

PLANTS AND MAN: WEEDS AND DISEASES.

BY ROBERT HESSLER.

Indiana may be divided topographically into three parts—the southern hilly, the central rolling, and the northern part flat and wet. With the exception of the northwest, the whole State was originally densely covered with forests. The wet lands are being drained more and more and the land brought under cultivation. The soil is rich and produces heavy crops. It is surprising to learn that along the Kankakee first year crops require practically no cultivation, because there are no weeds. The next year a few come in; many are found by the third year, and after that farming becomes mainly a contest against weeds.

Bringing the land, whether densely forested or marshy prairie, into cultivation means displacing the native flora by foreign plants. These latter are of two kinds—those brought in purposely, cultivated plants of all kinds, and those brought in unintentionally, mainly weeds. Today most of our worst weeds are foreigners that have come from all parts of the world, especially from Europe, where for ages weeds have been fought and where certain ones have developed resisting qualities. Weeds are introduced in imported seed and also largely in hay and straw, used in crating. In waste places about cities where trash is thrown one may expect to find "new weeds." Some are also brought in by the railroads, the seed lodging on cars and falling off. Some are brought down by rivers.

When man cuts down the forests, plows the prairies and drains the marshes, he is disturbing the "balance of nature," and animals and plants move about to find new, suitable homes. Animals, of course, move about very freely; if their homes are destroyed they seek new ones; every botanist knows that plants do the same. That is, seed is carried about and germinates here and there; if conditions are favorable the plant may thrive, become re-established. If conditions are unfavorable it may perish very quickly, or it may persist for a year or two. Thus at present some of our native plants may be seen in localities where they had not been seen the year before or where they had not been seen for many years. I have a number of notes of such "moving about" plants.

When the old style rail fences were still common, many plants found a home along them; they perished under wire fence conditions. Some species may flourish for several years in wet meadows until a dry season destroys them. On the other hand, dry soil plants may flourish until a wet season drowns them out. Some will grow in ungrazed pastures. A number of other factors might be mentioned, but it will perhaps be seen from the above why some plants are constantly on the move. Some people, like plants and animals, are also constantly on the move. We need only think of the frontiersman who feels crowded when a neighbor moves within a mile of him. But this type has almost disappeared.

For a number of years I have been going along the railways and rivers looking for new arrivals. It is surprising to note the number of new weeds that have come in and are still coming. The railways in many respects furnish ideal situations. Here and there the right of way is level, alternating with steep, dry and gravelly embankments and wet ditches, occasionally there is a little pond; all these furnish a variety of habitats for different species. One destructive factor, however, must be considered—the annual weed cutting, as required by law. This means that many plants cannot thrive; they are cut off about seed time. (By the way, in my observations the railways alone observe the State weed cutting laws; it is practically neglected by road supervisors.) In the Proceedings (Academy of Science) for 1893 I published a list of thirty-five immigrants, of which at least half a dozen subsequently became common weeds, to be found throughout the country.

When I made a tour through the West, in 1905, I was surprised to note how free the Yellowstone Park is from our common weeds; I saw only one or two; evidently they are just beginning to come in. On the other hand, in traveling through the West, I saw a number of plants that I had previously found as adventive plants along the railways here at home. I felt like greeting them as old acquaintances. I saw many plants that I felt sure would come to Indiana in the course of time; in fact, as those who keep track of plants well know, new ones are appearing from year to year.

One year at Longeliff (the Northern Indiana Hospital for Insane) we had a large field of Crimson Clover, the seed having been obtained from a seedsman. In passing it one day I noticed a number of strange weeds and I at once came to the conclusion that this Crimson Clover had been imported from Europe. A few years later, while in Germany, I saw these

same weeds in fields, and I then concluded that that seed had been imported from Germany. Moreover, while traveling through different countries in Europe I saw a number of weeds that I instantly recognized, because I had seen them at home as immigrants. There were many that I expected would come to Indiana in time—and they are coming; new ones appear every year. This summer, for instance, I found a little composite plant (*Galinsoga parviflora*)—it has no common name—about Longcliff. I had seen the plant about Berlin; the German botanies stated that it had been introduced from western South America. I have been wondering whether the plants at Longcliff had come from Germany or direct from western South America. It would be interesting to know the facts.

Several years ago I had as a patient an old farmer who came to an adjoining county when the country was first settled. He gave me many facts regarding early conditions; how the dense forest had to be cut down and clearings made; how the small truck patch required very little attention because there were no weeds, but in time weeds gradually came in and then the farmer had to fight weeds just as now in the Kankakee region. He also told of the coming in of pests and parasites of all kinds, including rats and mice, lice on animals, and blights and rusts on plants. He remembered when the peach blight first came, proving very destructive to peach trees. Unfortunately I kept no record of dates. I have often regretted that I did not make memoranda because these are matters for which we must rely more and more on what is already recorded in the books.

I live on a four-acre lot at the edge of town. In front of the house there is the lawn; in the rear along the river there is pasture; on one side there is the garden and on the other the orchard. Then there is the barn lot and also a neglected bit of land. (There are also two little plots, one for wild flowers and another for plants grown from seed brought from foreign countries.) There is a variety of habitats for plants and it is interesting to note how some flourish in one situation and some in another. The movement of plants is, of course, constantly interfered with by cultivation and weeding, notably in the garden and on the lawn. Some weeds are very resistent; in the barn lot, in spite of one or two cuttings every year, the Jimson weed and the Spiny Amaranth continue to grow: every year there are two or three plants. In the pasture again there is a small patch of Canada Thistles. This plot has been cut down and plants hoed down two or three times every year for the past eight years, and still the thistles

are able to maintain themselves. The garden, of course, requires constant weeding. Practically all the weeds on the place are foreigners.

I just referred to a neglected bit of land, to an idle plot of ground. This at first, eight years ago, was covered with Blue grass and grazed. The number of plants that have come in since is something remarkable. Equally remarkable is the absence of common weeds; they seem not to get a start in the dense covering of Blue grass. Barnlot weeds are never found in that patch, nor some of the common garden weeds. Among the plants to appear were a number of trees and shrubs. Unfortunately, three years ago, a cow got in and many of the plants were killed off, but the way the shrubby and woody plants spring up would indicate that in a short time there will be a forest and light-loving plants will be wholly crowded out.

It is interesting to note how in the South, old exhausted cotton land when left to nature grows up in pine forests, Old Field Pine, but the wood has so little substance that a tree, when cut, will wholly fade away in the course of a year. It certainly takes a long time for exhausted soil to regain its strength and for trees worth while to again get a foothold.

Besides tramping along railways in search of new arrivals, I frequently take strolls about neglected parts of the city to see whether any new weeds have come in and what changes have taken place among those already present. One day last summer I started out from the heart of the city where there is no vegetation, no grass and no trees, because streets and sidewalks are everywhere paved. I went along one of the neglected streets which is either deep in dust or in mud. This street has practically no trees at all. Along the gutters were found growing a number of weeds, practically all foreign ones, that seem able to resist the dense clouds of dust that are deposited on them. The plants are white with dust, or rather grayish, almost resembling desert plants. I passed several waste lots covered with weeds, nearly all of European origin. I finally reached Shanty Town, where weeds flourish among the human habitations. The people themselves, like the weeds, were of the neglected kind. A little farther on I came to the railway shop, with its large roundhouse, where an immense amount of dense black smoke arises. Now, since our prevailing winds are from the southwest and west, the smoke, of course, blows off in the opposite direction. I was surprised to see that all the trees to the east in line with the smoke were dead, a number of dead trunks were still standing. When I first came here, fourteen years ago, there were a num-

ber of trees in that neighborhood. The black smoke killed them off. I was reminded of the hills about Pittsburg, which, as some of you may have seen, are denuded of trees on account of the smoke. The same thing is seen about some of the western smelters, where vegetation may be killed for miles, and poisonous deposits, especially of arsenic and copper, cover vegetation for a still greater area.

From the roundhouse I walked along the Wabash river, still looking for plants. The river is shallow and has a limestone bottom. Once or twice a year there is high water and that means to wash out everything loose before it. Seed brought down may lodge along the banks, especially at the flood lines, and every now and then new plants may be found. Some may grow near the water, but the next flood is very apt to wash them out. There are no gravel banks and some plants characteristic of other places are absent, as, for instance, plants found along the White Water river, where I used to collect, such as *Saponaria officinalis*, *Polanisia graveolens* and *Cuphea viscosissima*. The former, however, is to be seen more and more frequently above high water mark; the second, *Polanisia graveolens*, is occasionally seen; but I have not seen *Cuphea* at all..

Leaving the river I went west along the Wabash railway. This at first runs on a high fill with gravelly sides, later becoming level and prairie-like. Here in the course of time I have found a number of adventive plants, both European weeds and western species, the latter as a rule lasting only a season or two and then disappearing. Lower down I crossed the river on the railway bridge and followed up the Vandalia track northward. This runs over a deep fill. At one place the steep embankment was covered with cinders. I was immediately reminded of the cinder and lava slopes of Vesuvius. I was not at all surprised to see only a single plant growing among the cinders, the sheep sorrel. At once my trip up the Vesuvius came vividly to mind. I had gone up on horseback with three companions and a guide. At first we passed through towns and highly cultivated fields, but we gradually left these behind and came to a desert region of black cinders and lava, going upward all the time. Finally all vegetation disappeared, the last plant to disappear being sheep sorrel. On the descent I made a collection of plants, beginning with the first one to re-appear, *Rumex*¹. Next came a shrubby *Spartium*. Gradually

¹ Whether the species is *acetosella* or *scutatus* I do not know. My Italian botany, moreover, speaks of a variety under the last species that grows among volcanic scoriae,

other plants appeared, including a wild fig. Still further down came a small patch (one cannot say a field) of Lupines; probably that is the only cultivated plant that is able to thrive in the cinders. Next came a small vineyard and the cottage of a family. These people, like the plants on the slopes of the volcano, are in constant danger of being overwhelmed. Small plants are, of course, in danger on account of clouds of cinder dust, the wind at times being terrific.

All this came to mind vividly while standing at the cinder covered railway embankment. Then I mentally retraced my steps down to the river and to the plants that lead a precarious existence and are constantly threatened by high water. Then I thought of the people who live on the river front and especially on the little island, who, once or twice a year, are in danger of floods. Occasionally some must be rescued in boats. These, too, are reckless; prudent people likely would not be found under such surroundings. We all know how large cities with a river front are infested by a class of people known as "river rats," a highly undesirable class: human weeds, so to speak. When botanizing: we are frequently asked, What is the plant good for? One may also ask, What are weeds good for? Shall we also ask, What are some human weeds good for?

Continuing, I retraced my steps to the railway shops and the smoke. I recalled the sad-eyed women and sickly-looking children who exist in that atmosphere. The men, of course, are employed in the shops and I wondered how long they are able to hold out. It is well known that the city "takes it out" of strong and robust men—they soon fail. Large industrial cities have little use for a man after the age of about forty or forty-five. Now I knew that smoky air about the shops killed the trees and that only a few weeds were able to grow, and I wondered how long human life itself is able to endure under such conditions. Trees being fixed to the soil, live and die *in situ*; human beings are not fixed to the soil and so when they fall sick they generally remove to another neighborhood. If they are unable, on account of sickness, to pay the house rent, they are evicted and others move in. People removing from an unsanitary environment may regain health and perhaps again become self-supporting, but only too often they continue to fail and many die prematurely and the children become public charges. Who is to be blamed for premature deaths?

I further retraced my steps to Shanty Town. I recalled how the newspapers had frequent accounts of the prevalence of typhoid fever in that

section, how shallow wells were infected. The water from the wells is used because it is clear. People prefer clear, sparkling water to muddy hydrant water, although the sparkling water may be veritable poison. Where does the blame for typhoid fever rest?

Still retracing my steps, I came to the neglected street with its weeds and with its corresponding class of people, going on to the heart of the city, with its lack of trees and full of sickly people. Then I compared or contrasted the West End of town with the East End. The West End is the home of working people, while the East End is occupied mostly by tradesmen and the well-to-do. Now our prevalent winds, as already mentioned, are from the west, and that means that the people in the West End get air from the woods and fields, while those in the East End get the smoke and dust from the shops and from the heart of the city. This may explain why the East End Wind has such an evil reputation, and why towns having the "West End" properly located are more desirable as places of residence. These remarks will be better understood when we consider that people, like herbaceous plants, but unlike trees, are more or less constantly moving about. Some plants come and go, they are seen one year and then disappear, perhaps to re-appear later; those finding the habitat favorable may remain permanently. Common weeds find conditions favorable almost anywhere and flourish, especially in neglected places. Shall we say that human weeds also thrive almost anywhere, and shall we say that people who are well-to-do and able to move do move out if they find that the "West End" has not been properly located?

The subject may be considered a little further. Several years ago a patient with whom I had often discussed things like the above told me about meeting an old friend who had just returned from the Saskatchewan. The man gave a glowing account of the large crops of wheat, and the large potatoes, beets and turnips, all growing without weeds; he told how healthy the people were, they did not even have the common ailments; he ascribed it all to the "wonderful climate." Climate nothing! my friend exclaimed; weeds and ills and diseases are absent because they have not as yet been brought in. They will all come in time; just wait a few years.

I might again refer to my old patient who had told me of early Indiana conditions and the coming in of weeds and pests and parasites of all kinds. He had also told me how healthy the first settlers were until malaria came in; then nearly everybody became sick. Life now assumed a

serious aspect and there was much sickness until wet places were drained and chills and fever, that is malaria, became less and less prevalent; today malaria is a comparatively rare disease. At first, too, all the minor ills were absent. People did not even suffer from cough and colds. He told me how he used to go barefoot until the ground was covered with ice and snow and how he could wade through water that was cold enough to form ice and never "catch a cold". But he noticed that in time ailments and diseases came in. He referred to some afflictions as "new-fangled diseases".

When I called his attention to the analogy between weeds and diseases he readily understood. Before this was pointed out to him, however, he had expressed his belief that the race was degenerating. Referring to his long-lived family with many brothers and sisters, he said that all lived to old age, he himself being now in the eighties. He made the contrast between himself and his grandchildren, especially those living in the large city; he regarded them as "weaklings", requiring the attention of the physician more or less constantly. After I had pointed out the analogy between plants and man and weeds and diseases, he readily saw that his grandchildren were "weaklings" because they were living under an entirely different, an unsanitary, environment. The original Indiana inhabitants, the Indians, were healthy simply because not exposed to the cause of ill health and disease. People who are housed up in town are living hosts for the propagation of diseases, just as plants in hot-houses, which require constant attention to keep down diseases.

Moreover, the man himself was a living illustration of these changes, for he came to me on account of his own ill health, which he thought his home physician did not understand. He said the common country doctor is good enough for common country diseases, but "these here new-fangled diseases need men who have studied more". He referred to his own ill health as a "new-fangled disease", while as a matter of fact it was a very common ailment, one of the "diseases of civilization," nothing more than common catarrh. One did not have to seek far for the cause of his complaint. Until a year ago he always lived on the farm, very seldom coming to town; then he rented out his farm and removed to a small town, and now occupied a seat on the cracker barrel, that is, he spent much time loafing at the village store. Some of these stores are so dirty that they have required repeated notices from the State Food Inspector. Air conditions are espe-

cially bad. In a short time he began to react. He had catarrh and cough. On account of his cough he was inclined to be in the open air less and less and to house himself more and more, the very things he ought not to do. When I pointed out these things he promptly changed his mode of life and the reaction ceased. He was again "healthy".

It is undoubtedly true that all now common weeds and pests and parasites and diseases were restricted at one time to certain localities, from whence they have spread until they have become cosmopolitan. There are many data regarding first appearances. In our annual Proceedings, for instance, are a number of records for the first appearance of new plants and new animals, new in the sense of not having been found here before. The appearance of new diseases in the State is of course recorded in the medical journals, but imperfectly. The subject of the coming in of new pests and parasites and diseases is an important one and cannot be dismissed with a few brief paragraphs. I should like to give at least one illustration relating to the common potato.

The potato was carried from South America to Europe about the middle of the sixteenth century, and subsequently brought to our country, and now goes under the name of the Irish potato. Those of middle age can recall how, until in the seventies, the Colorado potato beetle was never seen in our potato fields. How this beetle came to us is an interesting story.

On the dry western plains there grows a species of spiny Solanum (*S. rostratum*), a near relative of the potato (*S. tuberosum*). This plant has a parasite, the beetle now commonly known as the potato bug. The plant grows very sparingly and that means that the beetle also occurs sparingly. A little reasoning will show why. If the bugs became abundant and would completely consume their food plant then they themselves would perish for want of food. On the desert the plants are far apart and many escape the attacks of the bugs and ripen seed, or if a single bug reaches a plant it will not injure it enough to destroy it.

Now when the common potato began its westward march it gradually reached the home of this beetle. The beetle found the new species more acceptable than the old and, since plants were close together, life conditions became easy and the potato beetle, now called the potato bug, at once increased enormously and traveled from one field to another, and in a short time overran the whole United States. I was surprised when in Germany to see the potato fields free from the potato bugs; authorities there are on

the lookout; they are keeping it out as our own authorities at present are keeping out cholera, the plague, yellow fever, etc. It need scarcely be said that between the potato plant and the potato bug there exists the relationship of host and disease. The potato bug in its destructive action on the plant may be considered the disease; it will destroy the plant just as the potato-rot destroys it. Before the cause of the potato-rot was recognized it was looked upon as a visitation, just as many of the human diseases were looked upon.

This fall the newspapers contained an occasional item regarding the spread of the potato-rot or potato disease. Just now the disease seems to be prevalent in some parts of Europe, destroying outright large potato fields in the course of a few days. Such an epidemic is a great calamity; it has been such in times past. It seems to be only a matter of time until the disease will reach our State. This disease seems to be at home originally in South America on the wild plants, but plants were few and far apart. When the potato is grown in masses this fungus disease naturally spreads very rapidly from one plant to another and from one field to another.

But it was noticed that after an epidemic a few plants survived. By taking these survivors and cultivating them a more and more resistant strain has been produced. One can thus speak of disease proof potatoes, just as we can speak of disease proof individuals, for instance, the negroes on the west coast of Africa, who are constantly exposed to malaria and are quite immune.

In the life of every individual there are periods that stand out. We need only think of such statements as "Before I went to college", or "Before I got married". Similar periods or landmarks stand out in the life of a community, as "Before we had paved streets" or "Before we had filtered water". We can likewise speak regarding the introduction of weeds and pests and parasites and diseases, as the days "before the potato bug".

Perhaps in tracing analogies one might mention the coming to our country of such diseases as Influenza and Asiatic Cholera. In earlier years, when the country was thinly settled, many escaped, and, on account of poor traveling facilities, diseases traveled slowly. Influenza has traveled more rapidly each time it appeared and attacked a greater number of people, because they are now living closer together. There are regions today, especially islands in the ocean, where some of our common diseases have not yet been introduced.

Our country was originally in possession of the Indians; European immigrants gradually displaced them. The early comers found a wilderness; they cut down forests and cultivated the land. They thrived exceedingly and built up towns and cities. Immigrants in large numbers have continued to come, but those who come today find all the land occupied. The poor immigrant no longer can or does settle in the country; he goes to the crowded cities where there is a demand for labor. Many of the present immigrants come from the open country; they are used to open air life, as their ancestors had always been. There has been little or no weeding out such as we find among people whose ancestors lived under city conditions. As a consequence, when these immigrants crowd into our cities—and of necessity they crowd into what are called slums rather than go to clean portions—they soon fail. Why is it that the children of the stolid immigrants are called neurotic?

Immigrants massed in cities need a change of environment. Country people thrive best under country conditions; many are wholly unadapted to city life with its many-sided contact with ill health and disease. Most immigrants are from country districts. No wonder the old farmer referred to his grandchildren as "weaklings", and believed that the race is degenerating, and no wonder physicians find children with all sorts of abnormalities and defects and that many are neurotic. Children, like plants, need room to grow; if massed together they, like plants, become stunted—in the end it is, of course, a survival of the fittest.

This brings up the very practical question, Why do we allow slums to exist? Why do we allow people to live under slum conditions? European cities are driving out their slums, but we have scarcely made any effort.

I referred to a plot of ground that is "going back to nature". Perhaps we can find analogies among men. In the first place, there are situations where we scarcely expect to find certain people. For instance, people who normally live in the slums are not to be found among the better class.

What do we mean by "the better class"? Do we not find a constant shifting about, some drop out, some rise and enter it? The old saying, From shirt sleeve to shirt sleeve, is very expressive. Very often, however, the dropping out is due to ill health.

Civilization, like farming and gardening, means a constant interference with nature. It is man against nature. When man gets back to nature old-time conditions never return, man again becomes strong and robust. We

hear much of Race Suicide today. Perhaps under a more simple and sanitary life the race would again become strong and healthy and prolific, just as soil left to nature returns to its former condition.

I referred to the fact that many of our plants are constantly on the move. We see this exemplified again in man. Some people are moving all the time, one might almost come to the conclusion that the old-time home is disappearing. People will move from one house into another, from one street to another, from one town to another, alternating perhaps between town and country and from one end of the country to the other. One wonders why people move so much. One important cause in my observation is on account of ill health. Many move into another house or into another town in the hope of having better health. When they do find a congenial place they are apt to stay, just as plants and animals stay.

It is interesting to study the movement of population, of towns as a whole or of certain streets or of certain buildings in the heart of the city, say a large store or office or bank. "Office boys" are both from city and country; many country boys go to the city to "try city life". Some succeed but many fail. We hear of the successes but we usually do not hear of the failures, although there may be only one successful man to a hundred or several hundred failures. I am reminded of the remark of an old merchant: "The new boy who cannot stand the work of sweeping out the store and running errands is not apt to make a good business man", meaning in this case a storekeeper. The merchant knew this as a fact, he did not attempt to explain it. I offered him this explanation:

The new boy when put to sweeping may or may not react to dust influences. If he reacts there will be more or less complaint of ill health and in time he will drop out; if he does not react he may gradually advance and in time become a business man. The merchant whose name appears in the city directory year after year may be regarded as an immune, as an individual able to live under unsanitary city conditions. The directory does not mention the numerous failures. The successful business man in the city must be regarded as the survival of the fittest. He does not move about; he remains fixed because he is able to bear the unsanitary environment. This moving about is, of course, seen at its best in large manufacturing establishments, where there is a constant influx of "new hands".

Looking over the books on diseases of plants, one is surprised at the analogy between plant diseases and human diseases. One finds plant

pathologists using the names of the human pathologist and the physician. They speak of "epidemics" and "endemics" among plants—those terms etymologically refer to people, meaning "upon the people" and "among the people". It seems rather incongruous to use such terms for diseases upon or among plants. But it is facts, not words, that scientists are after. Then there occur such names as chlorosis, ieterus, atrophy, necrosis, and even cancer and consumption.

Plants are afflicted with diseases due to bacteria, to fungi (even to higher, flowering, plants), to animal and vegetable parasites of all kinds, to mites and worms, just as human beings. But, perhaps needless to say, the species are different. Although some of the common names current among physicians are used, yet the scientific names are wholly different. Another thing that impresses one on going through the books on plant pathology is the importance attached to cleanliness, as cleanliness about the orchard, destroying dead branches and leaves and keeping the ground and trunk clean, the necessity for spraying and fumigating, measures that physicians long ago learned but which the people are slow to adopt. That cities need as careful attention as orchards seems to be known to but few of the people. The old farmer must be told why his orchard does not flourish, why trees are sickly and ultimately die, just as many a community must be told why its people are sickly and why there is race suicide.

One day while botanizing I came across a field thickly overgrown with Iron Weed and Vervain. At one end it was wet and swampy, with pools of water. The farmer, who was plowing, overtook me. We engaged in conversation. I asked him why he allowed those weeds to grow. "The cows like weeds; they brush off mosquitoes and flies." He thought this sufficient reason for allowing weeds to grow. I pointed out how flies breed in his manure pile and that by giving a little attention the number of flies could be greatly reduced; that mosquitoes breed in wet places, as at the end of the field, and that with a little drainage the mosquito pest could be prevented; that with flies and mosquitoes absent there would be no need for the weeds; with fewer flies the cows wasted less energy in switching them and would give more milk; and in the absence of blood-sucking mosquitoes would gain in flesh. In the absence of weeds there would not be a constant cloud of seed blowing on to his cultivated fields and on to those of his neighbors.

He listened incredulously and when I finally told him how a certain mosquito transmitted malaria, he said, "Now do you really believe all that?" His own belief was that it was all nonsense.

What is the use of attempting to teach the old farmer? I thought. Perhaps if the school teacher told these things to the farmer's boys it would have some effect. They might see the need for cleaning up everywhere.

It is perhaps unnecessary to refer to the experienced florist or horticulturist whose knowledge enables him to tell from a plant's appearance that it is sickly and needs certain treatment, otherwise it will perish; or to the physician whose knowledge enables him to quickly recognize certain conditions in man and the need for a change.

Now resurveying the field, one comes to the conclusion that weeds and diseases and ill health exist mainly because we neglect to pay attention to cleanliness. When an epidemic threatens a large city then everybody gets busy and cleans up. There should be constant not periodical cleaning up. We should not allow the existence of waste places where weeds grow which will re-seed the whole country about. No matter how free from weeds a farmer or gardener may keep his own ground, seed are constantly brought in from the surrounding country. It takes a combined effort to fight weeds. As matters stand, farming and gardening are largely a warfare against weeds. The same is true in regard to communities and diseases. No matter how careful one individual may be the seed of disease constantly comes to him from those who are sick and diseased. He meets people on the street who come from neglected homes, from the slums where disease and ill health are endemic and from where diseases are carried to all parts of the city. By the way, nearly all the patent medicine testimonials we see in the newspapers are signed by people living in such localities.

We can look at the subject in another light. Many plants adapt themselves to their environment. Sensitive ones are readily killed off under conditions where weeds continue to flourish, just as many human beings are killed off or driven out where conditions are unsanitary. But we know to what extent some human beings can live under slum conditions; some must be regarded as human weeds, such as the Juke and Ishmael families. Like common weeds, they are undesirable. Cleaning up drives

out the slums; moreover, slum children, if removed, in time may become desirable citizens.

Why is it that "human weeds" are given such an undue amount of attention, asylums are erected for them where they have the best of attention, where they live on to old age? Why must a man wait until he becomes insane or a pauper or a criminal before being housed under sanitary surroundings?

Why does ill health flourish so widely? Why are there so many quack remedies, as those advertised in newspapers? The newspapers of some small towns are overcrowded with nostrums for common ill health. Where should the attempt to make a change begin?

One day I was telling a teacher that in Germany children are taken out into the country on certain afternoons to study nature, the valleys and streams and underlying rocks, the plants and animals; that boys make collections of plants and bugs, etc. Perhaps later when as adults they go out into the country they really "see" something. He admitted that that was all very nice but that it required the teacher himself to know what to point out.

He mentioned that some of our teachers had the pupils to study newspapers. But that occurs only in isolated instances; when we investigate we find that the editorial page only is read and studied.

Now the editorial page of large city newspapers as a rule is the only page free from offensive advertisements and reading matter, of accounts of murders and all sorts of things that do not elevate mankind. Likely the back of the editorial page is full of murder news and crude pictures of the murderer, his victim and the places where the deed was committed; or the page is full of quack advertisements, of medical pariahs who claim to cure what no conscientious physician can cure; or of deceptive patent medicine advertisements for ills that no physician can cure, because they are a reaction to an unsanitary environment.

Now it would be a good thing for schools to study the newspapers, all their pages and all the papers, the high toned ones that leave comparatively little to be desired and the other kind called yellow. The re-

¹ This is not to be considered a criticism of our benevolent institutions; they are doing a good work, one in harmony with the spirit of the age. It took a long time to reach a high plane. Our leveling should be upward. As matters stand, the amount of attention given charitable institutions is wholly out of proportion to what is given worthy people not in institutions.

lationship of cause and effect should be traced. Do newspapers supply wants?

Is it reasonable to believe that the average newspaper publisher deliberately prefers to publish horrible murder accounts, nauseating and lying advertisements of all kinds, which he does not want his children to read? The editor himself has very little voice in the matter; he writes the high-toned editorials. It is the managing editor who must look for financial returns for the owner or rather for the publishing company; he gives the people what they want.

The matter of clean newspapers, clean cities and clean farms goes back to the community—there is room for the school teacher.

Every large city has a number of newspapers; some appeal to a certain class of readers only and go to certain sections of the city, some to the fine homes, some to the slums; others appeal to all sorts of readers.

Small communities may have only a single paper. By comparing the newspapers of small cities one can get a comparative idea of city conditions. Quacks and charlatans and patent medicine men do not thrive in clean communities.

The patent medicine men in their newspaper advertisements are still loud in their praise of our "valuable native medicinal plants." They evidently try to keep up the old-time belief that there is a plant for the cure of every disease.

In strolling about the country with a botany can, one frequently meets people who ask, What are the plants good for? Many have an exaggerated idea of the importance of plants, especially of common weeds, in medicine. Usually one does not attempt to explain. It may be said that as a rule plants play a very slight role in medicine today, only a few are used and then mainly to modify symptoms, less and less in the light of "curing diseases." Perhaps one can make distinctions between plants and their use, in this wise: Plants of least value, used to modify symptoms, are those that can be gathered readily, or which grow naturally as weeds, or which can be cultivated in gardens. Secondly, plants that must be looked for away from the haunts of man. One may say of these that if the individual in ill health will go and seek them out, using them under simple life conditions, likely he will regain health, as shown for instance in a little story by O. Henry, where the mere search for the rare plant in the mountains brought back health.

Just now we hear much about school gardening, having the children attend to a small plot of ground. We can readily see how a child may learn much regarding plant life, how the soil must be prepared, the seed planted at the right time, food and moisture supplied, and enemies of the plant held in check, weeds and animals of all kinds. The school boy learns that in proportion as attention is given to his plants and they are protected from destructive influences they thrive. By pointing out analogies between plants and man he can understand why man himself requires attention.

It is customary nowadays when any change is proposed to say, Teach it in the schools! Teach the Young! Just now there is a demand to teach agriculture in order to get away from old-time farming with its wasteful methods. Teach it in the schools! Teach the young! Now the same may be said regarding causes of common ill health. Teach it in the schools! Teach the young! The young learn readily and remember. Our schools already teach physiology but unfortunately it is largely if not exclusively a book study; often the book used is dry bone anatomy or dry as dust physiology and forced upon the children before they can grasp it. The new books on hygiene and sanitation are a great improvement but it is still only a teaching from books. If the teacher could take his pupils out and point out analogies between plants and weeds and diseases and if newspaper accounts were studied in the light of environmental influences, it would not take long until there would be a change for the better.

But in order that the teacher may be able to instruct the young, he must himself be taught. That means the colleges must take up the work, and since our Academy is mainly made up of college people, shall we say the work comes home to the Academy?

But, some will say, educating the people in regard to sanitary matters is work for the physicians, the physician should educate the people. That may be true theoretically but practically it is wholly false. Physicians treat sick people. Under present conditions that is all the people demand and all they are willing to pay for. Many have no use for the physician until they are actually disabled, sick or diseased, and then it may be too late to talk of education.

It may be asked, Why do not physicians at least call attention to these matters and to environmental influences, how people become sick and diseased on account of unsanitary surroundings? There are several

reasons. First, a financial one: physicians like everybody else do not take up a work unless paid. Second, when physicians do advocate sanitary measures they are almost invariably accused of working to their own interests. As a matter of fact, however, practically all the sanitary improvements that have been made and are taking place are due to the efforts of physicians. To see how measures intended for the welfare of the people are antagonized by "peanut politicians," we need only consider what takes place in the legislature at every session, and how long it takes sanitary measures to pass. Why many physicians do not take an interest may be seen by what occurs when physicians object to the coming of quacks and charlatans who herald their wonderful abilities in the newspapers—almost invariably the newspapers take the advertising quack's part and oppose the home physicians. As a result many physicians do not concern themselves with the subject, they have all the work they can do and the "fly by night" does not interfere with their practice. Another, a third and very important reason is this: The physician as a rule belongs to the "weeded out" class. He is an individual who does not react to ordinary unsanitary environmental influences and because he fails to react is why he pays little attention to common ills and minor maladies. The reason why physicians belong to the "weeded out" class is simple: The boy who intends to become a physician requires good schooling; he may even be required to take a preliminary college course, get an A. B. degree, before he is allowed to enter medical college. Now many of our schools are very unsanitary and the bright boy reacts; he has ill health. He may drop out entirely or attend school only at intervals, but finally manage to complete the grades; then he is ready to enter high school. This is often located in the heart of the city under highly unsanitary surroundings. Trees may not grow but children are expected to. The ventilation of the school house is usually bad. The boy reacts promptly. He is more or less constantly in ill health and soon drops out entirely. Unless his parents are well-to-do and able to send him to a private school he is not apt to become a physician.

One can go a step further. Many medical schools are located in large cities under surroundings about as bad as they can be. Some young men who were able to complete high school (and we know there are some sanitary high schools where boys pass through readily) are now weeded out in the medical college. They fail to get a medical degree. The boys

and young men who have "robust health" and are able to continue their education uninterrupted are "the survival of the fittest." They can follow their profession in the heart of a city under the most unsanitary environment—and since they do not react they fail to understand the common ill health of their patients; they are apt to refer to some individuals as "imaginary ill." That may explain why the sick often go elsewhere and why faith and mind cures flourish. Now in regard to the latter it may be said that many individuals when they adopt some mind or faith cure change their habits, perhaps leading the simple life and remaining away from crowds. With this change comes about improvement in health.

The common doctor treats the common ill health and the common diseases of the common people, a fact pointed out by the Father of Medicine 2,500 years ago. It is rather anomalous that scientific physicians today should so largely be interested in well-defined diseases to the neglect of common everyday ill health. Every now and then we see a newspaper item under such a heading as "Conquering Disease." Newspaper reporters at times become enthusiastic and predict the conquering of all disease—but the less a man knows about the subject the more enthusiastically he may write. Be that as it may, we know that under present-day sanitation well-defined infective diseases are becoming less and less common every year. We need only think of what the introduction of pure water means to a city in such diseases as Asiatic cholera and typhoid fever. But although specific, epidemic, diseases are decreasing, common ill health is increasing, in spite of more and better doctors and better medicines—medicines that palliate but do not cure.

Now unfortunately there is no institution devoted to the study of common ill health, especially ill health dependent upon bad air conditions. The very common things of life are neglected—a fact which critics of the medical profession pointed out long ago. Until the people themselves take hold of the subject we need not expect much change.

Today we hear much regarding the role of well-equipped hospitals in city life. Many have an idea that the number of hospitals and their equipment are an index of a city's progress. The same individuals likely estimate a city's progress by the size of the smoke cloud overhanging it. As a matter of fact the opposite is true. A sanitary and well managed city has comparatively little use for hospitals, barring of course accident

and surgical cases. Many hospitals in a community indicate much sickness and especially sickness of preventable kinds. What our cities need is not more hospitals but a thorough cleaning up, and shall one add that our cities should also prevent smoke clouds? Smoke means waste, besides destruction of life, as already mentioned.

The plant breeder is constantly seeking to eliminate the unfit. But man can not proceed on the same plan regarding his own kind. He does not wilfully seek the destruction of those not adapted. He tries to make the environment favorable so those who are apparently unadapted will survive. Nature is of course constantly weeding out the unadapted and the mortality rate of crowded cities is something terrific compared with life under simple country conditions. By giving the inhabitants of the large city pure water, good food, good air and clean homes the conditions for existence are at once made favorable.

Every now and then we read of cities that are seeking a slogan; what they want is one to indicate that they are growing bigger. A good slogan for nearly all of our American cities would be, "Let us clean up," or, "Not bigger but cleaner." Perhaps the best reputation that any city could acquire is "A city that cleans up." When the people once realize what cleanliness means our cities will be radically different from what they are today.

From what is said above it may perhaps be seen that the cries of Race Suicide, Back to Nature, and Back to the Simple Life have a good foundation.

Our Academy has a Committee on The Restriction of Weeds and Diseases ("Diseases" was added on my recommendation). For the past two years I have been chairman of this Committee but, I am sorry to say, when at the annual meetings a call for reports was made I had nothing to report. Perhaps I ought to explain. For the past year and a half I have been working on a manuscript, in fact on two manuscripts, dealing with common ill health and the need for cleaning up. One of these volumes is intended for the public and the other for physicians. The problem I am especially interested in as most of you know is to give the people good air, air free from dust and smoke. Until these two volumes are out I do not feel like taking up the subject publicly. But I feel that this is a subject that should be taken up by the Academy, perhaps at first in a small way, gradually enlarging. We must interest the people. Sanitation can not be

forced upon them. It takes time. We need only think of measures to limit the use of alcohol and tobacco. If there is no public sentiment in a community laws are not enforced, and a law that is not enforced is worse than none at all. Many are skeptical about the present generation but expect much from the coming one. Perhaps the matter is largely in the hands of the school teachers, and since the Academy is made up mainly of men who instruct the teachers it comes back to the Academy.

In concluding I may say that we have a Federal Department of Agriculture which gives attention to plants and weeds, to animals and pests and parasites of all kinds, but it neglects the farmer himself and his children. We need a Federal Department of Public Health, a Department which will study the needs of the people and give them information regarding health and ill health and disease just as the Agriculture Department now gives information about animals and plants.¹

¹ A resolution endorsing the establishment of a National Department of Public Health was passed unanimously.

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