

thrash reluctant industry into a state of greater vitality and productivity.

The next village on our journey is marked "Biological Discoveries," a village which has increased greatly since the beginning of the century. Here one sees at work those engaged in the study of life in all its many phases. One of the most modern buildings in this village is labelled "Biological Control of Disease and of Plant Life." Here methods are evolved for curbing the activities of plant and animal diseases by the discovery of parasites, which prey upon and thus keep in check such diseases and pests as prickly pear, woolly aphis, blowflies, etc.

No more spectacular achievement in this direction has ever been seen than the checking of the prickly pear in Australia by means of the cochineal, red spider and other insects. In 1920 a part of Australia greater in area than the whole of Great Britain was covered with dense impenetrable jungle of prickly pear, and the pest was increasing at the rate of a million acres per year. Scientists searched throughout the world wherever the prickly pear existed to find out what insects were holding the pear in check. Specimens of these insects were then taken to Australia, and after careful testing on other plants to make sure they were not likely to attack other vegetation they were set free. The results have already exceeded the most sanguine expectations, and prickly pear land in Australia is once again being brought into cultivation. Similar methods have been successfully used by the Cawthron Institute, Nelson, to eradicate that orchard pest, woolly aphis, while an attack on similar lines is being made upon gorse, ragwort, bidibidi, blowfly and blackberry.

Medico-Biological Research.

A VILLAGE in our scientific world closely connected with the village of Biology is that labelled "Medico-biological Research." Here it is that such diseases as yellow fever have been investigated, where Ross was able to trace the infection to the bite of a particular kind of mosquito, so that the problem resolved itself into "no mosquito, no fever." Here, too, those notable advances in the study of bacteria which have been of such importance to mankind have been made.

Science to the Aid of Civilisation

(Continued from page 3.)

The first house to be built in this village bears the name of Pasteur, honoured throughout the ages. His scientific investigations on yeast, prompted by a brewing difficulty, led him to the discovery of the causes leading to fermentation; the existence and behaviour of bacteria, to the pasteurisation process, to the cure of anthrax and hydrophobia. By his discoveries he has transformed not only the brewing, yeast, dairy and cheese industries, but has led to the rise of many similar processes which have made possible the production of lacquer solvents, used now in such enormous quantities for the motor-car. In fact, we may truthfully say, "No Pasteur, no duco finish to the family car."

Another branch of work deals with plant-breeding. Here, for example, a cross between a high yielding English wheat and the frost-resisting wheat of S. Sweden has been made, leading to a new race of wheat which has increased the wheat production of Sweden by 50 per cent. without another new acre being sown. Similar work on these lines has for some time been going on at Lincoln College in the endeavour to combine the high yield and wind-resisting qualities of our local Tuscan wheat with the exceptional baking qualities of Canadian wheat, so also to obtain improved varieties of clover, cocksfoot and ryegrass.

Plant-breeders have also managed to breed a type of tobacco plant which is free of nicotine, but which retains those desirable flavours and aromas so dear to the heart, or rather the palate, of the smoker. Again, the lupin has certain possibilities as a fodder plant on light sandy soils, but the presence of bitter poisonous substances in stalk and leaves has limited its use to green-manuring, but the recent isolation of a few non-poisonous plants has opened up new possibilities. A few such plants have been isolated from over a million and a half plants tested, and these have bred true, giving non-poisonous progeny. It is expected that in a very few years large crops of edible lupin will be grown on light sandy soils, making a most valuable green fodder.

Chemical Discoveries.

OUR journey now brings us to a rather large village almost worthy of the name of city, labelled "Chemical Discoveries." One of the most notable contributions in this respect deals with the modern exploitation of the tree, both in its growing state and in its fossilised form, known as coal. Trees are now fashioned by the hand of the chemist, and there emerges artificial silk, dyed in every imaginable shade of colour by the aid of coal-tar dyes. So great has this industry become, that in one year England alone produced over 400,000,000 lb weight of artificial silk, most of which found its way into ladies' dresses. And so the sons of Adam have returned to the forest for the adornment of their women-folk, the

fig-leaf finding its modern counterpart in the spruce tree.

Most of the dazzling colours which appeal so strongly to the feminine eye are made from materials extracted from ordinary tar, whilst other substances obtained from tar, such as carbolic acid, are converted into sheep-dips, disinfectants, resins, and hard waxes, such as bakelite. What the chemist will do in a few years' time



Hilda Hutt,

who will contribute several soprano solos to 3YA's concert programme on Friday, September 2.

cannot be foretold, but new fabrics will assuredly come. Synthetic wool and clothing made from it have already been reported, enough to make the woolliest of sheep tremble for the fate of its offspring.

Fossilised wood or coal is also receiving a good deal of attention from a devoted band of chemists. The growing use of powered coal, especially when mixed with oil, offers great possibilities for a more economical conversion of coal into steam power, but a more significant development is in the production of petrol from coal. A commercial process has been working for about twenty years which enables the rather rancid fish and whale oils to be changed into solid edible fats suitable for making margarine. This is done by blowing the gas hydrogen through the fish-oil in the presence of finely-divided nickel.

The same process is made use of in soap manufacturing, so that comparatively worthless vegetable and fish oils after such treatment are now used in the manufacture of high-quality soaps.

Recent work has shown that coal, when treated with hydrogen under pressure in the presence of certain accelerators is largely changed into petrol. Most of this work in England has been done at the huge I.O.I. factory near Newcastle, and so great has been the success attending the efforts of these men

that it is now possible to obtain over 160 gallons of first-grade petrol from a ton of coal (over 60 per cent. conversion by weight) at a cost of 7d per gallon. Of course this cannot yet compete with the natural petrol, which can be landed in England at about 4d per gallon, but a few more improvements in the process will see synthetic petrol on the English market produced on terms strictly competitive with the natural product.

Such an event is, of course, highly desirable, as it would put the British coal industry once again on its feet, enabling it to enter once again into competition with oil fuel.

One other huge chemical industry deserves mention—the manufacture of fertiliser from the air. It is now many years since we were told that the day was fast coming when the arable lands of the world would fail to produce sufficient food for the teeming population of the earth. Although many may not now be receiving their full quota of food, this is due to the temporary failure of the world's methods of distribution rather than of production, and there seems no doubt that the critical period of world starvation has been passed. The production of such fertilisers as ammonium sulphate in hundreds of thousands of tons from the air by the aid of electricity at a relatively small cost has laid to rest, probably for all time, the bogey of world-starvation.

Scientific and mechanical inventions and discoveries have often brought in their wake grave dislocation of labour, but science can scarcely be blamed for that. The statesman and the politician should be able to follow the trend of world affairs and apply the necessary utilised in the fullest degree for the benefit of mankind. After all an invention is what we make of it.

The scientist has given us the wireless, but it would be palpably unjust to saddle him with the blame for all the stuff sent over it. For more than a century chlorine served a useful purpose as a disinfectant and a bleaching agent before its diabolical use as a poison gas in the Great War!

Finally, let me conclude with a few words left us by that great scientific benefactor, Pasteur: "Two opposing laws seem to me now in conflict. The one, a law of blood and death, opening out each day new methods of destruction, forces nations to be always ready for the battle; the other, a law of peace, work and health, whose only aim is to deliver man from the calamities which beset him. The one seeks violent conquests, the other the relief of mankind. The one places a single life above all victories, the other sacrifices hundreds of thousands of lives for the ambition of a single individual. Which of these two laws will prevail God only knows. But of this we may be sure, that Science, in obeying the law of humanity, will always labour to enlarge the frontiers of life. I believe that Science and peace must triumph over ignorance and war, that nations will unite not to destroy but to instruct one another, and that the future will belong to those who have done most for suffering mankind."

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