planta* 174, 321–332.
- Saftner, R.A., Raschke, K., 1981. Electrical potentials in stomatal complexes. *Plant Physiol.* 67, 1124–1132.
- Sagan, L., 1967. On the origin of mitosing cells. *J. Theoret. Biol.* 14, 225–274.
- Sager, R., Ryan, F.J., 1961. *Cell Heredity. An Analysis of the Mechanisms of Heredity at the Cellular Level*. John Wiley & Sons, Inc., New York.
- Sagi, G., Katz, A., Guenoune-Gelbart, D., Epel, B.L., 2005. Class 1 reversibly glycosylated polypeptides are plasmodesmal-associated proteins delivered to plasmodesmata via the Golgi apparatus. *Plant Cell* 17, 1788–1800.

- Saint-Jore, C.M., Evins, J., Batoko, H., Brandizzi, F., Moore, I., Hawes, C., 2002. Redistribution of membrane proteins between the Golgi apparatus and endoplasmic reticulum in plants is reversible and not dependent on cytoskeletal networks. *Plant J.* 29, 661–678.
- Saito, S.Y., Karaki, H., 1996. A family of novel actin-inhibiting marine toxins. *Clin. Exp. Pharma. Physiol.* 23, 743–746.
- Sakaguchi, S., Hogetsu, T., Hara, N., 1988a. Arrangement of cortical microtubules in the shoot apex of *Vinca major* L. *Planta* 175, 403–411.
- Sakaguchi, S., Hogetsu, T., Hara, N., 1988b. Arrangement of cortical microtubules at the surface of the shoot apex in *Vinca major* L: Observations by immunofluorescence microscopy. *Bot. Mag. Tokyo* 101, 497–507.
- Sakaguchi, S., Hogetsu, T., Hara, N., 1990. Specific arrangements of cortical microtubules are correlated with the architecture of meristems in shoot spines of angiosperms and gymnosperms. *Bot. Mag. Tokyo* 103, 143–163.
- Sakai, T., Kagawa, T., Kasahara, M., Swartz, T.E., Christie, J.M., Briggs, W.R., Wada, M., Okada, K., 2001. *Arabidopsis* nph1 and nph1: Blue light receptors that mediate both phototropism and chloroplast relocation. *Proc. Natl. Acad. Sci. USA* 98, 6969–6974.
- Sakamoto, K., Briggs, W.R., 2002. Cellular and subcellular localization of phototropin I. *Plant Cell* 14, 1723–1735.
- Sakano, K., Tazawa, M., 1985. Metabolic conversion of amino acids loaded in the vacuole of *Chara australis* internodal cells. *Plant Physiol.* 78, 673–677.
- Sakiyama-Sogo, M., Shibaoka, H., 1993. Gibberellin A₂ and abscisic acid cause the reorientation of cortical microtubules in epicotyl cells of the decapitated dwarf pea. *Plant Cell Physiol.* 34, 431–437.
- Sakmann, B., 1991. Elementary steps in synaptic transmission revealed by currents through single ion channels. *Nobel Lect.* December 9.
- Sakmann, B., Neher, E. (Eds.), 1983. *Single-Channel Recording*. Plenum Press, New York.
- Sakurai, M., Pak, J.Y., Muramatsu, Y., Fukuhara, T., 2004. Integrin-like protein at the invaginated plasma membrane of epidermal cells in mature leaves of the marine angiosperm *Zostera marina* L. *Planta* 220, 271–277.
- Sale, W.S., Satir, P., 1977. Direction of active sliding of microtubules in *Tetrahymena* cilia. *Proc. Natl. Acad. Sci. USA* 74, 2045–2049.
- Salic, A., Waters, J.C., Mitchison, T.J., 2004. Vertebrate shugoshin links sister centromere cohesion and kinetochore microtubule stability in mitosis. *Cell* 118, 567–578.
- Salisbury, F.B., 1993. Gravitropism: Changing ideas. *Hortic. Rev.* 15, 233–278.
- Salisbury, J.L., Baron, A., Colling, D., Martindale, V., Sanders, M., 1986. Calcium-modulated contractile proteins associated with the eucaryotic centrosome. *Cell Motil. Cytoskel.* 6, 193–197.
- Salisbury, J.L., Baron, A.T., Sanders, M.A., 1988. The centrin-based cytoskeleton of *Chlamydomonas reinhardtii*: Distribution in interphase and mitotic cells. *J. Cell Biol.* 107, 635–641.
- Salisbury, J.L., Baron, A., Surek, B., Melkonian, M., 1984. Striated flagellar roots: Isolation and partial characterization of a calcium-modulated contractile organelle. *J. Cell Biol.* 99, 962–970.
- Salisbury, J.L., Sanders, M.A., Harpst, L., 1987. Flagellar root contraction and nuclear movement during flagellar regeneration in *Chlamydomonas reinhardtii*. *J. Cell Biol.* 105, 1799–1805.
- Salminen, A., Novick, P.J., 1987. A *ras*-like protein is required for a post-Golgi event in yeast secretion. *Cell* 49, 527–538.
- Salmon, E.D., 1989. Microtubule dynamics and chromosome movement. In: Hyams, J.S., Brinkley, B.R. (Eds.), *Mitosis: Molecules and Mechanisms*. Academic Press, Canada, pp. 119–181.
- Salomon, M., Christie, J.M., Knieb, E., Lempert, U., Briggs, W.R., 2000. Photochemical and mutational analysis of the FMN-binding domains of the plant blue light receptor, phototropin. *Biochemistry* 39, 9401–9410.
- Salpeter, E.E., 1974. Dying stars and reborn dust. *Rev. Mod. Phys.* 46, 433–446.
- Salpeter, E.E., 2002. A generalist looks back. *Annu. Rev. Astron. Astrophys.* 40, 1–25.
- Saltman, P., Kunitake, G., Spolter, H., Stitt, C., 1956. The dark fixation of CO₂ by succulent leaves. The first products. *Plant Physiol.* 31, 464–468.
- Sampson, K., Pickett-Heaps, J.D., 2001. Phalloidin stains the kinetochore region in the mitotic spindle of the green alga *Oedogonium* spp. *Protoplasma* 217, 166–176.
- Sampson, K., Pickett-Heaps, J.D., Forer, A., 1996. Cytochalasin D blocks chromosomal attachment to the spindle in the green alga *Oedogonium*. *Protoplasma* 192, 130–144.
- Samuels, A.L., Bisalputra, T., 1990. Endocytosis in elongating root cells of *Lobelia erinos*. *J. Cell Sci.* 97, 157–165.
- Samuels Jr., A.L., Giddings, T.H., Staehelin, L.A., 1995. Cytokinesis in tobacco BY-2 and root tip cells: A new model of cell plate formation in higher plants. *J. Cell Biol.* 130, 1345–1357.
- Samuels, A.L., Staehelin, L.A., 1996. Caffeine inhibits cell plate formation by disrupting membrane reorganization just after the vesicle fusion step. *Protoplasma* 195, 144–155.
- Sanchez, A.M., Bosch, M., Bots, M., Nieuwland, J., Feron, R., Mariani, C., 2004. Pistil factors controlling pollination. *Plant Cell* 16, S98–S106.
- Sanchez, R.A., Ferris, J.P., Orgel, L.E., 1966. Conditions for purine synthesis: Did prebiotic synthesis occur at low temperatures? *Science* 153, 72–73.
- Sanchez, R.A., Ferris, J.P., Orgel, L.E., 1968. Studies in prebiotic synthesis. IV. Conversion of 4-aminoimidazole-5-carbonitrile derivatives to purines. *J. Mol. Biol.* 38, 121–128.
- Sanchez-Fernandez, T., Davies, G.E., Coleman, J.O.D., Rea, P.A., 2001. The *Arabidopsis thaliana* ABC protein superfamily, a complete inventory. *J. Biol. Chem.* 276, 30231–30244.
- Sandelius, A.S., Morré, D.J., 1987. Characteristics of a phosphatidylinositol exchange activity of soybean microsomes. *Plant Physiol.* 84, 1022–1027.
- Sandelius, A.S., Penel, C., Auderset, G., Brightman, A., Millard, M., Morré, D.J., 1986. Isolation of highly purified fractions of plasma membrane and tonoplast from the same homogenate of soybean hypocotyls by free-flow electrophoresis. *Plant Physiol.* 81, 177–185.
- Sanderfoot, A., 2007. Increases in the number of SNARE genes parallels the rise of multicellularity among green plants. *Plant Physiol.* 144, 6–17.
- Sanderfoot, A.A., Assaad, F.F., Raikhel, N.V., 2000. The *Arabidopsis* genome: An abundance of SNAREs. *Plant Physiol.* 124, 1558–1569.

- Sanderfoot, A.A., Ahmed, S.U., Marty-Mazars, D., Rapoport, I., Kischhausen, T., Marty, F., Raikhel, N.V., 1998. A putative vacuolar cargo receptor partially colocalizes with AtPEP12p on a prevacuolar compartment in Arabidopsis roots. *Proc. Natl. Acad. Sci. USA* 195, 9920–9925.
- Sanders, D., 1990. Kinetic modeling of plant and fungal membrane transport systems. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 41, 77–107.
- Sanders, L.C., Wang, C.S., Walling, L.L., Lord, E.M., 1991. A homolog of the substrate adhesion molecule vitronectin occurs in four species of flowering plants. *Plant Cell* 3, 629–635.
- Sandstrom, R.P., Cleland, R.E., 1989. Comparison of the lipid composition of oat root and coleoptile plasma membranes. *Plant Physiol.* 90, 1207–1213.
- Sanford, J.C., 2008. *Genetic Entropy & The Mystery of the Genome*, Third Edition. FMS Publications, Waterloo, New York.
- Sanger, F. 1958. The chemistry of insulin. Nobel Lecture, December 11, 1958.
- Sanger, F. 1980. Determination of nucleotide sequences in DNA. Nobel Lect. December 8.
- Sanger, F., 1981. Determination of nucleotide sequences in DNA. *Science* 214, 1205–1210.
- Sano, T., Katsuna, N., Higami, T., Oda, Y., Yoneda, A., Kumagai-Sano, F., Hasezawa, S., 2007. Cytoskeletal and vacuolar dynamics during plant cell division: Approaches using structure-visualized cells. *Plant Cell Monogr.* 9, 125–140.
- Santi, L., Batchelor, L., Huang, Z., Hjelm, B., Kilbourne, J., Arntzen, C.J., Chen, Q., Mason, H.S., 2008. An efficient plant viral expression system generating orally immunogenic Norwalk virus-like particles. *Vaccine* 26, 1846–1854.
- San Pietro, A., Lang, H.M., 1956. Accumulation of reduced pyridine nucleotides by illuminated grana. *Science* 124, 118–119.
- Sapolsky, R.M., 1998. *Why Zebras Don't Get Ulcers*. Barnes & Noble Books, New York.
- Sapp, J., 2007. Mitochondria and their host. In: Martin, W.F., Müller, M. (Eds.), *Origin of Mitochondria and Hydrogenosomes*. Springer, Berlin, pp. 57–83.
- Saranak, J., Foster, K.W., 1994. The in vivo cleavage of carotenoids into retinoids in *Chlamydomonas reinhardtii*. *J. Exp. Bot.* 45, 505–511.
- Saranak, J., Foster, K.W., 1997. Rhodopsin guides fungal phototaxis. *Nature* 387, 465–466.
- Saranak, J., Foster, K.W., 2000. Reducing Agents and Light Break an S-S Bond Activating Rhodopsin In Vivo in *Chlamydomonas*. *Biochem. Biophys. Res. Comm.* 275, 286–291.
- Sarwar Khan, M., 2007. Engineering photorespiration in chloroplasts: A novel strategy for increasing biomass production. *Trends Biotechnol.* 25, 437–440.
- Sastry, S.K., Horwitz, A.F., 1993. Integrin cytoplasmic domains: Mediators of cytoskeletal linkages and extra- and intracellular initiated transmembrane signaling. *Curr. Opin. Cell Biol.* 5, 819–831.
- Satiat-Jeunemaitre, B., Hawes, C., 1994. G.A.T.T. (A general agreement on traffic and transport) and brefeldin A in plant cells. *Plant Cell* 6, 463–467.
- Satiat-Jeunemaitre, B., Martin, B., Hawes, C., 1992. Plant cell wall architecture is revealed by rapid-freezing and deep-etching. *Protoplasma* 167, 33–42.
- Satiat-Jeunemaitre, B., Steele, C., Hawes, C., 1996. Golgi-membrane dynamics are cytoskeleton dependent: A study on Golgi stack movement induced by brefeldin A. *Protoplasma* 191, 21–33.
- Satir, P., 1961. Cilia. *Sci. Amer.* 204, 108–116.
- Satir, P., 1965. Studies on cilia. II. Examination of the distal region of the ciliary shaft and the role of the filaments in motility. *J. Cell Biol.* 26, 805–834.
- Satir, P., 1974. How cilia move. *Sci. Amer.* 231, 45–50.
- Satir, P., 1975. Ciliary and flagellar movement: An introduction. In: Inoué, S., Stephens, R.E. (Eds.), *Molecules and Cell Movement*. Raven Press, New York, pp. 143–149.
- Sato, H., Ellis, G.W., Inoué, S., 1975. Microtubular origin of mitotic spindle form birefringence. *J. Cell. Biol.* 67, 501–517.
- Sato, M., Schwarz, W.H., Selden, S.C., Pollard, T.D., 1988. Mechanical properties of brain tubulin and microtubules. *J. Cell Biol.* 106, 1205–1211.
- Sato, M., Wong, T.Z., Allen, R.D., 1983. Rheological properties of living cytoplasm: Endoplasm of *Physarum plasmodium*. *J. Cell Biol.* 97, 1089–1097.
- Sato, N., Albrieux, C., Joyard, J., Douce, R., Kuroiwa, T., 1993. Detection and characterization of a plastid envelope DNA-binding protein which may anchor plastid nucleoids. *EMBO J* 12, 555–561.
- Sato, S., 1972. *Mitochondria. Selected Papers in Biochemistry*, vol 10. University Park Press, Baltimore.
- Sato, Y., Kadota, A., Wada, M., 1999. Mechanically induced avoidance response of chloroplasts in fern protonemal cells. *Plant Physiol.* 121, 37–44.
- Sato, Y., Wada, M., Kadota, A., 2001a. Choice of tracks, microtubules and/or actin filaments for chloroplast photo-movement is differentially controlled by phytochrome and a blue light receptor. *J. Cell Sci.* 114, 269–279.
- Sato, Y., Wada, M., Kadota, A., 2001b. External Ca^{2+} is essential for chloroplast movement induced by mechanical stimulation but not by light stimulation. *Plant Physiol.* 127, 497–504.
- Sattelle, D.B., Buchan, P.B., 1976. Cytoplasmic streaming in *Chara corallina* studied by laser light scattering. *J. Cell Sci.* 22, 633–643.
- Satter, R.L., Morse, M.J., Lee, Y., Crain, R.C., Coté, G., Moran, N., 1988. Light and clock-controlled leaflet movements in *Samanea saman*: A physiological, biophysical and biochemical analysis. *Bot. Acta* 101, 205–213.
- Sauer, H.W., 1982. *Developmental Biology of Physarum*. Cambridge University Press, Cambridge.
- Saunders, J.A., 1979. Investigations of vacuoles isolated from tobacco—quantitation of nicotine. *Plant Physiol.* 64, 74–78.
- Saunders, M.J., 1986a. Correlation of electrical current influx with nuclear position and division in *Funaria* caulonemal tip cells. *Protoplasma* 132, 32–37.
- Saunders, M.J., 1986b. Cytokinin activation and redistribution of plasma membrane ion channels in *Funaria*. A vibrating-microelectrode and cytoskeleton-inhibitor study. *Planta* 167, 402–409.
- Saunders, M.J., Hepler, P.K., 1981. Localization of membrane associated calcium following cytokinin treatment in *Funaria* using chlortetracycline. *Planta* 152, 272–281.
- Saunders, M.J., Hepler, P.K., 1982. Calcium ionophore A23187 stimulates cytokinin-like mitosis in *Funaria*. *Science* 217, 943–945.
- Sautter, C., 1986. Microbody transition in greening watermelon cotyledons. Double immunocytochemical labeling of isocitrate lyase and hydroxypyruvate reductase. *Planta* 167, 491–503.

- Sawin, K.E., LeGuellec, K., Philippe, M., Mitchison, T.J., 1992a. Mitotic spindle organization by a plus-end directed microtubule motor. *Nature* 359, 540–543.
- Sawin, K.E., Mitchison, T.J., 1991a. Mitotic spindle assembly by two different pathways in vitro. *J. Cell Biol.* 112, 925–940.
- Sawin, K.E., Mitchison, T.J., 1991b. Poleward microtubule flux in mitotic spindles. *J. Cell Biol.* 112, 941–954.
- Sawin, K.E., Mitchison, T.J., Wordeman, L.G., 1992b. Evidence for kinesin-related proteins in the mitotic apparatus using peptide antibodies. *J. Cell Sci.* 101, 303–313.
- Sawyer, R.M., Boulter, D., Gatehouse, J.A., 1987. Nuclease sensitivity of storage-protein genes in isolated nuclei of pea seeds. *Planta* 171, 254–258.
- Sax, K., 1944. Soviet biology. *Science* 99, 298–299.
- Sax, K., O'Mara, J.G., 1941. Mechanism of mitosis in pollen tubes. *Bot. Gaz.* 102, 629–636.
- Saxena, I., Brown Jr., R.M., 2005. Cellulose biosynthesis: Current views and evolving concepts. *Ann. Bot.* 96, 9–21.
- Saxton, M.J., Jacobson, K., 1997. Single-particle tracking: Applications to membrane dynamics. *Annu. Rev. Biophys. Biomol. Struct.* 26, 373–399.
- Sayer, A., 1975. Rosalind Franklin & DNA. W.W. Norton & Co., New York.
- Sazuka, T., Keta, S., Shiratake, K., Yamaki, S., Shibata, D., 2004. A proteomic approach to identification of transmembrane proteins and membrane-anchored proteins of *Arabidopsis thaliana* by peptide sequencing. *DNA Res.* 11, 101–113.
- Scala, J., Schwab, D., Simmons, E., 1968. The fine structure of the digestive gland of Venus's fly trap. *Amer. J. Bot.* 55, 649–657.
- Schachtman, D.P., Schroeder, J.I., Lucas, W.J., Anderson, J.A., Gaber, R.F., 1992. Expression of an inward-rectifying potassium channel by the *Arabidopsis* KAT1 cDNA. *Science* 258, 1654–1658.
- Schatz, G., Dobberstein, B., 1996. Common principles of protein translocation across membranes. *Science* 271, 1519–1526.
- Scheer, U., Franke, W.W., 1972. Annulate lamellae in plant cells: Formation during microsporogenesis and pollen development in *Canna generalis* Bailey. *Planta* 107, 145–159.
- Scheer, U., Benavente, R., 1990. Functional and dynamic aspects of the mammalian nucleolus. *BioEssays* 12, 343–346.
- Schekman, R., 1985. Protein localization and membrane traffic. *Ann. Rev. Cell Biol.* 1, 115–143.
- Schekman, R.W., 1996. Regulation of membrane traffic in the secretory pathway. *Harvey Lectures* 90, 41–57.
- Schekman, R., 2005. Peroxisomes: Another branch of the secretory pathway? *Cell* 122, 1–7.
- Schekman, R., Orci, L., 1996. Coat proteins and vesicle budding. *Science* 271, 1526–1533.
- Schenk, H.E.A., Bayer, M.G., Zook, D., 1987. Cyanelles. From symbiont to organelle. *Ann. NY Acad. Sci.* 503, 151–167.
- Scherer, G.F.E., von Drop, B., Schöllmann, C., Volkmann, D., 1992. Proton-transport activity, sidedness, and morphometry of tonoplast and plasma-membrane vesicles purified by free-flow electrophoresis from roots of *Lepidium sativum* L. and hypocotyls of *Cucurbita pepo* L. *Planta* 186, 483–494.
- Scheres, B., Benfey, P.B., 1999. Asymmetric cell division in plants. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 50, 505–537.
- Scherp, P., Hasenstein, K.H., 2007. Anisotropic viscosity of the *Chara* (Characeae) rhizoid cytoplasm. *Amer. J. Bot.* 94, 1930–1934.
- Schweikert, M., Meyer, B., 2001. Characterization of intracellular bacteria in the freshwater dinoflagellate *Peridinium cinctum*. *Protoplasma* 217, 177–184.
- Schibler, M.J., Pickett-Heaps, J.D., 1987. The kinetochore fibre structure in the acentric spindles of *Oedogonium*. *Protoplasma* 137, 29–44.
- Schiebel, W., Haas, B., Marinkovic, S., Klanner, A., Sanger, H.L., 1993a. RNA-directed RNA polymerase from tomato leaves. I. Purification and physical properties. *J. Biol. Chem.* 268, 11851–11857.
- Schiebel, W., Haas, B., Marinkovic, S., Klanner, A., Sanger, H.L., 1993b. RNA-directed RNA polymerase from tomato leaves. II. Catalytic in vitro properties. *J. Biol. Chem.* 268, 11858–11867.
- Schilperoort, R.A., 1970. Investigations on plant tumors, crown gall. On the biochemistry of tumor-induction by *Agrobacterium tumefaciens*. Demmenie N. V., Leiden.
- Schimper, A.F.W., 1883. Ueber die Entwicklung der Chlorophyllkorner und Farbkorper. *Bot. Z.* 41, 105, 121, 137, 153.
- Schimper, A.F.W., 1885. Untersuchungen uber die Chlorophyllkorper und die ihnen homologen Gebilde. *Jahrb. wiss. Bot.* 16, 1–247.
- Schindler, M., 1995. Cell optical displacement assay (CODA)—measurements of cytoskeletal tension in living plant cells with a laser optical trap. *Meth. Cell Biol.* 49, 71–84.
- Schindler, M., Meiners, S., Cheresch, D.A., 1989. RGD-dependent linkage between plant cell wall and plasma membrane: Consequences for growth. *J. Cell Biol.* 108, 1955–1965.
- Schleiden, M.J. [1838]. 1867. Contribution to Phytogenesis. Sydenhan Soc., London.
- Schleiden, M.J., 1842. Grundzuge der wissenschaftlichen Botanik. W. Engelmann, Leipzig.
- Schleiden, M.J., 1853. Poetry of the Vegetable World. A Popular Exposition of the Science of Botany and its Relations to Man. Moore, Anderson, Wilstach & Keys, Cincinnati, OH.
- Schleiden, M.J. [1849]. 1969. Principles of Scientific Botany or Botany as an Inductive Science. Translated by E. Lankester. Johnson Reprint Corp., New York.
- Schindelman, G., Morikami, A., Jung, J., Baskin, T.I., Carpita, N.C., McCann, M.C., Benfey, P.N., 2001. The COBRA gene encodes a putative glycosylphosphatidyl-inositol anchored protein, which is polarly localized and necessary for oriented cell expansion in Arabidopsis. *Genes Dev.* 15, 1115–1127.
- Schlesinger, G., Miller, S.L., 1983. Prebiotic synthesis in atmospheres containing CH₄, CO and CO₂. I. Amino Acids. *J. Mol. Evol.* 19, 376–382.
- Schliephacke, M., Kremp, A., Schmid, H.P., Kohler, K., Kull, V., 1991. Prosomes (proteosomes) of higher plants. *Eur. J. Cell Biol.* 55, 114–121.
- Schliwa, M., 1984. Mechanisms of intracellular organelle transport. In: Shay, J.W. (Ed.), *Cell and Muscle Motility*. Plenum, New York, pp. 1–82.
- Schliwa, M., Enteneuer, U., Porter, K.R., 1987. Release of enzymes of intermediary metabolism from permeabilized cells: Further evidence in support of a structural organization of the cytoplasmic matrix. *Eur. J. Cell Biol.* 44, 214–218.
- Schmid, A.-M.M. 1996. Cytoskeleton-cell wall interactions in diatoms. p. 7. Abstracts of the 1st European Phycological Congress. Aug. 11–18, 1996, Cologne.

- Schmid, V.H.R., Meindl, U., 1992. Microtubules do not control orientation of secondary cell wall microfibril deposition in *Micrasterias*. *Protoplasma* 169, 148–154.
- Schmidt, A., 1924. Histologische Studien an phanerogamen Vegetationspunkten. *Bot. Arch.* 8, 345–404.
- Schmidt, A., Jäger, K., 1992. Open questions about sulfur metabolism in plants. *Ann. Rev. Plant Physiol. Plant Mol. Biol.* 43, 325–349.
- Schmidt, A.C., Lambert, A.M., 1990. Microinjected fluorescent phalloidin in vivo reveals the F-actin dynamics and assembly in higher plant mitotic cells. *Plant Cell* 2, 129–138.
- Schmidt, A.L., Briskin, D.P., 1993. Energy transduction in tonoplast vesicles from red beet (*Beta vulgaris* L.) storage tissue: H^+ /substrate stoichiometries for the H^+ -ATPase and the H^+ -PPase. *Arch. Biochem. Biophys.* 301, 165–173.
- Schmidt, C.L.A., 1932. The chemistry of the amino acids and the proteins. *Ann. Rev. Biochem.* 1, 151–170.
- Schmidt, C.L.A., 1933. The chemistry of the amino acids and the proteins. *Ann. Rev. Biochem.* 2, 71–94.
- Schmidt, J.A., Eckert, R., 1976. Calcium couples flagellar reversal to photostimulation in *Chlamydomonas reinhardtii*. *Nature* 262, 713–715.
- Schmidt, U.G., Endler, A., Schelbert, S., Brunner, A., Schnell, M., Neuhaus, H.E., Marty-Mazars, D., Marty, F., Baginsky, S., Martinoia, E., 2007. Novel tonoplast transporters identified using a proteomic approach with vacuoles isolated from cauliflower buds. *Plant Physiol* 145, 216–229.
- Schmidt, W.E., Ebel, J., 1987. Specific binding of a fungal glucan phytoalexin elicitor to membrane fraction from soybean *Glycine max*. *Proc. Natl. Acad. Sci. USA* 84, 4117–4121.
- Schmidt, W.J., 1939. Doppelbrechung der Kernspindel und Zugfasertheorie der Chromosomenbewegung. *Chromosoma* 1, 253–264.
- Schmiedel, G., Schnepf, E., 1980. Polarity and growth of caulonema tip cells of the moss *Funaria hygrometrica*. *Planta* 147, 405–413.
- Schmit, A.C., Lambert, A.M., 1987. Characterization and dynamics of cytoplasmic F-actin in higher plant endosperm cells during interphase, mitosis, and cytokinesis. *J. Cell Biol.* 105, 2157–2166.
- Schmit, A.C., Lambert, A.M., 1990. Plant actin filament and microtubule interactions during anaphase-telophase transition. Effects of antagonist drugs. *Biol. Cell* 64, 309–320.
- Schmit, A.C., Lambert, A.M., 1990. Microinjected fluorescent phalloidin in vivo reveals the F-actin dynamics and assembly in higher plant mitotic cells. *Plant Cell* 2, 129–138.
- Schmit, A.-C., Nick, P., 2008. Microtubules and the evolution of mitosis. *Plant Cell Monogr.* 11, 233–266.
- Schmitt, F.O., 1939. The ultrastructure of protoplasmic constituents. *Physiol. Rev.* 19, 270–302.
- Schmitt, F.O., Bear, R.S., Ponder, E., 1936. Optical properties of the red cell membrane. *J. Cell Comp. Physiol.* 9, 89–92.
- Schmitt, F.O., Bear, R.S., Ponder, E., 1938. The red cell envelope considered as a Wiener mixed body. *J. Cell Comp. Physiol.* 11, 309–313.
- Schmitt, F.O., Palmer, K.J., 1940. X-ray diffraction studies of lipid and lipid-protein systems. *Cold Spring Harbor Symp. Quant. Biol.* 8, 94–101.
- Schnabl, H., Vienken, J., Zimmermann, U., 1980. Regular arrays of intramembranous particles in the plasmalemma of guard cells and mesophyll cell protoplasts of *Vicia faba*. *Planta* 148, 231–237.
- Schneider, S., Beyhl, D., Hedrich, R., Sauer, N., 2008. Functional and physiological characterization of Arabidopsis INOSITOL TRANSPORTER1, a novel tonoplast-localized transporter for myo-inositol. *Plant Cell* 20, 1073–1087.
- Schnepf, E., 1969a. Sekretion und Exkretion bei Pflanzen. *Protoplasmatologia VIII. Physiologie des Protoplasmas*. 8. Sekretion und Exkretion bei Pflanzen.
- Schnepf, E., 1969b. Über den Feinbau von Öldrüsen. I. Die Drüsenhaare von *Artium lappa*. *Protoplasma* 67, 185–194.
- Schnepf, E., 1969c. Über den Feinbau von Öldrüsen. II. Die Ölgänge von *Solidago canadensis* und die Exkretschläuche von *Arctium lappa*. *Protoplasma* 67, 205–207.
- Schnepf, E., 1986. Cellular polarity. *Ann. Rev. Plant Physiol.* 37, 23–47.
- Schnepf, E., Hrdina, B., Lehne, A., 1982. Spore germination, development of the microtubule system and protonema cell morphogenesis in the moss, *Funaria hygrometrica*: Effects of inhibitors and growth substances. *Biochem. Physiol. Pflanzen* 177, 461–482.
- Schneider, K., Brügger, B., Sandhoff, R., Zellnig, G., Leber, A., Lampl, M., Athenstaedt, K., Hrstnik, C., Eder, S., Daum, G., Paltauf, F., Wieland, F.T., Kohlwein, S.D., 1999. Electrospray ionization tandem mass spectrometry (ESI-MS/MS) analysis of the lipid molecular species composition of yeast subcellular membrane reveals acyl chain-based sorting/remodelling of distinct molecular species en route to the plasma membrane. *J. Cell Biol.* 146, 741–754.
- Schoenheimer, R., 1942. *The Dynamic State of Body Constituents*. Harvard University Press, Cambridge, MA.
- Schoenheimer, R., Rittenberg, D., 1938. The application of isotopes to the study of intermediary metabolism. *Science* 87, 221–226.
- Scholes, T.A., Hinkle, P.C., 1984. Energetics of ATP-driven reverse electron transfer from cytochrome c to fumarate and from succinate to NAD in submitochondria particles. *Biochemistry* 23, 3341–3345.
- Schönbohm, E., 1972. Die Wirkung von SH-Blockern sowie von Licht und Dunkel auf die Verankerung der *Mougeotia*-Chloroplasten im cytoplasmatischen Wandbelag. *Z. Pflanzenphysiol.* 66, 113–132.
- Schönbohm, E., 1975. Der Einblub von Colchicine sowie von Cytochalasin B auf fadige Plasmastrukturen, auf die Verankerung der Chloroplasten sowie auf die orientierte Chloroplastenbewegung. *Ber. Dtsch. Bot. Ges.* 88, 211–224.
- Schönknecht, G., Brown, J.E., Verchot-Lubicz, J., 2008. Plasmodesmata transport GFP alone or fused to potato virus X TGBp1 is diffusion driven. *Protoplasma* 232, 143–152.
- Schopf, J.W., 1992. The oldest fossils and what they mean. In: Schopf, J.W. (Ed.), *Major Events in the History of Life*. Jones and Bartlett Publishers, Sudbury, MA, pp. 29–63.
- Schopfer, C.R., Hepler, P.K., 1991. Distribution of membranes and the cytoskeleton during cell plate formation in pollen mother cells of *Tradescantia*. *J. Cell. Sci.* 100, 717–728.
- Schott, D.H., Collins, R.N., Bretcher, A., 2002. Secretory vesicle transport velocity in living cells depends on the myosin-V lever arm length. *J. Cell Biol.* 156, 35–39.
- Schrader, F., 1934. On the reality of spindle fibers. *Biol. Bull.* 67, 519–533.
- Schrader, F., 1936. The kinetochore or spindle fiber locus in *Amphiuma tridactylum*. *Biol. Bull.* 70, 484–498.
- Schrader, F., 1944. *Mitosis*. Columbia University Press, New York.

- Schramm, D.N., Turner, M.S., 1998. Big-bang nucleosynthesis enters the precision era. *Rev. Mod. Phys.* 70, 303–318.
- Schrecker, A.W., Kornberg, A., 1950. Reversible enzymatic synthesis of flavin-adenine dinucleotide. *J. Biol. Chem.* 182, 795–803.
- Schroeder, D.V., 2000. *An Introduction to Thermal Physics*. Addison-Wesley Longman, San Francisco.
- Schröder-Lang, S., Schwärzel, M., Seifert, R., Strünker, T., Kateriya, S., Looser, J., Watanabe, M., Kaupp, U.B., Hegemann, P., Nagel, G., 2007. Fast manipulation of cellular cAMP level by light in vivo. *Nature Methods* 4, 39–42.
- Schrödinger, E., 1944. *What Is Life?* Cambridge University Press, Cambridge.
- Schrödinger, E., 1996. *Nature and the Greeks and Science and Humanism*. Cambridge University Press, Cambridge.
- Schroeder, J.I., 1988. K^+ transport properties of K^+ channels in the plasma membrane of *Vicia faba* guard cells. *J. Gen. Physiol.* 92, 667–683.
- Schroeder, J.I., 1989. A quantitative analysis of outward rectifying K^+ channels in guard cell protoplasts from *Vicia faba*. *J. Membrane Biol.* 107, 229–235.
- Schroeder, J.I., Allen, G.J., Hugouvieux, V., Kwak, J.M., Waner, D., 2001. Guard cell signal transduction. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 52, 627–658.
- Schroeder, J.I., Hagiwara, S., 1990. Repetitive increases in cytosolic Ca^{2+} of guard cells by abscisic acid activation of nonselective Ca^{2+} permeable channels. *Proc Natl. Acad. Sci. USA* 87, 9305–9309.
- Schroeder, J.I., Raschke, K., Neher, E., 1987. Voltage dependence of K^+ channels in guard-cell protoplasts. *Proc. Natl. Acad. Sci. USA* 84, 4108–4112.
- Schroeder, J.I., Thuleau, P., 1991. Ca^{2+} channels in higher plant cells. *Plant Cell* 3, 555–559.
- Schroeder, J.I., Ward, J.M., Grassman, W., 1994. Perspectives on the physiology and structure of inward-rectifying K^+ channels in higher plants: Biophysical implications for K^+ uptake. *Ann. Rev. Biophys. Biomol. Struct.* 23, 441–471.
- Schroer, T.A., 1991. Association of motor proteins with membranes. *Current Opinion in Cell Biology* 3, 133–137.
- Schröter, K., Läuchli, A., Sievers, A., 1975. Mikroanalytische Identifikation von Bariumsulfat-Kristallen in den Statolithen der Rhizoide von *Chara fragilis* Desv. *Planta* 122, 213–225.
- Schultz, A.M., Henderson, L.E., Oroszlan, S., 1988. Fatty acylation of proteins. *Ann. Rev. Cell Biol.* 4, 611–647.
- Schultz, H.N., Jørgensen, B.B., 2001. Big bacteria. *Annu. Rev. Microbiol.* 55, 105–137.
- Schultz, S.G., Solomon, A.K., 1961. Determination of the effective hydrodynamic radii of small molecules by viscometry. *J. Gen. Physiol.* 44, 1189–1199.
- Schultze, M., 1863. *Das Protoplasma der Rhizopoden und der Pflanzenzellen*. W. Engelmann, Leipzig.
- Schulz, A., 1992. Living sieve cells of conifers as visualized by confocal, laser-scanning fluorescence microscopy. *Protoplasma* 166, 153–164.
- Schulz-Lessdorf, B., Hedrich, R., 1995. Protons and calcium modulate SV-type channels in the vacuolar-lysosomal compartment-channel interaction with calmodulin inhibitors. *Planta* 197, 655–671.
- Schumaker, K.S., Sze, H., 1985. A Ca^{2+}/H^+ antiport system driven by the proton electrochemical gradient of a tonoplast H^+ -ATPase from oat roots. *Plant Physiol.* 79, 111–1117.
- Schumaker, K.S., Sze, H., 1986. Calcium transport into the vacuole of oat roots. Characterization of H^+/Ca^{2+} exchange activity. *J. Biol. Chem.* 261, 12171–12178.
- Schumaker, K.S., Sze, H., 1987. Inositol 1,4,5-trisphosphate releases Ca^{2+} from vacuolar membrane vesicles of oat roots. *J. Biol. Chem.* 262, 3944–3946.
- Schumaker, K.S., Sze, H., 1990. Solubilization and reconstitution of the oat root vacuolar H^+/Ca^{2+} exchanger. *Plant Physiol.* 92, 340–345.
- Schuster, W., Brennicke, A., 1994. The plant mitochondrial genome: Physical structure, information contents, RNA editing, and gene migration to the nucleus. *Ann. Rev. Plant Physiol. Plant Mol. Biol.* 45, 61–78.
- Schuster, W., Knoop, V., Hiesel, R., Grohmann, L., Brennicke, A., 1993. The mitochondrial genome on its way to the nucleus: Different stages of gene transfer in plants. *FEBS Lett.* 325, 140–144.
- Schwab, D.E., Simmons, E., Scala, J., 1969. Fine structure changes during function of the digestive gland of Venus's fly trap. *Amer. J. Bot.* 56, 88–100.
- Schwartz, G., Bishop, P.W. (Eds.), 1958. *Moments of Discovery. Volume II. The Development of Modern Science*. Basic Books, New York.
- Schwann, T., 1838. Ueber die Analogie in der Structur und dem Wachstume der Thiere und Pflanzen. *Neue. Not. Geb. Nat. Helk.* 5, 33–36.
- Schwann, T. [1839]. 1867. *Microscopical Resarches into the Accordance in the Structure and Growth of Animals and Plants*. Sydenhan Soc., London.
- Schwartz, A.W., Orgel, L.E., 1985. Template-directed synthesis of novel, nucleic acid-like structures. *Science* 228, 585–587.
- Schwartz, M.A., Ingber, D.E., Lawrence, M., Springer, T.A., Lechene, C., 1991. Multiple integrins share the ability to induce elevation of intracellular pH. *Exp. Cell Res.* 195, 533–535.
- Schwartz, M.A., Schaller, M.D., Ginsberg, M.H., 1995. Integrins: Emerging paradigms of signal transduction. *Ann. Rev. Cell Biol.* 11, 549–599.
- Schwartz, R.B., Dayhoff, M.O., 1978. Origin of prokaryotes, eukaryotes, mitochondria and chloroplasts. *Science* 199, 395–403.
- Schwuchow, J.M., Kern, V.D., Sack, F.D., 2002. Tip-growing cells of the moss *Ceratodon purpureus* are gravitropic in high-density media. *Plant Physiol.* 130, 2095–2100.
- Scofield, G.N., Beven, A.F., Shaw, P.J., Doonan, J.H., 1992. Identification and localization of a nucleoporin-like protein component of the plant nuclear matrix. *Planta* 187, 414–420.
- Scott, P., Lyne, R.L., ap Rees, T., 1995. Metabolism of maltose and sucrose by microspores isolated from barley (*Hordeum vulgare* L.). *Planta* 197, 435–441.
- Seagull, R.W., Falconer, M.M., Weedenburg, C.A., 1987. Microfilaments: Dynamic arrays in higher plant cells. *J. Cell Biol.* 104, 995–1004.
- Seaman, M.N.J., Burd, C.G., Emr, S.D., 1996. Receptor signalling and the regulation of endocytotic membrane transport. *Curr. Opin. Cell Biol.* 8, 549–556.
- Searcy, D.G., 1987. Phylogenetic and phenotypic relationships between the eukaryotic nucleocytoplasm and thermophilic archaebacteria. *Ann. NY. Acad. Sci.* 503, 168–179.
- Seder, A.W., Wilson, D.F., 1951. Electron microscope studies on the normal and colchicized mitotic figures of the onion root tip (*Allium cepa*). *Biol. Bull.* 100, 107–115.

- Segal, L.A., 2001. Computing an organism. *Proc. Natl. Acad. Sci. USA* 98, 3639–3640.
- Segel, I.H., 1968. *Biochemical Calculations*. John Wiley and Sons, New York.
- Seguí-Simarro, J.M., Austin II, R., White, E.A., Staehelin, L.A., 2004. Electron tomographic analysis of somatic cell plate formation in meristematic cells of *Arabidopsis* preserved by high-pressure freezing. *Plant Cell* 16, 836–856.
- Seguí-Simarro, J.M., Otegui, M.S., Austin II, J.R., Staehelin, L.A., 2007. Plant cytokinesis—Insights gained from electron tomography studies. *Plant Cell Monogr.* 9, 251–287.
- Séguin, A., Lavoisier, A., 1789. Premier memoire sur la respiration des animaux. *Mem de l'Acad. Sci.* 566–584.
- Seifriz, W., 1920. Viscosity values of protoplasm as determined by microdissection. *Bot. Gaz.* 34, 307–324.
- Seifriz, W., 1921. Observations of some physical properties of protoplasm by aid of microdissection. *Ann. Bot.* 35, 269–296.
- Seifriz, W., 1924. An elastic value of protoplasm, with further observation on the viscosity of protoplasm. *Brit. J. exp. Biol.* 2, 1–11.
- Seifriz, W., 1929. The structure of protoplasm. *Biol. Rev.* 4, 76–102.
- Seifriz, W., 1930. The plasticity of protoplasm. *J. Rheology* 1, 261–268.
- Seifriz, W., 1931. The structure of protoplasm. *Science* 73, 648–649.
- Seifriz, W., 1935. The structure of protoplasm. *Bot. Rev.* 1, 18–36.
- Seifriz, W., 1936. *Protoplasm*. McGraw-Hill, New York.
- Seifriz, W., 1938a. Recent contributions to the theory of protoplasmic structure. *Science* 88, 21–25.
- Seifriz, W., 1938b. *The Physiology of Plants*. John Wiley and Sons, New York.
- Seifriz, W., 1945a. The physical properties of protoplasm. *Ann. Rev. Physiol.* 7, 35–60.
- Seifriz, W., 1945b. The structure of protoplasm II. *Bot. Rev.* 11, 231–259.
- Seifriz, W. 1955. The physical chemistry of cytoplasm. *Handb. d. Pflanzenphysiol* (Ruhland, W, ed.) 1: 340–382.
- Seitz, K., 1964. Das Wirkungsspektrum der Photodinese bei *Eloidea canadensis*. *Protoplasma* 58, 621–640.
- Seitz, K., 1967. Kirkungsspektren für die Starklichtbewegung der Chloroplasten, die Photodinese und die licht-abhängige Viskositätsänderung bei *Vallisneria spiralis ssp. torta*. *Z. Pflanzenphysiol.* 56, 246–261.
- Seitz, K., 1971. Die Ursache der Phototaxis der Chloroplasten: Ein ATP gradient? *Z. Pflanzenphysiol.* 64, 241–256.
- Seitz, K., 1979. Light induced changes in the centrifugability of chloroplasts: Different action spectra and different influence of inhibitors in the low and high intensity range. *Z. Pflanzenphysiol.* 95, 1–12.
- Seitz, K., 1987. Light-dependent movement of chloroplasts in higher plant cells. *Acta. Physiol. Plantarum*, 9, 137–148.
- Seki, M., Awata, J.-Y., Shimada, K., Kashiya, T., Ito, K., Yamamoto, K., 2003. Susceptibility of *Chara* myosin to SH reagents. *Plant Cell Physiol.* 44, 201–205.
- Senebier, J., 1788. *Experiences sur l'action de la lumière solaire dans la végétation*. Chez Briand, Genève.
- Senn, G., 1908. *Die Gestalts und Lageveränderungen der Pflanzenchromatophoren*. Englemann, Leipzig.
- Sentenac, H., Bonneaud, N., Minet, M., Lacroute, F., Salmon, J.-M., Gaymard, F., Grignon, C., 1992. Cloning and expression in yeast of a plant potassium ion transport system. *Science* 256, 663–665.
- Seravin, L.N., 2001. The principle of counter-directional morphological evolution and its significance for construction the megasystem of protists and other eukaryotes. *Protistology* 2, 6–14.
- Serio, T.R., Cashikar, A.G., Kowal, A.S., Sawicki, G.J., Moslehi, J.J., Serpell, L., Arnsdorf, M.F., Lindquist, S.L., 2000. Nucleated conformational conversion and the replication of conformational information by a prion determinant. *Science* 289, 1317–1321.
- Serlin, B.S., Ferrell, S., 1989. The involvement of microtubules in chloroplast rotation in the alga, *Mougeotia*. *Plant Sci.* 60, 1–8.
- Serlin, B.S., Roux, S.J., 1984. Modulation of chloroplast movement in the green alga *Mougeotia* by the Ca^{2+} ionophore A23187 and by calmodulin antagonists. *Proc. Natl. Acad. Sci. USA* 81, 6368–6372.
- Serrano, R., 1989. Structure and function of plasma membrane ATPase. *Ann. Rev. Plant Physiol.* 40, 61–94.
- Sexton, R., Hall, J.L., 1974. Fine structure and cytochemistry of the abscission zone cells of *Phaseolus* leaves: I. Ultrastructural changes occurring during abscission. *Ann Bot* 38, 849–854.
- Sexton, R., Jamieson, G.G.C., Allan, H.I.L., 1977. An ultrastructural study of abscission zone cells with special reference to the mechanism of enzyme secretion. *Protoplasma* 91, 369–387.
- Seymour, R.S., 2004. Dynamics and precision of thermoregulatory responses of eastern skunk cabbage *Symplocarpus foetidus*. *Plant Cell Environ.* 27, 1014–1022.
- Seymour, R.S., Bartholomew, G.A., Barhhardt, M.C., 1983. Respiration and heat production by the fluorescence of *Philodendron selloum*. *Planta* 157, 336–343.
- Shakespeare, W. [1623]. 1992. *The Taming of the Shrew*. Pocket Books, New York.
- Shamu, C.E., Murray, A.W., 1992. Sister chromatid separation in frog egg extracts requires DNA topoisomerase II activity during anaphase. *J. Cell Biol.* 117, 921–934.
- Shanklin, S., Jabben, M., Vierstra, R.D., 1987. Red light-induced formation of ubiquitin-phytochrome conjugates: Identification of possible intermediates of phytochrome degradation. *Proc. Natl. Acad. Sci. USA* 84, 359–363.
- Shannon, T.M., Henry, Y., Picton, J.M., Steer, M.W., 1982. Polarity in higher plant dictyosomes. *Protoplasma* 112, 189–195.
- Shapiro, R., 1999. Prebiotic cytosine synthesis: A critical analysis and implications for the origin of life. *Proc. Natl. Acad. Sci. USA* 96, 4396–4401.
- Shapley, H., 1926. *Starlight*. George H. Doran Co., New York.
- Shapley, H., 1943. *Galaxies*. The Blakiston Co., Philadelphia, PA.
- Shapley, H., 1958. *Of Stars and Men*. Human Response to an Expanding Universe. Beacon Press, Boston.
- Shapley, H., 1967. *Beyond the Observatory*. Charles Scribner's Sons, New York.
- Sharp, L.W., 1914. Spermatogenesis in *Marsilea*. *Bot. Gaz.* 58, 419–431.
- Sharp, L.W., 1921. *An Introduction to Cytology*. McGraw-Hill, New York.
- Sharp, L.W., 1934. *Introduction to Cytology*, Third ed. McGraw-Hill, New York.
- Sharp, P. A. 1993. Split genes and RNA splicing. Nobel Lecture, December 8, 1993.
- Shaw, P., Rawlins, D., Higlett, M., 1993. Nuclear and nucleolar structure in plants. In: Heslop-Harrison, J.S., Flavell, R.B. (Eds.), *The Chromosome*. BIOS Scientific Publishers, Oxford, pp. 161–171.

- Shaw, S., 2006. Imaging the live plant cell. *Plant J.* 45, 573–598.
- Shaw, S.L., Kamyar, R., Ehrhardt, D.W., 2003. Sustained microtubule treadmilling in *Arabidopsis* cortical arrays. *Science* 300, 1715–1718.
- Shea, E.M., Gilbeant, D.M., Carpita, N.C., 1989. Structural analyses of the cell walls regenerated by carrot protoplasts. *Planta* 179, 293–308.
- Sheahan, M.B., McCurdy, D.W., Rose, R.J., 2005. Mitochondria as a connected population: Ensuring continuity of the mitochondrial genome during plant cell dedifferentiation through massive mitochondrial fusion. *Plant J.* 44, 744–755.
- Sheetz, M.P., 1989. Kinesin structure and function. In: Warner, F.D., McIntosh, J.R. (Eds.) *Cell Movement. Volume 2. Kinesin, Dynein and Microtubule Dynamics*. Alan R. Liss, Inc, New York, pp. 277–285.
- Sheetz, M.P., Spudich, J.A., 1983a. Movement of myosin-coated fluorescent beads on actin cables in vitro. *Nature* 303, 31–35.
- Sheetz, M.P., Spudich, J.A., 1983b. Movement of myosin-coated structures on actin cables. *Cell Motil.* 3, 485–489.
- Sheetz, M.P., Chasan, R., Spudich, J.A., 1984. ATP-dependent movement of myosin in vitro: Characterization of a quantitative assay. *J. Cell Biol.* 99, 1867–1871.
- Sheffer, M., Fried, A., Gottlieb, H.E., Tietz, A., Avron, M., 1986. Lipid composition of the plasma-membrane of the halotolerant alga, *Dunaliella salina*. *Biochim. Biophys. Acta* 857, 165–172.
- Shelanski, M.L., Taylor, E.W., 1967. Isolation of a protein subunit from microtubules. *J. Cell Biol.* 34, 549–554.
- Shelden, E., Wadsworth, P., 1992. Microinjection of biotin-tubulin into anaphase cells induces transient elongation of kinetochore microtubules and reversal of chromosome-to-pole motion. *J. Cell Biol.* 116, 1409–1420.
- Shelley, M. [1818]. 1974. *Frankenstein or, The Modern Prometheus*. The 1818 Text. Edited by James Rieger. University of Chicago Press, Chicago.
- Shemer, T.A., Harpaz-Saad, S., Belausov, E., Lovat, N., Krokhin, O., Spicer, V., Standing, K.G., Goldschmidt, E.E., Eyal, Y., 2008. Citrus chlorophyllase dynamics at ethylene-induced fruit color-break: A study of chlorophyllase expression, posttranslational processing kinetics, and in situ intracellular localization. *Plant Physiol.* 148, 108–118.
- Shen, W.-H., 2007. G1/S transition and the eRb-E2F pathway. *Plant Cell Monogr.* 9, 59–73.
- Shen-Miller, J., Miller, C., 1972. Distribution and activation of the Golgi apparatus in geotropism. *Plant Physiol.* 49, 634–639.
- Shen-Miller, J., Hinchman, R.R., 1974. Gravity sensing in plants: A critique of the statolith theory. *BioScience* 24, 643–651.
- Shepherd, V.A., Beilby, M.J., 1999. The effect of an extracellular mucilage on the response to osmotic shock in the charophyte alga *Lamprothamnium papulosum*. *J. Membr. Biol.* 170, 229–242.
- Shepherd, V.A., Beilby, M.J., Heslop, D., 1999. Ecophysiology of the hypotonic response in the salt-tolerant charophyte alga *Lamprothamnium papulosum*. *Plant Cell Environ.* 22, 333–346.
- Shepherd, V.A., Goodwin, P.B., 1989. The porosity of permeabilized *Chara* cells. *Aust. J. Plant Physiol.* 16, 231–239.
- Sherrington, C.S., 1906. *The Integrative Action of the Nervous System*. Charles Scribner's Sons, New York.
- Shi, H., Ishitani, M., Kim, C., Zhu, J.-K., 2000. The *Arabidopsis thaliana* salt tolerance gene SOS1 encodes a putative Na⁺/H⁺ antiporter. *Proc. Natl. Acad. Sci. USA* 97, 6896–6901.
- Shibaoka, H., 1972. Gibberellin-colchicine interaction in elongation of azuki bean epicotyl sections. *Plant Cell Physiol.* 13, 461–469.
- Shibaoka, H., 1974. Involvement of wall microtubules in gibberellin promotion and kinetin inhibition of stem elongation. *Plant Cell Physiol.* 15, 255–263.
- Shibaoka, H., 1992. Cytokinesis in tobacco BY-2 cells. In: Shibaoka, H. (Ed.), *Cellular Basis of Growth and Development*. Proc. of the VII International Symposium in Conjunction with the Awarding of the International Prize of Biology. Toyonaka, Osaka, pp. 119–126.
- Shibaoka, H., 1993. Regulation by gibberellins of the orientation of cortical microtubules in plant cells. *Aust. J. Plant Physiol.* 20, 461–470.
- Shibaoka, H., 1994. Plant hormone-induced changes in the orientation of cortical microtubules: Alterations in the cross-linking between microtubules and the plasma membrane. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 45, 527–544.
- Shibaoka, H., Hogetsu, T., 1977. Effects of ethyl N-phenyl carbamate on wall microtubules and on gibberellin and kinetin-controlled cell expansion. *Bot. Mag. Tokyo* 90, 317–321.
- Shiina, T., Nishii, A., Toyoshima, Y., Bogorad, L., 1997. Identification of promoter elements involved in the cytosolic Ca²⁺-mediated photoregulation of maize cab-m1 expression. *Plant Physiol.* 115, 477–483.
- Shiina, T., Wayne, R., Tung, H.Y.L., Tazawa, M., 1988. Possible involvement of protein phosphorylation/dephosphorylation in the modulation of Ca²⁺ channel in tonoplast-free cells of *Nitellopsis*. *J. Membrane Biol.* 102, 255–264.
- Shikama, K., Nakamura, K.-I., 1973. Standard free energy maps for the hydrolysis of ATP as a function of pH and metal ion concentration: Comparison of metal ions. *Arch. Biochem. Biophys.* 157, 457–463.
- Shimamura, T., 1939. Cytological studies of polyploidy induced by colchicine. *Cytologia* 9, 486–494.
- Shimaoka, T., Ohnishi, M., Sazuka, T., Mitsuhashi, N., Hara-Nishimura, I., Shimazaki, K., Maeshima, M., Yokota, A., Tomizawa, K., Mimura, T., 2004. Isolation of intact vacuoles and proteomic analysis of tonoplast from suspension-cultured cells of *Arabidopsis thaliana*. *Plant Cell Physiol.* 45, 672–683.
- Shimazaki, K., Kinoshita, T., Nishimura, M., 1992. Involvement of calmodulin and calmodulin-dependent myosin light chain kinase in blue light-dependent H⁺ pumping by guard cell protoplasts from *Vicia faba* L. *Plant Physiol.* 99, 1416–1421.
- Shimmen, T., 1988a. Characean actin bundles as a tool for studying actomyosin-based motility. *Bot. Mag. Tokyo* 101, 533–544.
- Shimmen, T., 1988b. Cytoplasmic streaming regulated by adenine nucleotides and inorganic phosphates in characeae. *Protoplasma* (Suppl. 1), 3–9.
- Shimmen, T., 1996. Studies on mechano-perception in characean cells: Development of a monitoring apparatus. *Plant Cell Physiol.* 37, 591–597.
- Shimmen, T., 1997. Studies on mechano-perception in Characeae: Effects of external Ca²⁺ and Cl⁻. *Plant Cell Physiol.* 38, 691–697.
- Shimmen, T., 2001. Involvement of receptor potentials and action potentials in mechano-perception in plants. *Aust. J. Plant Physiol.* 28, 567–576.

- Shimmen, T., 2001a. Electrical perception of "death message" in *Chara*: Involvement of turgor pressure. *Plant Cell Physiol.* 42, 366–373.
- Shimmen, T., 2002. Electrical perception of "death message" in *Chara*: Analysis of rapid component and ionic process. *Plant Cell Physiol.* 43, 1575–1584.
- Shimmen, T., 2003. Studies on mechano-perception in the characeae: Transduction of pressure signals into electrical signals. *Plant Cell Physiol.* 44, 1215–1224.
- Shimmen, T., 2008. Electrophysiological characterization of the node in *Chara corallina*: Functional differentiation for wounding response. *Plant Cell Physiol.* 49, 264–272.
- Shimmen, T., Hamatani, M., Saito, S., Yokota, E., Mimura, T., Fusetani, N., Karaki, H., 1995. Roles of actin filaments in cytoplasmic streaming and organization of transvacuolar strands in root hair cells of *Hydrocharis*. *Protoplasma* 185, 188–193.
- Shimmen, T., Tazawa, M., 1977. Control of membrane potential and excitability of *Chara* cells with ATP and Mg^{2+} . *J. Membrane Biol.* 117, 201–221.
- Shimmen, T., Tazawa, M., 1982a. Cytoplasmic streaming in the cell model of *Nitella*. *Protoplasma* 112, 101–106.
- Shimmen, T., Tazawa, M., 1982b. Reconstitution of cytoplasmic streaming in characeae. *Protoplasma* 113, 127–131.
- Shimmen, T., Tazawa, M., 1983. Control of cytoplasmic streaming by ATP, Mg^{2+} and cytochalasin B in permeabilized characeae cell. *Protoplasma* 115, 18–24.
- Shimmen, T., Wakabayashi, A., 2008. Involvement of membrane potential in alkaline band formation by intermodal cells of *Chara corallina*. *Plant Cell Physiol.* 49, 1614–1620.
- Shimmen, T., Yano, M., 1994. Active sliding movement of latex beads coated with skeletal muscle myosin on *Chara* actin bundles. *Protoplasma* 121, 132–137.
- Shimmen, T., Yokota, E., 2004. Cytoplasmic streaming in plants. *Curr. Opin. Cell Biol.* 16, 68–72.
- Shimomura, O., 2008. Discovery of green fluorescent protein, GFP. Nobel Lecture, December 8, 2008.
- Shimoni, E., Rav-Hon, O., Ohad, I., Brumfeld, V., Reich, Z., 2005. Three-dimensional organization of higher-plant chloroplast thylakoid membranes revealed by electron tomography. *Plant Cell* 17, 2580–2586.
- Shin, S., Moore Jr., T.S., 1990. Phosphatidylethanolamine synthesis by castor bean endosperm. *Plant Physiol.* 93, 148–153, 154–159.
- Shine, I., Wrobel, S., 1976. Thomas Hunt Morgan. Pioneer of Genetics. The University Press of Kentucky, Lexington, Kentucky.
- Shinozaki, K., Ohne, M., Tanaka, M., Wakasugi, T., Chunwongse, N., Obokata, J., Yamaguchi-Shinozaki, K., Ohto, C., Torazawa, K., Meng, B.Y., Sugita, M., Deno, H., Kamogashira, T., Yamada, K., Kusuda, J., Takaiwa, F., Kato, A., Tohdoh, N., Shimada, H., Sugiura, M., 1986. The complete nucleotide sequence of the tobacco chloroplast genome: Its gene organization and expression. *EMBO J.* 5, 2043–2049.
- Shiratake, K., Martinoia, E., 2007. Transporters in fruit vacuoles. *Plant Biotechnol.* 24, 127–133.
- Shiva Kumar, N., Stevens, M.H.H., Kiss, J.Z., 2008. Plastid movement in the statocytes of the ARG1 (altered response to gravity) mutant. *Amer. J. Bot.* 95, 177–184.
- Shorter, J., Lindquist, S., 2004. Hsp104 catalyzes formation and elimination of self-replicating Sup35 prion conformers. *Science* 304, 1793–1797.
- Showalter, A.M., 1993. Structure and function of plant cell wall proteins. *Plant Cell* 5, 9–23.
- Shy, G., Ehler, L., Herman, E., Galili, G., 2001. Expression patterns of genes encoding endomembrane proteins support a reduced function of the golgi in wheat endosperm during the onset of storage protein deposition. *J. Exp. Bot.* 52, 2387–2388.
- Sibaoka, T., 1962. Excitable cells in *Mimosa*. *Science* 137, 226.
- Sibaoka, T., 1966. Action potentials in plant cells. *Symp. Soc. exp. Biol.* 20, 49–73.
- Sibaoka, T., 1969. Physiology of rapid movements in plants. *Annu. Rev. Plant Physiol.* 20, 165–194.
- Siegel, S.M., 1962. The Plant Cell Wall. Macmillan, New York.
- Siekevitz, P., 1952. Uptake of radioactive alanine *in vitro* into the proteins of rat liver fractions. *J. Biol. Chem.* 195, 549–565.
- Siekevitz, P., Palade, G.E., 1958a. A cytochemical study on the pancreas of the guinea pig. I. *J. Biophysic. Biochem. Cytol.* 4, 203–218.
- Siekevitz, P., Palade, G.E., 1958b. A cytochemical study on the pancreas of the guinea pig. II. *J. Biophysic. Biochem. Cytol.* 4, 309–318.
- Siekevitz, P., Palade, G.E., 1958c. A cytochemical study on the pancreas of the guinea pig. III. *J. Biophysic. Biochem. Cytol.* 4, 557–566.
- Siekevitz, P., Palade, G.E., 1959. A cytochemical study on the pancreas of the guinea pig. IV. *J. Biophysic. Biochem. Cytol.* 5, 1–10.
- Siekevitz, P., Palade, G.E., 1960a. A cytochemical study on the pancreas of the guinea pig. V. *J. Biophysic. Biochem. Cytol.* 7, 619–630.
- Siekevitz, P., Palade, G.E., 1960b. A cytochemical study on the pancreas of the guinea pig. VI. *J. Biophysic. Biochem. Cytol.* 7, 631–644.
- Siever, R., 1979. The Earth. In: Folsome, C.E. (Ed.), Life. Origin and Evolution. Readings From Scientific American. W. H. Freeman and Co., San Francisco, pp. 25–31.
- Sievers, A., 1963. Beteiligung des Golgi-Apparates bei der Bildung der Zellwand von Wurzelhaaren. *Protoplasma* 56, 188–192.
- Sievers, A., 1966. Lysosomen-ähnliche Kompartimente in Pflanzenzelle. *Naturwiss* 53, 334–335.
- Sikora, J., Wasik, A., 1978. Cytoplasmic streaming with Ni^{2+} immobilized *Paramecium aurelia*. *Acta Protozool.* 17, 389–397.
- Silk, W.K., 2000. A tribute to Paul Green. *J. Plant Growth Regul.* 19, 2–6.
- Silver, P.A., 1991. How proteins enter the nucleus. *Cell* 64, 489–497.
- Silver, P., Goodson, H., 1989. Nuclear protein transport. *Crit. Rev. Biochem. Mol. Biol.* 24, 419–435.
- Silver, R.B., 1986. Mitosis in sand dollar embryos is inhibited by antibodies directed against the calcium transport enzyme of muscle. *Proc. Natl. Acad. Sci. USA* 83, 4302–4306.
- Silver, R.B., 1989. Nuclear envelope breakdown and mitosis in sand dollar embryos is inhibited by microinjection of calcium buffers in a calcium-reversible fashion, and by antagonists of intracellular Ca^{2+} channels. *Dev. Biol.* 131, 11–26.
- Silver, R.B., Cole, R.D., Cande, W.Z., 1980. Isolation of mitotic apparatus containing vesicles with calcium sequestration activity. *Cell* 19, 505–516.
- Silverman-Gavrila, R., Forer, A., 2000. Evidence that actin and myosin are involved in the poleward flux of tubulin in metaphase kinetochore microtubules of crane-fly spermatocytes. *J. Cell Sci.* 113, 597–609.

- Silverman-Gavrila, R., Forer, A., 2001. Effects of anti-myosin drugs on anaphase chromosome movement and cytokinesis in crane-fly primary spermatocytes. *Cell Motil. Cytoskeleton* 50, 180–197.
- Simerly, C., Balczon, R., Brinkley, B.R., Schatten, G., 1990. Microinjected kinetochore antibodies interfere with chromosome movement in meiotic and mitotic mouse oocytes. *J. Cell Biol.* 111, 1491–1504.
- Simkin, J.L., 1959. Protein biosynthesis. *Ann. Rev. Biochem.* 28, 145–170.
- Simon, R., Altschuler, Y., Ruben, R., Galili, G., 1990. Two closely related wheat storage proteins follow a markedly different subcellular route in *Xenopus laevis* oocytes. *The Plant Cell* 2, 941–950.
- Simon, S.M., 1993. Translocation of proteins across the endoplasmic reticulum. *Curr. Opin. Cell Biol.* 5, 581–588.
- Simon, S., 2002. Translocation of macromolecules across membranes and through aqueous channels. *Translocation across membranes. Structure and Dynamics of Confined Polymers* 2, 37–66.
- Simon, S.M., Blobel, G., 1991. A protein-conducting channel in the endoplasmic reticulum. *Cell* 65, 371–380.
- Simon, S.M., Blobel, G., 1992. Signal peptides open protein-conducting channels in *E. coli*. *Cell* 69, 677–684.
- Simon, S.M., Blobel, G., Zimmerberg, J., 1989. Large aqueous channels in membrane vesicles derived from the rough endoplasmic reticulum of canine pancreas or the plasma membrane of *Escherichia coli*. *Proc. Natl. Acad. Sci. USA* 86, 6176–6180.
- Simon, S.M., Peskin, S.C., Oster, G.F., 1992. What drives the translocation of proteins? *Proc. Natl. Acad. Sci. USA* 89, 3770–3774.
- Simons, K., Ikonen, E., 1997. Functional rafts in cell membranes. *Nature* 387, 569–572.
- Simons, K., Toomre, D., 2000. Lipid rafts and signal transduction. *Nat. Rev. Mol. Cell Biol.* 1, 31–39.
- Simons, P., 1992. *The Action Plant*. Blackwell, Oxford.
- Simpson, D.J., 1978. Freeze-fracture studies on barley plastid membranes. I. Wildtype etioplast. *Carlsberg Res. Commun.* 43, 145–170.
- Simpson, D.J., 1979. Freeze-fracture studies on barley plastid membranes. II. Location of the light-harvesting chlorophyll protein. *Carlsberg Res. Commun.* 44, 305–336.
- Sineshchikov, O.A., Jung, K.H., Spudich, J.L., 2002. Two rhodopsins mediate phototaxis to low- and high-intensity light in *Chlamydomonas reinhardtii*. *Proc. Natl. Acad. Sci. USA* 99, 8689–8694.
- Singer, S.J., 1975. Architecture and topology of biologic membranes. In: Weissmann, G., Claiborne, R. (Eds.), *Cell Membranes. Biochemistry, Cell Biology & Pathology*. HP Publishing Co., New York, pp. 35–44.
- Singer, S.J., 1990. The structure and insertion of integral proteins in membranes. *Ann. Rev. Cell Biol.* 6, 242–296.
- Singer, S.J., 1992. The structure and function of membranes. A personal memoir. *J. Membrane Biol.* 129, 3–12.
- Singer, S.J., Nicolson, G.L., 1972. The fluid mosaic model of the structure of cell membranes. *Science* 175, 720–731.
- Singh, K.B., 1998. Transcriptional regulation in plants: The importance of combinatorial control. *Plant Physiol.* 118, 1111–1120.
- Sinnott, E.W., 1960. *Plant Morphogenesis*. McGraw-Hill, New York.
- Sinnott, E.W., 1961. *Cell & Psyche. The Biology of Purpose*. Harper & Row, New York.
- Sinnott, E.W., Bloch, R., 1940. Cytoplasmic behavior during division of vacuolate plant cells. *Proc. Nat. Acad. Sci. USA* 26, 223–227.
- Sinnott, E.W., Block, R., 1941. Division in vacuolate plant cells. *Amer. J. Bot.* 28, 225–232.
- Sinnott, E.W., Bloch, R., 1944. Visible expression of cytoplasmic patterns in the differentiation of xylem strands. *Proc. Natl. Acad. Sci. USA* 30, 388–392.
- Sinnott, E.W., Bloch, R., 1945. The cytoplasmic basis of intercellular patterns in vascular differentiation. *Amer. J. Bot.* 32, 151–156.
- Sinnott, E.W., Dunn, L.C., Dobzhansky, Th., 1950. *Principles of Genetics*, Fourth Edition. McGraw-Hill, New York.
- Sirks, M.J., 1938. Plasmatic inheritance. *Bot. Rev.* 4, 113–131.
- Sitte, P., 2005. Werner W. Franke: A retrospective to earlier years. *Eur. J. Cell Biol.* 84, 87–88.
- Sjölund, R.D., Shih, C.Y., 1983. Freeze-fracture analysis of phloem structure in plant tissue cultures. I. The sieve element reticulum. *J. Ultrastruc. Res.* 82, 111–121.
- Sjöstrand, F.S., Andersson-Cedergren, E., Dewey, M.M., 1958. The ultrastructure of the intercalated discs of frog, mouse and guinea pig cardiac muscle. *J. Ultrastruc. Res.* 1, 271–287.
- Sjöstrand, F.S., Hanzon, V., 1954. Ultrastructure of Golgi apparatus of exocrine cells of mouse pancreas. *Exp. Cell Res.* 7, 415–429.
- Skibbins, R.V., Rieder, C.L., Salmon, E.D., 1995. Kinetochore mobility after severing between sister centromeres using laser microsurgery: Evidence that kinetochore directional instability and position is regulated by tension. *J. Cell Sci.* 108, 2537–2548.
- Skulachev, V.P., 1990. Power transmission along biological membranes. *J. Membrane Biol.* 114, 97–112.
- Slautterback, D.B., 1963. Cytoplasmic microtubules. I. *Hydra*. *J. Cell Biol.* 18, 367–388.
- Slavkin, H.C. (Ed.), 1972. *The Comparative Molecular Biology of Extracellular Matrices*. Academic Press, New York.
- Slavkin, H.C., Greulich, R.C. (Eds.), 1975. *Extracellular Matrix Influences on Gene Expression*. Academic Press, New York.
- Sleigh, M.A., 1962. *The Biology of Cilia and Flagella*. Macmillan, New York.
- Sleigh, M.A. (Ed.), 1974. *Cilia and Flagella*. Academic Press, New York.
- Sleep, N.H., Zahnle, K.J., Kasting, J.F., Morowitz, H.J., 1989. Annihilation of ecosystems by large asteroid impacts on the early Earth. *Nature* 342, 139–142.
- Slepchenko, B.M., Schaff, J.C., Carson, J.H., Loew, L.M., 2002. Computational cell Biology: Spatiotemporal simulation of cellular events. *Annu. Rev. Biophys. Biomol. Struct.* 31, 423–441.
- Sluiman, H.J., Lokhorst, G.M., 1988. The ultrastructure of cellular division (autospores) in the coccoid green alga, *Trebouxia aggregate*, revealed by rapid freeze fixation and freeze substitution. *Protoplasma* 144, 149–159.
- Smertenko, A., Saleh, N., Igarashi, H., Mori, H., Hauser-Hahn, I., Jiang, C.-J., Sonobe, S., Lloyd, C.W., Hussey, P.J., 2000. A new class of microtubule-associated proteins in plants. *Nat. Cell Biol.* 2, 750–753.
- Smirnova, E.A., Bajer, A.S., 1992. Spindle poles in higher plant mitosis. *Cell. Motil. Cytoskel.* 23, 1–7.
- Smith, E.F., Townsend, C.O., 1907. A plant-tumor of bacterial origin. *Science* 25, 671–673.

- Smith, J.A.C., Marigo, G., Lüttge, U., Ball, E., 1982. Adenine-nucleotide levels during crassulacean acid metabolism and the energetics of malate accumulation in *Kalanchoë tubiflora*. *Plant Sci. Lett.* 26, 13–21.
- Smith, J.D., Todd, P., Staehelin, L.A., 1997. Modulation of staminal mass and grouping in white clover (*Trifolium repens*) grown in 1-g, microgravity and on a clinostat. *Plant J.* 12, 1361–1373.
- Smith, L.G., 2001. Plant cell division: Building walls in the right places. *Nat. Rev. Mol. Cell Biol.* 2, 33–39.
- Smith, M., Butler, R.D., 1971. Ultrastructural aspects of petal development in *Cucumis sativus* with particular reference to the chromoplasts. *Protoplasma* 73, 1–13.
- Smith, P.R., et al., 1999. Anomalous diffusion of major histocompatibility complex class I molecules on HeLa cells determined by single particle tracking. *Biophys. J.* 76, 3331–3344.
- Smith, T.A., Kohorn, B.D., 1994. Mutations in a signal sequence for the thylakoid membrane identify multiple protein transport pathways and nuclear suppressors. *J. Cell Biol.* 126, 365–374.
- Smyth, R.D., Saranak, J., Foster, K.W., 1988. Algal visual systems and their photoreceptor pigments. *Prog. Phycol. Res.* 6, 255–286.
- Smoluchowski, M.von., 1917. Versuch einer mathematischen Theorie der Koagulationskinetik kolloider Lösungen. *Z. physikal. Chem.* 92, 129–168.
- Smoot, G., Davidson, K., 1993. *Wrinkles in Time*. HarperCollins, New York.
- Snell, W.J., 1990. Adhesion and signalling during fertilization in multicellular and unicellular organisms. *Curr. Opin. Cell Biol.* 2, 821–832.
- Snow, C.M., Senior, A., Gerace, L., 1987. Monoclonal antibodies identify a group of nuclear pore complex glycoproteins. *J. Cell Biol.* 104, 1143–1156.
- Snyder, J.A., McIntosh, J.R., 1975. Initiation and growth of microtubules from mitotic centers in lysed mammalian cells. *J. Cell Biol.* 67, 744–760.
- Sohn, E.J., Kim, E.S., Zhao, M., Kim, S.J., Kim, H., Kim, Y.-W., Lee, Y.J., Hillmer, S., Sohn, U., Jiang, L., Hwang, I., 2003. Rha1, an Arabidopsis Rab5 homolog, plays a critical role in the vacuolar trafficking of soluble cargo proteins. *Plant Cell* 15, 1057–1070.
- Soll, J., Schleiff, E., 2004. Protein import into chloroplasts. *Nat. Rev. Mol. Cell Biol.* 5, 198–208.
- Solomon, A.K., 1992. Interactions between band 3 and other transport-related proteins. *Prog. Cell Res.* 2, 269–283.
- Solomon, A.K., Vennesland, B., Klemperer, F.W., Buchanan, J.M., Hastings, A.B., 1941. The participation of carbon dioxide in the carbohydrate cycle. *J. Biol. Chem.* 140, 171–182.
- Solomonson, L.P., Barber, M.J., 1990. Assimilatory nitrate reductase: Functional properties and regulation. *Ann. Rev. Plant Physiol. Plant Mol. Biol.* 41, 225–253.
- Somerville, C.R., 1986. Analysis of photosynthesis with mutants of higher plants and algae. *Annu. Rev. Plant Physiol.* 37, 467–507.
- Somerville, C.R., 2001. An early Arabidopsis demonstration. Resolving a few issues concerning photorespiration. *Plant Physiol.* 125, 20–24.
- Somerville, C., 2006. Cellulose synthesis in higher plants. *Annu. Rev. Cell Dev. Biol.* 22, 53–78.
- Somerville, C.R., 2008. Developing cellulosic biofuels. http://www.ciw.edu/somerville_keynote.
- Somerville, C., Bauer, S., Brininstool, G., Facette, M., Hamann, T., Milne, J., Osborne, E., Paredes, A., Persson, S., Rabb, T., Vorwerk, S., Youngs, H., 2004. Toward a systems approach to understanding plant cell walls. *Science* 306, 2206–2211.
- Somerville, C.R., Ogren, W.L., 1979. A phosphoglycolate phosphatase-deficient mutant of *Arabidopsis*. *Nature* 280, 833–836.
- Somerville, C.R., Ogren, W.L., 1980. Photorespiration mutants of Arabidopsis thaliana deficient in serine-glyoxylate aminotransferase activity. *Proc. Natl. Acad. Sci. USA* 77, 2684–2687.
- Somerville, C.R., Ogren, W.L., 1982. Mutants of the cruciferous plant Arabidopsis thaliana lacking glycine decarboxylase activity. *Biochem. J.* 202, 373–380.
- Sommarin, M., Sandelius, A.S., 1988. Phosphatidylinositol and phosphatidylinositolphosphate kinases in plant plasma membranes. *Biochim. Biophys. Acta* 958, 268–278.
- Son, O., Yang, H.S., Lee, H.J., Lee, M.Y., Shin, K.H., Jeon, S.L., Lee, M.S., Choi, S.Y., Chun, J.Y., Kim, H., et al., 2003. Expression of srab7 and SCaM genes required for endocytosis of rhizobium in root nodules. *Plant. Sci.* 165, 1239–1244.
- Sonesson, A., Widell, S., 1993. Cytoskeleton components of inside-out and right-side-out plasma membrane vesicles from plants. *Protoplasma* 177, 45–52.
- Sonneborn, T.M., 1942. Sex hormones in unicellular organisms. *Cold Spring Harbor Symp. Quant. Biol.* 10, 111–125.
- Sonnichsen, B., Fuellekrug, J., Van, P.N., Diekmann, W., Robinson, D.G., Mieskes, G., 1994. Retention and retrieval: Both mechanisms cooperate to maintain calreticulin in the endoplasmic reticulum. *J. Cell Sci.* 107, 2705–2717.
- Sonobe, S., Yamamoto, S., Motomura, M., Shimmen, T., 2001. Isolation of Cortical MTs from Tobacco BY-2 Cells. *Plant Cell Physiol.* 42, 162–169.
- Sopory, S.K., Oelmüller, R., Maheshwari, S.C. (Eds.), 2001. *Signal Transduction in Plants*. Kluwer Academic, New York.
- Sørensen, S.P.L., 1909. *Enzymstudien II*. *Biochem. Z.* 21, 131–304.
- Sørensen, S.P.L., 1925. *Proteins*. The Fleishmann Company, New York.
- Sottomayor, M., Pinto, M.C., Salema, R., DiCosmo, F., Pedreoo, M.A., Ros Barcelo, A., 1996. The vacuolar localization of a basic peroxidase isoenzyme responsible for the synthesis of α -3',4'-anhydrovinblastine in *Catharanthus roseus*. *Plant Cell Environ.* 19, 761–767.
- Sottosanto, J.B., Gelli, A., Blumwald, E., 2004. DNA array analyses of *Arabidopsis thaliana* lacking a vacuolar Na^+/H^+ antiporter: Impact of AtNHX1 on gene expression. *Plant J.* 40, 752–771.
- Southam, C.M., Erlich, J., 1943. Effects of extracts of western red-cedar heartwood on certain wood-decaying fungi in culture. *Phytopathology* 33, 517–524.
- Sovonick, S.A., Geiger, D.R., Fellows, R.J., 1974. Evidence for active phloem loading in the minor veins of sugar beet. *Plant Physiol.* 54, 886–891.
- Spallanzani, L. [1776]. 1920. *Observations et expériences faites sur les Animalcules des Infusions*. L'École Polytechnique, Paris.
- Spallanzani, L., 1769. *Nouvelles Recherches sur les Découvertes Microscopiques et la Génération des Corps Organisés*. Chez Lacombe, Londres & Paris.
- Spallanzani, L., 1784. *Dissertations Relative to the Natural History of the Animals and Vegetables*. J. Murray, London.

- Spallanzani, L., 1803. Memorie su la Respirazione. Agnello Nobile, Milano.
- Spanner, D.C., 1979. The electroosmotic theory of phloem transport: A final restatement. *Plant, Cell, and Environ.* 2, 107–121.
- Spanwick, R.M., 1972. Evidence for an electrogenic pump in *Nitella translucens*. I. The effects of pH, K⁺, Na⁺, light and temperature on the membrane potential and resistance. *Biochim. Biophys. Acta.* 288, 73–89.
- Spanwick, R.M., 1974a. Evidence for an electrogenic pump in *Nitella translucens*. II. Control of the light-stimulated component of the membrane potential. *Biochim. Biophys. Acta* 332, 387–389.
- Spanwick, R.M., 1974b. Symplastic transport in plants. *Symp. Soc. Exp. Biol.* 28, 127–137.
- Spanwick, R.M., 2006. Electrogenic pumps. In: Volkov, A.G. (Ed.), *Plant Electrophysiology—Theory & Methods*. Springer-Verlag, Berlin, pp. 221–246.
- Spanwick, R.M., Costerton, J.W.F., 1967. Plasmodesmata in *Nitella translucens*: Structure and electrical resistance. *J. Cell Sci.* 2, 451–464.
- Sparkes, I.A., Teanby, N.A., Hawes, C., 2008. Truncated myosin XI tail fusions inhibit peroxisome, Golgi, and mitochondrial movement in tobacco leaf epidermal cells: A genetic tool for the next generation. *J. Exp. Bot.* 59, 2499–2512.
- Spear, D.G., Barr, J.K., Barr, C.E., 1969. Localization of hydrogen ion and chloride ion fluxes in *Nitella*. *J. Gen. Physiol.* 54, 397–414.
- Speksnijder, J.E., Miller, A.L., Weisenseel, M.H., Chen, T.-H., Jaffe, L.F., 1989. Calcium buffer injections block fucoid egg development by facilitating calcium diffusion. *Proc. Natl. Acad. Sci. USA* 86, 6607–6611.
- Spemann, H., 1935. The organizer-effect in embryonic development. Nobel Lecture, December 12, 1935.
- Spencer, D., Wildman, S.G., 1962. Observations on the grana-containing chloroplasts and a proposed model of chloroplast structure. *Aust. J. Biol. Sci.* 15, 599–615.
- Spencer, H., 1864. *The Principles of Biology*. Vol. I. D. Appleton and Co., New York.
- Spencer, H., 1880. *First Principles*. Reprinted from Fifth London Edition. A. L. Bur, New York.
- Spencer, H., 1860. The social organism. *The Westminster Review* lxxiii: 90–121, pp. 105–108.
- Spiegelman, S., 1956. On the nature of the enzyme-forming system. In: Gaebler, O.H. (Ed.), *Enzymes: Units of Biological Structure and Function*. Academic Press, New York, pp. 67–89.
- Spiker, S., 1985. Plant chromatin structure. *Ann. Rev. Plant Physiol.* 36, 235–253.
- Spiker, S., Murry, M., Thompson, W.F., 1983. DNase I sensitivity of transcriptionally active genes in intact nuclei and isolated chromatin. *Proc. Natl. Acad. Sci. USA* 80, 815–819.
- Spiker, S., Thompson, W.F., 1996. Nuclear matrix attachment regions and transgene expression in plants. *Plant Physiol.* 110, 15–21.
- Spinoza, B. [1492]. 1995. The Ethics of Spinoza: The Road to Inner Freedom. In: Runes, (Ed.), *Carol Publishing Group*, New York.
- Spoehr, H.A., 1926. *Photosynthesis*. The Chemical Catalog Co., New York.
- Sprague, S.G., Camm, E.L., Green, B.R., Staehelin, L.A., 1985. Reconstitution of light-harvesting complexes and photosystem II cores into galactolipid and phospholipid liposomes. *J. Cell Biol.* 100, 552–557.
- Spreitzer, R.J., 1993. Genetic dissection of rubisco structure and function. *Ann. Rev. Plant Physiol. Plant Mol. Biol.* 44, 411–434.
- Spurck, T.P., Pickett-Heaps, J.D., 1987. On the mechanism of Anaphase A: Evidence that ATP is needed for microtubule disassembly and not generation of polewards force. *J. Cell Biol.* 105, 1691–1705.
- Spyrides, E.J., Lipmann, F., 1962. Polypeptide synthesis with sucrose gradient fractions of *E. coli* ribosomes. *Proc. Natl. Acad. Sci. USA* 48, 1977–1983.
- Square, A. (E.A. Abbott), 1899. *Flatland. A Romance of Many Dimensions*. Little, Brown, and Co., Boston.
- Srb, A.M., Horowitz, N.H., 1944. The ornithine cycle in *Neurospora* and its genetic control. *J. Biol. Chem.* 154, 129–139.
- Srb, A.M., Owens, R.D., 1952. *General Genetics*. W. H. Freeman and Co., San Francisco.
- Sreenivasulu, S., Usadel, B., Winter, A., Radchuk, V., Scholz, U., Stein, N., Weschke, W., Strickert, M., Close, T.J., Stitt, M., Graner, A., Wobus, U., 2008. Barley grain maturation and germination: Metabolic pathway and regulatory network commonalities and differences highlighted by New MapMan/PageMan profiling tools. *Plant Physiol.* 146, 1438–1758.
- Srere, P.A., 1985. The metabolon. *Trends Biochem. Sci.* 10, 109–110.
- Srivastava, D.K., Bernhard, S.A., 1986. Metabolite transfer via enzyme-enzyme complexes. *Science* 234, 1081–1086.
- Staal, M., Maathuis, F.J.N., Elzenga, T.M., Overbeek, J.H.M., Prins, H.B.A., 1991. Na⁺/H⁺ antiport activity in tonoplast vesicles from roots of the salt-tolerant *Plantago maritima* and the salt-sensitive *Plantago media*. *Physiol. Plant* 82, 179–184.
- Stabenau, H., 1992. Peroxisomes in algae and Evolutionary changes of enzymes in peroxisomes and mitochondria of green algae In: Stabenau, H. (Ed.), *Phylogenetic Changes in Peroxisomes of Algae*. *Phylogeny of Plant Peroxisomes*. *Proc. of an Int. Symp. on Phylogeny of Algal and Plant Peroxisomes*. University of Oldenburg, Sept. 18–20, 1991, Bad Zwischenahn, Germany, pp. 42–79.
- Stadelmann, E.J., Lee, O.Y., 1974. Inverse changes of water and non-electrolyte permeability. In: Bolis, L., Bloch, K., Luria, S.E., Lynen, F. (Eds.), *Comparative Biochemistry and Physiology of Transport*. North-Holland Publishing Co., Amsterdam, pp. 434–441.
- Stadler, L.J., 1954. The gene. *Science* 120, 811–819.
- Staehelin, L.A., 1986. Chloroplast structure and supramolecular organization of photosynthetic membranes. *Encycl. Plant Physiol. Photosyn.* III, 19, 1–84.
- Staehelin, A., 1991. What is a plant cell? A response. *The Plant Cell* 3, 553.
- Staehelin, 1997. The plant ER: A dynamic organelle composed of a large number of discrete functional domains. *Plant J.* 11, 1151–1165.
- Staehelin, L.A., 2003. Chloroplast structure: From chlorophyll granules to supra-molecular architecture of thylakoid membranes. *Photosyn. Res.* 76, 185–196.
- Staehelin, L.A., Arntzen, C.J., 1983. Regulation of chloroplast membrane function: Protein phosphorylation changes the spatial organization of membrane components. *J. Cell Biol.* 97, 1327–1337.

- Staehelin Jr., L.A., Giddings, T.H., Kiss, J.Z., Sack, F., 1990. Macromolecular differentiation of Golgi stacks in root tips of *Arabidopsis* and *Nicotiana* seedlings as visualized in high pressure frozen and freeze substituted samples. *Protoplasma* 157, 75–91.
- Staehelin, L.A., Giddings, T.H., Zhang, G.F., 1992. Immunocytochemical analysis of the functional compartmentalization of plant Golgi Stacks. In: Shibaoka, H. (Ed.), *Cellular Basis of Growth and Development in plants*. Proc. of the VII International Symposium in conjunction with the awarding of the international prize for Biology. November 26–28, 1991. Toyonaka, Osaka, pp. 45–53.
- Staehelin, L.A., Hepler, P.K., 1996. Cytokinesis in higher plants. *Cell* 84, 821–824.
- Staehelin, L.A., Kyle, D.J., Arntzen, C.J., 1982. Spillover is mediated by reversible migration of LHCP between grana and stroma thylakoids. *Plant Physiol.* 69, S69.
- Staehelin, L.A., Moore, I., 1995. The plant Golgi apparatus: Structure, functional organization and trafficking mechanisms. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 46, 261–288.
- Stafelt, M.G., 1955. The protoplasmic viscosity of terrestrial plants and its sensitivity to light. *Protoplasma* 55, 285–292.
- Stafford, H.A., 1991. What is a plant cell? *The Plant Cell* 3, 331.
- Staiger, C.J., Hussey, P.J., 2004. Actin and actin-modulating proteins. *Ann. Plant Rev.* 10, 21–80.
- Staiger, C.J., Lloyd, C.W., 1991. The plant cytoskeleton. *Curr. Opin. Cell Biol.* 3, 33–42.
- Staiger, C.J., Schliwa, M., 1987. Actin localization and function in higher plants. *Protoplasma* 141, 1–12.
- Stanier, R.Y., Adelberg, E., Douderoff, M., 1963. *The Microbial World*, second ed. Prentiss-Hall, Englewood Cliffs, NJ.
- Stanley, W.M., 1935. Isolation of a crystalline protein possessing the properties of tobacco-mosaic virus. *Science* 81, 644–645.
- Stanley, W.M., Valens, E.G., 1961. *Viruses and the Nature of Life*. E. P. Dutton & Co., New York.
- Stanton, E.C., 1848. The seneca falls declaration. <http://www.constitution.org/woll/seneca.htm>.
- Stark, J., 1938. The pragmatic and the dogmatic spirit in physics. *Nature* 141, 770–772.
- Starr, D.A., Williams, B.C., Li, Z., Etemad-Moghadam, B., Dawe, R.K., Goldberg, M.L., 1997. Conservation of the centromere/kinetochore protein ZW10. *J. Cell Biol.* 138, 1289–1301.
- Staudinger, H., 1961. *From Organic Chemistry to Macromolecules A Scientific Autobiography Based on My Original Papers*. Wiley-Interscience, New York.
- Staverman, A.J., 1951. The theory of measurement of osmotic pressure. *Recueil des Travaux Chimiques des Pays-Bas* 70, 344–352.
- Staves, M.P., 1997. Cytoplasmic streaming and gravity sensing in *Chara* internodal cells. *Planta* 203, S79–S84.
- Staves M.P., LaClair, J.W., II, 1985. Nuclear synchrony in *Valonia macrophysa* (Chlorophyta): Light microscopy and flow cytometry. *J. Phycol.* 21, 68–71.
- Staves, M., Mescher, M., Shepherd, V., Brenner, E., van Volkenburgh, E., 2008. Symposia in plant neurobiology: A new venue for discussion of plant behavior and communication. *Plant Sci. Bull.* 54 (2), 56–57.
- Staves, M.P., Wayne, R., 1993. The touch induced action potential in *Chara*: An inquiry into the ionic basis and the mechanoreceptor. *Aust. J. Plant Physiol.* 20, 471–488.
- Staves, M.P., Wayne, R., Leopold, A.C., 1992. Hydrostatic pressure mimics gravitational pressure in characean cells. *Protoplasma* 168, 141–152.
- Staves, M.P., Wayne, R., Leopold, A.C., 1995. Detection of gravity-induced polarity of cytoplasmic streaming in *Chara*. *Protoplasma* 188, 38–48.
- Staves, M.P., Wayne, R., Leopold, A.C., 1997a. Cytochalasin D does not inhibit gravitropism in roots. *Amer. J. Bot.* 84, 1530–1535.
- Staves, M.P., Wayne, R., Leopold, A.C., 1997b. The effect of the external medium on the gravitropic curvature of rice (*Oryza sativa* Poaceae) roots. *Amer. J. Bot.* 84, 1522–1529.
- Staves, M.P., Whitsit, K., Yeung, E., Wayne, R., 2005. The interaction between gravity and light in stimulating tropistic responses of *Chara* internodal cells. *J. Gravit. Phys.* 12, 158–160.
- Stearns, T., 1997. Motoring to the finish: Kinesin and dynein work together to orient the yeast mitotic spindle. *J. Cell Biol.* 138, 957–960.
- Stebbins, H., Hyams, J.S., 1979. *Cell Motility*. Longman, London.
- Stebbins, G.L., 1982. *Darwin to DNA, Molecules to Humanity*. W. H. Freeman and Co., San Francisco.
- Stebbins, G.L., Jain, S.K., 1960. Developmental studies of cell differentiation in the epidermis of monocotyledons. *Develop. Biol.* 2, 409–426 477–500.
- Steck, T.L., 1974. The organization of proteins in the human red blood cell membrane. *A. Rev. J. Cell Biol.* 62, 1–19.
- Steckline, V.S., 1983. Zermelo, Boltzmann, and the recurrence paradox. *Amer. J. Phys.* 51, 894–897.
- Steer, M.W., Steer, J.M., 1989. Pollen tube tip growth. *New Phytol.* 111, 323–358.
- Steffens, J.C., 1990. The heavy metal-binding peptides of plants. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 41, 553–575.
- Stein, J.C., Dixit, R., Nasrallah, M.E., Nasrallah, J.B., 1996. SRK, the stigma-specific S locus receptor kinase of *Brassica*, is targeted to the plasma membrane in transgenic tobacco. *Plant Cell* 8, 429–445.
- Stein, J.C., Nasrallah, J.B., 1993. A plant receptor-like gene. The S-locus receptor kinase of *Brassica oleracea* L. encodes a functional serine-threonine kinase. *Plant Physiol.* 101, 1103–1106.
- Stein, W.D., 1986. *Transport and Diffusion Across Cell Membranes*. Academic Press, San Diego.
- Steinberg, D., Mihalyi, E., 1957. The chemistry of proteins. *Ann. Rev. Biochem.* 26, 373–4118.
- Steiner, J., Pfanzagl, B., Ma, Y., Löffelhardt, W., 2002. Evolution and biology of cyanelles. *Biology and Environment: Proc. Roy. Irish Acad.* 102B, 7–9.
- Steinhardt, J., 1945. The chemistry of the amino acids and proteins. *Ann. Rev. Biochem.* 14, 145–174.
- Steinmann, E., Sjöstrand, F.S., 1955. The ultrastructure of chloroplasts. *Exp. Cell Res.* 8, 15–23.
- Stent, G.S., 1968. That was the molecular biology that was. *Science* 160, 390–395.
- Stent, G.S. (Ed.), 1980. *The Double Helix*. W. W. Norton & Co., New York.
- Stephenson, J.L.M., Hawes, C.R., 1986. Stereology and stereometry of endoplasmic reticulum during differentiation in the maize root cap. *Protoplasma* 131, 32–46.

- Stern, C., 1931. Zytologisch-genetische Untersuchungen als Beweise für die Morganische Theorie des Factorenaustauschs. *Biol. Zbl.* 51, 547–587.
- Stern, D.B., Lonsdale, D.M., 1982. Mitochondrial and chloroplast genomes of maize have a 12-kilobase DNA sequence in common. *Nature* 299, 698–702.
- Stern, D.B., Palmer, J.D., Thompson, W.F., Lonsdale, D.M., 1983. Mitochondrial DNA sequence evolution and homology to chloroplast DNA in angiosperms. *Plant Mol. Biol.* 1, 467–477.
- Steppuhn, A., Gase, K., Krock, B., Halitschke, R., Baldwin, I.T., 2004. Nicotine's defensive function in nature. *PLoS Biol.* 2, 1074–1080.
- Stetler, D.A., DeMaggio, A.E., 1972. An ultra-structural study of fern gametophytes during one- to two-dimensional development. *Amer. J. Bot.* 59, 1011–1017.
- Steudle, E., Tyerman, S.D., 1983. Determination of permeability coefficients, and hydraulic conductivity of *Chara corallina* using pressure probe: Effect of solute concentration. *J. Membrane Biol.* 75, 85–96.
- Steuer, E.R., Wordeman, L., Schroer, T.A., Sheetz, M.P., 1990. Localization of cytoplasmic dynein to mitotic spindles and kinetochores. *Nature* 345, 266–268.
- Stevens, N.E., 1932. The fad as a factor in botanical publication. *Science* 75, 499–504.
- Steward, C.R., Boggess, S.F., Aspinall, D., Paleg, L.G., 1977. Inhibition of proline oxidation by water stress. *Plant Physiol.* 59, 930–932.
- Steward, F.C., 1933. The absorption and accumulation of solutes by living plant cells. V. Observations upon the effects of time, oxygen and salt concentration upon absorption and respiration by storage tissue. *Protoplasma* 18, 208–242.
- Steward, F.C., 1941. Salt accumulation by plants—The role of growth and metabolism. *Trans. Faraday Soc.* 33, 1006–1016.
- Steward, F.C., Mühlethaler, K., 1953. The structure and development of the cell-wall in the Valoniaceae as revealed by the electron microscope. *Ann. Bot. N. S.* 17, 295–316.
- Steward, F.C., Mapes, M.O., Mears, K., 1958. Growth and organized development of cultured cells. *Amer. J. Bot.* 45, 705–713.
- Steward, F.C., Mühlethaler, K., 1953. The structure and development of the cell-wall in the Valoniaceae as revealed by the electron microscope. *Ann. Bot. N. S.* 17, 295–316.
- Stewart, B., Tait, P.G., *The Unseen Universe*. MacMillan and Co., London.
- Stewart, K.D., Mattox, K.R., 1975. Comparative cytology, evolution and classification of the green algae with some considerations of the origin of other organisms with chlorophylls a and b. *Bot. Rev.* 41, 104–135.
- Stewart, R.N., Norris, K.H., Asen, S., 1975. Microspectrophotometric measurement of pH and pH effect on color of petal epidermal cells. *Phytochemistry* 14, 937–942.
- Sticher, L., Biswas, A.K., Bush, D.S., Jones, R.L., 1990. Heat shock inhibits α -amylase synthase in barley aleurone without inhibiting the activity of endoplasmic reticulum marker enzymes. *Plant Physiol.* 92, 506–513.
- Stiles, W., 1925. Photosynthesis. *The Assimilation of Carbon by Green Plants*. Longmans, Green and Co., London.
- Stillman, B., 1989. Initiation of eukaryotic DNA replication. *Ann. Rev. Cell Biol.* 5, 197–245.
- Stocking, C.R., Gifford, E.M., 1959. Incorporation of thymidine into chloroplasts of *Spirogyra*. *Biochem. Biophys. Res. Commun.* 1, 159–164.
- Stockwell, C.R., Miller, J.H., 1974. Regions of cell wall expansion in the protonema of a fern. *Amer. J. Bot.* 61, 375–378.
- Stoeckenius, W., Engelman, D.M., 1969. Current models for the structure of biological membranes. *J. Cell Biol.* 42, 613–646.
- Stokes, G.G., 1864. On the reduction and oxidation of the colouring matter of the blood. *Proc. Roy. Soc.* 13, 144. 355–364.
- Stokes, G.G., 1891. *Natural Theology. The Gifford Lectures of 1891*. Adam and Charles Black, London.
- Stokes, G.G., 1893. *Natural Theology. The Gifford Lectures of 1893*. Adam and Charles Black, London.
- Stokes, G.G., 1922. On the effect of the internal friction of fluids on the motion of pendulums. In: *Mathematical and Physical Papers. Vol III*. Cambridge University Press, Cambridge.
- Stokes, K.D., McAndrew, R.S., Figueroa, R., Vitha, S., Osteryoung, K.W., 2000. Chloroplast division and morphology are differentially affected by overexpression of FtsZ1 and FtsZ2 genes in Arabidopsis. *Plant Physiol.* 124, 1668–1677.
- Stolc, V., Samanta, M.P., Tongprasit, W., Marshall, W.F., 2005. Genome-wide transcriptional analysis of flagellar regeneration in *Chlamydomonas reinhardtii* identifies orthologs of ciliary disease genes. *Proc. Natl. Acad. Sci.* 102, 3703–3707.
- Stone, I., 1982. *The Healing Factor. Vitamin C Against Disease* Forwards By L. Pauling and A. Szent-Györgyi. Perigee Books, New York.
- Storrie, B., Nilsson, T., 2002. The Golgi apparatus: Balancing new with old. *Traffic* 3, 521–529.
- Stowe, B.B., Yamaki, T., 1959. Gibberellins: Stimulants of plant growth. *Science* 129, 807–816.
- Strader, L.C., Bartel, B., 2008. A new path to auxin. *Nat. Chem. Biol.* 4, 337–339.
- Strain, H.H., 1958. Chloroplast Pigments and Chromatographic Analysis. Thirty-Second Annual Priestley Lecture. Pennsylvania State University, University Park, PA.
- Strasburger, E., 1875. *Ueber Zellbildung und Zelltheilung*. Hermann Dabiz, Jena.
- Strasburger, E., 1897. *Ueber Cytoplasmastrukturen, Kern- und Zelltheilung*. *Jahr. wiss. Bot.* 30, 375–405.
- Strasburger, E., 1898. *Die pflanzlichen Zellhäute*. *Jahr. wiss. Bot.* 31, 511–598.
- Strasburger, E., Jost, L., Schenck, H., Karsten, G., 1912. *A Text-Book of Botany*. MacMillan, London.
- Strasburger, E., Hillhouse, W., 1911. *Handbook of Practical Botany*, seventh ed. George Allen and Co., London.
- Stratmann, J.W., Ryan, C.A., 1997. Myelin basic protein kinase activity in tomato leaves is induced systemically by wounding and increases in response to systemin and oligosaccharide elicitors. *Proc. Natl. Acad. Sci. USA* 94, 11085–11089.
- Straub, F.B., 1981. From respiration of muscle to actin (1934–1943). In: Semenza, G. (Ed.), *Of Oxygen, Fuels, and Living Matter. Part 1*. John Wiley & Sons, Chichester, pp. 325–344.
- Straus, W., 1953. Chromoplasts—development of crystalline forms, structure, state of the pigments. *Bot. Rev.* 19, 147–186.
- Strepp, R., Scholz, S., Kruse, S., Speth, V., Reski, R., 1998. Plant nuclear gene knockout reveals a role in plastid division for the homolog of the bacterial cell division protein FtsZ, an ancestral tubulin. *Proc. Natl. Acad. Sci. USA* 95, 4368–4373.

- Strother, P.K., Barghoorn, E.S., 1980. Microspheres from Swartkoppie formation: A review. In: Halvorson, H.O., van Holde, K.E. (Eds.), *The Origins of Life and Evolution*. Alan R. Liss, Inc., New York, pp. 1–18.
- Strugger, S., 1935. *Praktikum der Zell- und Gewebephysiologie der Pflanze*. Gebrüder Borntraeger, Berlin.
- Struve, O., 1962. *The Universe*. MIT Press, Cambridge, MA.
- Stubblefield, E., 1975. Analysis of the replication pattern of Chinese hamster chromosomes using 5-bromodeoxyuridine suppression of 33258 Hoechst fluorescence. *Chromosoma* 53, 209–221.
- Sturbois-Balcerzak, B., Vincent, P., Maneta-Peyret, L., Duvert, M., Satiat-Jeunemaitre, B., Cassagne, C., Moreau, P., 1999. ATP-dependent formation of phosphatidylserine-rich vesicles from the endoplasmic reticulum of leek cells. *Plant Physiol.* 120, 245–256.
- Sturtevant, A.H., 1913. The linear arrangement of sex-linked factors in *Drosophila*, as shown by their mode of association. *J. Exp. Zool.* 14, 43–59.
- Sturtevant, A.H., 1925. The effects of unequal crossing over at the bar locus in *Drosophila*. *Genetics* 10, 117–147.
- Sturtevant, A.H., 1951. The relation of genes and chromosomes. In: Dunn, L.C. (Ed.), *Genetics in the 20th Century*. Macmillan, New York, pp. 101–110.
- Sueoka, N., 1960. Mitotic replication of deoxyribonucleic acid in *Chlamydomonas Reinhardtii*. *Proc. Natl. Acad. Sci. USA* 46, 83–91.
- Suetsuga, N., Mittman, F., Wagner, G., Hughes, J., Wada, M., 2005. A chimeric photoreceptor gene, NEOCHROME, has arisen twice during plant evolution. *Proc. Natl. Acad. Sci. USA* 102, 13705–13709.
- Suetsuga, N., Wada, M., 2007. Phytochrome-dependent photomovement responses mediated by phototropin family proteins in cryptogam plants. *Photochem. Photobiol.* 83, 87–93.
- Sugiura, M., 2003. History of chloroplast genomics. *Photosyn. Res.* 76, 371–377.
- Suh, S., Moran, N., Lee, Y., 2000. Blue light activates depolarization-dependent K channels in flexor cells from *Samanea saman* motor organs via two mechanisms. *Plant Physiol.* 123, 833–843.
- Sullivan, N., 1964. *Pioneer Astronomers*. E. M. Hale and CO., Eau Claire, WI.
- Summers, K.E., Gibbons, I.R., 1971. Adenosine triphosphate-induced sliding of tubules in trypsin-treated flagella of sea-urchin sperm. *Proc. Natl. Acad. Sci. USA* 68, 3092–3096.
- Summers, K., Kirschner, M.W., 1979. Characteristics of the polar assembly and disassembly of microtubules observed in vitro by dark-field light microscopy. *J. Cell Biol.* 86, 402–416.
- Sumner, J.B., 1926. The isolation and crystallization of the enzyme urease. *J. Biol. Chem.* 69, 435–441.
- Sumner, J.B., 1927. *Textbook of Biological Chemistry*. MacMillan, New York.
- Sumner, J.B., 1933. The chemical nature of enzymes. *Science* 78, 335.
- Sumner, J.B., 1946. The chemical nature of enzymes, Nobel Lecture, December 12, 1946.
- Sumner, J.B., Somers, G.F., 1943. *Chemistry and Methods of Enzymes*. Academic Press, New York.
- Sun, G., Bailey, D., Jones, M.W., Markwell, J., 1989. Chloroplast thylakoid protein phosphatase is a membrane surface-associated activity. *Plant Physiol.* 89, 238–243.
- Sun, G., Ohya, Y., Anraku, Y., 1991. Half-calmodulin is sufficient for cell proliferation. *J. Biol. Chem.* 266, 7008–7015.
- Sun, G.-H., Uyeda, T.Q.P., Kuroiwa, T., 1988. Destruction of organelle nuclei during spermatogenesis in *Chara corallina* examined by staining with DAPI and anti-DNA antibody. *Protoplasma* 144, 185–188.
- Sun, Q., Zybaylov, B., Majeran, W., Friso, G., Olinares, P.D.B., van Wijk, K.J., 2009. PPDB, the Plant Proteomics Database at Cornell. *Nucleic Acids Res.* 37, D969–D974.
- Sun, Y., Qian, H., Xu, X.-d., Han, Y., Yen, L.-F., Sun, D.-Y., 2000. Integrin-like proteins in the pollen tube: Detection, localization and function. *Plant Cell Physiol.* 41, 1136–1142.
- Sundell, C.L., Singer, R.H., 1991. Requirement of microfilaments in sorting of actin messenger RNA. *Science* 253, 1275–1277.
- Sunil Kumar, G.B., Ganapathi, T.R., Srinivas, L., Revathi, C.J., Bapat, V.A., 2005. Secretion of hepatitis B surface antigen in transformed tobacco cell suspension cultures. *Biotech. Lett.* 27, 927–932.
- Sunkar, R., Zhu, J.-K., 2004. Novel and stress-regulated microRNAs and other small RNAs from Arabidopsis. *Plant Cell* 16, 2001–2019.
- Surpin, M., Raikhel, N., 2004. Traffic jams affect plant development and signal transduction. *Nat. Rev. Mol. Cell Biol.* 5, 100–109.
- Sussman, M.R., Harper, J.F., 1989. Molecular biology of the plasma membrane of higher plants. *The Plant Cell* 1, 953–960.
- Sutherland, E.W., 1971. Studies on the mechanism of hormone action. Nobel Lecture, December 11, 1971.
- Sutter, J.U., Campanoni, P., Blatt, M.R., Paneque, M., 2006. Setting SNAREs in a different wood. *Traffic* 7, 627–638.
- Suzuki, L., Johnson, C.H., 2001. Algae know the time of day: Circadian and photoperiodic programs. *J. Phycol.* 37, 933–942.
- Svedberg, T., 1927. The ultracentrifuge. Nobel Lecture, May 19, 1927.
- Svedberg, T., 1937. The ultra-centrifuge and the study of high-molecular compounds. *Nature* 139, 1051–1052.
- Svedberg, T., Pedersen, K.O., 1940. *The Ultracentrifuge*. Clarendon Press, Oxford.
- Svnenelid, F., Olsson, A., Piotrowski, M., Rosenquist, M., Ottman, C., Larsson, C., Oecking, C., Sommarin, M., 1999. Phosphorylation of Thr-948 at the C terminus of the plasma membrane H⁺-ATPase creates a binding site for the regulatory 14-3-3 protein. *Plant Cell* 11, 2379–2392.
- Svoboda, K., Block, S.M., 1994. Force and velocity measured for single kinesin molecules. *Cell* 77, 773–784.
- Svoboda, K., Schmidt, C.F., Schnapp, B., Block, S.M., 1993. Direct observation of kinesin stepping by optical trapping interferometry. *Nature* 365, 721–727.
- Swalla, B.J., Moon, R.T., Jeffrey, W.R., 1985. Developmental significance of a cortical cytoskeletal domain in *Chaetopterus* eggs. *Develop. Biol.* 111, 434–450.
- Swann, M.M., 1951a. Protoplasmic structure and mitosis. I. *J. Exp. Biol.* 28, 417–433.
- Swann, M.M., 1951b. Protoplasmic structure and mitosis. II. *J. Exp. Biol.* 28, 434–444.
- Swann, M.M., 1952. The spindle. In: Hughes, A. (Ed.), *The Mitotic Cycle*. Academic Press, New York, pp. 119–133.
- Swanson, C.P., 1957. *Cytology and Cytogenetics*. Prentice-Hall, Englewood Cliffs, NJ.

- Swanson, C.P., Merz, T., Young, W.J., 1967. Cytogenetics. Prentice-Hall, Englewood Cliffs, NJ.
- Swanson, C.P., Webster, P.L., 1985. The Cell. Prentice-Hall, Englewood Cliffs, NJ.
- Swanson, S.J., Jones, R.L., 1996. Gibberellic acid induces vacuolar acidification in barley aleurone. *Plant Cell* 8, 2211–2221.
- Swatzell, L.J., Edelmann, R.E., Makaroff, C.A., Kiss, J.Z., 1999. Integrin-like proteins are localized to plasma membrane fractions, not plastids, in *Arabidopsis*. *Plant Cell Physiol.* 40, 173–183.
- Swedlow, J.R., Agard, D.A., Dedat, J.W., 1993. Chromosome structure inside the nucleus. *Curr. Opin. Cell Biol.* 5, 412–416.
- Sweeney, B.M., 1944. The effect of auxin on protoplasmic streaming in root hairs of *Avena*. *Amer. J. Bot.* 31, 78–80.
- Sweeney, B.M., 1987. Rhythmic Phenomena in Plants, second ed. Academic Press, San Diego.
- Sweeney, B.M., Hastings, J.W., 1958. Rhythmic cell division in populations of *Gonyaulax polyedra*. *J. Protozool.* 5, 217–234.
- Sweeney, B.M., Haxo, F.T., 1961. Persistence of a photosynthetic rhythm in enucleated *Acetabularia*. *Science* 134, 1361–1363.
- Sweeney, B.M., Thimann, K.V., 1942. The effect of auxins on protoplasmic streaming III. *J. Gen. Physiol.* 25, 841–851.
- Smyth, R.D., Saranak, J., Foster, K.W., 1988. Algal visual systems and their photoreceptor pigments. *Prog. Phycol. Res.* 6, 255–286.
- Syngé, J.L., 1951. Science: Sense and Nonsense. Cape, London.
- Syngé, J.L., 1970. Talking about Relativity. North-Holland Publishing Co., Amsterdam.
- Syngé, J.L., Griffith, B.A., 1949. Principles of Mechanics, second ed. McGraw-Hill, New York.
- Syngé, R.L.M., 1952. Applications of partition chromatography. Nobel Lecture, December 12.
- Sze, H., 1985. H⁺ translocating ATPases: Advances using membrane vesicles. *Ann. Rev. Plant Physiol.* 36, 175–208.
- Szent-Györgyi, A., 1935. Über die Bedeutung der Fumarsäure für die tierische Gewebsatmung. *Hoppe-Seyler's Z. Physiol. Chem.* 236, 1–20.
- Szent-Györgyi, A., 1937. Studies on biological oxidation and some of its catalysts. *Eggenbergersche Buchhandlung Karl Rényi, Budapest*.
- Szent-Györgyi, A., 1937a. Oxidation, energy transfer, and vitamins. Nobel Lecture, December 11, 1937.
- Szent-Györgyi, A., 1939. Biological oxidations and vitamins. *Harvey Lectures* 34: 265–279.
- Szent-Györgyi, A., 1941. Towards a new biochemistry. *Science* 93, 609–611.
- Szent-Györgyi, A., 1941a. Whatever a cell does. *Chronica Botanica*. 6, 169–171.
- Szent-Györgyi, A., 1943. Science needs freedom. *World Digest of Current Fact and Comment* (55), 50.
- Szent-Györgyi, A., 1947. Chemistry of Muscle Contraction. Academic Press, New York.
- Szent-Györgyi, A., 1948. Nature of Life: A Study of Muscle. Academic Press, New York.
- Szent-Györgyi, A., 1949a. Free-energy relations and contraction of actomyosin. *Biol. Bull.* 96, 140–161.
- Szent-Györgyi, A., 1949b. Muscle research. *Sci. Am.* 180, 22–25.
- Szent-Györgyi, A., 1953. Chemical Physiology of Contraction in Body and Heart Muscle. Academic Press, New York.
- Szent-Györgyi, A., 1957. Bioenergetics. Academic Press, New York.
- Szent-Györgyi, A., 1957a. Science, Ethics, and Politics. *Science* 125, 225–226.
- Szent-Györgyi, A., 1960. Introduction to a Submolecular Biology. Academic Press, New York.
- Szent-Györgyi, A., 1963. Lost in the twentieth century. *Ann. Rev. Biochem.* 32, 1–14.
- Szent-Györgyi, A., 1963a. Science, Ethics and Politics. Vantage Press, New York.
- Szent-Györgyi, A., 1964. Teaching and the expanding knowledge. *Science* 146, 1278–1279.
- Szent-Györgyi, A., 1966. In search of simplicity and generalizations (50 years Poaching in Science). In: Kaplan, N.O., Kennedy, E.P. (Eds.) *Current Aspects of Biochemical Energetics*. Fritz Lipmann Dedicatory Volume. Academic Press, New York, pp. 63–75.
- Szent-Györgyi, A., 1970. The Crazy Ape. Written by a Biologist for the Young. Philosophical Library, New York.
- Szent-Györgyi, A., 1971. Biology and pathology of water. *Perspectives in Biology and Medicine*. Winter, 239–249.
- Szent-Györgyi, A., 1972. Dionysians and Apollonians. *Science* 176, 966.
- Szent-Györgyi, A., Banga, I., 1941. Adenosinetriphosphatase. *Science* 93, 158.
- Szent-Györgyi, A.G., 1953. Meromyosins, the subunits of myosin. *Arch. Biochem. Biophys.* 42, 305–320.
- Szent-Györgyi, A.G., 1996. Regulation of contraction by calcium binding myosins. *Biophys. Chem.* 59, 357–363.
- Szent-Györgyi, A.G., Kalabokis, V.N., Perreault-Micale, C.L., 1999. Regulation by molluscan myosins. *Mol. Cell. Biochem.* 190, 55–62.
- Szilard, L., 1964. On the decrease of entropy in a thermodynamic system by the intervention of intelligent beings. *Behav. Sci.* 9, 301–310.
- Szmidt, A.E., Aldén, T., Hällgren, J.-E., 1987. Paternal inheritance of chloroplast DNA in *Carix*. *Plant Mol. Biol.* 9, 59–64.
- Szostak, J.W., Bartel, D.P., Luisi, P.L., 2001. Synthesizing life. *Nature* 409, 387–390.
- Szponarski, W., Sommerer, N., Boyer, J.C., Rossignol, M., Gibart, R., 2004. Large-scale characterization of integral proteins from *Arabidopsis* vacuolar membrane by two-dimensional liquid chromatography. *Proteomics* 4, 397–406.

-T-

- Taguchi, T., Uraguchi, A., Katsumi, M., 1999. Auxin- and acid-induced changes in the mechanical properties of the cell wall. *Plant cell Physiol.* 40, 743–749.
- Tague, B.W., Chrispeels, M.J., 1987. The plant vacuolar protein, phytohemagglutinin, is transported to the vacuole of transgenic yeast. *J. Cell Biol.* 105, 1971–1979.
- Tait, P.G., Steele, W.J., 1878. A Treatise on Dynamics of a Particle, fourth ed. Macmillan, London.
- Taiz, L., 1984. Plant cell expansion: Regulation of cell wall mechanical properties. *Ann. Rev. Plant Physiol.* 35, 585–657.
- Taiz, L., 1992. The plant vacuole. *J. Exp. Biol.* 172, 113–122.
- Taiz, L., Jones, R.L., 1973. Plasmodesmata and an associated cell wall component in barley aleurone tissue. *Amer. J. Bot.* 60, 67–75.

- Taiz, L., Struve, I., Rausch, T., Bernasconi, P., Gogarten, J.P., Kibak, H., Taiz, S.L., 1990. The vacuolar ATPase: Structure, evolution, and promoter analysis. In: Leonard, R.T., Hepler, P. K. (Eds.), *Calcium in Plant Growth and Development*. The American Society of Plant Physiologists Symposium Series, Vol. 4. American Society of Plant Physiologists, Rockville, Maryland, pp. 55–59.
- Taiz, S.L., Taiz, L., 1991. Ultrastructural comparison of the vacuolar and mitochondrial H^+ -ATPases of *Daucus carota*. *Botanica. Acta* 104, 117–121.
- Taiz, L., Zeiger, E., 2006. *Plant Physiology*, fourth ed. Sinauer, Sunderland, MA.
- Takagi, M., Ogata, K., 1968. Direct evidence for albumin biosynthesis by membrane bound polysomes in rat liver. *Biochem. Biophys. Res. Commun.* 33, 55–60.
- Takagi, S., 2003. Actin-based photo-orientation movement of chloroplasts in plant cells. *J. Exp. Biol.* 206, 1963–1969.
- Takagi, S., Kamitsubo, E., Nagai, R., 1989. Light action on chloroplast behavior under centrifugal acceleration. In: Tazawa, M., Katsumi, M., Masuda, Y., Okamoto, H. (Eds.), *Plant Water Relations and Growth under Stress*. Yamada Science Foundation, Tokyo, Japan, pp. 455–457.
- Takagi, S., Kamitsubo, E., Nagai, R., 1991. Light-induced changes in the behavior of chloroplasts under centrifugation in *Vallisneria* epidermal cells. *J. Plant. Physiol.* 138, 257–262.
- Takagi, S., Kamitsubo, E., Nagai, R., 1992. Visualization of a rapid, red/far-red light-dependent reaction by centrifuge microscopy. *Protoplasma* 168, 153–158.
- Takagi, S., Kong, S.-G., Mineyuki, Y., Furuya, M., 2003. Regulation of actin-dependent cytoplasmic motility by type II phytochrome occurs within seconds in *Vallisneria* epidermal cells. *Plant Cell* 15, 331–345.
- Takagi, S., Nagai, R., 1985. Light-controlled cytoplasmic streaming in *Vallisneria* mesophyll cells. *Plant Cell Physiol.* 26, 941–951.
- Takagi, S., Nagai, R., 1988. Light-affected Ca^{2+} fluxes in protoplasts from *Vallisneria* mesophyll cells. *Plant Physiol.* 88, 228–232.
- Takahashi, F., Hishinuma, T., Kataoka, H., 2001. Blue light-induced branching in *Vaucheria*. Requirement of nuclear accumulation in the irradiated region. *Plant Cell Physiol.* 42, 274–285.
- Takahashi, F., Yamagata, D., Ishikawa, M., Fukamatsu, Y., Ogura, Y., Kasahara, M., Kiyosue, T., Kikuyama, M., Wada, M., Kataoka, H., 2007. AUREOCHROME, a photoreceptor required for photomorphogenesis in stramenopiles. *Proc. Natl. Acad. Sci.* 104, 19625–19630.
- Takahashi, S., Bauwe, H., Badger, M., 2007. Impairment of the photorespiratory pathway accelerates photoinhibition of photosystem II by suppression of repair but not acceleration of damage processes in *Arabidopsis*. *Plant Physiol.* 144, 487–494.
- Takano, M., Wayne, R., 2000. ATP is synthesized by the alternative pathway in *Chara corallina*. *Plant Physiol. Abstr.* #751.
- Takeda, K., Shibaoka, H., 1981a. Changes in microfibril arrangement on the linear surface of the epidermal cell walls in the epicotyl of *Vigna angularis* Ohwi et Ohashi during cell growth. *Planta* 151, 385–392.
- Takeda, K., Shibaoka, H., 1981b. Effects of gibberellin and colchicine on microfibril arrangement in epidermal cell walls of *Vigna angularis* Ohwi et Ohashi epicotyls. *Planta* 151, 393–398.
- Takeshige, K., Baba, M., Tsuboi, S., Noda, T., Ohsumi, Y., 1992. Autophagy in yeast demonstrated with proteinase-deficient mutants and conditions for its induction. *J. Cell Biol.* 119, 301–311.
- Takeshige, K., Shimmen, T., Tazawa, M., 1986. Quantitative analysis of the ATP-dependent H^+ efflux and pump current driven by an electrogenic pump in *Nitellopsis obtusa*. *Plant Cell Physiol.* 27, 337–348.
- Takeshige, K., Tazawa, M., Hager, A., 1988. Characterization of the H^+ translocating adenosine triphosphatase and pyrophosphatase of vacuolar membranes isolated by means of a perfusion technique from *Chara corallina*. *Plant Physiol.* 86, 1168–1173.
- Takeshige, K., Tazawa, M., 1989a. Determination of the inorganic pyrophosphate level and its subcellular localization in *Chara corallina*. *J. Biol. Chem.* 264, 3262–3266.
- Takeshige, K., Tazawa, M., 1989b. Measurement of the cytoplasmic and vacuolar buffer capacities in *Chara corallina*. *Plant Physiol.* 89, 1049–1052.
- Talbot, M.J., Wasteneys, G.O., Offler, C.E., McCurdy, D.W., 2007. Cellulose synthesis is required for deposition of reticulate wall ingrowths in transfer cells. *Plant Cell Physiol.* 48, 147–158.
- Tallman, G., 1992. The chemiosmotic model of stomatal opening revisited. *Crit. Rev. Plant Sci.* 11, 35–57.
- Talmadge, K.W., Keegstra, K., Bauer, W.D., Albersheim, P., 1973. The structure of plant cell walls. I. The macromolecular components of the walls of suspension cultured sycamore cells with a detailed analysis of the pectic polysaccharides. *Plant Physiol.* 51, 158–173.
- Tanaka, K., 1987. Eukaryotes: Scanning electron microscopy of intracellular structures. *Int. Rev. Cytol. (Suppl.)* 17, 89–147.
- Tanaka, K., Murata, K., Yamazaki, M., Onosato, K., Miyao, A., Hirochika, H., 2003. Three distinct rice cellulose synthase catalytic subunit genes required for cellulose synthesis in the secondary wall. *Plant Physiol.* 133, 73–83.
- Tanaka, M., Murata-Mori, M., Kadono, T., Yamada, T., Kawano, T., Kosaka, T., Hosoya, H., 2002. Complete elimination of endosymbiotic algae from *Paramecium bursaria* and its confirmation by diagnostic PCR. *Acto Protozool.* 41, 255–261.
- Tanaka, T., Yamada, M., 1979. A phosphatidyl choline exchange protein isolated from germinated castor bean endosperms. *Plant Cell Physiol.* 20, 533–542.
- Tanchak, M.A., Fowke, L.C., 1987. The morphology of multivesicular bodies in soybean protoplasts and their role in endocytosis. *Protoplasma* 138, 173–182.
- Tanchak, M.A., Griffing, L.R., Mersey, B.G., Fowke, L.C., 1984. Endocytosis of cationized ferritin by coated vesicles of soybean protoplasts. *Planta* 162, 481–486.
- Tanchak, M.A., Rennie, P.J., Fowke, L.C., 1988. Ultrastructure of the partially coated reticulum and dictyosomes during endocytosis by soybean protoplasts. *Planta* 175, 433–441.
- Tanford, C., 1989. *Ben Franklin Stilled the Waves*. Duke University Press, Durham, NC.
- Tang, W., Deng, Z., Osés-Prieto, J.A., Suzuki, N., Zhu, S., Zhang, X., Burlingame, A.L., Wang, Z.-Y., 2008. Proteomics studies of brassinosteroid signal transduction using prefractionation and two-dimensional DIGE. *Mol. Cell. Proteomics* 7, 728–738.
- Tang, S., Mikala, G., Bahinski, A., Yatani, A., Varadi, G., Schwartz, A., 1993. Molecular localization of ion selectivity sites within the pore of an human L-type cardiac Ca^{2+} channel. *J. Biol. Chem.* 268, 13026–13029.

- Tangl, E., 1879. Ueber oftene Communicationen zwischen den Zellen des Endosperms einiger Samen. *Jahrb. wiss. Bot.* 12, 170–190.
- Tao, K.L.J., Jagendorf, A.T., 1973. The ratio of free to membrane-bound chloroplast ribosomes. *Biochim. Biophys. Acta* 324, 518–532.
- Tariq, M., Habu, Y., Paszkowski, J., 2002. Depletion of MOM1 in non-dividing cells of *Arabidopsis* plants releases transcriptional gene silencing. *EMBO Rep.* 3, 951–955.
- Tasaka, M., Kato, T., Fukaki, H., 2001. Genetic regulation of gravitropism in higher plants. *Int. Rev. Cytol.* 206, 135–154.
- Tashiro, S., 1917. *A Chemical Sign of Life*. Univeristy of Chicago Press, Chicago.
- Tate, B.F., Schaller, G.E., Sussman, M.R., Crain, R.C., 1989. Characterization of polyphosphoinositide phospholipase C from the plasma membrane of *Avena sativa*. *Plant Physiol.* 91, 1275–1279.
- Tatum, E.L., 1958. A case history in biological research. Nobel Lect. December 11.
- Tatum, E.L., Beadle, G.W., 1942. Genetic control of biochemical reactions in *Neurospora*: an “Aminobenzoicless” mutant. *Proc. Natl. Acad. Sci. USA* 28, 234–243.
- Taylor, C.E., Marshall, I.C.B., 1992. Calcium and inositol 1,4,5-triphosphate receptors: A complex relationship. *TIBS* 17, 403–407.
- Taylor, F.J.R. “Max” Taylor. 1987. An overview of the status of evolutionary cell symbiosis theories. *Ann. NY Acad. Sci.* 503, 1–16.
- Taylor, F.S., 1953. The idea of the quintessence. In: Underwood, E.A. (Ed.), *Science, Medicine and History*, vol. 1. Oxford University Press, Oxford, pp. 247–265.
- Taylor, H.S., Lawrence, E.O., Langmuir, I., 1942. *Molecular Films The Cyclotron & The New Biology*. Rutgers University Press, New Brunswick, NJ.
- Taylor, J.B., 2008. My Stroke of Insight. http://www.ted.com/index.php/talks/jill_bolte_taylor_s_powerful_stroke_of_insight.html.
- Taylor Jr., J.H., 1993. Binary pulsars and relativistic gravity. Nobel Lect. December 8.
- Taylor, J.H., Woods, P.S., Hughes, W.L., 1957. The organization and duplication of chromosomes as revealed by autoradiographic studies using tritium-labeled thymidine. *Proc. Natl. Acad. Sci. USA* 43, 122–129.
- Taylor, N.G., 2008. Cellulose biosynthesis and deposition in higher plants. *New Phytol.* 178, 239–252.
- Tazawa, M., 1957. Neue Methode zur Messung des osmotischen Wertes einer Zelle. *Protoplasma* 48, 342–359.
- Tazawa, M., 1968. Motive force of the cytoplasmic streaming in *Nitella*. *Protoplasma* 65, 207–222.
- Tazawa, M., 2003. Cell physiological aspects of the plasma membrane H^+ pump. *J. Plant Res.* 116, 419–442.
- Tazawa, M., Kishimoto, U., 1968. Cessation of cytoplasmic streaming of *Chara* internodes during action potential. *Plant Cell Physiol.* 9, 361–368.
- Tazawa, M., and Wayne, R., 1989. Characteristics of hydraulic conductivity of the plasmalemma in characean cells. In: *Plant Water Relations and Growth Under Stress*. Proc. Yamada Conference XII. Osaka, Japan, pp. 237–244.
- Tazawa, M., Okazaki, Y., 1997. Water channel does not limit evaporation of water from plant cells. *J. Plant Res.* 110, 317–320.
- Tazawa, M., Sutou, E., Shibasaka, M., 2001. Onion root water transport sensitive to water channel and K^+ channel inhibitors. *Plant Cell Physiol.* 42, 28–36.
- Tehei, M., Franzetti, B., Wood, K., Gabel, F., Fabiani, E., Jasnin, M., Zamponi, M., Oesterhelt, D., Zaccari, G., Ginzburg, M., Ginzburg, B., 2007. Neutron scattering reveals extremely slow cell water in a Dead Sea organism. *Proc. Natl. Acad. Sci. USA* 104, 766–771.
- Teilhard de Chardin, P., 1966. *Man’s Place in Nature*. The Human Zoological Group. Translated by R. Hague. Collins, London.
- Telling, G.C., Parchi, P., DeArmond, S.J., Cortelli, P., Montagna, P., Gabizon, R., Mastrianni, J., Lugaresi, E., Gambetti, P., Prusiner, S.B., 1996. Evidence for the conformation of the pathologic isoform of the prion protein enciphering and propagating prion diversity. *Science* 274, 2079–2082.
- Telzer, B.R., Haimo, L.T., 1981. Decoration of spindle microtubules with dynein: Evidence for uniform polarity. *J. Cell Biol.* 89, 373–378.
- Telzer, B.R., Moses, M.J., Rosenbaum, J.L., 1975. Assembly of microtubules onto kinetochores of isolated mitotic chromosomes of HeLa cells. *Proc. Natl. Acad. Sci. USA* 72, 4023–4027.
- Tepfer, M., Taylor, I.E.P., 1981. The permeability of plant cell walls as measured by gel filtration chromatography. *Science* 213, 761–763.
- Terasaki, M., 1989. Fluorescent labeling of the endoplasmic reticulum. *Methods Cell Biol.* 29, 126–135.
- Terasaki, M., Song, J., Wong, J.R., Weiss, M.J., Chen, L.B., 1984. Localization of endoplasmic reticulum in living and glutaraldehyde-fixed cells with fluorescent dyes. *Cell* 38, 101–108.
- Terasaki, M., Chen, L.B., Fujiwara, K., 1986. Microtubules and the endoplasmic reticulum are highly interdependent structures. *J. Cell Biol.* 103, 1557–1568.
- Terashima, I., Ono, K., 2002. Effects of $HgCl_2$ on CO_2 dependence of leaf photosynthesis: Evidence indicating involvement of aquaporins in CO_2 diffusion across the plasma membrane. *Plant Cell Physiol.* 43, 70–78.
- Terry, B.R., Robards, A.W., 1987. Hydrodynamic radius alone governs the mobility of molecules through plasmodesmata. *Planta* 171, 145–157.
- Testori, A., Skinner, J.D., Murray, A.W., Burgoyne, L.A., 1991. Phosphorylation and chromatin mechanics. The central importance of substrate conformation in determining the patterns of HL-60 nuclear phosphorylation. *Biochem. Biophys. Res. Commun.* 180, 329–333.
- Tezuka, K., Hyayashi, M., Ishihara, H., Akazawa, T., Takahashi, N., 1992. Studies on synthetic pathway of xylose-containing N-linked oligosaccharides deduced from substrate specificities of the processing enzymes in sycamore cells (*Acer pseudoplatanus* L.). *Eur. J. Biochem.* 203, 401–413.
- Thayer, W.S., Hinkle, P.C., 1975a. Kinetics of adenosine triphosphate synthesis in bovine heart submitochondrial particles. *J. Biol. Chem.* 250, 5336–5342.
- Thayer, W.S., Hinkle, P.C., 1975b. Synthesis of adenosine triphosphate by an artificially imposed electrochemical proton gradient in bovine heart submitochondrial particles. *J. Biol. Chem.* 250, 5330–5335.
- Theodoulou, F.L., Job, K., Slocumbe, S.P., Footitt, S., Holdsworth, M., Baker, A., Larson, T.R., Graham, I.A., 2005. Jasmonic acid levels are reduced in COMATOSE ATP-binding cassette transporter mutants. Implications for transport of jasmonate precursors into peroxisomes. *Plant Physiol.* 137, 835–840.

- Theophrastus, 1916. Enquiry into Plants. Translated by Arthur Hort. William Heinemann, London.
- Theorell, H., 1936. Keilen's cytochrome c and the respiratory mechanism of Warburg and Christian. *Nature* 138, 687.
- Theorell, H., 1955. The nature and mode of action of oxidation enzymes. Nobel Lect. December 12.
- Theriot, J.A., Mitchison, T.J., Tilney, L.G., Portnoy, D.A., 1992. The rate of actin-based motility of intracellular *Listeria monocytogenes* equals the rate of actin polymerization. *Nature* 357, 257–260.
- Theurkauf, W.E., 1994. Premature microtubule-dependent cytoplasmic streaming in cappuccino and spire mutant oocytes. *Science* 265, 2093–2096.
- Thiel, G., Blatt, M.R., 1994. Phosphatase antagonist okadaic acid inhibits steady-state K⁺ currents in guard cells of *Vicia faba*. *Plant J.* 5, 727–733.
- Thiel, R., 1957. And There Was Light. The Discovery of the Universe. Alfred A. Knopf, New York.
- Thimann, K.V., 1950. Autumn colors. *Sci. Am.* 83 (4), 40–43.
- Thimann, K.V., 1977. Hormone Action in the Whole Life of Plants. University of Massachusetts Press, Amherst.
- Thimann, K.V., Reese, K., Nachmias, V.T., 1992. Actin and the elongation of plant cells. *Protoplasma* 171, 153–166.
- Thomas, C.L., Bayer, E.M., Ritzenthaler, C., Fernandez-Calvino, L., Maule, A.J., 2008. Specific targeting of a plasmodesmal protein affecting cell-to-cell-communication. *PLOS Biol.* 6, 180–189.
- Thomas, E., Davey, M.R., 1975. From Single Cells to Plants. Wykeham Publications, Ltd., London.
- Thomas, J., 1939. L'acide citrique dans la respiration musculaire. *Enzymologia* 7, 231–238.
- Thomas, L., 1974. The Lives of a Cell. Notes of a Biology Watcher. Viking Press, New York.
- Thompson, J.E., Froese, C.D., Madey, E., Smith, M.D., Yuwen, H., 1998. Lipid metabolism during plant senescence. *Prog. Lipid Res.* 37, 119–141.
- Thompson, M.V., Wolniak, M., 2008. A plasma membrane-anchored fluorescent protein fusion illuminates sieve element plasma membranes in Arabidopsis and Tobacco. *Plant Physiol.* 146, 1599–1610.
- Thompson, W.F., Beven, A.F., Wells, B., Shaw, P.J., 1997. Sites of rRNA transcription are widely dispersed though the nucleolus in *Pisum sativum* and can comprise single genes. *Plant J.* 12, 571–582.
- Thomson, W. [1952] 1976. On a universal tendency in nature to the dissipation of mechanical energy. In: Kestin, J. (Ed.), The Second Law of Thermodynamics. Dowden, Hutchinson & Ross, Inc., Stroudsburg, PA, pp. 194–197.
- Thomson, W., Tait, P.G., 1862. Energy. *Good Words* (October), 601–607.
- Thomson, W.W., Lewis, L.N., Coggins, C.W., 1967. The reversion of chromoplasts to chloroplasts in Valencia oranges. *Cytologia* 32, 117–124.
- Thoreau, H.D., 1849. On the Duty of Civil Disobedience. <http://www.constitution.org/civ/civildis.htm>.
- Thoreau, H.D., 1947. Civil disobedience. In: Cummins, S., Linscott, R.N. (Eds.), The World's Greatest Thinkers. Man and the State. The Political Philosophers. Random House, New York, pp. 297–320.
- Thoyts, P.J.E., Millichip, M.L., Stobart, A.K., Griffiths, W.T., Shewry, P.R., Napier, J.A., 1995. Expression and *in vitro* targeting of a sunflower oleosin. *Plant Mol. Biol.* 29, 403–410.
- Thuleau, P., Graziana, A., Canut, H., Ranjeva, R., 1990. A 75-kDa polypeptide, located primarily at the plasma membrane of carrot cell-suspension cultures, is photoaffinity labeled by the calcium channel blocker LU 49888. *Proc. Natl. Acad. Sci. USA* 87, 10000–10004.
- Tian, G.-W., Mohanty, A., Chary, S.N., Li, S., Paap, B., Drakakaki, G., Kopeck, C.D., Li, J., Ehrhardt, D., Jackson, D., Rhee, S.Y., Raikhel, N.V., Citovsky, V., 2004. High-throughput fluorescent tagging of full-length Arabidopsis gene products *in planta*. *Plant Physiol.* 135, 25–38.
- Tibbs, J., 1957. The nature of algal and related flagella. *Biochim. Biophys. Acta* 23, 275–288.
- Tice, M.M., Lowe, D.R., 2004. Photosynthetic microbial mats in the 3,416-Mya-old ocean. *Nature* 431, 549–552.
- Tiezzi, A., Moscatelli, A., Cai, G., Bartalesi, A., Cresti, M., 1992. An immunoreactive homolog of mammalian kinesin in *Nicotiana tabacum* pollen tubes. *Cell Motil. Cytoskeleton* 21, 132–137.
- Tirlapur, U.K., Dahse, I., Reiss, B., Meurer, J., Oelmüller, R., 1999. Characterization of the activity of a plastid-targeted green fluorescent protein in Arabidopsis. *Eur. J. Cell Biol.* 78, 233–240.
- Tilney, L.G., 1976. The polymerization of actin. *J. Cell Biol.* 69, 51–57, 73–89.
- Tilney, L.G., Connelly, P.S., Portnoy, D.C., 1990a. Actin filament nucleation by the bacterial pathogen *Listeria monocytogenes*. *J. Cell Biol.* 111, 2979–2988.
- Tilney, L.G., Cooke, T.J., Connelly, P.S., Tilney, M.S., 1990b. The distribution of plasmodesmata and its relationship to morphogenesis on fern gametophytes. *Development* 110, 1207–1221.
- Tilney, L.G., Cooke, T.J., Connelly, P.S., Tilney, M.S., 1991. The structure of plasmodesmata as revealed by plasmolysis, detergent extraction, and protease digestion. *J. Cell Biol.* 112, 739–747.
- Tilney, L.G., Harb, O.S., Connelly, P.S., Robinson, C.G., Roy, C. R., 2001. How the parasitic bacterium *Legionella pneumophila* modifies its phagosome and transforms it not rough ER: Implications for conversion of plasma membrane to the ER membrane. *J. Cell Sci.* 114, 4637–4650.
- Tilney, L.G., Portnoy, D.A., 1989. Actin filaments and the growth, movement, and spread of the intracellular bacterial parasite, *Listeria monocytogenes*. *J. Cell Biol.* 109, 1597–1608.
- Time. 1937. Glorius handful. Monday, December 6, 1937. <http://www.time.com/time/magazine/article/0,9171,758538,00.html>.
- Time. 1940. The pulse of protoplasm. Monday, November 25, 1940. <http://www.time.com/time/magazine/article/0,9171,884191,00.html>.
- Timmis, J.N., Ayliffe, M.A., Huany, C.Y., Martin, W., 2004. Endosymbiotic gene transfer: Organelle genomes forge eukaryotic chromosomes. *Nat. Rev. Genet.* 5, 123–135.
- Timmis, J.N., Ingle, J., 1973. Environmentally induced changes in rRNA gene redundancy. *Nat. New Biol.* 244, 235–236.
- Tippit, D.H., Pickett-Heaps, J.D., Leslie, R., 1980. Cell division in two large pennate diatoms *Hantzschia* and *Nitzschia*. III. A new proposal for kinetochore function during prometaphase. *J. Cell Biol.* 86, 402–416.
- Tirlapur, U.K., Dahse, I., Reiss, B., Meurer, J., Oelmüller, R., 1999. Characterization of the activity of a plastid-targeted green fluorescent protein in Arabidopsis. *Eur. J. Cell Biol.* 78, 233–240.

- Tiselius, A., 1939. The chemistry of proteins and amino acids. *Ann. Rev. Biochem.* 8, 155–184.
- Tiselius, A.W.K., 1948. Electrophoresis and adsorption analysis as aids in investigations of large molecular weight substances and their breakdown products. Nobel Lect. December 13.
- Titel, C., Woehlecke, H., Afifi, I., Ehwald, R., 1997. Dynamics of limiting cell wall porosity in plant suspension cultures. *Planta* 203, 320–326.
- Titorenko, V.I., Mullen, R.T., 2006. Peroxisome biogenesis: The peroxisomal endomembrane system and the role of the ER. *J. Cell Biol.* 174, 11–17.
- Titorenko, V.I., Rachubinski, R.A., 1998. Mutants of the yeast *Yarrowia lipolytica* defective in protein exit from the endoplasmic reticulum are also defective in peroxisome biogenesis. *Mol. Cell. Biol.* 18, 2789–2803.
- Titus, D.E., Becker, W.M., 1985. Investigation of the glyoxysome-peroxisome transition in germinating cucumber cotyledons using double-label immunoelectron microscopy. *J. Cell Biol.* 101, 1288–1299.
- Titus, M.A., Warick, H.M., Spudich, J.A., 1989. Multiple actin-based motor genes in *Dictyostelium*. *Cell Regul.* 1, 55–63.
- To, L.P., 1987. Are centrioles semiautonomous? *Ann. NY Acad. Sci.* 503, 83–91.
- Todd, A.R., 1957. Synthesis in the study of nucleotides. Nobel Lect. December 11.
- Tolbert, N.E., 1971. Microbodies-peroxisomes and glyoxysomes. *Annu. Rev. Plant Physiol.* 22, 45–74.
- Tolbert, N.E., 1981. Metabolic pathways in peroxisomes and glyoxysomes. *Ann. Rev. Biochem.* 50, 133–157.
- Tolbert, N.E., Oeser, A., Kisaki, T., Hageman, R.H., Yamazaki, R.K., 1968. Peroxisomes from spinach leaves containing enzymes related to glycolate metabolism. *J. Biol. Chem.* 243, 5179–5184.
- Tolmarch, L.J., 1951. Effects of triphosphopyridine nucleotide upon oxygen evolution and carbon dioxide fixation by illuminated chloroplasts. *Nature* 167, 946–948.
- Tomenius, K., Clapham, D., Meshi, T., 1987. Localization by immunogold cytochemistry of the virus-coded 30 K protein in plasmodesmata of leaves infected with tobacco mosaic virus. *Virology* 160, 363–371.
- Tominaga, M., Kojima, H., Yokota, E., Orii, H., Nakamori, R., Katayama, E., Anson, M., Shimmen, T., Oiwa, K., 2003. Higher plant myosin XI moves processively on actin with 35 nm steps at high velocity. *EMBO J.* 22, 1263–1272.
- Tominaga, M., Morita, K., Sonobe, S., Yokota, E., Shimmen, T., 1997. Microtubules regulate the organization of actin filaments at the cortical region in root hair cells of *Hydrocharis*. *Protoplasma* 199, 83–92.
- Tominaga, M., Yokota, E., Sonobe, S., Shimmen, T., 2000a. Mechanism of inhibition of cytoplasmic streaming by a myosin inhibitor, 2,3-butanedione monoxime. *Protoplasma* 213, 46–54.
- Tominaga, M., Yokota, E., Vidali, L., Sonobe, S., Hepler, P.K., Shimmen, T., 2000b. The role of plant villin in the organization of the actin cytoskeleton, cytoplasmic streaming and the architecture of the transvacuolar strand in root hair cells of *Hydrocharis*. *Planta* 210, 836–843.
- Tominaga, Y., Shimmen, T., Tazawa, M., 1983. Control of cytoplasmic streaming by extracellular Ca^{2+} in permeabilized *Nitella* cells. *Protoplasma* 116, 75–77.
- Tominaga, Y., Tazawa, M., 1981. Reversible inhibition of cytoplasmic streaming by intracellular Ca^{2+} in tonoplast-free cells of *Chara australis*. *Protoplasma* 109, 103–111.
- Tominaga, Y., Wayne, R., Tung, H.Y.L., Tazawa, M., 1987. Phosphorylation-dephosphorylation is involved in Ca^{2+} -controlled cytoplasmic streaming of characean cells. *Protoplasma* 136, 161–169.
- Tomishige, M., Sako, M., Kusumi, A., 1998. Regulation mechanism of the lateral diffusion of band 3 in erythrocyte membranes by the membrane skeleton. *J. Cell Biol.* 142, 989–1000.
- Tomishige, M., Kusumi, A., 1999. Compartmentalization of the erythrocyte membrane by the membrane skeleton: Inter-compartmental hop diffusion of band 3. *Mol. Biol. Cell* 10, 2475–2479.
- Tomos, A.D., Leigh, R.A., 1999. The pressure probe: A versatile tool in plant cell physiology. *Annu. Rev. Plant Physiol.* 50, 447–472.
- Tomos, A.D., Malone, M., Pritchard, J., 1989. The biophysics of differential growth. *Environ. Exp. Bot.* 29, 7–23.
- Tong, C.-G., Dawulder, M., Clawson, G.A., Hatem, C.C., Roux, S.J., 1993. The major nucleoside triphosphatase in pea (*Pisum sativum* L.) nuclei and in rat liver nuclei share common epitopes also present in nuclear lamins. *Plant Physiol.* 101, 1005–1011.
- Tonkin, C.J., Foth, B.J., Ralph, S.A., Struck, N., Cowman, A.F., McFadden, G.I., 2008. Evolution of malaria parasite plastid targeting sequences. *Proc. Natl. Acad. Sci. USA* 105, 4781–4785.
- Toyoshima, C., Nomura, H., 2002. Structural changes in the calcium pump accompanying the dissociation of calcium. *Nature* 418, 605–611.
- Traas, J.A., Braat, P., Emons, A.M.C., Meekes, H., Derksen, J., 1985. Microtubules in root hairs. *J. Cell Sci.* 76, 303–320.
- Traas, J.A., Doonan, J.H., Rawlins, D.J., Shaw, P.J., Watts, J., Lloyd, C.W., 1987. An actin network is present in cytoplasm throughout the cell cycle of carrot cells and associates with the dividing nucleus. *J. Cell Biol.* 105, 387–395.
- Traube, M., 1867. Experimente zur Theorie der Zellenbildung und Endosmose. In: Reichert, C.B., du Bois-Reymond, E. (Eds.) *Archiv für Anatomie, Physiologie und wissenschaftliche Medicin. Veit et Comp, Leipzig*, pp. 87–128, 129–165.
- Trebst, A., 1974. Energy conservation in photosynthetic electron transport of chloroplasts. *Ann. Rev. Plant Physiol.* 25, 423–458.
- Trefil, J.S., 1983. *The Moment of Creation*. Charles Scribner's Sons, New York.
- Trefil, J., Morowitz, H.J., Smith, E., 2009. The origin of life. *Amer. Sci.* 97, 206–213.
- Tregunna, E.B., Krotkov, G., Nelson, C.D., 1966. Effect of oxygen on the rate of photorespiration in detached tobacco leaves. *Physiol. Plant.* 19, 723–733.
- Trelease, R.N., 1984. Biogenesis of glyoxysomes. *Ann. Rev. Plant Physiol.* 35, 321–347.
- Trelease, R.N., Becker, W.M., Gruber, P.J., Newcomb, E.H., 1971. Microbodies (glyoxysomes and peroxisomes) in cucumber cotyledons. Correlative biochemical and ultrastructural study in light- and dark-grown seedlings. *Plant Physiol.* 48, 461–475.
- Trelease, R.N., Lee, M.S., Banjoko, A., Bunkelmann, J., 1996. C-terminal polypeptides are necessary and sufficient for in vivo targeting of transiently-expressed proteins to peroxisomes in suspension-cultured plant cells. *Protoplasma* 195, 156–167.

- Trench, R.K., 1991. *Cyanophora paradoxa* Korschikoff and the origin of chloroplasts. In: Margulis, L., Fester, R. (Eds.), *Symbiosis as a Source of Evolutionary Innovation. Speciation and Morphogenesis*. MIT Press, Cambridge, MA, pp. 143–150.
- Treub, M., 1878. Quelques recherches sur le rôle du noyau dans la division des cellules végétales. *Natuurk. Verh. K. Akad. D. Wetensch. Amsterdam Deel*. 19, 1–33.
- Treviranus, G.R., 1802. *Biologi, oder Philosophie der lebenden Natur für Naturforscher und Aerzte*. Röwer, Göttingen.
- Trewavas, A., 2000. Signal perception and transduction. In: Buchanan, B., Gruissem, W., Jones, R. (Eds.), *Biochemistry & Molecular Biology of Plants*. American Society of Plant Physiologists, Rockville, MD, pp. 930–987.
- Trewava, A., 2006. The green plant as an intelligent organism. In: Baluska, F., Mancuso, S., Volkmann, D. (Eds.), *Communication in Plants*. Springer, Berlin, pp. 1–18.
- Troglodyte, A. [F. C. S. Schiller]. 1891. *Riddles of the Sphinx. A Study in the Philosophy of Evolution*. Swan Sonnenschein & Co., London.
- Trost, P., 2003. Plasma membrane redox systems. *Protoplasma* 221, 1.
- Trowbridge, I.S., 1991. Endocytosis and signals for internalization. *Curr. Opin. Cell Biol.* 3, 634–641.
- Trusty, J.L., Johnson, K.J., Graeme Lockaby, B., Goertzen, L.R., 2007. Bi-parental cytoplasmic DNA inheritance in *Wisteria* (Fabaceae): Evidence from a natural experiment. *Plant Cell Physiol.* 48, 662–665.
- Tsai, M.A., Frank, R.S., Waugh, R.E., 1993. Passive mechanical behavior of human neutrophils: Power-law fluid. *Biophys. J.* 65, 2078–2088.
- Tsai, M.A., Frank, R.S., Waugh, R.E., 1993. Passive mechanical behavior of human neutrophils: Effect of cytochalasin B. *Biophys. J.* 66, 2166–2172.
- Tse, Y.C., Mo, B., Hillmer, S., Zhao, M., Lo, S.W., Robinson, D.G., 2004. Identification of multivesicular bodies as prevacuolar compartments in *Nicotiana tabacum* BY-2 cells. *Plant Cell* 16, 672–693.
- Tsien, R.Y., 2008. Constructing and exploiting the fluorescent protein paintbox. *Nobel Lect.* December 8.
- Ts'o, P.O.P., Bonner, J., Vinograd, J., 1956. Microsomal nucleoprotein particles from pea seedlings. *J. Biophys. Biochem. Cytol.* 2, 451–465.
- Ts'o, P.O.P., Eggman, L., Vinograd, J., 1957. Physical and chemical studies of myxomycin, an ATP-sensitive protein in cytoplasm. *Biochim. Biophys. Acta* 25, 532–542.
- Ts'o, P.O.P., Sato, C.S., 1959. The incorporation of leucine- C^{14} into microsomal particles and other subcellular components of the peas epicotyl. *J. Biophys. Biochem. Cytol.* 5, 59–68.
- Tsubo, Y., Matsuda, Y., 1984. Transmission of chloroplast genes in crosses between *Chlamydomonas reinhardtii* diploids: Correlation with chloroplast nucleoid behavior in young zygotes. *Curr. Genet.* 8, 223–229.
- Tsugita, A., Fraenkel-Conrat, H., 1960. The amino acid composition and C-terminal sequence of a chemically evoked mutant of TMV. *Proc. Natl. Acad. Sci. USA* 46, 636–641.
- Tucker, E.B., 1982. Translocation in the staminal hairs of *Secresea purpurea*. I. A study of cell ultrastructure and cell-to-cell passage of molecular probes. *Protoplasma* 113, 193–201.
- Tucker, E.B., 1988. Inositol biphosphate and inositol triphosphate inhibit cell-to-cell passage of carboxyfluorescein in staminal hairs of *Secresea purpurea*. *Planta* 174, 358–363.
- Tucker, E.B., 1990. Calcium-loaded 1,2-bis(2-aminophenoxy) ethane-N,N,N',N'-tetraacetic acid blocks cell-to-cell diffusion of carboxyfluorescein in staminal hairs of *Secresea purpurea*. *Planta* 182, 34–38.
- Tucker, E.B., Boss, W.F., 1996. Matoparan-induced intracellular Ca^{2+} fluxes may regulate cell-to-cell communication in plants. *Plant Physiol.* 111, 459–467.
- Tucker, E.B., Tucker, J.E., 1993. Cell-to-cell diffusion selectivity in staminal hairs of *Setcreasea purpurea*. *Protoplasma* 174, 36–44.
- Tugal, H.B., Pool, M., Baker, A., 1999. Arabidopsis 22-kilodalton peroxisomal membrane protein. Nucleotide sequence analysis and biochemical characterization. *Plant Physiol.* 120, 309–320.
- Turing, A.M., 1992a. *Mechanical Intelligence*. Ince, D.C. (Ed.), North-Holland, New York.
- Turing, A.M., 1992b. *Morphogenesis*. Saunders, P.T. (Ed.), North-Holland, New York.
- Turgeon, R., 1991. Symplastic phloem loading and the sink-source transition in leaves: A model. In: Bonnemain, V.L., Delrot, S., Dainty, J., Lucas, W.J. (Eds.), *Recent Advances in Phloem Transport and Assimilate Compartmentation*. Quest Editions, Paris, pp. 18–22.
- Turgeon, R., 2000. Plasmodesmata and solute exchange in the phloem. *Aust. J. Plant Physiol.* 27, 521–529.
- Turgeon, R., Beebe, D.U., 1991. The evidence for symplastic phloem loading. *Plant Physiol.* 96, 349–354.
- Turgeon, R., Beebe, D.U., Gowan, E., 1993. The intermediary cell: Minor-vein anatomy and raffinose oligosaccharide synthesis in the Scrophulariaceae. *Planta* 191, 446–456.
- Turgeon, R., Gowen, E., 1990. Phloem loading in *Coleus blumei* in the absence of carrier-mediated uptake of export sugar from the apoplast. *Plant Physiol.* 94, 1244–1249.
- Turgeon, R., Hepler, P.K., 1989. Symplastic continuity between mesophyll and companion cells in minor veins of mature *Cucurbita pepo* L. leaves. *Planta* 179, 24–31.
- Turgeon, R., Medville, R., 2004. Phloem loading. A Reevaluation of the relationship between plasmodesmatal frequencies and loading strategies. *Plant Physiol.* 136, 3795–3803.
- Turing, A.M., 1992. *Morphogenesis*. Collected Works of Turing, A. M. Saunders, P. T. (Ed.), North-Holland, Amsterdam.
- Turner, C.E., Burridge, K., 1991. Transmembrane molecular assemblies in cell-extra matrix interactions. *Curr. Opin. Cell Biol.* 3, 849–853.
- Turner, F.R., Whaley, W.G., 1965. Intercisternal elements of the Golgi apparatus. *Science* 147, 1303–1304.
- Tuteja, N., 2003. Plant DNA helicases: The long unwinding road. *J. Exp. Bot.* 54, 2201–2214.
- Twell, D., Park, S.K., Hawkins, T.J., Schubert, D., Schmidt, R., Smertenko, A., Hussey, P.J., 2002. MOR1/GEM1 has an essential role in the plant-specific cytokinetic phragmoplast. 4, 711–714.
- Twyman, R.M., Schillberg, S., Fischer, R., 2005. Transgenic plants in the biopharmaceutical market. *Expert Opin. Emerg. Drugs*. 10, 185–218.
- Tyerman, S.D., Bohnert, H.J., Maurel, C., Steudle, E., Smith, J. A.C., 1999. Plant aquaporins: Their molecular biology, biophysics and significance for plant water relations. *J. Exp. Bot.* 50, 1055–1071.
- Tyerman, S.D., Niemietz, C.M., Bramley, H., 2002. Plant aquaporins: Multifunctional water and solute channels with expanding roles. *Plant, Cell Environ.* 25, 173–194.

- Tyndall, J., 1898. *Fragments of Science*. D. Appleton and Co., New York.
- Tyson, J., 1878. *The Cell Doctrine: Its History and Present State. For the Use of Students in Medicine and Dentistry. Also, a Copious Bibliography of the Subject*. Lindsay & Blakiston, Philadelphia.
- U-**
- Uchida, K., Furuya, M., 1997. Control of the entry into S phase by phytochrome and blue light receptor in the first cell cycle of fern spores. *Plant Cell Physiol.* 38, 1075–1079.
- Uddin, M.I., Qi, Y., Yamada, S., Shibuya, I., Deng, X.-P., Kwak, S.-S., Kaminaka, H., Tanaka, K., 2008. Overexpression of a new rice vacuolar antiporter regulating protein OsARP improves salt tolerance in tobacco. *Plant Cell Physiol.* 49, 880–890.
- Ueda, K., 1966. Fine structure of *Chlorogonium elongatum* with special reference to vacuole development. *Cytologia* 31, 461–472.
- Ueda, K., Matsuyama, T., Hashimoto, T., 1999. Visualization of microtubules in living cells of transgenic *Arabidopsis thaliana*. *Protoplasma* 206, 201–206.
- Ueda, M., Nakamura, Y., 2007. Chemical basis of plant leaf movement. *Plant Cell Physiol.* 48, 400–407.
- Ueda, T., Mori, Y., Nakagaki, T., Kobatake, Y., 1988. Changes in cyclic AMP and cyclic GMP concentration. Birefringent fibrils and contractile activity accompanying UV and blue light photoavoidance in plasmodia of an albino strain of *Physarum polycephalum*. *Photochem. Photobiol.* 47, 271–276.
- Ueda, T., Terayama, K., Kurihara, K., Kobatake, Y., 1975. Threshold phenomena in chemoreception and taxis in slime mold *Physarum polycephalum*. *J. Gen Physiol.* 65, 223–234.
- Ueda, T., Uemura, T., Sato, M.H., Nakano, A., 2004. Functional differentiation of endosomes in *Arabidopsis* cells. *Plant J.* 40, 783–789.
- Ueguchi-Tanaka, M., Fujisawa, Y., Kobayashi, M., Ashikari, M., Iwasaki, Y., Kitano, H., Matsuoka, M., 2000. Rice dwarf mutant *dl*, which is defective in the α subunit of the heterotrimeric G protein, affects gibberellin signal transduction. *Proc. Natl. Acad. Sci. USA* 97, 11638–11743.
- Uehara, K., Hogetsu, T., 1993. Arrangement of cortical microtubules during formation of bordered pit in the trochoides of *Taxus*. *Protoplasma* 173, 8–12.
- Uehlein, N., Novisolo, C., Siefritz, F., Kaldenhoff, R., 2003. The tobacco aquaporin NtAQP1 is a membrane CO₂ pore with physiological functions. *Nature* 425, 734–737.
- Uehlein, N.B., Otto, D.T., Hanson, M., Fischer, M., McDowell, N., Kaldenhoff, R., 2008. Function of Nicotiana tabacum aquaporins as chloroplast gas pores challenges the concept of membrane CO₂ permeability. *Plant Cell* 20, 648–657.
- Uemura, T., Ueda, T., Ohniwa, R.L., Nakano, A., Takeyasu, K., Sato, M.H., 2004. Systemic analysis of SNARE molecules in Arabidopsis: Dissection of the post-Golgi network in plant cells. *Cell Struct. Func.* 29, 49–65.
- Uhl, C.H., 1996. Chromosomes and polyploidy in *Lenophyllum* (Crassulaceae). *Amer. J. Bot.* 83, 216–220.
- Uhlenbeck, G.E., Goudsmit, S.A., 1926. Spinning electrons and the structure of spectra. *Nature* 117, 264–265.
- Uhlén, P., 2006. Visualization of Na,K-ATPase interacting proteins using FRET technique. *Ann. NY Acad. Sci.* 986, 514–518.
- Uhlmann, F., Wernic, D., Poupart, M.A., Koonin, E.V., Nasemyth, K., 2000. Cleavage of cohesin by the CD clan protease separin triggers anaphase in yeast. *Cell* 103, 375–386.
- Ulam, S., 1972. Some ideas and prospects in biomathematics. *Ann. Rev. Biophys. Bioeng.* 1, 277–292.
- Ulrich, W.R., Rigano, C., Fuggi, A., Aparicio, P.J. (Eds.), 1990. *Inorganic Nitrogen in Plants and Microorganisms. Uptake and Metabolism*. Springer-Verlag, Berlin.
- Ulmasov, T., Hagen, G., Guilfoyle, T.J., 1997. ARF1, a transcription factor that binds to auxin response elements. *Science* 276, 1865–1868.
- Underwood, M.R., Fried, H.M., 1990. Characterization of nuclear localizing sequences derived from yeast ribosomal protein L29. *EMBO J.* 9, 91–100.
- Ungerleider, S., 2001. *Faust's Gold*. St. Martin's Press, New York.
- Unwin, P.N.T., Milligan, R.A., 1982. A large particle associated with the perimeter of the nuclear pore complex. *J. Cell Biol.* 93, 63–75.
- Uozumi, N., Gassmann, W., Cao, Y., Schroeder, J.I., 1995. Identification of strong modifications in cation selectivity in an *Arabidopsis* inward rectifying potassium channel by mutant selection in yeast. *J. Biol. Chem.* 270, 24276–24281.
- Urbanowicz, B.R., Rayon, C., Carpita, N.C., 2004. Topology of the maize mixed-linkage (1→3),(1→4)- β -D-glucan synthase at the Golgi membrane. *Plant Physiol.* 134, 758–768.
- Ure, A., 1819. An account of some experiments made on the body of a criminal immediately after execution, with physiological and practical observations. *J. Sci. Arts* 6, 283–294.
- Url, W.G., 1964. Phasenoptische Untersuchungen und Innerepidermen der Zweibelschuppe von *Allium cepa* L. *Protoplasma* 58, 294–311.
- Urey, H.C., 1935. Some thermodynamic properties of hydrogen and deuterium. *Nobel Lect.* February 14.
- Urey, H.C., 1939. The separation of isotopes and their use in chemistry and biology. In: Baitzell, G.A. (Ed.), *Science in Progress*. Yale University Press, New Haven, CT, pp. 35–77.
- Urey, H.C., 1952a. *The Planets*. Yale University Press, New Haven, CT.
- Urey, H.C., 1952b. On the early chemical history of the Earth and the origin of life. *Proc. Natl. Acad. Sci. USA* 38, 351–363.
- Urey, H., 1979. The origin of the Earth. In: *Life. Origin and Evolution. Readings from Scientific American*. W. H. Freeman and Co., San Francisco, pp. 18–23.
- Ussher, J., 1658. *The Annal of the World*. Printed by E. Tyler, London.
- Ussher, J., 1864. *The Whole Works of the Most Rev. James Ussher, Collected by C. R. Elrington*. Hodges, Smith, and Co., Dublin.
- Ussing, H.H., Zerahn, K., 1951. Active transport of sodium as the source of electric current in the short-circuited isolated frog skin. *Acta Physiol. Scand.* 23, 110–127.
- Uyeda, T.Q.P., 1996. Ultra-fast *Chara* myosin: A test case for the swinging lever arm model for force production by myosin. *J. Plant Res.* 109, 231–239.
- V-**
- Vahey, M., Scordilis, S.P., 1980. Contractile proteins from the tomato. *Can. J. Bot.* 58, 797–801.

- Vahey, M., Titus, M., Trautwein, R., Scordilis, S., 1982. Tomato actin and myosin: Contractile proteins from a higher land plant. *Cell Motil.* 2, 131–147.
- Vaisberg, E.A., Koonce, M.P., McIntosh, J.R., 1993. Cytoplasmic dynein plays a role in mammalian mitotic spindle formation. *J. Cell Biol.* 123, 849–858.
- Vale, R.D., 1987. Intracellular transport using microtubule-based motors. *Ann. Rev. Cell Biol.* 3, 347–378.
- Vale, R.D., Reese, T.S., Sheetz, M.P., 1985a. Identification of a novel force-generating protein, kinesin, involved in microtubule-based motility. *Cell* 42, 39–50.
- Vale, R.D., Schnapp, B.J., Mitchison, T.J., Steuer, E., Reese, T.S., Sheetz, M.P., 1985b. Different axoplasmic proteins generate movement in opposite directions along microtubules *in vitro*. *Cell* 43, 623–632.
- Vale, R.D., Schnapp, B.J., Reese, T.S., Sheetz, M.P., 1985c. Movement of organelles along filaments dissociated from the axoplasm of the giant squid axon. *Cell* 40, 449–454.
- Vale, R.D., Toyoshima, Y.Y., 1988. Rotation and translocation of microtubules *in vitro* induced by dyneins from *Tetrahymena* cilia. *Cell* 52, 459–470.
- Vale, R.D., Toyoshima, Y.Y., 1989. Microtubule translocation properties of intact and proteolytically digested dyneins from *Tetrahymena* cilia. *J. Cell Biol.* 108, 2327–2334.
- Valenstein, E.S., 2005. *The War of the Soups and Sparks: The Discovery of Neurotransmitters and the Dispute over How Nerves Communicate*. Columbia University Press, New York.
- Valerio, M., Haraux, F., Gardeström, P., Diolez, P., 1993. Tissue specificity of the regulation of ATP hydrolysis by isolated plant mitochondria. *FEBS Lett.* 318, 113–117.
- Vallon, O., Bulte, L., Dainese, P., Olive, J., Bassi, R., Wollman, F.A., 1991. Lateral redistribution of cytochrome b_6/f complexes along thylakoid membranes upon state transitions. *Proc. Natl. Acad. Sci. USA* 88, 8262–8266.
- Valster, A.H., Hepler, P.K., 1997. Caffeine inhibition of cytokinesis: Effect on the phragmoplast cytoskeleton in living *Tradescantia* stamen hair cells. *Protoplasma* 196, 155–166.
- Valster, A.H., Pierson, E.S., Valenta, R., Hepler, P.K., Emons, A.M.C., 1997. Probing the plant actin cytoskeleton during cytokinesis and interphase by profilin microinjection. *Plant Cell* 9, 1815–1824.
- Valdivia, E.R., Sampedro, J., Lamb, C., Chopra, S., Cosgrove, D.J., 2007. Recent proliferation and translocation of pollen group 1 allergen genes in the maize genome. *Plant Physiol.* 143, 1269–1281.
- Valdivia, E.R., Wu, Y., Li, L.-C., Cosgrove, D.J., Stephenson, A.G., 2007. A group-1 grass pollen allergen influences the outcome of pollen competition in maize. *PLoS One* E154.
- van Bel, A.J.E., 1989. The challenge of symplastic phloem loading. *Botanica Acta* 102, 183–185.
- van Bel, A.J.E., van Kesteren, W.J.P. (Eds.), 1999. *Plasmodesmata. Structure, Function, Role in Cell Communication*. Springer-Verlag, Berlin.
- Van Bel, A.J.E., Ehlers, K., 2005. Electrical signaling via plasmodesmata. In: Oparka, K.J. (Ed.), *Plasmodesmata*. Blackwell, Oxford, pp. 263–278.
- van Beneden, E., 1883. Recherches sur la maturation de l'oeuf, la fécondation et la division cellulaire. *Arch. Biol.* 4, 265–641.
- Vance, D.E., Vance, J.E. (Eds.), 2008. *Biochemistry of Lipids, Lipoproteins and Membranes*, fifth ed. Elsevier Science, B. V.
- van Daele, Y., Gaill, F., Goffinet, G., 1991. Parabolic pattern of a peculiar striated body in the tunic of the ascidian, *Halocynthia papillosa* Tunicate Ascidiacea. *J. Struct. Biol.* 106, 115–124.
- Van den Berg, B., Clemons W.M., Collinson, I., Modis, Y., Hartmann, E., Harrison, S.C. Jr., Rappoport, T.A., 2004. X-ray structure of a protein-conducting channel. *Nature* 427, 24–26.
- VandenBosch, K.A., Becker, W.M., Palevitz, B.A., 1996. The natural history of a scholar and gentleman. A biography of Eldon H. Newcomb. *Protoplasma* 195, 4–11.
- van den Bulcke, M., Baun, G., Castresana, C., Van Montagu, M., Vandekerckhove, J., 1989. Characterization of vacuolar and extra vacuolar $\beta(1,3)$ -glucanases of tobacco: Evidence for a strictly compartmentalized plant defense system. *Proc. Natl. Acad. Sci. USA* 86, 2673–2677.
- Vanderhoef, L.N., 1985. Auxin-enhanced elongation. In: *Hormonal Regulation of Plant Growth and Development*, Vol. II. Nijhoff/Junk Publishers, Dordrecht/Boston, pp. 37–44.
- Vanderhoef, L.N., Lu, T.S., Williams, C.A., 1977. Comparison of auxin-induced elongation in soybean hypocotyl. *Plant Physiol.* 59, 1004–1007.
- Vanderhoef, L.N., Stahl, C.A., 1975. Separation of two responses to auxin by means of cytokinin inhibition. *Proc. Natl. Acad. Sci. USA* 72, 1822–1825.
- Van der Krol, A., Mur, R., Beld, M., Mol, J.N.M., Stuitje, A.R., 1990. Flavonoid genes in petunia: Addition of a limited number of gene copies may lead to a suppression of gene expression. *Plant Cell* 2, 291–299.
- van der Shoot, C., Dietrich, M.A., Storms, M., Verbecke, J.A., Lucas, W.J., 1995. Establishment of a cell-to-cell communication pathway between separate carpels during gynoecium development. *Planta* 195, 450–455.
- van der Wilden, W., Herman, E.M., Chrispeels, M.J., 1980. Protein bodies of mung bean cotyledons as autophagic organelles. *Proc. Natl. Acad. Sci. USA* 77, 428–432.
- van der Woude, W.J., Morré, D.J., Bracker, C.E., 1971. Isolation and characterization of secretory vesicles in germinated pollen of *Lilium longiflorum*. *J. Cell Sci.* 8, 331–351.
- Vandré, D.D., Borisy, G.G., 1989. The centrosome cycle in animal cells. In: Hyams, J.S., Brinkley, B.R. (Eds.), *Mitosis: Molecules and Mechanisms*. Academic Press, London, pp. 39–75.
- van Holde, K.E., 1989. *Chromatin*. Springer-Verlag, New York.
- Van Iterson, W., Hoeniger, J.F.M., van Zanten, E.N., 1967. A “microtubule” in a bacterium. *J. Cell Biol.* 32, 1–10.
- van Lammeren, A.A.M., Bednara, J., Wallemse, M.T.M., 1989. Organization of the actin cytoskeleton during pollen development in *Gasteria verrucosa* (Mill.) H. Duval visualized with rhodamine-phalloidin. *Planta* 178, 531–539.
- van Meer, G., 1993. Transport and sorting of membrane lipids. *Curr. Opin. Cell Biol.* 5, 661–673.
- van Niel, C.B., 1941. The bacterial photosyntheses and their importance for the general problem of photosynthesis. *Adv. Enzymol.* 1, 263–328.
- van Roessel, P., Brand, A.H., 2002. Imaging into the future: Visualizing gene expression and protein interactions with fluorescent proteins. *Nat. Cell Biol.* 4, E15–E20.
- van Spronsen, E.A., Sarafis, V., Brakenhoff, G.J., van der Voort, H.T.M., Nanninga, N., 1989. Three-dimensional structure of living chloroplasts as visualized by confocal scanning laser microscopy. *Protoplasma* 148, 8–14.

- Van't Hof, J., 1975. DNA fiber replication in chromosomes of a higher plant (*Pisum sativum*). Exp. Cell Res. 93, 95–104.
- Van't Hof, J., 1985. Control points within the cell cycle. In: Bryant, J.A., Francis, D. (Eds.), The Cell Division Cycle in Plants. Cambridge University Press, Cambridge, pp. 1–13.
- Van't Hof, J., 1988. Functional chromosomal structure: The replicon. In: Bryant, J.A., Dunham, V.L. (Eds.), DNA Replication in Plants. CRC Press, Boca Raton, FL, pp. 1–15.
- Van't Hof, J., Bjerknes, C.A., 1977. 18 μ m replication units of chromosomal DNA fibers of differentiated cells of pea (*Pisum sativum*). Chromosoma 64, 287–294.
- Van't Hof, J., Bjerknes, C.A., 1981. Similar replicon properties of higher plant cells with different S periods and genome sizes. Exp. Cell Res. 136, 461–465.
- Van't Hof, J., Kuniyaki, A., Bjerknes, C.A., 1978. The size and number of replicon families of chromosomal DNA of *Arabidopsis thaliana*. Chromosoma 68, 269–285.
- Van't Hof, J., Hernández, P., Bjerknes, C.A., Lamm, S.S., 1987a. Location of the replication origin in the 9 kb repeat size class of rDNA in pea (*Pisum sativum*). Plant Mol. Biol. 9, 87–96.
- Van't Hof, J., Lamm, S.S., 1992. Site of initiation of replication of the ribosomal RNA genes of pea (*Pisum sativum*) detected by 2-dimensional gel electrophoresis. Plant Mol. Biol. 20, 377–382.
- Van't Hof, J., Lamm, S.S., Bjerknes, C.A., 1987b. Detection of replication initiation by a replicon family in DNA of synchronized pea (*Pisum sativum*) root cells using benzoylated naphthoylated DEAE-cellulose chromatography. Plant Mol. Biol. 9, 77–86.
- Van't Hoff, J.H., 1874. A suggestion looking to the extension into space of the structural formulas at present used in chemistry and a note upon the relation between the optical activity and the chemical constitution of organic compounds. Archives neerlandaises des sciences exactes et naturelles 9, 445–454.
- Van't Hoff, J., 1888. The function of osmotic pressure in the analogy between solutions and gases. Phil. Mag. Series 5. 26, 81–105.
- Van't Hoff, J.H., 1898–1899. Lectures on Theoretical and Physical Chemistry. Translated by R. A. Lehfeldt. Edward Arnold, London.
- Van't Hoff, J.H., 1901. Osmotic pressure and chemical equilibrium. Nobel Lect. December 13.
- Van't Hoff, J.H., 1903. Physical Chemistry in the Service of the Sciences. University of Chicago Press, Chicago.
- Van't Hoff, J.H., 1967. Imagination in Science. Translated by G. F. Springer, Springer, Berlin.
- Van West, P., Morris, B.M., Reid, B., Appiah, A.A., Osborne, M.C., Campbell, T.A., Shepherd, S.J., Gow, N.A.R., 2002. Oomycete plant pathogens use electric fields to target roots. Mol. Plant Microbe Interact. 15, 790–798.
- Vanzin, G.F., Madson, M., Carpita, N.C., Raikhel, N.V., Keegstra, K., Reiter, W.-D., 2002. The mur2 mutant of Arabidopsis thaliana lacks fucosylated xyloglucan because of a lesion in fucosyltransferase AtFUT1. Proc. Natl. Acad. Sci. USA 99, 3340–3345.
- Varagona, M.J., Schmidt, R.J., Raikhel, N.V., 1991. Monocot regulatory protein opaque-2 is localized in the nucleus of maize endosperm and transformed tobacco plants. Plant Cell 3, 105–113.
- Varagona, M.J., Schmidt, R.J., Raikhel, N.V., 1992. Nuclear localization signal(s) required for nuclear targeting of the maize regulatory protein opaque-2. Plant Cell 4, 1213–1227.
- Varga, L., 1950. Observations on the glycerol-extracted *musculus psoas* of the rabbit. Enzymologia 4, 196–211.
- Varner, J.E., Lin, L.-S., 1989. Plant cell wall architecture. Cell 56, 231–239.
- Varner, J.E., Taylor, R., 1989. New ways to look at the architecture of plant cell walls--Localization of polygalacturonate blocks in plant tissues. Plant Physiol. 91, 31–33.
- Vaughan, M.A., Braselton, J.P., 1985. Nucleolar persistence in meristems of mung bean. Caryologia 38, 357–362.
- Vaughn, K.C., 1981. Organelle transmission in higher plants: Organelle alteration vs. physical exclusion. J. Heredity 72, 335–337.
- Vaughn, K.C., 1985. Physical basis for the maternal inheritance of triazine resistance in Amaranthus hybrids. Weed Res. 25, 15–19.
- Vaughn, K.C., Bowling, A.J., 2008. Recovery of microtubules on the blepharoplast of *Ceratopteris* spermatogenous cells after oryzalin treatment. Protoplasma 233, 231–240.
- Vaughn, K.C., DeBonte, L.R., Wilson, K.G., Schaeffer, G.W., 1980. Organelle alteration as a mechanism for maternal inheritance. Science 208, 196–198.
- Vaughn, K.C., Sheiman, T.C., Renzaglia, K.S., 1993. A centrin homologue is a component of the multilayered structure in bryophytes and pteridophytes. Protoplasma 175, 58–60.
- Vaughn, K.C., Talbot, M.J., Offler, C.E., McCurdy, D.W., 2007. Wall ingrowths in epidermal transfer cells of *Vicia faba* cotyledons are modified primary walls marked by localized accumulations of arabinogalactan proteins. Plant Cell Physiol. 48, 159–168.
- Vaux, L.D., Tooze, J., Fuller, S.D., 1990. Identification by anti-idiotypic antibodies of an intracellular membrane protein that recognizes a mammalian endoplasmic reticulum retention signal. Nature 345, 495–501.
- Vega-Palas, M., Ferl, R.J., 1995. The Arabidopsis Adh gene exhibits diverse nucleosome arrangements within a small DNase I-sensitive domain. Plant Cell 7, 1923–1932.
- Vejdovský, F., 1926–1927. Structure and Development of the “Living Matter”. Royal Bohemian Society of Sciences, Prague.
- Venning, F.D., 1949. Stimulation by wind motion of collenchyma formation in celery petioles. Bot. Gaz. 110, 511–514.
- Venverloo, C.J., Hovenkamp, P.H., Wedda, A.J., Libbenga, K.R., 1980. Cell division in *Nautilocalyx* explants. I. Phragmosome, preprophase band and plane of division. Z. Pflanaenphysiol. 100, 161–174.
- Verbelen, J.-P., Vissenberg, K., 2006. Cell expansion: Past, present and perspectives. Plant Cell Monogr. 5, 1–6.
- Vergara, C.E., Carpita, N.C., 2001. β -D-Glycan synthases and the CesA gene family: Lessons to be learned from the mixed-linkage (1 $\rightarrow$ 3),(1 $\rightarrow$ 4) β -D-glucan synthase. Plant Mol. Biol. 47, 145–160.
- Verlander, M.S., Lohrmann, R., Orgel, L.E., 1973. Catalysts for the self-polymerization of adenosine cyclic 2',3'-phosphate. J. Mol. Evol. 2, 303–316.
- Verma, D.P., 2001. Cytokinesis and building of the cell plate in plants. Annu. Rev. Plant Physiol. Plant Mol. Biol. 52, 751–764.

- Vernadsky, V.I., 1944. Problems of geochemistry, the fundamental matter-energy difference between the living and the inert natural bodies of the biosphere. *Trans. Conn. Acad. Arts and Sci.* 35, 487–517.
- Vernoud, V., Horton, A.C., Yang, Z., Nielsen, E., 2003. Analysis of the small GTPase gene superfamily of Arabidopsis. *Plant Physiol.* 131, 1191–1208.
- Véry, A.-A., Sentenac, H., 2003. Molecular mechanisms and regulation of K^+ transport in higher plants. *Annu. Rev. Plant Biol.* 54, 575–603.
- Vesk, P.A., Vesk, M., Gunning, B.E.S., 1996. Field emission scanning electron microscopy of microtubule arrays in higher plant cells. *Protoplasma* 195, 168–182.
- Vesper, M.J., Evans, M.L., 1979. Nonhormonal induction of H^+ efflux from plant tissues and its correlation with growth. *Proc. Natl. Acad. Sci. USA* 76, 6366–6370.
- Vickery, H.B., 1953. The behavior of the organic acids and starch of Bryophyllum leaves during culture in continuous light. *J. Biol. Chem.* 205, 369–381.
- Vickery, H.B., 1972. The history of the discovery of amino acids. II. A review of amino acids described since 1931 as components of proteins. *Adv. Prot. Chem.* 26, 81–171.
- Vierstra, R.D., 1993. Protein degradation in plants. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 44, 385–410.
- Vierstra, R.D., 2003. The ubiquitin/26S proteasome pathway, the complex last chapter in the life of many plant proteins. *Trends Plant Sci.* 8, 135–141.
- Vigil, E.L., 1970. Cytochemical and developmental changes in microbodies (glyoxysomes) and related organelles of castor been endosperm. *J. Cell Biol.* 46, 435–454.
- Vigil, E.L., 1983. Microbodies. In: Hall, J.L., Moore, A.L. (Eds.), *Isolation of membranes and organelles from plant cells*. Academic Press, London, pp. 211–236.
- Villanueva, M.A., Schindler, M., Wang, J.L., 2005. The nucleocytoplasmic microfilament network in protoplasts from cultured soybean cells is a plastic entity that pervades the cytoplasm except the central vacuole. *Cell Biol. Int.* 29, 936–942.
- Villanueva, M.A., Taylor, J., Sui, X., Griffing, L.R., 1993. Endocytosis in plant protoplasts; Visualization and quantitation of fluid-phase endocytosis using silver-enhanced bovine serum albumin-gold. *J. Exp. Bot.* 44 (Suppl.), 275–281.
- Villarejo, A., Burén, S., Larsson, S., Déjardin, A., Monné, M., Rudhe, C., Karlsson, J., Jansson, S., Lerouge, P., Rolland, N., von Heijne, G., Grebe, M., Bako, L., Samuelsson, G., 2005. Evidence for a protein transported through the secretory pathway en route to the higher plant chloroplast. *Nat. Cell Biol.* 7, 1224–1231.
- Villiers, T.A., 1967. Cytolysosomes in long-dormant plant embryo cells. *Nature* 214, 1356.
- Vincentini, F., Matile, P., 1993. Gerontosomes, a multifunctional type of peroxisomes in senescent leaves. *J. Plant Physiol.* 142, 50–56.
- Virchow, R. [1859]. Atoms and individuals. In: *Disease, Life, and Man. Selected Essays by Rudolf Virchow*. Translated by Rathel, L.J., Stanford University Press, Stanford, CA, pp. 120–141.
- Virchow, R., 1860. *Cellular Pathology*, seventh American ed. Robert M. de Witt, Publishers, New York.
- Virgil. [30 BCE]. 1952. Georgic II. In: *The Poems of Virgil*. Translated by J. Rhoades. Great Books of the Western World. Encyclopaedia Britannica, Chicago.
- Virgin, H.I., 1954. Further studies of the action spectrum for light-induced changes in the protoplasmic viscosity of *Elodea densa*. *Physiol. Plant* 7, 343–353.
- Virgin, H.I., 1981. The physical state of protochlorophyll(ide) in plants. *Ann. Rev. Plant Physiol.* 32, 451–463.
- Virgin, H.I., 1987. Effects of red, far-red and blue light on the cytoplasm of wheat leaf cells. *Physiol. Plant* 70, 203–208.
- Virgo, S.E., 1933. Loschmidt's number. *Sci. Prog.* 27, 634–649.
- Virshup, D.M., 1990. DNA replication. *Curr. Opin. Cell Biol.* 2, 453–460.
- Vishniac, W., Ochoa, S., 1951. Photochemical reduction of pyridine nucleotides by spinach grana and coupled carbon dioxide fixation. *Nature* 167, 768–769.
- Vitale, A., Chrispeels, M.J., 1984. Transient N acetylglucosamine in the biosynthesis of phytohemagglutinin: Attachment in the Golgi apparatus and removal in the protein bodies. *J. Cell Biol.* 99, 133–140.
- Vitale, A., Pedrazzini, E., 2005. Recombinant pharmaceuticals from plants: The plant endomembrane system as a bioreactor. *Mol. Interv.* 5, 216–225.
- Vitha, S., McAndrew, R.S., Osteryoung, K.W., 2001. FtsZ ring formation at the chloroplast division site in plants. *J. Cell Biol.* 153, 111–120.
- Vitha, A., Yang, M., Sack, F.D., Kiss, J.Z., 2007. Gravitropism in the starch excess mutant of Arabidopsis thaliana. *Am. J. Bot.* 94, 590–598.
- Voelker, T.A., Florkiewicz, R.Z., Chrispeels, M.J., 1986. Secretion of phytohemagglutinin by monkey COS cells. *Eur. J. Cell Biol.* 42, 218–223.
- Voeller, B.R., 1968. *The Chromosome Theory of Inheritance*. Appleton-Century-Crofts, New York.
- Vogel, S., 1981. *Life in Moving Fluids*. Princeton University Press, Princeton, NJ.
- Vogelmann, T.C., 1993. Plant tissue optics. *Ann. Rev. Plant Physiol. Plant Mol. Biol.* 44, 231–251.
- Volkin, E., Astrachan, L., 1956. Phosphorous incorporation in *Escherichia coli* ribonucleic acid after infection with bacteriophage T2. *Virology* 2, 149–161.
- Volkman, D., Baluška, F., 2000. Actin cytoskeleton related to gravisensing in higher plants. In: Staiger, C.J., Baluška, F., Volkman, D., Barlow, P.W. (Eds.), *Actin: A Dynamic Framework for Multiple Plant Cell Functions*. Kluwer Academic Publishers, Dordrecht, The Netherlands, pp. 557–572.
- Volkov, A.G. (Ed.), 2006. *Plant Electrophysiology—Theory & Methods*. Springer-Verlag, Berlin.
- Volkov, A.G., Adesina, T., Markin, V.S., Jovanov, E., 2008. Kinetics and mechanism of *Dionaea muscipula* trap closing. *Plant Physiol.* 146, 694–702.
- von Heijne, G., 1990. The signal peptide. *J. Membrane Biol.* 115, 195–201.
- Vonnegut, K., 1999. Unpaid consultant. In: *Bamboo Snuff Box. Uncollected Short Fiction*. G. P. Putman's Sons, New York, pp. 171–182.
- von Schaewen, A., Storm, A., O'Neill, J., Chrispeels, M.J., 1993. Isolation of a mutant *Arabidopsis* plant that lacks N-acetylglucosaminyl transferase I and is unable to synthesize Golgi-modified complex N-linked glycans. *Plant Physiol.* 102, 1109–1118.

- Voznesenskaya, E.V., Edwards, G.E., Kiirats, O., Artyusheva, E.G., Franceschi, V.R., 2003. Development of biochemical specialization and organelle partitioning in the single celled C_4 system in leaves of *Borszczowia aralocaspica* (Chenopodiaceae). *Am. J. Bot.* 90, 1669–1680.
- Voznesenskaya, E.V., Franceschi, V.R., Edwards, G.E., 2004. Light-dependent development of a single cell C_4 photosynthesis in cotyledons of *Borszczowia aralocaspica* (Chenopodiaceae) during transformation from a storage to a photosynthetic organ. *Ann. Bot.* 93, 177–187.
- Voznesenskaya, E.V., Franceschi, V.R., Kiirats, O., Artusheva, E.G., Freitag, H., Edwards, G.E., 2002. Proof of C_4 photosynthesis without Kranz anatomy in *Binertia cycloptera* (Chenopodiaceae). *Plant J.* 31, 649–662.
- Voznesenskaya, E.V., Franceschi, V.R., Kiirats, O., Freitag, E.G., Edwards, G.E., 2001. Kranz anatomy is not essential for terrestrial C_4 plant photosynthesis. *Nature* 414, 543–546.
- Voznesenskaya, E.V., Koteyeva, N.K., Chuong, S.D.X., Edwards, G.E., Akhani, H., Franceschi, V.R., 2005. Differentiation of cellular and biochemical features of the single cell C_4 syndrome during leaf development in *Binertia cycloptera* (Chenopodiaceae). *Am. J. Bot.* 92, 1784–1795.
- Vreeland, V., Morse, S.R., Robichaux, R.H., Miller, K.L., Hua, S.-S.T., Laetsch, W.M., 1989. Pectate distribution and esterification in *Dubautia* leaves and soybean nodules, studied with a fluorescent hybridization probe. *Planta* 177, 435–446.
- Vreugdenhil, D., Spanswick, R.M., 1987. The effect of vanadate on proton-sucrose cotransport in *Ricinus* cotyledons. *Plant Physiol.* 84, 605–608.
- W-**
- Wacholtz, M.C., Patel, S.S., Lipsky, P.E., 1989. Leukocyte function-associated antigen I is an activation molecule for human T cells. *J. Exp. Med.* 170, 431–448.
- Wacker, I., Quader, H., Schnepf, E., 1988. Influence of the herbicide oryzalin on cytoskeleton and growth of *Funaria hygrometrica* protonemata. *Protoplasma* 142, 55–67.
- Wacker, I., Schnepf, E., 1990. Unequal distribution of nuclear pores in oryzalin-induced mini-nuclei in protonema cells of the moss *Funaria hygrometrica*. Influence of the nucleolus. *Protoplasma* 158, 195–197.
- Wada, B., 1966. Analysis of Mitosis. *Cytologia* 30 (Supplement), 1–158.
- Wada, B., Izutsu, K., 1961. Effects of ultraviolet microbeam irradiation on mitosis studied in *Tradescantia* cells in vivo. *Cytologia* 16, 1–26.
- Wada, M., 1992. Control of site and timing of pre-prophase band development in *Adiantum* protonemata. In: Shibaoka, H. (Ed.), *Cellular Basis of Growth and Development in Plants. Proceedings of the VII International Symposium in Conjunction with the Awarding of the International Prize of Biology*. Osaka University, Osaka, pp. 137–144.
- Wada, M., 2005. Chloroplast photorelocation movement. In: Wada, M., Shimazaki, K., Iino, M. (Eds.), *Light Sensing in Plants*. Springer, Tokyo, pp. 193–199.
- Wada, M., Kadota, A., 1989. Photomorphogenesis in lower green plants. *Annu. Rev. Plant Physiol. Plant Mol. Biol.* 40, 169–191.
- Wada, M., Kadota, A., Furuya, M., 1981. Intracellular photoreceptive site for polarotropism in protonema of the fern *Adiantum capillus-venensis* L. *Plant Cell Physiol.* 22, 1481–1488.
- Wada, M., Kadota, A., Furuya, M., 1983. Intracellular localization and dichroic orientation of phytochrome is plasma membrane and/or ectoplasm of a centrifuged protonema of fern *Adiantum capillus-venensis*. *Plant Cell Physiol.* 24, 1441–1447.
- Wada, M., Kadota, A., Furuya, M., 1990. Changes in microtubule and microfibril arrangement during polarotropism in *Adiantum* protonemata. *Bot. Mag. Tokyo* 103, 391–401.
- Wada, M., Kagawa, T., Sato, Y., 2003. Chloroplast movement. *Annu. Rev. Plant Biol.* 54, 455–468.
- Wada, M., Staehelin, L.A., 1981. Freeze-fracture observations on the plasma membrane, the cell wall and the cuticle of growing protonemata of *Adiantum capillus-veneris* L. *Planta* 151, 462–468.
- Wada, Y., Anraku, Y., 1992. Genes for directing vacuolar morphogenesis in *Saccharomyces cerevisiae*. *J. Biol. Chem.* 267, 18671–18675.
- Wada, Y., Anraku, Y., 1994. Chemiosmotic coupling of ion transport in the yeast vacuole: Its role in acidification inside organelles. *J. Bioenerg. Biomembr.* 26, 631–637.
- Wada, Y., Kitamoto, K., Kanbe, T., Tanaka, K., Anraku, Y., 1990. The SLP1 gene of *Saccharomyces cerevisiae* is essential for vacuolar morphogenesis and function. *Mol. Cell. Biol.* 10, 2214–2223.
- Wada, Y., Ohsumi, Y., Anraku, Y., 1992. Genes for directing vacuolar morphogenesis in *Saccharomyces cerevisiae*. *J. Biol. Chem.* 267, 18665–18670.
- Waddington, C.H., 1942. The epigenotype. *Endeavour* 1, 18–20.
- Waddington, C.H., 1956. *Principles of Embryology*. Allen & Unwin, London.
- Waddington, C.H., 1969. Some European contributions to the pre-history of molecular biology. *Nature* 221, 318–321.
- Waddington, C.H., 1977. *Tools for Thought*. Basic Books, New York.
- Wadsworth, P., Salmon, E.D., 1986. Analysis of the treadmilling model during metaphase of mitosis using fluorescence redistribution after photobleaching. *J. Cell Biol.* 102, 1032–1038.
- Wagensteen, O.W., 1947. Research and the graduate student. *Am. Sci.* 35, 107–113.
- Wagner, G., 1983. Higher plant vacuoles and tonoplasts. In: Hall, J.L., Moore, A.L. (Eds.), *Isolation of Membranes and Organelles from Plant Cells*. Academic Press, London, pp. 83–118.
- Wagner, G.J., 1979. Content and vacuole/extra vacuole distribution of neutral sugars, free amino acids and anthocyanins in protoplasts. *Plant Physiol.* 64, 88–93.
- Wagner, G.J., Hrazdina, G., 1984. Endoplasmic reticulum as a site of phenylpropanoid and flavonoid metabolism in *Hippeastrum*. *Plant Physiol.* 74, 901–906.
- Wagner, G.J., Siegelman, H.W., 1975. Large-scale isolation of intact vacuoles and isolation of chloroplasts from protoplasts of mature plant tissues. *Science* 190, 1298–1299.
- Wagner, G., 1979. Actomyosin as a basic mechanism of movement in animals and plants. In: Haupt, W., Feinleib, M.E. (Eds.), *Encyclopedia of Plant Physiology. Physiology of Movements*, vol. 7. Springer, Berlin, pp. 114–126.
- Wagner, G., Bellini, E., 1976. Light-dependent fluxes and compartmentation of calcium in the green alga *Mougeotia*. *Z. Pflanzenphysiol.* 79, 283–291.

- Wagner, G., Haupt, W., Laux, A., 1972. Reversible inhibition of chloroplast movement by cytochalasin B in the green alga *Mougeotia*. *Science* 176, 808–809.
- Wagner, G., Klein, K., 1981. Mechanism of chloroplast movement in *Mougeotia*. *Protoplasma* 109, 169–185.
- Wagner, G., Valentin, P., Dieter, P., Marmé, D., 1984. Identification of calmodulin in the green alga *Mougeotia* and its possible function in chloroplast reorientational movement. *Planta* 162, 62–67.
- Wagner, V.T., Brian, L., Quatrano, R.S., 1992. Role of a vitronectin like molecule in embryo adhesion of the known alga *Fucus*. *Proc. Natl. Acad. Sci. USA* 89, 3644–3648.
- Waigmann, E., Turner, A., Peart, J., Roberts, K., Zambryski, P., 1997. Ultrastructural analysis of leaf trichomes plasmodesmata reveals major differences from mesophyll plasmodesmata. *Planta* 203, 75–84.
- Wait, L., Dundle, S., Wilkenson, F.E., Moreau, P., Safranski, K., Reust, T., Morré, D.J., 1990. Cell-free transfer of sterols from dictyosome-like structures to plasma membrane vesicles of guinea pig testes. *Protoplasma* 154, 8–15.
- Wald, G., 1955. The origin of Life. In: *The Physics and Chemistry of Life*, Scientific American (Eds.), Simon and Schuster, New York, pp. 3–26.
- Wald, G., 1963. The Origins of Life. In: *The Scientific Endeavor. Centennial Celebration of the National Academy of Sciences. The Rockefeller Institute Press*, New York, pp. 113–134.
- Wald, G., 1986. How the theory of solutions arose. *J. Chem. Educ.* 63, 658–659. (Also see *Science*, September 17, 1982.).
- Waldeyer, W., 1888. Ueber Karyokinese und ihre Beziehung zu den Befruchtungsvorgängen. *Arch. Mikr. Anat.* 32, 1–122.
- Waldschmidt-Leitz, E., 1932. Enzymes. *Ann. Rev. Biochem.* 1, 69–88.
- Walk, R.-A., Hoch, B., 1978. Cell-free synthesis of glyoxysomal malate dehydrogenase. *Biochem. Biophys. Res. Commun.* 81, 636–643.
- Walker, J.E., 1997. ATP synthesis by rotary catalysis. *Nobel Lect* December 8, 1997.
- Walker, C.E., 1905. *The Essentials of Cytology*. Archibald Constable & Co, London.
- Walker, C.E., 1910. *Hereditary Characters and their Modes of Transmission*. Edward Arnold, London.
- Walker, D., 1992. *Energy, Plants and Man*, second ed. Oxygraphics, Brighton, England.
- Walker, D.A., 1956. Malate synthesis in a cell free extract from a Crassulacean plant. *Nature* 178, 593–594.
- Walker, D.A., 1997. Tell me where all the past years are. *Photosynth. Res.* 51, 2–26.
- Walker, J.C.G., 1983. Possible limits on the composition of the Archaean ocean. *Nature* 302, 518–520.
- Walker, N.A., 1955. Microelectrode experiments on *Nitella*. *Aust. J. Biol. Sci.* 8, 476–489.
- Walker, N.A., 1960. The electric resistance of the cell membranes in *Chara* and *Nitella* species. *Aust. J. Biol. Sci.* 13, 468–478.
- Walker, R.I., 1938. The effect of colchicine on somatic cells of *Tradescantia paludosa*. *J. Arnold. Arbor.* 19, 158–162.
- Walker, R.P., Waterworth, W.M., Hooley, R., 1993. Preparation and polypeptide composition of plasma membrane and other subcellular fractions from wild oats (*Avena fatua*) aleurone. *Physiol. Plant* 89, 388–398.
- Walker, W.S., 1960. The effects of mechanical stimulation and etiolation on the collenchyma of *Datura stramonium*. *Amer. J. Bot.* 47, 717–724.
- Walko, R.M., Nothnagel, E.A., 1989. Lateral diffusion of proteins and lipids in the plasma membrane of rose protoplast. *Protoplasma* 152, 46–56.
- Wall, M.K., Mitchenall, L.A., Maxwell, A., 2004. *Arabidopsis thaliana* DNA gyrase is targeted to chloroplasts and mitochondria. *Proc. Natl. Acad. Sci. USA* 101, 7821–7826.
- Wallace, A.R., 1905. *Man's Place in the Universe*. McClure, Phillips & Co., New York.
- Wallace, R., 1844. *A Dissertation on the True Age of the World*. Elder and Co., Smith.
- Wallach, O., 1901. Briefwechsel zwischen J. Bezelius und F. Wöhler. W. Engelmann, Leipzig.
- Wallin, I., 1922. On the nature of mitochondria. *Amer. J. Anat.* 30, 203–339.
- Wallin, I.E., 1927. *Symbioticism and The Origin of Species*. Williams & Wilkins Co., Baltimore.
- Walmsley, A.M., Arntzen, C.J., 2003. Plant cell factories and mucosal vaccines. *Curr. Opin. Biotechnol.* 14, 145–150.
- Walsby, A.E., 1975. Gas vesicles. *Annu. Rev. Plant. Physiol.* 26, 427–439.
- Walsh, J., Krull, H.R., 1987. Heteromeric interactions among glycolytic enzymes and of glycolytic enzymes with F-actin: Effects of polyethylene glycol. *Biochim. Biophys. Acta* 952, 83–91.
- Walter, H., Stadelmann, E., 1968. The physiological prerequisites for the transition of autotrophic plants from water to terrestrial life. *Bioscience* 18, 694–701.
- Walter, P., 1997. Signal sequence recognition and protein targeting to the endoplasmic reticulum membrane. *Harvey Lect.* 91, 115–131.
- Walter, P., Lingappa, V.R., 1986. Mechanism of protein translocation across the endoplasmic reticulum membrane. *Ann. Rev. Cell. Biol.* 2, 499–516.
- Walters, M.S., 1958. Aberrant chromosome movement and spindle formation in meiosis of *Bromus* hybrids: An interpretation of spindle organization. *Amer. J. Bot.* 45, 271–289.
- Walton, P.A., Hill, P.E., Subramani, S., 1995. Import of stably folded proteins into peroxisomes. *Mol. Biol. Cell.* 6, 675–683.
- Wang, C.X., Wang, L., Thomas, C.R., 2004. Modelling the mechanical properties of single suspension-cultured tomato cells. *Ann. Bot.* 93, 443–453.
- Wang, J.J., Elliot, E., Williamson, R.E., 2008. Features of the primary wall CESA complex in wild type and cellulose-deficient mutants of *Arabidopsis thaliana*. *J. Exp. Bot.* 59, 2627–2637.
- Wang, J., Morris, A.J., Tolan, D.R., Pagliaro, L., 1996. The molecular nature of the F-actin binding activity of aldolase revealed with site-directed mutants. *J. Biol. Chem.* 271, 6861–6865.
- Wang, N., Nobel, P.S., 1998. Phloem transport of fructans in the crassulacean acid metabolism species *Agave deserti*. *Plant Physiol.* 116, 709–714.
- Warburg, O., 1920. Über die Geschwindigkeit der photochemischen Kohlensäurezersetzung in lebenden Zellen. *Biochem. Z.* 103, 188–217.
- Warburg, O. (Ed.), 1931. *The Metabolism of Tumours*. Richard R. Smith, New York.
- Warburg, O.H., 1931. The oxygen-transferring ferment of respiration. *Nobel Lect.* December 10.

- Warburg, O., 1964. Prefatory chapter. *Ann. Rev. Biochem.* 35, 1–14.
- Warburg, O., Christian, W., 1931. Über Aktivierung der Robison Hexose-mono-Phosphorsäure in roten Blutzellen und die Gewinnung aktivierender Fermentlösungen. *Biochem. Z.* 242, 206–227.
- Warburg, O., Christian, W., 1936. Pyridin, der wasserstoffübertragende Bestandteil von Gärungsfermenten. (Pyridin-Nucleotide). *Biochem. Z.* 287, 291–328.
- Ward, J. M., Mäser, P., Schroeder, J. I., 2009. Plant ion channels: Gene families, physiology, and functional genomics analyses. *Annual Review of Physiology* 71. Review in Advance first posted online on October 8, 2008.
- Ward, J.M., Reinders, A., Hsu, H.-T., Sze, H., 1992. Dissociation and reassembly of the vacuolar H^+ -ATPase complex from oat roots. *Plant Physiol* 99, 161–169.
- Ward, J.M., Sze, H., 1992a. Proton transport activity of the purified vacuolar H^+ -ATPase from oats. *Plant Physiol.* 99, 925–931.
- Ward, J.M., Sze, H., 1992b. Subunit composition and organization of the vacuolar proton ATPase from oat roots. *Plant Physiol.* 99, 170–179.
- Wardrop, A.B., 1983. Evidence for the possible presence of a micro-trabecular lattice in plant cells. *Protoplasma* 115, 81–87.
- Warner, F.D., Satir, P., Gibbons, I.R., 1989. *Cell Movement*. vol. 1 The Dynein ATPases. Alan R. Liss, Inc., New York.
- Warner, J.R., 1990. The nucleolus and ribosome formation. *Curr. Opin. Cell Biol.* 2, 521–527.
- Warren, C.R., 2008. Stand aside stomata, another actor deserves centre stage: the forgotten role of the internal conductance to CO_2 transfer. *J. Exp. Bot.* 59, 1475–1487.
- Wasik, A., Sikora, J., 1980. Effects of cytochalasin B and colchicine on cytoplasmic streaming in *Paramecium bursaria*. *Acta Protozool.* 19, 103–110.
- Wasteneys, G.O., Collings, D.A., 2006. The cytoskeleton and coordination of directional expansion in a multicellular context. *Plant Cell Monogr.* 5, 217–248.
- Wasteneys, G.O., Collings, D.A., Gunning, B.E.S., Hepler, P.K., Menzel, D., 1996. Actin in living and fixed characean internodal cells: Identification of a cortical array of fine actin strands and chloroplast actin rings. *Protoplasma* 190, 25–38.
- Wasteneys, G.O., Williamson, R.E., 1987. Microtubule orientation in developing internodal cells of *Nitella*: A qualitative analysis. *Eur. J. Cell Biol.* 43, 14–22.
- Wasteneys, G.O., Williamson, R.E., 1989. Reassembly of microtubules in *Nitella tasmanica*: Assembly of cortical microtubules in branching clusters and its relevance to steady-state microtubule assembly. *J. Cell Sci.* 93, 705–714.
- Waterhouse, P.M., Helliwell, C.A., 2002. Exploring plant genomes by RNA-induced gene silencing. *Nat. Rev. Genet.* 4, 29–38.
- Waters, J.C., Cole, R.W., Rieder, C.L., 1993. The force-producing mechanism for centrosome separation during spindle formation in vertebrates is intrinsic to each aster. *J. Cell Biol.* 122, 361–372.
- Watson, J.D., 1962. The involvement of RNA in the synthesis of proteins. Nobel Lect. December 11.
- Watson, J.D., 1963. Involvement of RNA in the synthesis of proteins. *Science* 140, 17–26.
- Watson, J.D., 1968. *The Double Helix*. Atheneum, New York.
- Watson, J.D., 1995. Values from a Chicago upbringing. *Ann. NY Acad. Sci.* 758, 194–197.
- Watson, J.D., Berry, A., 2003. *DNA. The Secret Life*. Knopf, New York.
- Watson, J.D., Crick, F.H.C., 1953a. A structure for deoxyribose nucleic acid. *Nature* 171, 737–738.
- Watson, J.D., Crick, F.H.C., 1953b. Genetical implications of the structure of deoxyribonucleic acid. *Nature* 171, 964–967.
- Watson, J.D., Crick, F.H.C., 1953c. The structure of DNA. *Cold Spring Harbor Symp. Quant. Biol.* 18, 123–131.
- Waugh, D.F., Schmitt, F.O., 1940. Investigations of the thickness and ultrastructure of cellular membranes by the analytical leptoscope. *Cold Spring Harbor Symposium Quant. Biol.* 8, 233–241.
- Wayne, R., 1994. The excitability of plant cells: With a special emphasis on characean internodal cells. *Bot. Rev.* 60, 265–367.
- Wayne, R., 2009. *Light and Video Microscopy*. Elsevier, Amsterdam.
- Wayne, R., Hepler, P.K., 1984. The role of calcium ions in phytochrome mediated germination of spores of *Onoclea sensibilis* L. *Planta* 160, 2–20.
- Wayne, R., Hepler, P.K., 1985a. Red light stimulates an increase in intracellular calcium in the spores of *Onoclea sensibilis*. *Plant Physiol* 77, 8–11.
- Wayne, R., Hepler, P.K., 1985b. The atomic composition of *Onoclea sensibilis* spores. *Amer. Fern J.* 75, 12–18.
- Wayne, R., Kadota, A., Watanabe, M., Furuya, M., 1991. Photomovement in *Dunaliella salina*: Fluence rate-response curves and action spectra. *Planta* 184, 515–524.
- Wayne, R., Mimura, T., Shimmen, T., 1994. The relationship between carbon and water transport in single cells of *Chara corallina*. *Protoplasma* 180, 118–135.
- Wayne, R., Staves, M., 1991. The density of the cell sap and endoplasm of *Nitellopsis* and *Chara*. *Plant Cell Physiol.* 32, 1137–1144.
- Wayne, R., Staves, M.P., 1996a. Newton's law of gravitation from the apple's perspective; or a down to Earth model of gravisensing. *Physiol. Plant.* 98, 917–921.
- Wayne, R., Staves, M.P., 1996b. The August Krogh principle applies to plants. *BioScience* 46, 365–369.
- Wayne, R., Staves, M.P., 1997. A down-to-Earth- model of gravisensing. *Amer. Soc. Grav. Space Biol. Bull.* 10 (2), 57–64.
- Wayne, R., Staves, M.P., 1998. Connecting undergraduate plant cell biology students with the scientists about whom they learn: A bibliography. *Amer. Biology Teacher* 60, 510–517.
- Wayne, R., Staves, M.P., 2008. Model Scientists. *Commun. Integr. Biol.* 1, 1–7.
- Wayne, R., Staves, M.P., Leopold, A.C., 1990. Gravity-dependent polarity of cytoplasmic streaming in *Nitellopsis*. *Protoplasma* 155, 43–57.
- Wayne, R., Staves, M.P., Leopold, A.C., 1992. The contribution of the extracellular matrix to gravisensing in characean cells. *J. Cel Sci.* 101, 611–623.
- Wayne, R., Tazawa, M., 1988. The actin cytoskeleton and polar water permeability in characean cells. *Protoplasma (Suppl. 2)*, 116–130.
- Wayne, R., Tazawa, M., 1990. Nature of the water channels in the internodal cells of *Nitellopsis*. *J. Membrane Biol.* 116, 31–39.
- Weaver, W., 1970. Molecular biology: Origin of the term. *Science* 170, 581–582.

- Weber, A., 1976. Synopsis of the presentations. Symp. Soc. Exp. Biol. 30, 445–456.
- Weber, H.H., 1955. Adenosine triphosphate and motility of living systems. Harvey Lect. 49, 37–56.
- Weber, H.H., 1958. The Motility of Muscle and Cells. Harvard University Press, Cambridge, MA.
- Webster, P.L., 1979. Variation in sister-cell cycle durations and loss of synchrony in cell lineages in root apical meristems. Plant Sci. Lett. 14, 13–22.
- Weeden, N.F., 1981. Genetic and biochemical implications of the endosymbiotic origin of the chloroplast. J. Mol. Evol. 17, 133–139.
- Weeds, A., Maciver, S., 1993. F-actin capping proteins. Curr. Opin. Cell Biol. 5, 63–69.
- Wegener, A., 1966. The Origin of Continents and Oceans. Translated from the 4th revised German edition by B. Biram. Dover Publications, New York.
- Wei, C., Lintilhac, L.S., Lintilhac, P.M., 2006. Loss of stability, pH, and the anisotropic extensibility of *Chara* cell walls. Planta 223, 1058–1067.
- Wei, C., Lintilhac, P.M., 2003. Loss of stability—a new model for stress relaxation in plant cell walls. J. Theor. Biol. 224, 305–312.
- Wei, C., Lintilhac, P.M., 2007. Loss of stability: A new look at the physics of cell wall behavior during plant growth. Plant Physiol. 145, 763–772.
- Wei, C., Lintilhac, P.M., Tanguay, J.J., 2001. An insight into cell elasticity and load-bearing ability. Measurement and theory. Plant Physiol. 126, 1129–1138.
- Weih, D., Mason, T.G., Teitell, M.A., 2006. Bio-microrheology: A frontier in microrheology. Biophys. J. 91, 4296–4305.
- Weier, T.E., 1938a. The structure of the chloroplast. Bot. Rev. 4, 497–530.
- Weier, T.E., 1938b. The viability of cells containing granular and optically homogeneous chloroplasts. Protoplasma 31, 346–350.
- Weier, T.E., 1961. The ultramicro structure of starch-free chloroplasts of fully expanded leaves of *Nicotiana rustica*. Amer. J. Bot. 48, 615–630.
- Weier, T.E., Thomson, W.W., 1962. Membranes of mesophyll cells of *Nicotiana rustica* and *Phaseolus vulgaris* with particular reference to the chloroplast. Amer. J. Bot. 49, 807–820.
- Weinberg, S., 1977. The First Three Minutes. Basic Books, New York.
- Weinsberg, S., 1979. Is nature simple? In: Huff, D., Prewett, O. (Eds.), The Nature of the Physical Universe, 1976 Nobel Conference. John Wiley & Sons, New York, pp. 47–62.
- Weiner, H., Burnell, J.N., Woodrow, I.E., Heldt, H.W., Hatch, M.D., 1988. Metabolite diffusion into bundle sheath cells from C_4 plants. Relation to C_4 photosynthesis and plasmodesmatal function. Plant Physiol. 88, 815–822.
- Weisäcker, C.F. von, 1949. The History of Nature. University of Chicago Press, Chicago.
- Weise, S.E., Kiss, J.Z., 1999. Gravitropism of inflorescence stems in starch-deficient mutants of Arabidopsis. Int. J. Plant Sci. 160, 521–527.
- Weisenberg, R.C., 1972. Microtubule formation in vitro in solutions containing low calcium concentrations. Science 177, 1104–1105.
- Weisenberg, R.C., Borisy, G.G., Taylor, E.W., 1968. The colchicine-binding protein of mammalian brain and its relation to microtubules. Biochemistry 7, 4466–4478.
- Weismann, A., 1891. Essays upon Heredity and Kindred Biological Problems. vol. 1., second ed. Clarendon Press, Oxford.
- Weismann, A., 1892. Essays upon Heredity and Kindred Biological Problems. Clarendon Press, Oxford.
- Weismann, A., 1893. The Germ-Plasm. A Theory of Heredity. Charles Scribner's Sons, New York.
- Weiss, A., 1981. Replication and evolution of inorganic systems. Angew. Chem. Internat. Ed. 20, 850–860.
- Weiss, P., 1940. The problem of cell individuality in development. American Nat. 74, 34–46.
- Weiss, T.F., 1996. Cellular Biophysics. vol. 1. Transport. MIT Press, Cambridge, MA.
- Weiss, T.F., 1997. Cellular Biophysics. vol. 2. Electrical Properties. MIT Press, Cambridge, MA.
- Weissbach, A., Horecker, B.L., Hurwitz, J., 1956. The enzymatic formation of phosphoglyceric acid from ribulose diphosphate and carbon dioxide. J. Biol. Chem. 218, 795–810.
- Welch, G.R., Easterby, J.S., 1994. Metabolic channeling versus free diffusion: Transition-time analysis. TIBS 19, 193–197.
- Welch, R.M., Epstein, E., 1968. The dual mechanism of alkali cation absorption by plant cells: Their parallel operation across the plasmalemma. Proc. Natl. Acad. Sci. USA 61, 447–453.
- Wellburn, A.R., 1982. Bioenergetic and ultrastructural changes associated with chloroplast development. Int. Rev. Cytol. 80, 133–191.
- Wellburn, A.R., 1987. Plastids. Int. Rev. Cytol. Suppl. 17, 149–210.
- Wellensiek, S.J., 1939. The newest fad, colchicine, and its origin. Chronica Bot 5, 15–17.
- Wells, H.G., Huxley, J., Wells, G.P., 1934. The Science of Life. Cassell, London.
- Welti, R., Shah, J., Li, W., Li, M., Chen, J., Burke, J.J., Fauconnier, M.L., Chapman, K., Chye, M.L., Wang, X., 2007. Plant lipidomics: Discerning biological function by profiling plant complex lipids using mass spectrometry. Front. Biosci. 12, 2494–2506.
- Welti, R., Wang, X., 2004. Lipid species profiling: A high-throughput approach to identify lipid compositional changes and determine the function of genes involved in lipid metabolism and signaling. Curr. Opin. Plant Biol. 7, 337–344.
- Wernicke, W., Gunther, P., Jung, G., 1993. Microtubules and cell shaping in the mesophyll of *Nigella damascena* L. Protoplasma 173, 8–12.
- Whaley, W.G., Kephart, J.E., Mollenhauer, H.H., 1959. Developmental changes in the golgi-apparatus of maize root cells. Amer. J. Bot. 46, 743–751.
- Whaley, W.G., Mollenhauer, H.H., 1963. The Golgi apparatus and cell plate formation—A postulate. J. Cell Biol. 17, 216–221.
- Whaley, W.G., Mollenhauer, H.H., Leech, J.H., 1960. The ultrastructure of the meristematic cell. Amer. J. Bot. 47, 319–399.
- Whatley, J.M., 1977a. The fine structure of *Prochloron*. New Phytol. 79, 309–313.
- Whatley, J.M., 1977b. Variation in the basic pathway of chloroplast development. New Phytol. 78, 407–420.
- Whatley, J.M., 1978. A suggested cycle of plastid developmental interrelationships. New Phytol. 80, 489–502.

- Wheeler, J.J., Boss, W.F., 1987. Polyphosphoinositides are present in plasma membranes isolated from fusogenic carrot cells. *Plant Physiol* 85, 389–392.
- White, A.D., 1877. *The Warfare of Science*. Henry S. King & Co., London.
- White, A.D., 1913. *A History of the Warfare of Science with Technology in Christendom*. D. Appleton and Co., New York.
- White, J.A., Scandalios, J.G., 1988. Molecular biology of intracellular protein trafficking. *Physiol. Plant.* 74, 397–408.
- White, J.G., Borisy, G.G., 1983. On the mechanism of cytokinesis in animal cells. *J. Theo. Biol.* 101, 289–316.
- White, R.G., Hyde, G., Overall, R.L., 1990. Microtubule arrays in regenerating *Mougeotia* protoplasts may be oriented by electric fields. *Protoplasma* 158, 73–85.
- White, R.G., Badelt, K., Overall, R.L., Vesik, M., 1994. Actin associated with plasmodesmata. *Protoplasma* 180, 169–184.
- Whitehead, A.N., 1925. *Science and the Modern World*. MacMillan, New York.
- Whitfield, P.R., Bottomley, W., 1983. Organization and structure of chloroplast genes. *Ann. Rev. Plant Physiol.* 34, 279–310.
- Whitman, C. O., 1890. Specialization and organization, companion principles of all progress. The most important need in American Biology. In: *Biological Lectures Delivered at the Marine Biological Laboratory at Woods Hole in the Summer Session of 1890*, pp. 1–26. Ginn, Boston.
- Whitman, C. O., 1894. The inadequacy of the cell-theory of development. In: *Biological Lectures Delivered at The Marine Biological Laboratory of Wood's Hole in the Summer Session of 1893*. Ginn & Co., Boston.
- Whitney, H.M., Kolle, M., Andrew, P., Chittka, L., Steiner, U., Glover, B.J., 2009. Floral iridescence, produced by diffractive optics, acts as a cue for animal pollinators. *Science* 323, 130–133.
- Whitney, S.E.C., Gidley, M.J., McQueen-Mason, S.J., 2000. Probing expansin action using cellulose/hemicellulose composites. *Plant J.* 22, 327–334.
- Whittaker, R.H., 1969. New concepts of kingdoms of organisms. *Science* 163, 150–160.
- Whittingham, C.P., 1974. *The Mechanism of Photosynthesis*. Elsevier, New York.
- Wichterman, R., 1986. *The Biology of Paramecium*, second ed. Plenum Press, New York.
- Wick, S.M., Cho, S.O., 1988. Higher plant spindle poles contain a protein that reacts with antibodies to the calcium-binding protein centrin. *J. Cell Biol.* 107, 455a. (abstr).
- Wick, S.M., Hepler, P.K., 1980. Localization of Ca^{++} -containing antimonide precipitates during mitosis. *J. Cell Biol.* 86, 500–513.
- Wick, S.M., Hepler, P.K., 1982. Selective localization of intracellular Ca^{2+} with potassium antimonide. *J. Histochem. Cytochem.* 30, 1190–1204.
- Wick, S.M., Seagull, R.W., Osborn, M., Weber, K., Gunning, B. E.S., 1981. Immunofluorescence microscopy of organized microtubule arrays in structurally stabilized meristematic plant cells. *J. Cell Biol.* 89, 685–690.
- Wickramasinghe, N.S., Lacey, Jr., J.C., 1994. Catalytic roles of the AMP at the 3' end of tRNAs. *Mol. Cell. Biochem.* 139, 117–121.
- Wickramasinghe, N.S., Staves, M.P., Lacey, Jr., J.C., 1991. Stereoselective, nonenzymatic, intramolecular transfer of amino acids. *Biochemistry* 30, 2768–2772.
- Wiebe, H.H., 1978. The significance of plant vacuoles. *Bioscience* 28, 327–331.
- Wiedenhoef, B., Schmidt, G.W., Palevitz, B.A., 1988. Dissociation and reassembly of soybean clathrin. *Plant Physiol.* 86, 412–416.
- Wieland, H., 1932. *On the Mechanism of Oxidation*. Yale University Press, New Haven, CT.
- Wienecke, K., Glas, R., Robinson, D.G., 1982. Organelles involved in the synthesis and transport of hydroxyproline-containing glycoproteins in carrot root disks. *Planta* 155, 58–63.
- Wildman, S.G., 1979. Aspects of fraction 1 protein evolution. *Arch. Bioch. Biophys.* 196, 598–610.
- Wildman, S.G., 2002. Along the trail from fraction 1 protein to Rubisco (ribulose biphosphate carboxylase-oxygenase). *Photosynth. Res.* 73, 243–250.
- Wildman, S.G., Bonner, J., 1947. The proteins of green leaves. I. Isolation, enzymatic properties and auxin content of spinach cytoplasmic proteins. *Arch. Biochem. Biophys.* 14, 381–413.
- Wildman, S.G., Hongladarom, R., Honda, S.I., 1962. Chloroplasts and mitochondria in living plant cells: Cine photomicrographic studies. *Science* 138, 434–436.
- Wildman, S.G., Jope, C., Atchison, B.A., 1974. Role of mitochondria in the origin of chloroplast starch grains. *Plant Physiol.* 54, 231–237.
- Wildman, S.G., Jope, C.A., Atchison, B.A., 1980. Light microscopic analysis of the three dimensional structure of higher plant chloroplasts. Position of starch grains and probably spiral arrangement of stroma lamellae and grana. *Bot. Gaz.* 141, 24–36.
- Wildman, S.G., Hirsch, A.M., Kirchanski, S.J., Spencer, D., 2004. Chloroplasts in living cells and the string-of-grana-concept of chloroplast structure revisited. *Photosynth. Res.* 80, 345–352.
- Wilkins, M.H.F., 1962. The molecular configuration of nucleic acids. Nobel Lect. December 11, 1962.
- Wilkins, M.H.F., Stokes, A.R., Wilson, H.R., 1953. Molecular structure of deoxypentose nucleic acids. *Nature* 171, 738–740.
- Wille, A.C., Lucas, W.J., 1984. Ultrastructural and histochemical studies on guard cells. *Planta* 160, 129–142.
- Willey, D.L., Fischer, K., Wachter, E., Link, T.A., Flügge, U.I., 1991. Molecular cloning and structural analysis of the phosphate translocator from pea chloroplasts and its comparison to the spinach phosphate translocator. *Planta* 183, 451–461.
- Williams, B.A.P., Hirt, R.P., Lucocq, J.M., Embley, T.M., 2002. A mitochondrial remnant in the microsporidian *Trachipleistophora hominis*. *Nature* 418, 865–869.
- Williams, L.E., Schueler, S.B., Briskin, D.P., 1990. Further characterization of the red beet plasma membrane Ca^{2+} -ATPase using GTP as an alternative substrate. *Plant Physiol.* 92, 747–754.
- Williams, R.J.P., 1961. Possible functions of chains of catalysts. *J. Theoret. Biol.* 1, 1–17.
- Williams, R.J.P., 1974. Calcium ions: Their ligands and their function. *Biochem. Soc. Symp.* 39, 133–138.
- Williams, R.J.P., 1976. Calcium chemistry and its relation to biological function. *Symp. Soc. Exp. Biol.* 30, 1–17.
- Williams, R.J.P., 1980. A general introduction to the special properties of the calcium ion and their deployment in biology. In: F. Carafoli, E. Kretsinger, R.H., MacLennan, D.H., Wasserman, R.H. (Eds.), *Calcium-Binding Proteins. Structure and Function*. Siegel Elsevier North Holland, Amsterdam, pp. 3–10.

- Williams, R.J.P., 1993. The history of proton-driven ATP formation. *Bioscience Reports* 13, 191–212.
- Williams, R.J.P., 1993a. Science and the Good Life. The J. D. Bernal Lecture 1993 delivered at Birkbeck College. London, May 26, 1993.
- Williams, R.J.P., Fraúto da Silva, J.J.R., 1996. The natural Selection of the Chemical Elements, The Environment and Life's Chemistry. Clarendon Press, Oxford.
- Williamson, R.E., 1975. Cytoplasmic streaming in *Chara*: A cell model activated by ATP and inhibited by cytochalasin B. *J. Cell Sci.* 17, 655–668.
- Williamson, R.E., 1990. Alignment of cortical microtubules by anisotropic wall stresses. *Aust. J. Plant Physiol.* 17, 601–613.
- Williamson, R.E., 1991. Orientation of cortical microtubules in interphase plant cells. *Int. Rev. Cytol.* 129, 135–206.
- Williamson, R.E., Ashley, C.C., 1982. Free Ca^{2+} and cytoplasmic streaming in alga *Chara*. *Nature* 296, 647–651.
- Williamson, R.E., McCurdy, D.W., Hurley, U.A., Perkin, J.L., 1987. Actin of *Chara* giant internodal cells. *Plant Physiol* 85, 268–272.
- Williamson, R.E., Perkin, J.L., McCurdy, D.W., Craig, S., Hurley, U.A., 1986. Production and use of monoclonal antibodies to study the cytoskeleton and other components of the cortical cytoplasm of *Chara*. *Eur. J. Cell Biol.* 41, 1–8.
- Willison, J.H.M., Brown, Jr., R.M., 1978. Cell wall structure and deposition in *Glaucocystis nostochinearum*. *J. Cell Biol.* 77, 103–119.
- Willstätter, R., 1920. On plant pigments. Nobel Prize, 1915. Nobel Lect. June 3, 1920.
- Willstätter, R., 1927. Problems and Methods in Enzyme Research. Cornell University, Ithaca.
- Willstätter, R., 1965. From My Life. The Memoirs of Richard Willstätter. Translated by Lilli S. Hornig. W. A. Benjamin, Inc., New York.
- Willstätter, R., Stoll, A., 1928. Investigations on Chlorophyll. Methods and Results. Translated by F. M. Schertz and A. R. Merz. The Science Press, Lancaster, PA.
- Wilson, D.E., Lewis, M.J., Pelham, H.R., 1993. pH-dependent binding of KDEL to its receptor in vitro. *J. Biol. Chem.* 268, 7465–7468.
- Wilson Jr., E.B., 1952. An Introduction of Scientific Research. McGraw-Hill, New York.
- Wilson, E.B., 1895. An Atlas of the Fertilization and Karyokinesis of the Ovum. MacMillan, New York.
- Wilson, E.B., (1896). 1966. The Cell in Development and Inheritance. Johnson Reprint Corp, New York.
- Wilson, E.B., 1923. The Physical Basis of Life. Yale University Press, New Haven, CT.
- Wilson, E.B., 1925. The Cell in Development and Heredity, third Edition. MacMillan, New York.
- Wilson, E.B., Pollister, A.W., 1937. Observations on sperm formation in the centurid scorpions with especial reference to the Golgi material. *J. Morphol.* 60, 407–443.
- Wilson, E.O., 1998. Consilience: The Unity of Knowledge. Knopf, New York.
- Wilson, R.J., Denny, P.W., Preiser, P.R., Rangachari, K., Roberts, K., Roy, A., Whyte, A., Strath, M., Moore, D.J., Moore, P.W., Williamson, D.H., 1996. Complete gene map of the plastid-like DNA of the malaria parasite *Plasmodium falciparum*. *J. Mol. Biol.* 261, 155–172.
- Wilson, S.B., 1980. Energy conservation by the plant mitochondrial cyanide-insensitive oxidase. *Biochem. J.* 190, 349–360.
- Wilson, T.P., Canny, M.J., McCully, M.E., Lefkovitch, L.P., 1990. Breakdown of cytoplasmic vacuoles. A model of endoplasmic membrane rearrangement. *Protoplasma* 155, 144–152.
- Wimmers, L. E., Ewing, N. N. Meger, D. J., Bennett, A. B., 1990. Molecular biology of plant *P-type* ion-translocating ATPases. In: Leonard, R. T., Hepler, P. K. (Eds.), Calcium in Plant Growth and Development. The American Society of Plant Physiologists Symposium Series, vol. 4, pp. 36–45.
- Winkel, B.S.J., 2004. Metabolic channeling in plants. *Annu. Rev. Plant Biol.* 55, 85–107.
- Winkel-Shirley, B., 2002. Biosynthesis of flavonoids and effects of stress. *Curr. Opin. Plant Biol.* 5, 218–223.
- Winter, H., Robinson, D.G., Heldt, H.W., 1994. Subcellular volumes and metabolite concentrations in spinach leaves. *Planta* 193, 530–535.
- Winter, K., Smith, J.A.C. (Eds.), 1996. Crassulacean Acid Metabolism: Biochemistry, Ecophysiology and Evolution. Springer, Berlin.
- Wirth, H.E., Rigg, G.B., 1937. The acidity of the juice of *Desmarestia*. *Amer. J. Bot.* 24, 68–70.
- Wise, D., 1988. The diversity of mitosis: The value of evolutionary experiments. *Biochem. Cell Biol.* 66, 515–529.
- Wise, D.A., Bhattacharjee, L., 1992. Anti kinetochore antibodies interfere with prometaphase but not anaphase chromosome movement in living PtK₂ cells. *Cell Motil. Cytoskeleton* 23, 157–167.
- Wise, D., Cassimeris, L., Rieder, C.L., Wadsworth, P., Salmon, E.D., 1986. Incorporation of tubulin into kinetochore microtubules—relation to chromosome congression. *J Cell Biol.* 103, 412.
- Witztum, A., 1978. Transcellular chloroplast banding patterns in leaves of *Elodea densa* induced by light and DCMU. *Ann. Bot.* 42, 1459–1462.
- Wodzicki, T.J., Brown, C.L., 1973. Organization and breakdown of the protoplast during maturation of pine tracheids. *Amer. J. Bot.* 60, 631–640.
- Woese, C.R., 1967. The Genetic Code. The Molecular Basis for Genetic Expression. Harper & Row, New York.
- Woese, C.R., 1977. Endosymbionts and mitochondrial origins. *J. Mol. Evol.* 10, 93–96.
- Woese, C.R., 1998. The universal ancestor. *Proc. Natl. Acad. Sci. USA* 95, 6854–6859.
- Woese, C.R., Fox, G.E., 1977. The concept of cellular evolution. *J. Mol. Evol.* 10, 1–6.
- Wohlfarth-Bottermann, K.E., 1962. Weitreichende, fibrilläre Protoplasmadifferenzierungen und ihre Bedeutung für die Protoplasmastromung. *Protoplasma* 54, 514–539.
- Wolf, S., Deom, C.M., Beachy, R.N., Lucas, W.J., 1989. Movement protein of tobacco mosaic virus modifies plasmodesmatal size exclusion limit. *Science* 246, 377–379.
- Wolf, S., Deom, C.M., Beachy, R., Lucas, W.J., 1991. Plasmodesmatal function is probed using transgenic tobacco plants that express a virus movement protein. *The Plant Cell* 3, 593–604.
- Wolf, S., Lucas, W.J., 1994. Virus movement proteins and other molecular probes of plasmodesmata function. *Plant Cell Environ.* 17, 573–585.
- Wolfe, J., Dowgert, M.F., Steponkus, P.L., 1986. Mechanical study of the deformation and rupture of the plasma membranes of protoplasts during osmotic expansions. *J. Membrane Biol.* 93, 63–74.

- Wolins, N.E., Donaldson, R.P., 1994. Specific binding of the peroxisomal protein targeting sequence of glyoxysomal membranes. *J. Biol. Chem.* 269, 1149–1153.
- Wollaston, W.H., 1808. On Super-acid and Sub-acid Salts. *Phil. Trans. Roy. Soc.* 98, 96–102.
- Wolniak, S.M., 1987. Lithium alters mitotic progression in stamen hair cells of *Tradescantia* in a time-dependent and reversible fashion. *Eur. J. Cell Biol.* 44, 286–293.
- Wolniak, S.M., Cande, W.Z., 1980. Physiological requirements for ciliary reactivation of bracken fern spermatozooids. *J. Cell Sci.* 43, 195–207.
- Wolniak, S.M., Hepler, P.K., Jackson, W.T., 1980. Detection of the membrane-calcium distribution during mitosis in *Haemanthus* endosperm with chlortetracycline. *J. Cell Biol.* 87, 23–32.
- Wolniak, S.M., Hepler, P.K., Jackson, W.T., 1981. The coincident distribution of calcium-rich membranes and kinetochore fibers at metaphase in living endosperm cells of *Haemanthus*. *Eur. J. Cell Biol.* 25, 171–174.
- Wolosewick, J.J., Porter, K.R., 1979. Microtrabecular lattice of the cytoplasmic ground substance; artifact or reality. *J. Cell Biol.* 82, 114–139.
- Wolters-Arts, A.M.C., van Amstel, T., Derksen, J., 1993. Tracing cellulose microfibril orientation in inner primary cell walls. *Protoplasma* 175, 102–111.
- Won, H., Renner, S.S., 2003. Horizontal gene transfer from flowering plants to Gnetum. *Proc. Natl. Acad. Sci. USA* 100, 10824–10829.
- Wood, H.G., 1982. The discovery of the fixation of CO₂ by heterotrophic organisms and metabolism of the propionic acid bacteria. In: Semenza, G. (Ed.), *Of Oxygen, Fuels, and Living Matter*, Part 2. John Wiley & Sons, Chichester, pp. 173–250.
- Woodcock, C.L.F., 1973. Ultrastructure of inactive chromatin. *J. Cell Biology* 59, 368a.
- Woodcock, C.L.F., Frado, L.-L.Y., Rattner, J.B., 1984. The higher order structure of chromatin: Evidence for a helical ribbon arrangement. *J. Cell Biol.* 99, 42–52.
- Woodcock, C.L.F., McEweon, B.F., Frank, J., 1991a. Ultrastructure of Chromatin. II. Three-dimensional reconstruction of isolated fibers. *J. Cell Sci.* 99, 107–114.
- Woodcock, C.L.F., Miller, G.J., 1973. Ultrastructural features of the life cycle of *Acetabularia mediterranea*. I. Gametogenesis. *Protoplasma* 77, 313–329.
- Woodcock, C.L.F., Safer, J.P., Stanchfield, J.E., 1976. Structural repeating units in chromatin. I. Evidence for their general occurrence. *Exp. Cell Res.* 97, 101–110.
- Woodcock, C.L.F., Woodcock, H., Horowitz, R.A., 1991b. Ultrastructure of chromatin. I. Negative staining of isolated fibers. *J. Cell Sci.* 99, 99–106.
- Woodhouse, E.D., 1933. Sap hydraulics. *Plant Physiol.* 8, 177–202.
- Woodrow, I.E., Berry, J.A., 1988. Enzymatic regulation of photosynthetic CO₂ fixation in C₃ plants. *Ann. Rev. Plant Physiol. Mol. Biol.* 39, 533–594.
- Woodruff, L.L., 1939. Microscopy before the nineteenth century. *American Nat.* 73, 485–516.
- Woodward, A.W., Bartel, B., 2005. The *Arabidopsis* peroxisomal targeting signal type 2 receptor PEX7 is necessary for peroxisomal function and dependent on PEX5. *Mol. Biol. Cell.* 16, 573–583.
- Woodward, R.B., 1965. Recent Advances in the Chemistry of Natural Products. Nobel Lect. December 11, 1965.
- Woodward, R.B., Ayer, W.A., Beaton, J.M., Bickelhaupt, F., Bonnett, R., Buchschacher, P., Closs, G.L., Dutler, H., Hanna, J., Hauck, F.P., Itó, S., Langemann, A., Le Goff, E., Leimgruber, W., Lwowski, W., Sauer, J., Valenta, Z., Volz, H., 1960. The total synthesis of chlorophyll. *J. Amer. Chem. Soc.* 82, 3800–3802.
- Wordeman, L., Cande, W.Z., 1987. Reactivation of spindle elongation *in vitro* is correlated with the phosphorylation of a 205 kD spindle-associated protein. *Cell* 50, 535–543.
- Wordeman, L., Mitchison, T.J., 1995. Identification and partial characterization of mitotic centromere-associated kinesin, a kinesin-related protein that associates with centromeres during mitosis. *J. Cell Biol.* 128, 95–105.
- Worley, L.G., 1946. The Golgi apparatus—An interpretation of its structure and significance. *Ann. N. Y. Acad. Sci.* 47, 1–56.
- Worman, H.J., Juan, J., Blobel, G., Georgatos, S.D., 1988. A lamin B receptor in the nuclear envelope. *Proc. Natl. Acad. Sci. USA* 85, 8531–8534.
- Wright, A.J., Smith, L.G., 2007. Division plane orientation in plant cells. *Plant Cell Monogr.* 9, 33–57.
- Wright, B.L., Salisbury, J., Jarvik, J.W., 1985. A nucleus-basal body connector in *Chlamydomonas reinhardtii* that may function in basal body localization or segregation. *J. Cell Biol.* 101, 1903–1912.
- Wright, J.P., Fisher, D.B., 1981. Measurement of the sieve tube membrane potential. *Plant Physiol.* 67, 845–848.
- Wright, S., 1941. The physiology of the gene. *Physiol. Rev.* 21, 487–527.
- Wright, S., 1945. Physiological aspects of genetics. *Ann. Rev. Physiol.* 7, 75–106.
- Wright, S.F., Upadhyaya, A., 1996. Extraction of an abundant and unusual protein from soil and comparison with hyphal protein of arbuscular mycorrhizal fungi. *Soil Science.* 161, 575–586.
- Wright, S.F., Upadhyaya, A., 1998. A survey of soils for aggregate stability and glomalin, a glycoprotein produced by hyphae of arbuscular mycorrhizal fungi. *Plant and Soil* 198, 97–107.
- Wright, S.F., Upadhyaya, A., 1999. Quantification of arbuscular mycorrhizal fungi activity by the glomalin concentration on hyphal traps. *Mycorrhiza* 8, 283–285.
- Wrischer, M., 1989. Ultrastructural localization of photosynthetic activity in thylakoids during chloroplast development in maize. *Planta* 177, 18–23.
- Wu, L., Joshi, C.P., Chiang, V.L., 2001. A xylem-specific cellulose synthase gene from aspen (*Populus tremoides*) is responsive to mechanical stress. *Plant J.* 22, 495–502.
- Wu, S.S.H., Platt, K.A., Ratnayake, C., Wang, T.-W., Ting, J. T.L., Huang, A.H.C., 1997. Isolation and characterization of neutral-lipid-containing organelles and globuli-filled plastids from *Brassica napus* tapetum. *Proc. Natl. Acad. Sci. USA* 94, 12711–12716.
- Wu, X., Weigel, D., Wigge, P.A., 2002. Signaling in plants by intercellular RNA and protein movement. *Genes Dev.* 16, 151–158.
- Wu, Y., Hiratsuka, K., Neuhaus, G., Chua, N.H., 1996. Calcium and cGMP target distinct phytochrome-responsive elements. *Plant J.* 10, 1149–1154.
- Wurtele, M., Jelich-Ottman, C., Wittinghofer, A., Oecking, C., 2003. Structural view of a fungal toxin acting on a 14-3-3 regulatory complex. *EMBO J.* 22, 987–994.

- Wuttke, H.G., 1976. Chromoplasts in *Rosa rugosa*: Development and chemical characterization of tubular elements. *Z. Naturforsch. Teil C* 31, 456–460.
- Wyatt, H.V., 1972. When does information become knowledge? *Nature* 256, 86–89.
- Wythe, J.H., 1880. *The Science of Life; or, Animal and Vegetable Biology*. Phillips & Hunt, New York.
- X-**
- Xicluna, J., Lacombe, B., Dreyer, I., Alcon, C., Jeanguenin, L., Sentenac, H., Thibaud, J.-B., Chérel, I., 2007. Increased functional diversity of plant K^+ channels by preferential heteromerization of the Shaker-like subunits AKT2 and KAT2. *J. Biol. Chem.* 282, 486–494.
- Xing, T., Higgins, V.J., Blumwald, E., 1997. Identification of G-proteins mediating fungal elicitor-induced dephosphorylation of host plasma membrane H^+ -ATPase. *J. Exp. Bot.* 48, 229–237.
- Xing, Y., Lawrence, J.B., 1991. Preservation of specific RNA distribution within the chromatin-depleted nuclear substructure demonstrated by in situ hybridization coupled with biochemical fractionation. *J. Cell Biol.* 112, 1055–1063.
- Xoconostle-Cázares, B., Xiang, Y., Ruiz-Medrano, R., Wang, H.-L., Monzer, J., Yoo, B.C., McFarland, K.C., Franceschi, V.R., Lucas, W.J., 1999. Plant paralog to viral movement protein that potentiates transport of mRNA into the phloem. *Science* 283, 94–98.
- Xoconostle-Cázares, B., Ruiz-Medrano, R., Lucas, W.J., 2000. Proteolytic processing of CmPP36, a protein from the cytochrome b(5)-reductase family, is required for entry into the phloem translocation pathway. *Plant J.* 24, 735–747.
- Xu, C., Fan, J., Riekhof, W., Froehlich, J.E., Benning, C., 2003. A permease-like protein involved in ER to thylakoid lipid transfer in *Arabidopsis*. *EMBO J.* 22, 2370–2379.
- Y-**
- Yaffe, M.P., Kennedy, E.P., 1983. Intracellular phospholipid movement and the role of intracellular phospholipid transfer proteins in animal cells. *Biochemistry* 22, 1497–1507.
- Yahalom, A., R. Warmbrodt, D., Laird, D.W., Traub, O., Revel, J.-P., Willecke, K., Epel, B.L., 1991. Maize mesocotyl plasmodesmata proteins cross-react with connexin gap junction protein antibodies. *The Plant Cell* 3, 407–417.
- Yamaguchi, J., Nishimura, M., 1984. Purification of glyoxysomal catalase and immunochemical comparison of glyoxysomal and leaf peroxisomal catalase in germinating pumpkin cotyledons. *Plant Physiol* 74, 261–267.
- Yamaguchi, T., Aharon, G.S., Sottosanto, J.B., Blumwald, E., 2005. Vacuolar Na^+/H^+ antiporter cation selectivity is regulated by calmodulin from within the vacuole in a Ca^{2+} - and pH-dependent manner. *Science* 102, 16107–16112.
- Yamaguchi, T., Apse, M.P., Shi, H., Blumwald, E., 2003. Topological analysis of a plant vacuolar Na^+/H^+ antiporter reveals a luminal C terminus that regulates antiporter cation selectivity. *Proc. Natl. Acad. Sci. USA* 100, 12510–12515.
- Yamaguchi, T., Fukada-Tanaka, S., Inagaki, Y., Saito, N., Yonekura-Sakakibara, K., Tanaka, Y., Kusumi, T., Iida, S., 2001. Genes encoding the vacuolar Na^+/H^+ exchanger and flower coloration. *Plant Cell Physiol.* 42, 451–461.
- Yamaguchi, Y., Nagai, R., 1981. Motile apparatus in *Vallisneria* leaf cells. I. Organization of microfilaments. *J. Cell Sci.* 48, 193–205.
- Yamamoto, K., 2007. Plant myosins VIII, XI, and XIII. In: Coluccio, L.M. (Ed.), *Myosins*. Springer, Berlin, pp. 375–390.
- Yamamoto, K., Kikuyama, M., Sutoh-Yamamoto, N., Kamitsubo, E., 1994. Purification of actin based motor protein from *Chara corallina*. *Proc. Jpn. Acad. Sci. Series B. Physical and Biological Sci.* 70, 175–180.
- Yamamoto, K., Kikuyama, M., Sutoh-Yamamoto, N., Kamitsubo, E., Katayama, E., 1995. Myosin from alga *Chara*: Unique structure revealed by electron microscopy. *J. Mol. Biol.* 254, 109–112.
- Yamamoto, R., Masuda, Y., 1971. Stress-relaxation properties of the *Avena* coleoptile cell wall. *Physiol. Plant.* 25, 330–335.
- Yamamoto, K., Shimada, K., Ito, K., Hamada, S., Ishijima, A., Tsuchiya, T., Tazawa, M., 2006. *Chara* myosin and the energy of cytoplasmic streaming. *Plant Cell Physiol.* 47, 1427–1431.
- Yamamoto, R., Shinozaki, K., Masuda, Y., 1970. Stress-relaxation properties of plant cell walls with special reference to auxin action. *Plant Cell Physiol.* 11, 947–956.
- Yamanishi, H., Kasamo, K., 1993. Modulation of the activity of purified tonoplast H^+ -ATPase from mung bean (*Vigna radiata* L.) hypocotyls by various lipids. *Plant Cell Physiol.* 34, 411–419.
- Yamamoto, T., Burke, J., Autz, G., Jagendorf, A.T., 1981. Bound ribosomes of pea chloroplasts thylakoid membranes: Location and release in vitro by high salt, puromycin, and RNase. *Plant Physiol* 67, 940–949.
- Yamanishi, H., Kasamo, K., 1994. Effects of cerebroside and cholesterol on the reconstitution of tonoplast H^+ -ATPase purified from mung bean (*Vigna radiata* L.) hypocotyles in liposomes. *Plant Cell Physiol.* 35, 655–663.
- Yamasaki, L., Kanda, P., Lanford, R.E., 1989. Identification of four nuclear transport signal-binding proteins that interact with diverse transport signals. *Mol. Cell. Biol.* 9, 3028–3036.
- Yamazaki, D., Yoshida, S., Asami, T., Kuchitsu, K., 2003. Visualization of abscisic acid-perception sites on the plasma membrane of stomatal guard cells. *Plant J.* 35, 129–139.
- Yanagida, M., 1990. Higher-order chromosome structure in yeast. *J. Cell Sci.* 96, 1–2.
- Yanagida, T., Kakase, M., Nishiyama, K., Oosawa, F., 1984. Direct observation of motion of single F-actin filaments in the presence of myosin. *Nature* 307, 57–60.
- Yang, C., Xing, L., Zhai, Z., 1992. Intermediate filaments in higher plant cells and their assembly in a cell-free system. *Protoplasma* 171, 44–54.
- Yang, F., Demma, M., Warren, V., Dharmawardhane, S., Condeelis, J., 1990. Identification of an actin-binding protein from *Dictyostelium* as elongation factor 1a. *Nature* 347, 494–496.
- Yang, J., Ellimore, P.T., Sather, W.A., Zhang, J.-F., Tsien, R.W., 1993. Molecular determinants of Ca^{2+} selectivity and in permeation in L-type Ca^{2+} channels. *Nature* 366, 158–161.
- Yang, T., Davies, P.J., Reid, J.B., 1996. Genetic dissection of the relative roles of auxin and gibberellin in the regulation of stem elongation in intact light-grown peas. *Plant Physiol.* 110, 1029–1034.

- Yang, W., Burkhardt, W., Cavallius, J., Merrick, W.C., Boss, W.F., 1993. Purification and characterization of phosphatidyl inositol 4-kinase activator in carrot cells. *J. Biol. Chem.* 268, 392–398.
- Yennawar, N., Li, L.-C., Dudzinski, D.M., Tabuchi, A., Cosgrove, D.J., 2006. Crystal structure and activities of EXPB1 (*Zea m 1*), a beta-expansin and group-1 pollen allergen from maize. *Proc. Natl. Acad. Sci. USA* 103, 14664–14671.
- Yano, H., Sato, S., 2002. Combination of electron microscopic *in situ* hybridization and anti-DNA antibody labelling reveals a peculiar arrangement of ribosomal DNA in the fibrillar centres of the plant cell nucleus. *J. Electron Microscopy* 51, 231–239.
- Yano, K., Matsui, S., Tsuchiya, T., Maeshima, M., Kutsuna, N., Hasezawa, S., Moriyasu, Y., 2004. Contribution of the plasma membrane and central vacuole in the formation of autolysosomes in cultured tobacco cells. *Plant Cell Physiol.* 45, 951–957.
- Yasuhara, H., Sonobe, S., Shibaoka, H., 1992. ATP-sensitive binding to microtubules of polypeptides extracted from isolated phragmoplasts of tobacco BY-2 cells. *Plant Cell Physiol.* 33, 601–608.
- Yatsushashi, H., Hashimoto, T., Wada, M., 1987a. Dichroic orientation of photoreceptors for chloroplast movement in *Adiantum* protonemata. Non-helical orientation. *Plant Sci.* 51, 165–170.
- Yatsushashi, H., Kadota, A., Wada, M., 1985. Blue- and red-light action in photoorientation of chloroplasts in *Adiantum* protonemata. *Planta* 165, 43–50.
- Yatsushashi, H., Wada, M., Hashimoto, T., 1987b. Dichroic orientation of phytochrome and blue-light photoreceptor in *Adiantum* as determined by chloroplast movement. *Acta Physiol. Plant.* 9, 163–173.
- Ycas, M., 1974. On earlier states of the biochemical system. *J. Theor. Biol.* 44, 145–160.
- Ycas, M., Vincent, W.S., 1960. A ribonucleic acid fraction from yeast related in composition to desoxyribonucleic acid. *Proc. Natl. Acad. Sci. USA* 46, 804–811.
- Yeh, K.C., Lagarias, J.C., 1998. Eukaryotic phytochromes: Light-regulated serin/threonine protein kinases with histidine kinase ancestry. *Proc. Natl. Acad. Sci. USA* 95, 13976–13981.
- Yin, H., Wang, M.D., Svoboda, K., Landick, R., Block, S.M., Gelles, J., 1995. Transcription against an applied force. *Science* 270, 1653–1657.
- Yoder, T.L., Zheng, H.-Q., Todd, P., Staehelin, L.A., 2001. Amyloplast sedimentation dynamics in maize columella cells support a new model for the gravity-sensing apparatus of roots. *Plant Physiol.* 125, 1045–1060.
- Yokota, E., McDonald, A.R., Liu, B., Shimmen, T., Palevitz, B.A., 1995a. Localization of a 170 kDa myosin heavy chain in plant cells. *Protoplasma* 185, 178–187.
- Yokota, E., Mimura, T., Shimmen, T., 1995b. Biochemical, immunocytochemical and immunohistochemical identification of myosin heavy chains in cultured cells of *Catharanthus roseus*. *Plant Cell Physiol.* 36, 1541–1547.
- Yokota, E., Shimmen, T., 1994. Isolation and characterization of plant myosin from pollen tubes of lily. *Protoplasma* 177, 153–162.
- Yokota, E., Muto, S., Shimmen, T., 1999b. Inhibitory regulation of higher-plant myosin by Ca^{2+} ions. *Plant Physiol.* 119, 231–240.
- Yokota, E., Ueda, S., Tamura, K., Orii, H., Uchi, S., Sonobe, S., Hara-Nishimura, I., Shimmen, T., 2008. An isoform of myosin XI is responsible for the translocation of endoplasmic reticulum in tobacco cultured BY-2 cells. *J. Exp. Bot.* Published online November 27, 2008.
- Yokota, E., Vidali, L., Tominaga, M., Tahara, H., Orii, H., Morizane, Y., Hepler, P.K., Shimmen, T., 2003. Plant 115-kDa actin-filament bundling protein, P-115-ABP, is a homologue of plant villin and is widely distributed in plants. *Plant Cell Physiol.* 44, 1088–1099.
- Yokota, E., Yukawa, C., Muto, S., Sonobe, S., Shimmen, T., 1999b. Biochemical and Immunocytochemical Characterization of Two Types of Myosins in Cultured Tobacco Bright Yellow-2 Cells. *Plant Physiol.* 121, 525–534.
- Yokoyama, R., Nishitani, K., 2001. Endoxylglucan transferase is localized in both the cell plate and in the secretory pathway destined for the apoplast in tobacco cells. *Plant Cell Physiol.* 42, 292–300.
- Yokoyama, R., Nishitani, K., 2004. Genomic basis for cell-wall diversity in plants. A comparative approach to gene families in rice and *Arabidopsis*. *Plant Cell Physiol.* 45, 1111–1121.
- Yokoyama, R., Rose, J.K.C., Nishitani, K., 2004. A surprising diversity and abundance of xyloglucan endotransglucosylase/hydrolases in rice. Classification and expression analysis. *Plant Physiol.* 134, 1088–1099.
- Yonath, A., Leonard, K.R., Wittman, H.G., 1987. A tunnel in the large ribosomal subunit revealed by three dimensional image reconstruction. *Science* 256, 813–816.
- Yoo, B.-C., Kragler, F., Varkonyi-Gasic, E., Haywood, V., Archer-Evans, S., Lee, Y.M., Lough, T.J., Lucas, W.J., 2004. A systemic small RNA signaling system in plants. *Plant Cell* 16, 1979–2000.
- Yoshida, K., Kawachi, M., Mori, M., Maeshima, M., Kondo, M., Nishimura, M., Kondo, T., 2005. The involvement of tonoplast proton pumps and $\text{Na}^+(\text{K}^+)/\text{H}^+$ exchangers in the change of petal color during flower opening of morning glory, *Ipomoea tricolor* cv. Heavenly Blue. *Plant Cell Physiol.* 46, 407–415.
- Yoshida, K., Kondo, T., Okazaki, Y., Katou, K., 1995. Cause of blue petal colour. *Nature* 373, 291.
- Yoshida, S., Uemura, M., 1986. Lipid composition of plasma membranes and tonoplasts isolated from etiolated seedlings of mung bean (*Vigna radiata*). *Plant Physiol.* 82, 807–812.
- Yoshida, K., Toyama-Kato, Y., Kameda, K., Kondo, T., 2003. Sepal color variation of *Hydrangea macrophylla* and vacuolar pH measured with a proton-selective microelectrode. *Plant Cell Physiol.* 44, 262–268.
- Yoshihisa, T., Anraku, Y., 1990. A novel pathway of import of α -mannosidase, a marker enzyme of vacuolar membrane, in *Saccharomyces cerevisiae*. *J. Biol. Chem.* 265, 22418–22425.
- You, W., Abe, S., Davies, E., 1992. Cosedimentation of pea root polyosomes with the cytoskeleton. *Cell Biol. Int. Rep.* 16, 663–673.
- Young, T., 1807. A Course of Lectures on Natural Philosophy and the Mechanical Arts. Joseph Johnson, St. Paul's Church Yard.
- Youngman, M.J., Aiken Hobbs, A.E., Burgess, S.M., Srinivasan, M., Jensen, R.E., 2004. Mmm2p, a mitochondrial outer membrane protein required for yeast mitochondrial shape and maintenance of mtDNA nucleoids. *J. Cell Biol.* 164, 677–688.
- Yu, L., Moshelion, M., Moran, N., 2001. Extracellular porons inhibit the activity of inward-rectifying K channels in the

- motor cells of *Samanea saman* pulvini. Plant Physiol. 127, 1310–1322.
- Yuasa, T., Okazaki, Y., Iwasaki, N., Muto, S., 1997. Involvement of a calcium-dependent protein kinase in hypoosmotic turgor regulation in a brackish water Characeae *Lamprothamnium succintum*. Plant Cell Physiol. 38, 586–594.
- Yuen, Y.G., Crain, R.C., 1993. Deflagellation of *Chlamydomonas reinhardtii* follows a rapid transitory accumulation of inositol 1,4-5,-trisphosphate and requires Ca^{2+} entry. J. Cell Biol. 123, 869–875.
- Z-**
- Zacharias, E., 1881. Ueber die chemische Beschaffenheit des Zellkerns. Bot. Z. 39, 169–176.
- Zambryski, P., 2004. Cell-to-cell transport of proteins and fluorescent tracers via plasmodesmata during plant development. J. Cell Biol. 164, 165–168.
- Zambryski, P., Crawford, K., 2000. Plasmodesmata: Gatekeepers for cell-to-cell transport of developmental signals in plants. Annu. Rev. Cell Dev. Biol. 16, 393–421.
- Zachleder, V., van den Ende, H., 1992. Cell cycle events in the green alga *Chlamydomonas eugametos* and their control by environmental factors. J. Cell Sci. 102, 469–474.
- Zamecnik, P.C., 1960. Historical and current aspects of the problem of protein synthesis. Harvey Lect. 54, 256–281.
- Zamecnik, P.C., 1969. An historical account of protein synthesis, with current overtones—A personalized view. Cold Spring Harbor Symp. Quant. Biol. 34, 1–16.
- Zamecnik, P.C., Keller, E.B., 1954. Relation between phosphate energy donors and incorporation of labeled amino acids into proteins. J. Biol. Chem. 209, 337–354.
- Zaar, K., 1979. Visualization of pores (export sites) correlated with cellulose production in the envelope of the gram-negative bacterium *Acetobacter xylinum*. J. Cell. Biol. 80, 773–777.
- Zaug, A.J., Cech, T.R., 1986. The intervening sequence RNA of *Tetrahymena* is an enzyme. Science 231, 470–475.
- Zeigler, D.M., Linnane, A.W., Green, D.E., Dass, C.M.S., Ris, H., 1958. Studies on the electron transport system. Biochim. Biophys. Acta 28, 524–538.
- Zelitch, I., 1953. Oxidation and reduction of glycolic and glyoxylic acids in plants. II. Glyoxylic acid reductase. J. Biol. Chem. 201, 719–726.
- Zelitch, I., 1955. The isolation of crystalline glyoxylic acid reductase from tobacco leaves. J. Biol. Chem. 216, 553–575.
- Zelitch, I., 1957. α -Hydroxysulfonates as inhibitors of the enzymatic oxidation of glycolic and lactic acids. J. Biol. Chem. 224, 251–260.
- Zelitch, I., 1959. The relationship of glycolic acid to respiration and photosynthesis in tobacco leaves. J. Biol. Chem. 234, 3077–3081.
- Zelitch, I., 1964. Organic acids and respiration in photosynthetic tissues. Annu. Rev. Plant Physiol. 15, 121–142.
- Zelitch, I., 1965. The relation of glycolic acid synthesis to the primary photosynthetic carboxylation reaction in leaves. J. Biol. Chem. 240, 1869–1876.
- Zelitch, I., 1966. Increased rate of net photosynthetic carbon dioxide uptake caused by the inhibition of glycolate oxidase. Plant Physiol. 41, 1623–1631.
- Zelitch, I., 1971. Photosynthesis. Photorespiration, and Plant Productivity. Academic Press, New York.
- Zelitch, I., 1974. The effect of glycidate, an inhibitor of glycolate synthesis, on photorespiration and net photosynthesis. Arch. Biochem. Biophys. 163, 367–377.
- Zelitch, I., 1975. Pathways of carbon fixation in green plants. Annu. Rev. Biochem. 44, 123–145.
- Zelitch, I., 2001. Travels in a world of small science. Photosynthesis Res. 67, 157–176.
- Zelitch, I., Ochoa, S., 1953. Oxidation and reduction of glycolic and glyoxylic acids in plants. I. Glycolic acid oxidase. J. Biol. Chem. 201, 707–718.
- Zetter, B.R., Brightman, S.E., 1990. Cell motility and the extracellular matrix. Current Opinion in Cell Biology 2, 850–856.
- Zhai, Y., Kronebusch, P.J., Borisy, G.G., 1995. Kinetochore microtubule dynamics and the metaphase-anaphase transition. J. Cell Biol. 131, 721–734.
- Zhang, D.H., Callahan, D.A., Hepler, P.K., 1990a. Regulation of anaphase chromosome motion in *Tradescantia* stamen hair cells by calcium and related signaling agents. J. Cell Biol. 111, 171–182.
- Zhang, D., Nicklas, R.B., 1995. Chromosomes initiate spindle assembly upon experimental dissolution of the nuclear envelope in grasshopper spermatocytes. J. Cell Biol. 131, 1125–1131.
- Zhang, D., Nicklas, R.B., 1996. “Anaphase” and cytokinesis in the absence of chromosomes. Nature 382, 466–468.
- Zhang, D.H., Wadsworth, P., Hepler, P.K., 1990b. Microtubule dynamics in living plant cells: Confocal imaging of microinjected fluorescent brain tubulin. Proc. Natl. Acad. Sci. USA 87, 8820–8824.
- Zhang, D.H., Wadsworth, P., Hepler, P.K., 1992. Modulation of anaphase spindle microtubule structure in stamen hair cells of *Tradescantia* by calcium and related agents. J. Cell Sci. 102, 79–89.
- Zhang, D., Wadsworth, P., Hepler, P.K., 1993. Dynamics of microfilaments are similar but distinct from microtubules during cytokinesis in living dividing plant cells. Cell Motil. Cytoskeleton 24, 151–155.
- Zhang, F., Wang, L.P., Boyden, E.S., Deisseroth, K., 2006. Channelrhodopsin-2 and optical control of excitable cells. Nat. Methods 3, 785–792.
- Zhang, G.F., Driouich, A., Staehelin, L.A., 1993. Effect of monensin on plant Golgi: re-examination of the monensin-induced changes in cisternal architecture and functional activities of the Golgi apparatus of sycamore suspension-cultured cells. J. Cell Sci. 104, 819–831.
- Zhang, G.F., Staehelin, L.A., 1992. Functional compactmentation of the Golgi Apparatus of plant cells. Immunocytochemical analysis of high-pressure frozen-and freeze-substituted sycamore maple suspension culture cells. Plant Physiol. 99, 1070–1083.
- Zhang, H.X., Blumwald, E., 2001. Transgenic salt tolerant tomato plants accumulate salt in the foliage but not in the fruits. Nat. Biotechnol. 19, 765–768.
- Zhang, H.X., Hodson, J.N., Williams, J.P., et al., 2001. Engineering salt-tolerant Brassica plants: Characterization of yield and seed oil quality in transgenic plants with increased vacuolar sodium accumulation, Proc. Natl. Acad. Sci. 98, 12832–12836.

- Zhang, J., Hill, D.R., Sylvester, A.W., 2007. Diversification of the RAB guanosine triphosphatase family in dicots and monocots. *J. Intr. Plant Biol.* 49, 1129–1141.
- Zhang, J., Ma, H., Feng, J., Zeng, L., Wang, Z., Chen, S., 2008. Grape berry plasma membrane proteome analysis and its differential expression during ripening. *J. Exp. Bot.* 59, 2979–2990.
- Zhang, Y.-P., Oertner, T.G., 2007. Optical induction of synaptic plasticity using a light-sensitive channel. *Nat. Methods* 4, 139–141.
- Zheng, H., Fischer von Mollard, G., Kovaleva, V., Stevens, T.H., Raikhel, N.V., 1999. The plant vesicle-associated SNARE AtVTI1a likely mediates vesicle transport from the trans-Golgi network to the prevacuolar compartment. *Mol. Biol. Cell.* 10, 2251–2264.
- Zheng, H.Q., Staehelin, L.A., 2001. Nodal endoplasmic reticulum, a specialized form of endoplasmic reticulum found in gravity-sensing root tip columella cells. *Plant Physiol.* 125, 252–265.
- Zhao, J., Last, R.L., 1996. Coordinate regulation of the tryptophan biosynthetic pathway and indolic phytoalexin accumulation in *Arabidopsis*. *Plant Cell* 8, 2235–2244.
- Zhen, R.G., Baykov, A.A., Bakuleva, N.P., Rea, P.A., 1994. Aminomethylenediphosphonate: A potent type specific inhibitor of both plant and phototrophic bacterial H^+ -pyrophosphatases. *Plant Physiol.* 104, 153–159.
- Zheng, H., Kunst, L., Hawes, C., Moore, I., 2004. A GFP-based assay reveals a role for RHD3 in transport between endoplasmic reticulum and Golgi apparatus. *Plant J.* 37, 398–414.
- Zhong, X., Ding, B., 2008. Distinct RNA motifs mediate systemic RNA trafficking. *Plant Signaling & Behavior* 3, 1–2.
- Zhong, X., Tao, X., Stombaugh, J., Leontis, N., Ding, B., 2007. Tertiary structure and function of an RNA motif required for plant vascular entry to initiate systemic trafficking. *EMBO J.* 26, 3836–3846.
- Zhou, R., Sicher, R.C., Quebedeaux, B., 2001. Diurnal changes in carbohydrate metabolism in mature apple leaves. *Aust. J. Plant Physiol.* 28, 1143–1150.
- Zhou, R.L.-L., Cheng, Wayne, R., 2003. Purification and characterization of sorbitol-6-phosphate phosphatase from apple leaves. *Plant Sci* 165, 227–232.
- Zhou, R., Quebedeaux, B., 2003. Changes in photosynthesis and carbohydrate metabolism in mature apple leaves in response to whole plant source-sink manipulation. *J. Amer. Soc. Hort. Sci.* 128, 113–119.
- Zhou, R., Sicher, R.C., Quebedeaux, B., 2002. Apple leaf sucrose-phosphate synthase is inhibited by sorbitol-6-phosphate. *Func. Plant Biol.* 29, 569–574.
- Zhu, C., Bao, G., Wang, N., 2000. Cell mechanics: Mechanical response, cell adhesion, and molecular deformation. *Annu. Rev. Biomed. Eng.* 2, 189–226.
- Zhu, T., Rost, T.L., 2000. Directional cell-to-cell communication in the *Arabidopsis* root apical meristem. III. Plasmodesmata turnover and apoptosis in meristem and root cap cells during four weeks after germination. *Protoplasma* 213, 99–107.
- Zhu, Q., Clarke, M., 1992. Association of calmodulin and an unconventional myosin with the contractile vacuole complexes of *Dictyostelium discoideum*. *J. Cell Biol.* 118, 347–358.
- Zhu, Q., Liu, T., Clarke, M., 1993. Calmodulin and the contractile vacuole complex in mitotic cells *Dictyostelium discoideum*. *J. Cell Sci.* 104, 1119–1127.
- Zhu, Y., Nam, J., Carpita, N.C., Matthyse, A.G., Gelvin, S.B., 2003. Agrobacterium-mediated root transformation is inhibited by mutation of an *Arabidopsis* cellulose synthase-like gene. *Plant Physiol.* 133, 1000–1010.
- Ziegler, J., Facchini, P.J., 2008. Alkaloid biosynthesis: Metabolism and trafficking. *Annu. Rev. Plant Biol.* 59, 735–769.
- Zillig, W., 1987. Eukaryotic traits in archaeobacteria. Could the eukaryotic cytoplasm have arisen from archaeobacterial origin? *Ann. NY Acad. Sci.* 503, 78–82.
- Zimmermann, M.H., Brown, C.L., 1971. Trees—Structure and Function. Springer-Verlag, New York.
- Zimmerman, S.B., Trach, S.O., 1991. Estimation of macromolecule concentrations and excluded volume effects for the cytoplasm of *Escherichia coli*. *J. Mol. Biol.* 222, 599–620.
- Zingen-Sell, I., Hillmer, S., Robinson, D.G., Jones, R.L., 1990. Localization of α -amylase isozymes within the endomembrane system of barley aleurone. *Protoplasma* 154, 16–24.
- Zirkle, C., 1937. The plant vacuole. *Bot. Rev.* 3, 1–30.
- Zirkle, C., 1949. Death of a Science in Russia. University of Pennsylvania Press, Philadelphia.
- Zolman, B.K., Bartel, B., 2004. An *Arabidopsis* indole-3-butyric acid-response mutant defective in PEROXIN6, an apparent ATPase implicated in peroxisomal function. *Proc. Natl. Acad. Sci. USA* 101, 1786–1791.
- Zolman, B.K., Nyberg, M., Bartel, B., 2007. IBR3, a novel peroxisomal acyl-CoA dehydrogenase-like protein required for indole-3-butyric acid response. *Plant. Mol. Biol.* 64, 59–72.
- Zolman, B.K., Silva, I.D., Bartel, B., 2001. The *Arabidopsis* pxa1 mutant is defective in an ATP-Binding cassette transporter-like protein required for peroxisomal fatty acid β -oxidation. *Plant Physiol.* 127, 1266–1278.
- Zonia, L., Munnik, T., 2008. Vesicle trafficking dynamics and visualization of zones of exocytosis and endocytosis in tobacco pollen tubes. *J. Exp. Bot.* 59, 861–873.
- Zot, H.G., Doberstein, S.K., Pollard, T.D., 1992. Myosin I moves actin filaments on a phospholipid substrate-implications for membrane targeting. *J. Cell Biol.* 116, 597–602.
- Zouhar, J., Hicks, G.R., Raikhel, N.V., 2004. Sorting inhibitors (Sortins): Chemical compounds to study vacuolar sorting in *Arabidopsis*. *Proc. Natl. Acad. Sci. USA* 101, 9497–9501.
- Zsigmondy, R., 1909. Colloids and the Ultramicroscope. Translated by J. John Wiley & Sons, Alexander.
- Zsigmondy, R.A., 1926. Properties of colloids. Nobel Lect. December 11, 1926.
- Zsigmondy, R., Spear, E.B., 1917. The Chemistry of Colloids. John Wiley & Sons, New York.
- Zurawski, G., Clegg, M.T., 1987. Evolution of higher-plant chloroplast DNA-encoded genes: Implications for structure-function and phylogenetic studies. *Ann. Rev. Plant Physiol.* 38, 391–418.
- Zurzycki, J., Lelatko, Z., 1969. Action dichroism in the chloroplast rearrangements in various plant species. *Acta. Soc. Bot. Pol.* 38, 493–506.