

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.¹

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 monotecnical 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.

¹ 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.¹

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.

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