The third was 31 feet over all and was captured in the Bay of Florida in June, 1919. The fourth (31.5 feet in length) was harpooned at Marathon in June, 1923. This, the fifth specimen, was taken on January 18, 1932. In addition, two specimens have been captured off Havana Harbor. The first (32 feet long) was taken west of the mouth of the harbor in 1927; the second (about 34 feet in length) was caught east of the harbor mouth in March, 1930. All these fish, save the first, I have put on record but only after the receipt of photographic evidence. Such data have come for this specimen, and since one photograph is the best ever made, I hope later to publish it and others and thus make them available for the use of ichthyologists.

These seven captures in the region of the Straits of Florida indicate that there is a breeding ground somewhere to the southwest from which the fish drift northeast with the Gulf Stream. From various data coming to me over a period of years, I am convinced that this is somewhere in the Yucatan region. The reasons for this are set out in a recent paper of mine,[2] to which the attention of those interested in this particular matter is called.

E. W. GUDGER
AMERICAN MUSEUM OF NATURAL HISTORY

THE WHALE SHARK ON THE COAST OF BORNEO

DARVEL BAY is a large indentation on the northeast coast of British North Borneo. In the jungles behind its flat sandy shore live deer, wild boar, tambadu or huge wild ox, elephant and rhinoceros.

Last summer I discovered that the waters of the bay held monsters even greater than anything on its shores. As the Philippine revenue cutter, *Mindoro*, entered Darvel Bay from the Sulu Sea on August 4, 1931, my friend, the Spanish engineer of the boat, spoke to me of the great "chacon" and its mate which were always seen whenever the *Mindoro* passed that way. To my surprise, while we were talking about it a great whale shark broke water and swam about on the surface, perhaps a little more than two hundred yards away. It was a typical specimen of *Rhineodon typus*, the white spots and longitudinal ridges being more distinct than I had ever seen them before. We estimated the length of the "chacon" to be between 12 and 15 meters.

Our boat was running parallel with the flat sandy coast, and we soon left the great shark behind, as it was merely circling about. Perhaps a quarter of a mile further on another whale shark broke water but did not emerge sufficiently to show its spots. Only its gigantic size, equal to that of the one seen first, told what it was.

The *Mindoro* frequents these waters during several months each year, while watching for smugglers, and anchors not far from the place where we saw the sharks. The engineer told me that he had seen these two sharks almost every time the ship had passed the point during the past fifteen years.

ALBERT W. HERRE,
Curator
ZOOLOGICAL MUSEUM,
STANFORD UNIVERSITY

DETERMINISM AND THE WEATHER

IN commenting on Professor Compton's[1] remarks on the uncertainty principle and free will, Professor Noyes[2] has contributed to clarity of thought and discussion by pointing out the important distinction between events which are indeterminable and those which are indeterminate. The illustration he has chosen, however, seems to imply a view of causation which calls for a certain amount of comment. He says: "I think no scientific man would claim that because the weather is indeterminable it is indeterminate—that the weather to-morrow will not depend, inevitably, on conditions which exist to-day." On the contrary—be it said for whatever measure of philosophic comfort weather forecasters may derive therefrom—I think that a considerable number of scientific men would decline to commit themselves to any such statement, for excellent reasons which Hume pointed out nearly two centuries ago. Sequence of events, however oft repeated, affords no proof of causal connection. The best that can be said, from the strictly critical standpoint, is that the weather to-day is related to the weather to-morrow through a chain of intermediate unknown events which, if we were able to find them out, we should be likely to naïvely regard as establishing a causal connection.

If it be objected that this strikes at the root of all scientific method, it may reasonably be replied that the scientist should himself be the most eager to examine critically the bases of his own procedure. Such an examination is inevitable when the boundary between physical science and metaphysics becomes as indefinite as it is at the present time.

It may be admitted that there are excellent pragmatic reasons for assuming a causal connection between events or series of events characterized by a high degree of statistical correlation (the relation of the weather on two successive days is not the best example of this!), but it should be pointed out that this assumption does not justify the ordinary idea

[2] E. W. Gudger, "The Fourth Florida Whale Shark, *Rhineodon typus*, and the American Museum Model Based on It." *Bulletin American Museum of Natural History*, 61: 630–632, 1931.

[1] A. H. Compton, SCIENCE, 74: 172, 1931.
[2] W. A. Noyes, SCIENCE, 74: 595, 1931.