Mr. Stayton. wood-pavement blocks, his experience did not convince him that it was good in practice. Some few years since he had seen wood pavement taken up at Westminster, where creosoted blocks had been used. Many of the blocks were internally as rotten as touch-wood, and the sappy blocks had worn down greatly under the pressure of traffic. It was difficult to see that any advantage or economy could be gained by the adoption of creosote, and the Author was strongly of opinion that the surface of blocks gorged at the rate of 10 or 12 lbs. per cubic foot, would become so slippery, and the jointing so unsatisfactory, that the system would create dissatisfaction.

Correspondence.

Mr. Culverwell. Mr. G. P. CULVERWELL approved of the contour of the carriage-way in Fig. 2, but thought that, if anything, the slopes might be reduced. It was ordinarily admitted that wood was a most slippery roadway, and thus every precaution should be taken. The sharp camber of the old macadam or stone pavement was too often followed, but it was unsuitable, and placed vehicles at a disadvantage, especially when starting from the kerb. The cross-section should be represented by two gradients, say of 1 in 40, from the channels to the crown, the latter being slightly eased off. In level roads the cross-section necessarily varied somewhat in order to drain to the gullies.

FIG. 5.

FIG. 6.

Figs. 5 and 6 were typical sections, and had been carefully taken recently. The east and south ends respectively were at

gullies, whilst the west and north ends were midway between Mr. Culverwell's gullies, both streets being level. It was to be noted that steep gradients transversely were specially objectionable, as in this direction the blocks were made to abut close one to the other without any joint, and this gave little foothold. He did not comprehend the remarks as to pitch-pine producing a "jarring bumping motion." He had examined the portion of that pavement in King's Road, and travelled over it in various vehicles without noticing any increase of bumping motion, but there was somewhat greater resonance than where the wood was softer. He would expect to find the coefficient of elasticity of pitch-pine greater than of yellow wood. It was misleading to say that creosoting "tends to produce premature internal decay," although, indeed, perhaps the large amount of inferior work done in the market might form a sufficient excuse. Creosoting consisted in driving out the sap, and then substituting oil. If the first portion of the operation was not effected, the oil formed merely an external coating, preventing the sap from escaping, and "dry rot" set up. He, however, thought that creosoting was unnecessary, and even in some respects undesirable for wood paving. Creosote was chiefly of use in the case of porous woods exposed on all sides to the weather, in prolonging the ordinary life of the sapwood and wood next the sap. It did not render the sapwood harder, or better able to withstand abrasion under traffic; and it was almost useless to creosote the heart-wood of pitch-pine, the wood being already so full of resin that little oil was taken in. He had no hesitation in saying that the money expended in creosoting would be better laid out in the careful selection of heart-wood timber of uniform quality; and he thought there were data to show that the life of pitch-pine pavement might, without undue maintenance, easily reach ten to twelve years as a first-class roadway under the traffic standard of 750 tons per yard width per day. The depth of block should be regulated to some extent by the weight of traffic, the aim being that the block should be fairly worn out by abrasion just before decay from weather or other causes set in. With pitch-pine, even 5 inches appeared unnecessarily deep, considering that the maximum annual wear in King's Road was given as under 0.1 inch, and in Oxford Street blocks (presumably deal), worn as thin as $1\frac{1}{2}$ inch, had not failed under the traffic.

"Top-dressing" was important, but the material used was often unsuitable and too much was put on, with a result that, upon the first rain, the roadway was almost impassable for pedestrians, as

Mr. Culverwell. in the case of the Strand at Charing Cross when last repaved. The material should be fine-screened sharp gravel, deposited in successive thin layers. Stones of the size of walnuts only rolled about, the wood not presenting a sufficiently hard anvil to crush them, and the material did not work its way into the wood so well when in a thick layer.

The opening up of streets for repairs to gas and water-mains, &c., was most objectionable, and peculiarly so in the case of wood pavement, owing to the time necessary for the proper restoration of the latter. It was to be regretted that a comprehensive scheme had not been carried out whereby to provide subway accommodation in the Metropolis for gas- and water-pipes, telegraph- and telephone-wires, &c. Many of the streets were much too narrow, whilst the evil daily increased, and thus every means should be taken to supplement their deficiencies.

More information was desirable so as to be able to determine the description of wood, size of block, and width of joint best adapted to varying conditions of traffic and gradient. He thought 1 in 20 too steep for any of the forms of wood-paving at present employed; and whenever the gradient exceeded 1 in 40, extra provision should be made for cleansing and sanding, especially in time of frost.

Sloane Street at present afforded a good opportunity for examination, as the paving and concrete foundation were being taken up throughout its whole length for a width of about 16 feet, in connection with new sewerage works. Such examination showed that the concrete foundation was clean and sound, and there was no appearance of moisture or objectionable matter having infiltrated. The blocks were not perceptibly rounded on top, and were in good condition, showing little soakage, and the cement grout bonded to them remarkably well. The cement joints were of uniform width, and were very little below the level of the blocks. The blocks were burred about $\frac{1}{8}$ inch upon the sides next the cement, and not at all at the ends where block bore against block. This pointed to the conclusion that blocks of uniform thickness, laid touching each other upon all four sides, and without any cement or other joint, would form a most durable pavement, whilst upon level roads it might give a sufficient foothold. The compression set up would effectually keep the blocks in place, and prevent infiltration of moisture. Expansion in the transverse direction of the street appeared to have been sufficiently allowed for, as the blocks bedded fairly upon the concrete, and no buckling away from it, or disturbance of the foot-pavements, had been noticed. That the compression

in the longitudinal direction of street was great was evidenced by Mr. Culverwell. the line of blocks continually cambering towards the free end. This camber averaged about 1 inch in the excavation width of 16 feet. This showed the advisability of laying wood pavements in long even gradients; and where the vertical curves at the summit levels were sharp, expansion should be provided for, otherwise buckling, followed by disintegration, might take place. Compression was most desirable for wood, and directly added to the life of the blocks, whilst further preventing objectionable soakage. Hence it appeared why a rigid joint, such as cement, was preferable to a mastic one. In the latter case, in place of the wood being compressed, the substance of the joint itself was expelled, and part, no doubt (especially if the transverse expansion had not been allowed for) found its way underneath the blocks, and uneven bedding, followed by disintegration, resulted. In connection with this matter of compression appeared a direct objection to the use of creosoted blocks, as these did not expand, and compression was not set up, and also the cement grout did not bond to them as well as to plain ones. This explained the several instances noted by the Author of the ease with which creosoted blocks were taken up, and of the moisture having been found between them.

He was informed of one case—that of the long-girder bridge over the River Foyle, at Londonderry—in which the cement grout had never set. This the engineer in charge attributed, no doubt correctly, to the unremitting vibration night and day, as every care had been taken with the materials. Henson's patent felt bed and joint appeared peculiarly applicable to such cases.

In conclusion, he congratulated the Author upon having at an early stage adopted an excellent and economical system of pavement, singularly free from faults or objections, and one that bid fair, with minor modifications only, to be largely employed in the future.

Mr. W. H. DELANO regretted that the Author should have per- Mr. Delano. petuated confusion by using the words "asphalt," "asphaltic," when the substances he referred to were evidently gas-tar and gas-tar-mastic, namely, gas-tar mixed with chalk and gravel. Asphalt was a natural bituminous limestone; asphalt-mastic was the same, mixed with natural bitumen, and when mixed with grit was called gritted asphalt mastic.¹ He understood that pine sets cut from Swedish yellow deals 6 inches deep, 3 inches wide, and 8 to 11 inches long, laid on a Portland cement foundation 6 inches

¹ Minutes of Proceedings Inst. C.E., vol. ix., p. 249.

Mr. Delano. thick, cost 10s. 6d. per square yard, exclusive of demolition of old roads, carting away old materials, and regulating the subsoil to proper contour. This price was low and probably misleading as a guide to contractors' prices for similar work, for it seemed to include no general expenses. A contractor paid rates and taxes, interest on money disbursed, cost of plant and tools, rent, employees, which made his general expenses from 15 to 20 per cent. Local boards, who were their own contractors, had none of these to count, but it was probable that their general expenses really exceeded those of a contractor, just as the management of railways by the State cost more than that of private companies. The standard traffic of 750 tons per yard width per diem seemed a misleading formula, for the wear and tear of a road did not depend so much upon the weight passing over it as upon the speed at which that weight travelled. There was also the important element of width of tire, the state of the atmosphere, the camber of the road, and the mode of traffic, cross, heavy, one side empty the other loaded, &c., &c. Take the new three-horse Paris omnibuses carrying, when full, forty-six people including driver and conductor, weighing when full $5\frac{1}{2}$ tons, the width of the wheel tires being only $3\frac{1}{2}$ inches, running at a speed of 7 to 9 miles an hour, and compare the same weight on a $4\frac{1}{2}$ -feet wide smooth cast-iron roller dragged at $1\frac{1}{2}$ miles an hour. The latter improved a road, the former rapidly destroyed it.

The Author having alluded to the wood pavement laid down by the Improved Wood-Pavement Company in Paris, he would make some remarks on that interesting work, having watched it daily from its beginning. It had been carried out in September 1881 on a portion of the Boulevard Poissonnière, of the Rue Montmartre, and cross-road formed by the two. The gradient of the former was nearly 4 in 100. It had been laid by skilled English workmen, with the thicknesses of concrete and wood as above stated, and had resisted up to the present some of the heaviest traffic in the world. It was fair to state, however, that the winters of 1881-2-3 had been remarkably mild, and the summers of 1882-3 remarkably cool. In March 1884 the first repairs had been effected, and now (July 1884), although the road was in good order, some of the sets had become spongy, and those in the lines of traffic were rounded at the edges. On a wet day the wheels of the omnibuses, by expressing the surface-moisture, left seemingly white tracks behind them. Now, large surfaces of wood pavement were being laid all over Paris, chiefly in substitution of macadam, and four rival contractors were in the field. The price for all was as near alike as

possible, say 23 francs the square metre, or 14s. 10d. the square Mr. Delano yard; but it must be noted that the Paris octroi on cement was 12 francs the ton, and on wood 7 francs 50 cents the cubic metre, which increased the cost price by about 1 franc 50 cents the square metre, or say 1s. the square yard as compared with that of London. The system of deferred payments had been adopted all round; the prime cost of 23 francs was spread over a period of eighteen years, interest and compound interest being allowed on both sides at the rate of 7 per cent. per annum. This gave 2 francs 35 cents per annum for first cost, to which was added for maintenance 2 francs 50 cents per square metre per annum, equal to 4 francs 85 cents per square metre per annum for first cost and maintaining, for a period of eighteen years, or 3s. 1d. per square yard. This price had been subsequently increased so as to include demolition of old roads, but to a slight extent only. When Mr. Léon Say was Prefect of the Seine, in 1872, he repudiated the system of deferred payments, stating that it was a disguised loan, and that a municipality could always borrow money for work at a lower rate of interest than from a contractor. The above price was about what the Author considered a good contractor's bargain, as made by the Improved Wood-Pavement Company in 1876, for the maintenance of Piccadilly roadway for fifteen years. It had been often remarked that the materials for making roads were few, say stone sets or flags, wood, macadam, asphalt, the tessellated pavement laid in concrete by the Romans, and lava flags, as in Naples and Catania. Macadam was certainly condemned for heavy traffic in all large towns, as being too costly in maintenance and too disagreeable owing to its dust and mud, choking of drains, making mud-banks in rivers, &c., and the tendency of the day was to substitute for it a noiseless pavement. The macadamized road of the Champs Elysées, Paris, now nearly all replaced by wood, cost for maintenance 17 francs per square metre per annum, say 13s. 8d. per square yard; that of the Boulevards, 6s. 8d. per square yard. The proper way to lay wood was upon a smooth cement concrete. Concrete was being used in Paris now as a foundation for granite sets, as in Berlin and Vienna. Wood might answer for wide, well-ventilated thoroughfares, but to use it for narrow streets was anti-hygienic. Wood absorbed the urine of horses and the diluted filth of the street; horse-dung clung to it, and in dry weather it gave rise to horse-dung dust.

For traffic, wood was excellent for the first two or three years, but as soon as it became fibrous and worn, like an old tooth-brush, it would certainly produce poisonous emanations under a hot sun,

Mr. Delano. and remain damp in winter. It lacked that first quality for a hygienic roadway, of impermeability; and was far less durable than asphalt; for Cheapside, laid in asphalt in 1870, had never been renewed, and its repairs had never stopped the traffic for one minute since it had been laid; whereas wood was entirely renewed in six to seven years. It might be safely predicted that a reaction would set in against wood within the next few years. The Paris engineers stated in Article 19 of their specification for wood pavements: "The administration reserves to itself the faculty of suppressing at any time any part whatever or even the whole of the roads paved with wood." He might add that the cost of the compressed-asphalt pavement now being laid round and inside the new Hotel des Postes, Paris (about 10,000 square metres), consisting of a 6-inch Portland cement foundation and asphalt 2 inches thick was 19 francs 50 cents the square metre, say 12s. 5d. the square yard, and the yearly maintenance for ten years 2 francs per square metre, or 1s. 4d. per square yard. In the Rue de Richelieu the two systems of noiseless roadways, asphalt and wood, had been laid this year side by side; a few years would prove which of the two possessed most durability.

Mr. Faija. Mr. H. FAIJA said, that as it seemed to be admitted that the life of wood pavement was dependent, to a rather important extent, on the foundation on which the wood-blocks were laid, he agreed with the Author that it was better to have good clean ballast for the formation of the concrete, than to use the broken granite which existed in the old roadway, from which it would be hardly possible to make a good concrete. Even after the granite had been screened it was very dirty, and all the holes and interstices, which for the production of concrete should be filled with cement, were filled with dirt. Then again, the screening removed not only the dirt but also the smaller pieces of stone, leaving only the large pieces, so that to secure a sound concrete a much larger quantity of cement would have to be used than was necessary with the ballast. But as this extra amount of cement was not used, the concrete was very rough, very open, and consequently neither strong nor sufficiently smooth to receive the blocks; it was therefore necessary to lay a surfacing of sand and cement on which to set the blocks. This surfacing must in time break up and become reduced to powder, for it had not a thickness sufficient to resist hard wear, nor was it homogeneous with the concrete underneath. The Author had stated the cost of the concrete at 2s. 3½d. per square yard, and it was therefore evident that if the concrete had to be relaid or materially repaired every

seven years when the blocks were renewed, the maintenance would be considerably increased beyond the figures given in the Paper; and might probably account for the high cost of maintenance which existed in the Holborn District. In fact, the concrete should be regarded as the permanent road which might from time to time be covered with wood or other material more suitable than itself to the requirements of the traffic. The concrete to be thus permanent should be one homogeneous mass throughout, without surfacing of any kind, such a concrete as resulted from a well-proportioned aggregate properly manipulated, and he therefore was certain that in putting a well-made concrete under the wood-blocks, the Author had acted to the best advantage for his vestry.

With reference to the number of experiments of the cement which he had made for the Author, and which had been published in their entirety, he should like to say that in every case he sent his report to the Author on the completion of the seven days' test, and that therefore the extracts from these reports, which were given in the Paper, were not to be considered as defining the nature of the cement as shown by future experiments, but simply as his opinion of the cement at that date. No doubt a finer-ground cement would have been preferable, and would probably have enabled the Author to obtain the strength he required with the larger proportion of aggregate, viz., 7 to 1 instead of the $5\frac{1}{4}$ to 1 which he found it necessary to use, and would therefore have resulted in economy; otherwise the cement was of good quality and well suited to the purpose.

Mr. A. SOUTHAM observed that his experience as Surveyor for the Wandsworth Board of Works at Clapham, enabled him to confirm the Author's conclusions. In October 1880, High Street, Clapham, was paved with wood by the London Tramways Company and the Wandsworth Board. In the centre of the road were two lines of tramway; these had been previously paved with several kinds of asphalt, and all had failed; the margins of the carriageway were macadam. The tramway was paved under the direction of the engineer to the company, with plain deal blocks grouted with cement; the margins, 3,600 square yards, were laid by the Improved Wood-Paving Company for the Wandsworth Board with blocks dipped in creosote, on a bed of 6 inches of concrete, composed of Thames ballast and Portland cement, in the proportion of 6 to 1, at a cost of 11s. per square yard. The excavation was undertaken by the Wandsworth Board; the value of the macadam somewhat exceeded the cost of breaking-up,

Mr. Southam. carting and sifting it for use elsewhere. The pavement had been maintained by the Improved Wood-Paving Company free of cost for three years, when they expressed their willingness to enter into a contract to maintain it for a further period of fifteen years at 10*d.* per square yard per annum, and to leave it in good order at the end of that term; but although that was considered a small sum the Board had thought it desirable to maintain it themselves. Both the pavement laid by the Improved Wood-Paving Company and the Tramway Company were in good order, no repairs having yet been required, and the work had been done nearly four years. In any extension of wood-paving he would use plain well-seasoned yellow deal wood-blocks grouted with Portland cement, laid on concrete, formed of the old macadam, sifted and mixed with Portland cement. He considered that it was expedient to have large works executed by contract, but the maintenance should be undertaken by the parish authorities who had the control of the road.

Mr. White. Mr. G. F. WHITE expressed his satisfaction with the Paper, which he thought was a valuable supplement to those of Mr. Deacon and Mr. Howarth. Considerable experience had been gained in the intervening five years as to the endurance of wood as a pavement. The statistics collected by the Author should help, he thought, to set at rest many questions on which opinions were divided some years back. There were two points on which he desired to offer a few remarks. The first, related to the character of the foundation to be used under the wood. The second, to the mode in which the blocks should be laid with reference to one another. It seemed now to be quite agreed that the indispensable condition of securing a good and lasting paving was a firm and unyielding foundation, and it was also conceded that no material was so fit for this purpose as concrete made of Portland cement and gravel, in the proportions of 1 part of cement to 5 or 6 parts of gravel. The Author seemed to be of opinion that a thickness of 6 inches was sufficient for all purposes. Mr. White concurred in this view where the soil under the concrete was hard and undisturbed; but where the ground had to be picked up to provide for gas or water pipes, as was so generally the case, he thought the layer of concrete should not be less than 8 to 9 inches, especially in thoroughfares where the traffic was heavy. He had noticed in certain cases, and especially in Pall Mall, where the wood paving was probably in a worse condition than in any street in London, that the excavation for the concrete base had been very unequal in depth, the sub-stratum having in some cases been hardly removed at all, while in other parts there were holes

12 and 13 inches deep, which had been filled up with hard rubbish; Mr. White. and over this surface had been laid a bed of concrete, averaging hardly more than 3 inches in thickness. Such a mode of proceeding could only have one result, which had been predicted while the work was in progress, namely, the speedy breaking up of the pavement, with the consequent necessity of replacing it within a year or two. As a matter of fact that was what happened. The paving showed signs of subsidence almost immediately; and, though the middle of the roadway had been in part relaid, the generality of the work was in as bad condition as ever. The Author had mentioned two cases in which the concrete had been laid 12 inches thick, and though in the one case (Regent Street) the advantage had been nullified by the inferior quality of the wooden road laid upon it, it was to be inferred from the description of another example in Parliament Street that the life of the wood road would, in the Author's estimation, be considerably increased by the extra solidity of the deep foundation. From a careful consideration of the whole question, Mr. White had come to the conclusion (1) that the concrete should in all cases have a thickness sufficient to make it act as a beam in bridging over these inequalities of excavation. (2) That the life of the wood was in direct proportion to the immobility of the foundation, which must be deep enough to resist from the first the hammering action of horses' hoofs and the heavy pressure of wheels. The second consideration to which he would advert, was the way in which the blocks should be laid together in the roadway, and which resolved itself practically into a question of joints, or no joints. Now in the various pavings reported on by the Author every sort of jointing seemed to have been tried, and though he had judiciously abstained from dogmatically asserting his opinion, lest he should perchance be regarded as the partizan of any particular system, there seemed to be little doubt that he had a strong preference for laying the blocks together as closely as they could be put, and filling in the interstices with Portland cement grout. In this view Mr. White heartily concurred, and was glad to find it was also the opinion of Mr. Howarth.¹ He believed that the use of grooves or wide joints, as affording foothold for horses, was of very doubtful advantage, since, when the paving was perfectly dry or thoroughly wet, the foothold was complete, even with a jointless material like asphalt; and when the pavement was in the intermediate state of slipperiness, caused by frost or London fog, the grooved paving

¹ Minutes of Proceedings Inst. C.E., vol. lviii, p. 41.

Mr. White. gave no more support to horses than did the close joint, the reason being that the mud filling of the joints, taken in connection with the rounded edges of the blocks, was rather a cause than a preventive of slipperiness, which was altogether absent in the case of the continuous paving. Another argument against setting the blocks apart was the fact that their being so set helped the abrasion and rounding of their arrises, which was not only in itself an element of deterioration, but tended after a time to create a sort of corduroy road, on which the wheels bumped from one block to another, producing thereby a jar very detrimental to comfort in driving over it. If any proof were needed of the correctness of this statement, one had only to drive in Oxford Street, over the road running from the Marble Arch eastward, to feel the difference in smoothness and comfort of the close-jointed pavement in comparison with the grooved and bumpy road which succeeded it further east.¹

Mr. White had been told by omnibus drivers, who were excellent judges, that if the wide-jointed pavements were universal in London streets, there would not be a driver without a spinal complaint at the end of a twelvemonth. As regarded the direction in which the blocks should be laid in relation to the street, there would seem to be no doubt that it should be transversely to its length, like ordinary stone paving. In the paving before referred to in Pall Mall, the blocks had for some inscrutable reason been laid diagonally, than which nothing could be imagined more unsafe for horses, or more prejudicial to the comfort of those who drove over them, especially when the joints were, as in the case of one exhibited, $1\frac{1}{2}$ inch in thickness. This particular pavement appeared from the Author's statement to have been constructed at a cost of about 8s. per square yard, about one-half the price at which most other roads had been laid. It was in his knowledge that the expense of making it had been largely subsidized by the Clubs and the War Office, who had not taken the ordinary precaution of employing an inspector to watch its construction, but had left it entirely to the parochial authorities, of whose parsimony and ignorance it remained unhappily a convincing proof. It was to be hoped such a state of things would not easily recur, though he was not without fear that the neighbouring roadway of Cockspur Street and Charing Cross, quite recently laid, would manifest before long the consequences of insufficient foundation. This led him to enquire whether it was impossible to institute some more authoritative control than at present existed over the

¹ Since this was written the road has been renewed.—G. F. W.

construction of the wood roads of London. The information Mr. White gathered by Mr. Howarth and by Mr. Stayton was as ample and specific as would have been collected by a select Committee sitting on the question, and must surely therefore be sufficient as a guide to some uniform plan for the execution of such works. The question then became whether such uniformity could be enforced on the different parochial bodies of the Metropolis. The roadways were for the comfort of the whole community—not of individual parishes; and he could heartily wish that such a body as the Metropolitan Board of Works, which seemed to have most things under its management, could actively intervene to give the ratepayers the benefit of the investigations which had been made on the subject, instead of leaving them any longer to be the victims, both in pocket and in comfort, of every experimenter who might have a nostrum to recommend, or a patent to push.

Mr. STAYTON, in reply to the correspondence, remarked that such Mr. Stayton. observations as those made by Mr. Culverwell were extremely practical and valuable. He, however, felt compelled to reassert his opinion that the pitch-pine blocks in King's Road created an unpleasant "jarring" motion when driving over them. He had many times experienced it, and on a recent occasion the effect was very apparent. Possibly this evil could be mitigated by the application of Henson's felt bed and joint. He was glad that Mr. Culverwell had so clearly expressed his reasons for declining to support the creosote theory, feeling convinced that the extra cost of creosoting could be better expended in the selection of the timber. He concurred in Mr. Delano's objection to the terms "asphalt" and "asphaltic" as applied to the wood pavement laid by the Asphaltic Wood-Pavement Company; obviously the British asphalt used by them was a manufactured article, and the name might lead to confusion. Where the word "asphaltic" appeared in Tables III. to VII., it merely referred to the "Asphaltic" Company's system, in the same way that "Henson's" or the "Improved" systems had been referred to. He did not find the wood in Chelsea "produce poisonous emanations under a hot sun," although it had been laid five and a-half years; this fact, however, could be accounted for, because its surface was thoroughly watered and machine-swept twice a week during the summer, independently of the attention described under the heading of management (p. 30). Any neglect of this service, however, would soon create the unpleasant condition described. He assumed that it would be taken for granted that the thickness of concrete foundation referred to by Mr. White (6 inches) would only be adopted where the soil

Mr. Stayton. was hard and undisturbed, and he could refer to numerous instances in the Chelsea pavements where the thickness was from 8 to 10 inches; in fact, a depth of 12 inches had been laid for a long distance over the site of a suspicious gas trench in Sloane Street.

During the evening some specimens of "teredo," commonly called "cobra" in the Colony, sent as a present to the Institution by Mr. J. B. Stanley, Assoc. M. Inst. C.E., of the Harbours and Rivers Department, Brisbane, were exhibited. The specimens consisted of the worm in spirits, the head of a worm, and a piece of a pile showing the effect of the working of the worm. The specimens of the worm and head were taken from an unmetalled ironbark pile, which had not been in the water more than eighteen months, and was one of the piles used in the cofferdam at the entrance to the graving dock in the Brisbane River. The piece of the pile was from the same place, and had not been more than two years in the water. The Brisbane River at the "dock" was always quite salt. Mr. Stanley had been informed on the authority of two reliable persons that a worm 14 feet long had been taken out of a plank from a ship's bottom in the port of Brisbane.

29 May, 1884.

The Session was concluded by a *Conversazione*, which was given by the President and Lady Bazalgette at the South Kensington Museum, by permission of the Lords of the Committee of the Council of Education.