

in the work. Difficult analyses should be made by specialists. Each title in the bibliography should be confined as closely as possible to a single subject, even to the extent of entering the several chapters of the work as separate titles whenever they treat of distinct subjects. The whole work may be integrated under its own title by giving the list of its chapters in the analysis of the work itself.

Aside from its cost, the principal difficulty in the preparation of a bibliography like that described lies in getting any person or persons to undertake the labor and responsibility of writing or editing the work. The magnitude of the task is apparent. If, however, the work can be issued as a current bibliography, with no regard to the order of titles or the connection of subjects, making use only of such material as may be available at the time, and attaching to each title a current number to serve for reference from an index, no editor need feel oppressed with the magnitude of his task. Whatever is done will be a step in the right direction; and the work may, if need be, temporarily be abandoned, without a loss in value of what has already been accomplished. It is only necessary that the titles of chapters and articles be given accurately, and that the analytical references be made fully; while the rest may be left to others who for their own purposes will make indexes to take the place of any special analyses of contents.

The publishing section was duly organized before final adjournment, and this move on the part of the association is of the first importance. The section will begin at once the publication of indexes to scientific and other essays, and prosecute whatever work may be found practicable in the line of co-operative bibliography.

The association were handsomely received and entertained by the mayor, the Hon. Emil Wallber, and citizens of Milwaukee; and the success of the meeting was largely secured through the exertions of Mr. K. A. Linderfelt of the Milwaukee public library. On Monday, the 12th, the association left Milwaukee for an eight-day excursion in northern Wisconsin.

The officers elected for the ensuing year are, president, Dr. Poole; vice-presidents, Mr. Spofford (Library of congress), Judge Mellen Chamberlain (Boston public library), and Mr. W. E. Foster (Providence public library); secretary, Prof. Melvil Dewey; assistant secretary, Mr. Richardson; treasurer, Mr. Carr of Grand Rapids.

At the conclusion of its last session, the association was adjourned to meet at the Thousand Islands, in the second week of September, 1887.

DAVID P. TODD.

HONOLULU LETTER.

THE Sandwich or Hawaiian Islands, situated about 2,000 miles to the south-west of San Francisco, are commonly reckoned at twelve in number, four of them ranging from 500 to 3,950 square miles in area, and the entire group amounting to 6,040 square miles. On examining a good chart of the Pacific Ocean, one finds a row of small islands and shoals having the same trend with, and being really a north-westerly extension of, the Hawaiian group. There are fourteen of these in addition to those usually styled the Sandwich Islands, twelve of which are claimed by the Hawaiians, while the two most remote belong to the United States, and are known as Midway and Ocean Islands. The U. S. government is said to have expended \$100,000 in improving the harbor of Midway Island, and coal is stored here also for the benefit of our war vessels and Japanese steamers. It would appear that this harbor has not answered expectations, and consequently negotiations have been commenced with reference to the cession to the United States of certain privileges at the Pearl Harbor district near Honolulu.

Two diverse theories meet us in the attempt to explain the origin of this extensive chain, between the meridians of $154^{\circ} 30'$ and 180° , and 1,725 miles in length. They are cones rising from a submarine plateau 16,000 to 18,000 feet below the surface. One view is that they are of volcanic origin, commencing as submarine volcanoes, and built up of their own ejecta, even to the height of 14,000 feet above the sea-level. The smaller ones are atolls, and are usually encircled by coral reefs; so that, after their original volcanic start, they must have been submerged for the accumulation of the organic growth. The other view ascribes their origin to an enormous subsidence, the several islands being supposed to be the summits of mountains, the apices of an ancient continent, capped by coral growth. If these were once a continent, we understand why the flora should be so much diversified, since the plants would be driven to the uplands by the gradual subsidence. In the same way it is easy to see how the Hawaiians themselves might have made their way here from the East Indies. The Hawaiian government has established a genealogical bureau at an annual cost of \$5,000, which devotes much attention to the early continental condition of the kingdom, as well as the study of the ancestors of the royal family.

Wallace accepts the former of these theories, and finds, from a study of the plants and animals, affinities with America, New Zealand, and Australia, the relation to the first being the most re-

mote. A botanist finds himself admiring the exaltation of our Compositae and lobelia into trees, and the violets, geraniums, and plantains into shrubs. The native phenogamous flora figures up to 554 species in Mann's catalogue, not including the grasses, and the ferns amount to nearly 150 species. Dr. Hillebrand, a former resident, has studied the plant-life most successfully, and has now in readiness for the press a complete description of all the Hawaiian plants. The government has declined to aid the publication of this volume, and it remains to be seen whether private enterprise will be adequate in bringing it before the public.

The most important scientific work done in the islands is of a topographical character, that of the government trigonometrical survey, under the very capable superintendence of Prof. W. D. Alexander. The annual appropriation has been \$20,000 for many years. This survey was rendered necessary by the change from a feudal system of land-tenure to fee simple. In order to produce satisfactory results, the work must be like that carried on by the U. S. coast and geodetic survey. The boundary lines of the various tracts of land have now been drawn, and maps published of the islands of Oahu and Maui, and that of Lauai is ready for publication, while much labor has been expended upon Hawaii and elsewhere. The map of Maui, just published, is very creditable in every respect. The survey attends also to hydrography and to any special service required for particular purposes, as in the reconstruction of the large burnt district of Honolulu. The Hawaiians have two peculiar words to express the direction of boundaries, *mauka* and *markai* (upward and downward), those being the most natural terms to express geodetic positions in oceanic islands.

Prof. L. L. Van Slyke of Oahu college recently made an elaborate chemical examination of the various waters used for household purposes in Honolulu. The high north and south ridge of Oahu causes the vapors brought by the south-west trade wind to fall upon it and to flow upon the surface and in subterranean channels to the western leeward shore where the city is located. The amount of rainfall varies greatly, according to the locality. Near the ridge the annual precipitation amounts to 150 inches; in the upper part of Honolulu to 70 inches; and at the harbor as little as 30 inches. As the rock is volcanic, there is a predominance of sodium carbonate in the springs, and sodium chloride and lime carbonate in the deep-seated waters brought up artificially. Fresh-flowing water is obtained from the sea-level to the height of 42 feet through artesian boreholes, and this altitude corresponds to a recent elevation of

coral rock, all around the island. There is not enough of the salt and lime compound to injure the water for potable purposes, but sufficient to indicate its marine origin. There are 25 of these flowing wells, the water reaching the same level in every one, and in the very dry season they fall off about three feet. Those yielding water are generally from 200 to 500 feet deep. The layers passed through are separate layers of clay, lava, and coral rock, and the water rises immediately after striking a black basalt at the base of the coral. The deepest well was put down at the edge of a tufa volcanic cone known as Diamond Head to the depth of 1500 feet. As fragments of coral abound in the tufa, it is probable that the volcanic action interfered with the regular downward flow of the rain-water, and this explains the absence of water.

The Hawaiian government is a limited monarchy. It was not until the beginning of the present century that Kamehameha the First brought all the islands under his sway, and founded the kingdom. About 1820 the chiefs rebelled against certain idolatrous observances, just before the arrival of the first deputation of American missionaries. Christianity was soon accepted by the higher classes, and then by the mass of the people; so that in less than half a century the country was regarded as Christian, and the foreign clergy withdrawn. They had in the mean while been instrumental in framing an excellent constitution, and either the missionaries or their descendants have held many of the important offices.

On the first of July there was a ministerial crisis in the kingdom and a new cabinet formed, with the same premier as before, but with new men in all the other offices. The cause of the disruption was partly personal and partly financial. Political parties divide somewhat according to sympathy or opposition to the missionary *régime*. King Kamehameha and his friends exalt the native Hawaiians, and desire to restore old heathenish customs, thereby seeking to awaken sentiments of patriotism. Their influence is against the best form of Christianity, and the men best qualified for their respective offices are dismissed when they sympathize with the missionaries. The king is also desirous of controlling the pastors of the native churches, tempting them to give up the voluntary system of support, and rely upon the government for their pay. The expenses of the government are one and a half millions of dollars annually, — a larger sum in proportion to the population than is raised by most of the states of our federal union. As this income is chiefly raised from the foreign residents, they are much dissatisfied with the government.

Meanwhile the native population is steadily decreasing. In 1823 there were 142,000, against 40,000 in 1884; and the foreigners, including the half-castes, are now as numerous, the sum total of the population being 80,578. The Chinese are the most numerous of the foreigners, amounting to about 18,000. Of the Caucasian element the Americans exceed all others in number. In fact, the islands are practically an American colony, and hence are entitled to such consideration from the U. S. government as is afforded by the reciprocity treaty. The decrease of the native population is due to bad influences introduced by foreigners. If it were possible to enforce rigorous laws relating to intemperance, licentiousness, and leprosy, and to train up the natives to engage in the most suitable occupations, the decrease might be stopped.

The most extensive business is that of raising sugar and selling the raw product to the California refineries. About eighty companies and firms are engaged in the business, and it is estimated that 90,000 tons, worth seven million dollars, will be shipped the present year. The best machinery and the latest improvements are employed in the manufacture of a superior grade. Most of the companies are controlled by Americans or persons of American descent, and the money hired to carry on the business is also American. Some prejudice has been felt against the business, because of the connection with it, in a very prominent way, of Mr. Claus Spreckels, an American citizen who has been very successful. He formerly controlled the sugar business of the islands, and was able to dictate his own prices to the planters. But the planters are now independent of him, as a new refinery has been started in California which actually buys and refines more sugar than Spreckles' establishment. It is fortunate for the Hawaiian government that this gentleman is so largely interested in the islands, as he is able to assist them by loaning funds, though, it must be confessed, with large interest. Perhaps for this reason he has recently reaped a golden harvest by carrying out the principles of the silver metallists. He had the contract for furnishing the government with a million dollars' worth of silver coin, according to the American standard, and realized from the transaction the difference in value between the silver and the gold.

It is unfortunate that the politicians stopped the investigations of Dr. Arning into the nature and possible cure of leprosy. He had instituted experiments with animals and condemned criminals, illustrating the propagation of the disease, and had discovered methods of ameliorating certain

stages of the malady. Nothing could contribute more to the welfare of the Hawaiian kingdom than researches of this character; and the removal of so efficient an experimenter for merely political reasons shows the prime cause of the decadence of the nation. What the government will be in the future, with its mixed population, no one can predict.

There is a social science club in Honolulu, meeting once a month, where questions of social, political, and physical science are vigorously discussed. The June assembly was held at the house of S. E. Bishop, whose name is familiar to the readers of *Science* as the discoverer of 'Bishop's rings' around the sun. Mr. Charles Cooke read a paper upon corporations, enumerating all the legal corporate bodies in the kingdom, followed by Chief Justice A. F. Judd upon the early history of the nation. The premier, Mr. Gibson, had said that the natives had done the most for the welfare of the nation, but Mr. Judd showed conclusively that the early missionaries had often saved the kingdom from destruction, especially when threatened by the irresponsible American, English, and French naval commanders. Had it not been for the prudence of Richards, the elder Judd, and other Americans, bombardment would certainly have followed the threats of those dissolute foreigners. The admirable constitution is due to the advice of the same missionary worthies. K.

Honolulu, July 4.

NOTES AND NEWS.

THE U. S. geological survey has partially mapped out its work for the present year. It will extend over a large portion of the United States. There will be nine parties at work in Virginia, West Virginia, Kentucky, Georgia, North Carolina, South Carolina, Alabama, and Tennessee. Prof. A. N. Thompson will have charge of two field-parties in Oregon, two in California, one in Arizona, three in Texas, and three in Montana. Professor Renshaw will have charge of three parties which will do work in Kansas and Missouri. Four parties working in Maryland, Massachusetts, and New Jersey, will be under the direction of Professor Baker. The chemical laboratory of the survey, which is located in the national museum, will continue during the summer months the examination of rocks, minerals, soils, and other matters necessary before the survey's work is published.

— The coast-survey work is still embarrassed, owing to the lack of funds to continue operations; and no further instructions have been given for field-work, pending the passage of the appropria-