AN INDIAN INCINERATOR.
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In this, the day of the sewage problem, the following account of a method evolved in an Indian hill station may be of interest, as it was worked with but small help from Government, and practically without expense. It may be premised that the official system in force in the spring of 1905 was the removal of excreta in buckets and its burial in shallow trenches, which, after filling in, had their surfaces planted; every stage being marked by dry earth—that is, dust—supplying microbes by the million for people to inhale. On account of the danger of the filth being washed out of the trench by the heavy rain in the monsoon in the hills, the measurements of the "Allahabad system" are not strictly adhered to, but the trench is dug deeper.

Early in the year, the question of the installation of an official incinerator had reached the stage of discussion of types, but as my tenure of the Station Hospital was only for two summers, the occasion appeared opportune for some independent experiments. On making a preliminary survey of the ground, a building of stone and mud was discovered on the hill side, some thirty feet below the general level of the hospital. On the Royal Engineers' plan it was marked "bug-boiler"; it, however, had no boiler, but a fireplace and an iron grating, over which was a vacant space where a boiler could be placed of about six cubic feet capacity. This was something to begin with, so we tried to burn some sweepings in it, and found that the draught was insufficient to burn anything except dry firewood. The Royal Engineers were then appealed to, and at a cost of ten shillings or thereabouts, we had four and a-half feet of iron stove-pipe put up, having a pyramidal base, with one side of the pyramid made to open as a door, and a second grating eighteen inches above the first. This worked very well, so we started with a bucketful from a latrine, and all the sweepings and waste paper which could be found, mixed together and put in on top, and below the grating a fire of dry wood. This charge was eventually reduced to ashes, though it took a very long time, as the mass was too solid to burn freely. We then got some wood shavings from a carpenter's shop and managed better, but this supply soon ran out; then we tried stable litter, which, in India, consists, besides horse-dung, chiefly of grass roots; some was
brought out and mixed with the latrine stuff and found to burn well. As there were five horses in the hospital stable, sufficient litter to mix with all the excreta was obtainable every day. The excess of liquid was strained off into a pit of loose earth near at hand, but with a boiler in the wall of the incinerator, this could easily be sterilised, which would allow of its general use in the garden.

All urine and slops from the enteric ward were boiled in an ordinary wash-tub. The excrement from about one hundred Europeans, the solids from the enteric ward, and the rubbish of the whole hospital, were put through the incinerator daily. The time taken for combustion was about eight to ten hours, but the fire needed attention for only an hour or so, as by that time the charge of litter and ordure caught fire and burned away by itself. A thorn
bush which overran the hill sides and needed clearing away, was found very useful, as it burnt when newly cut in the green state (*Berberis lycium*). The stable litter is indispensable, both for mixing with the wet mass to make it capable of ignition, and for its remarkable effect in destroying absolutely every trace of offensive smell. The diagram explains itself. The ash raked out from beneath the lower grating was disposed of as a manure in the garden.

One urinal had been built next a cook-house on the opposite side of the bungalow from the latrine. With the object of removing it from this unwise proximity to the kitchen, and also to diminish the amount of urine passed into the latrine pans, the urinal was moved to a position next the latrine; notwithstanding this improvement, the weight of ordure from 100 people was over 200 lbs. daily. I am convinced that the four ounces which the text-books give as the average weight of an adult's fæces in twenty-four hours is much too low an estimate. The dry earth in the pans, of course, had to be discontinued, and a disinfectant was required which would not cause trouble in the incinerator. In kerosene oil of cheap and crude quality is to be found, probably, an ideal substance for use in latrines; among other advantages, it is oily, and hence facilitates the cleansing of the pans; it is distasteful to flies, and keeps the latrines practically free from these microbe-carriers; it keeps the pans aseptic, and assists in the combustion of the ordure. The use of kerosine oil had previously been suggested by the Principal Medical Officer, Colonel Hamilton, for sprinkling the floors of latrines and urinals to keep down dust and harden the ground where the floor was only earthen, as had been done for motor-car roads. This result is satisfactorily achieved with a light sprinkle once a week, and besides, it has the great advantage, as remarked above, of keeping away flies, and this to such an extent that visitors have said that "the only places free from flies here are the latrines."

Finding that the patients' latrines were easily dealt with, we next turned our attention to the native staff, and added the stuff from a closet used by about forty people of all ages. But here a greater difficulty presented itself, namely, that the Indian washes himself after defaecation, so that there was much more liquid in the buckets, and our stoker declared that he could not burn it unless some of the liquid was separated. We, therefore, induced the barrack-master to part with a condemned wash-tub. In the bottom of this we had holes pierced about a quarter of an inch in diameter
(this size we found in use to be too large). A pit of about nine cubic feet was then excavated and filled up with loose humus; over this was placed the tub with some stable litter in the bottom; it was then filled with the pan contents, and the excess liquid strained slowly off; the solids left behind were then treated as before and found to be combustible.

This method of treatment was suggested by Colonel Hamilton's plan of earth urinals for troops, which he had practised with success before, and which we now introduced in the station hospital. Till August, 1905, the saw-dust system had been in use and worked well, but the supply of saw-dust was scanty and uncertain, and hence impracticable for any large number of troops. The earth plan is as follows:—A cube of ground is dug out, measuring about three feet each way, a coping of stone, slate or brick placed around the edge, and the pit filled up with loose earth free from stones; then a little kerosene oil sprinkled on the top and edges, and the urinal is ready. One of this size is suitable for about fifty men. On account of the rains, some of these were placed under cover; but one under the shade of a fig tree did equally well, though it was once partially washed out by a heavy shower. After a month's use these urinals were quite sweet, but as we required manure, the earth, as rich as guano, was taken out; the pits were then used, and when a smell became perceptible, a layer of fine earth, two inches deep, was put over the floor. This did not begin to smell for about ten days, when another layer of earth was put in. A pit can thus be slowly filled in to the top; then, if manure is wanted, the filling is removed and the process repeated, or a fresh pit may be dug. The kerosene oil imparts a dark metallic tinge to the earth, and the mixture kills not only microbes, but tender plants and seedlings. The plan in working is simplicity itself, and besides providing a valuable manure, saves much labour in carriage of stuff in smelly vessels along public roads, which, in a hill station, is generally unavoidable; but the mixture being always damp, as well as coated with kerosene, there is no "live" dust to blow about, there is no smell, and there are no flies.

The amount of kerosene used every month is twenty-four gallons. This is applied to the floors of two large latrines and on four earth-urinals; each latrine has ten compartments, and the pan in each has half an ounce of oil put in it, say seven to ten times daily for one hundred people. The oil being almost useless for illumination is not stolen by servants, and the floor, even when wet, cannot be ignited with a lighted match, so there is no danger of fire.