which make pure metals and alloys hard or soft, ductile or brittle, good or bad conductors of electricity, etc. Courses will be offered by Dr. John C. Slater, head of the department of physics, the Massachusetts Institute of Technology; Dr. M. F. Manning, University of Pittsburgh; Dr. William Shockley, the Bell Telephone Laboratories; Dr. Frederick Seitz, University of Pennsylvania; Dr. Edward U. Condon, associate director, the Westinghouse Research Laboratory. A booklet describing these courses has been prepared, and may be obtained by writing to Professor E. Hutchisson, University of Pittsburgh.

SIGMA PI SIGMA, physics honor society, installed a new chapter at Wayne University, Detroit, on May 22. Dr. F. C. Blake, of the Ohio State University, national president; Dr. M. W. White, of the Pennsylvania State College, national executive secretary; and Dr. C. W. Chapman, of the Michigan State College, were the installing officers. Following the installation banquet an open meeting was held, which was addressed by Dr. P. E. Klopsteg, of the Central Scientific Company, Chicago, who spoke on "Scientific Aspects of Archery."

CORNELL UNIVERSITY announces the establishment at Ithaca of a Summer Research Station in Psychology. Beginning this summer, facilities will be available, without fees, for experimental research, library research and informal study, to investigators holding the doctor's degree. Information concerning laboratory facilities and living accommodations may be obtained from the Secretary of the Department of Psychology, Cornell University, Ithaca, N. Y.

THE University of Missouri has received a grant of $80,000 for the erection of a building for the Laboratory of Genetics from the Division of Natural Sciences of the Rockefeller Foundation and an additional grant of $20,000 for the continuation of research projects now being carried on by Dr. L. J. Stadler, professor of field crops, and Dr. Barbara McClintock, assistant professor of botany, and their associates. Their work has hitherto been supported by the Rockefeller Foundation, the Missouri Agricultural Experiment Station, the U. S. Department of Agriculture and from general university funds.

THE National Foundation for Infantile Paralysis has approved a grant of $161,350 for the establishment of an infantile paralysis center for Negroes at the Tuskegee Institute, Alabama. The money will be used to build, equip and maintain for one year a center of thirty-six beds. The construction of the building will be started without delay.

DR. STUART T. DANFORTH, formerly a professor at the College of Agriculture at Puerto Rico, has bequeathed to the Smithsonian Institution one of the most complete collections yet made of birds of the West Indies. It consists of more than 3,000 specimens. Dr. Danforth spent approximately thirteen years in gathering this collection, which contains not only all the common forms of the islands, but some of which there are only a few specimens in existence.

THE Institute for Advanced Study at Princeton has been declared exempt from taxation by the State Board of Tax Appeals. The property on which the institution is located was assessed for $9,625 in 1937 and the Mercer County Tax Board denied a claim to exemption from taxation. The institute appealed to the state board to reverse the decision. In rendering this decision the state board pointed out that the institution makes no charge to students and, in some instances, subsidizes competent persons otherwise unable to take advantage of its resources, and that the property is used exclusively for non-profit-making, educational purposes.

DISCUSSION

MICRO-COPEPODA IN MARINE PHYTOPLANKTON CATCHES[1]

IN 1938 the Scripps Institution of Oceanography made six cruises (February, April, June, August, October and December) off the coasts of California in pursuit of hydrographical, chemical and biological investigations. Thirty-one stations were worked on each cruise except for minor changes and except for omission of about half in April on account of bad weather. On each cruise five liter samples of water for phytoplankton researches were collected with the Allen closing bottle and filtered through the Allen filtration net of No. 25 mill silk bolting cloth. Except for Cruise II (six levels only) collections were made at seven levels at each station (surface, 10, 20, 30, 40, 50, 60 meters).

While making routine microscopical studies of the phytoplankton I was struck by the constancy of representation of copepods less than two millimeters in length (most less than one millimeter). One female carrying twenty-five eggs was .85 mm long and one carrying fifteen eggs was .76 mm. Some of the nauplii were only about .15 mm long; surpassed in dimensions by a few of the diatoms and dinoflagellates with which they were associated.

By the time that I had studied about a thousand

[1] Contribution from the Scripps Institution of Oceanography, New Series, No. 56.

catches I got the idea that this copepod population deserved some special notice. Using my Sedgwick-Rafter counting cell I enumerated the micro-copepoda in one tenth of each catch and calculated the numbers per catch for the seven stations on the northern line of cruising, which extended 140 miles to sea from the general vicinity of San Luis Obispo. Separate records were kept of numbers in naupliar and copepodid (post-naupliar) stages.

A very few individual catches showed no specimens in the fraction counted, but no station showed less than 310, and two exceeded 1,000 per station. In numbers per cubic meter the range would be from about 10,000 to 30,000, a population far from negligible, especially when the constancy of representation is considered, both seasonal and geographical. The largest individual catch from any of the seven stations (134,000 per cubic meter) was made at a depth of thirty meters about seventy-five miles offshore. In most catches the numbers of nauplii were slightly larger than the aggregates of post-nauplii stages.

The tendency to show greatest abundance at or near a depth of thirty meters was very distinct in all cruises, possibly with some relationship to time of day and night, although the time correlation does not appear clear to me. That level was in the lead at four of the seven stations, and it was second at two. Twenty meters and forty meters were somewhat alike. The three levels were within the leading three in fourteen out of twenty-one instances. Contrariwise, the surface and sixty-meter levels were *not* within the leading three at any station.

No clearly marked seasonal differences were observed, although June seemed to be a little the best.

Locality differences were fairly notable, though not so prominent as the differences of levels. The station nearest shore (about nine miles) did not appear most prominent at any depth. On the other hand, the seventy-five-mile station was highly prominent at different depths, no other station showing so well. A few random counts at stations in other lines followed on the cruises indicated that micro-copepoda were regularly represented by considerable populations even at stations nearly two hundred miles from shore, *i.e.*, in waters clearly oceanic in character.

The largest single catch of micro-copepoda was taken with a large catch of diatoms at thirty meters at the seventy-five-mile station. One or two others of the larger catches also gave the impression of a tendency to larger numbers in catches containing notable numbers of diatoms. Superficially, one may be tempted to link such observations with the view commonly expressed by marine biologists that copepods feed heavily on diatoms. Unfortunately for this linkage, the micro-copepoda seem to be too small to feed successfully on the diatoms. For example, in this largest catch most of the diatoms (a large form of *Rhizosolenia styliformis* Btw.) were larger than the nauplii and as long as most of the copepodids.

Even more noticeable than the presence of the micro-copepoda was that of debris or detritus in all catches. In some catches two hundred miles from shore the volume of inert material appeared far greater than the combined volumes of diatoms, dinoflagellates and other micro-plankton. Variable proportions of these inert particles were organic in aspect at different times at different stations, but there was enough constancy of representation of organic material to suggest the idea that the micro-copepoda may depend upon it largely for sustenance; directly by ingestion, indirectly by feeding on bacteria or other organisms associated with the particles. Of course, this does not mean that association with the diatoms does not help the small copepods. It is entirely possible that they need the oxygen liberated by the latter and that the diatoms are benefited by the opportunity to use their wastes.

On account of my commitment to investigations of phytoplankton populations I shall not be able to give any more attention to these fascinating problems of the micro-copepoda. I am offering this memorandum because no quantitative study of marine micro-copepoda at seven specific levels, at all seasons of a single year, in a series of stations extending from littoral into oceanic waters has ever been made before. It is intended merely to give direct evidence of the existence of an important animal population which can be studied to advantage by methods similar to those used for phytoplankton at the Scripps Institution of Oceanography. It is possible that these populations of very small animals constitute an important feature in the supply of foods for young fishes and other prominent marine animals.

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MARSH GAS IN THE ECOLOGY OF SOME PEAT-BOGS

THE peat-bogs or muskegs of the north have been of great interest to plant ecologists and botanists from the highly specialized character of the flora and the peculiarly severe conditions which the plants must endure to survive. There are few habitats which offer more unfavorable conditions in many respects or such a wide range of extremes as these areas, oftentimes very small, afford. Investigations have shown that the pH values of the sphagnum water itself may be as low as 4.5 and that of the carex bog 7 or near this figure, while the open water in places may show a pH of 9. Many other conditions may obtain here which the majority of our mesic plants are unable to