sonants are not the same. I do not think the sense is changed, but intend to have a new translation made.

Another interesting Indian manuscript in my hands is the Mohawk version of the greater condoling songs. La Fort's is the Onondaga one used at the delivery of the wampum when the curtains are removed. The others are sung at the wayside meeting, and on the march to the council-house, in which they usually end. This version was very plainly written by Chief George Key, of the Grand River reservation, Canada. For mere convenience it is arbitrarily arranged in verses, and it has the valuable feature of a division into syllables throughout. The song with the names was written first, perhaps as being of first importance, but the remaining songs are in the order of Hale's book. There are slight variations from his version, but none of essential importance, except one. Those who have attended a condolence will remember the continual repetition of 'Ha-i-i-i,' much prolonged, and this hardly appears in his book. In the great song with names before me it is written nearly a thousand times. In the one he saw the writer may have spared himself the trouble of writing, knowing just where it should be used. The chiefs' names occur in the usual order, but some of those placed together in Mr. Hale's version are separated in this. The variations in sense are very slight.

The greater songs are always used in the Mohawk version, as this is better adapted to the music used. This music I hope soon to secure.

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204 Maple St., Syracuse,
November 19, 1902.

SHORTER ARTICLES.

THE TORTUGAS, FLORIDA, AS A STATION FOR RESEARCH IN BIOLOGY.

The Tortugas, Florida, probably surpasses any other situation in the tropical Atlantic, in the richness of its marine fauna and in natural advantages for the study of tropical life. Until within recent years, however, the inaccessibility of the islands rendered it difficult to maintain even a temporary station upon them, and all of our knowledge of the life of the region is due to the cursory visits of the United States government expeditions in the *Bibb*, 1869; *Blake*, 1877–78, and *Albatross*, 1885–86, as well as to the explorations of Louis Agassiz, 1850–51, and Alexander Agassiz, 1881.

Certain assistants of Alexander Agassiz have also studied the fauna of the Tortugas, and several expeditions not under government control have visited the reefs, notably that of the University of Iowa under C. C. Nutting, in 1893. The latest expedition to the islands was that of the Museum of the Brooklyn Institute of Arts and Sciences in 1902, the results of which have not yet been published.

Since 1898 the United States government has established a naval coaling station upon the Tortugas, and frequent and regular communication with Key West is now maintained by means of a large ocean-going tug. The region has thus recently become accessible, and the time for the establishment of a research station upon the islands is now ripe.

The Tortugas group is composed of seven low, sandy islands and numerous reef flats irregularly disposed so as to partially enclose a lagoon about ten miles long and six miles wide, and having an average depth of about eight fathoms.

Two of the islands are inhabited, Garden Key being occupied by Fort Jefferson, and Loggerhead Key by the Tortugas Lighthouse.

The group is the most recent of the Florida reefs. Pure, deep ocean water surrounds them, and there are none of the extensive mud flats or mangrove-covered shores so characteristic of the keys along the mainland coast of Florida. The northern edge of the Gulf Stream lies about twenty-five or thirty miles south of the Tortugas, and the east to southeast breezes, which prevail during the spring and summer, drift the surface waters of the Gulf Stream upon the Tortugas, giving a remarkable opportunity to study the life of the great tropical ocean current, while at the same time enjoying all of the advantages of a land station, a combination of advantageous conditions which all who have been upon cruising expeditions will appreciate.

Not one of the pelagic animals which abound at the Tortugas has been found living permanently north of Cape Cod, Massachusetts, although a large number of Tortugas species are annually drifted upon the southern coast of New England by the prevailing southerly winds of the summer months. The pelagic fauna of the Tortugas is, on the other hand, closely related to that of the Fiji Islands, both in the nature of the specimens themselves and in the relative abundance of characteristic forms, although slight specific distinctions can usually be perceived which separate the Tortugas from the Fijian forms.

About ten square miles of shallow reef flats lie around the Tortugas Islands and these support a fauna which, for variety and abundance, appears to be unsurpassed by that of any other situation in the Atlantic.

The Madreporaria, however, are poorly represented in the Tortugas, but previous to 1878 the coral reef was remarkable for both the number and variety of species represented. In October of that year a dark-colored water, coming apparently from the mainland of Florida, drifted out over the Tortugas reefs, killing great numbers of marine animals. Practically all of the stocks of *Madrepora murciata* were killed at this time, and this coral is still extremely rare at the Tortugas, only a few stocks being found at depths of two fathoms or more. The genera *Porites, Orbicella* and *Meandrina,* on the other hand, appear to have survived in considerable numbers, for many heads of these corals are now seen, all being far too large to have been formed since 1878.

As a result of one month's collecting in shallow water, it appears that about 265 species of marine animals are very abundant in water less than one fathom in depth, while a far greater number of forms are rare, or found in deeper water.

Several species of gulls nest upon the islands during the summer months, about four thousand of them annually visiting Bird Key late in April and remaining to attend their young until the third week in August. These gulls are the noddy (*Anonus stolidus*), the sooty tern (*Sterna fuliginosa*), the least tern (*S. antillarum*). The man-of-war hawk (*Fregata aquila*), and the Booby (*Sula sula*) are summer visitors. Marine turtles, especially the loggerhead (*Thalessochelys caretta*), were once abundant upon the Tortugas, but are now becoming rare, owing to indiscriminate and constant persecution. A few females still crawl up on the sandy beaches from between the middle of May and the first week in August and dig their nests near the line of the bushes above the reach of the spray. The eggs hatch in about six weeks and the young crawl immediately into the water.

The surface hauls obtained in the Tortugas appear to be richer than those gathered in the Bahama Islands, and this is what we should expect from the prevailing winds which constantly drift the surface waters of the Gulf Stream upon the Tortugas, whereas the Bahama Islands lie to the windward of the great current, which, as every one knows, teems with pelagic life drawn into it from all parts of the tropical Atlantic.

During the summer months the temperature of the air rarely exceeds 95° F. The humidity is very high, however, although the nights are cool, and the gentle breeze drifting almost constantly over the islands renders it possible to retain normal health and energy.

The accommodations at the Tortugas consist in the officers' quarters and barracks at Fort Jefferson, the now deserted quarantine hospital on Bird Key, and the buildings attached to the lighthouse on Loggerhead Key. Officers of the United States government have, upon all occasions, displayed commendable interest in the labors of scientific men at the Tortugas, and have always granted to well-qualified persons the privilege of living within the government buildings. Indeed, our knowledge of the Tortugas fauna is almost wholly due to the efforts of the government in forwarding research in this region, and to the private efforts of Alexander Agassiz, Were a permanent laboratory to be established upon the Tortugas, however, a comfortable, well-ventilated wooden building capable of accommodating from six to twelve investigators would be required. This should

be provided with a windmill to furnish running salt water for aquaria and a tank to retain rain water. The laboratory proper should be a large, well-ventilated wooden building having a good north light. No better room has yet been devised than that of the Newport laboratory designed by Alexander Agassiz, although the ventilation of a tropical laboratory should be provided for with special care.

A small working library and sleeping rooms should be attached to the laboratory, and the kitchen and alcohol storage sheds should be in small separate buildings. Six thousand dollars would be required to construct the laboratory and its accessory buildings.

A seaworthy launch at least 55 feet in length and of light draft would be required. This should be provided with sails, auxiliary naphtha for power, and sounding and dredging reels. Such a launch is necessary, in order to study the life of the Gulf Stream itself and of numerous reefs at the Tortugas and its neighborhood. It should be capable of making the journey to and fro between Miami or Havana and the Tortugas.

The time has come when American men of science should awaken to the fact that we have at our very door a tropical fauna far surpassing in richness that of Naples. With our great wealth and many able and energetic workers, we should begin to perform the task for science which is being so ably done at Naples. The great monographs of the Naples Laboratory should be our incentive to do even more and better things in the development of knowledge concerning the marine life of tropical America.

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Museum of the Brooklyn Institute of Arts and Sciences.

EGG-LAYING IN GONIONEMUS.

In a preliminary report on the life-history of *Gonionemus* (*Jour. Morph.*, Vol. XI., p. 494) I stated that the cause of deposition of eggs was due to the withdrawal of light, as the animals could be induced to deposit the eggs almost any time of day by placing them in the dark for an hour. The next year (1896) some experiments were made with colored light to find if egg-laying could be brought about in more than one way and thus get nearer the cause. As I was not able to continue these experiments and some one else may be in position to do so, I give the substance of a few notes made at the time and the conclusion. The medusæ were exposed in a blackened box, one end of which was closed with a sheet of the desired color glass.

First some medusæ were exposed to yellow-orange light for one hour. The sun was not shining into the box; no eggs were deposited. These were then exposed for one hour to blue light (cobalt glass) and eggs were deposited; they were abnormally slow in segmentation. Next some of the animals were exposed under darker orange glass for two hours and no eggs were deposited. This and a control set were then put in the dark for one hour and in both cases eggs were deposited normally. Two females and a male were exposed under blue glass for one hour. The sun was shining through the glass and it was, therefore, lighter than in the other exposure under the blue. No eggs were deposited within the hour.

Sixteen females and one male were exposed under dark ruby glass for one hour and ten minutes, the sun shining through the glass; no eggs were deposited. In two other trials under the ruby glass when the sun did not shine into the box eggs were deposited. Immediately after the first exposure to red, above, the animals were placed under blue glass and left for one hour and fifteen minutes, and still no eggs were deposited. It took over one and one half hours' exposure to darkness before extrusion took place. Whether the previous exposure to ruby light had a retarding effect or not was not determined. The conclusion drawn was that the colors were not effective as such, but merely as they obstructed the light. It was also found at that time that the gonads removed from the animal deposit the sex products just as well as the intact animal.

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