suming then that the mammal had eaten the larger quantity of poison listed, a hawk like the one tested could eat more than 50 squirrels that had been killed with strychnine; more than 8 that had been killed with arsenic, and about 20 that had died from the effects of thallium, providing it did not obtain any of the ingested poisoned grain.

With this resistance to strychnine the hawk would be practically immune to danger from secondary poisoning from such a toxic agent.

These experiments indicate that the bird would be forced to live entirely for about three weeks on mammals dying from thallium to obtain a lethal dose. This estimate is made disregarding the rate of elimination of poison that would be made by the mammal, which factor should double the number of animals needed to provide a lethal dose for the bird.

These results in laboratory experiments lead to the following conclusions:

Arsenic has no great secondary poisoning hazard, and is too erratic in its results to be a good rodent poison, consequently it is not used in large field-control operations.

Strychnine presents no danger of secondary poisoning to hawks.

Thallium is apparently more hazardous, but even this cumulative poison can kill hawks only in extraordinarily large doses, unlikely to be obtained under field conditions.

F. E. GARLOUGH
JUSTUS C. WARD

CONTROL METHODS RESEARCH LABORATORIES,
U. S. BUREAU OF BIOLOGICAL SURVEY

## SPREAD OF BROAD FISH TAPEWORM OF MAN

THE finding of *Diphyllobothrium latum* (Linn., 1758), the broad fish tapeworm of man, in Oklahoma should be of interest to parasitologists. It is known that this species was brought to the United States by the Swedes and Finns who settled in Minnesota and North Dakota, where the proper intermediate hosts for its development abound. Hegner, Root and Augustine[1] write: "In the United States *Diphyllobothrium latum* has been considered a rare parasite occurring only in emigrants from European endemic centers. However, a number of indigenous infections have been reported recently from Minnesota, Illinois, Indiana, Michigan and Massachusetts." The above-mentioned states are all in the northern tier of states. The occurrence of this tapeworm in Oklahoma shows a wider distribution for the species.

Recently a thirty-one-year-old laborer called at the Oklahoma Medical School Hospital clinic for treatment. He stated that he believed he had a tapeworm because he recognized the signs and that he knew people got them from eating dried fish in the old country, as he had done. He stated that he was a native of Finland and has been in America fifteen years, coming to Oklahoma three months ago from Louisiana. This is interesting, because the tapeworms taken from him must have had a length of life of over fifteen years, provided of course that he became infected in his native land. Riley[2] stated a Swedish woman was definitely known to carry the infection for thirteen years.

Upon examination he was found to have numerous ova in the stool, to have bloody diarrhea, to be very anemic and weak, with attendant colicy pains. These pains he claimed doubled him up and kept him from work. Dr. A. D. Danielson treated him with oleoresin of aspidium and salts. At the first treatment twelve feet of proglottids was obtained. Later fifteen to twenty feet was obtained. All the segments showed the characteristic grayfish color and coiled brown uterus centrally located. By careful search two heads were found. These were unarmed and had two bothria or slit-like suckers. Upon the patient's release, "feeling much better," he was told to come back in two months to be checked.

As this host came from Finland not more than fifteen years ago, it is evident that carriers are still actively transporting this parasite across the ocean and spreading it farther in the United States, and that the migration of Finns, and perhaps Swedes, in search of work in new areas is a large factor in its spread.

The danger of this species becoming indigenous to the southern states seems remote, due to the absence of cold water lakes and proper intermediate fish hosts. The possibility remains, however, that *D. latum* may adapt itself to different intermediate hosts from those now known for it and hence become endemic in new areas.

WM. P. N. CANAVAN

BACTERIOLOGY DEPARTMENT,
OKLAHOMA MEDICAL SCHOOL

## DISCOVERY OF CONODONTS IN THE PHOSPHORIA PERMIAN OF WYOMING

DURING the summer of 1931, the Phosphoria formation along the east front of the Wind River Mountains, Wyoming, was examined for microfossils. The Phosphoria is Pennsylvanian and Permian in age, the boundary coming below the Pustula member. This member contains a bed of low-grade rock phosphate

[1] R. W. Hegner, F. M. Root and D. L. Augustine, "Animal Parasitology," 731 pp. New York, 1929.

[2] Wm. A. Riley, "The Longevity of the Fish Tapeworm of Man, *D. latus*," *Jour. Parasitol.*, 5: 193, 1919.

which weathers rapidly into rounded grains. About 1 per cent. of these grains were found to be conodonts. This is the highest known stratigraphic occurrence of the conodont group.

The Phosphoria types are peculiar and are apparently senile specializations of a rapidly declining group. They seem to bear the same relationship to other conodonts that the late Cretaceous ammonites do to other ammonoids and that Silurian and Devonian trilobites do to other trilobites. There are at least two types of ribbed spoon-like teeth and one type of plate-like tooth with longitudinal lines of denticles. Simple conical forms are abundant. The species will be described and figured in a later paper.

C. C. BRANSON
BROWN UNIVERSITY

## ACADEMIC FREEDOM IN ITALY

NEXT summer the International Physiological Congress is scheduled to meet in Rome. In this connection I wish to call the attention of the members of the Federation of American Biological Societies, who are members of this congress, to the official edict issued by the Italian government on October 8, 1931, compelling all professors in Italian universities to swear allegiance to the Fascist régime. As announced in *School and Society* for January 9, eleven university professors out of 1,225 have refused to take this oath of allegiance.

I wish to propose to the members of the Federation of American Biological Societies for the coming meeting in Philadelphia in April the consideration of refusing to attend the International Congress of Physiology in Rome August next unless this brutal and defiant attack on academic freedom on the part of the Italian government is rescinded.

(*Signed*) A. J. CARLSON
DEPARTMENT OF PHYSIOLOGY,
UNIVERSITY OF CHICAGO
MARCH 4, 1932

# SCIENTIFIC BOOKS

*The Universe of Modern Physics.* By MAX PLANCK. W. W. Norton and Company, Inc., 1931.

THE revolution of thought which had its inception in two physical theories, relativity and quantum mechanics, has swept over larger and larger fields of human concern. It has drawn into scientific controversy, and caused a revision of, some of the concepts that were considered to lie at the very basis of philosophical and physical thought. In the midst of the multifarious and conflicting attempts of reformulation we hear the voice of Planck, the man whose work was largely responsible for the abandonment of classical reasoning in physics. He addresses not the comparatively few who work in the special fields of theoretical physics, but all those who have an interest in the basic problems of physical reality. And his message is certain to be received with greatest attention.

Physicists are entirely too prone to forget the relations between their science and the fundamental issues of epistemology; indeed they frequently neglect to apply the test of logical consistency to the concepts which compose their theories. Planck's aim is to clarify these matters. He starts by stating the goal of physics, which he defines as the apprehension of true reality, a goal which is admittedly unattainable but acts as a guiding ideal in scientific investigations. Reality, in Planck's analysis, is more than the mere phrase it appears to be in many similar treatises: the world of reality is definitely set aside as one of three, the other two being the world of sense and that of physics. The latter is a deliberate hypothesis and is subject to change, while the world of reality is immutable.

The discussion of these metaphysical matters is followed by a lucid exposition of relativity and the quantum theory, particular emphasis being placed upon those points at which they break away from the more common habits of thought. Planck's comments on Heisenberg's principle of uncertainty are very noteworthy indeed, for he makes a point which is too often overlooked in the numerous illustrations of this principle: It "has nothing whatever to do with any measurement," but derives its validity only from the wave nature of matter. Determinism is redefined, and its premises are then shown to apply to wave mechanics, so that uncertainty can not be said to be contradictory to determinism. Nevertheless, there is an important distinction between determinism in classical physics and in quantum physics. Classically, the configuration of objects was governed by definite laws; in quantum mechanics complete determination fixes the state of material waves. This situation is not opposed to strict determinism; it merely renders considerably looser the relation between the physical world and the world of sense.

Causality, complete physical lawfulness are in Planck's opinion the bases of physical science. He regards causality as a category which is given *a priori*, much in the Kantian sense. The definiteness of his statements on this controversial point is truly pleasing, and it is to be hoped that the soundness of the author's view will penetrate the mist which still be-