American Association of Museums, died on October 8 at the age of seventy-four years.

SIR GEORGE HENRY MAKINS, London, formerly president of the Royal College of Surgeons, died on November 2 at the age of eighty years.

THE death is announced of Professor Wilhelm Mielck, director of the State Biological Institute at Helgoland.

SENATOR PIETRO ALBERTONI, formerly professor of physiology at the Universities of Genoa and Bologna and a member of the physiological section of the Reale Accademia Nazionale dei Lincei, died on November 8 at the age of eighty-four years.

SCIENTIFIC NOTES AND NEWS

IT was announced from Stockholm on November 9 that the Nobel Prize in physics for 1932 has been awarded to Dr. Werner Heisenberg, professor of theoretical physics at Leipzig; for 1933 it has been divided between Dr. Erwin Schrödinger, professor of theoretical physics at Berlin, and Dr. Paul Adrien Maurice Dirac, Lucasian professor of mathematics at the University of Cambridge.

THE Copley Medal of the Royal Society has been awarded to Dr. Theobald Smith, emeritus member of the Rockefeller Institute, director of the department of animal pathology at Princeton, N. J., from 1915 to 1929, in recognition of his work on the comparative etiology, pathology and immunology of infections and parasitic diseases.

THE Wellcome Prize, including the Wellcome Gold Medal, for 1933 has been awarded to Major Edgar Erskine Hume, Medical Corps, U. S. Army, librarian of the Army Medical Library, Washington, for his essay on "The Value of Studies in Health and Sanitation in War Planning." The Wellcome Prize and Medal were established by Sir Henry S. Wellcome, London, in 1916, and are awarded annually through the Association of Military Surgeons of the United States.

A DINNER in honor of Dr. George H. Bigelow, formerly state health commissioner of Massachusetts, and Dr. Henry D. Chadwick, his successor, was given by the Massachusetts Tuberculosis League on October 26. Dr. Bigelow is now director of the Massachusetts General Hospital, succeeding Dr. Frederic A. Washburn. Dr. Chadwick was formerly controller of the tuberculosis division of the Detroit Health Department.

THE degree of doctor of engineering was conferred upon Orestes H. Caldwell, editor of *Electronics* and president of the New York Electrical Society, by Purdue University, on November 4. Mr. Caldwell served as a member of the original Federal Radio Commission. He is a director of the Institute of Radio Engineers, a past-chairman of the New York Section of the American Institute of Electrical Engineers, a member of the committees on communications and radio of the American Engineering Council, and a trustee of the New York Museum of Science and Industry.

DR. FRIEDRICH BERGIUS, of Heidelberg, has been elected an honorary member of the Institute of Petroleum Technologists, London.

OFFICERS of the New Mexico Association for the Advancement of Science, which met in Albuquerque, New Mexico, on November 2 and 3, were elected as follows: *President,* Dr. H. C. Gossard, president of New Mexico Normal University, Las Vegas; *Vice-president,* Mr. E. R. Harrington, instructor in chemistry, Albuquerque High School; *Secretary,* Dr. Stuart A. Northrop, professor of geology, University of New Mexico; *Treasurer,* Mr. Reginald G. Fisher, Laboratory of Anthropology, Santa Fé; *Editor,* Dr. Sterling B. Talmage, professor of geology, New Mexico School of Mines, Socorro. The program, in addition to technical papers, included the formulation of definite plans for expanding the activities of the association, particularly along the lines of aiding increased participation by high schools within the state.

AT the recent annual meeting of the Royal Society of Edinburgh, the following council was elected: *President,* Sir E. A. Sharpey-Schafer; *Vice-presidents,* Dr. J. B. Clark, Professor James Ritchie, Sir Thomas H. Holland, the Honorable Lord Sands, Professor C. G. Darwin, Professor R. A. Sampson; *General Secretary,* Professor J. H. Ashworth; *Secretaries to Ordinary Meetings,* Professor F. A. E. Crew and Professor James P. Kendall; *Treasurer,* Dr. James Watt; *Curator of Library and Museum,* Professor D'Arcy W. Thompson; *Councillors,* Professor P. T. Herring, Professor T. M. MacRobert, Professor Godfrey H. Thomson, Dr. Malcolm Wilson, Professor E. B. Bailey, Professor J. C. Brash, Professor A. J. Clark, Professor A. G. Ogilvie, Professor E. M. Wedderburn, Lieut.-Col. A. G. M'Kendrick, Professor James MacKinnon and Professor W. Peddie.

DR. GRIFFITH CONRAD EVANS, professor of mathematics at Rice Institute, Houston, Texas, has been ap-

pointed to succeed M. W. Haskell, professor emeritus of mathematics at the University of California, who retired at the end of the past year.

DR. HARRY BEAL TORREY, who for the past five years has been associated with the Health Service at Stanford University, has been appointed professor of biology in the School of Biological Sciences.

RECENT changes in the faculty at the University of Cincinnati College of Medicine include: Dr. Lee Foshay, associate professor of research bacteriology; Dr. Josef Warkany, assistant professor of pediatrics; Dr. Louis G. Hermann, assistant professor in the department of surgery. Promotions are as follows: Dr. Frank E. Stevenson, to associate professor of pediatrics; Dr. Waldo E. Nelson, to assistant professor of pediatrics; Dr. Johnson McGuire, to assistant professor of medicine. Dr. Nathan Chandler Foot has resigned as professor of pathology to go to Cornell University Medical Center, New York.

AT the University of London the following titles have been conferred in respect of posts held at the colleges indicated: Professor of malarial studies, Sir Samuel Rickard Christophers, London School of Hygiene and Tropical Medicine; reader in pathology, Dr. F. A. Knott, Guy's Hospital Medical School; reader in zoology, Dr. A. J. Grove, East London Medical College.

PROFESSOR ADOLF FRAENKEL, of Kiel, has been appointed to a chair of pure mathematics in the Einstein Institute of Mathematics at the Hebrew University in Jerusalem.

PAUL MARSHALL REA has been appointed director of the Santa Barbara Museum of Natural History. Mr. Rea was formerly director of the Charleston Museum and the Cleveland Museum of Natural History and consultant to the Advisory Group on Museum Education of the Carnegie Corporation. Harold Sidebotham, acting director since August, 1932, remains on the staff of the museum as research associate in biology.

DR. W. F. GEDDES, associate professor of chemistry at the Agricultural College of the University of Manitoba, Winnipeg, has been appointed chemist in charge of the Dominion Grain Research Laboratory, Winnipeg, Canada. For two years Dr. Geddes has been chairman of the Committee on Standardization of Laboratory Baking of the American Association of Cereal Chemists.

THE British Medical Research Council has appointed Professor E. P. Cathcart, of the University of Glasgow, to be chairman of the Industrial Health Research Board in succession to Sir Arnold T. Wilson, who has resigned on becoming a member of Parliament. Professor Cyril Burt and Miss Hilda Martindale have been appointed members of the board in succession to Sir John H. Parsons, and Miss M. Ritson, who have retired in rotation.

DR. M. V. GOVINDASWAMY, on leave from the University of Mysore, India, is spending the current year at the Worcester, Mass., State Hospital. He is collaborating in the research activities of this institution and making a study of psychiatric practise in the United States.

PRESIDENT KARL T. COMPTON, of the Massachusetts Institute of Technology, will deliver the Alexander Van Rensselaer Lecture at Drexel Institute on December 6. His subject will be "Possibilities and Difficulties of High Voltage Engineering." The Van Rensselaer Lectures were established by the Board of Trustees of Drexel Institute during the past year in honor of Alexander Van Rensselaer, son-in-law of Anthony J. Drexel, founder of the Institute, and for many years president of the Board of Trustees.

DR. ARTHUR B. DUEL, of New York, will deliver the annual Mutter lecture at the College of Physicians of Philadelphia on December 6. He will speak on "The Pathology and Surgical Treatment of Facial Paralysis."

PROFESSOR ARTURO CASTIGLIONI, professor of the history of medicine at the University of Padua, gave a lecture on November 2 at the Cornell University Medical College, on "The Medical School at Padua and the Renaissance of Medicine."

PROFESSOR OTTO H. WARBURG, director of the Kaiser Wilhelm Institute for Cell Physiology, Berlin-Dahlem, and winner of the Nobel Prize in medicine in 1931, delivered an address on physiology at Columbia University College of Physicians and Surgeons on October 23.

DR. OTTO LOUS MOHR, professor of medicine at the Royal Frederiks University, Oslo, will give the Edward K. Dunham lectures at the Harvard Medical School on November 20, 22 and 24. The general subject of the series is "Genetics and Pathology."

DR. HERBERT E. IVES, of the Bell Telephone Laboratories, New York, delivered the Thomas Young oration before the Physical Society at the Royal Institution, London, on October 6. Dr. Ives' subject was "Thomas Young and the Simplification of the Artist's Palette."

DR. E. H. R. HARRIES has been appointed by the Royal College of Physicians Milroy lecturer for 1935.

THE Society of American Bacteriologists will hold its annual meeting in Philadelphia from December 27 to 29, inclusive, under the presidency of Dr. W. Mans-

field Clark, of the Johns Hopkins University School of Medicine. The scientific program will include groups of papers on viruses, the chemistry of antigens, industrial fermentations, mastitis and the decomposition of soil organic matter. The group of papers on industrial fermentations will include important contributions by both American and foreign workers. Round table discussions will be held on "Clinical Bacteriology," "Classification of the Lactobacilli," "Decomposition of Soil Organic Matter" and "Mastitis."

THE first meeting of the International Congress of Anthropological and Ethnological Sciences will be held in London from July 30 to August 4, 1934. Sessions will be held at University College and the Wellcome Historical Medical Museum. The congress will meet hereafter every four years. Information can be obtained from the Secretaries, Royal Anthropological Institute, 52 Upper Bedford Place, London, W. C. 1.

THE department of geology and geography at Smith College has announced its plans for field work in the Black Hills of South Dakota during the summer of 1934. In addition to the usual undergraduate instruction in the general geology of the hills, the plans include a detailed study of the stratigraphy in the district southwest of Custer. The regular field courses will be given from June 21 to August 2, but it is probable that the stratigraphic research will run beyond the latter date. The 1934 program is aimed to inaugurate a series of annual investigations, in which stratigraphy and physiography are to feature.

THE Japanese correspondent of the *Journal* of the American Medical Association reports that since the epidemic of 1924, encephalitis has appeared sporadically. Since last June, however, it has again been increasing in the central parts of Japan, and suddenly it broke out in the Rin-kiu Islands in the east China Sea near Formosa. From June to the end of July, sixty-eight cases were found, with twenty-five deaths. Of 298 patients in other districts, 161 died. The total deaths were 220 out of 427 cases throughout the country. The Japan Science Promotion Association has formed a commission to study the cause of the epidemic. Professor Inada, of the medical department of the Tokyo Imperial University, has been appointed chairman. The commission is divided into eleven sections, each section having as its leader a well-known specialist. Two groups have already been sent to places where the disease is raging. As this epidemic threatens to spread all over the country, the police and physicians are cooperating to prevent a general outbreak.

SPECIAL purpose gifts, for scholarships and research, have been made to the University of Michigan. They include: From Parke, Davis and Company, $4,700 for an investigation to be conducted in the department of dietetics and surgery in the University Hospital on the dietary supply of calcium, phosphorus and vitamins A and D in relation to the healing of fractures. From the American Library Association, tender of the sum of $2,500 for fellowships in the Department of Library Science. These payments from the American Library Association represent original grants by the Carnegie Corporation. From the Upjohn Company of Kalamazoo, the sum of $750 was appropriated to continue the Upjohn fellowships in the College of Pharmacy through the year 1933–34.

THE Empire Cotton Growing Corporation will continue for five years more their grant of £1,000 to the School of Agriculture of the University of Cambridge.

PRINCETON UNIVERSITY will receive the principal sum of $900,000 after the death of survivors who are to receive the income during their lifetime, according to the will of John B. Anderson, contractor, who committed suicide last month.

SUPPLEMENTING its grant of $2,100 last spring, the Carnegie Institution of Washington has made a grant of $2,800 as emergency aid to the Institute of Forest Genetics at Placerville, California.

THE School of Dental and Oral Surgery of Columbia University announces the receipt of a second grant of money from the Commonwealth Fund of New York for the continuation of its caries research project. The initial allowance of $105,000 was made for a three-year period from February 1, 1930. The amount of the present grant is $30,000, which is to be expended over a period of two years.

A. G. C. CRUST, Meteorological Office, Wellington, New Zealand, has written to *Nature* directing attention to the advantages offered by certain sites in that country for the establishment of a large astrophysical observatory. Since statistical observations of the distribution of the various astrophysical objects over the sky are necessarily incomplete without observations of the southern skies, it is vitally important for the progress of astrophysics that a really large reflector should be established somewhere in the southern hemisphere. The only reason for the delay is, of course, the expense of erecting and maintaining an observatory with a large telescope, which would be considerable. So far, no private person or public institution has come forward with an offer to finance such an enterprise; instead, an extremely insular spirit has been exhibited in some quarters, and there seems to have been a reluctance to place the best interests of observational science above local considerations. New Zea-

land offers the advantage of a relatively high southern latitude, but it seems improbable that the astronomical observing conditions can surpass those of the Orange Free State and Transvaal, which have received extremely favorable reports from experienced observers who have worked there. Nevertheless, the claims of New Zealand should not be allowed to pass by without some examination. Mr. Crust points out that in Central Otago there is a treeless area at an elevation reaching 3,000 feet where the rainfall is less than 15 inches a year, while the number of clear nights may be so high as 276 a year.

DISCUSSION

PALEOSPONDYLUS[1]

THE fossil remains found in the old Silurian beds of Scotland are generally considered to be related to the myxinoids and have been named Paleospondylus. Of the several views which have been held by comparative anatomists as to the relation of Paleospondylus to other vertebrates, the majority of investigators believe that the fish-like animal which left its remains in the old red sandstone was a myxinoid. W. J. Sollas and I. B. J. Sollas published an account of the structure of the skeleton from serial sections of the fossils. These reconstructions from these sections give us the best view of the relation of the different parts of the head skeleton of this fossil yet published. The skeletal pieces lying ventrad of the ear capsule have been considered to belong to the skeleton of the gills. As a myxinoid the gills were probably located well behind the head as in the living myxinoids and the skeletal piece named the *post-branchial plate* occupies a position and has the relation to the other skeletal pieces of the *external lateral velar bars* of the living myxinoids. They lie ventral to and project back beyond the skull just as these velar bars do in the living myxinoids. The development of the notochordal skeleton of rings was continuous from the head to the tip of the tail in Paleospondylus, whereas in the living myxinoids there is a long interval between the head and the tail in which no skeletal pieces are developed. To this extent at least Paleospondylus was more advanced than the living myxinoids in the development of the skeleton for the attachment of the muscles of the body.

The admirable work of Patten and Stensiö and other students of early vertebrate animals, especially their researches among the ancient ostracoderms, brings out the need of fuller knowledge of the velum as a potent organ in the head of early vertebrates. Guided by the anatomy of living petromyzonts Stensiö located the velum in ostracoderms between what he has named the spiracular and prespiracular gills, and says that the prespiracular gill was part of the velar tissue. These deductions are based on certain bony ridges on the inner face of the bony head shield of these animals and the folds of soft tissue in the head of Ammocoetes. This reconstruction of the ostracoderm head is far from satisfactory viewed from the standpoint of the anatomy of Ammocoetes and of the ostracoderms.

Stensiö agrees that the living myxinoids and petromyzonts are primitive in their structure and for the most part not degenerate. He thinks, however, their skeleton is regressive from the ostracoderm condition of a continuous head-trunk shield of bone. He also decides the absence of pectoral fins in marsipobranchs is secondary. He assumes their ancestors had them, but that they have disappeared from the living forms of myxinoids and petromyzonts.

(1) We do not know the stages of descent of the present-day myxinoids and petromyzonts, but that they had paired appendages at any time in their history is not supported by any facts. Their whole development and life history shows that paired appendages had not been developed. There is no slightest trace in their anatomy.

(2) Among living vertebrates bone is the final stage of skeleton, not the first or most primitive stage and there is no support for the idea that the ostracoderm bony skeleton is the primitive condition from which all other forms of skeletal tissue and support organs have been derived. This is true from the standpoint of comparative morphology as well as ontogeny.

(3) The conclusion that the bony head skeleton of the ostracoderms was preceded by a cartilaginous structure similar to that of living petromyzonts is valid and well grounded in the morphology of the living marsipobranchs.

(4) The branchial basket of the marsipobranchs, as I have shown, is a development of the external velar skeleton and is not derived by the degeneration of the bony head shield of ostracoderms, from bone to cartilage and fibrous tissue with subsequent removal of this skeletal tissue by perforation, leaving only narrow strips and bars of cartilage with fibrous tissue left in the interspaces.

The marsipobranchs are primitive vertebrates when compared with other fish forms more advanced in differentiation and specialization of tissues and organs, but they are far along the road of vertebrate evolution. If one may guess the duration of geologi-

[1] Dr. Howard Ayers, author of this communication, died on October 17.