this subject to describe to us this afternoon, work which makes a notable addition to the subject of biochemistry. We are very happy that America should spare to us for this visit a man who has done so much for the reputation of American science, and we are very ready to learn what he has to teach us.

Our society has sought to pay its respect to Langmuir's work by the award of the Hughes Medal in 1918, and by electing him as a foreign member of our body. He received the Nobel Prize for chemistry in 1932. The American Academy of Arts and Sciences gave him the Rumford Medal in 1920.

It is an interesting fact that this Rumford Medal is the parallel of our own Rumford Medal, in that the two were founded by the same great scientist. I may draw your attention to a further interesting fact, that Rumford the American was the originator of the Royal Institution where we meet to-day.

SCIENTIFIC NOTES AND NEWS

THE American Association for the Advancement of Science and a large number of affiliated and associated societies are holding meetings in Richmond during the present week, under the presidency of Dr. S. A. Mitchell, professor of economics in Columbia University. A preliminary program, edited by Dr. F. R. Moulton, permanent secretary, was printed in the issue of SCIENCE for December 2. Full accounts of the meeting and a number of the more important addresses will appear subsequently. The address of the retiring president, Dr. George D. Birkhoff, will be found in the present issue.

THE election of the following sectional presidents of the British Association has been announced: *Mathematical and Physical Sciences,* R. S. Whipple; *Chemistry,* Professor E. K. Rideal; *Geology,* Professor H. H. Read; *Zoology,* Professor J. Ritchie; *Geography,* A. Stevens; *Economics,* Professor H. O. Meredith; *Engineering,* H. E. Wimperis; *Anthropology,* Professor W. E. Le Gros Clark; *Physiology,* Professor D. Burns; *Psychology,* R. J. Bartlett; *Botany,* Professor D. Thoday; *Education,* Dr. A. P. M. Fleming; *Agriculture,* Sir Thomas Middleton. The annual meeting in 1939 will be held at Dundee from August 30 to September 6, under the presidency of Sir Albert Seward.

PROFESSOR D. W. JOHNSON, professor of physiography at Columbia University; Professor H. von Eckermann, assistant professor of mineralogy and crystallography in the University of Stockholm, and Professor A. A. Öpik, professor of geology in the University of Esthonia, have been elected foreign correspondents of the Geological Society of London. Professor Emile Argand, professor of geology, mineralogy, petrography and paleontology in the University of Neuchâtel, and Dr. E. A. Stensiö, director of the department of paleozoology in the Naturhistoriska Riksmuseum, Stockholm, have been elected foreign fellows.

DR. H. B. WALKER, of the College of Agriculture of the University of California, was awarded the John Deere Medal for 1939 of the American Society of Agricultural Engineers in recognition of his "distinguished achievement in the application of science and art to the soil" at the Chicago meeting. The medal was given to the society for annual award by descendants of John Deere, inventor of the first all-steel plow. Last year for the first time it was awarded to S. H. McCrory, of the U. S. Department of Agriculture. The presentation to Dr. Walker will be made at the annual meeting of the American Society of Agricultural Engineers to be held at the University of Minnesota next June.

AT the hundred and ninety-fourth convocation of the University of Chicago the honorary doctorate of science was conferred on Dr. James B. Herrick, who retired in 1926 as emeritus professor of medicine of the Rush Medical College. Dr. Emmet B. Bay, dean of Rush Medical College, a former student and associate, presented Dr. Herrick for the degree. The citation read: "Scholarly teacher and devoted physician, whose character and attainments have adorned this university and whose contributions to knowledge have enriched the annals of medical science."

THE University of Paris has conferred honorary degrees on Dr. Albert von Szent-Györgyi, professor of medical chemistry in the faculty of medicine of the University of Szeged; on Dr. S. P. L. Sorenson, director of the chemical section of the Carlsberg Laboratory, Copenhagen, and on Dr. Paul Karrer, director of the Institute of Chemistry at the University of Zurich.

TRINITY COLLEGE, Dublin, conferred on December 8 the honorary degree of doctor of science on Dr. E. S. Goodrich, professor of zoology and comparative anatomy at the University of Oxford.

Museum News reports that the Inter-Museum Council of New York City, at a meeting of representatives of about thirty institutions held on November 4, elected Dr. Clark Wissler, of the American Museum of Natural History, *chairman;* Hardinge Scholle, Museum of the City of New York, *vice-chairman,* and Robert P. Shaw, of the New York Museum of Science and Industry, *secretary-treasurer.*

DR. ERNEST E. TYZZER, George Fabyan professor of comparative pathology at Harvard Medical School,

who succeeded Dr. Richard P. Strong when he retired last autumn as professor of tropical medicine, has been appointed head of the combined departments of tropical medicine and comparative pathology.

DR. JOHN C. WHITEHORN, physiological chemist and director of laboratories at McLean Hospital, Belmont, Mass., has been appointed professor of psychiatry in the Washington University School of Medicine, St. Louis. The department of neuropsychiatry of the medical school has received from the Rockefeller Foundation a grant of $150,000 to assist in the development of research and teaching.

DR. K. W. MEISSNER, formerly professor of physics in the University of Frankfurt-am-Main, Germany, has joined the staff of the department of physics of the Worcester Polytechnic Institute.

DR. F. A. PANETH, reader in atomic chemistry in the University of London, has been appointed professor of chemistry at the University of Durham. He succeeds Professor Irvine Masson, who recently resigned to become vice-chancellor of the University of Sheffield.

AT the Museum of Zoology of the University of Cambridge, F. T. Parrington, of Sidney Sussex College, has been appointed director. Other appointments include H. B. Cott, of Selwyn College, curator of vertebrates and Strickland curator; J. E. Smith, curator of invertebrates; Dr. G. C. Varley, of Sidney Sussex College, curator of insects. He was also appointed university demonstrator in zoology.

MISS MARGARET POOR has been appointed assistant entomologist at the Bernice P. Bishop Museum, Honolulu.

DR. JOHN VAN OOSTEN, in charge of Great Lakes Investigations of the U. S. Bureau of Fisheries, has become a member of the water resources committees of the National Resources Committee for the Upper Great Lakes (Superior, Michigan and Huron) and the Lake Erie basins.

CLINTON G. ABBOTT, director of the Natural History Museum, San Diego, Calif., has been appointed a member of the State Committee of Parks, Parkways and Recreational Facilities.

DR. JOHN F. CUNNINGHAM, dean of the College of Agriculture of the Ohio State University, has been named chairman of the resident teaching section of the Association of Land Grant Colleges and Universities.

DR. G. F. LOUGHLIN, chief geologist, and L. W. Currier, geologist, of the U. S. Geological Survey, recently conferred in Boston with officials of the Massachusetts Department of Public Works in regard to the plans for an accomplishment of geologic investigations in the state that are being undertaken by the Geological Survey in cooperation with the state. These investigations include geologic mapping of various areas and the preparation of reports to state engineers on road building projects, etc.

AT a meeting in Washington of the Board of Trustees of the National Geographic Society four life trustees were elected as follows: Rear Admiral L. O. Colbert, director of the Coast and Geodetic Survey; Major General Henry H. Arnold, chief of the U. S. Army Air Corps; Dr. Floyd K. Richtmyer, dean of the Graduate School of Cornell University, and Leroy A. Lincoln, president of the Metropolitan Life Insurance Company of New York.

CHARLES M. B. CADWALADER, president of the Academy of Natural Sciences of Philadelphia, has been elected to the board of managers of the Wistar Institute of Anatomy and Biology and to the board of trustees of the Wagner Free Institute of Science.

A NUTRITION PANEL, consisting of food experts and scientific men in every branch of research and industry, has been announced by the Food Group of the Society of Chemical Industry of Great Britain. The panel, with Dr. J. C. Drummond, professor of biochemistry at the University of London, as chairman, and A. L. Bacharach as honorary secretary, has been formed for the study of food in relation to health and disease. Its scope will include the production, processing and distribution of food for both human and animal consumption and the manufacture and control of preparations for supplementing diets for medical use in the nutritional disorders. Regular meetings of members are being arranged and subjects to be discussed will range from vitamins to food storage in national emergency and animal nutrition.

DR. IRVING LANGMUIR, of the General Electric Company, who is in England to give the first lecture established by the Pilgrim Trust, gave an address before the Physical Society of London on December 20. He spoke on "The Structure of Prolan."

H. D. MISER, geologist in charge of the section of fuels, U. S. Geological Survey, delivered his presidential address as retiring president of the Geological Society of Washington on December 14. His subject was "Our Petroleum Supply."

DR. PETER H. BUCK, professor of anthropology at Yale University and director of the Bishop Museum, Honolulu, addressed students of Mills College, California, on December 14.

AN inaugural lecture was given on November 28 by Professor J. D. Bernal, who was recently appointed to the university chair of physics at Birkbeck College,

University of London. He spoke on "The Structure of Solids as a Link between Physics and Chemistry."

THE annual conference of the British Geographical Association will be held at the London School of Economics from January 3 to 6, under the presidency of Sir Thomas Holland. The subject of Sir Thomas's address will be "The Geography of Minerals." The Institute of British Geographers will hold its annual meeting at the same time and place.

COMMEMORATING the thirty-fifth anniversary of the first flight of the Wright Brothers at Kitty Hawk, N. C., on December 17, 1903, the New York Museum of Science and Industry, in Rockefeller Center, opened on that day a special aeronautical exhibition with the emphasis on flying for the civilian. Airplane models, a full-sized all-metal plane designed for the amateur flyer, together with material showing how an all-metal plane is constructed, and an exhibit of aerial cameras make up the exhibition. Among the models, which number about thirty military, naval and commercial airplanes and flying boats, is one of the original Wright planes. A model of the Wright Brothers memorial at Kitty Hawk is also shown.

A HABITAT group containing the world's largest gorilla was opened on December 16 in the African Hall of the Academy of Natural Sciences, Philadelphia. The group was collected and presented to the academy by George Vanderbilt, of New York, who, with Mrs. Vanderbilt, attended a private opening of his group and a dinner given in their honor by Charles M. B. Cadwalader, president of the academy.

BY the will of the late Edward Benedict Cobb, Yale University receives, in addition to a bequest of $400,000, an interest in the residuary estate of $1,400,000.

ARCHES NATIONAL MONUMENT, Utah, one of a group known as the Southwestern National Monuments, administered by the National Park Service, has been increased in area more than six times. The extension adds four sections of much scenic value, related in geologic formation to the original area of 4,520 acres, set aside in 1929. These sections are known as the Devil's Garden, the Courthouse Towers, the "Klondike" and part of the Canyon of the Colorado River. Produced by centuries of water and wind erosion, the monument consists of a series of arches, natural bridges and windows, with balanced rocks, pinnacles and other shapes eroded from the basic red sandstone. Petrified remains of dinosaur bones have been found in the vicinity, as well as well-preserved dinosaur tracks. The canyon walls bear Indian petroglyphs, showing evidences of early Indian occupancy.

The Museum News calls attention to a recent report issued by the Dominion Bureau of Statistics of Canada enumerating 36 museums in the country with full-time staffs. Twelve of these have the full time of only one person each. Thirteen have three or more full-time staff members. The annual expenditure of these museums is estimated at $800,000 to $900,000. The average daily attendance is highest at the Royal Ontario Museum, Toronto, with 688 visitors for the five museums; Vancouver City Museum has 400; the Art Gallery of Toronto, 372; the Hudson's Bay Company exhibit at Winnipeg, 235; and the National Gallery, Ottawa, and the Chateau de Ramezay, Montreal, 200 each. A directory of all Canadian museums is included in the report.

THE Rothamsted Experimental Station at Harpenden, England, the oldest agricultural research station in the world, will celebrate its centenary in 1943. To mark the occasion it has been decided to carry out a plan of extension, and an appeal has been made for a fund of £125,000. It is proposed that the fund should be allocated as follows: Chemical laboratory new wing, £15,000; alterations to old chemical laboratory, £3,000; equipment, £3,000; pot culture houses and accessories, £5,000; farm buildings and cottages, £4,000; forecourt, £3,000; new agricultural library, with cubicles for workers, £20,000; new building for the Imperial Bureau of Soil Science and other workers associated with oversea activities, conference hall, etc., £30,000, and additions to endowment to provide upkeep of buildings, fellowships and salary augmentations, £42,000. It is hoped that it will be possible to complete the building program in advance of the celebration in 1943.

A CORRESPONDENT of the London *Times* writes that Dr. Knox Shaw, of the Radcliffe Observatory, Pretoria, has received news that the mirror of the big telescope for the observatory has been cast successfully by the Corning Glass Works, of Corning, N. Y. The work of casting began in May. The mirror has now to go to Great Britain to the telescope makers, Messrs. Howard Grubb, Parsons and Company, to be ground and polished. If all goes well the telescope may be expected to arrive in South Africa towards the middle of 1939. This is the third attempt to cast the mirror, which is 72 inches in diameter. The disk glass was originally ordered in July, 1936, but in December of that year the casting proved a failure. Another mirror was cast in June, 1937, and that also was found to be a failure in September of 1937. Until the mirror arrives in Pretoria the work of completing the observatory is held up, but everything is in readiness to accommodate the telescope.

AT the autumn meeting of the Zoological Section of the South-Eastern Union of Scientific Societies held at the Zoological Society of London, Sir Edward Poulton was in the chair. Dr. Julian Huxley, F.R.S., the president of the union for 1938, introduced the

program, which consisted of three biological films—*Mites and Monsters* (Strand Films), *Heredity in Animals* (G. B. Instructional) and *The Private Life of the Gannets* (London Films)—in all of which he had acted as scientific adviser. *Mites and Monsters* is designed for commercial showing, but with the aim of putting across cerain definite ideas concerning the size of animals and its limitations in different groups. *Heredity in Animals* is a purely educational film, designed to explain the elementary facts of Mendelism and selection to boys and girls in the higher classes of secondary schools, and *The Private Life of the Gannets* is a straightforward nature film, aimed simply at interesting the general public.

DISCUSSION

EVIDENCE OF THE AUSTRALOPITHECINE MAN-APES ON THE ORIGIN OF MAN

A RECENT visit to South Africa, in response to cordial invitations from Dr. Robert Broom, of the Transvaal Museum, Pretoria, and Professor Raymond A. Dart, of the Medical School of the University of the Witwatersrand, Johannesburg, was undertaken by us for the purpose of making a close study of the dentition of the Pleistocene South African man-apes described by Dart (1925)[1] and Broom (1936, 1938).[2] The full report of our results is being sent for publication by the Transvaal Museum, but in view of the exceptional importance of Dr. Broom's discoveries, the following brief note may be of interest to readers of SCIENCE.

We found that the forms called *Plesianthropus transvaalensis* and *Paranthropus robustus* by Broom displayed in their adult dentitions the following characters which are transitional or intermediate between the ape and human stages: (1) the upper and lower canine teeth, apparently in males as well as females, were of relatively small size, with low tips, and were altogether more human than ape-like; (2) the third upper and lower molars were very large, in contrast to the usually short third molars of man; (3) the second upper molar was larger than the first, as in apes; (4) the third lower molar crown pattern was evidently a derivative of the ancestral five-cusped "*Dryopithecus* pattern,"[3] but it was approaching the human "plus pattern" in the arrangement of its grooves and bore a large sixth cusp as in certain primitive men; (5) the grinding teeth when well worn acquired nearly flat occlusal surfaces as in man, whereas in apes the buccal cusps of the upper, and the lingual cusps on the lower, tooth rows, tend to remain in high relief even in well-worn specimens; (6) in the upper dental arch of *Plesianthropus,* as carefully reconstructed by us, the sides were slightly divergent posteriorly and the general effect was more human than ape-like; (7) in correlation with the small size and low crown of the upper canine, the first lower premolar had a convex buccal face and showed little or no trace of the shearing mesiobuccal face which is found in the ancestral *Dryopithecus* stock, where it sheared against the distolingual face of the tusk-like upper canine. Thus the first lower premolars in *Paranthropus* were almost human in stage.

On the whole the adult dentition of the South African Pleistocene man-apes was somewhat more human than ape-like in the small canines and premolariform first lower premolars, as well as in the flattening of the crowns of the grinding teeth by wear, in the form of the upper dental arch and in the great development of cusp 6 on the lower molars. On the other hand, it was more ape-like than human in the large size of the second and third upper and lower molars and in retaining the *Dryopithecus* pattern on all the lower molars.

The deciduous dentition, which is well preserved in the young skull of *Australopithecus africanus* Dart, is more human than ape-like in the reduction of the incisors and canines, in the advanced submolariform patterns of the upper and lower deciduous molars, in the shortness and width of the deciduous dental arches; on the other hand, the relatively huge size of its permanent upper and lower molars, together with their characteristic crown patterns, indicate that this is the young of one of the adult forms noted above and serve to mark its definitely infra-human status.

These conclusions are confirmed by the annectant characters of the braincast as recently figured by Broom. The smaller adult braincast, provisionally estimated by Broom as about 440 cc, although not as large as that of a large gorilla, is more human in general appearance. The larger braincast, estimated by Broom at about 600 cc, is not unlike that of *Pithecanthropus erectus,* but definitely smaller.[4]

In 1926 H. H. Wilder, in his excellent book, "The Pedigree of the Human Race," took the bold step of uniting apes and men in a single zoological family, the Hominidae. If mice rather than men were being classified, this would have been widely recognized as a genuine discovery, in line with the more fundamental one by Linnaeus that man is a member of the natural

[1] *Nature,* 115: 2884, 195–199, February 7, 1925.

[2] *Nature,* 138: 3490, 468–488, September 19, 1936; *ibid.,* 142: 3591, 377–379, August 27, 1938.

[3] William K. Gregory, 1916. *Bull Am. Mus. Nat. Hist.,* Vol. XXXV, art. 19, pp. 239–355, *Dryopithecus* pattern, pp. 293–295. Gregory and Hellman, 1926; Hellman, 1928.

[4] *Nature,* 142: 3603, 897–899, November 19, 1938.