## THE BAHAMA EXPEDITION OF THE STATE UNIVERSITY OF IOWA.

BY B. M. WILSON, A.M.

During the last summer a most unusual move in educational circles was made by the State University of Iowa.

It is well known among scientists that nowhere in the world, possibly, do the waters of the sea throb with a more varied and wonderful marine flora and fauna than around the Bahamas and Florida keys. The "gardens of the sea" are there! With the water-glass (a common wooden bucket with a glass bottom) one looks down through brilliantly hued waters upon scenes of wonder and exquisite beauty.

There are great jagged caves of coral, with curious sponges growing about their walls; long, slender sponges of lilac and ocher, and some of scarlet and others of brown and black, and still others coarse and clumsy, looking like lumps of yellow mud or clay. There the slender gorgonians, ranging through all the shades of browns and tans, lift their delicate fingers teeming with polyp life. Yonder one sees a cavern carpeted with gorgeous "sea anemones," their tentacles glowing with bright green and scarlet and maroon and flesh color. These are Neptune's sea flowers! Here those treasures of the mermaids—the "sea fans"—gracefully wave their red and yellow lace-work, and the "sea feathers" toss their nodding plumes. On this jutting coral crag a "sea urchin" bristles in long, slender black spines, and a little further on one of its relations glistens in a spiny armor as white as ivory. In and out among these caves flash the tropic fishes, on which the sea god has lavished the most vivid colors of his palette—intense blue and silvery white and gold, and turquoise; and some of these dwellers in his secret halls even gleam like mother-of-pearl, with all the colors of the rainbow.

But useless would it be to attempt to appropriately picture forth the wealth and beauty of these hidden wonders.

A few years ago the student got his knowledge of these marine forms from musty text-books bristling with names often as meaningless as unpronounceable. Later he had the advantage of dried and alcoholic specimens. But it was not until very recently that an effort was made to give him an opportunity to study these most beautiful and wonderful forms of life in their native homes.

Prof. C. C. Nutting, of the chair of systematic zoology at Iowa State University, had twice before crossed the rich zoological waters around the Bahamas, and it was then that occurred to him the plan which the summer of 1893 finally saw realized.

The Emily E. Johnson, a two-masted schooner, 96 feet long, tonnage 115 tons, was chartered of its owner, Captain C. C. Paul, of Baltimore, for three months for the use of the "Bahama Expedition of the State University of Iowa," which had for its object the "careful and systematic investigation of the marine fauna and flora around the Florida keys and Bahamas." The schooner was rapidly transformed into a dwelling vessel and floating laboratory.

A huge skylighted hatch was cut in the hold, and the hold itself fitted up to serve at once as sleeping apartments for the gentlemen of the party, as dining room, and as laboratory.

A double tier of extemporized bunks lined either wall, long oilcloth-covered tables and camp-chairs occupied the center space, and a complete scientific library and laboratory supplies, including microscopes, chemicals, dissecting apparatus, etc., occupied shelves at one end. Provisions were stored in the fore part of the hold.

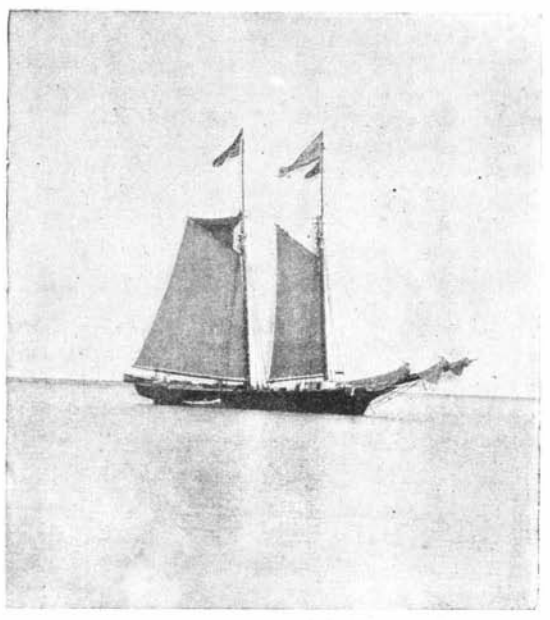
On deck was placed the hoisting apparatus, which was worked by hand and provided with 300 fathoms of wire rope. There was no steam aboard. The vessel had been chosen for its fitness to ride the shallow waters about the keys and islands.

Charles Flowers, of Baltimore, was engaged as captain and George Merrill was mate. Three sailors, a cook (all as black as the ace of spades), and a saffron-hued mulatto waiting boy comprised the crew.

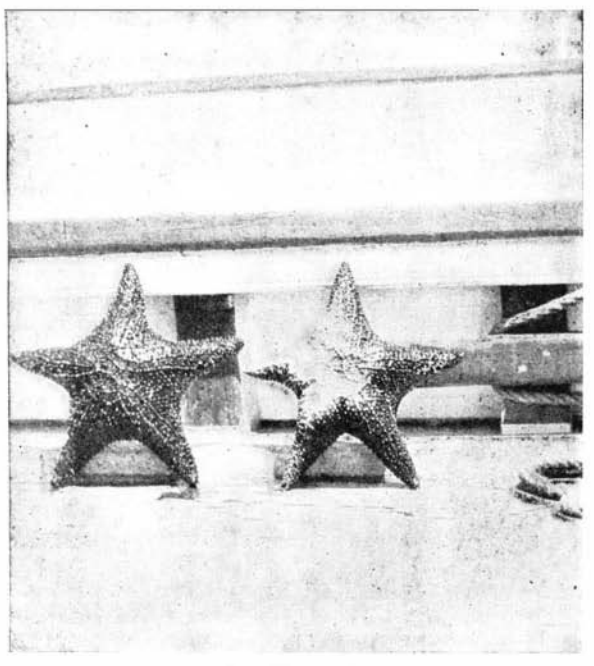
The party itself was composed of twenty-one members (of which seven were ladies), and included professors, instructors, alumni, and students of Iowa State University, Professor Nutting being the leader. Gilbert L. Honser, instructor in biology, was the photographer, and many beautiful pictures were taken, of which our space only permits us to present a few.

All were interested in science and each was supposed to be especially interested in some particular branch of science. All had applied voluntarily for membership in the party. The university furnished all appliances for dredging, for preserving materials, and for study. In addition, each member paid two hundred dollars, which covered all expenses incurred by the party *collectively*, including car fare from Iowa City to Baltimore and return, with "stop-offs" at Washington and the World's Fair, in addition to our life aboard the vessel for three months. It is estimated that we traveled by land and sea some six thousand miles.

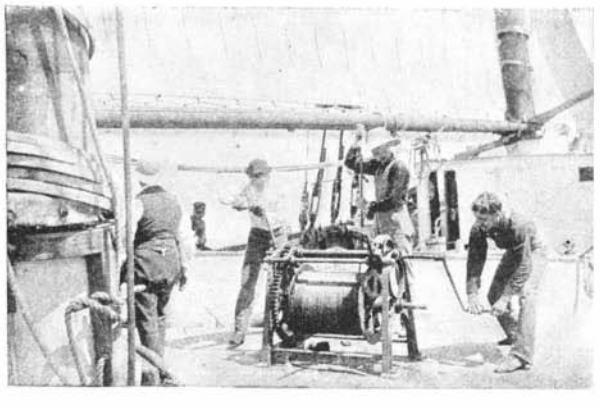
Prof. C. C. Nutting.



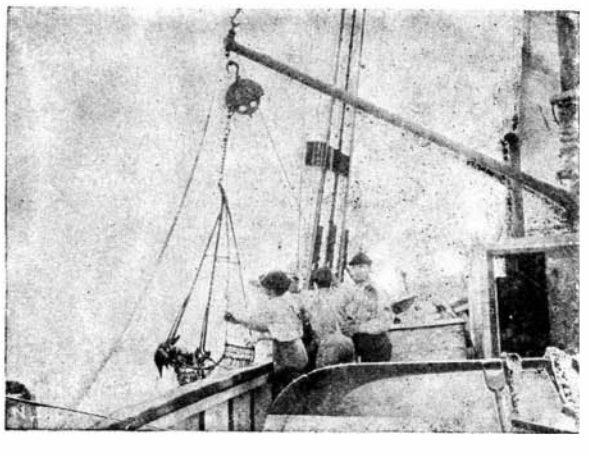
The Schooner E. E. Johnson.



Giant Star Fishes.



Winding up the Dredge.



Hauling in the Dredge.

On May 5, 1893, we left Baltimore in our floating summer home and laboratory.

Seven days later we anchored in the harbor of Egg Island, Bahamas. Here we made a marvelous collection in the shallow waters and on land. Our deck was strewn with sea-fans and gorgonians. There were great tubs of rattling crabs and star fish and sea urchins, and buckets of mollusks. One of our illustrations shows the giant star fishes captured, which measured about two feet across. The ornithologist and entomologist had captured strange birds and "bugs," the first prize of the latter being that curious luminous beetle worn by the Cuban ladies as a glowing ornament for the hair or to catch the lace of their mantillas. The botanists had their cans full and running over with tropic vegetation, from the passion flower to our own familiar shepherd's purse and *sand burr;* and there were pans full of floating algae, "sea mosses." But it would take volumes to give an adequate idea of the spoils.

From here we sailed for Havana, spent a few days exploring the city, and just outside the harbor dredged for that exceedingly rare animal form until lately supposed to be extinct, viz., the *crinoid*, genus *Pentacrinus*. We found fully 150 beautiful and perfect specimens.

Bahia Honda, thirty miles further along the western coast of Cuba, next claimed our attention The Spanish authorities, however, took us for a filibustering expedition, and forbade us to go more than thirty feet from the water line. The mosquitoes also waged war against us, and we turned toward Key West.

Here, too, however, we were forbidden to land, as a vessel clearing from a Cuban port during the quarantine season must either lie fifteen days at sea or go to the Dry Tortugas and be fumigated.

Accordingly we chose the Dry Tortugas, and made many valuable collections, both by dredging and in shallow waters around the keys. Here we procured our first shark and investigated the coral reefs.

Returning to Key West, we dredged in the vicinity some three weeks. In deep sea dredging we used a common oyster dredge, a trawl, and a tangle bar. This last was especially useful in procuring the finer materials. It was merely a horizontal bar of iron, with great masses of raveled manila hemp rope tied to it, and in its meshes were caught a tangle of basket fish, crabs, sea urchins, deep-sea algae, and so on.

Clearing from Key West, we sailed for Harbor Island, Spanish Wells, and Eleuthera, Bahamas, and after a hasty run to Little San Salvador, or Cat Island, we had to turn northward, as we were due at Baltimore August 1.

The whole summer had been one delightful round of novelty and surprises. To one scientifically inclined it was an opportunity for careful study and investigation, such as has heretofore been enjoyed only by specialists in government employ. The knowledge gained in actually seeing and studying these curious life forms in their native element was of more practical value than the perusal of whole libraries of monographs, or years of study of museum specimens.

Then the trip offered, as well, glimpses of the customs and peoples of strange countries under the rule of three different powers. Cuba is Spanish, Key West and the keys are Uncle Sam's southernmost possessions, and the Bahamas are English. It was a study in comparative sociology. The trip has opened new avenues to educators; new possibilities to students, and to scientists, we feel safe in saying, it will offer many new life forms, dredged from the "unknown depths."

As the favoring breeze swelled our sails homeward bound and the foam curled, a silvery plume behind our prow, studded at night with glowing phosphorescence, our little group sat silent on the deck, awed, subdued by the splendor of the tropic sunset, the swift-following night, or the indescribable beauty of the moonlight on the sea.

As we sat dumb, in trying to comprehend the infinite expanse of ever-restless water around, the infinite expanse of burnished sky above, the infinite *silence* over all, and as memory wandered back over the revelations

of the summer, one and all were humbled with the consciousness of the insignficance of manand the goodness of the Incomprehensible in granting us these glimpses of this wonderful glory!

State University of Iowa, April, 1894.

### Highly Sensitive Collodion Emulsion.

The publication of Dr. Hill Norris' process for the production of a highly sensitive collodion emulsion induced Dr. David, of Paris, to test the three methods described in the patent. He could not obtain a satisfactory result, but by making some alterations he has succeeded in preparing a bromide of silver collodion emulsion, the sensitiveness of which increases gradually to 22 or 23 degrees Warnerke.

The method adopted is as follows: Upon a horizontally adjusted glass plate, size 18×24 cm., are poured 25 c.c. of collodion, which contains per liter 18 grammes of silver nitrate and 7 to 8 grammes of pyroxyline. After the film has coagulated sufficiently, it is changed to a bromide of silver film by treatment with the following bath:

| | | |
|---|---|---|
| Potassium bromide | 80 to 120 | grammes |
| Potassium iodide | 0·01 | gramme |
| Gelatine | 2 | grammes |
| Distilled water | 1,000 | c.c. |

A completely opaque film must be obtained. It is sensitized by leaving the plate for a longer or shorter time in the following:

| | |
|---|---|
| Potassium bromide | 18 to 25 grammes |
| Gelatine | 1 gramme |
| Distilled water | 1,000 c.c. |

The sensitiveness increases with the duration of action and the temperature of this bath. At a temperature of 70° to 75° Cent., the time of action must be about two hours; at 90° to 95°, about one hour.

Upon looking through the film, it will be observed that the grain becomes gradually larger until the granularity is distinctly visible to the eye. Accompanying this increase in the size of the grain is an increase in the sensitiveness of the film.

After the plate has reached the desired stage, it is washed and dried. Contrary to what might be expected, the collodion film does not exhibit the slightest tendency to leave the plate at a temperature of 100° Cent., provided that the surface of the plate has been thoroughly cleansed.

Plates prepared in this way can be developed very quickly, washed and fixed. The negative is ready for printing in ten minutes. Varnishing is unnecessary, as the collodion film is very hard.—*Photographisches Archiv.*

### The United States Navy vs. the British Navy in 1812.

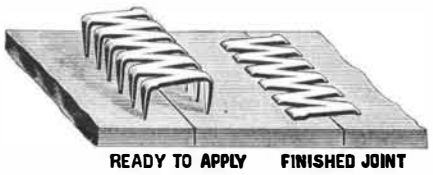
The following, from the New York *Sun*, occurs in the course of an able review of the first volume of "A History of the United States Navy from 1775 to 1893," recently published by the Appletons. The narrative is by Mr. Edgar Stanton Maclay, and the technical revisiou of the text by Lieut. Roy C. Smith, U.S.N. The book sets forth our naval annals from the outbreak of the revolutionary war up to the beginning of the last year of the war of 1812, the continuation of the history down to the present day being reserved for a second volume.

"It was pre-eminently in the war of 1812 that the pride of England in her navy was brought low. To appreciate the outcome of this contest, one must keep in view a comparison of the two navies, which will be found on page 319 of the book before us. At the outset of the war Great Britain had 1,048 ships, possessing an aggregate capacity of 860,990 tons, and carrying 27,800 guns, with 151,572 men and officers. At the same juncture the United States had but 17 ships, with a total tonnage of 15,300, and carrying only 442 guns, and but 5,025 officers and men. Yet, at the end of the struggle, which lasted but about two and a half years, the little American navy, assisted by privateers, had for the time practically swept the British mercantile marine from the high seas and captured over fifteen hundred vessels, on board of which were more than twenty thousand British seamen. It was not so much, however, the number of merchant vessels lost, great as this was, which affected the British public mind. It was the fact that in duels between warships of nearly equal force the English were generally beaten. In eighteen engagements with the Americans the British navy sustained fifteen defeats, and this just after England had successfully matched her sea power against the combined strength of all the other great maritime nations of the world. At the beginning of the war of 1812 the British navy had reached the apex of renown. Mr. Maclay points out that in two hundred actions between single ships it had been defeated but five times, and on those occasions the English ship was admitted to have been of inferior force. The complete reversal of results which followed a trial of strength and skill with the Americans produced in Englishmen a kind of stupor. The London *Times*, when it heard of the capture of the first English ship of war, said: 'The loss of a single frigate by us, it is true, is but a small one; when viewed as a part of the British navy it is almost nothing; yet under all the circumstances of the two countries to which the vessels belonged, we know not any calamity of twenty times its proportions that might have been attended with more serious consequences to the worsted party.' When the report of the loss of a second British frigate reached the *Times*, it exclaimed: 'In the name of God, what was done with this immense superiority of force? Oh, what a charm is hereby dissolved! The land spell of the French is broken [at Moscow], and so is our sea spell!' Mr. Maclay sums up the effect of the disasters suffered in the war of 1812 upon intelligent Englishmen in the well-founded assertion that in those defeats they foresaw the eventual subversion of their naval supremacy, and they well knew that, if that were lost, nothing could avert the reduction of Great Britain to one of the least important of European powers."

### THE BRISTOL CO.'S PATENT STEEL BELT LACING.

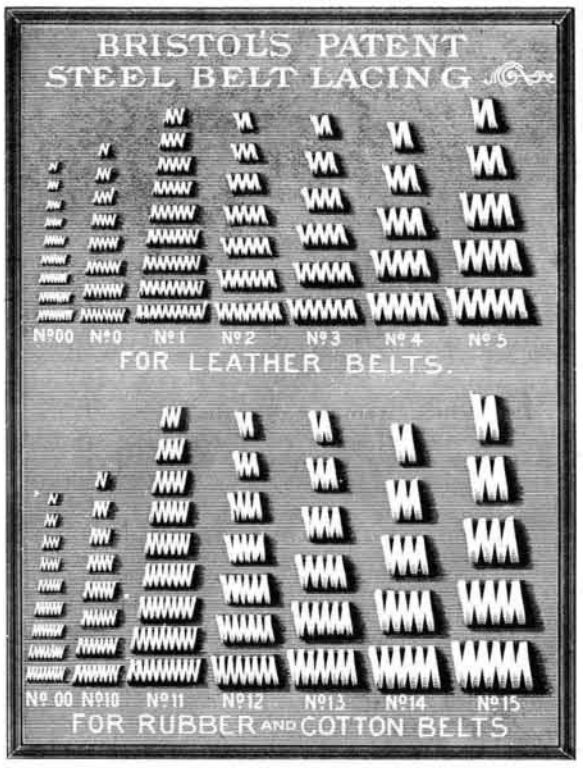
Five years ago the Bristol Company, of Waterbury, Conn., began the manufacture of their patent steel belt lacing, illustrated herewith.

At that time only one size, for ordinary single leather



READY TO APPLY FINISHED JOINT

belts, was produced, but encouraged by the success attained, which is principally attributed to the genuine merits of the steel lacing itself, the company have developed their machinery and improved their methods of manufacture, so that now they are able to announce




a complete line of one hundred different sizes (as shown in the larger view), suited to all kinds, widths and thicknesses of belting. As a result of improved processes of manufacture, prices have also been reduced. The lacing is made of the toughest cold-rolled steel, cut into a continuous zigzag form, and so proportioned as to give maximum strength with a minimum amount of material. The wedge-shaped points, when driven through the belt, force the fibers aside so as not to cut them; hence the ends of the belt are not weakened as when holes are punched. The lacing makes a smooth and elastic joint and is easily and quickly applied without any special tools, the spurs being driven through upon a piece of soft wood, after the ends of the belt to be joined have been brought evenly together. The belt is then turned over upon the pulley or any convenient piece of iron and the spurs clinched, bending them toward the joint. The lacings are furnished in lengths varying from one to three inches (No. 1 by quarter inches), it being always possible from a box of assorted lengths to find two or more pieces of lacing which, together, may be used for a belt wider than three inches. For rubber, cotton, and woven belts the space between the spurs is a trifle greater than in the corresponding sizes designed for leather belts. Thus a better grip is obtained on the fibrous ends of such belts. The lacing was exhibited at the World's Columbian Exhibition by the Bristol Company, and was awarded medal and diploma.

### Effect of Yellow Light on Diamonds.

Some diamond merchants on Maiden Lane, New York, have complained to the owner of a building opposite to them because he has painted it bright yellow, and when the sun shines yellow is reflected into their store. They say the yellow light falling upon their show windows spoils their trade by making the diamonds look yellow, and therefore cheap; whereas the stones are in reality pure white, of the highest grade. The owner refuses to have the color of his building changed although the diamond merchants have offered to do it at their own expense. We suggest that the effect of the reflected yellow rays could be neutralized by placing the diamonds in glass cases slightly tinted with blue; or by a thin varnish of a blue tint, applied to the show windows.

### Official Trial of H. M. S. Hornet.

On the 19th of March the official trial of H. M. S. torpedo catcher Hornet took place in the Estuary of the Thames, with the following admirable results. The propellers are 6 feet 4 inches in diameter. There was calm weather and high water. Steam is supplied by Yarrow water tube boilers; the power exerted was approximately 4,000 horse power. The Havock has locomotive boilers and gives 3,500 horse power; the difference in power is very nearly in direct proportion to the cubes of the speed of the two boats, but the air pressure for the Havock was 3 inches; for the Hornet, 1½ inches.

| Time of day. | Revol. Star. | Revol. Port. | Time. | Speed. | Means. | 2d Means. | |
|---|---|---|---|---|---|---|---|
| 10·28 | 395·9 | 395·4 | 2m. 17·6s. | 26·163 | 27·322 | | |
| 10·34 | 394·4 | 396·8 | 2m. 6·4s. | 28·481 | 27·418 | 27·370 | |
| 10·43 | 394·7 | 392·2 | 2m. 16·6s. | 26·355 | 27·373 | 27·395 | 27·313 |
| 10·52 | 391·3 | 392·7 | 2m. 6·8s. | 28·391 | 27·239 | 27·306 | |
| 11·02 | 390·0 | 391·7 | 2m. 18·0s. | 26·087 | 27·128 | 27·183 | |
| 11·10 | 394·3 | 394·3 | 2m. 7·8s. | 28·169 | | | |

Steam in boiler vacuum 26 inches.

The three hours' trial commenced at the "Chapman" lighthouse and ended below the "Sunk" lightship. The average speed for the whole time was found to be 27·628 knots per hour, or 31·8 miles an hour. After this circles at full speed were turned to starboard and port, and generally all the usual tests of machinery and ship, all of which were found to be perfectly satisfactory. At full speed and at slower speeds practically no vibration was felt. There was no heating of any parts of the engines, and the boilers made ample steam with a mean air pressure of 1·5 inch.

The Admiralty authorities expressed themselves as highly pleased with the result in every respect.

### Embossing Wood.

Carving wood is too costly a process for this age and country. People like it and want it on their furniture and inside finish, but most of them are not willing to pay for it what it costs. It requires a natural turn and a long practice to make a skillful wood carver, and consequently many devices have been resorted to to secure the same appearance by cheaper methods. The most common of these is to press the figures into the grain of the wood with a hot metal die. One of the latest machines for doing this kind of embossed "carving" was on exhibition in Machinery Hall annex of the World's Fair, and is an ingenious machine and does rapid work. Patterns are cut on a hollow brass cylinder which is heated by gas jets from the inside and the wood passed under it under a pressure of several thousand pounds to the inch in width. At first the work appears very pretty, but it will not stand the test of time. In the course of time the part of wood pressed into the grain will rise to nearly or quite its original position and, in large figured patterns, unevenly, making a very rough and rotten looking figure, that is more of a blemish than a thing of beauty. Another plan is to dress the board down to a level with the embossed figure and then by steaming to raise the pressed parts to their original height to imitate relievo carving. None of these processes are "carving," nor will the work retain its form like hand carving. However, it may suit people who must have their furniture and house finish carved and are not able or willing to pay for the genuine article, but it would be better taste, perhaps, to take it plain rather than to have alleged carving that will not last long and look well all the time.—*Tradesman.*

### The Fourth Dimension.

In an address before the New York Mathematical Society on "Modern Mathematical Thought," Professor Simon Newcomb is reported as saying: "As in space of two dimensions one line can be drawn perpendicular to another at a given point, and by adding another dimension to space a third line can be drawn perpendicular to these two; so in a fourth dimension we can draw a line which shall be perpendicular to all three. True, we cannot imagine how the line would look, or where it would be placed, but this merely because of the limitations of our faculties. As a surface describes a solid by continually leaving the space in which it lies at the moment, so a four-dimensional solid will be generated by a three-dimensional one by a continuous motion which shall constantly be directed outside of this three-dimensional space in which our universe appears to exist. As the man confined in a circle can evade it by stepping over it, so the mathematician, if placed inside a sphere, in four-dimensional space, would simply step over it as easily as we should over a circle drawn on the floor."