

THE TEACHING OF HYGIENE AS ILLUSTRATED BY THE PARKES MUSEUM.

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PROF. WYNTER BLYTH said that he had been commissioned to say a few words respecting the history and object of the building in which they were. The Parkes Museum was founded in 1876 in memory of Professor Alexander Parkes. At first a separate and distinct institution, it found a temporary home in University College. In 1882 it was removed to its present quarters, recently enlarged by the addition of another house. In 1888 it was incorporated with The Sanitary Institute. The Parkes Museum was a collection of object lessons, illustrating the subject of hygiene and recording the development of sanitary science. Not less than 20,000 people annually visited the collection, showing that at least that number took an interest in the subject. During the past nine years systematic instruction had been carried on within its walls. In addition to an elaborate course of lectures and demonstrations encouraged by the Institute, no less than forty-two different colleges, medical schools, or societies, had during the present year sent their students to study the exhibits. The number of students who had availed themselves of these facilities was not far short of a thousand, a fair proportion of whom were ladies. He mentioned that the catalogue of the Museum had been published, which afforded every facility for examining the different objects which the Museum contained. He observed that often the least conspicuous objects in the Museum possessed very considerable interest. He had not the slightest doubt that ninety-nine out of 100 persons would pass by certain pipes (to which the speaker called attention) without supposing them to possess any particular interest. If, however, one examined them carefully, they would see certain transverse markings which indicated that they had been attacked by rats. He pointed out that it did not require a sanitary Sherlock

Holmes to elucidate the fact that the presence of rats in a house (at any rate in cities) constituted a fair presumption of something being wrong. That might not be the case in farm-houses, for one might have rats in country houses without the drains being wrong; but in cities the home of the rats was in sewers, and if they escaped from the sewers through the house drains into the house, that fact afforded very substantial evidence of there being a direct communication between the sewers and the house drain. Therefore these markings on the pipes would tend to render a Sanitary Inspector suspicious. The catalogue was divided into various divisions. There was a classification which had been rigidly adhered to. Possibly the most interesting section was that dealing with bacteriology, but the limits of the building would not allow of their having a room devoted entirely to bacteriological subjects. A lecture, however, was given in their course of lectures to students on this subject. Dr. Hewlett had presented the Museum with a few specimens of micro-organisms, as exemplified in the tubes before him. He pointed out, in speaking of bacilli, it must not be imagined that the particular growth they saw in these tubes represented a single bacillus, on the contrary, each tube contained a colony of bacilli. Some of these were innocent, and some were more or less of a malignant nature. They had also a few specimens illustrating pathology, especially the pathology of parasites, flukes, trichinae, tuberculosis in the ox, &c. Then there was a meteorological section arranged by Mr. Symons, with a very fair set of meteorological instruments detailed in the catalogue. There were also a number of lantern slides for lecture purposes, and these were made considerable use of by their own lecturers, and also by lecturers who went about under the auspices of The Sanitary Institute delivering lectures in different parts of the country. In Section B, devoted to the hygiene of special classes, trades, and professions, considerable space in the catalogue was devoted to plans and drawings of schools and artisans' dwellings. He did not mean to say that these were all models of construction, indeed many of them were models of what they ought to avoid in the future. Some towns, when demolishing large areas, had sent deputations to the metropolis to ascertain what sort and kind of artisans' dwellings it would be desirable to construct. Such persons would find it useful to consult the plans in this Museum.

The chief section was, however, Division C, dealing with building construction and sanitary apparatus, which constituted the most interesting and the most comprehensive collection in the whole Museum. In connection with this they had at the present time drawings, plans, and sections of the sewers, and

of the apparatus by which the sewage of London was dealt with. He believed that these drawings could not at the present time be found anywhere except at this Museum. These might be of great use to sanitary engineers as samples of construction. He referred them to a model on his right of various forms of brick walls set in wet sand showing the efficacy and the result of a damp-proof course, and without it. If they would examine it closely after the lecture, they would see that where there was a proper damp-proof course the moisture did not extend beyond that course, but in the absence of such a course the damp rose more or less up the wall.

The next exhibit gave them a visual impression of the enormous quantity of water that an ordinary brick would take up. It consisted, as they could see, of two bricks originally of exactly the same weight, poised on a pair of scales, and the amount of water in the beaker placed upon the dry brick represented the amount of water taken up by the moist brick. They would understand with regard to a house that was damp what an enormous quantity of water the wall must contain.

The diagram above that specimen showed a house that had been built in a very happy and fortunate position so far as view was concerned, but they would see from the diagram that unless that house had been built on a concrete foundation it was certain to be damp, for it had been built on a pocket of gravel, beneath which was an impervious stratum of close clay in which the water accumulated and rose by capillary attraction through the walls of the house. Beneath their feet they would see several examples of flooring, the floor of the Museum being a sort of patchwork just to illustrate the various kinds of flooring that were available—Mosaic, Wood Block Flooring, Parquet Flooring, &c.

Then there were various kinds of water-closets, to two of which he wished to call attention. These were both very bad forms of closets, one a long hopper, and the other the old-fashioned pan closet, there being under the container a D trap which very often caused disease. The particular exhibit he was referring to was connected directly with the cistern which was presumably used for drinking purposes, and he pointed out that whenever the valve was pulled bubbles of air found their way from the pan up through the water. That met an argument which had often been raised, for people sometimes said it was an impossibility if a closet was connected with a cistern, for gas to get from the closet up into the cistern. The exhibit in question showed very clearly the contrary. Such people reasoned as if the pipe going from the cistern to the closet was always full of water, which was by no means the case. This

pipe might get full of foul air, and directly they got a connection between the cistern and the closet, that foul air was expelled through the water and contaminated it. Moreover, there were plenty of analyses showing that water in a cistern so connected often contained a considerable quantity of ammonia and was extremely impure. So they had a simple fact proved by ocular demonstration and other means. Some of the most modern forms of closets would also be found in the Museum. There were the Syphonic closets, which presented several advantages, though, on the other hand, they presented the disadvantage of requiring a three-gallon flush. The Sanitary Institute had accepted the doctrine established by some very careful experiments made by a committee of the Institute, that a two-gallon flush is not sufficient to keep a w.c. and drain perfectly clear. Unfortunately in the metropolis the water companies had laid down two gallons as the maximum quantity, and this limit had been sanctioned by statute. There was consequently a difficulty at the present time, and the law required altering in order to make it agree with the dictates of sanitary science.

With regard to drainage they had some special exhibits. A very useful one which he supposed had taught hundreds of students what a drain ought to be, was the large model on his left, showing a soil pipe with all kinds of joints, showing how a lead soil pipe should be connected with the earthenware pipe of the drain, an inspection chamber and an air inlet. It also showed how the soil pipe should be ventilated by being carried up full bore to the roof, and also how the various closets are to be connected with the drain which was provided with its ventilating pipe to prevent what was known as anti-syphonage. He then referred them to a drawing immediately above the model, of a drain which presented nearly every possible defect. It ran up and down, its contents were escaping into the earth, the root of a tree had grown through at one of the joints, a common enough accident; in the Museum, indeed, was a large root which was found inside a drain. It also showed a right-angle junction instead of a smaller drain joining the drain in the direction of the flow. The next junction was not inserted in the proper way. A drain such as that must necessarily pollute the ground in which it was laid, and would be liable to get choked.

The next drawing represented the damming back of sewage in the drain from a defective syphon. The arm of the syphon which went towards the sewer was bent in a faulty manner, in that the outlet was at a higher level than the arm of the house part. The consequence was that the drain never emptied itself. Then, with regard to traps of drains, there were all

kinds of traps to be seen in the corridor—bell traps, dip traps, and other kinds of traps that human ingenuity had devised. What they found extremely useful in instructing students was a fairly complete collection of apparatus for the testing of drains. Modern drains were tested by what was called the water test, also by what was called the smoke test. The water test was applied by plugging one end of a drain at the lowest joint and simply pouring in water at a higher point, and noticing whether the water level sank or not; if not, then the drain might be presumed to be sound, while if it did, then it certainly leaked. Instead of stopping the end of the drain up with clay, there were several more or less ingenious appliances which had been devised for the purpose. He showed one such, which, if of the proper size, firmly plugged it on being screwed up. He also showed a bag which was used for the same purpose, which had the advantage over the screw plug that it could be applied more easily in certain cases. Then there were smoke rockets. These were filled with a composition which emitted an enormous volume of smoke, probably something like the volume of smoke in the "Arabian Nights" which the poor fisherman let out when he uncorked the bottle which contained the genii. This was inserted into the drain after being lighted, the ventilating shafts having been plugged and the smoke being under pressure would find its way through any imperfect joint. Sometimes the defect was not shown by one rocket, and several had to be employed to get the requisite pressure. He then showed another kind of smoke rocket, which he said was being very much used at the present time. It was a comparatively small rocket, but it would burn under water, that is to say, the fuse was not extinguished by water. That was an advantage, inasmuch as it enabled them to pass it round the bend of a trap through the water. The holder attached to the rocket was used for drawing back the case after the discharge. All these various appliances were made great use of in the lectures and in the demonstrations to students.

There were also in the corridor a number of exhibits showing the results of faulty sanitation, the effects of gases on pipes and so on. He especially called attention to a fine collection of corroded D traps and corroded old pan closets, and also to some extraordinary sanitary arrangements which have been taken out of some of the best houses in the West-End and had been presented to this Museum, showing what serious sanitary defects might exist in high-class dwellings.

There was an excellent exhibit bearing on water supply, including a filter of one of the London Water Companies, full size filled with fine sand, coarse sand and pipes underneath.

They had also diagrams one-quarter scale of the filtering beds of other companies.

He directed their attention to a new exhibit which had recently been presented to the Museum by a Member of their Council, illustrating the effects of pumping at a well on the surrounding strata. They would see that a well in the centre of a porous sandy soil reduced the water level over a very wide area. The fall of level in the form of a curve being shown by glass tubes symmetrically arranged outside. The more they pumped the more marked was the curve. In other words, the more water that was pumped, the more polluted would it be likely to be, drawing as it did its water from a larger area of surrounding soil. The arrangement of the model was in a linear series, but of course if the soil were homogeneous, the well would act more or less in a circle.

In the same division there were various ventilating appliances, cowls, tubes, and flaps, which could be seen in the gallery. Tobin's tubes, perforated bricks, ventilating windows, in fact, a fair example of the appliances at present in use.

Further on there were various forms of cooking apparatus. He thought it would interest the ladies to see the little apparatus on the table which showed a kettle being heated by electricity, than which one could hardly imagine a cleaner method of boiling or cooking, but unfortunately at present an expensive luxury. He also showed a radiator for heating a room by means of electricity, which did not require any flue. This, too, was unfortunately at present only a scientific curiosity.

With regard to Division "D" he would not say much about the various foods, or hospital and sick room appliances, but he could not dispense with saying a few words about filters. According to a very elaborate investigation, the results of which had recently been published in the *British Medical Journal*, the only filters that could be relied upon to make an injurious and polluted water safe to drink, were those in which there was very close packing together of mineral particles, such as the Pasteur and Berkefeld filters. The one was a sort of porous porcelain, and the other was a siliceous earth closely packed together. In such a tube as the one he held in his hand the spaces between the material must be extremely fine, so fine indeed that they did not appear to allow bacteria to pass through, and since bacteria were of extreme minuteness that would give them some idea of the fineness of the pores. On the other hand a great many waters were only polluted with a little harmless vegetable matter, and such waters could be freed from that by sand or other filtering medium, many varieties of which

could be seen in the Museum, such as the silicated carbon, the magnetic iron, &c., but it must be borne in mind that these would not free water from bacteria.

He hoped that these remarks would give them some idea of the Museum as a teaching institution, but beyond mere students it afforded technical knowledge to those engaged in the building trades, engineers, architects and others. If a builder wanted to know the various patterns of ventilators, sinks or drain pipes, he would find it an advantage to come to the Museum, especially as from time to time they had Congresses with exhibitions of sanitary appliances, to the best of which medals and certificates were awarded after careful examination and trial. It was more or less a rule that these exhibits to which medals were awarded should be deposited in the Museum, and that rule would doubtless be more strictly adhered to in the future; therefore, anything new or special in sanitary appliances would be likely to be found in the Museum.

In concluding his remarks he hoped they would admit that The Sanitary Institute did useful work although they had no State aid. In the Museum they had brought together a number of objects, not perhaps of interest as a show place, but of high value to all who were engaged in teaching hygiene, and of special value to the advancement of sanitary science as applied to domestic and public life.

Mr. H. C. SOPER (London) called attention to the ventilation of public sewers, the gratings for which were generally in the roadway. He maintained that such a practice was altogether objectionable; in fact, the Vestries did what they would not permit a private individual to do. He asked why it was not made a rule to carry the pipes up against the wall of a house, as indeed it was done in some districts. He thought the practice of ventilating into the roadway was the cause of much illness.

Mr. A. WINTER BLYTH, in reply, said that presuming that the sewers were perfectly made, as sewers of the best form were, they could give rise to very little offence. He admitted that in the old sewers where there were "dead-ends" offensive accumulations might take place. He pointed out that there were difficulties in the way of carrying pipes up the houses, since that could not be done without the permission of the landlord, and experience showed that such permission was very reluctantly accorded.