

this class. It is also rather higher in the left hemisphere of the brain than on the right side.

The specific gravity of the cornu Ammonis of imbeciles is higher, on the whole, in the left hemisphere, this being due to a decrease in the consistence of the white matter of the right side only. The grey matter of these regions is precisely identical in the two hemispheres.

In conclusion it is to be regretted that no data are to hand concerning the cerebral specific gravity of the acute and chronic psychoses, but further investigations into this subject will be undertaken at the earliest possible opportunity.

*Sewage Disposal at Hawkhead Asylum.** By W. R. WATSON,
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THE bacterial disposal of sewage has been so widely discussed during the past year or two, that possibly some apology is due to the Association for the introduction of a subject that has ceased to be novel. So far as Hawkhead Asylum is concerned the subject is still in the experimental stage, and the brief outline of the experiment contained in the following communication is the outcome of a correspondence with some of my friends who suggested that the question is not without interest to asylum superintendents.

When the building of Hawkhead Asylum was under the consideration of the Govan District Lunacy Board the disposal of the sewage necessarily received attention. Various plans were in turn suggested and rejected. The asylum grounds having about a thousand yards of river frontage, obviously the simplest way would have been to run the raw sewage directly into the river Cart, already a foul sewage-laden stream. This plan, at present largely followed by private proprietors and public bodies, received no countenance from the Board. Irrigation, so efficient and economical at Cane Hill Asylum and elsewhere, is not available, owing to the character of the soil. Precipitation by chemicals has the enormous disadvantage of having to deal with the sludge, which, after all the expense and trouble, is of little or no agricultural value. For a time a method was followed of

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intercepting the solids for use as manure, and collecting the fluids in tanks for a similar purpose, but after a two years' trial this plan was found to be inconvenient and offensive, and was discontinued. A temporary expedient was adopted, and a further and full consideration of the whole question became clamant. About this time Mr. Dibdin, chemist to the London County Council, had been publishing the results of his investigations of sewage disposal by means of "bacteria beds," and Mr. Cameron of Exeter had constructed his now famous "septic tank." The Govan Board having very wisely decided on obtaining further information, a deputation visited Exeter and Hendon. At the former Mr. Cameron's experimental tank and filters were seen at work, successfully disposing of the sewage of one of the suburbs of the city with a population of 1500. I do not propose to enter upon any lengthened detail of this system, and merely indicate that it consists essentially of two parts: (1) a deep dark tank where the sewage is received, and where by bacterial action liquefaction and other changes take place; (2) filters of clinkers and coke breeze freely exposed to light and air. The effluent from the tank is distributed on the filters, where it is further clarified by filtration and bacterial action, and discharged into the river bright and clear, and free from liability to putrefaction. I satisfied myself of this, having kept a sample for many months. At Hendon the "Ducat filter" was in use, also experimentally. It is simply a deep filter of cinders or coke, with very free admission of air in all directions by means of drain tiles. The filtrate seemed free from objectionable characters, such as odour or colour. When in London two months later I had the opportunity, by the courtesy of Mr. Dibdin and Mr. Wootten, of the Sutton Urban Council, of inspecting the new sewage works at Sutton in Surrey, where what is known as the "Dibdin" or "Sutton" system is in operation. This consists simply of filters of burnt ballast and coke breeze freely exposed to light and air, through which the sewage gradually passes, and in its passage is attacked by myriads of bacteria and changed in character and appearance, the effluent passing out quite clear. The system is at once so simple and so effective that I was most favourably impressed, and anxious to apply it to the sewage problem at Hawkhead. With the object of submitting the matter to the test of experience, permission was readily obtained from the Board to apply the system to the sewage of a number of cottages belonging to the asylum, but

situated at too low a level to admit of their inclusion in a general sewerage scheme for the institution.

Owing to the situation of the cottages favourable conditions of fall and depth of filters were unattainable, but even with these disadvantages the results have been encouraging. The small scheme carried out by Mr. Crawford, the Clerk of Works at Hawkhead, may be shortly described as follows:—An ordinary drain carries the sewage into a man-hole, where a screen is placed to arrest any foreign substances and allay the passage of paper until it becomes pulpy and easily broken up. At some distance from the man-hole, and connected with it by a drain-pipe, two concreted tanks are formed. Care has been taken in the construction to allow a minimum area of one square yard for every 500 gallons of sewage. The floor of the tank slopes to the centre, forming a channel. Over this is placed a cover perforated to admit of the passage of liquids. Two other tanks of similar construction but of smaller size are placed so that the upper margin is a little lower than the floor of the upper tanks. The upper tanks are filled with furnace cinders of a size to just pass a one-inch mesh to the depth of 30 inches, and the lower tanks are filled with coke breeze to the depth of 20 inches. Had it been possible to get double the depth of filtering material, even better results would have been obtained. On the surface of the cinders are radiating wooden channels leading from a central shallow trough, and so arranged as to secure an equal distribution of fluid. By a penstock arrangement in the man-hole the raw sewage is permitted to flow upon either of the two upper filters, or the "bacteria beds," to use Mr. Dibdin's phrase. The changes already referred to take place in the passage of the sewage downwards. By the channel in the floor the fluid is conducted to the surface of the lower tank, where a similar contrivance for equal distribution is placed. After its passage through the coke breeze the effluent, free from colour and smell, is discharged into the river. From a series of experiments I found this effluent to contain on an average as much oxidisable organic matter as "absorbs" .42 grain of oxygen per gallon. This result must be considered under the somewhat unfavourable conditions as satisfactory.

The advantages claimed for the "Sutton" system just described, and it seems with some reason, are—

1. Simplicity of construction. This follows from the absence of expensive machinery, such as is frequently seen at

sewage works. Nothing more is needed than the requisite area and depth of cinders and coke breeze for the volume of sewage to be dealt with.

2. Moderate cost of maintenance and supervision.

3. The disappearance of the sludge. In methods by precipitation, either by chemicals or simply by subsidence, the sludge has to be disposed of in some way. Local authorities have found its disposal by no means an easy matter. Its agricultural value is very small indeed, and in some localities the farmers will not take the trouble to cart it away.

The question of how long such "beds" and filters as I have described will work effectively without renewal cannot yet be answered from our own experience at Hawkhead; but when I was at Sutton those in use had been acting for nine months without any indications of failure. An important point is not to overtax the beds. They must be rested, and hence the arrangement by which two or more can be alternately used for short periods. The surface of the beds ought to be turned over from time to time to the depth of a few inches. When this is done the slight odour given out is very much that of rich garden mould. So far as I am aware there is no experience of any lessened activity in these filters. Beyond occasional small additions of fresh material any expense for renewal may be left out of account. The supervision required is very slight, but care must be taken that the distribution is good, and that the proper periods of action and rest are observed.

If such works as I have described be attended to, no odour can be perceived even close at hand, and by judiciously planting shrubs the whole can very effectually be concealed from view. Where asylums and similar institutions are situated in the country, away from systems of common drainage, the disposal of the sewage in an inoffensive way and at moderate cost is an obvious advantage. This, I think, can be secured by the method now under consideration.

Note.—Since the above paper was read the Govan District Lunacy Board have decided to treat the whole of the sewage of the Asylum and Hospital at Hawkhead by "bacteria beds," and as the general conditions are favourable, good results may be looked for.

Discussion.

Dr. SPENCE said he wished to draw their attention to a system of sewage treatment that was perhaps a little newer than Dr. Watson's. It had been brought into prominence by the Engineer of the Wolverhampton Sewage Works, approved

by the Medical Officer of Health for Staffordshire, and was now being introduced into the Lichfield Sewage Farm. The Garfield system was simply a series of tanks filled with common coal—placed in layers of different sizes of slack. The solids were first removed, and the supernatant fluid left to filter through the coal, the effluent being perfectly clear. It would not decompose after having been kept for months. The patentee did not explain the action of the coal. Some said that stones might answer the same purpose. The coal had been examined after having been used in the filter, and no changes, chemically or physically, could be detected. The fact remained that the effluent from the sludge tank, after passing through the coal, became chemically and bacteriologically pure. The coal could be used over and over again. At first, of course, many tons of coal were required, but the cost for renewal was very small.*

Dr. McDOWALL said that at Morpeth they were then increasing their bacteriological tanks. They had tried coal, and found it of no advantage. Small stones or brick (porous material) were better. They only required to form an extended surface for the growth of bacteria, which destroyed the albuminous material. They had got very good results, and now that they were increasing their tank accommodation they had no trouble except as to the disposal of the semi-fluid sludge. Both patients and attendants strongly objected to work in it. He had been advised by an old Yorkshireman to excavate a tank and line it with porous bricks, and to allow the sludge to stiffen in it to the consistency of cheese, the residue being removed from the surface and spread on the ground, forming excellent manure.

Dr. WATSON said that there was some slight misapprehension as to the sludge. At Hawkhead it disappeared entirely, as if it were manure put in the earth. The raw sewage was run upon the bacteria bed, passed through, and produced no sludge; even paper became a pulp and vanished. This went on month after month without any special attention except the alternate use of one or other set of beds, and turning the surface of them over occasionally. If the experimental system turned out as successful as it promised they would try for the whole asylum.

The Mismanagement of Drunkards.† By GEORGE R. WILSON,
M.D.‡

“It is to be hoped and expected that with the spread of knowledge and education alcoholic intemperance may come to be regarded always and everywhere as vicious and

* We hope to publish a more detailed account of this process in a future number of this Journal.—Ed.

† Read at the Annual Meeting of the Medico-Psychological Association, Edinburgh, 1898.

‡ Misunderstandings and misquotation have made it desirable to enlarge upon some of the opinions expressed in the abstract of this paper which was read to the meeting in Edinburgh. There are many verbal changes as well as additions. The former are inevitable in so far as a written statement must differ from what is spoken, and the latter seem desirable because of the nature of the attention which these views have received. Most of the disagreement which has been expressed is from misunderstanding, due to the shortness of the statement which the conditions of a meeting, called together for discussion, imposed. Nothing which was said then, or which has appeared subsequently, has induced me to alter, in the slightest, the significance of what I said. On the contrary, much proof has been forthcoming that the paper expressed, however