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EXPLORATIONS IN THE HAWAIIAN ISLANDS.

PROF. A. S. HITCHCOCK, of the U.S. National Museum, and his son, travelled recently in the Hawaiian Islands, studying the flora, especially with reference to the grasses, making what might be termed a forage survey.

The islands visited were Kauai, Oahu, Lanai, Molokai, Maui, and Hawii. They are all of volcanic origin and composed of lava, except a very small part, which is of coral formation. Kauai, geologically the oldest island, shows the greatest effect of erosion, its deep eanyons rivalling the beauty of the Grand Canyon of Colorado. The rainfall on the mountains of the windward side is excessive, that of Waialeale, the highest peak of Kauai, being as much as 600 in. per annum. But the lee side of the islands is arid, the rainfall being often reduced to fewer than 15 in. per annum.

To the south the islands are successively younger, Hawaii, the largest, being even now in a state of volcanic activity. On this island are situated the two highest peaks of the group, Mauna Kea, 13,825 ft., and Mauna Loa, 13,675 ft. in height. There is scarcely any vegetation upon these peaks, above 10,000 ft., especially upon Mauna Loa, which is made up of comparatively recent lava. Much snow covers the peaks in winter, extensive banks persisting throughout the year. The magnitude of the mountain mass is greater than at first appears, because the cones arise from the very floor of the ocean, 18,000 ft. below the surface, thus making the total height more than 30,000 ft. So gradual is the slope from the sea to the summit that the eye is deceived and the great height is not at first fully appreciated. The active volcano, Kilauea (4000 ft.), with its pit of boiling lava, is on Hawaii, while Haleakala, said to be the largest crater in the world, is on Maui, the second largest island of the group.

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Important agricultural industries of the island include sugar, live stock, and pineapples. The native Hawaiian population is decreasing, and it is only in the less accessible parts of the islands that the primitive customs still prevail. Here may be found the native grass huts made of a wooden framework filled in with a thatch of grass. The grass used for this purpose' is usually pill (*Heteropogon contortus*), an indigenous grass, abundant upon the rocky soil of the lowlands.

The introduced flora is very noticeable near towns, ranches, and plantations, and one must go several miles from Honolulu to find indigenous or native plants. Of sixty species of grasses found on Oahu, about fifty were introduced from foreign countries. One of the introduced trees of great economic importance is the algaroba tree (*Prosopis juliflora*) or kiawe, as the Hawaiians call it. It is found in a belt on the lowlands along the shores of all the islands, and occupies the soil almost to the exclusion of other plants. The pods are very nutritious, and are eagerly eaten by all kinds of stock. Its flowers furnish an excellent quality of honey. The Molokai ranch alone produces 150 to 200 tons of strained honey per year. The prickly pear cactus (*Opuntia tuna*) has become extensively naturalised in the drier portions of all the islands. Two introduced shrubs, Guava and Lantana, now occupy extensive areas, and have become great pests. In the moister portions of the islands large areas have been occupied by Hilo grass, which has little value as a forage plant. The kukui, or candlenut, tree (*Alcurites moluccana*), with its light, almost silvery, green foliage is now a common and rather striking element in the valleys and gorges.

The indigenous flora is highly interesting, though not abundant in species. Two of the commonest trees are the ohia (Matrosideros polymorpha) and the koa (Acacia koa). The former, also called ohia lehua and lehua, resembles, in the appearance of the trunk, our white oak, but bears beautiful clusters of scarlet flowers with long, protruding stamens. The koa produces a valuable wood much used in cabinet-making. Characteristic of the upper forest belt on the high mountains of Hawaii is the mamani (Sophora chrysophylla), a legu-minous tree with long, drooping clusters of yellow flowers and long, four-winged pods constricted between the seeds. In the arid regions is found the wiliwili (Erythrina monosperma), a deciduous tree with gnarly growth. Its bare branches are conspicuous, as deciduous trees are unusual in the tropics. It has very soft light wood, and bright scarlet seeds. Among the peculiar plants of the islands is the silversword (Argyroxiphium sandwicense), a strikingly beautiful composite with glistening silvery leaves, which grows only on the slopes of cinder cones in the crater of Haleakala, and in a few very limited localities on Hawaii. The family Lobeliaceæ is represented by about 100 species belonging to six genera. The numerous arborescent or tree-like species are very peculiar and characteristic. Many of them form slender trunks like small palms, crowned with a large cluster of long narrow leaves, the trunks of some species being as much as 30 or 40 ft. high.

The indigenous grasses of the Hawaiian Islands are not numerous. A tall species of Eragrostis is the dominant grass upon the plain between Mauna Loa and Mauna Kea. Upon many of the summits of the high mountain ridges in the regions of heavy rainfall are found open bogs which support a peculiar and interesting flora. Many species form more or less hemispherical tussocks which rise above the general level of the bog. A showy lobelia with numerous large cream-coloured flowers as much as $3\frac{1}{2}$ in. long, peculiar violets, and a sundew are found there. These boggy areas are devoid of trees, and sometimes occupy rather extensive areas, the one on Mt. Waialeale covering several square miles. Three species of tree ferns are found on the islands,

Three species of tree ferns are found on the islands, and in some places form extensive forests. These plants produce at the base of the stipe a great ball of brownish-yellow wool called pulu by the natives, and used by them for stuffing pillows and mattresses.

HIGHER EDUCATION IN THE UNITED STATES.

THE report of the U.S. Commissioner of Education for the year ended June 30, 1916, has been received from Washington. It consists of two bulky volumes, one running to 692 pages and the other to 663 pages. The first part contains a comprehensive survey of the progress of education in the United States for the school year 1915-16, and also a similar account of educational progress in all those foreign countries from which the U.S. Bureau of Education could obtain sufficient information. The second volume is given up to educational statistics, but owing to the difficulty of compiling such a mass of data and the time absorbed in the task, the numbers provided deal only with the year 1914-15.

The Cost of American Education.

The estimated cost of education in the United States in 1914 was very nearly 160,000,000l. An estimate, making due allowances for the time which has elapsed since the date given, would easily bring the current educational expenditure in the States to 200,000,000l. Public elementary schools cost approximately 100,000,000l.; public high schools, 14,000,000l.; private elementary schools, 10,400,000l.; private secondary schools, 3,000 000l.; universities, colleges, and professional schools, 20,000,000l.; and normal schools, 3,000,000l.

Gifts and Bequests.

The Bureau of Education periodically publishes tabular statements showing the amounts of gifts and bequests to education. The total for 1914 reached 6,271,490., the greatest ever recorded for a single year. For the academic year 1914–15 the total amount received in this way was 4,062,050l.; and of this about 1,997,000l. was for increase of plant, 711,300l. for current expenses, and 2,153,800l. for endowment. Thirty-five universities, colleges, and technological schools reported gifts of more than 20,000l., the total amount received by these institutions reaching 2,987,160l. The following institutions each received more than 100,000l.:--Johns Hopkins University, 271,820l.; Wellesley College, 255,585l.; Harvard University, 244,000l.; University of Pennsylvania, 234,700l.; University of Chicago, 228,876l.; Yale University, 193,160l.; Princeton University, 157,909l.; and Massachusetts Institute of Technology, 155,453l. The generous benefactions received for education in the States duving distations received for education in

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Universities and colleges	 	5,334,010
Schools of theology	 	311,660
Schools of law	 	40,610
Schools of medicine	 	299,150
Public normal schools	 	121,490
Private normal schools	 	23,260
Private high schools	 :	141,310

£6,271,490

For the forty-four years from 1871 to 1914 inclusive the grand total of gifts and bequests to American education reaches 116,883,616*l*.

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Number of Students.

For the year ending June, 1915, the U.S. Bureau of Education received reports from 563 universities, colleges, and technological schools in the different States. States and municipalities control ninety-five of these institutions, and private corporations control 468. There were 237,168 students in the collegiate and resident graduate departments of these institutions, and of this total 84,861 were women.

In the year 1915, 29,608 baccalaureate, 4140 graduate, and 883 honorary degrees were conferred. The degree of doctor of philosophy was conferred on examination by forty-three institutions on 486 men and 60 women.

Agricultural and Mechanical Colleges.

The institutions commonly known as "agricultural and mechanical colleges," or "land-grant colleges," are dealt with in a separate chapter of the report. In some States, it should be remembered, the agricultural and mechanical colleges form parts of the State universities, and in such cases the statistics respecting such universities concern themselves also with the activities of these departments.

During 1914–15 particulars respecting sixty-nine agricultural and mechanical colleges were collected by the bureau. In the fifty-two institutions for white students there were 9742 instructors of various grades, and in the seventeen institutions exclusively for coloured students there were 529 instructors. The total number of students in these institutions was 125,075.

The total income of these colleges for 1915 was 6,392,353*l*., of which 3,601,221*l*. was State and the remainder Federal aid. In addition, the colleges received the following grants for the year :--U.S. grant for experiment stations, 273,858*l*.; State grants for extension work and farmers' institutes, 215,001*l*.; and U.S. grant for extension work, 98,248*l*. The distribution, according to source, excluding the experiment station funds and the extension and farmers' institute funds, was Federal government 11 per cent., State 56 per cent.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE inaugural address for the session 1917-18 of the London (Royal Free Hospital) School of Medicine for Women will be delivered by Dr. L. Garrett Anderson, C.B.E., on Monday, October 1, at 3.30 p.m. The subject will be "Ambition."

MENTION was made in NATURE of May 17 (p. 238) of a bequest by the late Mrs. E. D. Denning, of South Norwood, of property for the application of modern scientific knowledge to educational needs. It is now announced in the *Times* (September 18) that Mrs. Denning left estate of the gross value of 169,719*l*., the net personalty being 78,581*l*. By her will she bequeathed "to the Public Trustee all her freehold property in trust for a 'Frank Denning Memorial ' for the advancement and propagation of education in mechanical science in any part of the United Kingdom, with preference to those persons who reside in the Borough of Croydon."

A SECONDARY-SCHOOL Examinations Council has been constituted by the President of the Board of Education to assist the Board in the co-ordination of the examinations to which secondary schools now submit their pupils. The council is to consist in the first instance of the following representative members, with the Rev. William Temple, formerly headmaster of Repton School, as chairman:—Oxford and Cambridge Schools Examination Board, Mr. P. E. Matheson; Oxford Delegacy for Local Examinations, Mr. H. T. Gerrans;

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