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ON THE APPLICATION OF SEWAGE IN AGRICULTURE.

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Baron Liebig has lately brought forward the idea of collecting the sewage of dwelling houses, which at present runs to waste, for the purpose of enriching soils that have been too much drawn upon by constant cropping, without a sufficient return being made in the shape of manure, or by allowing them to be fallow. The present system of sending to the antipodes for guano, at enormous expense, or keeping animals for the sake of farm-yard manure, are both liable to many draw backs; and should it be proved that Liebig's suggestion is practicable, it certainly will produce a great change in the farming operations of this country. Whatever objections may be suggested by the fastidiousness of amateur farmers, those whose daily bread depends on the profitableness of this calling will not hesitate about adopting such measures as may be clearly shown to be instrumental in producing large crops at small expense, and which will enable small capitalists to do a considerable amount of business without running into debt. The best argument that can be adduced in favour of Liebig's suggestion is the fact that it has long been acted on in China (of course, like all Chinese customs, from the earliest times), with the very best results, several crops being produced every year from the same fields without any rotation of variety in the crops sown, or without allowing the land to lie fallow. Ground would appear to be very dear in China, every yard being either under cultivation or applied to some useful purpose, so that no rest can be afforded to particular fields, nor are there enough of cattle kept to supply manure in any considerable quantity.

Now, it is true that the mode in which human ordure is collected in China would be utterly repulsive to Europeans, and inconsistent with our ideas of civilization; but it is by no means necessary to follow their example in every respect; surely we are not above taking a hint, when our understanding is convinced of the utility and reasonableness of any particular mode of cultivation, or social scheme of operations. Had it not long been a question what was to be done with our sewage, it would, perhaps, be time enough to talk about the matter when guano begins to run short, or our fields refuse to return a fair crop under careful tillage; but the question is by no means one of pounds, shillings, and

pence. It is one of health or pestilence—one of plenty or scarcity—one of doing what is right of our own accord, because it is right, or of being compelled, by troubles which we have brought upon ourselves, to undo what we have been doing for half a century, and finding, to our great disgust and humiliation, that we have expended countless treasures on an absurdity, and only sunk deeper into the mire every flounder which we made in the midst of our abominations. Every sewer which we construct pollutes some stream, every stream flows into some river, and every river sends up a pestilential exhalation, which decimates our population by zymotic diseases, and sows the seed of future maladies in thousands who are unconscious of its immediate effects. Had the last climax of unpleasantness not offended the noses of our legislators in the Houses of Parliament assembled, even London itself would probably have talked in vain against a condition of the Thames by no means worse than many of our provincial rivers. But the prodigious sewers now in process of construction are merely putting off the evil day a little longer, or rather destroying the salubrity of one neighbourhood for the benefit of those who can afford to pay for individual advantages; but this system cannot go on for ever. It reminds me of a late learned gentleman who proposed to get rid of some inacademic rubbish by digging a hole for it, and burying it; on being pressed then as to what should be done with what came out of the hole, he answered that he would dig *another* hole for that! Now, the only difference between the two ideas is, that the present system of sewage reaches to the sea, which being of unlimited extent, is supposed to be a final method of getting rid of *our* rubbish. But this is very far from being the real state of the case; the tide bringing back its disagreeable burthen, and destroying in a most complete manner the healthfulness of the sea breeze, and the purity of the water for bathing purposes. I say nothing about the odours which concentrated putrefaction must necessarily generate, for I do not come here as a defender of romantic rambles among the cliffs, or the pursuits of the naturalist. I simply ask John Bull, before he spends his hard-earned money, whether he is not about to pay too dear for his whistle? There is no lack of opportunities of spending money to the public advantage, ergo, why spend it on a humbug? Is it not evident that the present system of universal selfishness is one of universal destruction? No man is safe from typhoid diseases, while every large city in the empire is bisected by a current of the most unwholesome description. But I will be told there is no remedy for this state of affairs; people are doing the best they can, and must put up with inevitable evils! More is the pity! for it is quite clear that every extension of the present system makes matters inevitably worse! The more thoroughly and efficiently it is carried out, the worse are the results, *because the system is fundamentally and radically unsound.* This must be first admitted before any remedy is *possible*, for it is quite plain that a contrary idea would be fatal to any real improvement. But I may be met with a *tu quoque* argument, and told that other systems are just as bad, and that, therefore, nothing is to be done. This I deny; but even were it true that no results can be brought forward to establish the superiority of any other plan, we

are still bound to be on the look out for whatever can deliver us from undoubted present and anticipated evils. Now, it seems to me that there is a wide difference between keeping manure in proper receptacles, and diffusing it through the earth in an even manner, from allowing it to lie in close proximity to dwellings, or in the midst of a dense population. Were I a farmer or an architect, I might discuss the question of the relative superiority of different manures, or the kind of structures in which the more unpleasant kinds should be stowed; but my object is rather to draw attention to the advantages of making use of products which are not merely waste at present, but very destructive to human life under the existing system. In a country so rich in peat as Ireland, the use of peat-charcoal at once suggests itself as an efficient agent both in deodorizing and increasing the usefulness of such sewage products as may be applied to agricultural purposes. It does not appear that small quantities of decaying matter are ever productive of any injurious effects when exposed to the breezes of heaven, or when mixed with the soil in even pretty large amount. What is complained of, and whose fatal effects cannot be denied, is the concentration of decomposing matters wherever situated, but especially in the midst of human habitations. Who can wonder at the unwholesomeness of the French "cabinet," when only emptied about once a year? of the dung-heap and stagnant duck-pond, close to the door of many an Irish cottage? or of the sweltering tide of corruption which rolls unceasingly in the midst of the modern Babylon? But we have got so used to these "household words," that we consider them as almost a part of the British constitution! Again, let us look at the subject under another aspect. If it is no longer necessary to keep cattle in order to render arable farming profitable, it is quite plain that one great inducement to the breeding of cattle is removed; and would not that be injurious to Ireland as a grazing country? I believe that less cattle would be raised, and also that meat would not be consumed in this country to so great an extent as it is now. But would the land, therefore, lie idle? Would a fewer number of labourers be employed in agriculture? By no means. But, on the contrary, tillage would be more profitable, and we should import less food from abroad. To feed a given number of mouths by raising cattle would require more land than to raise any kind of crop which is suitable for human food; and, therefore, the people would be better fed with less occupation of ground, and we should also be less dependent upon our neighbours for food in time of war.

No doubt the colonies of Great Britain are a great safeguard against famine, even were we at war with the whole world; but we should remember that we import enormous quantities of corn from many countries with whom we have not always friendly relations, and not a little flour from a neighbouring state, at present acting in a manner calculated to raise the suspicions of all her allies. Would it not then be a desideratum to be able to raise enough of food without ever requiring a grain of corn from a foreign port? I believe that enough of vegetable produce might be raised for this purpose, and that men would be able to fight as well in time of need upon it as if fed upon animal diet. I merely throw

out this as a possible result of a new system of agriculture, that vegetable products will be found well suited both for the climate, as regards profit to the farmer, and to the health of the inhabitants, who, under the present artificial inducements to the rearing of cattle, and consequent cheapness of meat, eat a great deal too much of it, and neglect those more salutary productions which nature provides as the cheapest and best food for a dense population, many of whom are occupied in sedentary employments quite inconsistent with a stimulating diet. We see, then, that the adoption of Liebig's views will ultimately prove beneficial to the country in several ways. First, by increasing the fertility of land; second, by diminishing disease; and thirdly, by rendering the nation independent of foreigners for food. It is also no small matter to be able to purify our streams, if we only consider them as the source from which all urban populations are supplied with the water which they drink. There will, no doubt, be some difficulties in the details of every new principle when it comes to be applied, but I have no doubt that it will make its way gradually, and ultimately be taken into consideration by the legislature.

As, no doubt, all sorts of objections will be advanced against the adoption of any principle which tends to interfere with vested interests, it may be as well to notice in anticipation those which will have the greatest appearance of plausibility. That which will operate most powerfully in blinding people's eyes will be the appeal to experience in favour of the existing state of things. In the words of Liebig—"So long as agriculturists derive from the spoliation of their own lands plentiful crops and a good income, there is no hope of the advent of a more rational system of husbandry. The field is to such men simply a cow that gives them milk, but which they would feed with its own flesh taken from its ribs; and the folly of such a proceeding would strike them only when the light shines through the hollow skeleton of their victim." "In the flesh and the produce of the field, we have for centuries supplied to the large towns *the constituent elements of guano*, and have never brought this guano back again, and we now send vessels to Chili, Peru, and Africa for this substance. By *the exportation of these elements* our fields have lost in productiveness: were it not so, how could it have been conceivable or possible for us to raise their fertility by the *importation* of these elements? Agriculturists must not rely on guano; its price at the present time, as compared with an earlier period, is already doubled, and no sensible man would entertain the idea of making the production of an entire country dependent on the supply of foreign manure." Liebig further shows that not only does guano exert a powerful influence upon the soil, by restoring the elements of which it has been spoliated, but that all its good qualities are possessed by human excrements, in addition to others which it is deficient in. He says:—"The excrements of man contain the *full complement* of mineral elements removed in *flesh and grain*, but in guano there is wanting a certain quantity of potash to replace fully these ash constituents. Hence, on soils poor in potash (on lime and sandy soils), the action of guano after a certain time percep-

tibly diminishes, and its efficiency is then restored by the addition of wood-ashes rich in potash." These arguments would seem unanswerable as to the value of sewage, both in its solid and liquid portions. Its value per ton is a question for chemical professors, but I think the authority of Liebig, on a purely chemical question, is at least worthy of the respect of every one connected with chemical science, whatever they may think of his practical deductions in its application to agriculture. Another class of objectors will admit the value of sewage, but say that there is no way of collecting it, and therefore it must be allowed to run to waste. To say that there are mechanical difficulties in the way of *anything* in this practical age is almost an absurdity; for there is no work so gigantic that our engineers are not prepared to grapple with it. To say that the present arrangement is better, in a sanitary point of view, than one in which sewage should be collected, is certainly a mistake, as there can be no doubt that such a mode of effecting this object might be adopted as would be greatly superior to the present plan. The third objection which may be urged, is the only one which seems to me to have any weight; it is, that we have not the *wish* to change our present expensive and unwholesome system, because it would be repulsive to our feelings to adopt *any* mode of collecting substances which we regard with disgust. I fully sympathize with this view of the subject, but at the same time I do not see any reason why those who can gain profit by an honest calling should not be permitted to benefit themselves and society by the collection and sale of what is now most injurious, and might be made most advantageous to the interests of mankind. There is no reason why the solid portions of sewage might not be dried and compressed so as to form a marketable commodity like guano; and by the use of wood or peat-charcoal in its preparation, I have no doubt that it might be completely deodorized, and rendered in every way less disgusting than ordinary farm-yard manure. Under its use the land would continue undiminished in fertility, so long as the earth moved round the sun; inasmuch as everything is restored to the ground which has been taken from it, and the produce of the country would be doubled. I am aware that it will be objected to Liebig's estimate of the value of sewage, that although originally rich in the elements of vegetable growth and nutrition, the escape of gases through the gully-holes of the sewers, deprives it of its value, and the residue becomes hardly worth collecting. But this only shows that *we have been at no trouble to preserve the above elements*, and that we require to adopt some mechanical arrangement which shall prevent the escape of ammonia and other important constituents of manure. The Chinese adopt the plan of keeping it in close vessels, being indifferent to unpleasant odours; but I am far from wishing to see anything of the kind resorted to in this country, unless by means of wood or peat-charcoal complete deodorization can be effected. I do not, however, despair of seeing public "cabinets" established in every large town of the empire, which shall be so constructed as to substitute a stream of peat-charcoal (coarsely powdered to avoid dust) for the rush of water at present employed in our water-closets, which shall be as inodorous as drawing-

rooms, and an infinite convenience to the public.* The manure obtained from them will be equal to the best guano, without having a more disagreeable odour, and the price obtained for it ought to leave a large margin for profit. There is only one principle which would appear necessary to insist on, in order to place the art of tillage on a sound foundation, viz., that the elements abstracted from the soil by the growth of corn and green crops, and the raising of cattle, must be restored to it in the shape of manure. And common sense must, therefore, tell us that "the effect of individual manures must be judged of *by the condition in which they leave the field.*" At present the large proprietor sends his grain and flesh for sale to the great centres of consumption, and accordingly loses the conditions for their reproduction. This is the natural cause of the impoverishment of lands by cultivation. There is no other; and this will sufficiently account for the present condition of those countries whose wealth was devoured by the great metropolis of the ancient world, and the future condition of many, by which our great cities are now supplied, and whose sewers cast into the ocean a species of wealth which neither art nor science can restore when once suffered to run to waste.

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* In order to render this system suitable for the habitations of the rich, sand or sawdust may be used to prevent any black dust arising from the wood or peat-charcoal, which might be scattered by a simple mechanical contrivance, connected with the opening or shutting of a door, so as to be in *every way* superior to the present arrangement.