

DEEP SEA FISHING WITH A LINE FOUR MILES LONG

Remarkable Catches Made by Uncle Sam's Oceanographers From the United States Steamer Albatross

By CLEVELAND MOFFETT.

There is no more remarkable fishing in the world than that done by the United States steamer Albatross, a glancing white craft of less than a thousand tons, manned by a force of blue-jackets and presided over by oceanographers and zoologists from various museums and universities, who face perils and discomforts in many seas in pursuit of strange creatures of the deep.

The Albatross fishes with a line three miles long, often four miles long, sometimes six miles long or over, a line of slender cable, but wonderfully strong, rolled off a deck winch by a sputtering steam engine, that will bring up from the ocean floor a three or four ton haul of sponges, crinoids, jelly fish, sea urchins, giant crabs, long white worms that break in two if you touch them, phosphorescent trees (really animals), sea cucumbers with hideous heads, star fish, devil fish, pelican fish, lantern fish, sharks' teeth, whales' ear bones, sea cows' ribs and scores of other extraordinary things.

The Albatross follows no beaten paths of commerce. She goes where other vessels rarely go. She explores forgotten corners of the seven seas, drops her great nets by day and by night, takes hundreds of soundings in uncharted waters and after a cruise of months brings home her trophies for final safekeeping in jars filled with alcohol and labelled with Greek and Latin names. This sort of work she has been doing for thirty-odd years, ever since George W. Baird designed her engines for the United States scientific service in 1882. It is worthy of note that the Albatross was the first steel steamer built in America.

For details of work done aboard the Albatross and of strange creatures brought up by her from the depths of the ocean I am indebted to Dr. Austin H. Clark of the Washington National Museum, who was the scientist in charge of this interesting vessel during one of her recent cruises in the Pacific. From the Bering Sea to the waters east of Corea they zigzagged back and forth during many months, making hundreds of hauls and soundings and bringing up deep sea specimens that will keep men busy for months sorting them and classifying them.

When you talk with an oceanographer like Dr. Clark, a man of broad vision and extensive knowledge, you realize that his specialty is the converging point of many sciences, paleontology, geology, zoology, botany, chemistry and physics. He will explain to you how life first originated in the shallow waters of the seashore, spreading hence out over the surface of the sea and down into its depths, into the fresh waters and out over the land. He will point out the great desirability of a fuller knowledge of the ocean with its immense food supply and its wealth of material products, at present largely neglected through ignorance of their importance to humanity.

"As the earth's agricultural and mineral resources become fully developed or partly exhausted," said Dr. Clark, "man will realize more and more the vast untouched resources of the sea and, turning to these, will find relief from the increasing difficulties of existence. That is the chief object of our oceanographic work—to study and set forth the economic importance of the sea."

Every day, when the Albatross is working in favorable waters, the trawl net is lowered and dragged along for hours at a depth of one mile or two miles or three miles or four miles; then it is lifted to the deck and its contents are dumped into receiving sieves, where the mud is washed out and the treasures of the sea are separated.

Among the strangest creatures brought up from great depths, some times as great as three miles, are the "lilies that eat meat," hungry mouthed animals that have the form of beautiful plants with gracefully branching arms and brilliant colors. These crinoids, as they are scientifically known, spread miles over the floor of the ocean in vast swaying gardens, all red or all yellow at great depths, but in the higher levels abounding in many gorgeous pinks and purples, blues and crimsons. Never was there an animal so lacking in any immediate usefulness as the crinoid. It cannot move, it has no eyes, it makes no attack, and it does no harm. It simply eats, playing the part of universal scavenger of the seas, catching all food that falls through the waters, animal and vegetable, in its ten or more waving arms, each of which has a long groove lined with propulsive hairs, that work the food along in the manner of a moving stairway to a central mouth and stomach.

This stomach lies between the bases of the arms, which rest either upon a long stalk or upon two or three dozen

legs that cling fast to rocks or other animals or spread out upon the surface of the mud. The crinoid is perhaps the only creature in the sea that is not desired as food by some other creature; but these animal lilies which eat everything are not themselves to be eaten, being too brittle, too full of lime—all skeleton, as it were. Even the stomach of a crinoid has its own skeleton.

In the midst of gorgeous submarine forests and waving gardens that fringe the reefs of the ocean floor and spread over its vast plains are abundant clusters of shining trees or bushes known as sea feathers or sea pens; these also being animals, not vegetables. Their long stems glow with a dull phosphorescent light when the trawl nets bring them up from the depths, and if they are touched with ammonia they shine brightly. It is thought that their light is dulled through their fright in capture and it is probable that normally they give forth a brilliant radiance when they desire to attract their prey or to terrify their enemies.

I asked Dr. Clark if fishes have good hearing and he replied that they have an auditory apparatus, although they lack external ears. And some fishes utter sounds that can be heard under the water; the squirrel fish makes a noise like a squirrel chewing on a nut, the drum fish produce a drumming sound, the "grunts" a grunting sound, and laboratory experi-

ments at Woods Hole and elsewhere have shown that fishes react unmistakably to sounds about them.

As to the range of vision in fishes little is definitely known, except that some species, like sharks, have very keen eyesight, while others seem to get on excellently, perhaps by feeling, in dark or muddy waters where eyesight can little serve them. It is certain that the depths of the ocean, all below an upper mile or so, are wrapped in absolute darkness. No ray of light from the sun ever penetrates there. Everywhere is utter blackness, so that photographic plates may be exposed for hours and not be affected.

The fish brought up from this abyss are small in size and black in color or red in color, red being actinically the equivalent of black. And many of these bottom of the ocean fish are blind. One might imagine that all of them would be blind in a region of perpetual night, but such is not the case. Some fish in these great depths have eyes, and use them most effectively, as will presently appear.

There has been discussion as to how the blind fish get their food and it has been suggested that they may live off the mud at the bottom, which, to a depth of three or four miles, is rich in organic matter that sifts down ceaselessly from the areas above. Various bottom dwelling sea urchins and star fish live on this nutritive mud.

It may be mentioned that the method by which these deep sea fish accomplish their nightly vertical migration is very much of a mystery, as there is a difference between the near surface water pressure and that at a three mile depth of several tons to the square inch. How do these weak, frail creatures accommodate themselves to this enormous pressure below and then to the release of this pressure above? What saves them from the double peril of being crushed as they go down or blown to pieces by the force of gases released from their bodies as they go up? And how do they alter their specific gravity so as to ascend for a mile or two at will and then descend for a mile or two, it being noted that they have no air bladders?

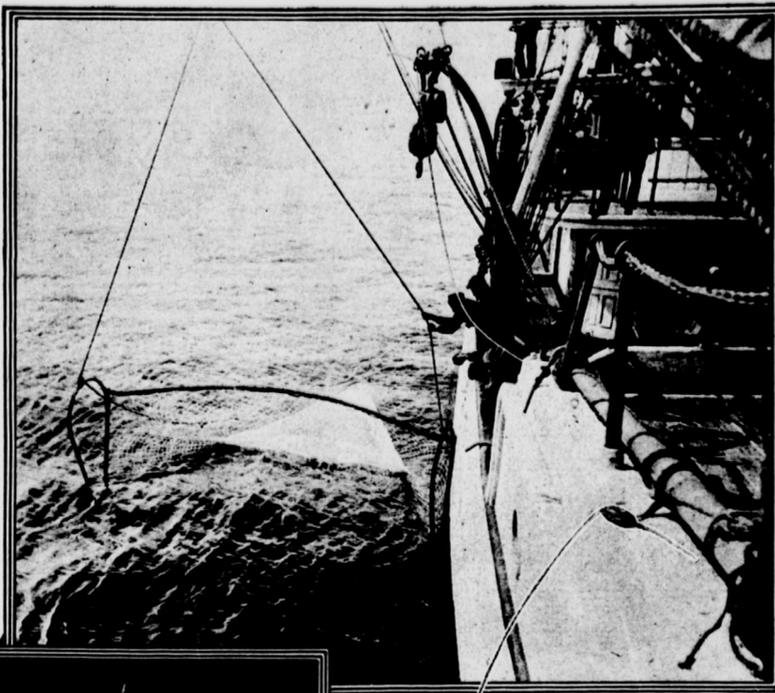
Among the strangest of these ascending night feeders are the lantern fish, weak little creatures, but remarkable for this, that their bodies are dotted over with electric lights, certain round phosphorescent spots arranged in rows along the sides that glow brilliantly, just as fireflies glow, especially a large spot on the end of their noses that shines like a searchlight. So these queer fish move through the water, ascending and descending, small submarines, all ablaze. There may be a double usefulness in these phosphorescent lights which flare up suddenly against a deep sea enemy and frighten him away or which lure the

prey at higher levels as a candle does the moth.

The potency of light in attracting wanderers of the deep is seen in the equipment of the lure fish, a grotesque creature with a huge mouth that hides its black body in the mud and waits patiently for victims, dangling before them a phosphorescent bulb that shines at the end of a long filament—a self-grown and self-baited fishing rod curving forward from the animal's head and hanging temptingly before its hungry jaws, ready to snap open at the approach of a curious visitor. These lure fish are found at the depth of three miles or more.

Perhaps nature's most fantastic creation among fish that tempt their prey by means of phosphorescent light is the wonder fish, with its snare mouth at the approach of a curious visitor—a brand new discovery brought up by the Albatross during her Philippine cruises from a depth of nearly a mile off the island of Celebes.

The Thaumactichthys pagidostomus (oceanographers spend hours naming these creatures) is remarkable for its sombre ugliness, for its two tiny eyes so near the corners of its mouth that they seem in danger of being swallowed and for the enormous size of this mouth, which opens like an elastic cavern and is provided with large



The Albatross, with trawl net.



Lesser Angler. This fish was caught 10,116 feet down. It lures its prey by means of the illuminated bulb seen above its body.



Skeleton of a Radiolarian; from the American Museum of Natural History.

linked and hooked teeth that fold back against the jaws to allow easy entrance of the prey and then swing forward, once the prey is inside, to bar escape.

Most extraordinary of all is a phosphorescent bulb in the roof of the mouth that shines brilliantly when this wonder fish spreads its jaws and that serves to attract victims.

Among prized captures of the trawl nets are many beautifully formed and gorgeously colored little creatures that might properly be called opals of the sea, but really come under the homely classification of sea worms. Some swim in the ocean, some live on the rocks inside of straight or crooked tubes which they make out of sand or lime, some hitch themselves fast to the shells of other animals, the sharp spikes of sea urchins or the branches of corals. Some of them are ten or fifteen feet long and no wider than two fingers and no thicker than one, extremely brittle creatures, easily dividing into fragments that go on living as separate worms.

Each haul of the nets brings up some deep sea wonder. It may be the hideous viper fish with teeth so long that they fold outside of its mouth like the tusks of a wild boar; or the snipe eel, with a bill like its namesake

Strange and Little Known Creatures Brought Up From the Depths—Fishes That Carry Electric Lights

and a body like a length of whipcord; or the queer pelican fish, that will swallow a fish much larger than itself and somehow digest it; or a dead ribbon fish with its almost transparent body, twenty feet long and a foot wide and half an inch thick; or a great red jellyfish full of poisonous darts coiled up in its body and ready to shoot out their venom against any touch.

In New England and Arctic waters some of these jellyfish grow to enormous size, their bodies measuring six or eight feet across and their pendent arms reaching down seventy feet or more. I may mention also the giant squid or cuttlefish, thirty feet long, a whitish colored beast that is always found dead, the same being true of the giant octopus with its reach of seventy feet from tip to tip of its huge arms.

I asked Dr. Clark if oceanographers can throw any light on the sea serpent legend.

"Certainly we can," he said. "Ordinarily it takes two basking sharks to make one sea serpent. These sharks are forty or fifty feet long and they travel in pairs, male and female, line abreast, close together, both showing above the water a length of tail and dorsal fin. The sight of two such creatures, swimming tandem, might easily suggest the convolutions of some huge single unclassified sea monster."

However eager for new specimens he may be, the experienced oceanographer is extremely careful in his handling of the white enamel pan into which the contents of the tow net are emptied. There may be dangers here, unsuspected by the novice. Even a poor haul of a few red shrimps and a wriggling blackfish in a snarl of

slimy seaweed may have its dangers. The slime crustacean, for instance, may have come from a most poisonous jellyfish known as the Portuguese man-of-war, that has stung to death many a valiant swimmer with its ten foot streamers that paralyze the body. On fair days these formidable creatures lift their pink and blue oval crests above the surface, but in rough weather they sink, and one of their streamers entangled in a tow net might do serious harm, as happens on the "slime banks" of Bering Sea, where the cod fishermen suffer grievously when their lines are up smeared with a poisonous jellyfish secretion. It was the Albatross that traced the cause of this Bering Sea fishing trouble to a jellyfish.

Another danger lurking in the tow nets is the possible presence of a strange crustacean related to a crab, an unappreciated creature about three inches long, that is invisible, literally invisible, owing to the fact that its head and body, its arms, legs and claws are quite transparent. The presence of this animal in the receiving pan is usually indicated by a disturbance among its visible neighbors, the shrimps and fishes, and when it is lifted out with a pair of tongs, it appears like the glass model of a crab with slowly moving glass legs and glass claws. When killed this crab loses its transparency and reveals itself in a dull white coloring, like the white of an egg. The Albatross encountered many of these invisible wrigglers while fishing in Japanese waters. It is well known that very young fish and tiny eels are quite transparent except for two black dots which mark their eyes.

Dr. Clark explained to me that while many fish have an extraordinary power of adapting themselves to their backgrounds, literally changing the colors and the patterns of their skins, and thus rendering themselves invisible to enemies, there are others that seem to make themselves conspicuous as possible, flaunting their vivid colors, one would say, darting about like flashing rainbows. This is because nature in her profusion has given to one species a cer-

tain means of defence, and to another species a different means, and to still another the brilliantly hued mackerel fears nothing that swims, not even the savage shark, because he knows that his unequalled swiftness outruns him. And in tropical waters, swimming with fish gorgeous in pinks and gold and scarlet, there is quite a different protection.

These jewelled beauties, swimming about rather tamely, would be helpless against ravenous pursuers were it not that they live in shallow side pools and near coral reefs, where these pursuers dare not follow them. Why not? Because coral reefs are full of stings of the live coral animals, stings that hurt a man, and if he touches them and might sting the eyes of any big fish that ventured among their tortuous arms and branches. And tide pools abound in sea urchins with sharp pointed spines, hundreds of them that break off on one side a wound, also in sea anemones possessed of a powerful stinging apparatus, which dangers the big fish could not avoid in shallows and narrow passages, whereas the little brightly colored "butterflies" are protected by some ancient instinct steeped among them.

In addition to her work with one of the duties of the Albatross is to take deep soundings, this being done by a small winch on the deck operated by a little steam engine that swiftly lowers over the stern a length of piano wire held fast by a sixty pound iron shot. This wire is released from the wire as soon as it strikes the bottom, whereupon the sounding stops and the depth is ascertained automatically—2,000, 3,000, 4,000 fathoms—by a cyclometer arrangement connected with the winch. In sailing unknown seas the Albatross takes soundings every half hour, day and night.

The Albatross also makes records of deep sea temperatures by means of self-registering thermometers secured to the sounding line above the gun shot. These temperature observations prove that the ocean has a far more limited range of heat and cold than the land, its maximum surface temperature being about 85 degrees Fahrenheit and its minimum about 29 degrees Fahrenheit in the most frigid depths. The "cold patches" are, however, limited in extent, and the average ocean temperature at a depth of six or seven hundred fathoms is 36 degrees Fahrenheit.

One of the mysteries of the sea is a regular nightly temperature rise of half a degree at a depth of one hundred fathoms. This unaccountable temperature variation has been observed by the Albatross over and over again.

Another regular task of the oceanographers is to take observations of the saltness of the sea, which varies greatly in different localities. This is done by sending down on the trawl line brass specimen bottles arranged to fill and close at any desired depth. Thus it has been learned that the North Atlantic is considerably saltier than the North Pacific and that the saltiest of all the great seas are the Mediterranean, the Red, and especially the Adriatic. Also, on either side of the equator, in both Atlantic and Pacific, there have been discovered "trade wind patches" that are considerably saltier than the surrounding sea. Some patient statisticians have calculated that if all the salt in the sea were evaporated and spread over this country it would cover the United States with salt more than a mile and a half deep.

During my stay in Washington for this investigation I had several conversations with Commissioner Fisheries Hugh M. Smith regarding the immensely valuable food supplies that have been taken from our oceans, and the fashion of more thrifty eating, but that we allow to go to waste. The total value of marine vegetables gathered annually by the United States is only about \$400,000 as against \$1,000,000,000 worth gathered by Japan. It is far less to draw upon. In our Atlantic waters we have inexhaustible beds, hundreds of millions of bushels, an important food product that is entirely neglected, although it is the help industry is zealously prosecuted.

Another marine vegetable that is prized in the East is one found in a nutritious insalad or jelly called "sea lettuce." This vegetable has been abundant along our New England coast and might be had for the asking, but no one takes the trouble to gather it owing to general ignorance. The same is true of sea purslane and the sea urchins and other marine vegetables that we have in our waters in numbers about as great as those that would support a great population of people were taught to make use of them.

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OBITUARY PARTIES IN BOSTON

BOSTON has developed a new social diversissement of a more or less intellectual variety, as might justly be expected. It is deservedly popular and is called the obituary party.

The method of procedure is to ask each guest to supply an original obituary note or epitaph appropriate to one or more of the other guests, no limit being placed upon the number who may be subjected to having a few last respects paid to them. Any guest declining to act may be muted in a forfeit to be determined by the company. Only obituaries in verse are accepted, but epitaphs may consist of no more than one line. Three prizes are awarded for the best productions of each class. Herewith are a few specimens submitted at a party held at Commonwealth avenue recently:

Deacon Winthrop, thou hast left us,
And we're sad as sad can be;
It was the devil who bereft us
And he has our sympathy.

Mrs. Susan Smith has gone
To the world that never ends;
Sister Smith is always doing
Something that will please her friends.

Tom Linson's gone away from us,
They say a better place is his;
But that's not so, because there isn't
No better place than Boston is.

Beneath this stone lies Standish Doan,
And surely he must love it,
Because all know he did love so
To always lie above it.

To heaven above has gone at last
Dear Sister Martha Hewitt,
And it will be some time before
She gets accustomed to it.

Richard Johnson has departed;
He was a loss, time getting started.
Waiting for the elevator
Stood our dear friend, Silas Brown;

"Going up," they called, but Silas
Missed and got it going down.

There were others, some showing the master hand no less than these, and there were still others not so good, because it is not in every Bostonian to verify in a manner unfaithful to print, and it would be unkind to publish to the world what is not flattering to the well known Boston intellectuality. However, in this obituary party proposition Boston offers to laded society everywhere a new diversissement and jaded society everywhere may hasten to divert itself in the Boston manner, without fear of brain fog to a hurtful degree.

AMERICAN LABOR SPEEDIEST

I CAN readily understand," said an employer of labor, "that the Glasgow strike was, as it is reported, caused by American workmen speeding up the machines and so turning out more work than their British fellows; also that their superior garments worn while going to and from the shops caused some dissatisfaction to the same people. Without going into the psychology or sociology of the situation every employer in this country recognizes the fact.

"I do not mean, however, that every best workman is a native son. Far from it. Some of the best were born in other countries, but they learned their trade here and arrived from their home lands before they had become settled in their habits of labor. Thrown among fast workers, they develop the same speed of operation and become fine examples of American workmen.

"And of all America the city of New York turns out the best and fastest of the skilled labor. While on my way to Detroit recently I met in the smoking compartment of the Pullman car a German foreman of plasterers and got into conversation with him. He was going to the same city to take charge of a gang of New York plasterers who had been sent there to work on a mansion that was being built by a wealthy man.

"I asked him why his firm sent men