

Highly Cited Botanical Articles  
from Botanical and Other Journals

January 27, 1975

Number 4

Last week we listed 90 highly cited articles originally published in plant physiology journals.<sup>1</sup> We now provide a list of 101 highly cited botanical articles published in other journals. All were cited more than 50 times during the period 1961-1972. They appeared in 41 different journals. In order of the number of articles each contributed, the journals are:

- 12 Proc. Nat. Acad. Sci. USA
- 9 Amer. J. Bot.
- 5 J. Cell Biol.
- 5 Phytochemistry
- 4 Canad. J. Bot.
- 4 J. Biol. Chem.
- 4 Nature
- 4 Plant Soil
- 4 Science
- 3 Annu. Rev. Phytopathol.
- 3 Biochem. J.
- 3 Biochim. Biophys. Acta
- 3 Ecology
- 3 J. Biophys. Biochem. Cytol.
- 3 J. Ultrastruct. Res.
- 3 Phytopathology
- 2 Ann. Bot.
- 2 Arch. Biochem. Biophys.
- 2 Biochem. Biophys. Res.
- 2 J. Amer. Chem. Soc.
- 1 Adv. Bot. Res.
- 1 Amer. Naturalist
- 1 Analyt. Chem.
- 1 Arch. Mikrobiol.
- 1 Biol. Rev.
- 1 Calif. St. Water Poll. Contr. Bd. Publ.
- 1 Cold Spring Harbor Symp.
- 1 Ecol. Monogr.
- 1 Flora
- 1 J. Amer. Oil Chemists Soc.
- 1 J. Brit. Grassland Soc.
- 1 J. Exp. Bot.
- 1 Meded. Landbouwhogesch. Wag.
- 1 Mycologia
- 1 Naturwissenschaften
- 1 New Phytologist
- 1 Phytopathol. Zschr.
- 1 Proc. Chem. Soc. London
- 1 Stain Technol.
- 1 Symp. Soc. Exp. Biol.
- 1 Zschr. Zellforsch. Mikrosk. Anat.

As you can see, only about sixteen would be conventionally classified as botanical journals. Those sixteen contributed only 39 of the articles. The other 25 contributed 62.

In compiling previous lists of highly cited articles, we scanned the *Science Citation Index*® (*SCI*®) data base for articles published by journals identified with a particular specialty. In our study of botany, we attempted to find articles from other journals as well. This isn't as easy as it sounds. It is impossible to scan all article titles published in the many non-botanical journals we have identified as important to botany.<sup>2</sup>

An algorithmic approach was necessary. We used the simple method of tracking down authors. It's simple because we have the data base accessible. First we selected highly cited articles published in botany journals. Then we scanned the *SCI* data base for other highly cited articles by the same authors. In this way we were able to identify articles from multidisciplinary and other specialty journals. As additional articles were identified, we repeated the process with the names of their secondary authors, and so on.

The list of 101 articles which follows begins appropriately enough with three articles by Nobel laureates. The names of many authors reappear. Notable in this respect are Arnon, Whatley, Mollenhauer, and Muhlethaler. All of them published four or more of these papers.

There is an interesting chronological difference between this list of articles and that from the five plant physiology journals. The articles listed below tend to be older. About 30% of them were published prior to the 1960s.

One can tentatively conclude that in botany as many "classic" papers are published in multidisciplinary and other journals as in botany journals. The articles listed below received more than 10,000 citations. Of those, about 7000 were to articles in non-botanical journals.

The nature of the research that this list of articles reports is roughly but usefully indicated by the words that occur most frequently in the titles. Excluding syntactical signposts (*of, the, and, etc.*), and such words as *plant, leaf, root, cell, etc.*, the most frequently occurring words are: *photosynthesis* or *photosynthetic*; (*photo*)*phosphorylation*; *carbon dioxide* (fixation, compensation, etc.);

*enzymes* and the names of particular enzymes; *microbodies* and the names of known and newly investigated *-somes*; *protein(s)* (synthesis, storage, etc.); and, finally, in a multiplicity of settings, *structure* (microstructure, ultrastructure, fine-structural, etc.).

As with the previous list, the articles here are arranged by year of publication. The group for each year is alphabetized by first author.

1. Garfield, E. Highly cited articles from plant physiology journals. *Current Contents (CC)* No. 3, 2 January 1975, p. 5-9.

2. .... Journal citation studies. 18. Highly cited botany journals. *CC* No. 2, 13 January 1975.

## Highly Cited Articles of Botanical Interest from Botanical and Other Journals

Times Cited 1961-1972	Bibliographical Data
1. 51	<b>Beadle G W &amp; Tatum E L.</b> Genetic control of biochemical reactions in <i>Neurospora</i> . <i>Proc. Nat. Acad. Sci. USA</i> 27:499-506, 1941.
2. 66	<b>Ryan F J, Beadle G W &amp; Tatum E L.</b> The tube method of measuring the growth rate of <i>Neurospora</i> . <i>Amer. J. Bot.</i> 30:784-99, 1943.
3. 209	<b>Beadle G W &amp; Tatum E L.</b> <i>Neurospora</i> . II. Methods of producing and detecting mutations concerned with nutritional requirements. <i>Amer. J. Bot.</i> 32:678-86, 1945.
4. 225	<b>Benson A A, Bassham J A, Calvin M, Goodale T C, Haas V A &amp; Stepka W.</b> The path of carbon in photosynthesis. V. Paper chromatography and radioautography of the products. <i>J. Amer. Chem. Soc.</i> 72:1710-18, 1950.
5. 95	<b>Weatherly P E.</b> Studies in the water relations of the cotton plant. I. The field measurement of water deficits in leaves. <i>New Phytologist</i> 49:81-97, 1950.
6. 57	<b>Curtis J T &amp; McIntosh R P.</b> An upland forest continuum in the prairie-forest border region of Wisconsin. <i>Ecology</i> 32:476-96, 1951.
7. 55	<b>Losada M, Whatley F R &amp; Arnon D I.</b> Separation of two light reactions in noncyclic photophosphorylation of green plants. <i>Nature</i> 190:606-10, 1951.
8. 103	<b>Johnson C M &amp; Nishit H.</b> Microestimation of sulfur in plant materials, soils and irrigation waters. <i>Analyt. Chem.</i> 24:736-42, 1952.
9. 111	<b>Hughes S J.</b> Conidiophores, conidia, and classification. <i>Canad. J. Bot.</i> 31:577-659, 1953.
10. 87	<b>Arnon D I, Allen M B &amp; Whatley F R.</b> Photosynthesis by isolated chloroplasts. <i>Nature</i> 174:394-96, 1954.
11. 54	<b>Allen M B.</b> General features of algal growth in sewage oxidation ponds. <i>California St. Water Poll. Control Board Publ.</i> 13:1-47, 1955.
12. 113	<b>Arnon D I, Allen M B &amp; Whatley F.R.</b> Photosynthesis by isolated chloroplasts. IV. General concept of three photochemical reactions. <i>Biochim. Biophys. Acta</i> 20:449-61.
13. 57	<b>Avron M &amp; Jagendorf A T.</b> A TPNH diaphorase from chloroplasts. <i>Arch. Biochem. Biophys.</i> 65:475-90, 1956.
14. 82	<b>Cottam G &amp; Curtis J T.</b> The use of distance measures in phytosociological sampling. <i>Ecology</i> 37:451-60, 1956.
15. 60	<b>Miller C O, Skoog F, Okumura F S, VonSaltza M H &amp; Strong F M.</b> Isolation, structure and synthesis of kinetin, a substance promoting cell division. <i>J. Amer. Chem. Soc.</i> 78:1375-80, 1956.
16. 60	<b>Rovira A D.</b> Plant root excretions in relation to the rhizosphere effect. <i>Plant Soil</i> 7:178-94, 1956.
17. 78	<b>Steere R L.</b> Purification and properties of tobacco ringspot virus. <i>Phytopathology</i> 46:60-69, 1956.
18. 108	<b>Bray J R &amp; Curtis J T.</b> An ordination of the upland forest communities of southern Wisconsin. <i>Ecol. Monogr.</i> 27:325-49, 1957.
19. 55	<b>Carrier H B.</b> Callose substance in plant cells. <i>Amer. J. Bot.</i> 44:478-88, 1957.

20. 69 **Johnson C M, Stout P R, Broyer T C & Carlton A B.** Comparative chlorine requirements of different plant species.  
*Plant Soil* 8:337-53, 1957.
21. 119 **Skoog F & Miller C O.** Chemical regulation of growth and organ formation in plant tissues cultured in vitro.  
*Symp. Soc. Exp. Biol.* 11:118-30, 1957.
22. 101 **Steere R L.** Electron microscopy of structural detail in frozen biological specimens.  
*J. Biophys. Biochem. Cytol.* 3:45-60, 1957.
23. 72 **Arnon D I, Whatley F R & Allen M B.** Assimilatory power in photosynthesis.  
*Science* 127:1026-34, 1958.
24. 75 **Benson A A & Maruo B.** Plant phospholipids. I. Identification of the phosphatidyl glycerols.  
*Biochim. Biophys. Acta* 27:189-95, 1958.
25. 61 **Jagendorf A T & Arvon M.** Cofactors and rates of photosynthetic phosphorylation by spinach chloroplasts.  
*J. Biol. Chem.* 231:277-90, 1958.
26. 50 **Radley M.** The distribution of substances similar to gibberellic acid in higher plants.  
*Ann. Bot.* 22:297-307, 1958.
27. 92 **Steward F C, Mapes M O & Mears K.** Growth and organized development of cultured cells. II. Organization in cultures grown from freely suspended cells.  
*Amer. J. Bot.* 45:705-13, 1958.
28. 64 **Arnon D I.** Conversion of light into chemical energy in photosynthesis.  
*Nature* 184:10-21, 1959.
29. 212 **Gaastera P.** Photosynthesis of crop plants as influenced by light, carbon dioxide, temperature, and stomatal diffusion resistance.  
*Meded. Landbouwhoges. Wageningen* 59(13):1-68, 1959.
30. 50 **Rovira A D.** Root excretions in relation to the rhizosphere effect.  
*Plant Soil* 11:53-64, 1959.
31. 56 **Russell R S & Shurrocks V M.** The relationship between transpiration and the absorption of inorganic ions by intact plants.  
*J. Exp. Bot.* 10:301-16, 1959.
32. 57 **Zelitch I.** The relationship of glycolic acid to respiration and photosynthesis in tobacco leaves.  
*J. Biol. Chem.* 234:3077-81, 1959.
33. 281 **Arvon M.** Photophosphorylation by Swiss-chard chloroplasts.  
*Biochim. Biophys. Acta* 40:257-72, 1960.
34. 102 **Pittendrigh C S.** Circadian rhythms and the circadian organization of living systems.  
*Cold Spring Harbor Symp.* 25:159-84, 1960.
35. 237 **Porter K R & Machado R D.** Studies on the endoplasmic reticulum. IV. Its form and distribution during mitosis in cells of onion root tip.  
*J. Biophys. Biochem. Cytol.* 7:167-80, 1960.
36. 173 **Smillie R M & Krotkov G.** The estimation of nucleic acids in some algae and higher plants.  
*Canad. J. Bot.* 38:31-49, 1960.
37. 120 **Whaley W G, Mollenhauer H H & Leech J H.** The ultrastructure of the meristematic cell.  
*Amer. J. Bot.* 47:401-49, 1960.
38. 101 **Winston P W & Bates D H.** Saturated solutions for the control of humidity in biological research.  
*Ecology* 41:232-37, 1960.
39. 54 **Arnon D I, Losada M, Whatley F R, Tsujimoto H Y, Hall D O & Horton A A.** Photosynthetic phosphorylation and molecular oxygen.  
*Proc. Nat. Acad. Sci. USA* 47:1314-34, 1961.
40. 68 **Mollenhauer H H, Whaley W G & Leech J H.** A function of the Golgi apparatus in outer rootcap cells.  
*J. Ultrastruct. Res.* 5:193-200, 1961.
41. 148 **Moor H, Muhlethaler K, Waldner H & Frey-Wyssling A.** New freezing-ultramicrotome.  
*J. Biophys. Biochem. Cytol.* 10:1-13, 1961.
42. 73 **Moore R T & McAlear J H.** Fine structure of *Mycota*. V. Lomasomes; previously uncharacterized hyphal structures.  
*Mycologia* 53:194-200, 1961.
43. 58 **Ruinen J.** The phyllosphere. I. An ecologically neglected milieu.  
*Plant Soil* 15:81-109, 1961.
44. 98 **Zelitch I.** Biochemical control of stomatal opening in leaves.  
*Proc. Nat. Acad. Sci. USA* 47:1423-33, 1961.
45. 94 **Farkas G L & Kiraly Z.** Role of phenolic compounds in the physiology of plant diseases and disease resistance.  
*Phytopathol. Zschr.* 44:105-50, 1962.
46. 62 **Ruppel H G.** Untersuchungen ueber die Zusammensetzung von *Chlorella* bei Synchronisation im Licht-Dunkel-Wechsel [Studies on *Chlorella* preparation in light-darkness change].  
*Flora* 152:113-38, 1962.
47. 51 **Dainty J.** Water relations in plant cells.  
*Adv. Bot. Res.* 1:279-326, 1963.

48. 58 Epstein E, Rains D W & Elzam O E. Resolution of dual mechanisms of potassium absorption by barley roots.  
*Proc. Nat. Acad. Sci. USA* 49:684-92, 1963.
49. 77 Frey-Wyssling A, Grieshaber E & Muhlethaler K. Origin of spherosomes in plant cells.  
*J. Ultrastruct. Res.* 8:506-16, 1963.
50. 77 Hind G. & Jagendorf A T. Separation of light and dark stages in photophosphorylation.  
*Proc. Nat. Acad. Sci. USA* 49:715-22, 1963.
51. 99 Kende H, Ninnemann H & Lang A. Inhibition of gibberellic acid biosynthesis in *Fusarium moniliforme* by AMO-1618 and CCC.  
*Naturwissenschaften* 50:599-600, 1963.
52. 105 Mollenhauer H H & Whaley W G. An observation on the functioning of the Golgi apparatus.  
*J. Cell Biol.* 17:222-25, 1963.
53. 398 Moor H & Muhlethaler K. Fine structure in frozen-etched yeast cells.  
*J. Cell Biol.* 17:609-28, 1963.
54. 117 Nooden L D & Thimann K V. Evidence for a requirement for protein synthesis for auxin-induced cell enlargement.  
*Proc. Nat. Acad. Sci. USA* 50:194-200, 1963.
55. 65 Shaw M. The physiology and host-parasite relations of the rust.  
*Annu. Rev. Phytopathol.* 1:259-94, 1963.
56. 79 Smillie R M. Formation and function of soluble proteins in chloroplasts.  
*Canad. J. Bot.* 41:123-54, 1963.
57. 221 Tilley J M A & Terry R A. A two-stage technique for the in vitro digestion of forage crops.  
*J. Brit. Grassland Soc.* 18:104-11, 1963.
58. 65 Wetmore R H & Rier J P. Experimental induction of vascular tissues in callus of angiosperms.  
*Amer. J. Bot.* 50:418-30, 1963.
59. 72 Frey-Wyssling A, Lopez-Saez J F & Muhlethaler K. Formation and development of the cell plate.  
*J. Ultrastruct. Res.* 10:422-32, 1964.
60. 101 Key J L & Ingle J. Requirement for the synthesis of DNA-like RNA for growth of excised plant tissue.  
*Proc. Nat. Acad. Sci. USA* 52:1382-88, 1964.
61. 76 Letham D S, Shannon J S & McDonald I R. The structure of zeatin, a factor inducing cell division.  
*Proc. Chem. Soc. London (July)*:230-31, 1964.
62. 100 Marcus A & Feeley J. Activation of protein synthesis in the imbibition phase of seed germination.  
*Proc. Nat. Acad. Sci. USA* 51:1075-79, 1964.
63. 586 Mollenhauer H H. Plastic embedding mixtures for use in electron microscopy.  
*Stain Technol.* 39:111-14, 1964.
64. 158 Moor H. Die Gefrier-Fixation lebender Zellen und ihre Anwendung in der Elektronenmikroskopie [Freeze-fixation of living cells and its use in electronmicroscopy].  
*Zschr. Zellforsch. Mikroskop. Anat.* 62:546-80, 1964.
65. 143 Neumann J & Jagendorf A T. Light-producing pH changes related to phosphorylation by chloroplasts.  
*Arch. Biochem. Biophys.* 107:109-19, 1964.
66. 60 Pittendrigh C S & Minis D H. Symposium on time measurement in photoperiodic phenomena; the entrainment of circadian oscillations by light and their role as photoperiodic clocks.  
*Amer. Naturalist* 98:261-94, 1964.
67. 142 Starr R C. The culture collection of algae at Indiana University.  
*Amer. J. Bot.* 51:1013-44, 1964.
68. 128 Bracker C E. Ultrastructure of fungi.  
*Annu. Rev. Phytopathol.* 5:343-74, 1967.
69. 54 Staples R C & Stahmann M A. Changes in proteins and several enzymes of susceptible bean leaves after infection by the bean rust fungus.  
*Phytopathology* 54:760-64, 1964.
70. 58 Steward F C, Mapes M O, Kent A E & Holsten R D. Growth and development of cultured plant cells.  
*Science* 143:20-27, 1964.
71. 190 Varner J E. Hormonal control of enzyme synthesis in barley endosperm.  
*Proc. Nat. Acad. Sci. USA* 52:100-06, 1964.
72. 65 Arnon D I. Ferredoxin and photosynthesis.  
*Science* 149:1460-70, 1965.
73. 100 Burg S P & Burg E A. Ethylene action and the ripening of fruits.  
*Science* 148:1190-96, 1965.
74. 65 Kende H. Kinetin-like factors in the root exudate of sunflowers.  
*Proc. Nat. Acad. Sci. USA* 53:1302-07, 1965.
75. 54 MacArthur R H. Patterns of species diversity.  
*Biol. Rev.* 40:510-33, 1965.
76. 51 Monteith J L. Light distribution and photosynthesis in field crops.  
*Ann. Bot.* 29:17-37, 1965.

77. 52 **Rowe J W.** The sterols of pine bark.  
*Phytochemistry* 4:1-10, 1965.
78. 56 **Zelitch I.** The relation of glycolic acid synthesis to the primary photosynthetic carboxylation reaction in leaves.  
*J. Biol. Chem.* 240:1869-76, 1965.
79. 93 **Bateman D F & Millar R L.** Pectic enzymes in tissue degradation.  
*Annu. Rev. Phytopathol.* 4:119-46, 1966.
80. 122 **Benson A A.** On the orientation of lipids in chloroplasts and cell membranes.  
*J. Amer. Oil Chemists Soc.* 43:265-70, 1966.
81. 65 **Benveniste P, Hirth L & Ourisson G.** La biosynthese des sterols dans les tissus de tabac cultives in vitro. I. Isolement de sterols et de triterpenes [Biosynthesis of sterols in tissues of tobacco cultured in vitro. I. Isolation of sterols and triterpenes].  
*Phytochemistry* 5:31-44, 1966.
82. 51 **Benveniste P, Hirth L & Ourisson G.** La biosynthese des sterols dan les tissus de tabac cultives in vitro. II. Particularites de la biosynthese des phytosterols des tissus de tabac cultives in vitro [Sterol biosynthesis in tissues of tobacco cultured in vitro. II. Peculiarities of phytosterol biosynthesis in tobacco tissues cultured in vitro].  
*Phytochemistry* 5:45-58, 1966.
83. 202 **Branton D.** Fracture faces of frozen membranes.  
*Proc. Nat. Acad. Sci. USA* 55:1048-56, 1966.
84. 113 **Burg S P & Burg E A.** The interaction between auxin and ethylene and its role in plant growth.  
*Proc. Nat. Acad. Sci. USA* 55:262-69, 1966.
85. 58 **Epstein E.** Dual pattern of ion absorption by plant cells and by plants.  
*Nature* 212:1324-27, 1966.
86. 50 **Farkas G L & Stahmann M A.** On the nature of changes in peroxidase isoenzymes in bean leaves infected by the southern bean mosaic virus.  
*Phytopathology* 56:669-77, 1966.
87. 146 **Hatch M D & Slack C R.** Photosynthesis by sugarcane leaves; a new carboxylation reaction and the pathway of sugar formation.  
*Biochem. J.* 101:103-11, 1966.
88. 168 **Loomis W D & Battaille J.** Plant phenolic compounds and the isolation of plant enzymes.  
*Phytochemistry* 5:423-38, 1966.
89. 85 **Breidenbach R W & Beevers H.** Association of the glyoxylate cycle enzymes in a novel subcellular particle from castor bean endosperm.  
*Biochem. Biophys. Res.* 27:462-69, 1967.
90. 109 **Hatch M D, Slack C R & Johnson H S.** Further studies on a new pathway of photosynthetic carbon dioxide fixation in sugarcane and its occurrence in other plant species.  
*Biochem. J.* 102:417-22, 1967.
91. 50 **Matile P & Wiemken A.** The vacuole as the lysosome of the yeast cell.  
*Arch. Mikrobiol.* 56:148-55, 1967.
92. 59 **Newcomb E H.** Fine structure of protein-storing plastids in bean root tips.  
*J. Cell Biol.* 33:143-63, 1967.
93. 67 **Skoog F, Hamzi H Q & Szweykowska A M.** Cytokinins; structure-activity relationships.  
*Phytochemistry* 6:1169-92, 1967.
94. 98 **Slack C R & Hatch M D.** Comparative studies on activity of carboxylases and other enzymes in relation to new pathway of photosynthetic carbon dioxide fixation in tropical grasses.  
*Biochem. J.* 103:660-65, 1967.
95. 89 **Smillie R M, Graham D, Dwyer M R, Grieve A & Tobin N F.** Evidence for the synthesis in vivo of proteins of the Calvin cycle and of the photosynthetic electron transfer pathway on chloroplast ribosomes.  
*Biochem. Biophys. Res.* 28:604-10, 1967.
96. 79 **Downton W J S & Tregunna E B.** Carbon dioxide compensation; its relation to photosynthetic carboxylation reactions; systematics of the *Gramineae*, and leaf anatomy.  
*Canad J. Bot.* 46:207-15, 1968.
97. 117 **Feder N & O'Brien T P.** Plant microtechnique; some principles and new methods.  
*Amer. J. Bot.* 55:123-42, 1968.
98. 71 **Johnson U G & Porter K R.** Fine structure of cell division in *Chlamydomonas reinhardtii*; basal bodies and microtubules.  
*J. Cell Biol.* 38:403-425, 1968.
99. 63 **Laetsch W M.** Chloroplast specialization in dicotyledons possessing the C4-dicarboxylic acid pathway of photosynthetic carbon dioxide fixation.  
*Amer. J. Bot.* 55:875-83, 1968.
100. 120 **Tolbert N E, Oeser A, Tisaki T, Hageman R H & Yamazaki R K.** Peroxisomes from spinach leaves containing enzymes related to glycolate metabolism.  
*J. Biol. Chem.* 243:5179-84, 1968.
101. 80 **Frederick S E & Newcomb E H.** Cytochemical localization of catalase in leaf microbodies (peroxisomes).  
*J. Cell Biol.* 43:343-53, 1969.