

national Time Conference which was held in Paris in October, 1913. Reference is next made to the arrangements for the determination of the difference of longitude between the observatories of Paris and Washington using the Eiffel Tower and Arlington as the radio stations for the transmission of the signals. A suggestion is made that owing to the great range of the signals to be sent out from Arlington, advantage will be taken of these signals by other institutions to determine their own longitude. The replies to the issue of a circular letter giving information concerning the special signals have indicated that a number of institutions widely scattered in the United States will utilise the opportunity offered. The report then describes the work carried out during the past year in the different instrumental divisions. These relate to the 9-in. transit circle, 5-in. altazimuth instrument, 6-in. transit circle, 26-in. and 12-in. equatorials, photo-heliograph, etc. The reduction work is next summarised, followed finally by that of the department of compasses, chronometers, and other nautical and surveying instruments.

#### TRADE AND TECHNICAL EDUCATION IN FRANCE AND GERMANY.<sup>1</sup>

THE interesting and important report recently presented to the Education Committee of the London County Council by one of its officers, specially deputed to make the inquiry, on recent developments in the provision of continued and specialised education in France and Germany, deserves the closest attention of all who are seriously concerned with the educational well-being of the children of the United Kingdom, and with the conditions necessary to the maintenance in the highest state of efficiency of our industries and commerce.

The report confines itself to the educational activities of four great cities, namely, Paris, Munich, Leipzig, and Berlin, dealing especially with measures having for their object the continued education of the child on leaving the elementary school, the thorough technical training of the apprentice, and the adequate preparation of the capable young workman or business man for positions of responsibility and leadership.

The question of the higher scientific and technical training is only incidentally treated, its ample provision, especially in the case of Germany, being fully recognised.

The report is, therefore, devoted in the main to the facilities offered in specialised and monotech schools, whether day or evening, dealing with specific trades and industries, of which the city of Paris affords abundant illustration in its apprenticeship schools and in its schools of applied design, the work of which was a most interesting feature of the educational section of the Paris Centennial Exhibition of 1900.

But the chief interest of the report is to be found in its description of the provision made, in the three important German cities named, for the continued effective education of German youth on leaving the elementary school and entering upon their respective occupations, "blind alley" or otherwise.

Much stress is laid upon the successful working of the Imperial Law of Industry, establishing compulsory continuation schools, applying especially to all boys on leaving school at fourteen years of age and requiring attendance from six to nine hours a week over a session of forty weeks during a period of three or four years—time for which must be provided by the employer within the usual hours of labour.

<sup>1</sup> Trade and Technical Education in France and Germany. Report by J. C. Smail, Organiser of Trade Schools for Boys, London County Council. (Westminster: P. S. King and Son.) Price 1s.

The result has been, notably in Berlin, Munich, and Leipzig, that provision has been made for almost every class of occupation, skilled and unskilled—the instruction dealing not only with vocational needs, but also preparing the boy for his future responsible domestic and public duties.

Evidence is forthcoming that after a period of doubt and difficulty employers are beginning to appreciate the value and advantage of this continued education and training, though it is somewhat disconcerting to learn that in 1912 in Berlin there were proceedings pending, either on account of school neglect or of offences against school laws under this Act numbering 6,448.

In England, not to speak of the girl population, only 13 per cent. of the boys between fourteen and seventeen years of age are continuing their education, and even this small percentage attends the continuation classes on the average only fifty-eight hours per annum, whilst in Munich virtually all boys engaged in occupation are in the continuation classes and receive 375 hours' instruction per annum for a period of four years. Much praise is given to the admirable facilities existing, especially in the cities of Munich and Leipzig, for the effective training of the commercial and industrial rank and file.

The leaders of German thought and business enterprise are persuaded that in the best interests of the nation all ranks of the industrial army must be thoroughly trained, not only vocationally, but as citizens. They do not fear that they will be less able to compete with their industrial rivals, but, on the contrary; and unless we are prepared to better their example we cannot hope to maintain the industrial and commercial pre-eminence we now enjoy.

We have still to abolish half-time for young children now at school, and to adapt our factory and workshop organisation to conditions which shall secure the educational well-being of the children employed therein.

J. H. REYNOLDS.

#### MARINE BIOLOGY IN THE TROPICS.<sup>1</sup>

THE Department of Marine Biology of the Carnegie Institution of Washington has issued in this fifth volume of contributions from its laboratory on the Tortugas, near Florida, a number of important papers. Three of these deal with the origin of Oolitic rocks, such as those of the Bahamas and of Florida, and inferentially with the origin of oolitic structure in other deposits. The first paper is the last work of a brilliant English investigator, Mr. G. H. Drew, whose recent death has deprived marine biology of one of the most original and fertile workers, and to whose memory the director of the department, Mr. A. G. Mayer, contributes a sympathetic and appreciative notice. Drew's memoir deals with the action of denitrifying bacteria in the tropical seas, and also with the precipitation of calcium carbonate by marine bacteria. Though necessarily incomplete, the results are a fine contribution to the difficult subject of marine bacteriology. They show that the reason why marine plankton is less abundant in the tropics than in temperate seas lies in the rapid and complete action of the denitrifying organisms in the warmer parts of the ocean; and Drew was able also to point to the extraordinary interest and importance of *Bacterium calcis* in inducing such precipitation of the calcium carbonates as to give rise to nodules of chalk. He suggests that chalk and oolitic rocks have been formed in shallow seas and are being produced round the Bahamas by this peculiar bacterial carnie.

<sup>1</sup> Papers from the Tortugas Laboratory of the Carnegie Institution of Washington. Vol. v. Pp. 222+plates+maps. (1914.)



This mode of rock origin was suggested by Dr. Wayland Vaughan in 1912, and he contributes a further paper on the subject, and on the geology of the Bahamas in the present volume. It appears therefore as a companion paper to the work of Drew, and both should be read by those who wish to realise how bacteriology and marine research are throwing light on the problems of geology. Dr. Vaughan also contributes a memoir on the origin of the coral reefs on the Florida coast with especial reference to the origin of the atolls of that district. His main conclusion is that atolls are formed "not by solution of an interior mass of limestone, but by constructional geologic processes."

Careful systematic studies of the Polyzoa of the Tortugas Islands and of Jamaican Echinoids have been made, and the result should be of interest to systematists. Of more general importance is a study of mammalian spermatogenesis, curiously out of place in a publication of this kind, and therefore likely to be overlooked by workers on this subject. Prof. H. E. Jordan, who contributes this paper, comes to the conclusion that in several mammals examined the spermatozoa are not all alike, but, as in certain other groups of animals, fall into two classes. Amongst the mammals exhibiting this important peculiarity are white mice, sheep, horse, mule, bull, and dog. In man the evidence is at present contradictory and difficult properly to assess. The importance of this subject lies in its bearing on the theory of sex determination.

The last paper we have space to refer to concerns the habits and power of regeneration in sea-fans or Gergonians, a group of corals which have been little studied in a living state. The establishment of a marine laboratory in the tropics now permits these and many other neglected subjects to be more fully investigated, and under the directorship of Dr. A. G. Mayer there is every reason to believe that important biological advances will be made.

#### TERMITES AND THEIR HABITS.

TWO interesting papers on termites and their habits, by Mr. T. Petch (reprinted from the *Annals of the Royal Botanic Gardens, Peradeniya*, November, 1913), have reached us. The author has already made a special study of the fungi which grow in termite nests, and not only serve as food for the insects, but are also frequently cultivated by the latter, and undergo remarkable changes in form and mode of growth as the result. The first paper deals with a supposed association of white ants with a mushroom-like fungus, and though the facts are not yet definitely established, it would seem probable that after a period of cultivation in the termite nest this fungus loses its vigour, and in order to remedy this defect the termites carry spherical masses of the fungus up to the surface and plant them out in places where they will develop spores, which the termites convey back to the nest as "seed" for a new fungus crop.

The second paper is an extended study of the habits of the Ceylon black termite (*Eutermes monoceros*), which usually builds its nest in hollow trees. The nest contains a single comb, and consists of thin, tortuous plates, irregularly united to form a sponge-like mass with wide passages separated by thin walls; its substance is composed of excrement, fragments of the epidermis of various plants, fungus threads, and spores, and crystals, and the same mixture is found in the stomachs of the workers and soldiers. After describing the process of nest-building, the remarkable organised foraging processions, etc., the author states that lichens form the staple food of the black termite, and that they prefer lichens with loose texture

and powdery surface (crustaceous lichens); they prefer algæ, but as the supply of these is small in comparison with the extensive growths of lichens on tropical trees, they evidently eat the lichens for the sake of the contained algæ, and not the fungal constituent, since they rarely touch fungi even when no other food is available.

#### THE AUSTRALASIAN ANTARCTIC EXPEDITION, 1911-14.<sup>1</sup>

THE object of the expedition was to investigate the Antarctic regions to the southward of Australia, a locality where the hypothetical Antarctic Continent was supposed to extend far to the north, but concerning which only the most meagre information was at hand. Most of the expeditions of late years have had as their objective the South Pole. Consequently, in order to secure the most promising route, their geographical fields have much overlapped, and the area of the unknown has not diminished commensurably with the magnitude of those undertakings.

There is still a vast unknown at the southern extremity of the globe, and, now that the Pole is reached, it is hoped, in the interests of science, that no further consideration will arise to cause future expeditions to follow upon each other's tracks, until at least a superficial knowledge of the whole has been attained.

It was our intention to land several self-contained wintering parties at widely separated points between longitude 90° E. and 150° E., each to make continuous scientific records at the base-station, and to investigate the surrounding region by sledge journeys. On the southward voyage, a party was also to be left at Macquarie Island, a little-known possession of the Commonwealth. Wireless telegraphy was to be used for the first time in Polar exploration, our Macquarie Island station transmitting Antarctic news to Hobart.

The vessel selected and fitted for the work was the *Aurora*, with a carrying capacity of about 600 tons. The ship sailed from Hobart on December 2, 1911.

Macquarie Island, a sub-Antarctic possession of Tasmania, situated in the same latitude as South Georgia, was sighted on December 11. There exists there but one main island around the shores of which are many rocky reefs and islets. Rocks also appear for many miles to the north and south rising from a submarine ridge, which is the submerged continuation of the main island itself. The habitable island has a length of more than 20 miles and greatest breadth of 3½ miles. The chief vegetation is tussock grass and Kerguelen cabbage, but it abounds in a truly wonderful population of birds and animals.

At one time the island was a favourite haunt of the valuable fur seal, but for fifty years or more only odd specimens have been seen. The ruthless slaughter of the early sealers is responsible for this almost complete extermination. Sea elephants, however, are numerous, the bulls being met with up to 20 ft. in length and weighing probably some 2 tons.

Very little accurate information was known concerning the island, and the only available map preceding Blake's survey was a sketch made by a sealer. Rumours of the existence of wingless parrots and other continental forms of life indicated that perhaps Macquarie Island was the last remaining summit of a vast sunken southern land. Other evidence also suggested that probably at one time such a land existed uniting Australia with the Antarctic Continent. There was, indeed, an interesting field for scientific work.

Steaming south from Macquarie Island, the first ice

<sup>1</sup> From a paper read before the Royal Geographical Society on June 9 by Sir Douglas Mawson.