became faster as the centre progressed nearer the coast, where it reached 14·3 miles an hour; the high pressure to the north also made the gradient steeper, and so increased the violence of the vortex. The track of the storm was approximately W.N.W. or W. by N.

The Rev. José Algué, S.J., director of the Manila Observatory, has published an article upon the above typhoon in the Monthly Bulletin of the Philippine Weather Bureau for September. The observations at Santo Domingo (Batanes Islands) and at Aparri (Luzon) show how accurate were the warnings and particulars of the track of the storm issued by the Zi-ka-wei Observatory, and that the typhoon passed close to the north of Santo Domingo between 3h. and 4h. p.m. on September 15, the centre moving in the direction of N.W. by W.; the barometric minimum at the latter place at 2h. 30m. p.m. on that day was 29·290 inches, the mercury having fallen 0·572 inch since 8h. p.m. on September 14. Father Algué thinks it probable that a depression felt at Guam (Marianne Islands), lying to the eastward of Santo Domingo, on September 8, may have been caused by the passage of the typhoon about 200 miles to the north of that station; in this case its mean rate of progression to Santo Domingo would have been about eight nautical miles an hour.

Report of the Fernley Observatory, Southport, for the Year 1905.—This institution, which is maintained by the Corporation, occupies an important position between the Liverpool Observatory and the anemograph station at Fleetwood, and possesses an exceptionally complete equipment of standard self-recording instruments. The year was very dry, the rainfall being 26·31 inches, or 7·11 inches below the average. Owing to the position of the observatory on the coast of the Irish Sea, gales were experienced in every month, but although barometric pressure was lowest in November, this was one of the two calmest months, the other being May. The town enjoys a good amount of bright sunshine; in the year a duration of 1624 hours was recorded, or seventy hours above the average, being only about fifty hours less than at Brighton, and above 300 more than in the London district.

Annuaire météorologique, Observatoire Royal de Belgique, 1906.—Although, as pointed out by M. Lancaster, an *Annuaire* is not indispensable for a meteorological organisation, the results of its observations being given in other publications, it is a very convenient method of bringing together data useful to different classes of workers, including agriculturists, engineers, medical men, and others. The work in question is certainly most valuable, and contains, in concise and handy form, the yearly and average results of observations made at Brussels (or Uccle) since 1833, together with a summary of miscellaneous information, including tables and constants which are both useful and instructive to meteorological students of any country. To render the publication more attractive, it contains from time to time original articles by members of the observatory staff. Among those contained in the current volume we may mention one by M. Vincent on weather prediction, illustrated by fourteen maps, as well worthy of attention. The author looks for future improvement in the wider dissemination of daily weather reports and the instruction of persons interested in drawing their own conclusions from the synoptic charts, in decentralisation to some extent, in the preparation of local forecasts as in the United States, and, eventually, in each person becoming his own forecaster, from information supplied by the central offices.

Climate of Alaska.—In the *U.S. Monthly Weather Review* for June reference is made to an important memoir on this subject, by Dr. C. Abbe, jun., which forms part of Professional Paper No. 45 of the U.S. Geological Survey. Dr. Abbe summarises the materials collected during the last thirty years by the Signal Service and the Weather Bureau, and therefore supplements the useful memoir by Dr. Dall published in the Pacific Coast Pilot in 1879. The territory is divided into eight climatic provinces, for each of which much fresh information is afforded, especially as regards temperature and rainfall. The maximum shade temperature in the great Yukon basin is given as 90°, and 94°, on the Copper River plateau, is the highest reported from any of the Weather Bureau stations, instead of 112° or even 120° formerly spoken of. The lowest recorded temperature is −80°, at Fort Reliance, in January. The largest annual rainfall is 170·09 inches, at Fort Constantine; the number of rain days is 251, at Unalaska, being the highest number at any point in the United States.

Meteorological Observations, Bremen, 1905.—The publication of the results obtained at this important observatory under the superintendence of Dr. P. Bergholz forms part of the German *Meteorologisches Jahrbuch*, which is prepared on a uniform plan for all parts of the empire. The present volume is of more than usual interest, as, in addition to hourly readings and means from self-recording instruments for the year in question, it contains monthly, seasonal, and yearly means for the lustrum 1901–5, results for the thirty-year period 1876–1905, and for all observations available from 1803–1905. As the latter are not quite continuous, we quote the following data for the thirty-year period:—mean temperature, January, 32°·5, July, 62°·6; the absolute extremes were 93°·9 (May 28, 1892), −13° (December 4, 1879); means of the absolute monthly extremes, 11°·1, January, 83°·5, July. The mean annual rainfall was 27·48 inches; July, 3·64 inches, April, 1·63 inches; the greatest fall in one day was 3·39 inches (June 10, 1884). The mean percentage of bright sunshine for fifteen years was 32·4, as compared with 29 per cent. in London for twenty years.

BRITISH INLAND WATERWAYS.

THE commissioners appointed early this year to investigate and report on this important question, have exercised a wise discretion in publishing, as soon as practicable, the first portion of the evidence given before them by fifty-four witnesses, at twenty-two meetings, held between March 21 and July 31, relating almost entirely to English canals and inland navigations. This first instalment forms a fairly bulky Blue-book, with 375 pages of evidence, an index of ninety-five pages, various appendices, together with a list of English inland waterways, occupying 111 pages, and a map of the canal-systems and navigable rivers of England and Wales in two sheets at the end of the volume, coloured so as to indicate each separate system, with the name of the system printed in large letters of the same colour.

Since the evidence here recorded was taken, the commissioners have been hearing evidence in Ireland on Irish inland waterways, and have also resumed lately their sittings in London; and they further propose to obtain detailed information with regard to inland navigation in the Continental countries of Europe where it has been most fully developed, which will doubtless be published in due course. Accordingly, considering the large amount of matter with respect to inland waterways which will be gradually collected by this commission, it is very advantageous that it should be given to the public at intervals to give an opportunity of its being properly studied; and this arrangement has the further merit that it will enable future witnesses, by seeing the previous evidence beforehand, to supply omissions or correct errors.

A perusal of the engineering evidence alone suffices to show, by its conflicting nature, the magnitude of the task which lies before the commissioners, and the complicated problems which they will have to solve. The questions to be considered with regard to the improvement of inland waterways are:—first, the additional traffic that an improved waterway would be likely to attract; secondly, the size of barges which could most economically transport the traffic; thirdly, what would be the cost of a transformed waterway suitable for the passage of such barges, how far it should be carried inland, what connections should be formed with other waterways, and what return might be expected on the capital expended; and, lastly, by what means the funds might be raised for executing the proposed improvements.

The engineers of inland navigations being sometimes also the managers, or generally concerned in the management of their system, and being thoroughly conversant with the cost of improvements and with the working expenses, have for the most part dealt with the above questions in their evidence. One engineer suggests that the Government

should undertake the improvement of the tidal portions of the rivers; that above this limit the local authorities should improve the rivers by canalisation up to a town conveniently situated to form an inland port, up to which sea-going vessels of 400 or 500 tons could come, and which would serve as a distributing or receiving centre for waterways of suitable dimensions penetrating into the interior; and that in some cases, for surmounting high summit-levels, inclined planes worked by locomotives should be substituted for canals. Another engineer proposes that the Government should undertake through routes for vessels of 350 tons from Birmingham to Liverpool, Hull, the Severn, and London, and between Liverpool and Hull, and from London to Bristol, and considers that these main routes would be certain to yield a profit on the purchase of the existing waterways involved in the schemes and on the expenses of construction, which could then be utilised in acquiring and improving other waterways. A third engineer desires to make each river-basin a separate system; he considers that a barge of 150 tons is the largest barge that would pay; and instead of bringing sea-going vessels inland, he would bring these inland barges down to the tideway, where transhipment into sea-going craft would take place most conveniently. A fourth engineer considers that 100-ton barges are the largest size expedient for English inland navigation, and that in certain cases the improvement of canals to accommodate them would not pay; whilst a fifth engineer thinks that any improvements of inland waterways would prove an unprofitable and useless expenditure.

It is evident from this summary of the views expressed by some of the most experienced engineers with reference to inland navigation, that the commissioners, after having collected all the evidence available, will require some time to formulate their recommendations, and to decide how far Continental practice with regard to inland waterways is applicable to the special conditions of the United Kingdom.

THE SCIENTIFIC STUDY OF INFECTIOUS DISEASES.[1]

THE wider recognition of medical science as a rewarding object of endowment is a result of discoveries made during the last quarter of a century, and it is of interest to inquire why this increased knowledge should have borne such abundant fruit. The result is not due to any change in the ultimate aims of medicine, which have always been what they are to-day and will remain—the prevention and the cure of disease—nor to the application to the solution of medical problems of any higher intellectual ability and skill than were possessed by physicians of past generations, nor to the growth of the scientific spirit, nor to the mere fact of a great scientific advance in medicine, for the most important contribution ever made to our understanding of the processes of disease was the discovery by Virchow in the middle of the last century of the principles and facts of cellular pathology, the foundation of modern pathology.

The awakening of this wider public interest in scientific medicine is attributable mainly to the opening of new paths of investigation which have led to a deeper and more helpful insight into the nature and the modes of prevention of a group of diseases—the infectious diseases—which stand in a more definite and intimate relation to the social, moral, and physical well-being of mankind than any other class of diseases. The problems of infection which have been solved and kindred ones which give promise of solution are among the most important relating to human society. The dangers arising from the spread of contagious and other infectious diseases threaten, not the individual only, but industrial life and the whole fabric of modern society. Not medicine only, but all the forces of society are needed to combat these dangers, and the agencies which furnish the knowledge and the weapons for this warfare are among the most powerful for the improvement of human society.

[1] Abridged from an address delivered by Dr. W. H. Welch at the formal opening of the Laboratories of the Rockefeller Institute for Medical Research on May 11.

Great as was the material, intellectual and social progress of the world during the past century, there is no advance which compares in its influence upon the happiness of mankind with the increased power to lessen physical suffering from disease and accident, and to control the spread of pestilential diseases.

Before some accurate knowledge of the causation of infectious diseases was secured preventive medicine was a blundering science, not, however, without its one great victory of vaccination against small-pox, whereby one of the greatest scourges of mankind can be controlled and could be eradicated, if the measure were universally and efficiently applied. The establishment upon a firm foundation of the germ doctrine of infectious diseases, the discovery of the parasitic organisms of many of these diseases, the determination by experiment of the mode of spread of certain others, and the experimental studies of infection and immunity have transformed the face of modern medicine.

The recognition, the forecasting, the comprehension of the symptoms and lesions, the treatment of a large number of infectious diseases have all been illuminated and furthered, but the boon of supreme import to the human race has been the lesson that these diseases are preventable.

Typhus fever, once widespread, and of all diseases the most dependent upon filth and overcrowding, has fled to obscure, unsanitary corners of the world before the face of modern sanitation.

In consequence of the knowledge gained by Robert Koch and his co-workers Asiatic cholera, to the modern world the great representative of a devastating epidemic, will never again pursue its periodical, pandemic journeys around the world, even should it make the start.

Of bubonic plague, the most dreaded of all pestilences, which disappeared mysteriously from the civilised world more than two centuries ago, we know the germ and the manner of propagation, and, although it has ravaged India for the last ten years with appalling severity, it can be, and has been, arrested in its spread when suitable measures of prevention are promptly applied.

Typhoid fever, the most important index of the general sanitary conditions of towns and cities, has been made practically to disappear from a number of cities where it formerly prevailed. That this disease is still so prevalent in many rural and urban districts of the United States is due to a disgraceful neglect of well-known measures of sanitation.

To Major Walter Reed and his colleagues of the United States Army Commission an inestimable debt of gratitude is due for the discovery of the mode of conveyance of yellow fever by a species of mosquito On the basis of this knowledge the disease, which had been long such a menace to lives and commercial interests in the Southern States, has been eradicated from Cuba, and can be controlled elsewhere.

Another army surgeon, Major Ross, acting upon the suggestion of Sir Patrick Manson, had previously demonstrated a similar mode of incubation and transportation of the parasite of malaria, discovered by Laveran, and it is now possible to attack intelligently and in many localities, with good promise of success, the serious problem of checking or even eradicating a disease which renders many parts of the world almost uninhabitable by the Caucasian race, and, even where less severe, hinders, as does no other disease, intellectual and industrial activities of the inhabitants.

The deepest impress which has been made upon the average death-rate of cities has been in the reduction of infant mortality through a better understanding of its causes. The Rockefeller Institute, by the investigations which it has supported of the question of clean milk and of the causes of the summer diarrhœas of infants, has already made important contributions to this subject which have borne good fruit.

No outcome of the modern science of bacteriology has made a more profound impression upon the medical profession and the public, or comes into closer relation to medical practice, than Behring's discovery of the treatment of diphtheria by antitoxic serum, whereby in the last twelve