

THE GREAT FLORAS OF AMERICA.

The first fruits of last summer's visit of distinguished scientists to our coast, under the auspices of Prof. Hayden's survey, are beginning to appear. We have had the advantage of examining an advance abstract of Prof. Hayden's report of the summer's work, and thus gain for our readers the earliest information on a very interesting and important subject. The botany of the survey was represented the past season by the two great masters of that department, Sir Joseph D. Hooker, Director of the Gardens of Kew, England, and President of the Royal Society of London, and Prof. Asa Gray, of Cambridge, Massachusetts. Their examination extended over a great portion of Colorado, Wyoming, Utah, Nevada and California. Their investigation into the alpine flora and tree vegetation of the Rocky mountains and Sierra Nevada enabled them to give a clear idea of the relation and influence of the climatic conditions on both sides of the great mountain range. Sir Joseph Hooker, whose botanical researches embrace the greater part of Europe; the Indies, from the Bay of Bengal across the Himalayas to Tibet; the Antarctic region and the southern part of South America; New Zealand, Australia, South Africa, Morocco and Asia Minor presents in the English periodical *Nature*, for October 25th, an outline of his studies during the season, and this outline, when filled out, will form a most important report for the eleventh annual report of the Hayden Survey. It will be seen at a glance that the report will be of a most comprehensive character, and cannot fail to be of the highest interest to our people. The tree vegetation, and especially the conifers, were made special objects of study, and many obscure points were cleared up.

Of a section of the Rocky mountains, comprising Colorado, Wyoming and Utah, Dr. Hooker says: "Such a section of the Rocky

tanical geography of North America; but the relations of the dry intermediate regions, either to these or to the floras of other countries, had not been similarly treated, and this we hope that we have now materials for discussing.

Dr. Hooker sums up the results of the joint investigations of Dr. Gray and himself—aided by Dr. Gray's previously intimate knowledge of the elements of the American flora—from the Mississippi to the Pacific coast: "that the vegetation of the middle latitudes of the continent resolves itself into three principal meridional floras, incomparably more diverse than those presented by any similar meridians in the Old World, being, in fact, as far as the trees, shrubs and many genera of herbaceous plants are concerned, absolutely distinct. These are the two humid and the dry intermediate regions, above indicated."

Each of these, again, is subdivisible into three, as follows:

1. The Atlantic slope plus Mississippi region, subdivisible into (A) an Atlantic, (B) a Mississippi valley and (V) an interposed mountain region with a temperate and sub-alpine flora.

2. The Pacific slope, subdivisible into (A) a very humid, cool forest-clad coast range; (B) the great hot, drier California valley formed by the Sacramento river flowing to the north and the San Juan river flowing to the south, both into the Bay of San Francisco; and (V) the Sierra Nevada flora, temperate, sub-alpine and alpine.

3. The Rocky mountain region (in its widest sense extending from the Mississippi beyond its forest region to the Sierra Nevada), subdivisible into (A) a prairie flora; (B) a desert or saline flora; (V) a Rocky mountain proper flora, temperate, sub-alpine and alpine.

As above stated, the difference between the floras of the first and second of these regions, is specifically, and to a great extent generally absolute; not a pine or oak, maple, elm, plane or birch of Eastern America extends to Western, and genera of 30 to 50 species are confined

THE ART OF THE DIE SINKER.

When a die is required for a coin or medals, the engraver takes a piece of soft steel of suitable dimensions, generally three or four inches in length, and about an inch greater in diameter than the coin or other article required; on this he hollows out the exact form of the desired impression by cutting away the steel by degrees, with small, well-tempered, case-hardened tools. As soon as this work is thoroughly accomplished the steel is hardened by being heated red-hot in a crucible with charcoal and oil of bone-dust, and then plunged into cold water. When a great number of coins of one sort are required, the original die is termed the matrix, and copies are made from it by taking impressions from it in soft steel, which is in relief, and is called the puncheon, and from which, when it has been hardened, other dies are produced by pressure exactly similar to the matrix, and in *adagio*, which are case-hardened in their turn before they are fit to transmit an impression to any metal used for money. The metal used for our coinage, whether gold, silver, copper, or bronze, is stamped in a cold and solid state; but medals and casts can also be produced by a method called casting *en creux*, in which the metal is used in a soft state. For this purpose an alloy is used, consisting of one-fourth lead, one-fourth tin, and one-half bismuth, which fuses readily at the boiling point, 212° Fah. When the metal is soft, resembling putty in consistency, the die is placed upon it, and the impression produced by a smart blow from a mallet; the surface of the metal sets instantly, from coming into contact with the cold die, and thus readily retains the form that has been given to it. Copies of medals may be readily made in this way, but each face will be obtained in a separate piece, and these must be joined to give representations of the coin in a complete form. Ornamental work is produced in thin metal for gasketing, corners, parts of ornament-stains, trays, etc., by means of a pair of

STEAM CULTIVATION.

The telegraph announces that Congressman Horace Davis, of San Francisco, has introduced a bill at Washington allowing the importation of tackle, etc., for steam cultivation free of duties for the coming two years. Although we have no fuller information of Mr. Davis' measure other than the mere statement of the above fact, we imagine that the removal of duty will be advocated on the ground that experiment of steam cultivation is one very desirable to make in this country, and the tools to conduct the experiments must be had abroad. Therefore, to remove the duty long enough for the introduction of the experimental machinery, will not do injury to home manufactures, but rather will widen their field, for if steam cultivation be proved adaptable to our conditions, our machine shops can then nerve themselves to supply a recognized need, and the whole army of enterprising inventors may strive together to frame the best apparatus. Thus it seems to us the measure which opens the way for experiment is a good one, even for manufacturers, in its great future possibilities of demand for what they must ultimately furnish, if success calls for it. The concession which Mr. Davis asks for was granted for a time by a former Congress, but experimenters did not avail themselves of it very largely. We trust if it prevail this time there will be wider interest and full trials made.

We look upon steam cultivation as full of promise to our grain growers and producers of other cultivated crops. The favor which it is enjoying in England, and the increase of its employment from year to year, certainly teaches that we should not fail to give it a practical trial. Our fields are admirably adapted to the working of steam machinery in the most effective and most economical manner, and the depth and thoroughness of the work which can be done at a low rate, will, in most cases, both cheapen the cost of production and increase the volume of the product. This will be a double source of profit to our grain producers. It will be equivalent to strengthening the foundation and raising the roof of the productive structure at a single operation. This would be indeed most desirable. It would induce new strength in our soil and new spirit in our cultivators, and would be just the stimulus which our producers need now that new fields in India and elsewhere are being brought into competition with them in the production of breadstuffs.

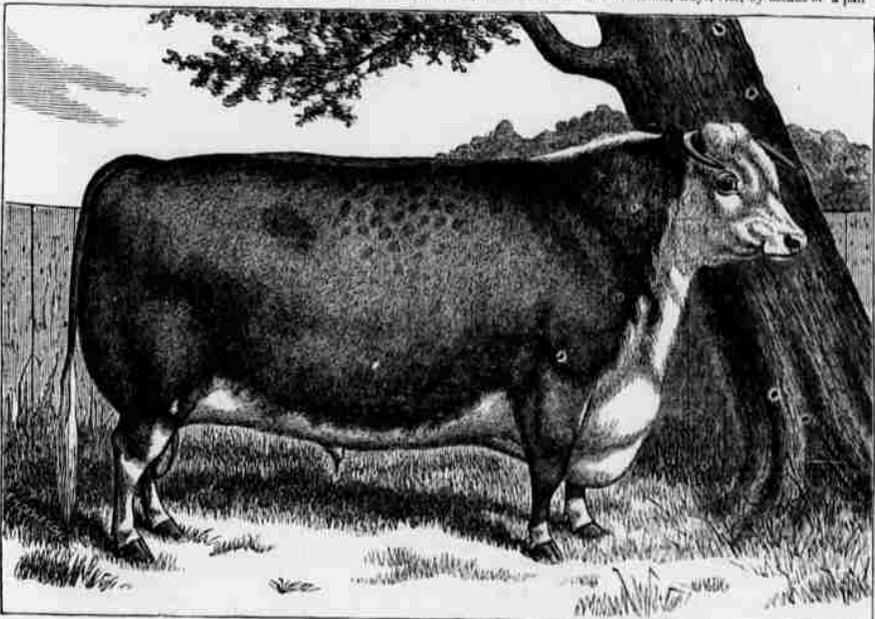
As the subject is up for discussion we have taken from this week's receipts of English exchanges two paragraphs; one giving the experience of a practical farmer from his own work, and the other the general deduction of an agricultural writer from a wider range of experience. A Bedfordshire farmer, in a letter to the *London Times*, says: "Within a distance of four miles from where I am writing, there were six sets of Fowler's double-engine tackle at work on Wednesday. Neither is it necessary for farms to increase in size, in order that industry, capital and steam may be applied to the land. I myself occupy barely 300 acres, and yet I have the pleasure of seeing the rubbish torn from the ground by the steam cultivators. I entered upon the farm, which had been much neglected, two years ago, and but for steam I know not what I should have done."

The advantages of steam work when the soil is too hard and dry for horse plowing commend themselves most forcibly to our farmers. We quote from the *Agricultural Economist* commenting on the present season in England: "The possessors of steam tackle have certainly had a good time of it, while many farmers have had to submit to the annoyance of seeing their horses jilt so far as the breaking of land was concerned. We do not remember an autumn which has been so favorable for clearing land, where the power has been equal to the work. An owner of one of Howard's farmer's engines and tackle told us the other day that nothing could have given him greater satisfaction than the work he had been able to accomplish this season, while all around him his neighbors had been compelled to suspend plowing because of the dry, hard condition of the soil. Nothing can prove such a practical argument in favor of steam power properly applied as a walk over a farm under steam cultivation at this time. Steam has enabled farmers to take time to the forelock, and to utilize the hard, dry weather by breaking stubbles and going on with all necessary operations, and thus doing away with all grass and weeds; while farms under the ordinary plow are only partially and imperfectly cleared, and must remain an eyesore to the occupiers until the spring is far advanced."

Is not this a deduction from experience with steam plowing which is of sharp application to our general conditions? It would give us the mastery of the soil at a season when there is abundant time to work it, and it would leave it in such condition that the earliest of the fall rains could sink deep and deposit themselves for the future needs of the plant. Under conditions which do not favor dry sowing, the advantage would be almost as great, for if the soil were thoroughly stirred beforehand, a very slight cultivation would prepare the seed bed for later sowing. The advantage of plowing the summer-fallow, even in spite of the difficulty with which it is now accomplished, is generally recognized. It would be directly productive of profit, then, if the engines, when not driving the threshers, could be kept employed in working the fallow as well as plowing for direct seeding.

We hope that a thorough and careful test of steam cultivating machinery will be made, both in its effect upon soils which have been long crusted under the old system, and in the matter of comparative expense of doing the work and other matters relating thereto. We should not pass untried progressive ideas which are demonstrating their value elsewhere.

The Government of Colombia has made a contract with an Englishman named Ross for the construction of the Central railroad for \$20,000,000. Panama subscribers \$250,000 per annum as a subsidy, it is reported.



CENTENNIAL PREMIUM HEREFORD BULL, "SUCCESS."

mountains must hence contain certain representatives of three very distinct American floras, each characteristic of immense areas of the continent. There are two temperate and two cool or mountain floras, viz.: 1. A prairie flora, derived from the eastward. 2. A so-called desert and saline flora, derived from the west. 3. A sub-alpine; and, 4. an alpine flora—the two latter of widely different origin, and in one sense proper to the Rocky mountain ranges."

The principal American regions with which the comparison will have first to be instituted are four. Two of these are, in a broad sense, humid; one, that of the Atlantic coast, which extends thence west to the Mississippi river, including the forested shores of that river's western affluents; the other that of the Pacific side, from the Sierra Nevada to the western ocean; and two inland, that of the northern part of the continent, extending to the polar regions, and that of the southern part, extending through New Mexico to the Cordillera of Mexico proper.

The first and second (Atlantic plus Mississippi and the Pacific) regions are traversed by meridional chains of mountains approximately parallel to the Rocky mountains; namely, on the Atlantic side, by the various systems often included under the general term Appalachian, which extend from Maine to Georgia, and on the Pacific side by the Sierra Nevada, which bounds California on the east. The third and fourth of the regions present a continuation of the Rocky mountains of Colorado and Utah, flanked for a certain distance by an eastern prairie flora extending from the British possessions to Texas, and a western desert or saline flora, extending from the Snake river to Arizona and Mexico. Thus the Colorado and Utah floras might be expected to contain representatives of all the various vegetations of North America, except the small tropical region of Florida, which is confined to the extreme south-east of the continent.

The most singular botanical feature of North America is unquestionably the marked contrast between its two humid floras, namely, those of the Atlantic plus Mississippi, and the Pacific one; this has been already illustrated and discussed by Dr. Gray in various communications to the American Academy of Sciences and elsewhere, and he has further largely traced the peculiarities of each to their source, thus laying the foundations of all future resources into the bo-

to each. The Rocky mountain region again, though abundantly distinct from both, has a few elements of the eastern region and still more of the western.

Many interesting facts connected with the origin and distribution of American plants and the introduction of various types into the three regions, presented themselves to our observation or our minds during our wanderings; many of these are suggestive of comparative study with the admirable results of Heer's and Lesqueren's investigations into the phytocenosis and miocene plants of the north temperate and frigid zones, and which had already engaged Dr. Gray's attention, as may be found in his various publications. No less interesting are the traces of the influence of a glacial and a warmer period in directing the course of migration of Arctic forms southward, and Mexican forms northward in the continent, and of the effects of the great body of water that occupied the whole saline region during (as it would appear) a glacial period.

Lastly, curious information was obtained respecting the ages of not only the big trees of California, but of equally aged pines and junipers, which are proofs of that duration of existing conditions of climate, for which evidence has hitherto been sought rather amongst fossil than amongst living organisms.

LOCATING AN OBSTRUCTION IS A PNEUMATIC TRICK.—The French have a very ingenious plan for locating an obstruction, thus overcoming a difficulty in pneumatic transmission that has often been a source of great expense. It appears, when an obstruction exists anywhere in the underground tubes, its location is determined by firing a pistol into the tube; the resulting wave of compressed air, traversing the tube at the rate of 1,000 feet a second, strikes the obstruction, and is then reflected back to its origin, where it strikes against a delicate diaphragm, and its arrival is recorded electrically upon a very sensitive chronograph, on which also the instant of firing the pistol had been duly recorded. The wave of sound, on reaching the diaphragm, is recorded, and thence reflected back, and a second time strikes the obstacle and returns to the diaphragm. This operation is several times repeated, so that several successive measurements can be made of the time required by the sound wave to traverse to and fro within the pneumatic tube.

ties, on one of which the pattern is formed in relief, and on the other in *intaglio*, the metal being placed between them, and brought into the desired shape by pressure. Dies are also made in metal for forming articles in gutta-percha and leather, and producing embossed figures on the cloth covers of books, as well as on card-board, paper, etc.

HEREFORD CATTLE.

We herewith give an illustration of the Centennial premium bull "Success," an animal which has achieved many victories.

The rivals of the Southfield show, in England, have been the Short Horns and the Herefords. A few years ago each had taken the same number of first premiums for fat bullocks, and now the friends of Herefords claim the victory.

Of the career of the Herefords in this country it may be said that they have made a good record at the State fairs in New York for nearly 40 years, as also in Ohio for 25 years past. At the northern Ohio fair, in 1876, they took the sweepstakes premium for the best breeders' herd of a bull and four heifers bred and owned by the exhibitor, and for the best herd of bull and four cows or heifers. Another herd of Herefords, in 1876, took the third premium from seven Short-horn herds at the Michigan State fair.

AGRICULTURE IN GERMANY.—Mr. H. M. Kennedy, who is studying in Germany, writes as follows: "They are farther behind in agriculture here than I thought, especially as regards implements. The plows and wagons remind one of barbarous ages, and they drive the workhorses—which are noble animals—with a piece of rope, instead of lines. But year after year they get magnificent crops of potatoes, rye, oats, wheat and vegetables. No sooner are the crops off in the fall than they turn over the stubble for the next crop. But they take care of the manure. They save it in the cities and villages, and not the straw. They go around with cylindrical carts in the city, and pump up the contents of all the water closets, and spread them upon the soil. By such means they are able to make the country one compact mass of vegetation with villages thickly scattered between the rows. The cows are nearly all Holsteins, and goats' milk is also fashionable."