easily than it lets the long-waves emitted from the planet's surface out again; and partly, perhaps, to some residual internal heat in the planet. The existence of the latter is made probable by the rapid changes in the cloud-forms, which often suggest the ascent of new material from below. The variety of colors upon the surface, which range from clear white through pinks and browns almost to black, remain unexplained.

On Saturn, where the ammonia bands are fainter than on Jupiter and the surface gravity less than half as great, the limiting temperature may be 10° or 15° lower. The radiometric observations indicate about the same difference.

Uranus and Neptune, being farther from the sun, should be still colder. The ammonia should be frozen out of their atmospheres, leaving them clear to a greater depth, which may explain the extraordinary strength of the methane bands in their spectra. The methane itself must be nearly ready to condense on Neptune, despite its very low boiling point. Assuming, roughly, that Neptune has six mile-atmospheres of methane above its surface, the pressure, due to this alone, would be about 500 mm and the limiting temperature −165° C. A large excess of hydrogen might reduce this to −183°. Solar radiation alone would maintain a mean temperature near −220°. Whether the difference arises from the powerful "greenhouse" effect of the methane itself, or from internal heat, can not yet be determined. It may be, however, that if the methane could once be frozen out of Neptune's atmosphere, the surface temperature would fall so much that it would stay frozen and leave the planet with an atmosphere which, apart from the inevitable Rayleigh scattering, exerted no influence upon visible light.

The problem of planetary atmospheres, so perplexing a few years ago, is now far advanced toward its solution. Toward its interpretation many of the sciences have contributed—astronomy, physics, chemistry, geology, biology and technology. No one of them alone could have resolved the difficulties. It may, therefore, be appropriate that the attention of so general a scientific gathering may have been invited for a while to it: for it truly illustrates the old motto, "In union there is strength."

SCIENTIFIC EVENTS

THE BRITISH WATER POLLUTION RESEARCH BOARD

IN the annual report of the Water Pollution Research Board for the year ended June 30, 1934, issued by the Department of Scientific and Industrial Research, according to a summary in the London *Times*, reference is made to the exceptional conditions of weather during 1933 and 1934. The long spell of dry weather not only caused difficulties in the provision of ample quantities of water, but also had a serious detrimental effect on the quality of the water in rivers and streams into which sewage and trade effluents are discharged, as less water than usual was available for dilution of the discharges.

The investigations initiated by the board may be divided into four main groups dealing respectively with purification of water for public supply, methods of treatment and disposal of sewage, methods of treatment and disposal of trade effluents, and various problems of river pollution.

With regard to water for public supply, many experiments have been carried out with the object of ascertaining the effects of various factors on the treatment of water by the base-exchange process of softening. During the last two years experiments have been carried out on methods of treatment of British clays with the object of preparing base-exchange material suitable for water softening. Many samples of clays have been employed and a method of treatment has been devised whereby prepared clays have been produced with water-softening capacities greater than those of some imported materials at present in use.

Further experiments have been carried out in the laboratory on methods of treatment of the waste waters discharged from dairies and milk products factories. These effluents may seriously affect rivers and streams into which they are discharged, and may be many times as strong in polluting character as domestic sewage. The problem is of particular importance at the present time because of the expansion of the milk industry and the increase in the number of large centralized factories and milk collecting and distributing depôts. During the year many cases of serious difficulty and pollution of streams by such effluents have arisen. The experiments have indicated that there are methods whereby the effluent can be satisfactorily purified before disposal, and a stage has been reached at which the processes suggested should be tested on a large scale. The industry has been informed of the progress of the work and has been offered the opportunity of cooperating both technically and financially in the further investigations which are desirable.

Considerable progress has been made in fundamental investigations of the biology and chemistry of methods of purification of sewage.

The question has also arisen whether the amount

of material deposited and the character of the deposits in the estuary of the River Mersey and in Liverpool Bay are affected by the large quantities of sewage discharged into the estuary of adjacent towns. In response to a request from the Merseyside local authorities, the Mersey Docks and Harbor Board, and other interested bodies, a comprehensive investigation of the subject has been undertaken.

THE ANNUAL REPORT OF THE DIRECTOR OF THE FIELD MUSEUM OF NATURAL HISTORY

STILL operating on a very much curtailed budget, necessitated by depression, the Field Museum of Natural History nevertheless was able to maintain during 1934 full activity so far as services to the public are concerned, according to the annual report of Dr. Stephen C. Simms, director of the museum.

Attendance at the museum was more than 1,985,000 persons. While this was a decline of about 1,284,000 from the 3,269,390 visitors received during 1933, it was nevertheless the second highest year's attendance in the history of the museum, and the reduction from the 1933 peak was a natural expectation in view of the smaller attendance at the second year's Century of Progress Exposition. Of the visitors in 1934, only about 99,000, or approximately 5 per cent., paid the 25-cent admission fee charged on certain days; all the rest, approximately 95 per cent., either went on the days when admission is free, or belonged to classifications such as children, teachers and students, who are admitted free on all days.

The scientific expeditions of the museum had to be kept to a minimum. The Straus West African Expedition of Field Museum, sponsored by Mrs. Oscar Straus, of New York, collected zoological material in Senegal, the French Sudan, Nigeria and Angola (Portuguese West Africa). The Leon Mandel Guatemala Expedition, sponsored by Leon Mandel, of Chicago, concluded its work of making comprehensive collections of characteristic Central American fauna. Research on sites of ancient Maya civilization was conducted by an expedition jointly sponsored by the Carnegie Institution of Washington, D. C., and Field Museum. The Field Museum Archeological Expedition to the Southwest, financed by the Julius and Augusta N. Rosenwald Fund of the museum, carried on its fourth season of operations on the Lowry ruin, prehistoric Indian site in Colorado. An anthropometric survey of Kurd, Arab and Beduin populations was made by the Anthropological Expedition to the Near East sponsored by Marshall Field, of New York and Chicago. The Joint Botanical Project of the Rockefeller Foundation and Field Museum was in its fifth year of operations in Europe. Paleontological field work was conducted in Nebraska, the Bad Lands of South Dakota and Pennsylvania.

A new hall devoted to domestic animals was opened. It contains a series of sculpture in marble and bronze, one fourth life-size, by the sculptor Herbert Haseltine, of champion horses, beef and dairy animals, sheep and swine of Great Britain. The collection is a gift to the museum from Marshall Field, a member of the board of trustees. Many new habitat groups of wild animals were added to the zoological exhibits. The additions of further sculptures of types of races of mankind by Malvina Hoffman brought the series of nearly 100 figures in Chauncey Keep Memorial Hall practically to completion.

The regular lecture courses in spring and autumn, and the year-around lecture tours for adults, as well as the series of motion picture programs, extension lectures and other activities for children presented by the museum unit known as the James Nelson and Anna Louise Raymond Foundation, were continued as in other years, and were attended by approximately 240,000 persons. The N. W. Harris Public School extension, another separately endowed department of the museum, maintained its service of circulating some 1,300 traveling natural history exhibits which daily reach about 500,000 children in all the public and many private schools of Chicago.

Field Museum Press issued a number of important scientific publications for international circulation, as well as several leaflets in popular style for lay readers.

Two new members were elected to the museum's board of trustees—Joseph N. Field, of Chicago, and Leslie Wheeler, of Lake Forest, Ill. The museum suffered the loss by death of its curator of anthropology, Dr. Berthold Laufer, noted for his research in Oriental subjects. Subsequent to his death, Dr. Paul S. Martin was appointed acting curator in charge of the department.

OFFICERS OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

A FULL account of the Pittsburgh meeting of the American Association for the Advancement of Science and of the scientific societies associated with it, edited by the permanent secretary, will be published in the issue of SCIENCE for February 1.

Officers of the association were elected as follows:

PRESIDENT

Dr. Karl T. Compton, president of the Massachusetts Institute of Technology.

VICE-PRESIDENTS AND CHAIRMEN OF THE SECTIONS

Mathematics—Dr. T. H. Hildebrandt, University of Michigan.

Physics—Dr. John T. Tate, University of Minnesota.

Chemistry—Dr. Moses Gomberg, University of Michigan.