

On the whole, it must be admitted that the four papers contributed at the session on research, apart from Prof. Timmermans' appeal for fuller exchange of scientific publications, and Prof. G. I. Finch's plea for British assistance to universities and research schools on the Continent in the form of interchange of apparatus and workers and teachers as well as literature, contributed little fresh. Dr. M. Ruhemann, in a paper on the organization of research in the U.S.S.R., while urging that organization is only a means to an end, never an end in itself, believes that some combination of a political, an economic and a scientific body is fundamental in order that research may be organized effectively on a national scale. To organize science without taking into consideration the economic needs of the country would lead to a divorce of science from the life of the people, and thus to a lifeless and scholastic science, while the organization of national economy without some political directive might be impossible.

More vital, on the whole, than the sessions on research and on teaching in the universities were those concerned with the influence of the university on the student and the influence of the universities on society. In the former, Miss M. R. Gale, secretary of the International Council of Students in Great Britain, and of the National Union of Students, stated that the students' union is a most important factor in training students in committee work, public speaking, and similar activities fitting them to take part in public life. Some Continental speakers remarked on a distinct gap between the student body in Great Britain and the rest of the community. Mr. J. L. Henderson, general secretary to the British Committee of World Student Relief, in speaking of what is already being done in this field of student relief and of the plans of the British Committee of World Student Relief for developing post-war activities, indicated at the same time one way of re-integration of student life with that of the community. He foresees during the post-war years a tendency among students to political apathy, frivolous irresponsibility, as well as to hatred and despair, especially among those who can appreciate most clearly the inadequacy of the political conditions which surround them. To rekindle the flame of true scholarship, to re-create moral values and spiritual principles may perhaps be done best by working empirically from the bonds which necessity in the shape of famine and disease has forged between all sorts of men holding all sorts of rival opinions. The immediate need in centres such as Vienna, Prague, Warsaw or Belgrade will be the establishment of student committees of self-help to plan and control, in association with whatever foreign assistance may be available, the relief work among local university students.

Mr. Henderson's plea for an act of imagination and faith, to restore student life to a worthy place in the community, was in keeping with the high note that was generally struck at the Conference. There was no disposition to ignore the fact that the Western universities have enemies. They were clearly enunciated by Prof. E. Vermeil as specialization, mechanization of learning and undue interference by the State; and Prof. Vermeil developed something of the argument of Mr. A. S. Nash in his book on "The University in the Modern World" which appeared after the Conference. The Western tradition of humanism, resting on the Greco-Latin humanities, on certain elements in Christianity, on the liberalism of the

eighteenth century and the social spirit of the nineteenth, has always regarded the university as the chosen soil for the unimpeded growth of scientific research and culture. But the plans for university reform, for the shaping of Western universities so that they may serve more effectively the needs of to-day, will come to nothing unless they are based on a renewed conception of the university spirit, on general culture and its role in the democracies of to-morrow.

No one would pretend that this Conference made a fundamental contribution to the evolution of a new philosophy of the university, but it at least points to some of the fundamental questions that have to be faced, to some problems where practical action might easily be taken. In such thinking, it is no small matter to have this evidence that the problems of university expansion and its relation to the needs of the community, to which so much thought has already been given in Great Britain, are problems on which the best minds of Western Europe and the United States have also been exercised, that the great traditions of university life are held in common with them, and that from their experience also we may draw both guidance and inspiration.

## TUNAS OF THE PACIFIC\*

FOUR species of *Tuna* play an important part in the fisheries of California, Mexico and Central America: the skipjack *Katsuwonus pelamis* (Linnaeus), the yellowfin tuna *Neothunnus macropterus* (Temminck and Schlegel), the albacore *Thunnus germon* (Lacépède) and the bluefin tuna *Thunnus thynnus* (Linnaeus). The big-eyed tuna *Parathunnus mebachi* (Kishinouye) was also investigated and compared with the others. The present study was undertaken in March 1940, to determine the geographical range of these and the relationships between them and similar species occurring in the Central, Western and Equatorial Pacific. This entailed a detailed anatomical treatment which will form a firm foundation upon which investigations may be extended into lines more directly applicable to conservation.

The work has shown concerning the skipjack that within the entire fishing area in the Eastern Pacific extending along the Central and North American coast-line from the equator to California and offshore to include all the outlying islands, there is but a single species, and specimens from all these areas are furthermore individually indistinguishable from those obtained from Japan and the Hawaiian Islands.

In the case of the yellowfin tuna, again there is a single species throughout the fishing area, and these fish are individually indistinguishable from the specimens obtained from the Hawaiian Islands, Japan and Peru. Distinct populations may exist within this larger area, but conclusions concerning these await the analysis of data collected.

The albacore of the North American coast-line proved to be the same species as that from Japan and the Hawaiian Islands, with a geographical distribution extending across the north temperate Pacific.

\* A Systematic Study of the Pacific Tunas. By H. C. Godsil and Robert D. Byers. (Bureau of Marine Fisheries, California Division of Fish and Game: State of California Department of Natural Resources, Division of Fish and Game, Fish Bulletin No. 60.) (Sacramento: California State Printing Office, 1944.)

The bluefin tuna from southern and lower California are essentially one species and, until adequate descriptions are available from all localities, must be assigned to the same species as *Thunnus thynnus* of the Atlantic. Lacking material from Japan, comparison with Kishinouye's (1923) description of *Thunnus orientalis* (the oriental bluefin) shows that this is probably a different species.

With regard to the chief morphological features, it was found that the appearance of the viscera *in situ* is a valuable identifying character. Other differences appear in the presence or absence of air bladder, differences in excretory system, and the circulatory system which is unique in many respects. The differences in circulatory system were used by Kishinouye in classifying the tunas. The present observations were confined largely, but not exclusively, to the arterial system. The post-cardinal vein is present in all but the genus *Thunnus*, but its course and degree of development differ. The skeletal elements are remarkably alike, and the authors believe that they offer less promise for specific identification than other anatomical parts. Nevertheless a key is given to the five species studied, based on these skeletal elements; also a table giving a summary of anatomical differences.

In the most important characters the skipjack differs from all the others. Alone it can be distinguished at once by the external features. It lacks an air bladder. The intestine is not folded. The ventral view of the viscera *in situ* is distinctive and differentiates it. In its blood system and excretory system it differs sharply from the others. It is the easiest to identify of the five species.

Foreseeing the necessity of a more detailed population study of some species, a large number of both external and internal measurements and counts were added to the routine. These are reserved for a future work.

## A METEORIC THEORY OF THE ORIGIN OF THE EARTH AND PLANETS

O. J. SCHMIDT has a paper with this title in *Comptes Rendus (Doklady) de L'Académie des Sciences de L'URSS.* (45, No. 6; 1944), in which he propounds a new theory of the origin of the planetary system. At the basis of the theory there are two fundamental facts—the rotation of the Galaxy and the presence near its central plane of large masses of obscuring matter. During its motion round the centre of gravity of the Galaxy, the sun crossed a dark cloud of dust and meteorites and captured portions of this, compelling the particles to revolve around its centre. In the course of time these captured particles united into larger formations, thus producing the planets.

In a previous paper (*C.R. Acad. Sci. URSS.*, 44, No. 1; 1944), the author dealt with the formation of binaries in a rotating Galaxy. The motions of stars are a combined result of the attraction of the central galactic masses and of external masses and the neighbouring individual stars, and under certain conditions two stars can come into such a position that they are drawn closer together, so that capture and the formation of a double star occur. The following assumptions, considered to correspond to statistical averages, were made in dealing with this

problem: (a) The stars move along circular orbits, subject to the attraction of the Galaxy, supposed to be concentrated in its centre. (b) The orbits lie in different planes inclined at small angles to one another. (c) Capture takes place when the two stars pass the position of the shortest distance between the orbits.

On these assumptions, a formula has been derived which connects the semi-major axis and eccentricity of the orbit of the binary with a quantity which depends on "the galactic parameter of the stars". This is a function of the distance to the galactic centre, the mass of the inner portion of the Galaxy, the total mass of the two stars, and the angle between the orbital planes of the stars previous to capture. While the formula is not strictly applicable in every case, as it considers mean results, nevertheless it is sufficiently accurate to apply to the problem of the capture of meteoric matter by the sun.

It is essential to the theory that the plane of the sun's galactic orbit should be inclined at an angle of about  $3^\circ$  to the central plane of the Galaxy. If the sun while at one of the nodes of its orbit passes through a cloud of matter, meteorites are captured in accordance with the same laws as underlie the formation of double stars. Both direct and retrograde motions take place with the captured meteorites; but if the sun passes near the edge of the cloud its density is not uniform, and in consequence more meteorites revolve in one direction about the sun. Those revolving in the opposite direction collide with the more numerous portion of the swarm and lose their momentum, ultimately falling into the sun. The main mass segregates in the course of time into larger bodies from which the planets are formed, and this segregation proceeds through smaller particles falling on larger ones just as meteorites fall on the earth at present. As the swarm of meteorites has the form of a flat lens, the planets in the process of formation have their orbits lying approximately in one plane—the central plane of the lens—and as the meteorites ultimately revolve in one direction, for reasons already suggested, the planets will also revolve in one direction. In the early stage the major axes of the swarm have a tendency to distribute their axes along the shortest distance between the galactic orbit of the sun and that of the cloud, but they are deflected from this direction by mutual perturbations. Hence no planet formed in the manner suggested can have a preferential direction for its major axis.

The problem of the angular momenta of the planets, which has been an insuperable difficulty with many theories of the formation of the solar system, is avoided by the present view, as the galactic momentum of the meteorites supplies the necessary angular momenta. Dr. Schmidt hopes that the theory will be further developed to bring within its scope such problems as the rotation of the sun and of the planets, the age of the planetary system, the formation of the satellites, etc. In addition, certain features concerning the internal structure of the earth are explicable, and Dr. Schmidt is engaged in the preparation of papers which will discuss such problems. The present paper contains some quantitative results regarding the distribution of mass and momentum in the planetary system and also the extent of agreement between the theory and observational evidence. These are largely provisional, and additional evidence in support of the theory will be forthcoming in the papers which are to be published in due course.