

in various ways is all imported—chiefly from the United States of America, and from Hainan and Formosa. Till the overflow of the Yellow River some time ago, no one paid the least attention to this question; but now a proclamation of the liberal Viceroy, Li Hung Chang, to the people of his thickly-populated provinces, shows that the subject will receive the attention it deserves. His Excellency says that one of the first principles in governing a State is to watch over the agriculture of the State, so that it may benefit both the individuals who till it and the State. In one of the provinces over which he rules—namely, that of Chihli—arboriculture is rendered especially easy by the softness and fertility of its alluvial plains. If we omit the various species of fruit-trees, such as the apple, pear, and apricot, other kinds of trees are very rarely seen, and in consequence vast tracts of fertile plains are left barren. Some slight attempts have been made to plant these extensive tracts with forest trees; but the strong northerly winds which prevail soon uprooted trees which had not been planted to a sufficient depth nor in well-chosen places. Amongst the peasants, the Viceroy says, the principles of arboriculture are unknown, and therefore their previous efforts have only resulted in labour and money uselessly expended. In recent years the Viceroy has ordered the planting of willow-trees along the banks of the streams and rivers in Chihli, with the object of protecting and strengthening the embankments.

If successful methods, His Excellency asks, have been found for cultivating trees in salt lands, how much more easy ought they to be found in the rich level plains of Chihli? Accordingly, the authorities of the various prefectures and sub-prefectures of Chihli are instructed to procure the necessary seed trees, and to inform the people in their respective districts of the eight directions for tree-planting and the ten benefits to be derived from the same. Steps are to be taken by the authorities to encourage the people in their efforts at planting, but official agents, who might oppress the people, are not to be sent among them. At the end of each year a statement is to be submitted to the authorities, by every person who has tried planting, of the number of trees he has received, the number successful, the species which have thriven best, &c., so that the Government may reward those who are most successful in these experiments in arboriculture, as well as gather information to guide them in the future. Instructions are given to the local authorities to deal severely with any person who steals or cuts down the trees of others. The Viceroy says that his intentions in issuing this proclamation are to afford another source of livelihood to the peasants, to help in preventing droughts and checking floods, to regulate the rainfall, and to beautify the country.

The eight directions and the ten benefits are worth recording. The directions are as follow:—(1) To fortify the roots against injury from cold, which, on account of the loose nature of the soil near the surface, readily injures the roots, a fertilizer, made by burning a mixture of dung and grass, should be used when planting trees, and when the fertilizer is put in, the roots should be carefully covered. (2) When a tree has been securely planted, a small cumulus of earth should be placed around it, 6 or 7 inches high, and should be renewed before winter sets in every year till the close of the third year. By this means the wind and cold cannot reach the roots, nor will the necessary natural nourishment in the earth escape. (3) In places exposed to high winds the trees should be planted to a depth of at least 3½ feet; at this depth the rich part of the soil is reached. In case of willows and other such trees, the outspreading and dependent branches are to be carefully pruned. (4) Rich earth, with a suitable fertilizer, is to be added to poorer soils. (5) To prepare the ground for the reception of the seeds of such trees as the oak, elm, poplar, cypress, &c., which are shed every year, a trough is to be dug round each tree and filled with water to keep the soil moist. (6) Willow and mulberry trees should be planted in the spring, when there is rain. Before planting the young shoots, the soil should be well loosened and fertilized, and grafting should always take place after the rain, and the graft-trees should be well watered every alternate day. (7) In transplanting trees, the greatest care should be taken to preserve the three vertically-projecting roots, which every tree has, from the wind and sun. When there is rain, a small hole is to be dug by the side of the tree, cutting away one of these roots; this operation is to be repeated in a fortnight if there is rain; if not, a month must elapse before the second root is cut, and similarly in the case of the third root. When the roots are cut away, innumerable little roots will be thrown out. If there is no rain,

the ground must be well watered before any transplanting is attempted. (8) In raising trees from the seeds of the oak, mulberry, &c., some fertile spot should be prepared just as it would be for a crop of grain, and the seeds are planted in the same way as grain is planted. Spring-time is the best, and while there is rain. When the young trees spring up and grow to the height of one or two feet, they can easily be transplanted as directed above.

The ten benefits of planting trees are thus enumerated by His Excellency:—(1) By planting trees at the river-banks the loose and sandy soil is strengthened by the roots, and the banks increase in height. (2) A large and profitable industry will spring up if pine, elm, willow, &c., are planted in the mountains on the borders. (3) The planting of trees around fields and farms will do away with the superfluous moisture and preserve a fair equilibrium of wind and fluid influences. (4) Where trees are in abundance, droughts will be unknown. (5) Abundance of trees also help to ward off epidemics, and in thickly-populated districts trees should be specially planted for this purpose. (6) Where there is abundance of trees, travellers and families can find rest and shelter in the summer. (7) The operations of highwaymen and banditti are hindered where trees and forests are plentiful. (8) The snows on the mountains of the border will be absorbed by forests. (9) The poorer peasants will have sufficient fuel from the branches, which are pruned every year. (10) Many of these trees, as the *Quercus mongolica*, afford food to the silkworm, which, in the mountainous regions, weaves a cocoon which makes much cheaper and more durable silk than that of the mulberry silkworm.

SUPERSTITION AND SORCERY IN NEW GUINEA.

IN the Report to the Colonial Office of the Special Commissioner for British New Guinea during the past year, there is a long and very interesting account of some of the superstitions of the natives of that country, written by Mr. H. H. Romilly. One of the most sacred obligations, he says, on the relatives of a deceased man is to place in his grave, and in his accustomed haunts, food and water for the spirit of the departed. It is thought that this spirit is all that remains of the deceased, and the human appetites take possession of it, or, rather, remain in existence, just as if the body had not died. If, however, he is killed in battle, there is not the same necessity of constantly feeding his spirit; the head of one of the tribe or race who killed him is sufficient. If the slayer is a white man, the angry spirit can be laid by a large payment of goods to the relatives of the deceased, and this constantly happens. Dreams are, to them, voices from the land of spirits, telling them what to do, for whom to work, from whom to steal, and what to plunder. White men are always attended by a familiar spirit, which is blamed for any mischief that befalls the natives in a locality where a white man happens to be. If the white man is a friend of theirs, they merely demand compensation, which he will pay, says Mr. Romilly, if he is a wise man; if he is unfriendly to them, the unfortunate white man may prepare for the worst. His attendant spirit will not help him, for it flies at the sound of a gun. On the death of a relative, there is a great drumming and burning of torches to send the spirit safely and pleasantly on its travels. In some parts of the country, certain trees have spirits, and on feast-days a portion of the food is set apart for these spirits. It is worthy of remark that all their spirits are malignant, and these have to be overcome by force of arms, by blessings, or by cursings. They cannot grasp the idea of a beneficent spirit, but regard them all as resembling Papuans generally—that is, vindictive, cruel, and revengeful. Consequently, these spirits are much feared; though they cannot be seen, yet they constantly use arrows and spears when they are vexed. The great opposer of spirits is fire, and hence, on every possible occasion, bonfires and torches are employed. Strange to say, though fire is thus all-powerful with them, they have no god or spirit of the fire. In this they are at least true to their belief, for no spirit can be, with them, beneficent. Sorcerers are implicitly believed in, and they generally do a good trade in the sale of charms, which are made, not on any fixed principle, but according to the freaks of fancy of the sorcerer or the purchaser. Sometimes it is a bit of bark, sometimes a crab's claw worked in the most fantastic way. These are protectors against all injuries or accidents that may happen to a

man. A sailor will wear one as a protection against shipwreck, another charm saves its wearer from wounds in battle, another from disease, and so on. Besides being a sorcerer, that personage is also a physician and surgeon, and usually the astrologer and weather prophet of his district. It can hardly be said that he is skilled in these professions. An unvarying mode of treatment of a patient who is suffering pain from any cause whatever is to make a long, and sometimes a deep, incision over the abdomen. As may be imagined, this is not a very safe remedy. In one instance Mr. Romilly mentions, a woman, who was suffering severely from several spear-wounds, was thus treated by the native sorcerer, who, in pursuit of his profession of surgeon, inflicted by far the most severe wound the poor woman received, thus destroying the chance of life which she had before he attended her. Many of the tribes are, through the influence of the missionaries, shaking off these superstitions. "But even these people," says Mr. Romilly, "the most civilized in New Guinea, and many of them professed Christians, in times of great excitement revert to their old habits. This was shown during the autumn of 1886. At that time a severe epidemic raged along the south coast. The people were dying, by hundreds, of pneumonia, and were beside themselves with fear. The usual remedies for driving away spirits at night were tried, remedies which had been in disuse for years; torches were burnt, horns were blown, and the hereditary sorcerers sat up all night cursing; but still the people died. Then it was decided that the land spirits were working this harm, and the whole population moved their canoes out in the bay and slept in them at night; but still the people died. Then they returned to their village, and fired arrows at every moving object they saw. . . . In course of time the epidemic wore itself out; but while it lasted the civilized Motuans were as superstitious as any of their neighbours could have been."

THE MUSEUM OF COMPARATIVE ZOOLOGY, HARVARD COLLEGE.

THE Annual Report of Prof. A. Agassiz for 1887-88 has been issued. It gives the usual interesting account of the various courses of instruction which have been provided at the Museum during the academic year, and of the reports from the several officers about the collections under their care. Excellent progress has been made with the extensive addition to the Museum building, in which there will be ample accommodation for the geological and geographical departments. While numerous specimens have been sent to specialists, a number of applications have from necessity been refused, as the Museum staff is very far from being large enough to meet the demand on its time which attention to all such applications would require. For the future, the very reasonable rule has been laid down that only single specimens for special study can be sent out from the Museum, so that the larger collections must be studied at the Museum, where, we may add, they may be examined with every advantage. In an appendix, a list of the publications of the Museum during the past year will be found, and there is also a most important list of all its publications from the commencement: the Annual Report from 1859, the Bulletin from 1863, the Memoirs from 1864. In a footnote comment is made on some remarks appearing in the preface to the *Zoologischer Jahresbericht* for 1886, on the irregular way in which the publications of the Museum appear. We only allude to this to express our hope that no criticisms will alter the present arrangement, which is one that allows of the prompt publication of the various new facts brought to light by the band of workers at Harvard. We can conceive that by a librarian, simply as such, the publication of a volume in parts is held in abhorrence, and the publication of parts of two or three volumes of a series, at the one time, fills him with dismay; but to the working student it is very different, and such owe a great deal of gratitude to the Curator of the Museum at Harvard, for the speedy publication of the Museum Memoirs as well as for the great liberality with which these are immediately posted to Europe on their issue from the press. The following paragraph we read with mingled feelings of regret and pleasure:—"In the past fifteen years I have been in the habit of supplying deficiencies for such expenditures as seemed to me essential for the rapid development of such an establishment. But it has now become evident that, while such a policy may have been useful in the early stages of the Museum, it has of late been rather a detriment to it than

otherwise, as it was fast coming to be regarded as my personal establishment. The demands upon my time for the administration of the affairs have become so great, that I must retire from active duty to devote myself to scientific work, which I have too long neglected for the sake of bringing the Museum to the point it has reached. It is high time that I should withdraw, and that a younger man, more in sympathy with the prevailing tendency of science in this country, should endeavour to develop the Museum by increasing the interest of the friends of the University in its behalf." We fail to comprehend how any man living could be more in sympathy with modern science than Alexander Agassiz, but we recognize as a fact that he has original work to finish, while it is yet day, and it is universally acknowledged that he has established such a museum at Harvard as may employ the energies of many workers for years to come.

RESULTS OF EXPERIMENTS UPON THE GROWTH OF POTATOES AT ROTHAMSTED.

DR. GILBERT has, in the form of a lecture recently delivered at the Royal Agricultural College, given a *résumé* of twelve years of experimental work in connection with the growth of potatoes. The subject is in itself highly interesting, including, as it does, a large number of important questions relating to the propagation of new varieties, the proper cultivation of the ground, the potato-blight, as well as the best fertilizers for the crop. Dr. Gilbert at once disclaims all idea of entering upon the larger questions involved in potato-cultivation, and confines himself entirely to that of fertilizers, and in regard to this point he is not able to throw much fresh light upon the usual practices of growers. The old story of the value of a due apportionment of nitrogenous and mineral substances is clearly shown to be required for the growth of potatoes, as for all crops. The value of farmyard manure is also well indicated in a manner which, on the whole, supports the present practice of all good farmers. The meagre results obtained from mere mineral manures, unassisted by nitrogenous manures, are also well brought out. The practice of employing liberal dressings of dung, superphosphate, and potash salts, or of substituting nitrate of soda or sulphate of ammonia for farmyard dung, is simply indorsed by Dr. Gilbert's results, and, beyond this, no new light is shed upon the subject of fertilizers for potatoes.

The effect of liberal applications of nitrogenous and mineral manures in increasing the proportion of diseased tubers, in years in which the blight is prevalent, is too familiar to need further proof; and as a matter of fact, the wisest course appears to be to balance the advantages of a heavy crop against an increased liability to disease.

A point is made by proving very conclusively that the continuous growth of potatoes upon the same land does not render the crop more liable to disease, but rather the reverse. For example, the percentage of diseased tubers during the first four years of potato-growing ranged in the various plots from 5.14 to 12.82, the largest amount of disease occurring upon the land manured heavily with dung and nitrogenous dressings. In the second four years, the average amount of diseased potatoes ranged from 1.63 to 4.95 per cent., while in the third series of four years it was reduced to from 1.43 to 1.73 per cent. No fluctuations of season can overturn these figures. They have an important bearing upon the question of the propagation of the disease, and appear to detract from the value of suggestions that the blight continues to exist in the form of resting spores in the ground. If such was the case, the disease, when once established, would surely tend to greater virulence in the case of constantly repeated growths of diseased crops. Practical agriculturists would scarcely be induced, from these results, to take special measures for destroying diseased tubers, for carefully preventing their introduction into manure-heaps, or for gathering diseased haulm off the land—all of which precautions students of potato-disease have advised agriculturists to take.

The composition of the tubers, after manuring with the various fertilizers employed, is strikingly similar, with the exception that the heavier crops are rather more watery in character—a result which may always be looked for in luxuriant vegetation. The general result of these experiments is encouraging, in so far as they show that the methods in general use for manuring the potato crop are the best that can be devised for the growth of potatoes.