

modern applications of electricity to traction, by P. Dawson; the chloride battery, by W. H. Earle; extension and development of the telephone in agricultural districts, by Major-General Webber; telephony, by A. R. Bennett; the field telegraph in Chitral campaign, by P. V. Luke; a new portable photometer, by W. H. Preece and A. P. Trotter. Tuesday, 17.—Interim report of committee on standardising; modern flour-milling machinery, by F. W. Turner; paper-making machinery, by Mr. Mason; printing without use of movable types, by J. Southward; incandescent gas lamps, by C. Cooke; B.A. Standard small screws, by R. B. Compton; uniform factor of safety in steam boilers, by J. Key.

The provisional programme for Section H is as follows:—Thursday, September 12.—Address by Prof. Flinders Petrie; skulls of the aborigines of Jamaica, by Sir W. H. Flower; skulls of the Neolithic invaders of Egypt, by Dr. J. G. Garson; Andamanese, by Morris Portman; Neolithic invaders of Egypt, by Prof. Flinders Petrie. Friday, September 13.—Worked flints from South Africa, by H. W. Seton Karr; flint and metal working in Egypt, by Prof. Flinders Petrie; flints found at Thebes, by Gen. Pitt Rivers; plateau flints of North Kent, by B. Harrison;

A SOUVENIR OF "CHALLENGER" WORK.

A MEDAL has been prepared as a souvenir of the scientific work connected with the *Challenger* expedition. The medal, which is in bronze, is three inches in diameter, and was modelled by Mr. Birnie Rhind, sculptor, from designs by Mr. William S. Black, both of Edinburgh. It was cast in Paris, and is being presented by Dr. John Murray to the naval officers of the expedition, the contributors of memoirs to the report on the scientific results of the expedition, and to members of the civilian scientific staff, as a souvenir of *Challenger* work.

The accompanying illustrations have been reproduced from two photographs of the casts forwarded to us by Mr. Black, and show the two sides of the medal. On the front of the medal, the head of Athena with owl occupies the centre, and is placed on the globe, which in turn is surrounded by a border of water indicating the voyage of the expedition around the world. Out of the water rises Neptune, with trident and a trawl disclosing the treasures of the deep-sea. The decoration of the border is completed with a dolphin and two mer-



graving tools from terrace gravels of the Thames valley, by H. Stopes; Palaeolithic projectiles, by the same; megaliths of Tripoli, by Swainson Cooper; kitchen midden at Hastings (report), by W. J. Lewis Abbott. Saturday, September 14.—North-west tribes of Canada (report), by Prof. E. B. Tylor; Samoyedes of the Arctic tundras, by A. Montefiore; language illustrating primitive warfare, by Rev. Hartwell Jones; ethnographical survey (report), by E. Sidney Hartland; deviations of children (report), by Dr. Warner. Monday, September 16.—Cannibalism, by Captain Hinde; folk-lore of Ipswich, by Miss Layard; ethnographical conclusions, by G. Laurence Gomme; general conclusions, by Edward Clodd; folk-lore illustrated, by Prof. Haddon; religious origin of dances, by Mrs. Grove. Tuesday, September 17.—On interference with the civilisation of other races, by Lord Stanmore, Prof. Douglas, Prof. Haddon, and Dr. R. N. Cust, and letters of the late R. L. Stevenson; southern Arabians, by Theodore Bent; the Eskimo, by F. Linklater and J. A. Fowler. Wednesday, September 18.—Lake village of Glastonbury (report), by Dr. R. Munro; prehistoric Greek idols, by Arthur Evans; Neolithic station of Butmir, by Dr. R. Munro.

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maids supporting a ribbon with the words "Voyage of H.M.S. *Challenger*, 1872-1876."

The back of the medal bears the crest of the *Challenger*—a mailed warrior throwing down the gauntlet to Neptune, whose trident appears above the waves. This central figure is surrounded by a scroll bearing the words, "Report on the Scientific Results of the *Challenger* Expedition, 1886-1895." The name of the recipient of each medal is engraved around the edge.

It is hardly necessary to say that the medal has been very much appreciated, and appears to have been received with special satisfaction by foreign contributors to the *Challenger* Report, who regard it as a pleasing recognition of their assistance in the great work which has now been completed.

DR. FRIEDRICH W. G. SPÖRER.

IN a recent number of NATURE we unfortunately had to record the loss of an astronomer, Dr. Friedrich Tietjen, who devoted himself to computation, or, we should say, to that branch of astronomy which deals with

the methods of calculation, and with the reduction of the observations themselves.

It is our lot to-day to say a few words about another hard worker in astronomical science, whose end has followed too soon after that of Dr. Tietjen. This devoted student of astronomy has been an energetic observer in the same degree that Dr. Tietjen was an ardent computer. We refer to Dr. Friedrich Wilhelm Gustav Spörer, the former chief assistant of the Astro-Physical Observatory at Potsdam, and who died on July 7 last.

Dr. Spörer was born in Berlin on October 23, 1822, and after spending some time at the Friedrich-Wilhelms Gymnasium, he entered the University of Berlin, making mathematics and astronomy his chief studies. On December 14, 1843, he gained his doctor's degree, the subject of his thesis being the comet of 1723. In the following years he worked under Encke's direction at the Berlin Observatory, and in 1846, after having made his Staats exam., went as a teacher of mathematics and natural science to the Gymnasium at Bromberg. In 1847 he proceeded to Prenzlau, and two years later to Anclam, at which latter place he taught for twenty-five years, and became eventually Pro-rector.

It was during his leisure hours there that Dr. Spörer was able to turn his attention to astronomical observations, his instrumental equipment being of a very inferior kind. Notwithstanding this hindrance, he was able, however, by great diligence and perseverance, to make useful observations with regard to the statistics of the solar spots, which have made his name known to every worker of solar physics. Through the attention of Prof. Schellbach, who was the teacher of the then Crown Prince Friedrich Wilhelm, afterwards Kaiser Friedrich, Dr. Spörer was equipped with a good 5-inch telescope, with which he continued to make his solar observations by the known method of projection. His Anclam observations appeared from time to time in numerous articles contributed to the *Astronomischen Nachrichten*, and also in two larger papers which came out in the years 1874 and 1876 in the *Publicationen der Astronomischen Gesellschaft*. The chief value of these pieces of work lies in the careful determination of the elements of rotation of the sun, and also in the more accurate settlement of the then empirically known law of Carrington, namely, the decrease in the velocity of rotation of the sun-spots according to increase of solar latitude.

In the year 1868, accompanied by Prof. Tietjen and Dr. Engelmann, Dr. Spörer took part in the astronomical expedition to observe the total eclipse of the sun visible in the East Indies. Six years later (1874) he received the appointment as observer at the Potsdam Astro-Physical Observatory, and in the same year continued his solar observations from the top of the tower of the Military Orphan Asylum, until the completion of the observatory.

There Dr. Spörer, with untiring energy and with the same ardour that he displayed in Anclam, did a great amount of work in collecting data on the subject of sun-spots. The publications of the Astro-Physical Observatory (years 1879-1894) contain four valuable papers by him, giving a rich quantity of accurate observations that will remain a classical work for the study of the proper motion of the solar spots.

In 1882 Dr. Spörer became chief assistant, and this position he held until October 1894, when he retired for a well-earned rest.

From Dr. Spörer's observations of solar spots, the most important deductions that have been made may be summed up as follows:—

(1) That the period of rotation of the apparent surface of the sun about the axis, is not the same for every part.

(2) That the velocity of the spots is greater nearer the

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equator than further away from it, and that this velocity can be approximately represented by a formula.

(3) That the variation in latitude is periodical, and that there are two series of spots. We learn thus that the true sun-spot cycle is one extending over twelve to fourteen years, and that another begins in high latitudes before the former has ceased.

(4) His observations of the quantity of spotted area between the years 1856-1880, show a length of period of eleven years, this being the time between two consecutive maxima.

The maximum is reached when the mean latitude of the spots is about 16° north and south. A retreat then takes place from about 30° to 16° , that is, 14° in four years, and a further retreat from 16° to 8° , that is, 8° in eight years; or, in other words, we get a change of latitude of over 3° a year to begin with, and one of $\frac{1}{2}^\circ$ a year to end with.

Such results as these, which have here only been briefly summarised, are of fundamental importance, and form valuable data for those attempting to investigate the conditions of atmospheric circulation at the surface of our sun. Since the observations have been made consecutively by such a diligent observer, and extend over a considerable period of time, they are strictly of a uniform nature, and in consequence they are comparable *inter se*.

Happy in his work, and endowed with a strong constitution, Dr. Spörer was free from the ailments of old age up to his last day. It was when on a journey to visit his children that he was suddenly seized with paralysis of the heart, without ever having had any previous sign of illness, and died quietly and without pain.

His loss not only affects the astronomical world, but his large circle of friends, all of whom will mourn deeply such a sudden and unexpected bereavement.

W. J. S. L.

NOTES.

CONSIDERABLE activity has been displayed at the Plymouth laboratory of the Marine Biological Association during the present summer, and general satisfaction has been experienced by the naturalists who have visited the station for the purpose of research. Progress has been made with the series of dredging operations in the outlying grounds of the neighbourhood. The unsettled weather of the past two months has been a somewhat unfavourable condition in these expeditions; but it is expected that these operations may be carried on regularly and with increased success during the autumn months. The following naturalists have occupied tables at the laboratory during the summer: Prof. Weldon, F.R.S., Mr. G. P. Bidder, Mr. W. Garstang, Mr. T. H. Richey, Dr. Albrecht Bethe, Mr. W. J. Beaumont, Mr. Gilchrist, and others.

A WELL-MARKED earthquake disturbance was felt at Zermatt on Wednesday, August 21. Many houses were severely shaken.

AMONG the deaths of eminent scientific men abroad, we notice the name of Dr. F. Hoppe-Seyler, professor of physiological chemistry in Strassburg University, and also that of Dr. S. Moos, professor of otology in Heidelberg University.

WE regret to record the death of Dr. J. S. Bristowe, F.R.S., whose work on the "Theory and Practice of Medicine" is recognised as a classic, while his other contributions to scientific literature give him a high place among medical worthies. Dr. Bristowe had filled the offices of President of the Medical Society, of the Pathological Society, and of the Neurological Society. He was elected into the Royal Society in June 1881.