NATIONAL ACADEMY OF SCIENCES

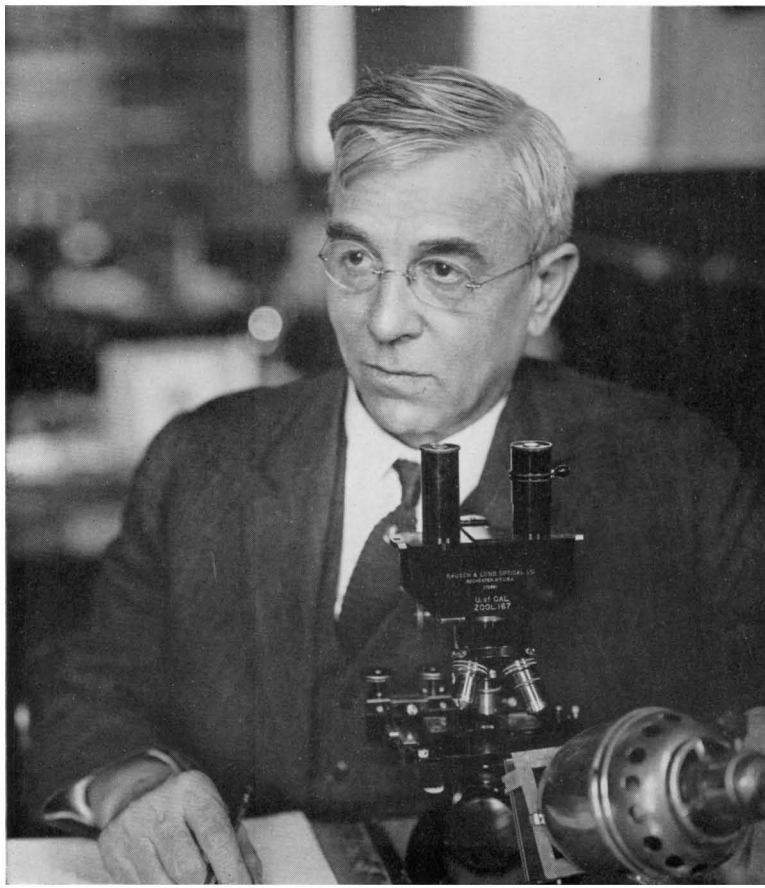
CHARLES ATWOOD KOFOID

1865—1947

A Biographical Memoir by

RICHARD B. GOLDSCHMIDT

Biographical Memoir



Charles Atwood Kofoid

CHARLES ATWOOD KOFOID[1]

1865–1947

BY RICHARD B. GOLDSCHMIDT

Charles Atwood Kofoid was born on a farm near Granville, Illinois, on October 11, 1865. His father, Nelson Kofoid, had immigrated from Bornholm, Denmark, five years earlier and had settled as a cabinetmaker and contractor in that little midwestern town. Kofoid himself referred frequently with pride to his Scandinavian descent, kept up correspondence with his Danish relatives and also visited them. His mother, née Janette Blake, was of old Puritan stock, descendant of one of the early Massachusetts settlers, William Blake. Although nothing is known of the parents' influence upon the boy, the Puritan background remained rather conspicuous throughout his life. No information has come down concerning his boyhood and early education, but the fact that he entered Oberlin College when he was already 21 years of age and worked his way by waiting on tables and sawing wood indicates that he had not had an easy time before he was able to begin his college education. It seems that his interest in biology was awakened at Oberlin by Professor Albert Wright, who inspired him with the beauties of the living world. He started collecting plants and making field trips, and he had his first taste of teaching in his junior year as an assistant in zoology.

While in college he became engaged to Carrie Prudence, the daughter of the Rev. Alpheus Winter, soon to become Mrs. Kofoid. She was his almost lifelong companion and had an immense influence upon his extra-curricular activities as well as his mode of life and thinking.

After his graduation in 1890, he served for a year as teaching fellow at Oberlin and afterwards went to Harvard for three

[1] The following biographical accounts were available to the writer:
A. E. Noble. Bios, 6, 1935: 243-249.
C. Dobell. Nature, 160, 1947: 115.
H. Kirby. Univ. Calif. Fac. Bull. 17, 1948: 80-82.
——— Science, 106, 1947: 462-463.
——— Sci. Mo. 61, 1945: 415-418.
——— Anat. Rec. 101, 1948: 403.
Professor Harold Kirby kindly offered the writer the use of his extensive notes and contributed the bibliography assembled by the University of California Library. Without this gratefully acknowledged help this memoir could not have been finished.

years of graduate study under Professor Mark. His fianceé taught girls in Middletown, Connecticut, until their marriage on June 30, 1894. His doctor's thesis dealt with cell lineage, a topic in embryology, which had become popular through Whitman's work. His material was Limax, and the paper is a creditable contribution although Kofoid never returned to this field. After receiving his degree, Kofoid obtained a position in Illinois. His principal work there was with a natural history survey of the Illinois River, and he was permitted to call himself the director of a floating laboratory. Simultaneously he taught at the University of Illinois. It was during the six years which he spent in this survey that his interest in the plankton organisms was developed and, still more important for his future work, the happy association with Jennings aroused an interest in the protozoa, a group to which most of his life work was to be dedicated.

In Harvard he had met William Emerson Ritter, who wanted to take him to California. But President Eliot forced him to keep the appointment in Illinois, which he had aided him in securing. When Ritter renewed his offer it was not difficult to entice Kofoid to come to the University of California as an assistant professor, though on a very small salary. Ritter was at that time occupied in modernizing the teaching of zoology in this University. In addition he was about to found a marine biological laboratory and Kofoid, with his abundance of energy, seemed to be the proper collaborator. Kofoid remained Ritter's friend to the end of the senior zoologist's long life. Kofoid remained in Berkeley from 1903 to 1936, and after his retirement in 1936 until his death. According to Ritter's plan, Kofoid had a great share in selecting the site and starting a zoological station at San Diego and later at La Jolla, the present Scripps Institution of Oceanography. From 1907 to 1910 he served as assistant director of the San Diego station and from 1910 to 1923 as assistant director of the La Jolla station. Meanwhile, in 1904, he had been promoted to associate professor and in 1910 he became Professor of Zoology and Chairman of the Department. He held this position until the time of his retirement, except for four years when there was a rotating Chairmanship.

When the aging Alexander Agassiz made his *Albatross* expedition to the South Seas in 1904 and 1905, Kofoid partici-

pated as planktonologist and collected a huge amount of material. This expedition played a great role in his recollections, and in his later days he loved to tell especially of his visit to mysterious Easter Island. This was his first real travel, and it whetted his appetite for more, so that whenever there was a chance he went abroad. In 1908 and 1909 he was in Europe working part of the time at the famous Naples Zoological Station and part in the monastic halls of the Zoological Institute in Munich, where the present writer first saw a good deal of him. In 1916 he made a collecting trip to India, and one of his favorite stories later was how he shot an elephant in order to collect its parasites. In 1920 he made another trip to Europe, and in 1930 he accepted for a year the visiting professorship which the Rockefeller Foundation had endowed at the Tohoku Imperial University in Sendai. This trip he enjoyed more than all others, and he loved in his later years to talk privately or publicly about Japan, although his picture was somewhat obscured by too much association with Japanese in the missionary circles. His last major trip was a European tour after his retirement. The last ten years of his life were spent in Berkeley, mostly with his hobby of book collecting, and science did not attract him very much any longer. He died from a heart attack on May 30, 1947, after a month in a hospital.

An evaluation of Kofoid's performance and personality must begin with mention of his unbelievable power for work and activity. He was not the type of scholar who shuts himself in an ivory tower. His intensive and extensive temperament did not permit him to be satisfied with patient search into a problem with all the detours, failures, and disappointments contingent upon a quest into the inside of things. Neither did he have the patience to start experimental work, which absorbs all the time and energy of the investigator. He had to have things done, and the more of them the better. This basic pattern of his mind, combined with a strong collector's instinct, determined the type of his work. His actual research work was only one facet of the many surfaces of his activity, in spite of the fact that the printed output was an immense one. This was made possible in part by the nature of his work which, being very much of the cataloguing type, permitted the extensive use of collaborators and paid assistants, at least in his later years, and lent itself to efficient organization by an administrative

mind. For this reason it is not easy to describe the actual accomplishments of his research work, most of which was not a search for answers to important problems but was stimulated by the wish to extend the knowledge of living forms in their most detailed aspect. After he had become interested, in his younger days, both in plankton organisms and in protozoa, he spent much effort upon a systematic study of planktonic protozoa. He had made large collections during the Agassiz expedition and later, in his association with the new biological station on the California coast, he had a chance to collect on a large scale. With his usual resourcefulness he constructed two excellent pieces of collecting apparatus which bear his name: the Kofoid horizontal net, which can be opened and closed at will in the desired depth, and the Kofoid self-closing bucket for vertical plankton studies. His systematic work on two of the main groups of plankton protozoa, the tintinnoids and the dinoflagellates, extended over many years, and some of his collections were worked out by others almost a lifetime after they had been made. His results were presented in numerous individual papers and a series of large, expensively illustrated monographs. They have been criticized abroad because he belonged to the group of "splitters," who tend to describe all small deviations from type as new species. But they certainly catalogued and illustrated an immense amount of material for those who might become interested in these groups.

Though less voluminous and conspicuous, his numerous contributions to the knowledge of individual forms of protozoa seem to be more important than the large monographs, and established him as an excellent protozoologist. He had an ability to pick out interesting forms and to describe them thoroughly. I think, for example, of the cystoflagellate *Craspedotella,* which suggests the morphological features of a Medusa. To this group of papers belong also some which go beyond systematic and morphological description, such as his work on exuviation and regeneration in dinoflagellates and his interpretation of the structure of *Noctiluca.* But his most important contributions to the morphology of the protozoa were made during his association with Olive Swezy. Many co-authored papers dealt with the mitosis of flagellates and amoebae. The most interesting work of this period relates to the complicated structure of the parasitic protozoa of termites and to the remark-

able system of fibrillae in different groups of protozoa, which can be made visible by silver impregnation and which was interpreted as a neuromotor system. Much of the important work in this field (the original discovery is due to Neresheimer) has been carried out by Kofoid's students, and the writer is inclined to consider this as Kofoid's most important contribution to protozoology.

The second line of research, to which Kofoid devoted many years of his youth, was quantitative and statistical plankton work. In his position as superintendent of the Illinois River work the collection of statistical data on plankton distribution and movement, which is of basic importance for fisheries, was his major duty: certainly a tedious duty, with not many rewards in the form of major discoveries in sight. He did not finish his reports on this work until after he had gone to California. In 1903 the first part of the results was published in a volume of forbidding size, which contains the description of the environment and the volumetric investigations. A second big volume, which appeared in 1908, contains the tabulations of 235 collections made over 5 years. After his removal to California his interest shifted from fresh-water to marine plankton, but purely quantitative studies were given up and replaced by the study of the protozoa in the plankton.

The third major line of Kofoid's work was suggested to him by external circumstances. He had already become interested in some groups of intestinal protozoa, those living in the intestines of termites, ruminants, and the elephant,—protozoa of various groups known for their weird forms and complicated structure. In 1918 he was appointed a Major in the U. S. Army Sanitary Corps, to make a hookworm survey and later to organize a parasitological laboratory. The task appealed to him not only for patriotic reasons but also as a chance to practice his organizing abilities and to do research on human parasites, especially *Endamoeba histolytica,* the cause of amoebic dysentery. With his usual vigor he attacked the problems of morphology and taxonomy of this parasite and published many papers on his findings. He described a new genus and several new species of Amoebae in man. The "splitter" in his nature as a taxonomist had been awakened. Protozoologists did not take very kindly to this work, considering it to be mistaken interpretation of observed variation. After his army service,

he and his students returned repeatedly to work in parasitology, including also parasitic worms. Much of this work was of the statistical, collecting type to which his nature inclined.

Kofoid's wartime work led to what was probably the most unpleasant experience of his life, of which in later years he never talked. A rich Indian Parsee, Mr. Tata, had endowed a professorship of protozoology in the School of Tropical Medicine in Bombay, and the Committee on Tropical Diseases of the Royal Society was to make the selection. Kofoid applied for this position, although it was stipulated that graduate teaching, not research, should be in the foreground. He felt attracted, according to his own statement, by the possibility of a cooperative effort in preventive medicine between public health enterprises and philanthropic and industrial organizations; and further, by the idea of starting a research library and a research journal, the possibility of erecting a museum of preventive medicine, and graduate teaching in protozoology in the interest of Indian physicians. Thus it seems that the organizer and the philanthropist in him were behind the astonishing decision to leave California for India. As he had asked that his library should be purchased by the Bombay Institute, he was clearly inclined to leave for good. The Royal Society presented his candidacy to the Bombay school and, soon after, he received his appointment to the chair with the huge salary of 36,000 rupees. At that time an English protozoologist, known for his aggressive criticism, violently attacked Kofoid's war work in the Tropical Diseases Bulletin, and Kofoid was disturbed lest this should undermine his position in India. The problem was solved for him when the institute did not materialize.

As indicated above, Kofoid's research work in protozoology and parasitology was only a small part of his vast activities and not even the part which gave him most satisfaction. One of his most prominent traits was his civic conscience, the sense of duty toward the commonwealth, which included the University, the public, the teaching profession, and the public health organization. Thus a large share of his efforts went into the application of his biological knowledge to the common good. This was done within the University as well as outside, and the many phases of these activities were more instrumental in

securing him his prominent position in the University and in the profession than was his actual research work. These activities, any one of which would have taxed the working ability of any other man, were too numerous to be reported in toto, and only the most important ones will be considered. The early association with Professor Ritter and his plans for a Pacific Coast Biological Station aroused Kofoid's interest in marine laboratories. He spent considerable time in exploring the different possibilities along the California coast and when first the San Diego, later the La Jolla site were chosen, he devoted his energy to equipping and planning the work and organization of the station and its integration into the University program. Afterwards, when his work was concentrated on the Berkeley campus, he retained his deep interest in marine laboratories. When he went abroad in 1909 to work at the Naples Station, he accepted an invitation of the U. S. Bureau of Education to report in detail on the work of European stations. The result was a book giving a full and well illustrated account of the biological stations, their work, equipment, and history.

A major effort of Kofoid's went into organization of work on human parasites in the interest of public health. After his return from the Army he took over the direction of the parasitological work of the Bureau of Communicable Diseases, California State Board of Health. He organized a laboratory for parasitological examinations, which he conducted until after his retirement. According to Kirby, "An important feature of his laboratory was the technical training of students working in it, and the upholding of standards of accuracy and thoroughness that had a valuable influence upon the training of medical technicians in the state."

Another time-consuming project in the public interest came up when in 1914 marine borers (the shipworm, *Teredo*) appeared in the Navy docks of Mare Island, San Francisco Bay. During the following years the damage spread over all the waterfront installations in the northern part of the Bay. They had been built with untreated wood because it was supposed that the fresh water of the Sacramento River would protect the wood. In 1920, when the damage had become very severe, a committee was organized with the interest of the American Wood-Preservers' Association and the Forest Products Labora-

tory, and Kofoid became chairman of the Sub-Committee on Biological Research. This assignment was "to study the present distribution of marine borers, their past history, dissemination, growth and habits, and the factors that influence their rate of attack and the resulting damage." Together with a group of his students, Kofoid started this work. Later it was realized that a larger framework was needed, and a Committee on Marine Piling Investigation was initiated by the National Research Council. The San Francisco committee became the Pacific representative of this group, and tested wood samples from various Pacific stations. The final report of the investigations, edited by Hill and Kofoid, appeared in 1927 as a lavishly illustrated and documented volume.

This work led to another of still larger scope. It originated with the discovery of *Coptotermes* in the wood of an ocean liner, suggesting the possibility of introduction of this devastating pest into the already termite-infested State of California. Therefore a committee on termite damage was organized, in which Kofoid participated prominently, together with the late S. F. Light. All phases of the life history and activities of termites in California were studied. Although in this case Light and the students did most of the actual biological work, as R. C. Miller had done in the *Teredo* investigations, it was Kofoid's enthusiasm, public spirit and unrelenting drive which led up to the results published in 1934 as a big volume on Termites and Termite Control.

These are some of the major activities of Kofoid in fields of applied zoology. There were many minor ones, such as his special investigations for the U. S. Bureau of Fisheries into the pearl fisheries of India and the cultured-pearl industry of Japan.

All these manifold, time-and-energy-consuming activities were carried out while Kofoid, as Professor of Zoology and Chairman of the Department, did the usual University work, which he took very seriously. He had come to Berkeley originally as assistant professor of histology and embryology, to join a staff which had been reorganized by Ritter for the modern laboratory type of teaching and which had already included such men as H. B. Torrey, S. J. Holmes and J. C. Merriam. He taught in these years embryology, cytology, and general zoology and did his share in the instruction in marine

biology. When Ritter began to spend most of his time at La Jolla, and later left the Berkeley campus, Kofoid took over the direction of all zoological work, especially after he became Chairman in 1910. He left his former classes to others and introduced courses in protozoology and parasitology, and laboratory and seminar work in this field. But occasionally he liked to give the introductory course in zoology, and in later years one of his hobbies was the organization of a class in the history of biology.

Kofoid took his teaching as seriously as everything else, insisting upon exactness, detailed and complete knowledge, and high standards. But it would be wrong to say that he was an inspiring teacher in class, as he was a rather dry lecturer. He was very different in seminars or scientific lectures, where his clarity of mind and logical presentation showed what he could do as a lecturer. In his Department he concentrated his interest upon his graduate students, about 60 of whom took the doctor's degree under him. A considerable number of his papers were prepared in collaboration with these students, who had to work hard and were pushed relentlessly by their exacting teacher. Among those who succeeded later in the learned profession are Edward Hindle, Olive Swezy, C. V. Taylor, R. C. Miller, G. H. Ball, E. G. Moberg, A. S. Campbell, Harold Kirby, S. F. Light, J. McA. Kater, A. E. Noble, E. H. Myers, and E. R. Noble.

As Chairman of the Department of Zoology for most of 26 years Kofoid strove to organize teaching in zoology in all its phases and aspects, setting very high standards of perfection. It is certain that he succeeded in making the Department one of the best organized teaching teams in the country. It is also true that this was not accomplished without damage to the other members of the Department. Just as Kofoid drove himself relentlessly, so he drove others. He was full of new plans which had to be executed at once. He also had the old-fashioned, actually European, idea that the Chairman is the Department and therefore considered all funds and assistance as belonging only to his work, which caused much unhappiness among the other professors. There was certainly no ill will in all this; it was the outflow of his powerful, even a little tyrannic, personality and his inexhaustible drive to go ahead at maximum speed. If he wanted to get things done he took it for

granted that everybody had to pull to exhaustion, although this word was not in his own vocabulary.

On top of all this activity Kofoid was able to do a considerable amount of work at the periphery of science. He was an editor or associate editor of a number of periodicals. The University of California Publications in Zoology were edited by him for many years and he did this work with the same accuracy and care for the minutest details as was conspicuous in all his other activities. Being very much interested in the cataloguing type of work, he wrote innumerable abstracts and reviews, probably thousands, on all phases of his fields of interest, including the history of biology. He was always ready to give University Extension lectures in every part of California, to speak to societies and clubs on topics of general interest, to give interviews, and to serve on civic, scientific or university committees.

How he could manage, in addition to all this, to indulge in a time-consuming hobby is hard to understand. Kofoid was an enthusiastic collector of books, especially those bearing on the history of biology. One never passed the door of his office without finding it blocked by newly arrived packages. The correspondence with book dealers and the study of catalogues must have consumed hours every day. He bought rather indiscriminately, in large lots, then picked out what he wanted and resold the rest. After his retirement he devoted practically all his time to this hobby and even kept an employee of the Department occupied in handling all this traffic. There were books in his office, in his home, in his garage, and in large rooms provided by the University Library. At the time of his death his collection, which he left to the University, contained more than 40,000 volumes not then present in the University Library, among them many first editions, complete sets of editions, and rarities. He left also a collection of about 120,000 reprints. The astonishing thing is that he actually knew his books, their relative importance and history, and he knew exactly what he had and could find any volume at once. He greatly cherished in this collection the esthetic side, also, the good illustrations, printing, and binding, and he probably got more pleasure out of this hobby than out of any of his other activities.

Finally his extramural activities were as extensive and intensive as all his real work. He probably spent very little time

on so-called pleasures, except hiking, driving and traveling, but he was very active in civic and philanthropic affairs. In this domain he was mainly the collaborator and helper of his wife who, childless, was untiring in social work, church work and women's club work. Kofoid spent many evenings on church affairs, and was an important and active member of the First Congregational Church. He even went as delegate to church and missionary congresses and associated a good deal with men of this profession. Thus it is not surprising that he left his considerable estate half to the University and half to the Pacific School of Religion, which just now is building a "Kofoid Hall."

An appraisal of Charles A. Kofoid as a scientist must honestly say that he did not belong to the small group of great minds who by major discoveries or great ideas push science ahead to a higher level. No really important discovery is contained in all his work, excellent as it is; his clear and logical mind was, it seems, not imaginative enough to conceive inspiring ideas. But it is also possible that his love for detail and for the cataloguing of details, together with the unbelievable rush of his activities, did not leave time and leisure for quiet thinking. Actually when he had this leisure he surpassed the usual level of his work. In the writer's opinion the best piece of synthetic and analytic writing he did was done after his retirement, when he contributed a masterly paper on the cell theory to a symposium commemorating the centenary of this theory. But though not great, he was a very good zoologist of broad scientific background, interested in many different aspects of the field, taxonomy and distribution, ecology and morphology, evolution, development, cytology and applied science. The quantity alone of the facts described by him makes for him a position in the zoological research of his time. Beyond this he was a conspicuous and successful scientific personality through the intensity of his attack, his power of organization, his readiness to serve the commonweal and his fostering of international good will by reaching out continuously beyond the borders of his country. Thus, the many honors which he received in memberships, honorary fellowships and honorary degrees were the well deserved rewards for a life devoted to the pursuit of science as he saw it. He was elected to the National Academy of Sciences in 1922.

All these data on Kofoid's life and performance reveal, with all its limitations, a remarkable personality and character. I think the meaning of relaxation was completely unknown to him. The predominant traits were clearly the abundance of energy, the hunger for facts, the need of putting things in order, a great sense of civic responsibility and a general Puritanic outlook on life. The intensity of his activity, together with his hard driving of himself and others, made him appear sometimes a hard and forbidding personality. But when he relaxed and allowed a twinkle to appear in his eyes, he could develop a great charm. At such times he was a good conversationalist, always eager to discuss any subject whatever. His great erudition allowed him to comment interestingly on many subjects, and a ready memory put innumerable facts in easy reach of his mind. He was always ready to learn. Even in traveling he was always a student. He was a good traveler, one who tried to enter into the spirit of the countries he visited and to live with the people. If his judgments were not always correct, this was due less to a lack of information than to the Puritanic background of his mind. He enjoyed in his travels, in which he did not mind roughing it, the beauties of nature and also of art, though the understanding of the arts was not his greatest quality. He also thoroughly enjoyed meeting people; he had friends all over the world and liked to recall many an interesting interview. Thus his mind was wide open to the world, though what he saw and experienced did not change his general outlook, which was that of a conservative and Puritan. His strong ethical and specifically Christian background made him a severe judge where he disagreed. But by the same token he was always ready to help causes and persons of which he approved. The present writer has every reason to set down gratefully this trait. Though he lived comfortably and his life was free of material wants, it was also of Puritan simplicity with the exception of a good car which he drove recklessly almost to the last, in spite of many smash-ups and narrow escapes. It was probably also a consequence of his Puritan heritage that he was a very good financier. In the Department he was considered an authority on investment, and the fact that he left a considerable estate, most of which he must have accumulated himself, bears out such reputation. Altogether Charles A. Kofoid was a remarkable personality,

a man who owed his success and his high standing in the University and the community to a strong and inflexible character, huge will power, immense capacity for work, and deep ethical convictions.

KEY TO ABBREVIATIONS USED IN BIBLIOGRAPHY

Amer. Assn. Adv. Sci. = American Association for the Advancement of Science
Amer. J. Hyg. = American Journal of Hygiene
Amer. J. Pub. Health = American Journal of Public Health
Amer. J. Trop. Med. = American Journal of Tropical Medicine
Amer. Nat. = American Naturalist
Amer. Soc. Civil Eng. = American Society of Civil Engineers
Amer. Vet. Rev. = American Veterinary Review
Anat. Rec. = Anatomical Record
Ann. Mag. Nat. Hist. = Annals and Magazine of Natural History
Ann. Rept. Amer. Soc. Hyg. Assn. = Annual Report, American Social Hygiene Association
Ann. Rept. United Fruit Co. Med. Dept. = Annual Report, United Fruit Company Medical Department
Arch. Int. Med. = Archives of Internal Medicine
Arch. Ophth. = Archives of Ophthalmology
Arch. Path. = Archives of Pathology
Arch. für Protistenk. = Archiv für Protistenkunde
Bull. Ill. State Lab. Nat. Hist. = Bulletin, Illinois State Laboratory of Natural History
Bull. Mich. Fish Comn. = Bulletin, Michigan Fish Commission
Bull. Mus. Comp. Zool. = Bulletin, Museum of Comparative Zoology, Harvard University
Bull. Musée Roy. d'Hist. Nat. Belg. = Bulletin, Musée Royal d'Histoire Naturelle de Belgique
Bull. Soc. Path. Exot. = Bulletin de la Société de Pathologie Exotique, Paris
Bull. U. S. Bur. Educ. = Bulletin, United States Bureau of Education
Bull. Zool. Soc. San Diego = Bulletin, Zoological Society of San Diego
Calif. State Bd. Health, Bur. Comm. Dis., Div. Paras. = California State Board of Health, Bureau of Communicable Diseases, Division of Parasitology
Calif. State J. Med. = California State Journal of Medicine
Calif. & West. Med. = California and Western Medicine
China Med. J. = China Medical Journal
Gac. Méd. Caracas = Gaceta Médica de Caracas
Internat. Cong. Zool. = International Congress of Zoology
Int. Rev. d. ges. Hydrobiol. u. Hydrogr. — Internationale Revue der Gesamten Hydrobiologie und Hydrographie
J. Amer. Dent. Assn. = Journal, American Dental Association
J. Amer. Med. Assn. = Journal, American Medical Association
J. Amer. Water Works Assn. = Journal, American Water Works Association
J. Appl. Micros. = Journal of Applied Microscopy
J. Lab. Clin. Med. = Journal of Laboratory and Clinical Medicine
J. Med. Res. = Journal of Medical Research
J. Paras. = Journal of Parasitology
J. Pharm. Exper. Therap. = Journal of Pharmacology and Experimental Therapeutics

J. Western Soc. Eng. = Journal, Western Society of Engineers
Mem. Mus. Comp. Zool. = Memoirs, Museum of Comparative Zoology, Harvard University
Mil. Surg. = Military Surgeon
Mo. Bull. Calif. State Bd. Health = Monthly Bulletin, California State Board of Health
New Orleans Med. Surg. J. = New Orleans Medical and Surgical Journal
Pop. Sci. Mo. = Popular Science Monthly
Proc. Amer. Acad. Arts Sci. = Proceedings, American Academy of Arts and Sciences
Proc. Amer. Phil. Soc. = Proceedings, American Philosophical Society
Proc. Internat. Conf. Health Problems Trop. Amer. = Proceedings, International Conference on Health Problems in Tropical America
Proc. Nat. Acad. Sci. = Proceedings, National Academy of Sciences
Proc. N. Y. Path. Soc. = Proceedings, New York Pathological Society
Proc. 2nd Pan Amer. Sci. Cong. Wash. = Proceedings, Second Pan American Scientific Congress, Washington
Proc. 7th Internat. Zoöl. Cong. Boston = Proceedings, Seventh International Zoölogical Congress, Boston
Proc. Soc. Exper. Biol. Med. = Proceedings, Society for Experimental Biology and Medicine
Sci. Amer. = Scientific American
Sci. Mo. = Scientific Monthly
Texas State J. Med. = Texas State Journal of Medicine
Trans. Amer. Gastro-Enterol. Assn. = Transactions, American Gastro-Enterological Association
Trans. Amer. Micros. Soc. = Transactions, American Microscopical Society
Univ. Calif. Mem. = University of California Memoirs
Univ. Calif. Publ. Bot. = University of California Publications in Botany
Univ. Calif. Publ. Zool. = University of California Publications in Zoology
Univ. Texas Bull. = University of Texas Bulletin
Zool. Anz. = Zoologischer Anzeiger
Zool. Bull. = Zoological Bulletin

BIBLIOGRAPHY OF C. A. KOFOID

1894

On some laws of cleavage in Limax. Proc. Amer. Acad. Arts Sci., 29 (n.s. 21): 180-203, 2 pls.

1895

On the early development of Limax. Bull. Mus. Comp. Zool., 27:35-118, 8 pls. 5 figs.

1896

The Biological Experiment Station. The Illini, 26:665-672, 7 figs.
On the occurrence of Trochosphera solstitialis in the Illinois River. Science, n.s. 4:935-936.

A report upon the Protozoa observed in Lake Michigan and the inland lakes in the neighborhood of Charlevoix, during the summer of 1894. Bull. Mich. Fish Comn., no. 6, Appendix no. 2, pp. 76-84.

1897

On some important sources of error in the plankton method. Science, n.s. 6:829-832.

Plankton studies. I. Methods and apparatus in use in plankton investigations at the Biological Experiment Station of the University of Illinois. Bull. Ill. State Lab. Nat. Hist., 5: art. 1, 1-25, 7 pls.

1898

The fresh-water biological stations of America. Amer. Nat., 32:391-406, 2 figs.

Hints on the construction of a tow-net. J. Appl. Micros., 1:111-113, 5 figs.

Plankton studies. II. On Pleodorina illinoisensis, a new species from the plankton of the Illinois River. Bull. Ill. State Lab. Nat. Hist., 5: art. 5, 273-293, pls. 36-37; Also in Ann. Mag. Nat. Hist., ser. 7, 6:139-156, 1900.

Report of the Superintendent of the Biological Station. Bien. Rept. Ill. State Lab. Nat. Hist., 1897-98, pp. 8-25.

1899

On the specific identity of Cotylaspis insignis Leidy and Platyaspis anodontae Osborn. Zool. Bull., 2:179-186.

Plankton studies. III. On Platydorina, a new genus of the family Volvocidae, from the plankton of the Illinois River. Bull. Ill. State Lab. Nat. Hist., 5: art. 9, 419-440, pl. 38; Also in Ann. Mag. Nat. Hist., ser. 7, 6:541-558, 1900.

1900

Notes on the natural history of Polyodon. Science, n.s. 11:252.

On Platydorina caudata. Science, n.s. 11:252.

The plankton of Echo River, Mammoth Cave. Trans. Amer. Micros. Soc., 21:113-126.

A preliminary account of some of the results of the plankton work of the Illinois Biological Station. Science, n.s. 11:255-258.

1903

On the structure of Protophrya ovicola, a ciliate infusorian from the brood-sac of Littorina rudis Don. *In* Mark Anniversary Volume; to Edward Laurens Mark, Hersey Professor of Anatomy and Director of the Zoological Laboratory at Harvard University. N. Y.: H. Holt and Co., pp. 111-120, pl. 8.

Plankton studies. IV. The plankton of the Illinois River, 1894-1899, with introductory notes upon the hydrography of the Illinois River and its basin. Part I. Quantitative investigations and general results. Bull. Ill. State Lab. Nat. Hist., 6:95-629, 50 pls.

1904

Biological survey of the waters of Southern California by the Marine Laboratory of the University of California at San Diego. Science, n.s. 19:505-508.

1905

Craspedotella, a new genus of the Cystoflagellata, an example of convergence. Reports on the scientific results of the expedition to the eastern tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission steamer "Albatross," from October, 1904, to March, 1905. Bull. Mus. Comp. Zool., 46:163-165, 1 pl.

A self-closing water bucket for plankton investigations. Conseil Permanent International pour l'Exploration de la Mer. Publications de Circonstance, no. 32, 10 pp., 4 figs.

Some new Tintinnidae from the plankton of the San Diego region. Univ. Calif. Publ. Zool., 1:287-306, pls. 26-27.

1906

Dinoflagellata of the San Diego region. I. On Heterodinium, a new genus of the Peridinidae. Univ. Calif. Publ. Zool., 2:341-368, pls. 17-19.

Dinoflagellata of the San Diego region. II. On *Triposolenia,* a new genus of the Dinophysidae. Univ. Calif. Publ. Zool., 3:93-116, pls. 15-17.

A discussion of species characters in Triposolenia. Univ. Calif. Publ. Zool., 3:117-126.

On the significance of the asymmetry in Triposolenia. Univ. Calif. Publ. Zool., 3:127-133, 2 figs.

On the structure of Gonyaulax triacantha Jörg. Zool. Anz., 30:102-105, 3 figs.

1907

The coincident distribution of related species of pelagic organisms as illustrated by the Chaetognatha. Amer. Nat., 41:241-251, 2 figs.

Dinoflagellata of the San Diego region. III. Descriptions of new species. Univ. Calif. Publ. Zool., 3:299-340, pls. 22-33.

The limitations of isolation in the origin of species. Science, n.s. 25:500-506.

New species of Dinoflagellates. Reports on the scientific results of the expedition to the eastern tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission steamer "Albatross," from October, 1904, to March, 1905. IX. Bull. Mus. Comp. Zool., 50:163-207, pls. 1-18.

On *Ceratium* eugrammum and its related species. Zool. Anz., 32:25-28, 4 figs.

The plates of *Ceratium* with a note on the unity of the genus. Zool. Anz., 32:177-183, 8 figs.

The San Diego Marine Biological Laboratory. Univ. Calif. Chronicle, 9:37. (A report on the Summer Session)

The structure and systematic position of Polykritos Bütsch. Zool. Anz., 31:291-293, 1 fig.

1908

Cooperation in scientific bibliography. Science, n.s. 27:543-545.

Exuviation, autotomoy and regeneration in *Ceratium.* Science, n.s. 27:948. (Abstract of paper for American Association for the Advancement of Science Sect. F—Zoology, American Society of Zoologists)

Exuviation, autotomy and regeneration in *Ceratium.* Univ. Calif. Publ. Zool., 4:345-386, 33 figs.

Notes on some obscure species of *Ceratium.* Univ. Calif. Publ. Zool., 4:387-393.

Plankton studies. V. The plankton of the Illinois River, 1894-1899, with introductory notes upon the hydrography of the Illinois River and its basin. Part II. Constituent organisms and their seasonal distribution. Bull. Ill. State Lab. Nat. Hist., 8:3-361, 5 pls.

1909

The morphology of the skeleton of *Podolampas.* Arch. für Protistenk., 16:48-61, pl. 3.

Mutations in *Ceratium.* Reports on the scientific results of the expedition to the eastern tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission steamer "Albatross," from October, 1904, to March, 1905. XX. Bull. Mus. Comp. Zool., 52:213-257, 4 pls., 5 figs.

On *Peridinium steini* Jörgensen, with a note on the nomenclature of the skeleton of the Peridinidae. Arch. für Protistenk., 16:25-47, pl. 2.

1910

The biological stations of Europe. Bull. U. S. Bur. Educ., no. 440, 360 pp., 55 pls., 48 figs.

A great marine museum. Pop. Sci. Mo., 76:196-201, 5 figs.

A revision of the genus *Ceratocorys,* based on skeletal morphology. Univ. Calif. Publ. Zool., 6:177-187.

1911

Contributions of Alexander Agassiz to marine biology. Int. Rev. d. ges. Hydrobiol. u. Hydrogr., 4:39-43, 1 pl.

Dinoflagellata of the San Diego region. IV. The genus *Gonyaulax,* with notes on its skeletal morphology and a discussion of its generic and specific characters. Univ. Calif. Publ. Zool., 8:187-269, 9 pls., 5 figs.

Dinoflagellata of the San Diego Region. V. On *Spiraulax,* a new genus of the Peridinida. Univ. Calif. Publ. Zool., 8:295-300, 1 pl.

The evolution of animal life, the facts and factors. Outline of lectures in general science 2. Univ. Calif. Syllabus Series, no. 23, pp. 1-27.

New genera and species of Dinoflagellates. Reports on the scientific results of the expedition to the eastern tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission steamer "Albatross," from October, 1904, to March, 1905. XXII. Bull. Mus. Comp. Zool., 54:267-302.

On a self-closing plankton net for horizontal towing. Univ. Calif. Publ. Zool., 8:311-348, pls. 22-25.

On an improved form of self-closing water-bucket for plankton investigations. Univ. Calif. Publ. Zool., 8:349-352, 2 pls.

On the skeletal morphology of *Gonyaulax catenata* (Levander). Univ. Calif. Publ. Zool., 8:287-294, pl. 18.

1912

The evolution of animal life, the facts and factors. Outline of lectures in general science 2. Univ. Calif. Syllabus Series, no. 30, pp. 1-25

The faunal relations of the Dinoflagellata of the San Diego region. Proc. 7th Internat. Zoöl. Cong. Boston, 1907, pp. 922-927. (An advance separate was issued in 1910)

Haeckel's *Sethocephalus eucecryphalus* (Radiolaria) a marine ciliate. Univ. Calif. Publ. Zool., 9:353-357.

A new apparatus for marine exploration. Recently invented deep-sea nets. Sci. Amer., 106:174.

A new horizontal self-closing plankton net. Int. Rev. d. ges. Hydrobiol. u. Hydrogr., 5:91-92, 1 pl.

(With C. M. Haring.) Observations concerning the pathology of roup and chicken-pox. Amer. Vet. Rev., 40:717-728.

(With Edna Earl Watson.) On the orientation of Gyrocotyle and of the cestode strobila. Proc. 7th Internat. Zoöl. Cong. Boston, 1907, pp. 187-191, figs. 1-3. (An advance separate was issued in 1910)

(With Josephine Rigden Michener.) On the structure and relationships of *Dinosphaera palustris* (Lemm.) Univ. Calif. Publ. Zool., 11:21-28, figs. 1-8.

A peculiar form of schizogony in Gonyaulax. Reports on the scientific results of the expedition to the eastern tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission steamer "Albatross," from October, 1904, to March, 1905. XXIV. Bull. Mus. Comp. Zool. 54:335-348, 2 figs., 2 pls.

Significance of certain forms of asymmetry of the Dinoflagellates. Proc. 7th Internat. Zoöl. Cong. Boston, 1907, pp. 928-931. (An advance separate was issued in 1910)

1914

Die Aufgaben der biologischen Stationen. Int. Rev. d. ges. Hydrobiol. u. Hydrogr., 6:1-16, 1 pl., 2 maps.

Laboratory instructions for zoology. General zoology, first half-year. Univ. Calif. Syllabus Series, no. 50, 58 pp.

Phytomorula regularis, a symmetrical protophyte related to *Coelastrum.* Univ. Calif. Publ. Bot., 6:35-40, pl. 7.

1915

The evolution of the protozoan nucleus and its extranuclear connections. Science, n.s. 42:658. (Abstract of report before American Association for the Advancement of Science, San Francisco, Aug. 6)

Instruction of teachers in sex hygiene. 1st Ann. Rept. Amer. Soc. Hyg. Assn., pp. 116-122.

Marine biology on the Pacific coast. *In* American Association for the Advancement of Science, Pacific Coast Committee. Nature and Science on the Pacific Coast. San Francisco, Paul Elder, pp. 124-132, pls. 16-18, figs. 12-13.

(With Olive Swezy.) Mitosis and mutiple fission in trichomonad flagellates. Proc. Amer. Acad. Arts Sci., 51:289-378, pls. 1-8, figs. A-G.

Mitosis in Trichomonas. Proc. Nat. Acad. Sci., 1:315-321, figs. 1-9.

Notes on the Tintinnoina. 1. On the probable origin of *Dictyocysta tiara* Haeckel. 2. On *Petalotricha entzi* sp. nov. Univ. Calif. Publ. Zool., 16:63-69, figs. 1-8.

(With Elizabeth Bohn Christiansen.) On binary and multiple fission in *Giardia muris* (Grassi). Univ. Calif. Publ. Zool., 16:30-54, pls. 5-8, fig. A.

(With Elizabeth Bohn Christiansen.) On *Giardia microti* sp. nov., from the meadow mouse. Univ. Calif. Publ. Zool., 16:23-29, 1 fig.

On the life-history of *Giardia*. Proc. Nat. Acad. Sci., 1:547-552, 1 fig.

On the relative numbers of rhizopods and flagellates in the fauna of soils. Science, n.s. 42:937-940, 1 fig.

The probable effect of the European war upon the human stock. Calif. Outlook, 17, no. 19:19-23.

A reliable method for obtaining amoeba for class use. Trans Amer. Micros. Soc., 34:271-274.

1916

(With Irene McCulloch.) On *Trypanosoma triatomae,* a new flagellate from a hemipteran bug from the nests of the wood rat *Neotoma fuscipes.* Univ. Calif. Publ. Zool., 16:113-126, pls. 14-15.

1917

The biological and medical significance of the intestinal flagellates. Proc. 2nd Pan Amer. Sci. Cong., Washington, 1915-16, 10:546-565.

Hookworm among miners. Mo. Bull. Calif. State Bd. Health, 13:224-225.

Laboratory instructions for zoology 1A. General zoology, first half-year, 1917-18. Univ. Calif. Syllabus Series, no. 87, 77 pp.

(With Olive Swezy.) On the orientation of *Erythropsis.* Univ. Calif. Publ. Zool., 18:89-102, figs. 1-12.

1917-18

Monthly report of the Biological Division, July 1917-Jan. 1918, Mo. Bull. Calif. State Bd. Health, 13:122-123, 170-171, 224-225, 281, 334, 377-378, 430-431. (Sept. 1917-Mar. 1918)

1918

(With W. W. Cort.) Hookworm a communicable and compensable disease. Mo. Bull. Calif. State Bd. Health, 13:405-414, pls. 1-2, figs. 1-3.

(With W. W. Cort.) Laboratory instructions for zoology 1A. General zoology, first half-year, 1918-1919. Univ. Calif. Syllabus Series. no. 92, 70 pp.

(With Marshall A. Barber.) Rapid method of detection of ova of intestinal parasites in human stools. J. Amer. Med. Assn., 71:1557-1561. *Also issued* as v. 1, no. 1 of Reprint Series in Parasitology, Calif. State Bd. Health, Bur. Comm. Dis., Div. Paras.

(With William W. Cort.) Sanitation in mines for the prevention and eradication of hookworm. Special Bull. Calif. State Bd. Health, no. 28, 12 pp., 2 pls., 3 figs.

1919

(With Sidney I. Kornhauser and Olive Swezy.) Criterions for distinguishing the Endamoeba of amebiasis from other organisms. Arch. Int. Med., 24:35-50, figs. 1-43.

(With Olive Swezy.) Flagellate affinities of Trichonympha. Proc. Nat. Acad. Sci., 5:9-16, figs. 1-10.

(With Sidney I. Kornhauser and J. T. Plate.) Intestinal parasites in overseas and home service troops of the U. S. Army with especial reference to carriers of amebiasis. J. Amer. Med. Assn., 72:1721-1724; *Also issued* as v. 1, no. 6 of Reprint Series in Parasitology, Calif. State Bd. Health, Bur. Comm. Dis., Div. Paras., 11 pp.

Intestinal protozoan infections in United States Army troops. Trans. Amer. Gastro-Enterol. Assn., 22:262-273.

Laboratory instructions for zoology 1A. General zoology, first half-year, 1919-1920. Univ. Calif. Syllabus Series, no. 99, 75 pp.

(With Marshall A. Barber.) Un metodo rapido para encontrar en las heces los huevos de parasitos intestinales. Gac. Med. Caracas, 26: 87-90, 98-101.

(With A. W. White.) A new nematode infection of man. J. Amer. Med. Assn., 72:567-569; *Also issued* as v. 1, no. 4 of Reprint Series in Parasitology, Calif. State Bd. Health, Bur. Comm. Dis., Div. Paras.

(With W. C. Boeck, D. E. Minnich and J. H. Rogers.) On the treatment of giardiasis in rats with arsenobenzol. J. Med. Res. 39 (n.s. 34):293-299. *Also issued* as v. 1, no. 2 of Reprint Series in Parasitology, Calif. State Bd. Health, Bur. Comm. Dis., Div. of Paras.

(With Sidney I. Kornhauser and Olive Swezy.) Structure and systematic relationships of the "iodine cysts" from human feces. Mil. Surg., 45:30-43, 25 figs.

(With Olive Swezy.) Studies on the parasites of the termites. I. On *Streblomastix strix,* a polymastigote flagellate with a linear plasmodial phase. Univ. Calif. Publ. Zool., 20:1-20, pls. 1-2, 1 fig.

(With Olive Swezy.) Studies on the parasites of the termites. II. On *Trichomitus termitidis,* a polymastigote flagellate with a highly developed neuromotor system. Univ. Calif. Publ. Zool., 20:21-40, pls. 3-4, figs. a-b.

(With Olive Swezy.) Studies on the parasites of the termites. III. On *Trichonympha campanula* sp. nov. Univ. Calif. Publ. Zool., 20:41-98, pls. 5-12, figs. a-d.

(With Olive Swezy.) Studies on the parasites of the termites. IV. On *Leidyopsis sphaerica* gen. nov., sp. nov. Univ. Calif. Publ. Zool., 20:99-116, pls. 13-14, fig. A.

1919-20

Summary of examinations made in the Division of Parasitology during August, 1919 (-March 1920). Mo. Bull. Calif. State Bd. Health, 15:115, 155, 199, 231, 264, 294, 316, 336. (Oct. 1919-Apr. 1920)

1920

A critical review of the nomenclature of human intestinal flagellates, Cercomonas, Chilomastix, Trichomonas, Tetratrichomonas, and Giardia. Univ. Calif. Publ. Zool., 20:145-168, figs. 1-9.

(With Olive Swezy.) The flagellate infections of the human digestive tract. Nelson's Loose Leaf Encyclopedia of Living Medicine, 5:365-398, pls. 1-6, figs. 1-59.

Hookworm and amoebiasis in California. Calif. State J. Med., 18:329-332.

(With Pirie Davidson and W. F. Hamilton.) Laboratory instructions for zoology 1A. General zoology, first half-year, 1920-1921. Univ. Calif. Syllabus Series, no. 92.

A new morphological interpretation of the structure of *Noctiluca,* and its bearing on the status of the Cystoflagellata (Haeckel). Univ. Calif. Publ. Zool., 19:317-334, pl. 18, figs. A-I.

(With Olive Swezy.) On the morphology and mitosis of Chilomastix mesnili (Wenyon). A common flagellate of the human intestine. Univ. Calif. Publ. Zool., 20:117-144, pls. 15-17, figs. A-B.

(With Olive Swezy.) On the prevalence of carriers of Endamoeba dysenteriae among soldiers returned from overseas service. New Orleans Med. Surg. J., 73:4-11; *also in* Amer. J. Trop. Med., 1:41-48, 1921.

1921

(Biennial report of the) Division of Parasitology (July 1, 1918, to June 30, 1920). 26th Bien. Rept. Calif. State Bd. Health, pp. 31-33.

(With Olive Swezy.) Councilmania lafleuri, a new amoeba of the human intestine. Proc. Soc. Exper. Biol. Med., 18:310-312.

A critical discussion of the chromidial formation of nuclei, of autogamy, and of the multiple division of polyenergid nuclei, with especial reference to the unity of the mechanism of heredity in the Protozoa and Metazoa. Symposium on fertilization, 81. Anat. Rec., 20:223-225.

(With Olive Swezy.) The free-living unarmored Dinoflagellata. Univ. Calif. Mem., 5, 562 pp., 12 pls., 388 figs.

The marine borers of the San Francisco Bay region. Report San Francisco Marine Piling Survey, 1:23-61, 1 fig. (Revised ed. issued the same year has the same pagination)

(With Olive Swezy.) On the free, encysted, and budding stages of Councilmania lafleuri, a parasitic amoeba of the human intestine. Univ. Calif. Publ. Zool., 20:169-198, pls. 18-22, figs. A-C.

(With John P. Tucker.) On the relationship of infection by hookworm to the incidence of morbidity and mortality in 22,842 men of the United States Army Camp at Bowie, Texas, from October 1917, to April 1918. Amer. J. Hyg., 1:79-117, figs. 1-3.

1921-22

Summary of examinations made in the Division of Parasitology during the month of April, 1921 (-Nov. 1921). Mo. Bull. Calif. State Bd. Health, 17:41, 97, 136, 183, 222, 258, 289. (July 1921-Jan. 1922)

1922

(With L. M. Boyers and Olive Swezy.) Amebiasis in relation to arthritis deformans and to Hodgkin's disease. Proc. N. Y. Path. Soc., n.s. 22:120-126.

(With Luther M. Boyers and Olive Swezy.) Amebiasis of the bones. J. Amer. Med. Assn., 78:1602-1604, figs. 1-7.

(With Robert C. Miller.) Biological section, San Francisco Marine Piling Survey Report, 2:72-82.

(With Olive Swezy and Luther M. Boyers.) The coexistence of Hodgkin's disease and amebiasis. J. Amer. Med. Assn., 78:532, 1147.

(With Luther M. Boyers and Olive Swezy.) Endamoeba dysenteriae in the lymph glands of man in Hodgkin's disease. Univ. Calif. Publ. Zool., 20:309-312, figs. 1-4.

The geographical distribution of hookworm infection in the United States, detected in army recruits. Amer. J. Trop. Med., 2:389-396.

1922-25

Investigation on intestinal protozoa. Yearbook Carnegie Institution of Washington, 21:323; 22:279-280; 23:228-229; 24:283.

Microscopic organisms in reservoirs in relation to the aesthetic qualities of potable waters. J. Amer. Water Works. Assn., 10:183-191.

(With Olive Swezy.) Mitosis and fission in the active and encysted phases of Giardia enterica (Grassi) of man, with a discussion of origin of bilateral symmetry in the polymastigote flagellates. Univ. Calif. Publ. Zool., 20:199-234, pls. 23-26, figs. A-K.

Mitosis in Endamoeba dysenteriae in the bone marrow in arthritis deformans. Univ. Calif. Publ. Zool., 20:301-307, figs. 1-7.

(With Luther M. Boyers and Olive Swezy.) Occurrence of Endameba dysenteriae in the lesions of Hodgkin's disease. J. Amer. Med. Assn., 78:1604-1607, 7 figs.

(With Olive Swezy.) On the occurrence of the Endamoeba dysenteriae in bone lesions in arthritis deformans. Calif. State J. Med., 20:59.

Technique for staining the Amoeba with iron haematoxylin. China Med. J., 36:406-409, 2 pls.

1922-23

(Quarterly report of the) Division of Parasitology, January, 1922-February, 1923. Quart. Bull. Calif. State Bd. Health, v. 1, no. 1, pp. 16-17; v. 1, no. 2, pp. 18, 21, 24; v. 1, no. 3, pp. 25-26; v. 1, no. 4, pp. 23-24; v. 2, no. 1, pp. 21-22.

1923

Amoeba and man. Univ. Calif. Chronicle, 25:149-312, 6 pls.

(Biennial report of) the Division of Parasitology, July 1, 1920, to June 30, 1922. 27th Bien. Rep. Calif. State Bd. Health, pp. 87-95.

(With Robert C. Miller.) Biological section. San Francisco Bay Marine Piling Survey Report, 3:40-55, pls. 1-6, 2 maps.

An early account of the California condor. The Condor, 25:29-30.

The life cycle of the Protozoa. Science, n.s. 57:397-408.

A little known ornithological journal and its editor, Adolphe Boucard, 1839-1904. The Condor, 25:85-89.

(With Henry H. P. Severin and Olive Swezy.) Nelson's spiral bodies in tomato mosaic not protozoans. Phytopathology, 13:330-331.

(With Olive Swezy and John F. Kessel.) On the genus Councilmania, budding intestinal amoebae parasitic in man and rodents. Univ. Calif. Publ. Zool., 20:431-445, figs. 1-19.

(With Olive Swezy.) On the morphology and behavior of Pentatrichomonas ardin delteili (Derrieu and Raynaud). Univ. Calif. Publ. Zool., 20:373-390, pl. 37, fig. A.

Parasitism and evolution. Science, n.s. 57:593. (Abstract of report before National Academy of Sciences, Washington, Apr. 23-25)

Pasteur and the science of biology. Sci. Mo., 16:658-662.

The preservation of our streams and lakes. Izaak Walton League Monthly 1:523, 550.

Preventive medicine and sanitation in relation to human efficiency. J. Western Soc. Eng., 28:195-213, 18 figs., *Also in* Nation's Health, 6:80-82, 1924.

(With Robert C. Miller.) An unusual occurrence of rock boring mollusks in concrete on the Pacific Coast. Science, n.s. 57:383-384.

1924

The cytology of Endamoeba gingivalis (Gros) Brumpt compared with that of E. dysenteriae with special reference to the determination of the amoebas in bone marrow in arthritis deformans of Ely's second type. Univ. Calif. Publ. Zool., 26:165-198, pls. 14-18, figs. A-G; *Also in* J. Amer. Dent. Assn., 12:175-196, 1925.

(With Olive Swezy.) Karyamoeba falcata, a new amoeba from the human intestinal tract. Univ. Calif. Publ. Zool., 26:221-242, pls. 23-24, figs. A-B.

(With Olive Swezy.) A note on Dr. Gunn's difficulties with Councilmania. J. Paras., 10:153-157.

On guard at the southern gate. Nation's Health, 6:790-791.

On the distinctions between Endamoeba coli and Councilmania lafleuri. Univ. Calif. Publ. Zool., 26:21-39, figs. 1-24.

On the revealing and concealing coloration of birds: an unpublished letter by Theodore Roosevelt. The Condor, 26:94-98, 1 fig.

Outwitting the marine borers. Popular Research Narratives, 1:74-76. Engineering Foundation, Baltimore, Williams & Wilkins. (Presented Feb. 1, 1922)

(With Olive Swezy.) Pentatrichomoniasis in man. Amer. J. Trop. Med., 4:33-41, 1 fig.

Ravages of the Teredo in San Francisco Bay. Calif. Month., 18:215-216, 3 figs.

(With Luther M. Boyers and Olive Swezy.) Systemic infections by Endamoeba dysenteriae. Proc. Internat. Conf. Health Problems Trop. Amer., Kingston, Jamaica, p. 381-399.

1925

(With Edna Hannibal Wagener.) The behavior of Endamoeba dysenteriae in mixed cultures with bacteria. Univ. Calif. Publ. Zool., 28:127-154, pls. 13-15.

(With Luther M. Boyers and Olive Swezy.) Chronic human amebiasis; a review of the diagnosis and treatment on the basis of encystment in the liver area. J. Amer. Med. Assn., 85:1441-1447, figs. 1-6.

The hardy Teredo. Architect and Engineer, 81:105-108, 2 figs.

Human amoebiasis with special reference to the chronic phase. Texas State J. Med., 21:347-350.

The human values in biology. Univ. Texas Bull., no. 2545:26-42.

(With Olive Swezy.) Karyamoebina substituted for Karyamoeba, with a note on its occurrence in man. Uinv. Calif. Publ. Zool., 26:435-436.

(With Olive Swezy.) On the number of chromosomes and the type of mitosis in Endamoeba dysenteriae. Univ. Calif. Publ. Zool., 26:331-352, pls. 31-33, fig. A.

(With Olive Swezy and Luther M. Boyers.) A report on an investigation of intestinal protozoan infections at Santa Marta, Colombia, in the hospital of the United Fruit Company, with special reference to the incidence of amoebiasis. Ann. Rept. United Fruit Co., Med. Dept., 14:140-153.

(With Edna Hannibal Wagener.) Studies of the effects of certain drugs upon Endamoeba dysenteriae in vitro. Univ. Calif. Publ. Zool., 28:155-166.

1926

Hand washing, a health ritual. Nation's Health, 8:265-266.

The occurrence of cysts of Councilmania lafleuri Kofoid and Swezy in the duodenal drainage. Proc. Soc. Exper. Biol. Med., 23:299.

(With Olive Swezy.) On Oxymonas, a flagellate with an extensile and retractile proboscis from Kalotermes from British Guiana. Univ. Calif. Publ. Zool., 28:285-300, pl. 30, figs. a-e.

On Oxyphysis oxytoxoides gen. nov., sp. nov. A dinophysoid dinoflagellate convergent toward the peridinioid type. Univ. Calif. Publ. Zool., 28:203-216, pl. 18.

(With Olive Swezy.) On Proboscidiella multinucleata gen. nov., sp. nov., from Planocryptotermes nocens from the Philippine Islands, a multinucleate flagellate with a remarkable organ of attachment. Univ. Calif. Publ. Zool., 28:301-316, pls. 31-32, figs. a-d.

(With Ena A. Allen.) On the culture in vitro of Councilmania laflueri and Endamoeba coli. Proc. Soc. Exper. Biol. Med., 23:300-301.

(With Edna Hannibal Wagener.) A simplified medium for the cultivation of Endameba dysenteriae. J. Lab. Clin. Med., 11:683.

Statistical summary of fecal examinations for protozoa and worms made in the Division of Parasitology, State Hygienic Laboratory, California

State Board of Health, for the biennium July 1, 1924 to June 30, 1926. 29th Bien. Rept. Calif. State Bd. Health, pp. 93-94.

Statistical summary of persons examined for protozoa and worms in the Division of Parasitology, State Hygienic Laboratory, California State Board of Health, for the biennium July 1, 1924 to June 30, 1926. 29th Bien. Rept. Calif. State Bd. Health, p. 93.

1927

(With Robert Miller, et al.) Biological section. Marine borers and their relation to marine construction on the Pacific Coast. Final report of the San Francisco Bay Marine Piling Committee, pp. 188-351, figs. 68-143, tables 28-45.

(Greater efficiency of E. B. I. and emetine in treating infection with *Entamoeba histolytica;* a new amoeba, *Councilmania dissimilis.*) Lancet, 213:707. (Abstract of report before British Medical Association Annual meeting, Edinburgh, July 20)

The higher values of the zoological park. Bull. Zool. Soc. San Diego, no. 2, 16 pp.

(C. L. Hill and C. A. Kofoid, editors.) Marine borers and their relation to marine construction of the Pacific Coast, being the final report of the San Francisco Bay Marine Piling Committee, prepared under the direction of the San Francisco Bay Marine Piling Committee, cooperating with the National Research Council and the American Wood-preservers' Association. 357 pp., 143 figs., 45 tables, 1 map.

On Councilmania dissimilis sp. nov., an intestinal amoeba from man. Univ. Calif. Publ. Zool., 31:7-16, pls. 1-2.

1928

Councilmania tenuis and C. dissimilis, intestinal amebas of man. Arch. Int. Med., 41:558-573, figs. 1-5.

(With Tage Skogsberg.) The Dinoflagellata: the Dinophysoidae. Reports on the scientific results of the expedition to the eastern tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission steamer "Albatross," from October, 1904, to March, 1905. XXXV. Mem. Mus. Comp. Zool., 51:1-766, 31 pls., 103 figs.

(With Elizabeth Custer Nasset.) The effects of radium and radium in combination with metallic sensitizers on Endamoeba dysenteriae in vitro. Univ. Calif. Publ. Zool., 31:387-416, pls. 16-17, figs. 1-7.

Intestinal parasites. *In* The Medical Department of the United States Army in the World War, U. S. Surgeon-General's Office, v. 9. Communicable and Other Diseases, by Joseph F. Siler, pp. 529-549.

(With Mary Louise Dodds.) Relationships of the Opalininae. Anat. Rec., 41:51.

1929

About termites. Calif. Month., 22:11-13, 52, 3 figs.

(With H. Corwin Hinshaw and Herbert G. Johnstone.) Animal parasites of the mouth and their relation to dental disease. J. Amer. Dental Assn., 16:1436-1455, figs. 1-5.

Biennial report of the Division of Parasitology, July 1, 1926 to June 30, 1928. 30th Bien. Rept. Calif. Dept. Pub. Health, pp. 122-125.

(With Arthur S. Campbell.) A conspectus of the marine and fresh-water ciliata belonging to the suborder Tintinnoinea, with descriptions of new species principally from the Agassiz expedition to the eastern tropical Pacific, 1904-1905. Univ. Calif. Publ. Zool., 34:1-403, figs. 1-697.

(With Herbert G. Johnstone.) The cultivation of Endameba gingivalis (Gros) from the human mouth. Amer. J. Pub. Health, 19:549-552.

The genus Councilmania, amoeba parasitic in man and rodents. 10. Internat. Cong. Zool., Budapest, pp. 861-878, 6 figs.

(With E. A. Garland.) Mode of attack of the sound-wood termite on a city building. Architect and Engineer, 99, no. 2:87-90, 2 figs.

The protozoa of the human mouth. J. Paras., 15:151-174. (Presidential address, American Society of Parasitologists, New York, Dec. 29, 1928)

Termites in relation to buildings, and other industrial uses of wood. Proc. San Francisco section, Amer. Soc. Civil Eng., 25, no. 1, pp. 4-8.

Why is there a termite problem in California? Report on the symposium on termite problems of the Termite Investigations Committee, Sept. 2-13, 1929, San Francisco, pp. 15-23; *Also in* Proc. 26th Annual Meeting Amer. Wood-Preservers' Assn., 1930. pp. 298-306.

1930

Factors in the evolution of the pelagic ciliata, the Tintinnoinea. Contributions to Marine Biology, Stanford Univ. Press, pp. 1-39, figs. 1-31.

(With Herbert G. Johnstone.) The oral amoeba of monkeys. Univ.

Chronic amoebiasis. (Proc. 8th Japanese Medical Congress, Osaka. (Nippon igakkaishi)), pp. 73-83.

(With Ronald F. MacLennan.) Ciliates from Bos indicus Linn. I. The genus Entodinium Stein. Univ. Calif. Publ. Zool., 33:471-544, pls. 49-52, figs. A-Q.

Calif. Publ. Zool., 33:379-392, pls. 41-42.

1931

(With Ethel McNeil and M. J. Kopac.) Chemical nature of the cyst wall in human intestinal protozoa. Proc. Soc. Exper. Biol. Med., 29:100-102.

Protozoan fauna of Mutsu Bay. Subclass Dinoflagellata; Tribe Gymnodiniodae. Report of the biological survey of Mutsu Bay. 18. Sci. Reports, Tohoku Imp. Univ. Sendai, ser. 4, Biology, 6:1-43, 3 pls., 12 figs.

1932

(With Ethel McNeil.) The advantages of Locke's blood medium in the culture of parasitic protozoa of the digestive tract. Amer. J. Hyg., 15:315-317.

(With R. F. MacLennan.) Ciliates from Bos indicus Linn. II. A revision of Diplodinium Schuberg. Univ. Calif. Publ. Zool., 37:53-152, pls. 4-7, figs. A-J.

(With Ethel McNeil and Relda Cailleau.) Electrometric pH determinations of the walls and contents of the gastro-intestinal tracts of normal albino rats. Univ. Calif. Publ. Zool., 36:347-355.

1933

(With R. F. MacLennan.) Ciliates from Bos indicus Linn. III. Epidinium Crawley, Epiplastron gen. nov., and Ophryoscolex Stein. Univ. Calif. Publ. Zool., 39:1-33, 1 pl., figs. A-E.

(With E. McNeil and A. Bonestell.) Correlation of the distribution of the protozoa in the intestine of Rattus norvegicus with the hydrogen ion concentration of the intestinal contents and wall. Univ. Calif. Publ. Zool., 39:179-190, figs. 1-3.

(With Alastair Martin Adamson.) The Dinoflagellata: the family Heterodiniidae of the Peridiniodiae. Reports on the scientific results of the expedition to the eastern tropical Pacific, in charge of Alexander Agassiz, by the U. S. Fish Commission steamer "Albatross," from October, 1904, to March, 1905. XXXVI. Mem. Mus. Comp. Zool., 54:3-136, 22 pls.

(With E. McNeil and A. E. Bonestell.) Diseased rats showing increase of Giardia and a septicemic Bacillus coli. Proc. Soc. Exper. Biol. Med., 30:1339-1341.

(With Fae Donat.) Experimental infection with Trypanosoma cruzi from intestine of cone-nose bug, Triatoma protracta. Proc. Soc. Exper. Biol. Med., 30:489-491.

(With Fae Donat.) The experimental transfer of *Trypanosoma cruzi* from naturally infected *Triatoma protracta* to mammals in California. Bull. Soc. Path. Exot., 26:257-259.

(With Fae Donat.) South American trypanosomiasis of the human type—occurrence in mammals in the United States. Calif. and West. Med., 38:245-249, figs. 1-5.

1934

American trypanosomiasis. The northward extension of Brazilian trypanosomiasis, or Chagas' disease, among mammals in California. Proc. 5th Pacific Sci. Cong., Vancouver, 1933, 4:3075-3078.

Arsine hazard; arsenic not a termite barrier. Architect and Engineer, 119, no. 1:47-50.

(With John F. Christenson.) Ciliates from Bos gaurus H. Smith. Univ. Calif. Publ. Zool., 39:341-391, pls. 25-29, figs. A-G.

The distribution of the pelagic ciliates in the eastern tropical Pacific. Proc. 5th Pacific Sci. Cong., Vancouver, 1933, 3:2159-2161.

An interpretation of the conflicting views as to the life cycle of the Foraminifera. Science, n.s. 79: 436-437.

(C. A. Kofoid, editor and contributor.) Termites and termite control. Berkeley, Univ. Calif. Press. 795 pp., 182 figs. (Issued Jan. 1934; 2nd ed. rev., Dec. 1934.)

What to do about termites. Progressive Contractor, 15:10-12, 2 figs.

1935

The biological significance of the life cycle of the Protozoa. Moscow. Vsesoiuznyi Institut Eksperimental noi Meditsiny. Otdel Meditsinskoi Parazitologii, Trudy, v. 1. Parasity, Perenoschiki i Iadovitye Zhivotnye, p. 373-376. ("Receuil des travaux dédié au 25-me anniversaire scientifique du Professeur Eugene Pavlovsky, 1909-1934".)

(With E. McNeil and A. E. Bonestell.) A comparison of the distribution of the intestinal protozoa of the Norway rat, wood rat, and guinea pig with reference to the hydrogen ion concentrations as determined by the glass electrode. Univ. Calif. Publ. Zool., 41:1-8.

(With F. D. Wood and E. McNeil.) The cycle of Trypanosoma cruzi in tissue culture of embryonic heart muscle. Univ. Calif. Publ. Zool., 41:23-24.

The fight against termites. Sci. Mo., 40:275-278.

(With Owen L. Williams.) The nematode Thelazia californiensis as a parasite of the eye of man in California. Arch. Ophth., 13: 176-180, figs. 1-5.

On two remarkable ciliate Protozoa from the caecum of the Indian elephant. Proc. Nat. Acad. Sci., 21:501-506, figs. 1-5.

The termite fight. Architect and Engineer, 120:45-48.

1936

(With F. Forest Whedon.) (Dinoflagellata of the San Francisco region. I. On the skeletal morphology of two new species, Gonyaulax catenella and G. acatenella. Univ. Calif. Publ. Zool., 41:25-34, figs. 1-16.

Has biology advanced in the last twenty-five years? Univ. of Southern Calif. Proceedings 25th Anniversary Celebration of the Inauguration of Graduate Studies, p. 229-235.

(With Mildred Bush.) The life cycle of *Parachaenia myae* gen. nov., sp. nov., a ciliate parasitic in *Mya arenaria* Linn. from San Francisco Bay, California. Bull. Musée Roy. d'Hist. Nat. Belg., 12, no. 22: 1-15, figs. 1-29.

(With Bruce G. Whitaker.) Natural infection of American human trypanosomiasis in two species of cone-nosed bugs, *Triatoma protracta* Uhler and *Triatoma uhleri* Neiva, in the western United States. J. Paras., 22:259-263.

1937

(With Datus M. Hammond.) Continuity of structure and function in the neuromotor system of Euplotes patella during its life cycle. Proc. Amer. Phil. Soc., 77:207-218, pls. 1-3.

(With Ethel McNeil and Fae D. Wood.) Effects of arsenicals on Trypanosoma cruzi in tissue culture. J. Pharm. Exper. Therap., 59:424-428.

(With James T. Park.) A new trematode, Paramphistomum castori sp. nov., from Castor canadensis baileyi Nelson, from Mary's River, Nevada. Univ. Calif. Publ. Zool., 41:419-422, 1 fig.

(With Ethel McNeil.) Notes on various media used in the culture of intestinal protozoa. *In* Culture Methods for Invertebrate Animals, by Paul S. Galtsoff *et al*, Ithaca, N. Y., Comstock Pub. Co., pp. 86-89.

(With Hermann Sommer, W. F. Whedon and R. Stohler.) Relation of paralytic shell-fish poison to certain plankton organisms of the genus Gonyaulax. Arch. Path., 24:537-559, figs. 1-2.

(With Owen L. Williams and N. C. Veale.) Thelazia californiensis, a nematode eye worm of dog and man, with a review of the thelazias of domestic animals. Univ. Calif. Publ. Zool., 41:225-233.

1938

Francis Orpen Morris: ornithologist and anti-Darwinist. Auk, 55:496-500.

(With Datus M. Hammond.) The neuromotor system of Anaplophrya lumbrici, a degenerate ciliate, from the earthworm Octolasium cyaneum. Proc. Amer. Phil. Soc., 78:595-612, pls. 1-2.

(With W. R. Hinshaw and E. McNeil.) The presence and distribution of *Hexamita* sp. in turkeys in California. J. Amer. Med. Assn., 93:160.

(With W. R. Hinshaw and E. McNeil.) The relationship of *Hexamita* sp. to an enteritis of turkey poults. Cornell Veterinarian, 28:281-293.

1939

(With Arthur Shackleton Campbell.) The Ciliata: the Tintinnoinea. Reports on the scientific results of the expedition to the eastern tropical Pacific in charge of Alexander Agassiz by the U. S. Fish Commission steamer "Albatross," from October, 1904, to March, 1905. XXXVII. Bull. Mus. Comp. Zool., 84:1-473, 36 pls.

George Henry Falkiner Nuttall (1862-1937.) Proc. Amer. Acad. Arts Sci., 73:139-141.

The significance of the number of flagella in Trichomonadae. Volumen Jubilare pro Prof. Sadao Yoshida, Osaka, 2:59-64.

1940

(With H. R. Wessenberg and Ethel McNeil.) The action of carbarsone and two nitrogen-free organic arsenicals, 4-p-propenoneoxy-phenylarsonic acid and p-2-propanol-oxy-phenylarsonic acid, on the intestinal protozoa of rats. Univ. Calif. Publ. Pharmacology, 1:291-300.

Cell and organism. *In* The Cell and Protoplasm, Amer. Assn. Adv. Sci., Pub. no. 14, pp. 98-105.

(With Lauren E. Rosenberg.) Neuromotor system of *Opisthonecta henneguyi* (Faure-Fremiet). Proc. Amer. Phil. Soc., 82:421-430, 1 pl., figs. A-D.

(With E. McNeil and W. R. Hinshaw.) *Hexamita meleagridis* sp. nov. from the turkey. Amer. J. Hyg., Sect. C., 34:71-82, 1 fig.

The life cycle of the Protozoa. *In* Protozoa in Biological Research, by Gary N. Calkins, N. Y.: Columbia Univ. Press., pp. 563-582, figs. 135-139.

1942

The social aspects of the epidemiology of amoebic dysentery. Proc. 6th Pacific Sci. Cong., Berkeley, 1939, 5:7-10.

1943

An American pioneer in science, Dr. William Charles Wells, 1757-1817. Sci. Mo., 57:77-80.

1948

(With Mildred Bush.) Ciliates from the Sierra bighorn, Ovis canadensis sierrae Grinnell. Univ. Calif. Publ. Zool., 53:237-262, pls. 24-25.