THE SECOND CAPTURE OF THE WHALE SHARK, RHINEODON TYPUS, NEAR HAVANA HARBOR, CUBA

IN 1928 we put on record[1] the capture of a thirty-two foot whale shark on November 20, 1927, at Jaimanitas, a fishing village in the suburbs of Havana, about five miles west of the mouth of the harbor. Now we have the data for the taking of another at Cojimar Bay about as many miles to the east of Havana, and interestingly enough the new specimen is of about the same size—the former thirty-two feet, the present one thirty-four feet.

On March 10, 1930, a Havana paper contained a notice of the capture of a gigantic "Pez-dama" or checkerboard fish on that day off Cojimar. Investigation confirmed the account. The Havana papers during the next few days printed a picture of the fish drawn up on the beach and gave accounts of its capture which on investigation were found to give the facts. All available data from the papers and from talks with the fishermen have been used in writing this notice.

The accounts, which seem reliable, are that this or another fish had been seen in the open sea off Cojimar for at least three years, and efforts had been made to capture it. So well known was it that the fishermen had dubbed it "El Elefante" from its huge size. That the presence of this fish off Cojimar was common knowledge is attested by the fact that a Spanish merchant, Sr. José V. Fernández, of Havana, had subsidized a crew of fishermen under José González to watch out for and to capture the fish. They had been provided with steel cables, empty metal casks or "drums" and specially made harpoon lines and harpoons. The necessity for the latter will be understood when it is recalled that the skin of *Rhineodon* is from three to four inches thick, and not penetrable by the ordinary harpoon.

The method of capture seems to have been somewhat as follows. Two gasoline launches managed to get a slip noose of small steel rope over the shark's head and around his middle—over the pectoral fins and just in front of the dorsal as is shown in a photograph. The wire cable was then drawn tight, confining the pectorals and hampering the fish's activity. Since this attack took place out on the open sea, in water of some depth, it was necessary to hinder the shark from diving or at least to locate it when submerged. This was effected by affixing (how we have not been able to ascertain) empty metal barrels or drums to the cable. This done and the whale shark being more or less held at the surface, two or three harpoons were thrown into it just back of the head and above the gill region. With *Rhineodon* thus doubly held to the boats, about fifty shots were fired into its body in the endeavor to kill it. We have a photograph in which the wire rope and the harpoons are plainly visible.

The fish does not seem to have offered much resistance to this treatment, and was finally towed and driven from the open sea into Cojimar Bay and stranded in shallow water. A crowd quickly collected and an effort was made to pull the gigantic fish up on the beach. But since the monster was thirty-four feet long and had an estimated weight of nine tons, the utmost efforts of forty men were not sufficient to effect this, and it was finally achieved by putting the fish on a wooden framework (allied to the "stone boat" of New England) and by dragging this up by means of a winch or crane. The fish was still alive when brought to the beach and died some twenty-four hours later—presumably from loss of blood resulting from lance thrusts in the gill region. There seems to be no other method to compass its death, unless by the use of a bomb-harpoon.

The huge fish was finally drawn on the shore where it was covered with an awning to protect it from the sun. Here it was visited by great numbers of people not merely from the countryside but from Havana. The picture published by the Havana *El Diario* was made of the fish under the awning. Later the skin was removed and taken to Havana where it is being mounted for exhibition.

As in the case of the other Havana specimen this fish seems to have come near shore in pursuit of schools of sardines, on which the fishermen allege that it feeds. This, as noted in our former paper, coincides with the other definite information which we have about its feeding habits in the western Indian Ocean.

This fish, a male as was the other Havana specimen, offered no effectual resistance to capture, but seemed very sluggish—even stupid. This indeed seems characteristic of the whale shark. All other specimens taken in the Florida Straits have put up no fights at all, in fact have done nothing save drag the attacking boats around. However, the three captured on the Florida coast (the fourth came ashore dead) have been taken in shallow water where they could not effectively exert their strength. But the two taken near Havana have made no more resistance than did the Florida fish, notwithstanding the fact that they were taken in the open sea, in water of at least moderate depth—water by no means so shallow as to hamper the fish. These two did no more than drag the boats around with them, as the others have done.

In conclusion we may add that the capture of this new specimen of *Rhineodon* is by no means surprising. This conclusion is arrived at because the capture of one other Havana and of four Florida

[1] E. W. Gudger and W. H. Hoffmann, "The Whale Shark, *Rhineodon typus*, near Havana Harbor, Cuba; the Fifth Record from the Straits of Florida," American Museum Novitates, 1928, no. 318, 7 pp., 4 figs.

specimens have been recorded from this general region. And secondly, because the head fisherman of the crew that caught the first Havana specimen reports that after the capture of this fish he had two months later seen in the same locality and had tried to harpoon another huge spotted shark. The same reports come to us now for a second specimen in the waters of Cojimar. Then again we have seen recent newspaper accounts (unconfirmed) of a specimen seen off Bimini, Bahamas.

It is a matter of regret that the demise of Sr. Fernández took place some months before the realization of his dream for the taking of this great shark, the search for which he had maintained for many months. However, the mounting of the fish seems to be going forward under the direction of his widow and of the head fisherman and it is to be hoped that the exhibition of the mounted fish may bring in sufficient returns to recoup at least some of the expenses of its capture and preparation.

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QUOTATIONS

REMARKS ON THE HISTORY OF COSMIC RADIATION[1]

IN previous articles I have never sought to assign the origin or history of the speculative ideas about atom building in cosmic processes—a very ticklish thing to do, since during the past twenty years this question has aroused general interest. But if the historian of this domain can find anything useful in it, I will be glad to contribute my own knowledge of the history of the subject.

In the year 1904, when I was engaged in the study of certain rare ores for their uranium content by the action of radioactivity, Professor F. R. Moulton, of the University of Chicago, came to me with the statement that even if the sun were originally of pure uranium it could not have given up as much energy as he would regard as necessary for a minimum of the life of the sun, and that, therefore, it was necessary to postulate a store of cosmic energy from a previously unknown source for the stellar energies.

Now this source had already been found, although I did not, at that time, fully appreciate it; the interchangeability of mass and energy was demonstrated in 1901 for special cases by the experiments of Kaufmann, and the discovery of radiation pressure some years before was also of great importance. A few years later (1905) Einstein discovered this interchangeability as a consequence of the special theory of relativity, and from this time on this theory was available to any one who, like Professor Moulton, was seeking a new source of energy for the continued existence of the life of the celestial bodies. Certainly, for something less than ten years it was a theme of general table conversation at the University of Chicago. As soon as the Mosleyian relations (1913–14) and the existence of the isotopes were discovered, atom building within the stars, accompanied by a change of the superfluous mass into radiation, was considered as a source of stellar energy. Harkins[2] explained in detail this loss of mass, or packing effect, in the atom building process. I mentioned this fact in the first edition of my book "The Electron."[3]

That this phenomenon is not sufficient to explain the energy of the universe was shown later on. In *Nature* (1917) Eddington mentioned the idea of the annihilation of matter by collision and the complete superposition of the positive and negative electrical fields, and ascribed the idea to Jeans.[4]

Certainly by the year 1915 the idea of the building of the elements from hydrogen as a source of universal energy was prevalent, and in 1917 the total destruction of mass as a more active source found its way definitely into the literature, and was familiar at other universities than Chicago, since these ideas are obvious consequences of the Einstein equations (1905) and the known existence of isotopes (hydrogen with the atomic weight 1.008 instead of 1).

In our conversations at Chicago W. D. MacMillan constantly held out for the view that a still further step forward should be taken and that the idea of the "running down of the universe" should be given up by the assumption that atom building went on in space by the condensation of radiation into atoms. He discussed this idea with me in detail in the year 1915, and in July, 1918, he published it in full.[5] Any one who is interested in the history of this subject should read MacMillan's other articles,[6] since this investigator, on the theoretic side, is the foremost representative of the idea of the development of cosmic energy by the process of atom building.

These three ideas, first, atom building from hydrogen; second, the radiating away of mass, and third, the condensation of radiant energy into atoms, are

[1] Translated from the *Physikalische Zeitschrift*, Nr. 6, March, 1930.

[2] *Phil. Mag.*, 30: 723, 1915.
[3] P. 203, 1917.
[4] *Nature*, 70: 101, 1904.
[5] *Astrophysical Journal*, 48: 35, 1918.
[6] SCIENCE, 62, July 24 and August 7, 1918.