News and Views

Planetary Atmospheres

WE are glad to be able to publish as a special supplement this week a survey of existing knowledge of the atmospheres of the planets, which formed the subject of the presidential address delivered by Prof. H. N. Russell at the recent Pittsburgh meeting of the American Association. Prof. Russell is known to all astronomers for his work on stellar development, and particularly by his division of stars into the two types of 'giants' and 'dwarfs' in which the temperature is rising and falling respectively. In recognition of this and other contributions to astrophysics, he was awarded the Gold Medal of the Royal Astronomical Society in 1921, and he has been similarly honoured by a number of other leading scientific societies. In his address Prof. Russell first points out that the presence of atmospheres on Jupiter, Saturn, Mars and Venus was proved, many years ago, by telescopic observations of clouds, polar snow-caps and twilight. The moon has no trace of atmosphere, nor has Mercury. The spectroscope enables information about the composition of these atmospheres to be obtained, but it will not detect hydrogen, nitrogen, helium or other inert gases in such atmospheres. Tests for oxygen and water-vapour are complicated by the presence of these substances in the earth's atmosphere. By taking advantage of the Doppler shift of the lines when a planet's distance is changing rapidly, this difficulty can be escaped. The latest observations at Mount Wilson show no traces of oxygen or water-vapour, either on Mars or Venus. The small amount of water required for the Martian polar caps might escape detection. Bands due to carbon dioxide have been discovered in Venus, and they indicate a layer of the gas at least two miles thick. The major planets show other bands—increasing in strength from Jupiter to Neptune—all due to methane (CH_4) the simplest hydrocarbon. Ammonia gas gives weaker bands in Jupiter and Saturn.

PHYSICO-CHEMICAL explanations are available for these facts. Small bodies, such as the moon, have not sufficient gravitational attraction to prevent their atmospheres from escaping into space. Middle-sized planets, like the earth, probably lost almost all their initial atmospheres while they were in process of formation, and intensely hot. As the rocky crust solidified, water vapour and carbon dioxide would escape from it and be added to the residual nitrogen, argon and neon. The free oxygen on the earth is probably a product of plant life. Venus appears to be a planet on which life did not start—leaving the carbon dioxide unaffected. Large planets would retain hydrogen and all other gases. There is a great excess of hydrogen in the sun. If the same were true of the planets, they would cool down into rocky cores, surrounded by oceans thousands of miles deep, and then by atmospheres highly compressed by their own weight. The chemical equilibria in such mixtures have been carefully studied, as they are of industrial importance. At high temperatures and low pressures, hydrogen, nitrogen and carbon dioxide would prevail—at low temperatures and high pressures, hydrogen, methane, ammonia and water. The surface temperature of Jupiter is about − 120° Centigrade, and the ammonia is on the point of condensation, probably forming the clouds visible in the planet. Saturn is colder, and almost all the ammonia is frozen out. In Uranus and Neptune it is completely gone, enabling us to look deep into the atmospheres of hydrogen and methane, which must be very extensive.

Inland Water Survey

THE Minister of Health (the Right Hon. Sir Hilton Young), and the Secretary of State for Scotland (the Right Hon. Sir Godfrey Collins), have appointed a Committee to advise on the Inland Water Survey for Great Britain, on the progress of the measures undertaken and on further measures required and, in particular, to make an annual report on the subject. The members are as follows: Col. Sir Henry G. Lyons, F.R.S., Sir Charles H. Bird, Prof. W. S. Boulton, Mr. G. Dallas, Mr. G. J. Griffiths, Lieut.-Col. F. Hibbert, Sir Clement D. M. Hindley, Mr. S. R. Hobday, Mr. W. A. Millar, Mr. D. Paul, and Mr. B. Verity. The secretary to the Committee is Mr. I. F. Armer, and any communications relating to the work of the Committee should be addressed to him at the Ministry of Health, Whitehall, S.W.1. In constituting this Committee, it is stated that the object has been, not to appoint representatives of organisations or interests, but to obtain a body of men of different classes of experience serviceable for the work to be undertaken.

THE class of experience chiefly represented upon the Committee is, however, that of water users; and we are disappointed that little attention seems to have been paid to the recommendations of the British Association Committee on Inland Water Survey by the Ministry of Health. The need for a scientific survey of the water resources of Great Britain was brought out at the York meeting of the Association in 1932 through a paper in which Capt. W. N. McClean described some of his work on river flow. The result was the appointment of a strong committee, with Vice-Admiral Sir Percy Douglas, formally hydrographer of the Navy, as chairman, and Capt. W. N. McClean as secretary. This Committee produced a valuable report, in which the scientific aspects of inland water survey were clearly presented. It is surprising, therefore, to record that not a single member of the British Association Committee, which was responsible for directing public attention to the whole subject and suggesting a possible programme of work, is included among the members of the Committee just appointed.

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