southern California, and the following zones are recognized, according to the classification of C. Hart Merriam: Sonoran, Transition, Canadian, Hudsonian and Boreal. A useful census of California trees is given where the species are not only arranged according to families, but the occurrence of each in the several previously mentioned phyto-geographic provinces is given. Jepson recognizes the difficulty of always deciding as to whether a species is a tree or a shrub by a brief account of the arboreous forms of shrubs, such as *Prunus demissa, Alnus tenuifolia,* toyon *Heteromeles arbutifolia,* etc. A list of the typically Californian species is added. Perhaps to the ecologist, the most interesting part of the memoir is the one devoted to the dendrologic characters of California trees. These are considered under the captions, mutilation and regeneration, seed production, architectural forms, wind-controlled tree forms, weeping trees, vanism in endemic species, natural hybrids, the "walnut-oak hybrids," teratology, leaf persistence, age of California trees and a bibliography with consideration of nomenclature.

After a synopsis of families, the author proceeds to minutely describe the characters, botanic habitat and history of each tree found in the Californian region and these full descriptions are supplemented by the plates of trees in the forest, as well as numerous plate figures illustrating the botanic characters of each tree admitted into the volume, as occurring within the confines of the state. Two maps illustrate the geographic distribution of the big trees (*Sequoia gigantea*) and a third is a general map of California showing the mountain chains, valleys and river systems of most importance to phytogeography. To make the work completely rounded, a subject index and a geographic index conclude the memoir. Altogether in a most thorough manner, Professor Jepson leaves little for the future botanist to consider from the purely systematic standpoint. The volume ably supplements the account of the California trees given in Sargent's "Silva," in Ludworth's "Forest Trees of the Pacific Slope" and in Britton and Shafer's "North American Trees."

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Hawaii and its Volcanoes. By Charles H. Hitchcock, LL.D., Emeritus Professor of Geology in Dartmouth College. Pp. viii + 314; 52 plates. Honolulu, The Hawaiian Gazette Co., Ltd. 1909. Second edition, with supplement of 8 pages, 1911.

The Hawaiian Islands have long attracted the attention of vulcanologists because nowhere else in the world can basaltic volcanoes of such majestic proportions be so easily studied as to both past history and the phenomena of active eruption. While but two centers can be described as now active, there are many others where erosion has revealed details of internal structure and petrographic constitution.

It is but natural that with nearly all explorers of the islands the liveliest interest has attached to Mauna Loa and Kilauea, where the spectacular phenomena of basaltic eruptions are displayed every few years and may be observed with ease and safety. Owing to the frequency of these eruptions during the last hundred years there is quite an extensive literature recording the observations of different outbursts, by geologists or laymen.

Kilauea in particular presents such an unrivalled opportunity for the study of the working of a basaltic volcano that several writers have given much space to recording its observed changes in historic times. Dana's well-known "Characteristics of Volcanoes" devotes nearly two thirds of its space to Kilauea and Mauna Loa, giving with considerable detail the recorded history of these volcanoes. Dutton, in his Geological Survey report on the Hawaiian Islands,[1] also quotes extensively from the published records of the principal eruptions of the active volcanoes.

It is clearly desirable that the eruptive history of Kilauea and Mauna Loa should be made as complete as possible, so that the student of present and future conditions at

[1] Fourth Ann. Rept. U. S. Geol. Survey, 1882–3.

these centers may have at his disposal all recorded observations of the phenomena of earlier outbreaks or periods of quiet. During a residence of several years in Hawaii, Professor Hitchcock has sought to complete the record of the active volcanoes by search of all available sources of information and by personal study of many features. The book under review is the result of this research. Its object is said to be "to describe correctly the phenomena connected with the discharges of molten lava from the two great Hawaiian volcanoes—Kilauea and Mauna Loa." "It is presumed that all the Hawaiian volcanoes throughout the archipelago have been developed in a similar manner. . . ."

From this point of view the work is the most satisfactory source of information on the subject, because compiled with care and with the aim of completeness.

The work is arranged in four parts. Part I., of 55 pages, is called Physiography of the Hawaiian Archipelago. Here may be found a brief but desirable sketch of the character and relations of the reefs and low islands which stretch away for more than a thousand miles to the northwest of Niihau, the most westerly inhabited island of the main group. In this part is found, also, the entire description, physiographic and otherwise, of Kauai, Oahu, Molokai, Maui and even of Hawaii, exclusive of the active volcanoes. Considerable space, relatively, is given to the stratigraphy of the water-bearing tuffs and coraline sands and limestones in the vicinity of Honolulu, to the study of which the author has given much attention.

Parts II. and III. are devoted, respectively, to the great volcanoes of Mauna Loa and Kilauea, and consist, as above indicated, chiefly of the compiled record of exploration and observation. Valuable as this record is, it serves to emphasize the fact that up to the present time little attempt has been made to study the phenomena displayed in other than a rather superficial manner. The actual physics of basaltic magma, the gaseous emanations accompanying it, the chemical composition of special magmas exhibiting certain phenomena, and the whole vast problem of volcanic energy, have scarcely been touched by observations thus far made at these volcanoes. It is to be hoped that some plan for more thorough investigations may be carried out. The field is certainly a most promising one.

Part IV. reviews The Hawaiian Type of Volcanic Action by summarizing the phenomena observed and citing the views of various authors as to their explanation. The comparison of Lunar and Hawaiian physical features by Pickering is specially noted.

In an appendix (17 pages) are given notes on earthquakes in Hawaii, the origin of the moon, the use of the spectroscope, a table of analyses of Hawaiian lavas, and biographical notes of explorers of the islands.

The second edition presents a supplement of eight pages, containing further data on certain eruptions, a criticism of W. T. Brigham's volume "The Volcanoes of Kilauea and Mauna Loa,"[2] and a list of errata, which is by no means complete.

The illustrations of this work are chiefly half-tone reproductions of photographs, which give an excellent idea of the volcanoes and their lava forms, and valuable sketch maps of the craters at several stages of development. The book is attractively gotten up, well printed, and is a credit to the enterprise of the Honolulu newspaper house which has published it.

WHITMAN CROSS

SPECIAL ARTICLES

THE PERMEABILITY OF LIVING CELLS TO SALTS IN PURE AND BALANCED SOLUTIONS

OVERTON performed experiments on *Spirogyra* and other plant cells and later upon various animal cells and came to the conclusion that only those substances penetrate which are soluble in lipoid. His criterion of penetration is simple and precise. If a solution plasmolyzes a cell and the protoplast does not subsequently expand if left in the solution it is clear that the dissolved substance does not penetrate. If it penetrated it would gradually

[2] "Memoirs of the Bernice Pauahi Bishop Museum," Honolulu, 1909.