NINTH MEETING: *9th January, 1889.*

W. M. Maskell, F.R.M.S., President, in the chair.

New Members.—H. Taperell, W. Herbert, H. W. Robinson, and George Denton.

Papers.—1. "A Note in reference to a Paper which appeared in Vol. xx. of the 'Transactions,' on 'Gravitation,'" by T. Wakelin, M.A.

ABSTRACT.

Lord Grimthorpe says that he copied the figures as for an iron jar from a well-known paper by Baily, P.R.H.S., who gave 6·8in. as height of mercury for glass jar. He subsequently worked out Baily's paper, and found a great mistake, which he says he has corrected in the new edition of the "Encyclopædia Britannica." This, however, is a mistake: the figures 6·8in. are uncorrected. The height should be 8½in. to 9in.

2. "On Sanitary Sewerage," by H. P. Higginson, M.Inst.C.E. (*Transactions*, p. 369.)

Mr. Maxwell considered that one of the chief merits of this scheme over others that had been proposed was that it would obviate the necessity of having contour-sewers at great depth, passing through private property, and causing great inconvenience and expense; and another advantage was that the ejectors could be placed in duplicate.

Sir J. Hector had always favoured this scheme. It dealt with what was absolutely necessary, and nothing more. There were, comparatively speaking, no gases given off as in the old system, and the drains were self-cleansing, and did not require to wait for a flood to wash them out. The perfect tightness of the drains was also a great recommendation, and the ease with which they could be laid without going to any great depth. It was a pity more information as to comparative cost had not been given. He had explained this system to the engineers in Melbourne, where it seemed unknown, and in which city the drainage was very imperfect.

Mr. Hughes did not think the cost of this system would be so much less as at first appeared, as there would have to be a separate system for surface-drainage. He was doubtful whether the houses would be entirely free from the return gas, as stated.

The Hon. R. Pharazyn did not think gas would escape. The separate drains for rain would not be expensive. This system seemed to have great advantages over, and to do away with many objections to, old drainage-plans. There would be no difficulty in procuring information as to the cost of establishing such a system in Wellington. The thanks of the public were due to Mr. Higginson for this practical paper.

Mr. Richardson thought it would be a good plan to try this scheme on a small scale before finally deciding as to its merits. He thought it would answer admirably.

Mr. Higginson, in reply to Mr. Maxwell, stated that the "Shone" system, applied to Wellington, would avoid the annoyance and expense attendant upon interference with private properties, as the sewers could be constructed entirely upon the street-lines. Mr. Clark's high-level contour-sewer, which for the greater part of its length passed through private land, would entail a heavy outlay for compensation.

In answer to Sir James Hector, the author said it was now accepted as a fact that the "separate" system enabled the size of the sewers to be properly proportioned, and avoided the necessity for constructing huge brick sewers in order to carry off an exceptional rainfall, the result being that in dry weather the flowing contents were represented by a

mere trickle along the invert of the sewer. This state of things resulted in the accumulation of deposit, owing to the velocity being insufficient. The outfall-main being under pressure, any leak is easily detected, and quite as easily repaired, owing to its being laid but little below the surface of the ground. The cost of applying the system to Wellington had purposely not been dealt with in the paper, as sufficient data from which to frame a reliable detail-estimate were not available. It might, however, be stated that, from such information as could be gathered from Mr. Clark's published report and other sources, and allowing for the reticulation of the whole forty-two miles of streets with properly-constructed sewers, laid on a concrete bed, provided with man-holes, lamp-holes, automatic flush-tanks, also for the whole of the necessary machinery, cast-iron mains, &c., the cost would not exceed £80,000, or 32s. per head for the 50,000 persons provided for; while the cost of Mr. Clark's scheme amounted to £145,000, or 41s. 5d. per head for the 70,000 persons provided for.

In reply to Mr. Hughes, Mr. Higginson agreed that to a certain extent the "separate" system necessitated duplicate sewers, but considered that over a large area of the suburbs it was possible to carry off the rainfall by the side-channels and short lengths of pipes into the nearest natural watercourses. In many cases the watercourses had been converted into sewers, but it was now proposed to re-convert them to their original use. It should also be remembered that the existing drains and sewers would be devoted to this purpose entirely, and that for the sewage a complete system of independent sewers is provided for in the estimate quoted. It would be impossible for sewer-gas to become generated between the dwellings and the ejectors, provided the sewers were laid to self-cleansing gradients. The area served by each ejector would contain no sewers more than 20 or 30 chains in length, so that, with a velocity given to the sewage of but 2ft. per second, only from 11 to 16 minutes would elapse before it had passed from the dwelling into the ejector, and become a thing of the past. It would therefore be seen that, unless a defect and stoppage existed in the sewers, there would not be time for gas to become generated. The system had been in constant use in Southampton and Warrington since 1884, where the officers in charge expressed to the author, when visiting the works, their entire approval. The town of Eastbourne was also drained upon this system in 1884, and, in a report published for the German Embassy by the Chairman of the Drainage Committee, that gentleman stated that they "have every reason to be satisfied with the works already executed on this system." A Select Committee of the House of Commons adopted the system in 1886 for the drainage of the Houses of Parliament, Westminster, where it had completely remedied the evils that previously existed.

In reply to Mr. Richardson, the author of the paper hoped that before long the system would be adopted on a small scale for the drainage of Pitone, when it would be possible to see the ejectors in action. As explained in the paper, the system could be adapted to suit the present requirements of a town, increasing the number of ejector-stations and main outfall-pipes so soon as the increased population warranted the expenditure.

In reply to the President, Mr. Higginson stated that he regretted he had omitted to mention that the air made use of in the ejectors was compressed by an ordinary air-compressing machine, driven by any suitable power available, and placed in the locality best adapted to meet the requirements of the particular case. This compressed air was conveyed by a line of small pipes to the different ejector-stations. It is usual to have only one compressing-station, the loss by friction in a long length of pipes being insignificant. In the proposed scheme for Wellington, the air-compressing station would be at the Corporation Yards, where either steam- or water-power would be available.

3. "On the Disappearance of Young Trout from our Streams," by W. Ferguson; communicated by T. W. Kirk. (*Transactions*, p. 235.)

4. "Note on a Rock Specimen collected by the Rev. W. S. Green near the Summit of Mount Cook," by Professor T. G. Bonney, F.R.S.; communicated by Professor Hutton. (*Transactions*, p. 334.)

Handsome and interesting specimens of Graptolites, which are interesting forms of great antiquity; also ores of copper and antimony from Nelson, and Alexandra, in Otago, collected by Mr. James Park, of the Geological Survey, were exhibited by the Director.

ANNUAL MEETING: *18th February, 1889.*

W. M. Maskell, F.R.M.S., President, in the chair.

1. The Annual Report and Balance-sheet were read and adopted.

ABSTRACT.

Ten general meetings had been held, at which thirty-one papers were read on the following subjects: Eight on geology, nine on zoology, one on botany, three on chemistry, and ten on miscellaneous subjects. A conversazione was held in the Museum on the occasion of the departure from the colony for a time of Mr. W. T. L. Travers, F.L.S. Thirteen new members had been elected during the year The balance-sheet showed that the receipts, including the balance brought forward for the year, amounted to £206 18s. 2d., and the expenditure to £156 7s. 2d, leaving a balance in hand of £50 11s. The report and balance-sheet were adopted.

The report contained a proposal made by the President, with the view to the greater encouragement of research in the different departments of the Society's work, and it had been resolved to submit the following scheme for the approval of members: That the Society offer bronze medals, to be given annually for the best papers in the following groups: (1) Natural science (botany or zoology or geology of the New Zealand zoological sub-region), one medal; (2) physics, chemistry, and technical science, one medal; (3) history, archæology, and anthropology, one medal; (4) literature and philology, one medal; (5) philosophy; (6) art. That the Board of Governors of the New Zealand Institute be asked to appoint a judge in any group in each year for the papers competing in that group; that only those papers be submitted to the judges which shall have been read during the year at a meeting of the Society; that the writers of the papers must be members of the Society at the time the papers are read; that each writer must declare when sending in his paper if he wishes to compete; that the judges should be empowered to declare that in their opinion no paper of the year is sufficiently meritorious for a medal; that for the foregoing object the Society set apart annually £20 only of its income as a prize fund; that the medals be presented by the President at the first meeting of the Society ensuing after the receipt of the judge's awards; and that the Governors of the New Zealand Institute be requested to announce specially in the "Transactions" the names of the successful writers, though not necessarily to print the papers.

The scheme was, after discussion, adopted.