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.

that the event which precedes in time is the cause, while that which follows is the effect. We are quite as justified in saying that the weather to-morrow is the cause of that to-day as in saying the opposite. Any one to whom the logic of this is not self-evident is invited to reread "Alice in Wonderland, or Through the Looking Glass." When we say that two events are causally related, all that we can mean from either the philosophical or scientific standpoint is that there is a high degree of probability that one will not occur without the other.

It is a commonplace of probability theory that empirically determined laws are liable to violation. When the probability of such violation is slight, we are prone to disregard it, but on very much the same basis that we disregard the probability of being killed by slipping in the bathtub. This admittedly may happen, but we continue to take baths and hope for the best.

The "collapse of causality" alleged to result from the uncertainties of quantum theory has been variously received by different segments of the scientific world—with alarm and consternation, with resignation or despair, or with an enthusiasm born of the hope that it offers new arguments for human freedom. It is difficult to see how any of these points of view is justified. The principle of causation is just as valid as ever for practical purposes, while from the philosophical standpoint it never had any validity. Therefore it would seem that matters remain *in statu quo*.

If quantum theory has rendered any service to the cause of free will, it is primarily that of showing that some of the reasons for believing in determinism are not as good as was formerly supposed. At present each hypothesis seems to rest on the somewhat precarious ground that the other can not be shown to be true. Without discounting his own prejudices in the matter, the present writer leans to the view that determinism labors under the disadvantage of requiring a greater number of assumptions in regard to the behavior of unknowns. In other words, the conservative attitude is to emphasize that events which are indeterminable are indeterminate as far as we know. It requires an extraordinary extension of the scientific method to assert what would be true if we knew all the facts in the case.

ROBERT C. MILLER

UNIVERSITY OF WASHINGTON,
SEATTLE

ON "ACADEMIC FREEDOM IN ITALY"

IN SCIENCE for March 25 Dr. A. J. Carlson, head of the department of physiology, University of Chicago, asks American biologists not to attend the next International Congress of Physiology, which is scheduled to meet in Rome next August, "unless the brutal and defiant attack on academic freedom on the part of the Italian government is rescinded." The "attack" is the oath of loyalty required by the government from the professors of the Royal universities. I wish to make, in this connection, some statements of facts, which are perhaps not well known, or have often been overlooked in the discussion on the subject.

The Italian universities are classified in three categories, namely, universities entirely supported by the state; universities largely supported by the state and partially by private contributions, and private universities, which do not receive any financial help from the state. The oath is demanded only from the professors (including associates, assistants, etc.) teaching in universities belonging to the two first categories, *i.e.*, from the official instructors maintained by the state. The professors of private universities are, of course, entirely free from such an obligation; a large number of them, however, offered spontaneously to take the oath. As it has been published, twelve, out of a total number of 1,225 professors, refused to take it. Does Dr. Carlson think that the remaining 1,213 took the oath against their conscience? Did he realize that the attitude that he suggested implies an insult toward the very men he seems so anxious to defend?

An oath of loyalty and allegiance to the King, the fatherland and the laws of the state has been required since the time of the constitution of the Kingdom of Italy from every person taking any office in direct dependence on the state. After the advent of the Fascist régime, which represents now the Italian State, the phrase ". . . and to the Fascist régime" was added to the prior formula. The formulae are essentially the same for every category of officials, but may vary somewhat, according to the specific functions which shall be exercised. For the university professors, the sentence concerning their functions is the following: ". . . and (I swear) to exercise the teaching function and to fulfill all academic duties with the purpose of forming citizens active, honest and devoted to the fatherland and to the Fascist régime." The entire formula has already been published in SCIENCE (Jan. 15, p. 73), but evidently in the translation the meaning of the Italian word "probo," *i.e.*, honest, has been confused with "prode," *i.e.*, bold.

The statement of a group of Harvard professors (SCIENCE, *ibid.*), namely, "This decree imposes upon all university professors of the Kingdom of Italy—and among all state officials of the Department of Education it is applicable to university professors alone—the obligation to take an oath which implies complete adherence without reservation or discussion to a particular system of political ideas," is thus somewhat misleading, since all state officials are ob-