THE WATER SUPPLY OF KENT.

THE question of water supply, a matter of such vital importance to corporate life, has been studied from the practical and theoretical standpoint by numerous authorities, but no hard-and-fast rules can be laid down, owing to the fact that general principles are subservient to local conditions. This is, perhaps, the reason why the leading authorities are so often contradictory.

Owing, partly, to the large area of its outcrop and subterranean extension beneath the Tertiary beds of the northern part of the county, partly to its great thickness, and partly to its unlimited capacity for water storage, the Chalk is the most important member of the Cretaceous series which is so finely developed in Kent, and yet it is rare to find two authorities agreeing on any point with regard to the behaviour of water in Chalk, while all speak from many years of experience.

The reason is that the question is far more complex than appears at first sight; as Whitaker points out, the absorbent capacity is modified by the extent of exposure, which is not always made clear by geological maps. The surface may be bare, in which case the absorptive power is very high, in some cases, where the Chalk is open and fissured, large volumes of water being swallowed up with extraordinary rapidity; in others, where the soil is unusually thick or clayey, the absorption may be hindered; the case is modified by a covering of permeable beds such as Drift gravels and sand, and, again, where the Chalk is covered by beds of varying character, and, finally, where the Chalk is covered by beds of an impermeable character. Such an area as the latter is, of course, to be definitely excluded in calculating the absorptive area of the Chalk. In Kent this tract is confined to those districts where the London Clay covers the Chalk.

Again, the storing and transmitting capacity of the Chalk depends upon the physical nature of the different beds, and as in Kent the Chalk attains in many places a thickness of nearly 800 feet, it is obviously natural to find the different zones differing in character to a considerable extent; and yet engineering geologists have persistently ignored the value of a knowledge of the palæontological zones of the Chalk, of which eight are represented in Kent. There is no excuse for this apathy, since the work of Dr. Rowe has placed the geology of the Chalk upon a scientific footing. It is a striking fact that in all the literature quoted in the extensive bibliography, the author has only been able to find a single work dealing with the zones of Chalk from the point of view of the engineer.

In this memoir, one of the most useful that the Geological Survey has published, Mr. Whitaker discusses briefly the geological formations of Kent, and the nature and causes of the different kinds of springs occurring in the different beds, while a special chapter is devoted to swallow-holes and nailbournes, phenomena essentially characteristic of a Chalk area. A valuable chapter on the rainfall of Kent, illustrated by a map, is contributed by Dr. H. R. Mill.

The amount of water taken from springs in Kent is very small; there are only two large supplies, those for Maidstone and Folkestone, and neither of these is dependent upon the springs.

The Chalk area of Kent is pierced by very numerous wells for private or restricted use, but they are being rapidly superseded by the institution of larger corporate water works, which are only wells on a large scale. The quantity of water taken from surface deposits, as at Tunbridge Wells, from the Eocene beds, Lower Greensands, and sandy members of the Hastings beds, is insignificant compared with the amount provided by the Chalk, which supplies all the larger towns, as Ashford, Tonbridge, Dover, and the Kentish part of London.

Not the least interesting part of the book is the 147 pages occupied by sections of wells, and details of a large number of borings are also included.

Prominence is given to sections of some of the shafts and borings put down with the view of proving and working coal; these pages summarise our knowledge of the subterranean geology of Kent as it stood two years ago, but the impetus recently given by the new exploring companies since the discovery of the splendid coal-seams at the borings of Walder-share and Fredville has doubled the information available, though it has not yet all been made public. It is unfortunate that the author contented himself with the meagre sections of these two famous bore-holes given by Boyd Dawkins in his evidence before the Royal Commission on Coal Supplies; if he had applied direct to the companies, the information would surely have been willingly given.

The work is completed by a large number of analyses of both well and spring waters, and a number of notes on various subjects, some of considerable interest, such as the effect of heavy pumping, infiltration of salt water, and the deep borings at Cliffe and Frindsbury, but the vital question of pollution might have received more attention.

As a striking instance of the value of well-managed public water companies over purely local sources we may quote the following remarks from the report of an analysis of a sample of water from Delf stream, which gave drinking water to Sandwich until recently:—

"Colour objectionable, a dirty pale yellow; microscopic examination eminently unsatisfactory. The residue . . . . was full of animal matter; . . . it would be much more appropriate to call the liquid from this pump sewage rather than water . . . . however valuable this fluid might be as a liquid manure, and it would be impossible to deny that it has a certain value in this respect, it should not be used as water." M. B.

1 "The Water Supply of Kent; with Records of Sinkings and Borings." By William Whitaker, F.R.S. With Contributions by Dr. H. Franklin Parsons, Dr. H. R. Mill, and Dr. J. C. Thresh. (Memoirs of the Geological Survey of England and Wales, 1908.) Pp. v+399. (London: Published for H.M. Stationery Office by Wyman and Sons, Ltd., 1908.) Price 8s. 6d.

THE WINNIPEG MEETING OF THE BRITISH ASSOCIATION.

THE British Association will hold its annual meeting in Winnipeg from August 25 to September 1, under the presidency of Sir J. J. Thomson, F.R.S.

Regular attendants at meetings of the Association have become accustomed to reminiscences of previous meetings in the same city. Thus, when the association meets in Great Britain, the expression "When we met here twenty-five years ago," or "At our meeting fifty years ago," has become a stereotyped part of the presidential addresses. A meeting of the association in Winnipeg thirty years, or even twenty-five years, ago would have been almost an impossibility. At that period Winnipeg was little more than a Hudson's Bay Company's trading post—Upper Fort Garry—the population of the scattered settlement numbering only some 2000 people, mostly farmers. Winnipeg could not have been reached by the Canadian Pacific main line until some six years later; passengers arrived by stern-wheel steamers of the Mississippi type from Moorhead, Minnesota, *viâ* the Red River; or came by irregular trains over the Great Northern Railway from St. Paul to St. Boniface

across the river. A daily paper, the *Manitoba Free Press*, had, however, been in existence for about five years. The Great West was unpopulated; and local troubles with the natives were concurrent with Cetewayo's disturbances in Zululand.

After the meeting in Montreal in 1884—twenty-five years ago—several members of the association went out West and caught a glimpse of Winnipeg; some of these have described their impressions of the Winnipeg of that date. The chief of these seem to be the wide Main Street, in the centre of it the rails of the one-horse tramcars, with a lateral ocean of black mud, in which it was no uncommon sight to see derelict vehicles of every description. Quite different will be the experience of the visitors next August. The width of Main Street, Portage Avenue, and Broadway will present itself as the most striking feature, with their fine asphalt roadways and granolithic "side-walks." The buildings will be found of the most modern type, and many may lay claim to considerable architectural excellence. The Bank buildings, railway termini, and Government offices will be especially noticeable in this respect. There is no need, however, in this place to enter into details about the city, as these will be fully dealt with in the handbook supplied to visitors on arrival.

The rate of progress in Winnipeg is too well known to need emphasis. The writer has noticed wonderful changes within even the past five years. The railway stations, principal hotel, largest business blocks, and the new theatre have all sprung up within this period. The following illustrates the attitude of mind of the enthusiastic "Winnipegger." A conversation was overheard on a train going east; a typical Winnipegger asked a returning tourist the inevitable question, "What do you think of our city?" "Not much of a place; saw it all in ten minutes!" "When did you see it?" "Two weeks ago." "Ah! but you should see it now!"

The invitation to meet at Winnipeg originated with the Royal Society of Canada, which considered that as previous meetings of the association had been successfully held in Montreal and Toronto, the third meeting in Canada might appropriately be held in the Prairie City. A committee of the Royal Society of Canada was appointed to approach the council of the City of Winnipeg, and to urge upon it the advisability of issuing an invitation to the British Association. The city, acting upon this suggestion, forwarded an invitation to the association at its meeting in South Africa, that it should meet in Winnipeg in 1907. This invitation was supported by the faculty of science of the University of Manitoba and by the Manitoba Historical Society. The council of the association, realising the difficulty of meeting overseas so soon after the South African meeting, felt bound to refuse the invitation for the year 1907, but intimated that if the offer were renewed for a subsequent year it would be favourably considered. The City of Winnipeg accordingly issued a renewed invitation to meet there in 1909, and a deputation consisting of the Rev. Dr. Bryce, Prof. M. A. Parker, and Prof. Swale Vincent interviewed the officers of the association, and, in addition, Profs. Parker and Vincent attended the York meeting and supported the invitation. At that meeting the offer was definitely accepted. Previously, the Dominion Government had promised generous financial support, and the fund now at the disposal of the executive committee at Winnipeg amounts to about 10,000*l*. In addition to the Dominion Government grant of 5000*l*., the Province of Manitoba has appropriated 2000*l*., the City of Winnipeg 1000*l*., and the western provinces and cities have undertaken to bear the expense of the western excursion of office bearers and distinguished guests.

At a public meeting held in March, 1907, a large and representative local general committee was appointed, and the executive committee and the usual subcommittees were elected. The local arrangements are now well in hand. The four local secretaries are Mr. C. N. Bell, Mr. W. Sanford Evans (Mayor), Prof. M. A. Parker, and Prof. Swale Vincent, the local treasurer being Mr. John Aird, manager of the Bank of Commerce. The office of the local secretaries has been installed in the University of Manitoba.

Arrangements have been made with the Canadian railways by which members of the association can obtain return tickets to Winnipeg from the port of landing at single fares, and the same terms are also available for extended trips; some concessions have also been obtained from the steamship companies.

Much interest in the meeting has already been manifested in Canada and the United States, as well as in Great Britain, and it may reasonably be expected that a large number of men of science from both sides of the Atlantic will take advantage of the meeting—not only because of their interest in science, but in order to obtain a glimpse of the great Canadian West, and to meet its people.

Invitations to attend the meeting are being sent to the leading men of science on the continents of Europe and America. The attendance of a large number of men of science from the United States, and of distinguished foreigners, will go far to impart an international character to the gathering, and will give a special value and interest to many of the discussions.

The last week of August is perhaps the most favourable time at which to make a visit to Winnipeg and the Canadian West. The climate at this season is delightful—warm days and cool nights. In the city everything is looking at its best, and in the country the harvesting operations are in full progress.

By the kindness of the Provincial Government, the Department of Militia and Defence, and various boards, permission has been granted for the use of the following buildings, which will be used as meeting places:—the Legislative Chamber in the Parliament Buildings, the Drill Hall, the University of Manitoba, Manitoba and Wesley Colleges, the Alexandra, Carlton, and Isbister Schools.

One of the finest playhouses on the continent of America, the Walker Theatre, has been engaged for five evenings for the president's address, the evening discourses, and the popular lectures. Sir J. J. Thomson will give his address there on Wednesday, August 25. On August 26, Dr. A. E. H. Tutton, F.R.S., will discourse on "The Seven Styles of Crystal Architecture"; on August 31, Prof. W. A. Herdman, F.R.S., will lecture on "Our Food from the Waters"; Prof. Harold B. Dixon, F.R.S., will deal with "The Chemistry of Flame" on August 30; and Prof. J. H. Poynting, F.R.S., with "The Pressure of Light," on September 1.

Winnipeg is noted throughout the Dominion for its hospitality; the work of the hospitality committee is in full swing, and visitors may be assured of a hearty welcome.

THE DARWIN CENTENARY CELEBRATION.

CHARLES ROBERT DARWIN was born on February 12, 1809, the same day that Abraham Lincoln first saw the light. The anniversary of this day was celebrated by many gatherings and "recitations" in North America, and it is a marked sign of the times that these celebrations were in most cases held in the churches and chapels of the numerous