

## CHAPTER XXVII

### THE HAULAGE OF FERTILITY

**T**HE ability to destroy the earth is in the hands of man. It is a new power, and comes to him through wonderful increases in his might through knowledge. Knowledge is power—how trite, and yet how true! We are destroying the earth day by day, as far as concerns human habitation. We are so using the hills and fields that their fertility washes away, never to return. We are so cultivating the soil that its virtue departs year by year in the phosphorus, nitrogen, potash, sulphur and lime we carry from it. The ability to destroy comes along with the pressure of need and greed, both of which urge us to take away and not replace, to exhaust and not replenish. But we are coming to another age.

Already the phosphates are being mined and ground and used on our farms. The potash of

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Germany comes in such tonnage that the control of its shipment by the German government has become an international question. Nitrates are sold as freely as ever, notwithstanding the discovery that the pod-bearing crops will take nitrogen from the air. And the demand for lime for the soil is far greater than ever. As for sulphur, we once used great amounts of it as ground gypsum, or "land plaster", a use which has been abandoned only to be revived, if the students of the subject are to be believed.

Except in the case of some few alluvial soils, which are naturally supplied with new plant food by means of the minerals dissolved in the waters which overflow them, all soils which are cultivated will sooner or later need phosphorus in the form of phosphate rock. This will become one of the great questions in the future—and in the not distant future; for the original supply of phosphorus on good soils like those of Ohio, Indiana, Illinois and Wisconsin is a third gone after fifty years of cultivation. The phosphate rocks are mostly in

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Florida, the Carolinas, Arkansas, and the Rocky Mountain states of Oregon, Idaho and Montana.

Imagine the situation when all the depleted acres of the east, the south and the Mississippi Valley, not to mention the rest of the world, begin to call for phosphates. The carrying of this immense tonnage of rock from the deposits to the farms will be one of the hugest transportation problems which ever confronted a people. While the supply in Florida, South Carolina and Arkansas lasts this carrying problem will be hard enough; but when the phosphates must be brought from the northwest to the east, south and middle states and for shipment abroad, if such shipment be allowed as a permanent policy, it will be stupendous. The present railway lines to those regions could not carry from the mountains to the farms half the supply of phosphate which it would be desirable to use now, even if they abandoned all other tonnage. But, of course, new railways will be built—many of them. Whether or not it will ever be possible for

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phosphate rock to be hauled by rail from those regions on such terms as will enable us to keep up the fertility of our lands, is really the thing which is doubtful.

What is true of phosphorus is equally certain with reference to potash. The present supply comes from the potash beds—and is shipped a long, long way. We shall need a hundred tons of potash to one used now, when we begin to go seriously about the drainage and reclamation of our 70,000,000 acres of swamps—for swamps are usually so poor in potash that they need it from the very day of reclamation. Our own supplies of potash are found in the kelp growing in the Pacific Ocean off the Californian coast, and some small beds of potash salts in the Great Basin. The carrying of this supply from any of these sources is sure to become before very long a huge problem for the nation—and as other nations are no more favorably situated, on the whole, these will be enormous world problems for all us mariners on the good ship *Earth*.

Nitrogen can be bought in the market, as

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yet, though this supply is limited; it may be saved in immense quantities from burning coal and in other commercial ways; but in the main we must get our nitrogen from the air, in which it is found in unlimited quantities. There are many plants which take nitrogen from the air, and use it in their own growth. When they die, they leave some of it in the soil. But the plants on which we must mainly rely are the pod-bearing plants or legumes, such as beans, peas, alfalfa, clover and the like. They house in their roots the bacteria which are able to fix the free nitrogen of the air in such quantities that the farmer who plows these plants down has more of this most precious of plant foods than he had before. No such operation is possible with any of the other elements of plant food.

Air transports itself. The haulage of nitrogen is not, therefore, a problem, as in the case of the phosphorus in the phosphate rocks, or the potash in the sea and its kelp, or the potash beds of Germany. But it presents a problem in transportation for all that. There is

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lime enough for the crops in almost any soil but the root-bacteria of the legumes will not live in an acid soil. When a soil is "sour" it must be sweetened with lime before the bacteria will live in it, and until they do so live, the crops that enrich the soil with nitrogen can not be grown. Millions of acres of our so-called "poor" soils need lime for the bacteria rather than fertility for the crops. Limestone is found in unlimited quantities in almost every country, but the transportation of the ground limestone or the burned lime to the lands is a great task for the nations, and a pressing duty resting upon the transportation facilities of the world, perhaps as great as the haulage of potash and phosphorus.

Sulphur has long been supposed to be plentiful enough in all soils so that, with the fifteen to twenty pounds per acre which fall in the rains and snows each year, it would never become so scarce as to limit the growth of crops. But investigators have recently found that this is not true. Plants use much more sulphur than was supposed. Many soils now need sul-

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phur. The supply is unlimited, and is found in the gypsum beds. The grinding and hauling of gypsum to the lands is sure to become a greater and greater task as the years go by.

In addition to these problems in the haulage of fertility, there is that of returning the manure to the land. All the hay and grain used in cities reaches the final condition of manure. So with all these things fed to animals on farms. This manure is the best fertilizer in the world, containing as it does, phosphorus, potash, nitrogen and sulphur, together with the plant fiber which makes humus in the land. The waste of manure in this country is a great national crime—nay, it is a world crime, since it decreases permanently the capacity of the world as a whole to maintain population. The burning of manure piles is a crime. The practise of allowing them to rot away unused is a crime. The wasting of these immense stores of fertility in cities, by burning, dumping into the sea and otherwise, should no longer be permitted. What is true with regard to manure off the farm is true of it on the farm. No

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landowner should be allowed to waste the fertility of the land through waste of manure because the land happens to be "his own farm." The world has an interest in the maintenance of the land's virtue—for "the earth He hath given to the children of men"—not to *some* of the children of men.

Do you see the problem! It is very simple. We are all the time hauling fertility away from the fields in things to eat, drink and wear. The ships and cars and wagons of the world are loaded with this away-going fertility. And the ships, cars and wagons must be loaded with all that is necessary to return it—if the world is to last.