PHYSICS SECTION

Chairman, E. K. Plyler, University of North Carolina
Secretary, C. N. Warfield, Woman's College

The thirty-third annual meeting of the North Carolina Academy of Science will be held at the University of North Carolina, Chapel Hill, N. C., in the spring of 1934.

H. R. TOTTEN,
Secretary

THE INDIANA ACADEMY OF SCIENCE

THE Indiana Academy of Science met from May 25 to 27, 1933, at Clifty Falls State Park for its regular spring meeting. The formal address was given by Mr. Curtis Marshall, president of the Jefferson County Historical Society, on "Some Incidents in Local History." The primary purpose of the spring meeting is to study regions of particular geological, botanical or zoological interest, so that one whole day was spent in field trips to the Fourteen-mile Creek area, Rose Island, and to the Forestry Farm near Henryville.

The forty-eighth annual fall meeting of the academy was held at South Bend, from November 17 to 19, 1932, the academy being the guests of the University of Notre Dame. Dr. Fernandus Payne, Indiana University, was chairman of the meeting. A total of 116 papers on bacteriology, botany, chemistry, geology and geography, physics and mathematics and zoology were presented. The meeting closed with the annual dinner, held in the faculty dining room of the University of Notre Dame, at which the following officers were chosen for 1933: Marcus W. Lyon, Jr., South Bend, *president;* H. S. Markle, Earlham College, *vice-president;* Ray C. Friesner, Butler University, *secretary;* Paul Weatherwax, Indiana University, *treasurer;* Stanley A. Cain, Indiana University, *editor;* Will E. Edington, DePauw University, *press secretary.* The fall meeting for 1933 will be held from October 12 to 14, at Indiana University.

WILL E. EDINGTON,
Press Secretary

REPORTS

APPROPRIATIONS FOR GRANTS-IN-AID BY THE NATIONAL RESEARCH COUNCIL

THE Committee on Grants-in-Aid of the National Research Council made seventy-four grants last spring for the support of individual research, as follows, from 249 applications received:

Kenneth T. Bainbridge, Bartol Research fellow, Bartol Research Foundation of the Franklin Institute, isotopes of light chemical elements; S. J. Barnett, professor of physics, University of California at Los Angeles, a gyrostatic method for the process of magnetization in strong fields; J. W. Beams, professor of physics, University of Virginia, magneto-optical method of chemical analysis of solutions; Samuel L. Boothroyd, professor of astronomy, Cornell University, the spectra of O, B and A type stars at the Lowell Observatory Mountain Station, Arizona; G. Breit, professor of physics, L. P. Granath, instructor in physics, and J. L. Rose, instructor in physics, New York University, measurement of hyperfine structure of spectral lines; Jesse W. M. DuMond, research associate in physics, California Institute of Technology, the construction of a high energy x-ray tube; S. A. Mitchell, director, Leander McCormick Observatory, University of Virginia, the spectra and photographic magnitudes of faint stars; Harald H. Nielsen, professor of physics, Ohio State University, the infrared region of the spectrum; Thomas C. Poulter, professor of physics, Iowa Wesleyan College, physical observations in connection with the second Byrd Antarctic Expedition; Francis G. Slack, associate professor of physics, Vanderbilt University, the magnetic rotation of the plane of polarization of light; J. C. Stearns, professor of physics and mathematics, University of Denver, distribution of the intensity of cosmic rays at high altitudes.

Corbin T. Eddy, associate professor of metallurgy, Michigan College of Mining and Technology, development of a thermo-analyzer; Richard H. Frazier, assistant professor of electrical engineering, Massachusetts Institute of Technology, Thompson effect in electric circuits; Kenneth G. Merriam, assistant professor of aeronautical engineering, Worcester Polytechnic Institute, air flow around standard pitot-static heads.

Francis E. Blacet, instructor in chemistry, University of California at Los Angeles, the effects of monochromatic ultra-violet radiation upon organic substances in the vapor phase; Charles B. Hurd, professor of chemistry, Union College, the process of setting of silicic acid gels; I. M. Kalthoff, professor of analytical chemistry, University of Minnesota, internal structural changes taking place in fresh precipitates of lead sulfate; Gilbert N. Lewis, professor of chemistry, University of California, the separation and properties of pure isotopes; James W. McBain, professor of chemistry, Stanford University, construction of an ultracentrifuge; William A. Noyes, Jr., associate professor of chemistry, Brown University, absorption spectra of organic compounds, particularly ketones; H. I. Schlesinger, professor of chemistry, University of Chicago, hybrides of boron.

Charles I. Alexander, assistant professor of geology, Texas Christian University, fossil Ostracoda of Texas; Ira S. Allison, professor of geology, Oregon State Agricultural College, Pleistocene history of the Willamette Valley, Oregon; Ralph L. Belknap, assistant professor of geology, University of Michigan, upper air conditions over the Greenland Ice Gap; Margaret Fuller Boose, Madison, Wisconsin, granites of the Front Range, Colo-

rado; Arthur Keith, U. S. Geological Survey, mountain building in New England and Quebec as evidenced by Ordovician and Silurian formations; Kenneth K. Landes, associate professor of geology, University of Kansas, study of the molybdenite-bearing pegmatite at Climax, Colorado; J. F. Lutz, assistant professor of soils, North Carolina State College, the physical and chemical properties of soils which affect soil erosion; Evans B. Mayo, instructor in petrography, Cornell University, the Sierra Nevada granites between Mono Lake and Round Valley, California; Elizabeth McCoy, assistant professor of agricultural bacteriology, University of Wisconsin, the rôle of microorganisms in the diagenesis of the sediments of a fresh-water lake; Raymond C. Moore, professor of geology, University of Kansas, stratigraphic and paleontologic studies of the Carboniferous rocks in Wyoming; Francis L. Parker, research assistant, Cushman Laboratory for Foraminiferal Research, the genus *Bulimina* and related genera; William F. Prouty, professor of geology, University of North Carolina, the Silurian system in the Southern Appalachian Mountains; C. Warren Thornthwaite, assistant professor of geography, University of Oklahoma, the climatic basis of forest distribution in eastern North America; Samuel Weidman, professor of geology, University of Oklahoma, dolomitization, silicification and related phases of mineralization associated with the zinc-lead ore deposits of the Tri-State district.

Joseph D. Aronson, assistant professor of bacteriology, Henry Phipps Institute, relation of tuberculosis and syphilis in experimental animals; Robert Chambers, professor of biology, New York University, secretionary function in tissue culture; Ernest C. Faust, professor of parasitology, Tulane University School of Medicine, *Schistosoma mansoni* infection in Puerto Rico; Robert Gesell, professor of physiology, University of Michigan, action potentials of the nerve cells and fibers constituting the respiratory center; Arthur Grollman, associate professor of pharmacology and experimental therapeutics, Johns Hopkins University Medical School, the active principle of the adrenal cortex; Sanford B. Hooker, professor of immunology, Boston University School of Medicine, quantitative studies of precipitin reactions; E. V. McCollum, professor of chemical hygiene, School of Hygiene and Public Health, Johns Hopkins University, supplementing fat-free diets with refined fat-soluble dietary essentials; F. A. McJunkin, professor of pathology, Loyola University School of Medicine, inhibition of the proliferation of kidney cells; Valy Menkin, instructor in pathology, Harvard University Medical School, inflammatory reaction in relation to immunity; Robert A. Moore, instructor in pathology, Western Reserve University, senile changes in the prostate gland; Torald Sollman, professor of pharmacology and materia medica, Western Reserve University School of Medicine, the excretion and distribution of bismuth during clinical treatment; Hans Zinsser, professor of bacteriology and immunology, Harvard University Medical School, protective and therapeutic value of vaccines and serums in the treatment of typhus fever.

W. C. Allee, professor of zoology, University of Chicago, the relationship between numbers of animals and the rate of formation of automatisms in birds; L. R. Cleveland, assistant professor of protozoology, Harvard University Medical School, cytology and hypermastigote flagellates from termites; T. D. A. Cockerell, professor of zoology, University of Colorado, the taxonomy of the bees of Africa; Emmett R. Dunn, professor of biology, Haverford College, the amphibians and reptiles of lower Central America; Raymond E. Girton, assistant professor of plant physiology, Purdue University, the respiratory activity of plant roots; P. W. Gregory, assistant professor of animal husbandry, College of Agriculture, University of California, glutathione in relation to growth and hereditary body size in the rabbit; Mary J. Guthrie, associate professor of zoology, University of Missouri, the cytology of the organs of reproduction in mammals, with special reference to bats; Herbert C. Hanson, professor of botany, North Dakota Agricultural College, methods of analyzing quantitative data in grassland investigations; Walter N. Hess, professor of biology, Hamilton College, cataract and diabetes in trout; Robert K. Nabours, professor of zoology, Kansas State College, inheritance in Orthoptera; H. D. Reed, professor of zoology, and Myron Gordon, Heckscher research assistant, Cornell University, cytological investigations of certain species of fishes; George B. Rigg, professor of botany, University of Washington, the profiles of sphagnum bogs of the Pacific Coast region; William J. Robbins, professor of botany, University of Missouri, the growth of meristems of higher plants; A. Franklin Shull, professor of zoology, University of Michigan, wing production in aphids; Septima Smith, associate professor of zoology, University of Alabama, cystocercous Cercariae; T. L. Smith, department of zoology, Columbia University, genetical studies of the wax moth, *Galleria mellonella* L.; Mary B. Stark, professor of histology and embryology, New York Homeopathic Medical College, living cancer and sarcoma cells; F. B. Sumner, professor of biology, Scripps Institution of Oceanography, University of California, effects of optic stimuli upon the hair color of mammals; Allyn J. Waterman, instructor in biology, Brooklyn College, the organization of early mammalian embryos.

Fay-Cooper Cole, professor of anthropology, University of Chicago, pictorial survey of Mississippi Valley archeology; Harry R. DeSilva, professor of psychology, Massachusetts State College, action potentials of cutaneous nerves in rats and human beings; Franklin Fearing, associate professor of psychology, Northwestern University, the vestibular function in pigeons; J. A. Ford, archeologist, Mississippi Department of Archives and History, Indian mounds and village sites in Louisiana; Walter B. Jones, director, Alabama Museum of Natural History, archeological survey of Alabama; Robert A. McKennon, instructor in sociology, Dartmouth College, ethnographic study of a Kutchin group of Athabascan Indians in Alaska; Edward Sapir, professor of anthropology, Yale University, the preparation of a grammar, a series of texts and a dictionary of the Nootka language, of Vancouver Island, B. C.; T. C. Schneirla, assistant professor of psychology, New York University, the behavior of army ants.

The National Research Council will be ready to consider further requests for research assistance this fall. Applications should be filed with the Committee on Grants-in-Aid before October 15, 1933. Action upon these applications will be taken during the latter part of December.

ISAIAH BOWMAN,
Chairman

SCIENTIFIC APPARATUS AND LABORATORY METHODS

LAMELLIBRANCH LEUCOCYTES AS LIVING MATERIAL FOR CLASSROOM DEMONSTRATION

INCIDENTAL to studies concerned with the vitality of Molluscan leucocytes *in vitro* it was noted that those of *Ostrea virginica* possessed several features especially recommending them for classroom use as demonstration material. These features were found to be also evident in Venus and Anodonta and are probably common to most other lamellibranchs.

After removing one valve, a capillary pipette may be thrust into the heart and a quantity of blood withdrawn. A single specimen will yield more than enough material for a large class. The leucocytes in a drop, when placed on a slide, contract to a spherical shape and clump together. In from five to ten minutes they begin to thrust out pseudopods and move away from each other, and will then remain active for at least several hours if the drop is sealed. Since these forms occur in a practically pure culture, if properly collected, they are particularly suited to student purposes.

If a few drops of the blood are placed in a dish of the same water from which the animals came, the leucocytes will go on living for several days without further attention.[1] As the leucocytes collect on the bottom they are readily recovered by means of a pipette when needed. The advantageous features of such material are evident and include the ease with which they are obtained, the simplicity of handling, the abundance of cells and their relative hardiness. As demonstration material they show amoeboid movement, ingestion of food, and in fact all the usual features for which free-living amoebae are customarily employed to illustrate. If left in a sealed drop of sera over night they will be found to have again contracted to a spherical form. The addition of some fresh water will revivify them a second time, at least. It seems that their length of life *in vitro* is almost directly proportional to the amount of fluid in their container.

The operative technique mentioned is not imperative, as these mollusks, if placed in a water that is allowed to warm slightly, will emit quantities of leucocytes. This is the well-known diapedesis or "bleeding" of oysters under suffocation.[2] Thus a single animal can be used repeatedly if a suitable aquarium is handy to which it may be returned. Samples taken this way frequently show contamination. For example, oysters obtained from a New York market yielded an *Amoeba* of the *limax* type from the exterior of the shell and *Valkampfia calkinski* or *V. patuxent* from the intestinal tract.[3] The latter two can be cultured easily on ordinary nutrient agar plates, yielding abundant parasitic material. Thus, such a demonstration may have a further advantage, showing on a single slide, from a single source, leucocytes, free-living and parasitic amoebae all migrated or ejected from one animal with no operative effort. Without considerable familiarity it is almost impossible to distinguish the living leucocytes from the parasitic amoebae.

Since the three genera, Ostrea, Venus and Anodonta, as well as other similar ones, are wide-spread, little difficulty should be encountered in obtaining material from various localities. The animals for most part are fairly hardy and may be kept in a suitable aquarium or obtained from a market or other sources as needed.

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EXAMINATION OF THE REVERSE SIDE OF MICRO-MOUNTS

ONE of the greatest needs of the acarologist, and others who mount minute arthropods on microslides, is to see the other side of their specimen. To turn the slide over and look through the one to two millimeters of glass is hardly satisfactory because the objectives are corrected for cover-glass thickness. Obviously, this may be overcome by securing an objective corrected for a cover-glass thickness of one or more millimeters. To have such a lens made up in America is prohibitive. Besides, the American four-millimeter objectives have such small working distances as to strike the slide before coming into focus. Finally I discovered that W. Watson and Sons, London, stock a four-millimeter (six-inch) parachromatic objective with a long working distance and that this objective

[1] Orton (1924, Fisheries Invest. Series II, 6) reported that the leucocytes of *Ostrea edulis* will live from 3 to 4 days in a dish, while we have had those of *Ostrea virginica* live for 6 days under similar conditions.

[2] This effect has been discussed by Orton (1924) ref. cited and Yonge (1928), *Jour. Mar. Biol. Ass.*, 15. The slight provocation that will cause this response can hardly be considered suffocation in the ordinary sense and certainly must take place frequently in a state of nature.

[3] Hogue (1915), *Arch. f. Protist.*, 35 (1922), *Jour. Exp. Zool.*, 35.