# SCIENCE:

*A WEEKLY NEWSPAPER OF ALL THE ARTS AND SCIENCES.*

PUBLISHED BY

N. D. C. HODGES,

874 BROADWAY, NEW YORK.

SUBSCRIPTIONS.—United States and Canada..... .....$3.50 a year.
Great Britain and Europe..... 4.50 a year.

Communications will be welcomed from any quarter. Abstracts of scientific papers are solicited, and one hundred copies of the issue containing such will be mailed the author on request in advance. Rejected manuscripts will be returned to the authors only when the requisite amount of postage accompanies the manuscript. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guaranty of good faith. We do not hold ourselves responsible for any view or opinions expressed in the communications of our correspondents.

Attention is called to the "Wants" column. It is invaluable to those who use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

For Advertising Rates apply to HENRY F. TAYLOR, 13 Astor Place, New York.


## THE HOPKINS SEASIDE LABORATORY.

BY DAVID S. JORDAN.

ONE of the best equipped and most favorably situated of the marine laboratories for research is the Hopkins Seaside Laboratory on Monterey Bay in California. This institution is an outgrowth from the biological departments of the Leland Stanford, Jun., University, its equipment having been provided for by the generosity of Mr. Timothy Hopkins, one of the trustees of the University. The laboratory is situated on a rocky point of land known as Point Aloha, which juts into Monterey Bay near the village of Pacific Grove. The laboratory is a two-story, frame building sixty feet by twenty. On each floor the many windows make the sides of the building virtually of glass. The lower floor is devoted to aquaria and to work in connection with aquaria. The upper floor is fitted up for advanced research, with private rooms for workers in special fields. On the lower floor are seven aquaria provided with running water, besides various glass jars and similar vessels used for the study of smaller animals.

The fauna of Monterey Bay is peculiarly rich, as the life histories of the animals of this region have been scarcely studied by zoologists. The laboratory, therefore, offers special attractions to naturalists, particularly to workers on tunicates, jelly fishes, star-fishes, fishes, and nudibranch mollusks. The material for zoological purposes is extremely abundant, and one singular feature of the life of this region is the immense size to which many animals grow as compared with the size reached by their relatives in the Atlantic.

In the aquaria I notice many specimens of salpa, large transparent tunicates, reaching a length of four or five inches. There are nudibranch mollusks (*Aplysia*) nearly a foot in length, and a twenty-armed star-fish (*Pycnopodia*) whose span covers the whole height of one side of the aquarium. This creature has been timed in making a circuit of the four sides of the aquarium, covering the distance of about nine feet in just four minutes. Immense jelly fishes which will almost fill a bushel basket are also very common, and sea anemones, reaching a size by which the largest of the Atlantic seem like marigolds compared with sunflowers. Tunicates, chitons, limpets, sea urchins, sea anemones, octopus, and squid exist in great abundance and variety. Among the fishes are also many forms of interest in the aquaria, numerous species of blennies and sculpins abounding about the rocks. The blue hag-fish (*Polistotrema*) occurs in great abundance. This is an eel-shaped fish about a foot to a foot and a half in length, which lives as a parasite in the bodies of other fishes. It enters at the eye or at the throat or some other soft place, and then by means of the rasp-like teeth, makes a hole in the body of its host and in time without breaking or disturbing the bones or viscera of the unfortunate animal, it will devour the entire muscular system of the fish on which it feeds. Many of the larger flounders and like fishes obtained in the Bay of Monterey are found to be half-devoured or reduced to mere hulks by the operation of this singular fish. The locality is especially favorable for the study of the viviparous surf-fishes and rock-fishes. The huge torpedo or cramp fish, which is found across the bay about Soquel, also invites investigation. As I write, a grampus 12 feet in length is brought in in a dray-wagon by a Portuguese fisherman from Monterey, while a constant stream of objects of interest comes in from the Chinese fishing camp at Point Alones. The marine flora of the Bay of Monterey is equally interesting. About one hundred and twenty species of sea weeds have been collected by Mr. Bradley M. Davis, who has charge of the work in botany. These range in size from the giant kelp, which here has a length of thirty or forty feet, down to the minute algæ about the wharves.

The laboratory is well supplied with collecting apparatus, with microscopes, reagents, embedding apparatus, and the usual material for study, this being brought from the laboratories of the Stanford University. About thirty students have been in attendance during the summer, some of these being advanced workers in different departments, some of them teachers and the others students from the laboratories of the university.

Among the pieces of special work which may be noticed are the studies of Professor Frank M. MacFarland on the egg segmentation of the nudibranchs, those of Frank M. Cramer on the nervous system of the limpet, those of Leaverett M. Loomis on the sea birds of Monterey Bay, those of Wilbur W. Thoburn on the rock-fishes, those of Miss Flora Hartley on the anatomy of the abalone, and those of Mr. Charles W. Green on hydroids.

The instruction for the summer has been in the hands of Professors Charles H. Gilbert and Oliver P. Jenkins, of the chairs of zoology and physiology respectively, in the Stanford University, assisted by Bradley M. Davis and Wilbur W. Thoburn, graduate students. The purposes of the laboratory as set forth in the circular are: To supplement the work given in the regular courses of instruction in the zoological, botanical, and physiological departments of the university under the favorable conditions of such a station; to provide facilities for investigators who are prepared to make researches in marine biology, for which the Pacific Coast offers exceptional attractions, in that its field is very rich and is as yet largely unworked, to afford an opportunity to those, especially to teachers, who desire to become acquainted with marine animals and plants, and to learn the practical methods of their study.

In respect to the abundance of material and newness and freshness of the fauna to be studied as well as in the matter

of comfort and convenience of living, there are none of the seaside laboratories which are so fortunately situated as the one at Pacific Grove.

The views from the windows of the laboratory are singularly picturesque and attractive. On the east is seen the long curve of Monterey Bay, bordered by white sand-dunes covered with deep green chapparal, the dark pine trees of Pacific Grove, and the rocky promontory of Point Alones with its Chinese fishing camp in the foreground, and in the distance the mountains which separate the valley of Monterey from that of San Benito. On the west the irregular coast-line is visible as far as the point of pines, and on the north the broad sweep of the bay-shore is in sight as far as the lighthouse of Santa Cruz. The Bay of Monterey, with its surroundings of rock, forest, and mountain, is one of the most picturesque in the world, and to the eye of the naturalist it has no equal, at least short of the coral-lined harbors of the tropics.

## THE ANTENNÆ AND STING OF YIKILCAB AS COMPONENTS IN THE MAYA DAY-SIGNS.

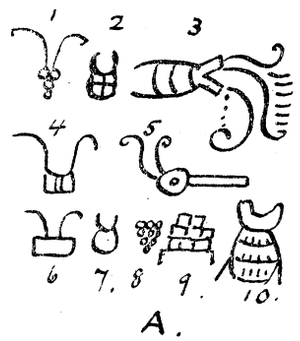
BY H. T. CRESSON, A M., M.D.

BEE-CULTURE among the ancient Mayas seems to have received considerable attention, and the apiarists, we are told, had patrons, — the *Bacabs*, — one of whom, called *Hobnil*, was in especial favor. It was in the month Tzoz that the bee-keepers began to prepare themselves for their celebration in Tzec, and the four Chacs were at that time presented with plates of incense, one for each Chac, the borders of which were painted around with designs representing the honey-comb.

The species of bee which prepared the celebrated honey of Estabentûm, from a white flower resembling our jessamine, is like the common bee of Europe in shape and size, and differs from it only in having no sting; it is in fact the bee of Yucatan and Chiapas, and the honey which was prepared, especially during the month when the Estabentûm bloomed, was much sought after in early times, and no doubt formed an important article of commerce between the inhabitants of *Maiam* and the island that is now called Cuba. Four or five other species of bee are said to exist in Yucatan, but, with a few exceptions, their productions are inferior to the bee common to that country and Chiapas.

That the honey-bee was highly esteemed by the ancient Mayas there is but little doubt; for we see this industrious insect represented in various portions of the "Bee-Keeper's Narrative" of the Codex Troano, while honey in the comb is represented by the Maya scribe as square cakes of that material (see Fig. 9, plate), carried in the hand of the "god with the old man's face,"— so named to distinguish him from other gods who were represented in the same narrative. Honey is represented by other hieroglyphs, one of which, shown in Fig. 8 of the drawing, has an especial connection with the antennæ sign, and we will presently refer to it. If our alphabet interprets with a reasonable degree of exactitude, we suppose the god with the old man's face to be Kukuitz, who appears in one of his various characters as the patron of the bee-keepers. The phonetic components of the hieroglyph which invariably accompanies this god, suggest this interpretation. In front of the glyph we have components of the day-signs Chuen and Akbal enclosed in the dotted aspirate circle, while below it are Landa's aspirates twice, and even in some cases thrice repeated. This gives us "chu-chu" or "khu-khu." Within the glyph, surrounding the eye, is the scroll which is always present in this god's glyph, and to us suggests the phonetic value of *ix* or *itz*. The c$^{h}$i glyph is generally placed underneath what we have assumed to be used as a determinative; the two round glyphs on either side of the tooth-like projections inside of the c$^{h}$i glyph suggest that in this case it is to be used as Chu. I find this c$^{h}$i glyph appearing as chá, chā, c$^{h}$i, cho, chu, a determinative being generally added to suggest which is to be used, whether it be á — ā — i — o — u. An example of one of these supposed determinatives will be given further on in this paper.

The sting of the bee is used in the day-sign *yk* or *ik* (see Fig. 7 of drawing), and appears quite frequently in glyph form in the Troano, also in Landa's day-signs and those of the Chilan Balaam of Káua, and is attached to the body of the *ahaulil-cab*, who so frequently appears in the Troano with body erect as if ready to strike with her stinging apparatus (Fig. 10 of drawing). It can readily be seen that this sting is but a variant of that used in the day-sign *ik* (Fig. 7 of drawing). It can also be seen attached to the right-hand side of the head-dress of the goddess *Cab*, second division of plate 25, Codex Troano. The end of the bee's abdomen and the stinging apparatus (Fig. 3 of drawing) is somewhat square like those of the Codex Troano (Bee-Keeper's Narrative); but it is easily recognized as a variant of glyphs 7 and 10 of our drawing. The determinative ending is placed just beyond the stinging apparatus, and is composed of the *i* loop and *kil;* the dotted aspirate also appears, and the *há* glyph is the parallel line running out from the *il* curve — "ish-kil-há" is thus expressed, an admirable suggestion of "*Ikilca*" (*b* is understood).




The antennæ of the bee appear in the day-sign Cauac; in fact the signs *yk* (or ik), *Cauac*, and *Caban*, all have the sting and antennæ of the bee as components. This connection will be more apparent by reference to Dr. D. G. Brinton's study of the "Books of Chilan Balaam," pages 16 and 17. The day-sign 13 Caban, in the Chilan Balaam of Káua, has the antennæ of the bee for its components, and 2 *Cauac* and 5th *ik* have the antennæ and sting, one more component appearing in 2d Cauac than in 5th *yk*. These same signs in the Landa and Troano columns of Brinton's plates have the honey signs, and the antennæ and hive, all used as phonetic components of the glyph, that of Landa and the Codex Troano rendering the word *ikilcab* with great simplicity. It is expressed thus, "x-il-cab," the dotted *sh*, or *x* aspirate, being added to assist the reader in obtaining the correct interpretation. The *Cauac* glyph also appears in the bas-relief of Kukuitz, the left-hand slab alongside of the doorway, Casa No. 3, Palenque. By placing a lens on a good photograph of this masterpiece of the scribe sculptor's art, the antennæ of the bee can be seen attached to the honey-sign (Fig. 1 of the drawing shows this glyph), the antennæ being at-