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Sir Albert Howard Memorial Issue

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THE WORK AT INDORE

By Yeshwant D. Wad, M.A., M.Sc.
Formerly Chief Chemist and Agronomist,
Institute of Plant Industry, Indore, Central India

IN 1928 I joined the staff of the Institute of Plant Industry just started at Indore by the late Sir Albert Howard and his wife for introducing improved agriculture in States of Central India and Rajputana and advising on their agricultural problems. Sir Albert's previous work at Pusa had enabled him to arrive at reforms in agriculture supremely suitable to rural India and very largely meeting the current needs of the population.

The principal features of his system were: improved implements and new labour-saving appliances, some improvised by the Howards themselves; adequate provision of food and fodders by suitable rotation of crops and grazing areas and the maintenance of grassed edges on field boundaries to prevent erosion; making of silage; systematic care of cattle and implements; orderly harvesting, threshing, and storage; planning of field operations to reduce hours of work, make effort easier and distribute it more evenly; and, the most outstanding item of all, the conversion of wastes to humus and their systematic return to the fields. On these principles the land and buildings of the Institute were laid out in grazing areas, irrigated and dry fields for cultivated crops, cattle shed, silage pits, compost factory, threshing floors, seed godowns, implement sheds, stores and storage godowns, etc., with a small model village for the workers, offices and quarters for the superintendent, students and visitors. The standard Indore Process for making humus was first evolved here, afterwards modified and adapted to suit varying requirements and different types of waste, whether at Indore or elsewhere.

This later proved to be the initial stage in founding an entirely new school of agricultural thought, which promises in the near future to offer a creed to humanity destined to halt its present headlong race towards destruction and the ruin of civilization, enabling it to pause and think and direct its course to safety, security and stable prosperity. This creed is the maintenance of a live and active soil, producing food capable of imparting to human beings genuine vitality and lasting power of survival. It has by now been fully established that it is the crumb structure of the soil which is essential for the production of healthy and high-yielding crops, by ensuring in the root zones throughout the seasons adequate ventilation, drainage, and release of nutrients in proper proportions as required. Crumb structure is dependent on humus;

and humus regulates crop nutrition by many different devices, not only by supplying soluble minerals but by direct nutrition in the growth of the symbiotic mycorrhiza, and by storing surplus mineral nutrients in colloidal absorption to be released later. The balanced food or fodder thus produced is superior in quality, health, and vigour-making properties when eaten by animals and humans. Healthy and vigorous bodies are the essential basis for healthy and vigorous mentalities, without which humanity cannot survive or progress.

This will indicate what Sir Albert has given to the world, and that surely at a very critical moment in history, when events are occurring in quick succession to distract unprepared humanity. In his report on Palestine to the National Jewish Agency the American specialist Lowdermilk has shown how since Biblical times the prosperity and welfare of races has coincided with careful land management and the maintenance of soil fertility, while misery, downfall, and destruction at the hands of barbarian hordes accompanied the neglect of Mother Earth's holy trust--the soil.

The deep attachment of Mr. and Mrs. Howard to their work, their colleagues, their staff, students and field workers, not forgetting their cattle, fields, and crops, was so marvellous that it inspired each and all voluntarily to respect, admire and enthusiastically co-operate with them in all their activities. It was a happy sight to see them on their rounds of inspection meet each worker at his duties, inquiring, encouraging, discussing as the case might be, caressing bullocks and gratified to find crops and land in condition. Wherever they moved, all was life. Their associates at Indore still look back on those days with fond memories.

May his soul rest in eternal peace, confident that he lighted a torch for a world drifting and groping in darkness to discover the right path.

THE LESSONS OF THE EAST

By E. Fairlie Watson, O.B.E.

One-time Superintendent, Governor's Estates, Bengal

I was a close friend to Sir Albert Howard ever since he took up the post of Economic Botanist to the Government of India at Pusa in 1905. There he was looked upon as a rebel, as any one who blazes new trails is bound to be. But to few pioneers has it been vouchsafed as it was to him to see their views so generally accepted throughout the world. Even in Pusa days his laboratories showed a great contrast to those of the other experts there. They all worked on diseases and abnormalities, while he chose the strongest and healthiest plants to discover the cause of their health.

Howard was always wont to say that he learned more from the ryot in his fields than he did from text books and the pundits of the class room. Certainly there were instances enough at Pusa. For example, the soil in the neighbourhood was found on

analysis to be so deficient in phosphorus and nitrogen that the other experts declared that without manure it could only grow indifferent crops and that for a short time. Yet for generations the ryot had got fair crops from his outlying fields without manure. Round the villages the crops were magnificent, explained by the habits of the people, which led to a supply of the missing elements to the surface soil of the fields in their excreta.

Howard showed that the outlying fields were not dependent for their phosphorus on the very small amounts in the surface soil, as the ryots' practice was always to have some deep-rooted crop in the rotation. His work on the root systems of fruit and forest trees showed that many of them combed the whole area between the 8 ft. level of the subsoil water after the monsoon and the 20 ft. level at the end of the dry season afresh each year with new rootlets, and deposited the phosphorus they got from this enormous area on the surface soil in their leaf fall. The deep-rooted crop of the ryot's rotation, usually pigeon pea, did the same thing on a lesser scale.

The explanation of the supply of the nitrogen needs was found in the very calcareous nature of the soil which enabled *Azotobacter* to flourish and fix sufficient from the atmosphere for the day-to-day requirements of the crop.

When Howard had got his area into good condition with his own work cattle fed on the produce of his fertile soil, there was a great outbreak of cattle disease and he was much blamed for refusing to have his herd inoculated. But in the outcome his herd were the only animals that escaped unscathed, though I frequently saw them mix with diseased animals.

It was a stroke of genius that enabled him to halve the time required for investigations by growing one crop in the plains of India and rushing off the seed to Quetta in Baluchistan in time to grow another crop there, reversing the process in the autumn. It was a great disappointment to me when his work as Economic Botanist to the Government of India came to an end through his insistence on having a free hand to treat agriculture as a whole. But the loss to Pusa became a gain to the world at large as his inspiring book--*An Agricultural Testament*--shows.

It is sad that he is gone just as every one is accepting his view that health is so much more than freedom from disease. But the sound foundations he had laid are there ready for others to build on.

SIR ALBERT HOWARD A TRIBUTE

By J.I. Rodale

Editor, *Organic Gardening Magazine*

ALMOST a year has passed since the death of Sir Albert Howard, which took place on October 20, 1947. But to that year events have shown and evidence has demonstrated that the organic farming and gardening movement, which received its inception in his researches, will march forward and onward more triumphantly than ever, its dynamic impetus gaining legions of converts and including many of its former scoffers and strongest critics. The name of Sir Albert will always be at the head of the roster of people connected with this movement, regardless of changes and improvements in his methods.

His name will be revered not only as that of a benefactor of mankind, not only as the health-bringing discoverer, inventor, and first practitioner of the organic system but, it will also spell the inspiration to start others on the path of developing that system until it becomes as easily applicable as the use of the chemical fertilizers he so vehemently condemned. It is doing so already in many quarters of his England and of our America.

We hear of experiments in compost-making that culminate in the achievement of a finished product in two weeks time. More startling still, a few days ago I received a report of a method that promises compost in two days! It is not beyond the bounds of possibility that some day will herald in some instantaneous process, whereby the raw materials will go in at one end of a machine and come out at the other as perfect compost. But whatever will have been accomplished will, in large measure, be due to the basic discoveries and labors of Sir Albert Howard.

For further refinements must perforce follow the fundamental principles of the Howard method: namely, the breaking down of organic matter with the help of bacteria, fungi, carbon dioxide released in the dissolution, and the inclusion of three times as much plant residue as of animal matter. Any alterations in that method will have to premise conditions that are ideal for the multiplication of bacteria, for the maintenance of moisture and aeration, and for the reduction of acidity.

It is due to Sir Albert Howard that there is taking place in the United States at the present moment an extensive and upsurging movement, a zealous rebellion against accepted and "orthodox" scientific agricultural practice. It is due to Sir Albert Howard that at last even the professional agronomists are beginning to admit that food must be raised with some prudent consideration of its ultimate nutritional qualities and with some forethought to the health requirements of its consuming public. It is due to Sir Albert Howard that the minority leader in the New Hampshire State Legislature recently made a long and impassioned speech cogently describing the organic method of agriculture and its claims, and demanding that a thorough investigation be made. It is due to Sir Albert Howard, the leader in the crusade for better health from better food, that *Organic Gardening Magazine* was established six years ago to carry the torch aloft for the spread of his ideas in this country. It is due to Sir Albert Howard that thousands of persons in America--gardeners and farmers and persons who have never before held an agricultural tool in their hands--have now envisioned a new ideal

in life and aspire to the frontiers of a better future, whether their immediate interest lies in the orange groves of Florida and California, in the potato fields of Maine, or in the apple orchards of Oregon. The impressive truth of Sir Albert's great ideas has at last permeated to the remotest hamlets of our nation.

Is it not a vast and irrepudiable debt that our nation owes to this celebrated Englishman, a high-minded gentleman and a penetrating scholar with his eyes ever set on a high horizon? The time since his passing has been all too short to allow us to measure with exactitude the incredible stature of the man and his work. But as the years roll on in their majestic tidal flow, posterity will truly assess the value and admit the pioneering genius of this leviathan of the soil. Sir Albert Howard, we who have assembled our writings in this our memorial issue dedicated to you, honor you as the greatest man of this era, a man who has given the world a means of attaining to permanent peace and happiness. In time to come may you be enshrined in the memory of an appreciative and a grateful world.

J. I. RODALE

The Birth of the Organic Farming Movement

By LADY LOUISE E. HOWARD

Lady Louise E. Howard, wife of the late Sir Albert Howard,
is the author of the *Earth's Green Carpet*)

THE organic farming movement was born on the lovely shores of the Adriatic at the seaside resort of Rimini. In May, 1931 before the tourist season had opened, with the sun-bathed stretches of sea and sand on either side, not a soul in sight, Mr. Howard as he then was, sat and corrected the proofs of his book *The Waste Products of Agriculture: their Utilization as Humus*. We had agreed to meet for a holiday, having fortunately been able to arrange our official vacations to coincide.

Mr. Howard had been bearing a colossal burden. The death of his wife, Gabrielle Howard, who for twenty-five years had been his fellow worker, had meant that before he left India for good he had not only to complete his research programmes at Indore--his commitments to the twenty-one Indian States which he served were heavy--but he had to take over all her work, including all those domestic and social details which she organized to perfection side by side with her scientific researches and her relations with the Indian cultivators. He had to deal well and generously with a large staff and to wind up a residence of many years in the East.

The integrity which was an abiding part of his character urged him to do more, to make one last gift of his genius to the peoples of India. This final gift was to be a book on the manurial future of a country which for four thousand years had used three-fourths of its dried animal dung as its sole domestic fuel, thereby reducing the

potentialities of its agriculture to an enormous extent. Yet the fuel was a necessity and no substitute was possible over the area of this huge continent. It was a cruel problem only too well known--a solution had never yet been suggested. Yet Mr. and Mrs. Howard had gradually become convinced that all their successful plant-breeding work--their new wheats were famous and were alone bringing in over £3 million yearly in increased production, all this work would end in nothing unless the basic question of enhanced fertility could be dealt with on behalf of the Indian peasants. In later years Sir Albert expressed the opinion that until the level of soil fertility could be raised on the peasant holdings the introduction of more intensively growing varieties of the staple crops in an indigenous agriculture might have the unforeseen effect of exhausting the soil humus hitherto so carefully conserved, thus disastrously reversing the work of an empiric policy of wisdom and restraint pursued for centuries.

The complete solution which now suggested itself was no last-minute invention, though the writing down of it was a last effort. To secure the time for this task Mr. Howard rose at 3 o'clock in the morning and did 'a day's work before the day's work,' to recall the exact words he used to me. When at last he staggered on to the homeward-bound vessel he, alarmed his cabin companion by a seasickness which coughed up blood. But this effect of an extreme fatigue passed away rapidly with that capacity for 'sleeping it off' which he retained all his life and which he shared with other well-known men of great endowments and great physique.

At Rimini his immediate acceptance from another of the considerable corrections of form suggested to him revealed the innate humility of the seeker after truth. This point is to be stressed because he did not to the outside observer exhibit this trait: yet it was a part of his character.

The science of the book needed no amendment and has stood four-square ever since. It is the foundation of all theories of compost making, as well it may be, being the outcome of thirty years' patient and exact labour: the solution of India's manorial problem was presented as a proved method of breaking down all organic wastes in a process apart from the growing of crops. On this basis of two separate undertakings, one dealing with decay (restoration of fertility), the other with growth (utilization of fertility), intensive forms of agriculture can be built even in India.

The central idea was borrowed from Chinese practice, and it is sometimes supposed that all that happened was that the composting principle was summarily transferred from one Eastern country to another. This was far from being the case. Like all original thinkers Albert Howard had the faculty of incorporating into his own mentality the ideas of those who preceded him or worked alongside him; again and again he recognized, better than the originators themselves, the significance of something done. On this crucial question of the return of wastes to the soil he always acknowledged his debt to the great American missionary, F. H. King, whose famous book, *The Farmers of Forty Centuries*, was to him a kind of bible. Nevertheless this faithful and interesting description of Chinese agriculture had been a mere starting-point. A prolonged series of experiments in composting, never wholly laid aside during all the years at the Indian Experiment Stations and brought to a final conclusion at the Institute of Plant Industry in the Indian State of Indore, of which Institute Mr. Howard was Director and Founder, had served to test under strict scientific conditions every stage of compost making, the use of different materials

including patent materials like Adco and artificial fertilizers, the chemical reactions involved, temperature and moisture and build-up, until the basic principles which govern the decay of organic materials had been so truly mastered that henceforward they could be presented to the public without further parley. The great simplicity of Sir Albert's later writing, which has proved such an asset to the general community, was the final outcome of a deep scientific study lasting half a life-time. Only those who have finally wrestled with the minutia of an intricate scientific problem can thus speak with such assurance and plainness. It was a favourite later thesis of Sir Albert's to explain to would-be patentees of one or other suggested composting methods that the laws governing organic decay were among the most complicated in Nature and that though, if we followed certain obvious rules we might be sure that decay would occur, yet the internal history of no single compost heap would ever be the same as the history of any other heap.

With this book on the principles and practice of composting written, Mr. Howard was prepared for retirement in fact as well as in form. It is curious to look back on this period and to remember how he planned all the leisure of a prolonged holiday. He had the good sense to take some part of it and the freshness of his later years cannot but be attributed to the interval of 'slacking'--to use another of his favourite expressions--which succeeded the stay at Rimini. One can sometimes hardly resist the suggestion that this admirable instinct to indulge in rest when necessary, so close to what an animal in its wisdom always practices, is a valuable faculty of the human being. It should be more nearly respected. Sir Albert had a strong feeling in this direction. He was an early advocate of shorter hours of work and of the five-day week, and actually in the course of his previous official career had succeeded in introducing what he rightly described as the miracle of speeding up Indian labour by sheer reduction of hours of work from the customary ten hours a day to seven and a half hours in the cold weather and only six hours in the hot. The interesting details of his management of his Indian labour force will be found in his paper, *An Experiment in the Management of Indian Labour*, (*International Labour Review*, Vol. XXIII, No. 5, 1931.)

Nevertheless the voyage round Africa which was undertaken for enjoyment as part of his retirement suddenly plunged him once more into the vortex of ideas. Eager invitations to go up-country in Kenya revealed the amazing fact that the principle which he had presented to the Indian cultivator had already received a far wider application. The coffee growers of Kenya had caught it up and were eagerly applying it with success.

From that moment there was no looking back. First the great plantation industries seized on the compost principle to turn it into a huge scale proposition: compost began to be reckoned in thousands of tons per year on the tea gardens of Assam and Ceylon. Further countries came in: correspondence increased: calls for advice and instructions multiplied. Then the Western farming world awoke; notable assistance was given in a practical way by pioneers and large estate owners--it was put beyond doubt that the process was perfectly at home in the temperate zones. Then the last phase of all--visible results in the improved health of crops and stock began to accumulate.

The evidence about improved health took on significance, confirming and strengthening earlier experiences which had always lain in the background of thought. The theory of disease resistance arising out of a fertile soil shaped itself and by the very boldness of the new path so uncompromisingly indicated aroused first contempt and then a frantic opposition.

This was just what was needed for one of Sir Albert's temperament: his opponents served him well. As he amusingly said in later years they provided him with a first-class advertising service worth many thousands of pounds per year and 'he would not have done without them for anything.' In his two great books *An Agricultural Testament*, and more especially in the last of these, *Soil and Health*, issue was joined and the glove flung down for any to pick up. The simple needs of the Indian peasant had finally merged into a world problem.

As the new ideas pursued their way they widened and deepened. The history of the last ten years of the organic farming movement are above all interesting for the number and importance of the apparently extraneous topics which have gradually been collected and fitted into a great theory of natural law: these additions have eventually proved to be part of one whole. First the earthworm came into prominence and was so hotly championed that one witty speaker described that lowly creature as 'gratefully looping after Sir Albert Howard.' Then the mycorrhizal association, the living together of fungus and plant root and the absorption of the fungus by the root, attracted attention: evidence was collected that this natural arrangement played an immense part in keeping the plant healthy. Finally, the mineral problem was attacked, for here the opponents of the organic school hoped to find a weak spot and to deter the agricultural world from final acceptance of the humus theory by the boggy of threatening mineral deficiencies in the soil. Once more, and for the last time, Sir Albert was ready: early significant work on the role of the tree root in Nature was revived and it was pointed out how satisfactory and complete was the natural arrangement for restoring mineral wealth to depleted soils by means of the suction action of deeprooted trees and plants.

Does not this gradual growth and widening of an original sound idea, derived from ancient practice and experience in the East but also supported by all the findings of Western knowledge, point to a pre-supposition of its truth? A fragmentary discovery limited in range and application would inevitably have narrowed Sir the years. But the work of Sir Albert Howard has expanded from an immediate practical problem by slow and magnificent stages to ideas which in their range and scope must place him in the forefront of our modern thinkers.

THE LATE SIR ALBERT HOWARD

By LADY EVE BALFOUR

Organizing Secretary, Soil Association, Ltd.

Author of *The Living Soil*

SO many tributes, from all over the world, have been paid to the late Sir Albert Howard, so many accounts have appeared of his career and lifework, that it would almost seem that nothing more remained to be said. Yet this opportunity must not be allowed to pass without a few words from a personal friend, on behalf not only of herself but of the many men and women now banded together as the Soil Association. For though Sir Albert to the last remained independent of this or any other organization, it is doubtful whether the Association would have come into being save as a result of the seed which he had sowed.

Sir Albert, like all outstanding pioneers, was a man of intense personality which he projected without reservation into the cause with which his name will always be identified. Yet because of this very gift of integrating life and work in one purposeful whole, it is far from easy, even for those who came into relatively frequent contact with him, to give an account of him as a man.

Though he possessed both intellect and scientific qualifications of a high order, anyone less like the popular concept of a scientific intellectual would be hard to imagine. Stocky in build, broad and weather-beaten in countenance, direct in speech, he typified the man of action. And man of action he undoubtedly was, spending a crowded lifetime in accumulating in the fields of many lands the evidence which led him to his triumphant conclusions, and then devoting the years which for most men mean peaceful retirement to the propagation of those conclusions far and wide.

Perhaps the dominant impression which one retains of him is that of utter sincerity, associated with an unshakable faith in his convictions and complete fearlessness in propounding them. He was never a man to do anything by halves. These qualities made him at times impatient, not only of those whose views were sharply opposed to his, but of those whose views differed only in points of detail. Yet, even at his most scathing, he was never spiteful or vindictive. One who differed from him fundamentally and publicly has written, "May I reveal that Sir Albert was in private correspondence quite uncompromising but always courteous and charming. The fierceness of his campaign against "devil's dust" never overlapped into his relations with those who crossed swords with him. He was a sincere opponent and an honourable opponent." (D. P. H. in "The Fertilizer and Feeding Stuffs Journal," 5. 11.47.) It is sometimes said that Sir Albert would have accomplished more, had he been less ready to castigate methods of which he did not approve, and that he would have made converts more rapidly, had he been more conciliatory. Apart from the fact that compromise was quite alien to his nature, there are at least two replies which can be made to this observation.

The first is that Sir Albert, thanks partly to his opportunities for gathering experience but even more to the excellent use which he made of them, had forged far ahead of nearly all his contemporaries. While the latter were still laboriously analysing and tabulating, or patiently endeavouring to track down and isolate pathogenic organisms, he was busy evolving and testing an entirely new approach to problems of soil, plant and animal health--one which sought, not to break down, but to build up. While they were trying to find remedies for what they thought were lapses on the part of Nature, he was proving by practical demonstration that Nature is the best husbandman and the finest teacher of all. When therefore, on his return to England from India, his work was to all intents ignored by agricultural scientists, he had no option but to go forward alone. To go back, or even to stand still in silence, at a time when the whole future of our civilization was menaced by falling soil fertility and the evils attendant upon it, would have been unworthy in any man, but especially in a man of Sir Albert's calibre.

The second reply is that his crusade was primarily addressed, not to the "expert" entrenched behind his apparatus of specialized investigation, but to the man on the land wrestling daily with its problems. He never forgot the debt which he owed to the peasants, first of the West Indies but chiefly those of India; for it was they who taught him, through their patient traditional methods, the root principles of good husbandry. That debt he strove always to repay, and if in the future the living standards of the peasantries of the world, whether of Asia, of Africa, of Europe, yes, even of the Americas, are raised and their services to humanity more adequately rewarded, there could be no better memorial to the life and work of one who laboured among them to such good effect.

For ourselves, the so-called civilized and progressive people, there is one lesson Sir Albert has left us which we should value beyond all price--humility in the face of Nature. "Distrust," it has been said, "the farmer who is always in a hurry; he's out of step with Nature." "Beware," we are learning to-day, "the scientist who is always being clever; for he, too, is out of step with Nature." Always Sir Albert looked to Nature for guidance, appealed to her for a verdict, cited her as the authority. It may be that he will best be remembered as the man who taught us to learn from her as he himself had learnt.

Sir Albert Howard's Deed for Science

By DR. EHRENFRIED E. PFEIFFER

SIR Albert Howard's life work has only just begun. It is the highest tribute one can make to a man if one can say that his aims, his thought, his work begin only at his death and will survive his physical death, granting him a spiritual survival. Sir Albert is one of whom one can thus speak. The importance of his thought is established not only for agriculture but it also leads into the realms of nutrition and health. And it is here that future generations will take up the work in order to complete what he has begun.

Sir Albert (this is the way one would address him in England according to his title of knighthood) started out from an intimate study of soil fertility. At a time when not the least thought of soil conservation existed and the term "erosion" had not yet been formed (even though erosion had existed all over the earth for hundreds of years) he began to worry about the poor state of agricultural soils, the decline of their fertility and the decline of crops, despite the fact that agricultural methods seemed to improve and more and more fertilizers were applied. At the same period when mineral fertilizers held the highest rank, his attention was directed to the very core of soils--the role which humus plays in their maintenance and improvement. It is true that the humus concept was not new. There was, to refer only to one, the humus theory of the German agriculturist Thaer, current early in the 19th century, long before Liebig.

But Liebig had given the agricultural concept a turn towards the mineral theory, in fact, towards the very one-sided concept that only a few major elements are needed for plant growth, namely, nitrogen, potassium, and phosphate. The application of these three elements brought about a revolution in farming; an increase of crops was observed. As a consequence, agricultural science and practice still believe today that "this is it." Many other factors were neglected during the next hundred years as a result of Liebig's discovery. One can objectively state that it led to the excessive use of soils and brought increases of crops at the expense of other factors in soil, all the other elements, including trace elements, the important biocatalysts, and organic matter. World agriculture, deceived by the NPK theory, demanded more from soils than they could give and a general depletion cycle began. More fertilizer had to be applied in order to maintain the new crop levels until the breakdown of, soils set in. "To hold the soil" by all means became the urgent demand. Mankind was living on the capital of soils rather than on what they could offer in a natural way.

It was here, decades ago, at the high tide of the mineral theory, that Sir Albert Howard, as a Cassandra, with courageous words and writing, based on observation and experience, began to stem the tide and call attention to the fallacies of a one-sided agriculture. Had his call been listened to thirty years ago, then a U. S. Soil Conservation Service might not have been necessary, or have been founded fifteen years earlier than it actually was. It is this foresight which scientists could treasure highly in studying Sir Albert's life work.

Sir Albert had to walk the rough and thorny path of every prophet and pioneer, overlooked, viewed with pitying silence, attacked from the side of the then current beliefs and customs--a lone man for many years. Even his enemies have to admire the will power and enthusiasm with which he propagated his gospel of soil fertility as an organic concept in spite of all obstacles. Time and future developments and discoveries upheld him though and he could, at least during the last decade of his life, look with satisfaction upon the fact that the organic movement grew in momentum and depth.

A few years before the outbreak of World War II a symposium of scientists and practical farmers took place, called together upon the initiative of Lord Lymington (now the Earl of Portsmouth). "Famine in England," a book by Viscount Lymington (published in 1938), picturing in urgent words the future of English agriculture, which came only too true, was just in preparation. Lord Northborn in "Look to the Land" seconded the organic idea. Captain Wilson, the successful farmer and gardener from

Lincolnshire, whose products stole all the prizes at agricultural exhibits, was also there. Many outstanding personalities were present. Sir Robert McCarrison, the apostle of health based on better nutrition from living soils was there, too.

The purpose of the symposium was to bring together and merge into one great endeavour all the different organic points of view and movements. It was felt that differences of opinion in the organic field could be bridged over, in fact, were healthy and a stimulus for the creation of future research and cooperation rather than opposition and stubborn disagreement. Field tests, laboratory experiments and health studies were decided upon. The need to extend soil studies into the analysis of products, their health and nutrition values, in short, a broad program of future research was instituted. Many valuable experiences and observations were contributed. Such a spirit of cooperation, mutual stimulation and enthusiasm to give momentum to the organic cause reigned there as the writer has rarely experienced at any other scientific conference. The meeting radiated a truly creative atmosphere. It was at this meeting that the writer, as the representative of the Biodynamic Movement, met Sir Albert Howard for the first time, although he had followed his ideas with the greatest interest before. In fact, one purpose of the conference was to bring the organic idea of Sir Albert Howard and the biodynamic method into peaceful cooperation. Mutual experiments were discussed, thoughts exchanged and results agreed upon. This acquaintance was continued with several visits of Sir Albert to the writer's former biodynamic farm in Holland, where he inspected and acknowledged the results of the biodynamic endeavour.

A personal memory of the first impression made by Sir Albert's personality may perhaps be mentioned here. When the writer entered the living room of Lord Lynton's beautiful home a lively discussion was already in full swing. Sir Albert was "enthroned" on the davenport and the writer was seated beside him. He was very impressive with his large head, which might be called a "Jupiter head" by a phrenologist, as he sat there animatedly propounding the organic gospel. There was immediate contact in basic ideas, in our approach to the needs of soil and health. Past experience provided a foundation for ideas for future research. Sir Albert had a slightly singing voice and spoke always with warmth and life. Never an abstract theory was voiced but everything sprang from a long and rich life experience. One had the feeling, one can trust his man, his whole personality is devoted to his cause. He has nothing for sale but his arguments are sound for they are founded on reality. The writer always wondered why Sir Albert, with his solid background, appeared at times to be so much on the defensive, particularly toward "professional" scientists and officials. This would not have been necessary since the organic movement even at that time, ten years ago, already had substance enough to wait until the others came around. When we rose from our seats to continue a lively discussion standing and walking about, the writer experienced a real surprise. Sir Albert was what one calls a "sitting giant" with a large head and trunk, but short legs. When he stood up he seemed to diminish in stature. He had this peculiar physical characteristic in common with Goethe.

The research program outlined at the symposium is still valid: to study soils treated with and without organic fertilizer; to follow up the health value of products thus raised; to study the influence of organic and mineral soils with a view to the resistance of plants to disease; to study the health and resistance of cattle and other animals fed

with the different types of products thus raised; to introduce the organic idea as a basis for human health and diet. Doctors and dietitians, nowadays, unaware of the organic approach, prescribe diets. They speak, for instance, of vitamins, of orange juice, lemons, etc. etc. as daily supplements necessary for health. Such a program as outlined above if truly taken up by experiment stations could deliver data of the most surprising nature and lead eventually to an entirely different aspect of the problem of health. We have heard much of preventive medicine in recent years. Sir Albert Howard's importance was that he sought to catch the trouble at its very source, namely the soil from which our food comes. Here indeed is the source of health, not merely later when we eat the fruits of the earth. All questions of the preservation of farm products in such a way that the original nutritive level is maintained are involved too.

Were we to follow the organic concept such embarrassing situations as that described to the writer recently by a chemist could not occur. This chemist had analyzed tomatoes and carrots and found not a trace of vitamins. One should grasp what that really means. A doctor tells a patient to eat carrots, tomatoes, or other vegetables and fruits for his health. The patient buys such products--but they are worthless. He believes he has done the right thing and wonders why the diet does not help, finally he blames the poor doctor. However, it is certain that the doctor was at fault, if he did not consider the origin of the products he prescribed. Ignorance of the organic idea excuse him no longer since Sir Albert Howard's organic movement and the sister movement of Rudolf Steiner's biodynamics have paved the way. We must become conscious of all the questions involved, otherwise mankind will "starve" in spite of eating. "Hidden Hunger" has since become a familiar concept but it should be enlarged so as to embrace the organic field as well.

An interesting panorama is revealed to us when we start to study composting processes. Bacteriological processes of different kinds, breakdown processes and up-building, humus forming processes are going on. For thousands of years these composting methods have been instinctively applied by the Chinese, by the natives of India (here Sir Albert made his basic observations). They took place at random, but now they have developed into a science. What goes on can be called by proper names, and what is active can be identified. These processes can now be consciously followed and directed. Composting has become a science, yes, even an art. If man loses out with the soil he can only blame his own ignorance of organic matters. Future research institutions will add all the tests and proofs which Sir Albert Howard needed so much and the absence of which forced him still to be on the defensive, even though he could point to empirical findings.

The soil itself is now considered a living being. It dies when it is abused and mineralized. It is sustained when organic methods are practiced. A new soil science has begun--that of humus as the basic matter. If humus is in the minimum, all other improvements will be costly and in the long run condemned to inefficacy. The law of the minimum has been broadened so that it now embraces not only a purely mineral, dead concept, but a wider, living concept too. It is this enlarged horizon in agriculture which forms one of Howard's most important contributions to science. Sir Albert has thousands of followers in the practical realms of farming and gardening. The day is near when professional scientists will furnish proof of the enlightenment they received from him for research and the betterment of our basic conditions for health.

Then his eternal entelechy will live forever in a future more prosperous and healthier mankind.

SIR ALBERT HOWARD
--STUDENT OF NATURE
By DR. WILLIAM H. EYSTER

LIKE most university graduates, Sir Albert Howard was trained as a specialist. He was sent to the West Indies to study the fungous diseases of crops, especially sugar cane, but fortunately he was required to give lectures in agricultural science to the school teachers in the Windward and Leeward Island. It was these lectures which saved him from becoming a laboratory hermit or specialist intent only on learning more and more about less and less. He soon fully realized that there was no opportunity for him to put to practical test his findings on the diseases of sugar cane before offering them to the growers. So convinced was he of the need for close integration of the research laboratory with results under natural field conditions, that he took steps to get a position where this might be done.

He next became Botanist to the South-Eastern Agricultural College at Wye in Kent where he was expected to teach and do research on hops. Sir Albert Howard was a keen observer and he was naturally attracted to the whole of nature. Whatever his problem, he looked at it in terms of its total environment. His many-sidedness was shown by his plant breeding approach to the study of hops. He found that by growing the male hop plants with the female plants, the pollination of the latter speeded up the growth and made them much more resistant to the green-fly and mildew. The hop-growing practice had eliminated the male plants as being economically worthless. Sir Albert Howard did nothing more than restore Nature's method of growing both male and female hop plants. This success in hop culture convinced him that Nature's laws must be observed, and that farmers and gardeners must work with Nature, not against her.

Sir Albert Howard was now ready for a more important assignment and became Economic Botanist at the Agricultural Research Institute about to be founded at Pusa in Bengal. His work was not restricted to the study of diseases but rather the whole problem of crop improvement and the production of new varieties. He humbly and wisely learned from the native Indian farmers who had maintained the same varieties and used the same rice fields for centuries. He even regarded the pests as his teachers and found that the occurrence of diseases and insect damages were the effects of definite causes. By learning these causes and by improving his cultural practices he found that he could grow healthy crops practically free from disease without the slightest help from the agricultural specialists, and the expensive methods and techniques which they suggest.

Having found that healthy plants can be produced if grown with proper cultural methods in soil of good tilth, he next observed that the health of animals is dependent

upon that of the soil and their food plants. His properly fed oxen were immune from the dreaded foot and mouth disease even though they rubbed noses with diseased animals across a hedge.

Next Sir Albert Howard turned his attention to the orchard and vineyard. Here again he found that by combining fruit growing with mixed farming and livestock as practiced by the tribesmen the orchards and vineyards were restored to normal vigor and health. This method of fruit growing was accompanied with an absence of insects and fungoid diseases. He was now more than ever convinced that the improvement of varieties, increase of yields, and freedom from diseases and insects were all parts of the same problem and basic to them all is the soil.

In India where fuel is scarce, much of the animal manure is dried and used for fuel. Again Sir Albert Howard went to the native to learn how the humus could be maintained in the soil in spite of burning a portion of it for fuel. The solution to this problem was suggested by the age-long practices of China where all farm wastes were turned into humus. This involved agricultural chemistry, soil bacteriology, and other special fields which had been organized into rather water-tight compartments at Pusa. To undertake this work at Pusa would have meant infringing on the fields of the specialists. Accordingly Sir Albert Howard sought an opportunity where he might have a free hand in solving the humus problem of the soil.

And so after a delay of six years the Indore Institute of Plant Industry was founded where the principal crop was cotton. Here Sir Albert was to have a free hand on a 300 acre farm. It was here that he perfected his method of making compost and demonstrated that if the soil is kept in good heart and if proper cultural practices are followed, all problems of the farmer and gardener are solved. In many cases humus accelerated the growth and vigor of plants far beyond what was expected. Plants in which this occurred, as conifers and tea shrubs, were found to have mycorrhizal associations with certain fungi which occur only in soils rich in humus. These fungi actually feed the crop plants organic nitrogen. There are reasons also for holding that plants without mycorrhiza, as tomatoes, may absorb nitrogen in the form of some protein. It was believed that these organic nitrogens play no small role in keeping plants healthy and free from insect pests.

As one reads the works of Sir Albert Howard, one cannot help but be amazed at the simplicity of his contributions. He solved most of the farmers' problems by inducing them to return to Nature's methods of mixed plantings, natural pollination and cross breeding, and suitable cultural methods. The conviction that the birthright of all living things is health was a fitting -climax to his great work.

Sir Albert Howard
Prophet and Champion of the Soil

By ELLINOR KIRKHAM
(Private Secretary to Sir Albert Howard)

IT was in the early years of the last war that, by chance, I noticed an advertisement in a local newspaper--Sir Albert Howard required a part-time Private Secretary. I had never heard of Sir Albert Howard: I was not even thinking of taking another post, but it sounded interesting and, mostly out of curiosity, I answered the advertisement. A few days later I entered upon an association with Sir Albert that was to last for more than six years.

We had an Author's and Writer's Who's Who in the house, and before I went to the neighbouring village of Heversham for my interview I looked for the name of the man I was to see. I found he had written, among other things, a book called *The Waste Products of Agriculture* which, to my untutored mind, did not sound a matter of absorbing interest, and until I met Sir Albert on that September day in 1941 I knew nothing about compost.

Of his scientific achievement there are many far more competent to write than I, for I had had neither education in science nor even practical gardening experience. But *An Agricultural Testament* had recently appeared and from the copy Sir Albert lent to me and from his correspondence and his contributions to the press I soon grasped the rudiments of the subject and began to learn from the protagonist of the soil fertility campaign its vast and vital implications.

With no more than superficial knowledge of Sir Albert's work, a casual acquaintance might have labelled him a man with a "bee in his bonnet," but not for long could one remain unconvinced. His own complete conviction and singleness of purpose, the authority of his personal experience, his genius for laying his finger on the crucial point compelled attention and swept any remaining doubt aside. The two factors which, more than anything, combined to forward his world-wide campaign for health based on soil fertility were his own supreme enthusiasm and his insistence upon the value of practical examples of his creed. There is no argument, he would say, like success.

I well remember the happening that set the seal upon my own conviction of the rightness of Sir Albert's principles. Already I could not gainsay the evidence given in letters that arrived daily at his war-time home. It had never been the way of my parents to use chemicals in our own garden--in fact we knew nothing of them, but remained faithful to periodic dressings of old-fashioned farm-yard manure, and it was my father's practice to give the roses--his special pride and joy--bone meal and blood. But we had never made compost and now we were eager to try. Our one-day-a-week gardener knocked together two rather roughly made New Zealand boxes and they were filled. The compost was not of a high quality. Our man had not paid sufficient attention to detail for that, but a plot of ground was dressed with the product. Later a double row of lettuce crossed the composted plot and continued along an adjoining

undressed piece of ground. The division where the composted portion ended could not have been more clearly marked. The lettuce suddenly changed from a good promising size to little tufts of green sticking out of the soil only two or three inches high.

During the years that I was one of Sir Albert Howard's Private Secretaries I saw his work grow and his campaign reach out in every direction. In Great Britain the Cheshire Local Medical and Panel Committees under the leadership of Dr. Lionel J. Picton, O.B.E., were taking a prominent part and had embodied in their *Medical Testament* their own observations of human health and disease which reinforced the conclusions to which, by another road, Sir Albert's work in India and the West Indies had led. Overseas, South African adherents were foremost in the field with the members of the New Zealand Humic Compost Club close on their heels. There was good contact with Costa Rica through the whole-hearted support of Señor Don Mariano Montealegre, Editor of the *Revista del Instituto de Defensa del Cafe de Costa Rica*, and a number of confirmed disciples among Sir Albert's friends in India. No great attention was at that time given and little was generally known about the Indore Process of composting in the North American continent or in Australia. Now Australia has more than one flourishing compost society and enthusiasm in the United States grows steadily and bids fair to take a world lead in propagating Sir Albert's creed. Contacts followed with the Far East, the Middle East, Scandinavia and other countries of Europe, the West Indies, and even islands of the Pacific.

Through the remaining years of his life the calls made upon Sir Albert Howard by correspondence, by lectures, and by new developments grew and grew, and although his advancing years compelled him sometimes to decline some of the lesser calls upon his time and energies, I never saw him fail to answer an earnest inquirer or leave unexplored an opening where some practical work might result.

Opposition only stirred him to greater effort; indeed, he enjoyed battle and was, I imagine, much disappointed that the champions of the chemical school always refused his challenge to implement their arguments and fight him in the field. Ridicule and even abuse left him unmoved: he saw them rather as an encouragement. First, he would say, your opponents will use counter-argument; if that fails, they turn to ridicule: when they begin to abuse you, then you know they are really worried. So with unfailing good humour he withstood the attacks of his critics, knowing his own ground was firm. What did exasperate him was narrowness or meanness of view, the type of mind that demanded statistics and refused to accept the visible evidence of practical achievement.

Sir Albert's opponents no doubt looked upon him as a man with a one-track mind. It is true that his thoughts ran continually upon the line of his all-absorbing purpose, but his conception of that purpose embraced a wide field in which, in its proper place, he saw every component part. He possessed the true inquiring mind of the scientist, ever ready to learn what had as yet lain outside his experience whether it might be the latest processes of sewage disposal or the small details of some new office routine. A casual observation in a letter would set his mind at work on some new aspect of natural processes unguessed by the writer and, though normally keenly alive to the topics of everyday life, he sometimes would seem removed from what went on around him as his mind worked upon a new aspect of soil fertility. Later he would say, "So-and-so has got on to an important point there" and elaborate it in language that the

most unscientific could follow. He was always at pains to see that those who had part in his work understood both its details and its import, so that one always worked with Sir Albert and never for him.

I have always been impressed by his judgment. Already I have mentioned his genius for laying his finger on the crucial spot. His wide experience and his insight combined to give him the power of a virtually unfailing diagnosis of the cause of trouble in the agricultural world of the true place of some factor in the processes of Nature. He seemed to have a foresight comparable to that of the Old Testament prophets, so that when a new fact of science emerged or a new method in agriculture was proclaimed, Sir Albert would say, "I said that would be so."

In the last years of his life he spoke of the advent of a new age of the utilization of municipal wastes; he foretold the failure of artificial insemination; he maintained unswervingly his faith in organic agriculture and preventive medicine as the accepted way of the future. So, however far off the acclamation of his principles by our so-called civilized world may seem and however strong the interests against which he fought for the good of the human race and the land he loved, I would say: That day will come--Sir Albert said it would.

Sir Albert Howard--An Appreciation

By H. MARTIN-LEAKE, D. Sc.
Close associate of Sir Albert Howard, and
Authority on Tropical Agriculture

IT was in 1906, when Sir Albert Howard arrived in India and visited me at Saharanpur, that there commenced that association and friendship which has lasted uninterruptedly till his untimely death in October last. At that date, the Agricultural Department had only recently been established and official views as to the function of the different technical officers was in a state of flux. The prevailing view at that time was that the plant breeder could fulfil his function by studying plants grown for him on a centrally controlled farm. It was in fighting that view and in establishing the principle that the breeder, if he is to succeed, must have personal direction of cultivation so that he may gain an insight into the reaction between the plant and its environment, that our association commenced. It was this establishment of a self-contained Botanical Area, with its balanced complement of animals and implements, which enabled him to make full use of his early upbringing on a farm and of his training as a scientist. Thence arose that broad vision of agriculture as an essential unity and not as a series of disconnected subjects, to be studied in watertight compartments.

The studies of those early years gave to India the first Pusa wheats which spread throughout that granary of India, the mighty plains of the Indus and Ganges; wheats which might have supported the rapidly increasing population of that subcontinent to the present day if his less spectacular work on the plant-environment relationship had

received greater recognition. Why, it may be asked, did these wheats fail to develop their intrinsic merits when placed in the hands of the Indian cultivator; why is the yield now, after forty years, unrecognizably greater than that at the end of last century? The answer is that that close inter-connection between the plant and its environment, which it was Howard's life work to demonstrate, was not recognized. The response of the plant to its environment is direct; man is the adaptable organism. A social organization which places man's requirements first and into which the plant must be fitted, offers an example of placing the cart before the horse. That is the position in India; a heavily indebted peasantry, with the family holding averaging five acres or under, is not in a position to provide these essential conditions which will enable the plant to give the maximum response. That was the atmosphere in which Howard evolved, on his area, that which became, in later years, his fundamental thesis. The primary requirement is humus and the animal is the provider of this. It was not his function at that time to follow his conclusions to their logical end--the reform of the land-tenure system; that no agricultural officer could do, since land-tenure was intimately linked with the administrative problem of land revenue. In another sphere, the ill effects of dealing with problems in water-tight compartments is seen. It is India's misfortune that others failed to see the lesson of his teaching with the result that now, with the crying demand for food for the increased population, the yields of wheat, as of most other crops, is stationary at the level of the end of last century.

With the establishment of a station in the North West Frontier Province, Howard came in contact with those age-old systems of cultivation, of which the Hunzas are a notable example and which have been familiarized through the writings of McCarrison and others. There he was able to see the association of a vigorous manhood with a balanced agriculture and thence his active mind was led to expand his thesis to include the correlation of human health with the well grown crop. On his transfer to Indore as Director of the Institute of Plant Industry and Agricultural Advisor to the States of Central India and Rajputana, his mind was well set to attack India's greatest problem; how to increase the supply of humus for which the land was crying out. His answer was the Indore process of composting, now popularized throughout the world.

If I have dealt at some length with Howard's early work, it is because I was fortunate to be associated as a colleague in that early work on wheat and to have gained thereby a closer insight into his line of thought than most. His later work, following his retirement, is better known to the world. During the forty years that have intervened, agricultural science has become ever more specialized and the idea of a unity permeating the whole subject has been lost. Soil becomes a simple physio-chemical complex to be studied in the laboratory; nutrition a matter of calories and so on. If "man has that within him which no science weighs," so have other organisms; the problems of life are not solved by such crude methods. It is in man's nature to err and it is equally in his nature to resent the exposure of his error. To the complacency with which agricultural science had become impregnated, Howard administered a rude shock. Slowly but surely, if painfully, recognition is gaining ground that, in agriculture, empiricism has still an important role to play and that, for some time to come, science must fill the humbler role of explaining the teachings of empiricism. It is among the practical farming community that Howard's teachings have been received with enthusiasm. Sorrow at the loss of a loyal friend and colleague is tempered by the thought that his work has not been in vain. He has built up a school

too well established to suffer eclipse now that the master hand is removed. To the lasting benefit of the world, in these difficult times, his work will endure.

The Scientific Work of Sir Albert Howard

By B. F. LUTMAN

Professor Emeritus--University of Vermont

SIR Albert Howard has finished what may be considered a fortunate life. It was fortunate in that his training and his work seemed to fit his temperament and the aims and ideals that he developed. Too many men are square pegs pushed into round holes, or vice versa. At the best, they are square pegs in square holes which they do not fit. But Sir Albert was, or appeared to be, a square peg which fitted exactly the square hole into which his work had placed him. He must surely be looked upon as a soldier of science.

Such a happy coincidence is not entirely a matter of luck. Training and work (which is also only a long continued and intensive training) must combine to bring out the best that a man can offer to his day and generation.

Sir Albert was fortunate in being born and raised in an English country home. No amount of book or laboratory training could have taken the place of boyhood years spent among the problems and uncertainties of a family whose livelihood depended on the soil. Those years gave him a practical touch with agriculture that he never lost.

His education at London and Cambridge Universities does not seem to have made a deep impression upon him and still, someone in those impressionable years must have drawn his attention and stirred his enthusiasm for plants and plant diseases. That teacher seems to have been Marshall Ward, a professor at Cambridge University. Ward had one of those uncompartimented minds that could roam over the whole field of plant life and touch every branch of it from the bacteria and fungi to the higher plants with the fingers of genius. Ward had been the student of some of the great botanists of his day and had served as an assistant to the zoologist, Huxley, the most noted biological teacher of his generation. In contact with such a mind as that of Marshall Ward, Sir Albert must have taken on some of those habits of thought and methods of approach to scientific problems, that made specialized technicians who knew only one small segment of their subject, almost as undesirable as investigators as those who were entirely ignorant of the subject. That Sir Albert Howard must have profited by Marshall Ward's influence is shown by the fact that he won honors in botany and plant diseases and after his graduation was appointed as a lecturer in botany and especially in plant diseases to the West Indies. He was stationed at the agricultural college on Barbados. This was in 1899 when he was 25 years old. Again he was fortunate. Barbados is the oldest, most civilized and cultured of all the many British colonies; it is like a little bit of England transplanted to a tropical island setting.

Howard's work here was to investigate the diseases of the cultivated tropical plants and to lecture to teachers on school gardens and to planters on plant diseases. He was not entirely happy in his work for as he later wrote, he was only a "laboratory hermit" without contacts with the large planters and without any opportunities for experimentation or for testing the treatments he might devise. In spite of this lack, however, he wrote some excellent scientific papers even if later he came to speak of them slightly as "learned reports fortified by a judicious mixture of scientific jargon."

His three years here were all a part of his training, especially in the background it gave him of tropical plant diseases. His return to England in 1902 as botanist to the agricultural college at Wye in Kent in the great hop-growing region of southern England gave him an entirely different training. He continued the breeding work on hops that had been started by the former head of the school, Mr. A. D. Hall, who is better known as the famous Director of the Rothamsted Experiment Station.

The two sexes in the hop are borne in flowers of separate plants. The male plants have no value except for their pollen; commercial hops all come from the female plants. But, unless at least four male plants per acre are always scattered among the female flower-producing plants, the hop yield was cut down and the plants were susceptible to disease. Sir Albert was particularly proud of the fact that he was able to point out this necessity for male plants. It was a good practical contribution to the knowledge of hop growing and he was primarily and always a practical investigator. During his stay at Wye he had learned much about plant breeding, a still further piece of good fortune.

His three years at Wye were followed by an appointment in 1905 as Economic Botanist to the Agricultural Research Institute at Pusa near Calcutta in Bengal in northeast India. Here followed another period of learning. The crops were new to him and the methods of growing them had to be mastered, a task which he reckoned at five years (1905-1910). His teachers were the natives whom he watched growing their crops of wheat, tobacco, chick peas and linseed with no artificial fertilizers or sprayings. From these observations he arrived at an important conclusion: "The birthright of every crop is health."

The motive power for all farm operations in India is the ox. On his experimental fields, all his oxen remained healthy and none of them contracted the common contagious diseases such as rinderpest or foot and mouth disease although they had frequent chances of infection from animals on adjoining farms.

From these observations on both plants and animals, Sir Albert was led to the conclusion that the secret of health and disease lay in the soil. The soil must be fertile, to produce healthy plants and fertility meant a high percentage of humus. Humus was the key to the whole problem, not only of yields but of health and disease. From healthy plants grown on humus-rich soil, animals would feed and be healthy. To produce this humus and soil fertility, the Indian cultivator had to depend on the manure of his cows and bullocks.

Shortage of fuel in India has forced the poorer classes to use dried dung as fuel for cooking, in this way decreasing severely the manure returned yearly to the soil. To

replace a part of the manure lost in this way as fuel, the Indore method of making humus from any plant remains was devised. In this method only a part of the humus is manure, the larger part may be any plant remains available. Howard credits the Chinese with the basic ideas on which he built his humus piles. The Chinese had kept their soil in a high state of fertility and supported an enormous population by carefully utilizing every bit of organic remains, even human excreta, and returning it to the land in the form of humus.

The land for experimentation at the Pusa Station was limited and the division of the work into air-tight compartments such as plant breeding, mycology, bacteriology, agricultural chemistry, etc. prevented any one man from attacking any problem except that of his narrow speciality. A transfer in 1924 to the Indore Institute of Plant Industry gave Sir Albert a free hand to experiment in any or all biological and agricultural fields. The opportunity was what he had been looking for. He could work on a large scale on this farm of 300 acres and, while the experimentation was supposed to be on cotton raising, he could spread out into the general problem of soil fertility which he felt was the real basis of everything agricultural. It was here that he developed his compost-making technic and here the work was done for which all the other positions had been only a training.

Sir Albert Howard published his humus methods and results in collaboration with a chemist, Mr. Y. D. Yad, in 1931 in the book *The Utilization of Agricultural Wastes*. Into this book went more than 30 years of experience and observation in the laboratory and fields on soil in England, the West Indies, and India. It marked his crowning achievement as a scientist.

With the publication of this book and his retirement from active scientific duties in 1931, Sir Albert regarded his career ended. But, as a matter of fact, it was only a change of base, from India to England, and the beginning of a 16 year campaign to impress on England and the world the importance of humus in the soil. His later books have all been written with this end in mind. While without any means to continue personal investigations on humus, humus making and the use of humus in agriculture, he was still able from his years of experience and his wide correspondence with all parts of the world to interpret work being done in many lands as a result of the stimulus that he had given in showing the essential position which humus must hold in any permanent agriculture that was to grow healthy plants and animals. He remained to the end, receptive of new ideas and approaches to the humus problem and never developed that closed mind which is too frequently the accompaniment of advancing years; the fixed conclusion that all had been done that was of any importance and that the last word had been written and was in the text books.

The 90 years from 1840 to 1930 might well be called the era of Liebig and chemical farming. Liebig's work seemed to be so absolutely unassailable from any possible attack that it was rapidly accepted not only in Germany but throughout the world. Liebig's laboratory at Giessen became the focal point for students who wished to specialize in agriculture or biological chemistry and from that laboratory they carried back with them his methods and theories. They translated his books into their own languages. The principle upon which his plant nutrition theory was based was so

simple that any farmer untrained in chemistry could grasp it and understand the immense practical conclusions to be drawn from it.

Liebig's approach to the problem of plant nutrition was purely chemical and disregarded any biological elements. It was not only purely chemical; it was inorganically chemical since organic chemistry (the composition of the carbon compounds) was still in its infancy.

His technic was to analyze chemically the ash of the dried remains of any plant for its inorganic substances: nitrogen, phosphorus, potassium, calcium, sodium, sulphur, iron, etc. This analysis was the answer to the question, What materials does the plant take up from the soil? The carbon compounds came from the air as carbon dioxide (carbonic acid gas) and the nitrogen salts were derived from the soil so they were always included in such an analysis.

To grow a plant such as a sunflower successfully with chemicals, all that was necessary to know was the composition of the ash. If the inorganic materials were supplied as chemicals soluble in water and in about the proportions that they occur in soil water, a plant could be grown to full size and maturity in water cultures.. Hydroponics is the modern version of the Liebig ideas. Boiled down to its essentials, it may be stated still more briefly as: the inorganic chemicals which once made a plant, if they are applied to another small plant should make another one just like it.

In compounding such chemical solutions, it was soon found that three elements: nitrogen, phosphorus and potassium occurred in all plants and were withdrawn in quantity from any culture solution. These three were the basic elements but they had to be supplemented by smaller quantities of calcium, magnesium, iron, sulphur, etc. Crops removed large quantities of nitrogen, phosphorus and potassium from the solution or the soil and these chemicals had to be replaced if crops were to be grown successfully on the same land year after year.

Liebig's theories and laboratory experiments were now transplanted to the garden and field. With nitrogen, phosphorus and potassium compounds needed for crop production, the problem was up to the chemists to supply these chemicals as cheaply and as readily available to the plant as possible. The N-P-K mark on every fertilizer bag sold today, was the answer of the chemists and the chemical manufacturers.

The original Liebig work and theory was of the academic type--what would be referred to as "the ivory tower" variety of investigations. But as soon as the practical and highly profitable financial returns from the exploitation of the "ivory tower" theory became evident, an entirely new set of faces appeared and an abundance of money was available to finance further experimentation and to exploit this new, rich chemical field. The famous Rothamsted Agricultural Station was established in England by Lawes, the inventor of superphosphate, who contributed both scientifically and financially to its support. From this station and from government stations in the United States and other countries, Liebig's theories were elaborated.

Between the years 1840 and 1914, these chemical fertilizers were used to supplement the huge quantities of stable manure still available from the work animals, horses, mules and oxen, the motive power of the farms. The introduction of gasoline-

propelled trucks and tractors made many of these animals unnecessary; manure became scarcer and the shift to chemical fertilizers increased every year. Shortage of farm labor over the entire world during the war still further increased our dependence on tractors and chemicals.

A bold, courageous scientist with a broad training in all the newer biology: plant breeding, plant diseases, and fertilizers as well as with a practical agricultural field experience was needed to throw down the gauntlet to interests as firmly entrenched as the Liebig theories and the chemical fertilizer industry. The century-old Rothamsted Station with its brilliant array of scientific Directors and soil chemists had spread its influence over the government-subsidized experimental work in England and the United States as well as in Germany. The theoretical work based on that of Liebig seemed unassailable. The purely chemical plant nutrition theory held all the key positions in experimental work and was backed by the almost unlimited financial resources of the gigantic chemical fertilizer companies which were in many cases interlocking throughout the world.

In the United States, with a few notable exceptions, the soil experimenters were chemists with the chemical viewpoint and with little training or interest in the biological and living parts of the soil. Humus was recognized as an important factor in soil fertility but always in a secondary position to the inorganic chemicals. The physical properties of humus, such as its capacity to hold water and soluble chemicals, or to prevent heavy clay soils from caking when dried out were emphasized rather than the possibility that the humus might itself furnish chemicals that were essential for normal, healthy plant growth. Plant nutrition involved only quite simple chemical compounds, or even the ions into which these compounds might be split when in the soil water. The essential feature of the Howard theory of humus and plant nutrition is that the organic remains which constituted the humus, supplied in some way, chemicals which plants found necessary for their growth and health. As a corollary to this absorption by plants of these complicated compounds, growth substances, or whatever they were, Sir Albert added his suggestion, derived from his observations that animals or humans that feed on plants grown on chemically fertilized soil will also be lacking in some of those qualities which give health and vigor.

The use of humus in successful, permanent agriculture was not new to Sir Albert Howard and he would have disclaimed any pretensions to being its discoverer. He insisted that the hundred years in which Liebig's theories have been tested had shown that mankind had gone downhill in general health although the life-span had been lengthened and that our cultivated plants had become an easy prey to the attacks of fungi and insects, especially the so-called degeneration and virus diseases. We had fed more people but we had fed them poorly although their stomachs had been filled. He was simply insisting on a return to the old farming methods of the pre-Liebig era when manure was the standard farm fertilizer. He wished to supplement the manure by the use of any plant or animal remains available.

While the length of life in man has doubled during the last century, many diseases have much more than doubled in the number of deaths they cause. Mankind has learned through medical research to control the diseases of the early days, diphtheria, scarlet fever, and intestinal disorders, as well as the infective diseases of the middle

period of life such as typhoid, tuberculosis, and venereal diseases but has not been as successful with the diseases of the later years. These diseases seem to have obscure or undetermined causes: poor teeth, pernicious anemia, arthritis, and that bane of the later years, cancer. In livestock, the foot and mouth disease is threatening cattle raising. In plants, a group of so-called "degenerative" diseases due to ultramicroscopic viruses require constant vigilance on the part of plant breeders and plant pathologists to keep them in check as do new and unexplained outbreaks of fungus troubles such as the recent disastrous epidemic of the late blight of the tomato in this country.

England has bred in the past three centuries some great innovators and leaders in agriculture and in the sciences upon which successful agriculture is based. Land drainage, liming soil, rotation of crops, the introduction of clovers and the turnip into the crop rotation, and the work and importance of the earthworm have all been the work of some man who was willing to try something new and tell his friends and neighboring farmers about his success. It is too early after Sir Albert Howard's death to say just how high his name will stand on this great honor roll but it will be there and undoubtedly well up toward the top. No man can say at this time just how much influence this great English scientist's work and writings will have on the trend of agricultural practices. The pressure of a dense population on an insufficient food supply in the British Islands which has to be supplemented from abroad, will make the people much more willing to listen to any proposal that promises even a measure of relief.

Here in the United States, agronomists in our agricultural experiment stations will tell you that they are constantly bombarded by letters containing queries on the humus methods with suggestions that their experimenters get busy on humus problems. The pendulum of pure chemistry as a basis for plant nutrition seems to have begun to swing back from the extreme position it had attained at the beginning of the century and much of the credit for this change must be given to Sir Albert Howard.

A Knight In Shining Armour!
A TRIBUTE TO MY FRIEND, SIR ALBERT HOWARD
by Herbert Clarence White

"**K**NOW ye not that a prince and a great man is fallen." So said King David of ancient Israel's stalwart Soldier-Statesman Abner, on the occasion of his tragic and untimely death.

We who are living in this modern age can say it again in capital letters as in retrospect we review the life and work of our friend, the late Sir Albert Howard-- England's Knight in shining armour, who with his mighty sword of TRUTH met the dragon of deception and falsehood face to face. While in the very act of demolishing his throne and his evil empire the tragic hand of death took this leader of men and laid him to rest. In his death the whole civilized world has suffered a great and irreparable loss.

But, as is the case of all truly great leaders--Sir Albert during his many fruitful years of active service for humanity, has trained a whole army of disciples. And when I say "disciples" I refer to men and women of no ordinary position and talents. Every week I receive letters from prominent personages--medical doctors, dentists, chemists, lawyers, preachers, University professors, and agronomists who are diligently seeking to follow the simple laws governing soil health and soil fertility laid down by our beloved leader.

Many and high are the tributes that have been paid Sir Albert by men of science throughout the civilized world in the months that have intervened since his untimely death. Even his avowed enemies pause long enough to remove their "high hats" as they stand in reverent contemplation before the grave of this fearless champion of "A Living Soil." His former antagonists cannot help but admire the indomitable spirit and force of character of a man who, almost single-handed went forth into the camp of the enemies of "the good earth" and won a magnificent victory.

These men testify in glowing words of praise to the sincerity and singleness of purpose of this friend of poor, starved, suffering humanity. But perhaps there is room left for one more tribute--this time from the pen of a humble layman who has followed the teachings and put into practice the heaven-born principles of restoring and maintaining LIFE in the soil.

The Devil's Substitute

From the very first day of his departure from the school of "orthodoxy", Sir Albert was engaged in a "holy war"--a Crusade, if you like, against time-honored traditions and practices which according to indisputable medical testimony, are leading the people of this world into "one of the greatest wholesale disappearing acts ever recorded in history."

Men and women everywhere, led by so-called scientists, occupying high and responsible positions in universities and colleges of agriculture throughout the world have accepted a "substitute" for soil fertility. And friends, let me say right here and now, the devil's substitutes have always looked good, and the majority of the people of this world have always in every age, been fooled and deceived by them.

Masquerading in the form of the most glorious and wisest creature in Eden, the wily old devil "pulled a fast one," when he succeeded in persuading Mother Eve that he could improve on God's plan by offering a dietetic *substitute* for the fruit of the "Tree of Life". You are all familiar with the story, and the untoward results that followed in the wake of that first masterpiece of deception. From that day to this, men and women everywhere around the circle of the earth have suffered, and death has been the accepted lot of all mankind.

Yes! The "forbidden fruit" from the "tree of knowledge" looked fine to Mother Eve. So, when she "saw that the tree was good for food, and that it was pleasant to the eyes, and a tree to be desired, . . . she took of the fruit, and did eat, and gave also unto her husband . . . and he did eat." (Gen. 3:6).

What a trail of woe has followed that acceptance of the devil's very first "substitute!" Poor, foolish Adam and Eve! Are we inclined to think harshly, or to blame our primeval parents for their stupidity? Their lack of good judgment? Before we "cast the first stone", however, let's take "a second look" at ourselves! Have we profited overmuch by the silly escapades of our ancestors? Or, are we, here in Christian America, like our first parents, engaged in dietetic blunders of almost equal magnitude, and of comparably dire consequences? My study of recent scientific and medical testimony leads me to answer YES in capital letters to the latter question.

Dr. Cavanaugh of Cornell University warns us, "The fact is there is only ONE major disease, and that is *malnutrition*. All ailments and afflictions to which we may become heirs are directly traceable to this major disease.

To these solemn and thought-provoking words, Dr. G. T. Wrench of England, adds his striking testimony, "Faulty food is the primary cause of such an overwhelming mass of disease that it may prove to be the primary cause of disease."

Add to these two authorities, the breath-taking testimony of R. M. DeHart, M. D., of the Radford Community Hospital, Virginia, where he says: "The people of this world are gradually starving themselves into one of the greatest wholesale disappearing acts ever recorded in history unless the doctors, chemists, and agronomists wake up to the basic cause of the great increase in diseases. We have definite evidence that deficiency diseases are increasing in both plants and man; but, for some reason unknown in the most scientific nation of the earth, there has not been a general recognition of the cause and source of these deficiencies."

Sir Albert Howard, during more than forty years as a soil scientist, abundantly proved that faulty food is the product of "tired" soils, and that by the simple procedure of restoring the "wheel of life" in the soil, he could produce healthy plants, healthy animals, and healthy men and women. This great humanitarian indicated clearly the source of the difficulty--the use of a "substitute" for soil fertility in the form of artificial chemical fertilizers which "stimulate" crop production on worn-out soils lacking in essential life-giving, health-sustaining minerals.

Dr. DeHart, quoted above, points out the interesting fact that "when a gas tank on an automobile is empty, we can keep the motor running by supplying gasoline in the carburetor with a squirt can." That is exactly what we have been doing for decades in modern, so-called "scientific" agriculture. For years on end we have mined the soil of the precious life-giving elements, with little if any thought being given to the effect this suicidal program might have on our crops, our live-stock, and our human population.

Alas! Many of our once fertile fields are no longer able to produce a crop. At long last the "gas tank" is empty. Long-suffering nature, no longer able to endure the strain, strikes back, and the old machine grinds to a halt. And what do we then do about it? Do we fill up the "gas tank" by restoring "*life*" to the sick, worn-out soil? Oh no! That wouldn't be "scientific"!--Instead we accept and adopt the devil's own "substitute" and merrily proceed to keep the machine going with the "squirt-can" method! The common-sense thing to do, Dr. De Hart reminds us, is to "replenish the supply of gas in the tank, so that the motor can feed itself!"

Wouldn't it be wonderful if we only had a little "horse-sense", and would do that very thing? But most modern agricultural experts are still bound by the stifling and stultifying NPK mentality--we are slaves of a "tradition" that has persisted in our schools of agriculture for almost a full century--a tradition now known to have been built on a *false premise*, and which, according to unimpeachable medical testimony, is responsible for much of the sickness and woe resulting from our national malnutrition.

In the hot words of King Ahasuerus of ancient Persia to his beautiful Jewish Queen Esther: "Who is he, and where is he, that durst presume in his heart to do so?" The cunning enemy who had devised the plot to destroy ancient Israel, was quickly unmasked, and a whole nation was saved from ignominious death by the sword.

In those ancient days the enemy of God's chosen people was no other than the devil himself masquerading in the person of "That wicked Haman", the Agagite prince. According to my humble opinion, in modern times, the enemy of mankind, through the teachings of a German nobleman and chemist, Baron Justus von Liebig, is seeking not only to destroy a few million souls in whose veins flows the blood of the patriarch Abraham; but he is out to weaken and destroy the whole western civilized world by this cunningly devised plan of robbing the life and vitality of the soil, and offering a few chemicals as a substitute measure to maintain crop production.

"The enemy is never dramatic", says Dr. William Albrecht, noted soil scientist, "It stalks us invisibly, strikes silently, is almost as hard to believe in as germs were when Pasteur revolutionized medicine by revealing their role in disease. It appears merely as a lack of minerals in the soil, and leaves no clear-cut sign. Fields that always have been green, may be green still. But the same LIFE is no longer in them, and they cannot provide healthful food for man."

It was Sir Albert Howard--the young "knight in shining armour", who like Sir Gallahad of story-book fame, came out with his trusty sword and fought the dragon to a standstill--the dragon of false theories, the dragon of vested interests, the dragon of apathy and indifference--and WON!

The "first round" is over--our champion is gone. His earnest voice of warning and admonition is stilled. But in the words of holy writ, "He being dead, yet speaketh." Of such it is written: "Yea, saith the Spirit, that they may rest from their labors, and their works do follow them."

May we who are left behind carry on the battle so well begun by Sir Albert! Like our beloved Abraham Lincoln at Gettysburg, may we dedicate our lives to the "unfinished task". In the words of his immortal address: "It is for us the living . . . to be dedicated . . . to the unfinished work which they . . . have thus far so nobly advanced. It is rather for us to be . . . dedicated to the great task remaining before us--that from the honored dead we take increased devotion to that cause for which they gave the last full measure of devotion."

Could anyone, anywhere say more?

**SIR ALBERT HOWARD --
A Man of the Whole World**

By LADY SETON

Hon. Editor of *The Guild Gardener*

The news of Sir Albert Howard's death reached us as we were going to press for November. There is so much of his life-work that needs saying by those who had the great privilege of his guidance that I shall devote this article to the attempt, remembering that the scope of his teaching is far too wide for me to cover.

Longfellow's lines, written on an older botanist fit him well:--

"Nature, the old nurse took
The boy upon her knee."

Sir Albert's youth was spent in a farming atmosphere in which he absorbed the deep influences of the soil and "the Earth's green carpet," to the love and service of which he devoted his whole life.

It is essential in considering the principles of the conservation of soil fertility which led later to much controversy, to bear in mind the fact that Sir Albert was a fully, indeed a highly, trained scientist. Educated at the Royal College of Science, he took first class honours in the Natural Science tripos at Cambridge in 1898. His first post was in the Imperial Department of Agriculture for the West Indies. In 1903 he went as botanist to Wye Agricultural College, and in 1905 his great life-work began when he was appointed to the post of Imperial Economic Botanist to the Government of India. He worked at that, and other posts in various parts of India for over 30 years. During that time he had the opportunities he long desired to carry out experiments on a large scale in testing various original ideas which had been gathering for years in his active brain.

Here we might consider the sharp difference (with which his work later came in conflict) between two schools of agricultural science. One is the school of which a cynic said "It learns more and more about less and less." When the creative power in any movement dies down, its energies are concentrated on probing into the discoveries of the great, creative minds of a past age. In laboratories, with the aid of microscopes and test tubes, with single roots in flower pots, or with plants grown in plots and fed with various chemicals, certain conclusions are arrived at and given to the agricultural world. It does not of course follow that the reaction of a few plants grown on a small plot in England, will hold good for crops grown by the square mile in distant lands.

Sir Albert Howard, and the world-wide School of Soil Fertility he has founded, place their reliance on science guided by nature. With the deep humility which marks only the greatest minds, Sir Albert took as his teachers the Indian peasant, the cattle, and the whole army of underground workers--earthworms, bacteria and soil fungi as well as the plant pests. His thorough grounding in science enabled him to read and make sense of all the hints he picked up in practical experience. In this way instead of studying "less and less" his view widened to embrace all the troubles Mother Earth is

subject to--soil erosion, plant and cattle diseases, loss of fertility both in soil and in mammals, and last, but not least, the health of the human races.

Everyone who wants to understand this vast gift of practical knowledge to our generation, should read *Soil and Health*, published by Faber and Faber in 1945.

Sir Albert Howard's discoveries lie under the well-known ban of a prophet in his own country, but that does not matter, for the great outer world has accepted him whole-heartedly.

North America, suffering as it does from appalling soil erosion, sees clearly that the cause is the exploitation of the stored up humus in the soil, and is now beginning to practice soil conservation. In the various countries where the great plantation crops are grown, tea, coffee, sugar, cotton, rubber, and the like, the new knowledge is being eagerly put into practice. Reports pour in from every part of the British Empire giving vivid accounts of plantations which were wearing out and crops becoming disease-ridden, now cured through practising the full cycle of soil fertilization. I shall quote a case that came to my notice yesterday from a distant, and very wide-awake, part of the Empire. It is in the introduction to a Seedsman's catalogue. The list advertises, along with seeds, all the usual chemical fertilizers, sprays, etc., but the introduction is a slashing article on compost gardening, advising strongly against chemical, and recommending compost as a remedy for all disease troubles, and a necessity for general use. At the end they say:--"In concluding these remarks on this vital question that badly needs publicity, we would like to say that although we sell and supply what our customers demand, we have formed our own ideas by generations of experience of the workings of Nature, and we have taken the liberty of expressing same here, although loss of sales of super insecticides, plants, trees, etc., will result through a general improvement in the health of plant life.

"Yours sincerely, for our Country against 'rackets'

Blank and Co., Ltd."

There is a fine example of the open mind, joined to courage. The very power and force of this movement has, of course, brought reactions from what are known as vested interests. For instance, Sir Albert's campaign to give the nation their daily bread made of whole wheat really the whole berry which we never get in what is sold as "whole-meal bread," knocks up against the milling trade which at present makes a profit by selling the germ of our wheat to the chemists, to be retailed to the rich as a costly tonic. Why does a Democratic Government permit this? Again the knowledge of the desiccating and exhausting effects on soil of the continued use of chemical fertilizers has brought the makers and sellers of these products into opposition.

It is a revolting revelation of how we are defiling our water supplies. First the water weeds disappear, then the small water animals, now the fish are gone, the farmers are beginning to complain that their cattle cannot drink at the foul rivers, and soon it will be our turn. Indeed, as I live in London, the description in their new issue of the state of the river Lea, from which a large part of our drinking water is obtained, is most alarming.

When we put first things first, we shall insist on the sewage of every town and village being composted and dug back into the soil, and only a perfectly pure water effluent allowed to drain back into streams and rivers. The system is already admirably carried out at a few--a very few--English centres, of which Dartford in Kent, and Isleworth in Middlesex are brilliant examples. The farmers are hungry for this superb fertilizer for their fields, there is a long waiting list for every ton that is at present for sale, and one result is a reduction of costs for the ratepayer instead of a heavy expense by the old system to get rid of wastes. Even to this obviously advantageous modern system you will find opposition. The entirely false plea is urged that it causes smells. On the contrary it prevents all possibility of smells. What is one to think of men who will offer false evidence to prevent this pure healthy process, while making no protest against cattle and human beings having to drink diluted sewage?

I have left all too little space to speak of Sir Albert Howard as a friend. His inspiration, courage, charm and helpfulness make his memory a thing to bless, and his loss an irreparable one. He was a great, warm-hearted leader, yet he had a unique way of putting himself on a level with his disciples. We could not but look up to him, although he never looked down on us.

One whose word can be taken writes of the principles he advocated: "What great principles they were! The more I reflect the more I am convinced of the immense scope of his work. It grew and grew and reached far beyond what he first envisaged, and this to me was, and is, a proof of its truth, for great things grow; they do not leap into being. The law of nature governs this too. He felt it I am sure, and on more than one occasion said he believed his ideas are now so far known in the world that it did not matter if he himself could do no more."

So be it. When a great life has been nobly lived for the good of humanity, the inspiration not only lives on, but being vital it grows and expands and showers its blessings on generations yet unborn. That will be the case with our loved and lost leader.

SIR ALBERT HOWARD--

Master Farmer of India

By DR. L. J. PICTON, O. B. E.

Member of Panel, Soil Association, Ltd.

HE was a man, alert, independent, fearless. Though a farmer born and bred, he was drawn by the education machine into a narrow speciality, but for his native courage might have stayed there. The young graduate, sent to the West Indies to study the fungus diseases of sugar-cane, found that no land was given him on which he could take his own advice about remedies before asking planters to adopt them. He was quick to realize that this was a fundamental weakness in the research organization, a weakness a farmer born and bred could not tolerate; and back he came

to England to study the pests of hops. But at Wye College, in Kent, where his work lay, again he met the same 'fundamental weakness'; he had no land. But he stayed long enough to make a discovery, one which, perhaps, coloured his whole outlook. The green cones or fuggles of the hop which are used to give beer its bitter taste, are the female flowers, so the growers concentrated on growing them: naturally they were not pollinated. Howard found them to be prone to diseases; but that any which by chance, happened to be pollinated were relatively free from disease. The young man, in his short time in Kent, left his mark on hop-growing practice, for the male flowers have ever since been grown. The discovery coloured his outlook with the reflection that the germ, fungus, or parasite, which, then-adays, was thought of as the disease, was only one part or factor of the cause. The other factor was the condition of the plant itself; in this instance the fertilized flowers did not provide the other disease-factor and therefore, in them, the disease did not occur.

It was in India, at Pusa, that he first had, not only the problems of pests to solve. but land on which to solve them. The fertilization of the hops was an indirect method of disease prevention: at Pusa he was going to try others. As he quaintly put it, his plan was to regard the peasants and the pests as his professors of agriculture. He saw that the peasants, using no pest killers, grew crops practically free from pests. The pests, on their part, were pointers to the unsuitability of the variety of the plant which suffered or succumbed from their attack, or to the farming methods used being inappropriate to the locality. Survival proved the suitability of kind or culture.

He saw and faced the astonishing conclusions from this reasoning, that insects and fungi are the farmer's critics or "censors" as he called them; and that spraying and dusting crops with powders lethal to the pests is, even when successful, bad practice, for it merely preserves the unfit.

But even the Experiment Station at Pusa became the subject of an infection he could not control,--not indeed a vegetable or animal pest but one of human origin--bureaucracy! He had found in his fourteen years in India (mostly at Pusa, but during eight summers at Quetta) that what "matters most in crop production is a regular supply of well-made farm-yard manure." Does that sound trite? Or, in this age of fertilizers, extolled by agricultural colleges and government departments and exploited by the chemical industry, is it a return to an old fashioned but largely discarded practice? His answer was emphatic: it was "the thing that matters most." But he went much further: having restated that farm-yard manure is the basis of soil fertility, he went on to proclaim that the maintenance of soil fertility is the basis of health. Holding these views his problem became how to get enough farm-yard manure in that country in which cattle dung, dried in the sun, is the normal fuel. For its solution he turned his eyes to China where the immemorial practice has been to rot the dung and vegetable wastes together. It was his study how such a system could make every holding in India self-supporting as regards manure.

His study? Yes, but self-imposed. He was Imperial Economic Botanist at the Pusa Agricultural Research Institute. Investigating the chemistry of Chinese manurial methods and the increase of manurial supplies were not tasks which fell to him as a botanist. In 1905, perhaps, when he first reached Pusa, the organization of the Institute being fluid, the unorthodox was possible; he was given 75 acres for his work and later "after persistent importunity," and the support of a man of vision, Sir Robert

Carlyle, K.C.S.I., he was allowed six yoke of work-oxen. But by 1924 the old latitude of research at Pusa was replaced by rigidity. He found a new centre, Indore, where he would be "free to follow the gleam."

The cradle of the work of this great man was the 300 acres in his charge at Indore. Under his care it must have acquired an astonishing fertility. On a wind-swept plateau, with low humidity for eight months in the year, this estate, it was said, came to look like a green emerald on a Kakhi garment. What exactly was the secret he discovered in his years at Indore (1924-1931)? It was that the wastes of life are the foundation of life; that the Chinese way of dividing agriculture into two processes, the preparation of the food of plants and the growing of them with it, in contrast with the traditional way of applying mere dung and straw and leaving them to disintegrate in the soil long before fermentation has prepared them to be plant food, is a priceless principle. By it, and by increasing the proportion of vegetable wastes to that of dung he doubled the yield of his land, sometimes as in the case of cotton trebled it, and at the same time banished disease from his fields without any aid from pesticides; he showed that not those chemicals only but chemical manures also are unnecessary and in the long run harmful; he proved that his work cattle, his 40 Malvi oxen, fed on the produce of the soil fertilized by his methods, were resistant to disease; all this he did; and he undertook in the evening of his life still more,--the tremendous task of spreading the doctrine, in the teeth of the vested interests of chemical manure makers and often against opposition of the orthodox in agriculture. Finally, particularly in association with the family doctors of Cheshire, he laboured to show and tell the world the value of man himself of food produced by the methods his researches had disclosed.

SIR ALBERT HOWARD--
Respecter of All Forms of Life
By H. C. HAAS

I know little about Sir Albert's life except what can be found in his book "An Agricultural Testament" but that book alone will bring him increasing eminence as the years pass. England has produced many men of brilliant mind, like Charles R. Darwin, John Milton, William Shakespeare, Sir Isaac Newton, George Stephenson and Adam Smith. I read only this morning that there were "two major and history-determining events in the year 1776, namely the Declaration of American Independence and the publication of Adam Smith's Wealth of Nations." Smith demanded free competitive enterprise among all merchants and traders. Under a free trade policy Great Britain amazed the world and London became the trade and financial center of the nations. It is perhaps too little known that the thinking which developed that book had such great results.

I feel confident that "An Agricultural Testament" is going to have equally great if not greater results. Sir Albert has produced a practical application of the findings of Darwin. In all the voluminous writings of the past produced since printing began not

many generations ago, writings which fill our libraries and confuse as much as they help the earnest searcher for the truth, we read of arms and conquest as in the Iliad and Aeneid, of kings and the search for riches and pomp, of religion, of human persecution, of finance and of the Rights of Man, all these applying to mankind only. As a result of Sir Albert's work the rights of other life on earth are going to be recognized, respected and guarded to permit that grand cooperation between animal life, plant life and soil life which evolution built up and which our transitory civilization has so largely destroyed.

Sir Albert's work has only begun. Hundreds of us now and millions later will be eager to continue it. For it is only by the means he has described and by using and expanding the ideas he has put forth that life as we and our ancestors for many a generation have known it can continue existence on this planet. Evolution can again produce life of a new and strange kind on man-produced deserts in too long a time for the creatures of posterity to have any but a dim record of man's past existence. Past human civilizations have perished. Let ours not perish.

Sir Albert Howard's Last Editorial

SIR Albert Howard was a man of the whole world. He was as much interested in conserving the soils of foreign countries as he was in conserving and making more productive the soils of his own native country. As a matter of fact it was in India that he, using God's creatures and plants as indicators, came to a full appreciation of the "Law of Return" in cultivation of the soil. Sir Albert Howard's greatness is indicated also by his withdrawal from the highly organized and departmentalized Institute of Plant Industry at Pusa, and the establishment of an Institute at Indore where he could study agriculture in a natural way. He realized that a highly specialized entomologist, for example, discovers effective ways to kill injurious insects but does not concern himself with the effects such insecticides may have on beneficial insects, on soil organisms, or on the health of animals and man who eat the poisons that have been used on food plants. Sir Albert Howard, more than any other person, appreciated the tragic effects on agriculture of the results of highly specialized researches. He shared his clear understanding of all aspects of the Wheel of Life with all the world. His personal interest in the organic movement in the United States is well expressed in his last editorial in *Soil and Health*, Winter, 1947 which follows:

The Progress of Organic Agriculture in the U. S. A. ALBERT HOWARD

The onward march of the organic farming and gardening movement in the United States of America will be evident from a single example. In June 1942 a new journal--*Organic Gardening*--appeared which was dedicated from the beginning to the Indore Process of composting. I was asked by the Founder and Editor, Mr. Jerome I. Rodale, to assist in the capacity of Associate Editor.

The history of *Organic Gardening* makes interesting reading. At the beginning there were no sales, but Mr. Rodale persisted and was soon rewarded by a growing roll of subscribers and by a steady rise in the revenue from advertisements. To-day the paper has over 60,000 subscribers and is well on its feet.

Several other schemes have been launched. A series of booklets known as the *Gardeners Book Club* has been issued. In 1945 an important work entitled *Pay Dirt* (in which Mr. Rodale condensed his agricultural experience and his wide reading) was published by the Devin-Adair Company of New York. Four editions have appeared and 18,000 copies have been sold. He has now taken up the publication of cloth-bound books and has acquired the American rights of *The Earth's Green Carpet*, which is now on the market.

Mr. Rodale's latest and most ambitious enterprise is the launching of a non-profit Soil and Health Foundation for the following objects:

'(a) To promote, foster, and encourage the use of humus and other organic matter in order to maintain and improve soil fertility, to prevent soil erosion and improve the health of man.

'(b) To conduct, engage in, foster, and encourage scientific research and study, and teaching, training, informing, and educating the public, on and concerning the soils, foods, and health of man-and their relation to each other.

'(c) To study the effects of organic and artificial fertilizers on soil, plants, animals, and man.

'(d) In order to accomplish the foregoing purposes, to establish, use, maintain, and operate farms, schools, laboratories, and experimental stations, publishing houses, and all other appropriate agencies, means, and instrumentalities.'

The first contribution of 1,000 dollars has been made by the Rodale Manufacturing Company of Emmaus, Pennsylvania. Contributions should be sent to The Soil and Health Foundation, 46 South West Street, Allentown, Pennsylvania. There will be only one class of members known as Associate Members, who will pay as much or as little as they can afford. All will receive the Foundation's bulletins.

Readers of *Soil and Health* will be interested to know that our American cousins are not letting the grass grow under their feet in the campaign for fresh food from fertile soil. A. H.