APPEARANCE OF A NEW POTATO DISEASE IN NORTHEASTERN COLORADO

A NEW disease, apparently caused by the feeding of the pentatomid (*Chorochroa sayi* Stål), has appeared in the potato fields of northeastern Colorado.

On July 20 calls from farmers in Morgan County, Colorado, brought attention to what seems to be a general condition in the medium-early and late plantings of potatoes. The pentatomids were found associated with the disease in every case of the several hundred plants examined.

Cage experiments at the Greeley Potato Experiment Station begun on July 31 with plants known to be free of psyllids and disease, have demonstrated that the Say's pentatomid, feeding on the plants, is definitely responsible for the condition.

Medium-early plantings show 15 to 20 per cent. of diseased plants, while many late plantings in the Greeley area show 50 to 60 per cent. of pentatomid-affected plants.

The feeding may cause a complete wilting of the leaves or tips of the plants. Where the feeding is confined to the stems of the lower part of the plants, the symptoms become more general. Associated with the feeding is a basal curling of the terminal leaves, a yellowing followed by a reddish discoloration along the margin and an erect condition of the affected foliage. The tubers may be produced in chains or, in the more mature tubers, serious bumpiness and malformation may occur. The number of insects on each plant determines the severity of the disease. In the Morgan County area, an average of eleven adult insects was found on each plant. Plants attacked by three or four insects were only mildly affected, while those on which there were nineteen or twenty adult insects showed extreme symptoms.

The disease is very similar to "psyllid yellows," caused by the tomato psyllid, *Paratrioza cockerelli* (Sulc.).

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REPORTS

THE VULCANIZATION OF RUBBER

THE centenary of the discovery of the vulcanization of rubber by Charles Goodyear was celebrated on Wednesday, September 13, at the ninety-eighth annual meeting of the American Chemical Society. Numerous papers describing the progress of rubber research and manufacture in the United States were read at a general meeting in the afternoon.

At the banquet in the evening, Dr. Karl T. Compton, president of the Massachusetts Institute of Technology, spoke on "Looking Forward in Research"; Dr. James Bryant Conant, president of Harvard University, discussed "Lessons from the Past," and P. W. Litchfield, president of the Goodyear Tire and Rubber Company, Akron, Ohio, described "Rubber's Position in Modern Civilization."

In his address Dr. Compton said:

A good deal has been said about the ways in which science has been applied to make warfare more destructive, just as science has also been applied to bring about a certain compensating degree of protection against new weapons. But there is one possibility in science which seems to me to be far more significant than these, namely, the use of science to remove some of the major causes of war.

In so far as wars are caused by the natural "cussedness" of human nature, science can contribute if at all only very indirectly. It can probably not do much toward removing the desire which some men have for great domination. It can not remove ambition and envy from the human breast. But in so far as wars may be induced by economic considerations, science may do much to remove the causes.

One of the earliest incentives to war was the invasion of one country by another for the purpose of loot. Later, as we became more civilized, this took the form not so much of loot as of the control of population for the purposes of taxation and of exploitaton of labor and of natural resources. This is all part of the old primitive instinct of animals and men to secure the good things of life by taking them from someone else.

Science, however, has given mankind a method of gaining the good things of life without taking them from someone else and without working inordinately long and hard to produce them. Discovery and development of "good things of life" by science, engineering and invention are a far more certain and productive source than organized loot and robbery. To the extent therefore that great groups of people, such as nations, can be induced to support technological development directed toward these ends, to that extent can they satisfy their desires, without recourse to war.

More specifically, many nations have felt the urge to conquest in order to secure to themselves an assured supply of various materials which are necessary to the nation's economy. For example, Great Britain needs oil for her navy and food for her population, which can not be produced in the British Isles. Germany and Japan need rubber, food stuffs and mineral resources. Even the United States, richest of all nations in its mineral resources, is inadequately supplied with such important materials as rubber, tin and tungsten. Does national safety force these nations to conquest in order to assure themselves of these commodities?

The necessities of national economies could be taken care of by scientific research at a cost far less than that of a major war and within a time far less than that in which the effects of a major war could be recovered from. At

the same time this could be done not only without hurting any one but with great indirect benefit to all concerned. Let me give a few examples.

The time will surely come in the not too distant future when a satisfactory motor fuel can be produced from coal at a cost which is not too far out of line with that of petroleum products. When this happens, Great Britain, for example, will no longer be critically dependent upon the Persian oil fields nor will we be so much worried about Japan's efforts to secure a foothold in Mexico.

When substitutes for rubber are produced which are satisfactory for automobile tires and which can be produced at a reasonably competitive price, then one of the great causes of anxiety and international haggling will have been removed. Perhaps the new development of "chemical agriculture" in which farm products are produced without soil by planting them so their roots are bathed in appropriately nutritive chemical solutions can be developed to remove the fear of food shortage which now causes so much anxiety in several nations, and will at the same time provide a diet which will be a distinct improvement on that which is now customary.

The development of suitable lacquers as substitutes for tin in the coating of containers for canned foods will make the United States less anxious about its access to the Bolivian tin supply. Or perhaps improved methods of extraction from our existing but rather poor tin deposits may accomplish the same result. To the extent that science can produce these materials or suitable substitutes, to that extent will be removed almost the only basis for war which can be intelligently argued for at the present time.

Dr. James B. Conant, president of Harvard University, holder of the William H. Nichols Medal of the New York Section of the American Chemical Society, said in an address on "Lessons from the Past":

One might claim that our scientific knowledge of large molecules and the chemical reactions which produce them is but a by-product of the ubiquitous motor car. Fifty years ago a celebration of Goodyear's discovery would have awakened almost no interest among chemists, for the science of rubber chemistry was hardly born. It would have awakened almost no interest among the general public, for the automobile was still unknown.

The total world's annual production of rubber was then less than 50,000 tons. It was not till the first years of this century that the production began to rise and not till the second decade that a phenomenal upswing commenced.

And why did the annual production reach 200,000 tons by 1916 and 500,000 tons by 1924? The answer is obvious. Tires for automobiles. From 1910 to 1930 the curves of rubber production and automobile registration rise together; during the last decade they rise and fall, somewhat, in almost parallel fashion. I venture to predict that if some industrious soul should count the number of articles published in scientific journals dealing with the chemistry of rubber and rubber-like compounds, he would find that the annual production from the laboratories followed the growth curve of the automobile industry.

One can have no adequate picture of scientific progress, I believe, without examining the social and economic conditions under which this progress took place. Admittedly, one can carry the economic interpretation of history, including the history of science, to absurd lengths. But one can also fail to understand the lessons of the past by reading the history of science solely as the story of scientific heroes who lived and moved in a vacuum.

Viewed in historical perspective, the contempt of the practical man for all scientific work, unless it has immediate utility, is seen to be shortsighted. Patience is needed by the scientist. It is no less needed by society in evaluating the work of our universities and research laboratories.

On the other hand, the scorn of some cloistered scientists and scholars for the inventor and the industrial worker is clearly equally shortsighted.

In science, as in other human activities, looking down one's nose at other people is worse than a ridiculous pastime. It is often equivalent intellectually to throwing a monkey wrench into the machinery. If my thesis is correct, that in the long run pure science and applied science are so closely interrelated as to be inseparable, then clearly when one lacks nourishment the other must eventually wither and inevitably die.

So industrialists and scientists may well join together in celebrating either a great discovery in pure science or a revolution in the industrial arts. For on close analysis both events are seen to be of equal significance for the attainment of these goals for which the two groups strive. And they may ask the other members of the community to join with them when they pay honor, as to-night, to a pioneer who opened doors to riches for mankind he little dreamed of. Treasures not measured in material terms alone, new weapons in man's intellectual armory—perhaps the only enduring wealth of modern times.

P. W. Litchfield, president of the Goodyear Tire and Rubber Company, Akron, Ohio, in an address on "Rubber's Position in Modern Civilization," said:

In fixing rubber's position in modern civilization it is possible to say that four million persons, the world over, are employed in the rubber business; it may also be pointed out that almost three billions of dollars are invested in facilities for the growing, manufacture and distribution of rubber; we may consider the fact that there are more than fifty thousand different and useful products made from rubber and that more than two billion pounds of pure rubber are consumed in a normal year.

But such measurements are inadequate. The influence and importance of rubber is so all-pervasive as to defy any rule of thumb. I believe we get closer to the real answer when we think of our social and economic structure as a living thing, the skeleton of which is composed of metal and stone, the arterial system of which carries a life stream of oil and the flexing muscles and sinews of which are of rubber.

I could go on indefinitely—into the building industry, into the modern conveniences of our homes and offices, into food packaging, into the operating rooms of the hospitals, into the mines and factories—and show to you the threads of vulcanized rubber which are woven back and forth through the fabric of modern living.