

are able to seek out their food, and are not dependent only upon what they may filter from the sea-water. The investigation has also brought to light a notable change in the reactions of sea-water at different seasons of the year, no doubt in correlation with the development of vast quantities of plankton-organisms.

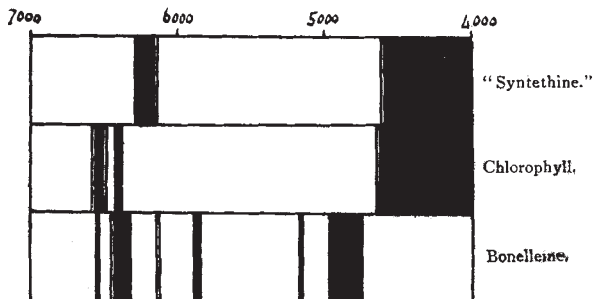


FIG. 2.—Absorption bands of pigments.

In spring (April) the water, not only near the shore but in the open sea, is acid to phenolphthalein, while in summer (August) it is distinctly alkaline to the same indicator, a change which signifies an enormous conversion of carbon in the inorganic into carbon in the organic form.

Prof. Moore, Dr. Adams, and others have studied the chemical changes taking place in the reproductive organs of the sea-urchin. They have found that, under normal conditions of nutrition, the amount of food consumed by a sea-urchin is many times that required for the ordinary metabolic uses of the animal. The excess is converted into storage products—glycogen, lecithides, and fats—which, throughout the non-breeding period, accumulate in the reproductive organs in quantities as great as are usually found in the liver or hepato-pancreas of other animals, and form a reserve for use during the breeding season.

Prof. Herdman has continued his observations on the occurrence of the dinoflagellate *Amphidinium* on the beach at Port Erin, and records certain variations in the form of this organism, and the alternate appearance in the same area, during the early part of the year, of *Amphidinium* and of diatoms (*cf.* NATURE, November 28, 1912, p. 371).

Prof. Herdman and his assistants have collected and examined, during 1912, about 400 samples of plankton from Port Erin and the neighbourhood. These show that diatoms, dinoflagellates, and copepods succeed each other in the summer plankton of the Irish Sea. The autumnal phyto-plankton increase was greater than usual in 1912, immense numbers of diatoms, chiefly *Chaetoceras*, being present in the latter part of September. Plankton gatherings were also made along the chain of the Outer Hebrides, and proved to be oceanic in character.

During this Hebridean cruise, specimens of the ascidian *Syntethys hebridicus* were dredged. They were pale green when alive, but when placed in spirit became mauve or violet in colour. The colour is due to a new pigment, syntethine, the absorption-bands of which differ from those of chlorophyll and bonelleine (see Fig. 2).

NO. 2258, VOL. 90]

NOTES ON THE CEREMONIES OF THE HOPI.¹

MR. H. R. VOTH is known to all students of North American ethnology for his researches into the sociology and religion of various Pueblo groups, and now, owing to the resources of the Stanley McCormick benefaction, they are indebted to him for further studies on the Hopi of Arizona. The description of the Oraibi winter and summer Marau ceremonies is the result of several partial observations in different years; as the ceremonies are sometimes going on day and night, it is a physical impossibility for one man to make an exhaustive study of a nine-day (and night) ceremony at one time, but a protracted study of the same ceremony, on different occasions, has several compensations, and it is evident that Mr. Voth has done all that was possible to render his account accurate and as complete as circumstances would permit.

As an instance of Mr. Voth's method, it may be mentioned that he gives the names of those who take important parts in the ceremonies. Even these isolated villages are subject to the social and religious influence of the white man, so these careful investigations are of especial value. In addition, "Strife and contentions between the different factions have driven a large part of the inhabitants from the village [of

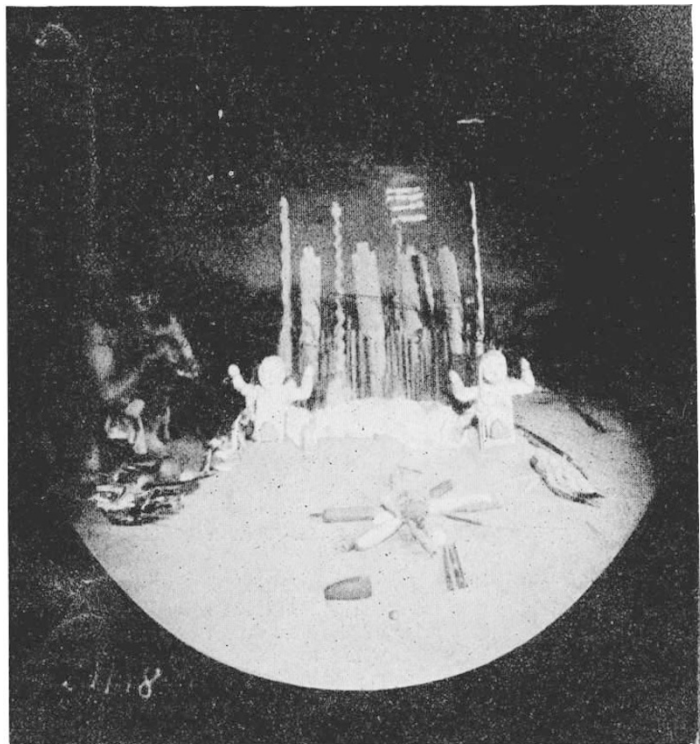


FIG. 1.—The chief priest smoking over prayer offerings. From "The Oraibi Marau Ceremony."

Oraibi]. These have started new villages. This fact makes it highly probable that the Marau ceremony, as well as the others, will, in the future, never be the elaborate affairs that they used to be in the past."

¹ Field Museum of Natural History. Anthropological series, vol. xi., No. 1, Publication No. 156. "The Oraibi Marau Ceremony." By H. R. Voth. Pp. 88+plates. Vol. xi., No. 2, Publication 157. "Brief Miscellaneous Hopi Papers." By H. R. Voth. Pp. v+99-149. (Chicago, 1912).

The chief interest of the Marau Society is that it "is a woman's fraternity, and in Oraibi has its own kiva, or underground ceremonial chamber; but, as is the case with all women's societies, a number of men also belong to the order, who perform certain functions and control certain sacred objects in all the ceremonies." The cult conforms to the usual type of the ceremonies

The ceremonies are too elaborate to describe; they consist largely of ceremonial smoking, asperging, sprinkling meal, offering feathered prayer-sticks, repeating prayers, and the like (Fig 1) It is significant that this woman's ceremony is connected with agriculture, and that, as in other societies, the summer or autumn ceremonies are more elaborate than the winter performances. A free translation of one of the songs runs as follows:—"Now then, here we array (decorate), these four different ones (somewhere in the four world quarters), our fathers, the chiefs (deities); therefore cooperate we here with our offerings. From somewhere, may, with their help, the four different ones (the deities of the four world quarters) have pity upon us quickly, and let it rain at the right time."

Mr. Voth has wisely given all the details he observed, but it would be very helpful if he would prepare a short synopsis of this and other ceremonies giving only such details as are sufficient to illustrate the symbolism of the ritual, and describing the real significance of the ceremony and the religious sentiments which it is designed to promote. Certain words in many songs, and often those of entire songs, are not understood by the Hopi; generally these are not archaic Hopi words or songs, but have been introduced from the Pueblo Indians on the Rio Grande—another example of cultural borrowing.

In the notes on modern burial customs of the Hopi Mr. Voth says that a child which has not yet been initiated into one of the religious societies is not buried in a cemetery but a crevice in the edge of the mesa (Fig. 2). A road is made then towards the child's home, because it is believed that the soul of that child returns to the house of its parents, and is reincarnated in the next child to be born in that family. Other notes deal with the Eagle cult of the Hopi, the Oraibi new year ceremony, the winter ceremony of the Drab Flute Society,

and Hopi marriage rites. An important element in the last is the washing of the hair of the couple, "and especially the washing of the two heads in the same bowl is said to be the 'crucial moment' in which the two are supposed to 'become one.'" Most of the articles are richly illustrated by photographs.

A. C. HADDON.



FIG. 2.—Children's burial places, top view. The piles of the smaller stones at the edge of the mesa, on some of which sticks and food bowls may be seen, indicate the crevice graves. From "Brief Miscellaneous Hopi Papers."

of the Pueblo Indians. There are altars with a screen of slabs of wood representing cornstalks, lightning, and deceased members of the order, at the sides are figurines of the deities of the order, in front is the medicine bowl with six ears of corn, aspergills, &c., trays with meal, rattles, bone whistles, and other articles used in the rites.

NO. 2258, VOL. 90]