

SEVENTY YEARS OF PHYCOLOGY AT THE OHIO STATE UNIVERSITY^{1, 2}

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ABSTRACT

Phycology at The Ohio State University had its conception with a "Proposed Algological Survey of Ohio" by Professor William A. Kellerman in 1902. Seventy years of teaching and research in phycology, and the faculty who have contributed to the program since Professor Kellerman's proposal, are reviewed. This includes the chronological sequence of this development at The Ohio State University, from a Botany Department speciality to an interdisciplinary program. Masters and doctoral degrees granted in phycology are listed, as are the bibliographies that pertain to algae of the phycology faculty for the years from 1902 to 1972 inclusive.

The March 1902 Ohio Naturalist carried a "Proposed Algological Survey of Ohio," by William A. Kellerman, then Professor of Botany (since 1891) at The Ohio State University. He wrote ". . . it is therefore proposed that botanists, collectors and amateurs, unite in an effort to make known, the coming season, the character and distribution of our State Algological Flora." He requested further that persons "send specimens for enumeration to the Botanical Department, Ohio State University." and that "Mr. W. W. Stockberger of Denison University, Granville, will assist in working up the material and tabulating the results." He also informed those who might cooperate as to the methods of preservation, keeping records, and mailing collections. He then included, without his source of information or distribution data, a list of 169 species of algae "hitherto reported as occurring in Ohio."

Professor Kellerman's proposal was the first step leading to what is now seventy years of nearly continuous phycological teaching and research at The Ohio State University. Though primarily a mycologist, his interest ranged widely over the plant kingdom. Undoubtedly he would have continued to support the algal survey if it had not been for his death 8 March, 1908, while on a collecting expedition in Guatemala.

Algal studies were quiescent after the death of Professor Kellerman until Edgar N. Transeau came to The Ohio State University in 1915, where he later assumed the Chairmanship of the Department of Botany in 1918. Dr. Transeau's formal training was in ecology, but he had become interested in algae while teaching at Eastern Illinois Teachers College at Charleston, Illinois. His interest had already resulted in the publication of several papers on various aspects of freshwater algae prior to his arrival at The Ohio State University in 1915. He continued research with the algae and published regularly until shortly after his retirement in 1946; his last work was a monograph of the Zygnemataceae that appeared in 1951. Though he never taught a formal course in the algae while at The Ohio State University, he advised and directed the graduate studies in phycology of numerous masters- and doctoral-degree candidates.

Lewis H. Tiffany, whose interest in algae stemmed from his association with Professor Transeau while at Eastern Illinois Teachers College in 1912, was the first graduate student in algae and received both the master's degree (1921) and the doctorate (1923) under the tutelage of Professor Transeau. Dr. Tiffany was retained in the Department of Botany as an instructor in 1920 and served as an active phycologist, rising to the rank of Professor, until he resigned in 1937 to

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accept the Chairmanship of the Department of Botany at Northwestern University. He taught the first formal algae course offered by The Ohio State University Department of Botany in 1927 at The Franz Theodore Stone Laboratory at Put-in-Bay, Ohio. This course became the nucleus for the algae course which was offered later on the Columbus campus.

Helen Jean Brown received her doctorate in phycology in 1929, and soon after became a member of the faculty. Though she did not teach phycology, she was active in algal research during the early 1930's.

Phycology was firmly established in the Department in the 1930's, with two formal courses and with many members of the faculty and the graduate students active in this area. Clarence E. Taft, who had received his doctorate in algae in 1934, was appointed to the Botany faculty in 1935, and assumed the phycology teaching and research duties vacated by Dr. Tiffany in 1937. He has since taught the algae courses both at Columbus and at Stone Laboratory, and in 1968 increased the departmental phycology offerings with a course in plankton, to serve the growing demand for trained aquatic biologists and limnologists.

Phycology as taught was largely taxonomic in nature from its inception in 1902 until 1938, when the Department of Hydrobiology of The Ohio State University was established at The Franz Theodore Stone Laboratory. Year-around research was then initiated, and Professor David C. Chandler became particularly involved in the limnological aspects of phytoplankton. Professor Jacob Verduin's interest in research in physiology and ecology of phytoplankton paralleled that of Professor Chandler.

The Department of Hydrobiology was disbanded in 1955, and the operation of the Laboratory returned to the auspices of the Botany and Zoology Departments. The type of research initiated within the Department of Hydrobiology has since been carried on by various agencies, some of which are outside the University.

Phycology, within the University, exhibited a steady growth during the decade from 1960 to 1970. Dr. Derry D. Koob, who came to The Ohio State University Institute of Polar Studies in 1963, added considerable breadth to the graduate program with his Arctic and Antarctic research programs between 1963 and 1968. Almost simultaneously, a new facet of marine-oriented research and seminars was introduced by Dr. Llewellyn Hillis Colinvaux, beginning in 1964. Dr. Hillis Colinvaux contributed much to the marine aspect of the program and will continue to do so, but from the Department of Zoology to which she transferred from Botany late in 1972.

The phycology program in the Department of Botany was further strengthened during 1967-1972 by the addition of Dr. Gary B. Collins, who organized both a course and a research program in the area of his speciality, the diatoms. The latest additions to the phycology program, also in Botany, have been both a course and research in culture techniques leading to studies in physiology and genetics of algae, offered by Dr. H. P. Hostetter, the most recent member of the phycology faculty, who joined the University in 1971. His speciality of culture techniques corrects a serious deficiency in the program.

Phycology during the early years was located entirely within the Department of Botany. The interdisciplinary phase that began with the establishment of the Department of Hydrobiology in 1938 later expanded to encompass the Polar Institute in the 1960's. More recently this phase has expanded into the Department of Microbiology, where Professors Patrick R. Dugan and Robert M. Pfister and their students and associates are making significant contributions with studies that concern the blue-green algae.

Formal courses, seminars, and faculty and graduate student research have contributed to three score and ten years of active phycology at The Ohio State University. Trends in phycology teaching and research at the University have generally reflected the changes in concepts that are associated with algae. The first forty years were largely devoted to taxonomy. Control of algae in water

supplies, along with their importance in the ecosystem, gradually evolved, beginning in the early 1940's. Courses which earlier had been primarily morphologic and taxonomic were broadened through the addition of physiology, ecology, genetics, and control. Now much research is becoming more specialized, as the study of pollution requires more detailed information about specific taxa of algae and their impact upon the aquatic environment.

A list of M.A. and M.Sc. theses, Ph.D. dissertations awarded in the area of phycology at The Ohio State University, and of publications of the phycology faculty there follows, organized into three different lists:

- 1—Master's Degrees in Phycology, arranged chronologically;
- 2—Ph.D. Degrees in Phycology, arranged chronologically; and
- 3—Bibliography of the Phycology faculty (while at The Ohio State University), arranged generally alphabetically, by name of major faculty member.

MASTER'S DEGREES IN PHYCOLOGY

(listed chronologically with the major professor's name in parentheses)

- Tiffany, Lewis H. 1921. Algal food of the young gizzard shad. 9 p. (Transeau) Publ. in Ohio J. Sci. 21(5): 113-122. 1921.
- Wurdak, Mary E. 1922. Chemical composition of the walls of algae. 18 p. (Sampson and Transeau)
- Brown, Helen J. 1925. The algae of the coastal plain region of the United States. 36 p. (Transeau)
- Dennis, Marsena A. G. 1928. The algae of the Marietta [Ohio] region. 26 p. (Tiffany)
- Coyle, Elizabeth E. 1929. The algal food of *Pimephales promelas* (Fat-head minnow). 12 p. (Tiffany) Publ. in Ohio J. Sci. 30(1): 23-35. 1930.
- Cain, Ada D. 1930. A study of the life history of *Stigeoclonium tenuis* Kuetzing. 12 p. (Tiffany)
- Salisbury, Louise. 1931. The plankton algae of Buckeye Lake [Ohio]. 32 p. (Tiffany)
- Shawver, Nellie M. 1931. The plankton algae of Put-in-Bay Harbor [Ohio]. 28 p. (Tiffany)
- Davidson, Paul W. 1932. The algae of the Westerville [Ohio] region. 69 p. (Tiffany)
- Krueger, Lillian K. 1932. The algae of northwestern Ohio. 63 p. (Tiffany)
- Ahlstrom, Elbert H. 1933. Plankton algae of Lake Michigan. 25 p. (Tiffany)
- Salisbury, Robert K. 1933. A preliminary survey of the desmid flora of Florida. 33 p. (Tiffany) Publ. in Ohio J. Sci. 36(1): 55-61. 1936.
- Chapman, Floyd B. 1934. Seasonal development of the algae in a freshwater pond. 90 p. (Tiffany)
- Joyce, Ray E. 1936. The algae of Vermont. 56 p. (Tiffany)
- Sudlow, Paul L. 1936. Growth of *Vaucheria* in culture. 42 p. (Tiffany)
- Britton, Max E. 1937. The freshwater algae of Puerto Rico. 91 p. (Tiffany)
- Mason, Helen M. 1938. A preliminary survey of the algae of the lake region of Portage County, Ohio. 42 p. (Taft)
- Strasburg, James A. 1938. Spore variation in *Spirogyra*. 29 p. (Transeau)
- Green, Betty R. 1946. The algicidal effects of 2,4-dichlorophenoxyacid and some of its derivatives. 16 p. (Taft)
- Curl, Herbert C., Jr. 1951. The distribution of phosphorus in western Lake Erie and its utilization by natural phytoplankton populations. 52 p. (Verduin)
- McMillan, Gladys L. 1951. Photosynthesis rates of the algae *Cladophora* and *Ulothrix*, growing naturally in western Lake Erie. 18 p. (Verduin)
- McFadden, James T. 1954. Population fluctuations in the plankton of O'Shaughnessy Reservoir and in the Scioto River [Ohio] below the dam. 57 p. (Taft)
- Davis, Norman D. 1955. A preliminary survey of the Diatomaceae of the O'Shaughnessy Reservoir of the Columbus [Ohio] City Water Supply. 43 p. (Taft)
- Koob, Derry D. 1956. Vertical distribution studies of the phytoplankton at Griggs Reservoir, Columbus, Ohio. 40 p. (Taft)
- Lang, Norma J. 1958. Phytoplankton populations in relation to certain physical features of Hoover Memorial Dam [Franklin County, Ohio] and of the downstream area. 30 p. (Taft)
- Matter, Flora-Louise. 1962. Algae and their habitats in selected areas of Blues and Mill Creeks [Delaware County, Ohio]. 58 p. (Taft)
- Morgan, Carole A. 1962. Freshwater algae of the central Death Valley Desert. 53 p. (Taft) Publ. in Ohio J. Sci. 65(1): 11-28. 1965.
- Huffman, Ann T. 1963. A quantitative study of the oil in individual cells of diatoms. 30 p. (Taft)
- Sweeney, Robert A. 1964. Some effects of lindane on the growth and structure of *Chlorella pyrenoidosa*. 40 p. (Taft) Publ. as "Effects of insecticide run-off on fish food supply." The Ohio State Univ., Nat. Resources Instit., Fisheries Res. Rep. Sec. 7. iv+32 p. 1964.

- Steinback, John T. 1966. An ecological investigation of the algal genera (and other biota) in waters polluted by mineral acid-drainage from coal mines in Vinton County, Ohio, 1956-66. 108 p. (Taft)
- Kishler, Willis J. 1967. A quantitative study of *Cladophora* in the island region of western Lake Erie. 58 p. (Taft)
- Cox (Downing), Rachel A. 1968. Shore line algae of western Lake Erie. 52 p. (Taft) Publ. in Ohio J. Sci. 70(5): 257-276. 1970.
- Gordon, Kenneth R. 1969. Primary productivity and limiting factors in four fresh-water ponds on Amchitka Island, Alaska. 57 p. (Koob) Publ. in Amchitka Bioenvironmental Program. Battelle Memorial Institute. BMI-171-117. 42 p. 1969.
- Leister, Geoffrey L. 1969. Primary productivity and associated physical, chemical and biological characteristics of Lake Bonney: a perennially ice-covered lake in Antarctica. 70 p. (Koob) Publ. by Derry D. Koob and Geoffrey L. Leister in Antarctic Research Series 20: 51-68. 1972.
- Kalinsky, Robert G. 1969. The winter periphyton community of Big Walnut Creek, Franklin County, Ohio. 80 p. (Taft)
- Johnson, Allen J. 1970. A study of *Microcystis aeruginosa* and its relationship with associated bacteria. 62 p. (Pfister)
- Martens, Judith M. 1970. Twenty years and the aging of a farm pond [Franklin County, Ohio]. 102 p. (Taft)
- Youger, John D. 1970. The effects of supplemental nutrients on the primary productivity of 8 Tundra Lakes, Amchitka Island, Alaska. 56 p. (Koob and Taft)
- Budd, Judith H. 1971. A comparison of the algae of an acid pond and an alkaline pond in southeastern Ohio [Jackson County]. 54 p. (Taft)
- Sweitzer, Sandra. 1971. The algae of Calamus Swamp, Pickaway County, Ohio. 47 p. (Taft)
- Briggs, Thomas. 1972. A survey of the algal flora exclusive of the diatoms of Cedar Bog, Champaign County, Ohio, in relation to the condition of aquatic habitats. 34 p. (Taft)
- McFeeley, Marybeth. 1972. Marine algae as associated with domestic waste in harbors on Martha's Vineyard 'Massachusetts'. 50 p. (Taft)

PH.D. DEGREES IN PHYCOLOGY

(listed chronologically with the major professor's name in parentheses)

- Tiffany, Lewis H. 1923. A physiological study of growth and reproduction among certain green algae. 63 p. (Transeau) Publ. in Ohio J. Sci. 24(2): 65-98. 1924.
- Brown, Helen J. 1929. The green algae of the southeastern coastal plain region of the United States. 73 p. (Transeau) Publ. in part in Trans. Amer. Micros. Soc. 49(2): 97-139. 1930.
- Ackley, Alma. 1930. A survey of the algae of Michigan. 177 p. (Tiffany)
- Smith, Benjamin H. 1931. The algae of Indiana. 102 p. (Transeau)
- Li, Liang C. 1932. The freshwater algae of China. 121 p. (Tiffany)
- McInteer, Berthus B. 1932. A survey of the algae of Kentucky. 93 p. (Tiffany)
- Ahlstrom, Elbert H. 1934. The algal genus *Scenedesmus*. 90 p. (Tiffany)
- Taft, Clarence E. 1934. The Chlorophyceae and Heterophyceae of Oklahoma. 41 p. (Tiffany)
- Coyle, Elizabeth E. 1935. Algae of some Ohio soils. 85 p. (Tiffany)
- Couch, Glenn C. 1941. The algae of the Boston Mountain Region of Arkansas. 30 p. (Transeau)
- Whitford, Larry A. 1941. The fresh-water algae of North Carolina. 127 p. (Transeau) Publ. in J. Elisha Mitchell Sci. Soc. 59(2): 131-170. 1943.
- Hughes, Elwyn O. 1942. Fresh-water algae of the Maritime Provinces. 53 p. (Transeau)
- McQuate, Arthur G. 1954. Photosynthesis and respiration of phytoplankton in Sandusky Bay. 43 p. (Verduin) Publ. in Ecology 37: 834-839. 1956.
- Sweeney, Robert A. 1966. Some interactions of lindane and *Chlorella vulgaris* Beijerinck, *Chlorococcum wimmeri* Rabenhorst, *Chlamydomonas Reinhardtii* Dangeard, and *Botrydiopsis alpina* Vischer. 67 p. (Taft) Publ. in part as "Some effects of Lindane on growth and structure of *Chlorella pyrenoidosa*, Kettering strain." Amer. J. Bot. 52(6): 640. 1965. Publ. in part as "Metabolism of Lindane by *Chlorella vulgaris* and *Chlamydomonas reinhardtii*." J. Phycol. Suppl. p. 7-8. 1968.
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- Cody, Terence E. 1972. Primary productivity in the western basin of Lake Erie. 113 p. (Taft and Tubb)
- Gordon, Kenneth R. 1972. Phosphate-induced changes in phytoplankton and primary productivity in a pond near Delaware, Ohio. 32 p. (Taft)
- Hufford, Terry L. 1972. Analyses of seasonal and areal distribution patterns of diatom taxa of Cedar Bog, Champaign County, Ohio. 145 p. (Taft)

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- Chandler, David C.** 1940. Limnological studies of western Lake Erie, I. Plankton and certain physical-chemical data of the Bass Island Region, from September, 1938, to November, 1939. *Ohio J. Sci.* 40(6): 291-326.
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- 1968. The laboratory culture of calcareous algae. *Lithographed Rep. to Dept. of Navy, Office Naval Res.* 10 p.
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Man, Health, and Environment. Brent Q. Hafen, Ed. Burgess Pub. Co., Minneapolis. 1972. x+269 p. \$3.95.

In these days of proliferating environmental publications, when many new books appear only because they have this magic word in their title, here is a book dealing with the environment that has real value. Key word in the title and throughout the book is *health*, for all the materials, though basic to any consideration of the environment and its pollution, are focused on this concern. Though generalizations appear as needed, especially at the beginning of each section, much of the content is specific—the actual physiological effects of air pollutants on the respiratory system; the actual percentages of waste in different kinds of disposal sites (open dumps, sanitary landfills, incinerators, and “not disposed”—e.g. uncollected); a concise, well-worded comparison of the trickling-filter and activated-sludge systems of secondary sewage treatment; actual examples of problems produced by toxic metallic materials, etc.

The book is made up of 31 different readings drawn from a variety of sources, many of which came from Public Health Service Publications and Reports of the Council on Environmental Quality and carry no author's name. Those with authors listed are selected from materials appearing in *Fortune Magazine*, *World Health Organization Chronicle*, *The Science Teacher*, *Today's Education*, *Modern Medicine*, and others. All the readings are organized under seven main headings: Understanding Environmental Health Problems (introductory), Understanding Air Pollution, Understanding Water and Solid Waste Pollution, Understanding Noise and Radiation Pollution, Understanding Toxic Substance Pollution, Understanding People Pollution, and Understanding Environmental Education. Under each of these headings are three or more readings, which in most cases describe and evaluate that type of pollution in a very informative and satisfying way. Emphasis in all cases is on explaining each type of pollution in enough detail, in sufficiently basic terms, and with enough specific examples, to make possible good understanding of the nature of the problem presented by the pollution and its effects on man's health, both physiological and social.

Despite the wide spectrum of pollution types considered and the large number of sources drawn upon, the overall presentation is clear and very well unified, a real tribute to the book's editor. In addition, though this is only a paperback, the type is of good size and clear and is almost without error. This book, at the present moment, is an outstanding survey of the nature and results, on man's health, of all forms of pollution. Unfortunately, in this very active field, new material is appearing so fast that books like this can go out of date very quickly. This particular book, however, because of the sound, basic material incorporated in each section, as well as the breadth of the coverage, should maintain its value longer than most.

Because of the basic facts incorporated in each section, the sound evaluations and relevant examples, the meaningful organization, and the basic understanding presented by this book, dealing as it does with the entire gamut of modern environmental problems, it should be in the reading list of every person concerned about the relationship of modern man to his environment.

JANE L. FORSYTH