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WHAT IT COSTS TO FEED INSECTS.

There are about a thousand species of insects in this country which are injurious to our grain, forage, and field crops, our garden vegetables, fruit crops, and forest and fruit trees. Among them a few are specially destructive. In 1875, it is said, as many as ten thousand settlers were driven out of Kansas by grasshoppers. In Missouri, according to State Entomologist Riley, the damage done by these insects in 1874 exceeded \$15,000,000, and he estimates the losses in other parts of the West at twice as much more, in all, \$45,000,000 for one year's support of these pests. During the same year, the destruction of growing crops by the chinch bug amounted to \$19,000,000 in Missouri alone. Just ten years before, in Illinois, the same insect occasioned a loss of over \$73,000,000 in a single season. The average annual damage to the cotton crop of the country by the cotton army worm is estimated at \$50,000,000. The devastating potato beetle is capable of deducting other millions from the annual profits of our agriculture, and the thousand other insect plagues are easily competent to swell the aggregate annual board-bill of their kind to something like \$200,000,000, according to the estimates of Professor Packard, whose conclusions on a subject like this are well worthy of respect.

If this enormous sum, or even half of it, could be saved, it would soon amount to enough to pay the national debt. The question whether it can be saved, or any portion of it, is certainly worth considering. Professor Packard is confident that, with care and forethought, based on the observation of facts by scientific men, from fifty to a hundred million dollars of this annual loss could easily be prevented by a little co-operation between the several States and the General Government. He would have the former emulate the practical good sense of Missouri and each appoint a salaried entomologist. Then these gentlemen, acting in connection with a United States Commissioner of Entomologists, might issue weekly bulletins, perhaps in combination with the Weather Signal Bureau, reporting the condition of the insect world, forewarning farmers and gardeners from week to week of the insect enemies to be guarded against, and suggesting the preventive and remedial means that should be adopted. The cost would be comparatively slight; the possible good immense.

Take for illustration the grasshoppers, or, more properly, locusts, of the West. They breed chiefly on the great plains beyond the Mississippi, from Minnesota to Texas. In summers of unusual drouth they multiply enormously, and the supply of food being short they are forced to migrate.

Professor Packard tells of a swarm of locusts, first observed at Boulder City, Colorado, which traveled six hundred miles to devastate Eastern Kansas and Missouri. Its original home was somewhere in Wyoming, perhaps two or three hundred miles northward of Boulder City. The locusts fly with the wind; and as the general direction of the wind in those parts during the summer season is pretty well known, the movements of the locust armies can already be predicted with tolerable accuracy. But more knowledge is needed, particularly with regard to the meteorological features of the Western country, and the relation of locust migrations to wind and weather. In the pursuit of these investigations, Professor Packard justly urges that the meteorologists and entomologists must go hand in hand. The government has provided a well organized corps of weather observers, and the addition of a few competent entomologists would increase the outlay but little, while the resultant good would, in all probability, be very great. It would certainly be so if, as seems by no means unreasonable, the service should be able to master the conditions of "locust years," and be able to tell with a good degree of certainty when locust invasions are likely to occur, and how they may be prevented.

In his plea for such observations in the West, Professor Packard observes that "not only should the border States, especially Texas, Kansas, Nebraska, Minnesota, and Iowa, employ entomologists, following the liberal policy of Missouri, which for eight years has had a State entomologist, whose reports have proved of incalculable practical value to the people of that State: but the habits of the locust need first of all to be thoroughly studied in the Territories, particularly in those of Wyoming, Montana, Idaho, Dakota, Utah, New Mexico, Arizona, and in the new State of Colorado. A commission of entomologists should be appointed to make a thorough study of the locusts in the Territories mentioned. It would seem that the recommendation made at the recent meeting of Western Governors, at Omaha, to the effect that an appropriation be passed by Congress, and a commission be attached to the existing United States Geological and Geographical Survey of the Territories (Hayden's), is the most feasible and economical method of securing the speediest and best results."

This is but one feature of the work that might be done with profit toward forestalling the depredations of insects, regular and periodical: a work which must, sooner or later, be undertaken, and which may ultimately prove as beneficial to the country as the weather predictions have been.

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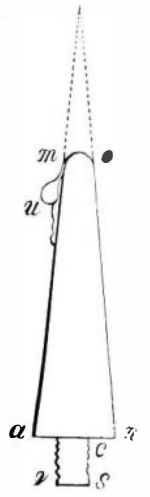
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EXPLOSIONS ON LIGHTNING ROD POINTS.

It is a well known fact that, if a metallic point communicating with the earth be presented to the conductor of an electric machine charged with positive electricity, the angle of the electrocope of the apparatus becomes small. The reason is that negative electricity escapes from the point as soon as developed, and serves to neutralize a quantity of the positive electricity of the conductor, no spark being produced. This phenomenon, as Professor Stroumbo, of the University of Athens, points out, is produced differently when the Holtz electric machine is used. If, while sparks are passing between the two balls of the apparatus, a third ball, having a metallic point attached to it, be taken in the hand and moved nearer one of the fixed balls, when the intervening distance becomes so small that the negative electricity of the point may escape the sparks at once cease. Yet, if the point be removed, they begin passing again between the two balls. This experiment can be repeated indefinitely. Now if the distance between movable and fixed balls above mentioned, at which no sparks pass, be gradually augmented, at a certain stage sparks will reappear between point and fixed ball. The conclusion from this is that, if the negative electricity of the point has great intensity, sufficient to enable it to escape from the point and pass over the interval, there will be no spark between point and fixed ball; but if the negative electricity of the point has not intensity sufficient to cause it to escape as soon as developed (the attraction then diminishing inversely as the square of the distance), there will be an explosion on the point itself, and electric sparks will occur constantly between the point and fixed ball, just as between the two balls of the machine.

During storms, the atmosphere is charged with enormous quantities of electricity, which, however, in their action should follow the same law as the smaller quantities produced in electric machines. If then a cloud, having positive electricity in determinate quantity, passes not too far away from the lightning rod point, analogous effects will take place. Then electricity developed by induction on the lightning rod will continue to escape at the point as soon as it gets there, and will go to neutralize the positive electricity of the cloud, neither thunder nor lightning being produced; but in case the same cloud were placed too far away, according to the experiments above detailed, an explosion might follow at the point of the rod, an intense heat would be developed, and the platinum point of the rod would be fused. This phenomenon occurred at the Royal Palace of Athens, where the platinum point was found melted, as shown in our illustration, which represents the rod in its full size.



THE INDUSTRIES AND RESOURCES OF NEW SOUTH WALES.

There is no people for whom we as Americans may cherish a more genuine fellow-feeling than for the colonists of the British Australian possessions. Sprung from the same parent stock as ourselves, during the hardships and privations incident to the settlement of a new and distant region as did our own ancestors, they have achieved results and can point to a progress which may justly claim to find its only parallel in our American advancement. No better proof could be asked to show that the energy and industry of the Anglo-Saxon are race characteristics, and that they will manifest themselves irrespective of the region which may chance to be their field of exertion.

Not three generations ago, Australia was but a frontier of barbarism. Now the continent is fringed with infant States already able to exercise the powers of elaborate political systems. Within thirty years, the population has risen from 214,000 to 2,000,000 souls, the trade from \$30,000,000 to \$315,000,000. There are nearly 5,000,000 acres of land under cultivation, 70,000,000 head of live stock on the pastures, 2,000 miles of railway and 26,000 miles of telegraph completed, and the revenue of the several governments aggregated \$350,000,000.

The mother colony of those which thus far have been established upon the Australian continent is New South Wales; and for a most valuable exposition of the resources, industries, and requirements of that political division we are indebted to Mr. George H. Reid, of Sydney, a copy of whose essay is now before us. The great need of the colonies—the need which overtops all others—is for men. The chief articles of her export trade are raw materials; and that these exist in abundance there is no question. But enterprise is paralyzed when hands fail; and therefore New South Wales now asks all nations, not for their custom nor for their money, but for their surplus population. The underpaid agricultural laborers of England, the great throngs of working men of the United States who, when the panic of 1873 checked enterprise here, were thrown out of employment—any one, in fact, blessed with good health and sturdy muscles, the new colony will gladly welcome, and provide with steady and remunerative work.

Mr. Reid's essay is primarily designed to exhibit in some detail the inducements which the colony offers to immigrants, and of these we summarize below those regarding which a workman would naturally first ask to be informed. The area of the colony is 323,437 square miles, that is about as large as the New England States, New York, Pennsylvania, New Jersey, Delaware, Ohio, Indiana, Illinois, and about a