gravity was in excess, as is usual on oceanic islands; upon the ice it was nearly normal, which confirms the results of Dr. Hecker's recent determinations of gravity at sea. The observations on the ice were of the heroic order, from difficulty, not with the pendulums, but with the clocks. An ice pillar proved nearly as stable as concrete for the pendulums, but the chronometer stopped at a temperature of −35° C., and the clock was filled with snow in the rather inadequate observing hut. The clock was then removed to the ship and connected with the "flash box" by cable; but the ship heeled over in an Antarctic gale, and again the clock stopped. Finally, after six months' work, it was installed in an ice house, when it went creditably.

The discussion of the observations, largely due to Prof. Haasemann, is full of interest, but the interest lies, unfortunately, in the details of the struggle against adverse circumstances rather than in the wealth of results. It is much to be regretted that Dr. Drygalski's pendulums failed to reach land within the Antarctic circle, for it may be long before so complete an equipment and so accomplished an observer travels again to that sector of the Antarctic.

A. R. H.

A NEW OCEANOGRAPHICAL EXPEDITION.

THE *Times* of November 9 announces the organisation of an important expedition for the investigation of the eastern part of the North Atlantic Ocean, with a possible extension westward to Newfoundland. By an Order in Council, dated October 16, his Majesty the King of Norway has granted permission, subject to certain conditions, for the Norwegian Government steamer *Michael Sars* "to be placed gratuitously at disposal for a scientific expedition in the Atlantic Ocean from the Canary islands to the Færöes, in the spring of 1910, proposed by a British subject, Sir John Murray," and also for "the Fishery Director, Dr. Hjort, Assistant Koefoed, and Mr. Helland-Hansen, as well as the ship's captain and engineer . . . to take part in the expedition while continuing to draw their salaries."

The *Michael Sars* is to sail under the Norwegian flag during the expedition, which is to extend over not more than four months, and Sir John Murray has undertaken to pay all expenses not provided for by the Order in Council.

The chief purpose of the forthcoming expedition, which must necessarily contribute results of first-rate importance to the science of oceanography, is to apply the new instruments and methods of research developed during the last few years, more particularly by the International Council for the Study of the Sea, to the deeper regions of the open ocean. It is believed that the use of large nets and trawls is practicable in deep water, and that, should this prove to be the case, zoological discoveries of great interest and importance will be made. The application of methods of high precision to the determination of the temperature and salinity of sea water has yielded results which have raised considerable doubt in the minds of some investigators as to the validity of the earlier observations made by the *Challenger* and other expeditions, and the cruise of the *Michael Sars* should not only afford much entirely new information, but provide a means of valuing the earlier work. Specially valuable data may be expected from the use of Ekman's new current-meter, which makes it possible for the first time to obtain direct measurements of the currents in the depth.

THE REV. W. H. DALLINGER, F.R.S.

IN the history of "Protozoology"—a department which has advanced of late so rapidly that it has journals, laboratories, and professorial chairs devoted to it—an honoured place, in one of the earlier chapters, must be given to the late Dr. Dallinger, for to him and to his fellow-worker, the late Dr. Drysdale, we owe the first complete record of a complex Protistan life-history, and at the same time a fine example of careful investigation.

William Henry Dallinger was born in 1842 at Devonport. He entered the Wesleyan ministry in 1861, and travelled various circuits, much esteemed as an impressive and weighty preacher. A serious illness is said to have driven him from theology to biology, for in his convalescence he took up the study of open-air natural history, and became fascinated with microscopic work. In 1880 he was appointed principal of the Wesley College, Sheffield, but he resigned this position in 1888 to devote himself more exclusively to scientific work, the Wesleyan Conference allowing him to retain his status and prerogatives as a minister, though without pastoral charge or any other office. Dallinger did much effective work as a lecturer on the staff of the Gilchrist Educational Trust, and his popular lectures on such subjects as "The Infinitely Little," "An Hour with the Microscope," and "Spiders," were models of clear exposition. He had a vivid and careful style, and give his delighted audiences a sound mixture of accurate facts and suggestive ideas. A good instance was the lecture on "The Lowest and Smallest Forms of Life," which he delivered on the occasion of the Montreal meeting of the British Association in 1884. For many years Dr. Dallinger was secretary of the Royal Microscopical Society, and he occupied the presidential chair from 1883 to 1887. He took a great interest in this society and in its valuable journal. It is said that during his presidency he travelled to attend the meetings a distance equal to about half the circumference of the globe, and it was characteristic of his conscientiousness that he usually journeyed back from London to Sheffield by the early mail train so as to be in time for his college duties in the morning.

Dallinger's scientific work began about 1870, and in 1873-6 he published, along with Drysdale, a series of papers on the life-history of monads in the *Monthly Microscopical Journal*. The characteristic feature of the patient labours of the two friends was continuity of observation. By means of a delicate mechanical stage and other devices they were able to keep their eye on one particular specimen of *Bodo saltans*, or whatever the flagellate might be, and follow it from phase to phase. By using a binocular they were able to change places without losing sight of the particular creature the life-cycle of which was being traced. On one occasion Dr. Dallinger kept up continuous observation for nine hours. The result was that some complete life-histories were worked out—spore-formation, growth of spores into flagellates, repeated fission of flagellates, conjugation, encysting, and spore-formation again. This was interesting in itself, it was prophetic of much that has followed in recent years, and it exposed one of the pitfalls in which believers in present-day abiogenesis are apt to come to grief.

In connection with the spontaneous generation question—which has had so many fruitful results—Drysdale and Dallinger made some interesting studies, showing, for instance, that although boiling the water killed monads in an active condition, it did not kill the spores. For the spores, indeed, the fatal temperature is very much higher, up to 268° F.

in water, up to 300° F. or more when dry. This led on to one of Dallinger's best known researches (Proc. Roy. Soc., xxvii., 1878), in which he showed that flagellates could gradually adapt themselves to tolerate extremely high temperatures. Starting with a medium at 60° F., in which three selected species (*e.g. Dallingeria Drysdalei*) flourished, he very gradually raised the temperature to 158° F., without killing off the organisms. That scalding heat would, indeed, have been fatal to the original stocks, but there had been, of course, myriads of generations, and the power of resistance to heat had been gradually augmented. The adapted forms showed marked vacuolation. Dallinger seems to have thought that this was a case of the inheritance of "acquired characters," but it is obviously out with Weismann's category of "somatic modifications." It is interesting to recall that Darwin was much interested in Dallinger's experiment because of its bearing on the adaptation of living creatures to hot springs. He wrote:—"The fact which you mention about their being adapted to certain temperatures, but becoming gradually accustomed to much higher ones, is very remarkable. It explains the existence of algæ in hot springs."

So far as we know, Dallinger's microscopical studies did not extend beyond monads and the like except by way of recreation, and his output of work was not great. It was thorough, however, as the man himself, and the lesson of his patience has still to be learned by some of the too impetuous workers of to-day. In 1886 he published the "Fernley Lecture" on "The Creator, and What we may Know about Creation," and he wrote many scientific articles for the *Wesleyan Methodist Magazine*. He wrote also a number of papers on spontaneous generation and heterogenesis, both of which he profoundly disbelieved in, on the ultimate limit of microscopic vision and kindred questions, and on the thermal death-point of microbes. A characteristic deliverance was an address to the Literary and Philosophical Society in Liverpool entitled "Life-histories and their Lessons: a Defence of the Uniformity and Stability of Vital Processes as Controlled by the Laws of Evolution." But his *magnum opus*, apart from monads, was his edition and re-edition (1891 and 1901) of "Carpenter's Microscope," which he brought up to date, and with the aid of specialists developed into a most valuable encyclopædia of the whole science and art of microscopy.

Dallinger was elected a Fellow of the Royal Society in 1880, and he received the honorary degrees of LL.D. from Victoria University in 1884, of D.Sc. from Dublin in 1892, of D.C.L. from Durham in 1896. He enjoyed the respect and esteem of scientific workers, and he has left his successors a pattern of thoroughness, patience, and enthusiasm.

THE STUDY OF GERMAN IN SCHOOLS.

TWELVE months ago an influentially signed letter, dealing with the study of German in secondary schools, was sent to the President of the Board of Education. That letter pointed out the serious neglect into which the study of the German language is falling in secondary schools, and urged the Board to take steps to encourage and foster the teaching of German. It was made clear that the decline of German as a secondary-school subject is a matter of grave national importance from the points of view of general literary culture, the public services, practical utility, and of rendering a good understanding between the peoples of two great nations less easy.

About six months after the receipt of this letter, the Board of Education issued a memorandum (circular 705) on language-teaching in State-aided secondary schools in England, in which an optimistic view of the condition of German teaching in England was taken, and it appeared to be argued that an advance was in progress in the number of pupils studying the language.

The various associations interested in the teaching of modern languages have had the Board's circular in particular, and the whole question generally, under consideration again, and a second letter has been sent to the President of the Board of Education, signed by representatives of the Modern Language Association, the Society of University Teachers, the Teachers' Guild of Great Britain and Ireland, and the British Science Guild.

The letter conveys the sense of disappointment of the associations generally with the "Memorandum on Language Teaching in Secondary Schools in England" (circular 705), and dissents in particular from several of the doctrines and statements laid down in it. It appears that

> The Board of Education has not obtained, and cannot obtain, the materials required for making the return on the time allotted to modern language teaching in schools in the exact form that the motion in the House of Lords made on February 5, 1908, demanded, but there seems no good reason why the Board should not furnish Parliament and the public, in whatever shape it thought good, with the information suggested by the motion. What we desire to know, and what the Board has full power and opportunity for ascertaining, is the present condition of modern language teaching in secondary schools, the place assigned to it in the curriculum by headmasters and governing bodies, the relation in which it stands to the teaching of Classics and of English, the qualifications, emoluments, and status of its teachers. On these points the memorandum throws no light.

The remark in the Board's memorandum that "the advance in the study of German is not at the present moment as rapid as the advance in the study of French, or even of Latin," scarcely represents the facts. All the evidence available shows that, not only has there been no advance in the study of German, but rather a rapid and decided retrogression. Sympathetic action is required to arrest this decline.

The letter continues:—

> As regards the contention that "the curriculum of schools is necessarily guided by the course of the Universities to which it is to lead," we would observe that only a fraction of the pupils in State-aided schools proceed to the university, and no curriculum can be deemed satisfactory which does not satisfy the needs of the bulk of the scholars. The majority of the pupils in these schools leave school before the age of seventeen, and it is allowed that for such pupils, "both practically and educationally, German is a language of the first importance"; yet the Board throws the whole weight of its influence into the scale of Latin as against German, apparently out of consideration for the one boy in a hundred who will go on to the university; and in this case what would be confessedly good for the many would be no less good for the favoured few. The number at Oxford and Cambridge taking medicine, science, and modern subjects is rapidly on the increase, and it is a constant cause of complaint among the professors and teachers of these subjects that their pupils come to them heavily handicapped by their ignorance of German. It is hardly necessary to insist on the value of a knowledge of German to honour students in every faculty.
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> Our suggestion that the Board should encourage and foster schools of the type of the German Realschule and Ober-Realschule is not noticed, but it is indirectly negatived by the insistence on Latin as one of two foreign languages where two are taught.