Letters to the Editor

Rains of Fishes—Myth or Fact?

Being particularly interested in all the unusual things that fishes do and that happen to them, I have for over 40 years been collecting and publishing accounts of such matters, from laymen observers, from scientific men, and from my own experience. In all these articles I have sought to evaluate the evidence and to give credence accordingly. My reports are accredited by my scientific colleagues everywhere.

In the *Atlantic* for April 1946, Bergen Evans, professor of English at Northwestern University, writes that "the little fishes that come in heavy storms are one of the most delightful . . . myths," and further on he refers briefly to one report of a "rain" in my first article (1921). This particular fall occurred in India in 1830. The English reporter had the 10 Indian farmers who saw it attest their reports in 1-2-3 order before a magistrate, and their accounts are so printed in my article. Of Nos. 5 and 8 Prof. Evans says: "Some of Dr. Gudger's more reliable witnesses make the interesting point that the fish that descended on them were headless, rotten and partly eaten—suggesting birds to the incredulous, and God knows what (a rain?) to the credulous."

What Prof. Evans does not note is that these two "more reliable witnesses" also state that some of the specimens were "fresh." Furthermore, he also fails to note that, of the eight other (unreliable?) witnesses, five state that they saw the fishes fall, and No. 5 (a "reliable" witness above) had a fish fall on his head. Furthermore, three men (including Prof. Evans' No. 5 above) picked up fresh fishes and carried them away. All these and the accounts of 43 other reporters in this article (among them James Prinsep) are disregarded by Prof. Evans. He picked out the evidence he wanted, but was "incredulous" of all the other.

In my first article (1921), which seems to be the only one of the four seen by Prof. Evans, I made an attempt to evaluate the evidence. Some accounts were put down as hearsay and some as hearsay pretty well attested. Others come from men who found previously dry receptacles filled with rain water and fishes—among them, James Prinsep (1833), long secretary of the Royal Asiatic Society of Bengal, who "found a small fish, which had apparently been alive when it first fell in the brass funnel of my pluviometer at Benares, which stood on an isolated stone pillar, raised five feet above the ground in my garden." Some of the various reporters saw the fishes fall, and some had the fishes strike their heads or bodies. Among those who did not witness the falls were scientific men of high standing and veracity who, after carefully investigating the alleged rains, accepted the accounts as credible and whose printed word is today accepted by scientific men. Prof. Evans makes no mention of these.

The explanation is to be found in the action of whirlwinds and waterspouts and possibly of strong typhoon and monsoon winds. A "twister" or whirlwind starts in front of an approaching storm, and as it gains in size the "snout" elongates and approaches the water. This, caught by the whirling wind, rises up in a cone. The two unite, and the swirling column moves along, picking up water, fishes, and any other fairly light objects at or near the surface of the water.

I have seen waterspouts off Beaufort, North Carolina, and numerous ones in the Florida Keys west of Key West. In these latter, on a day in July 1914, at the Marquesas Atoll, a huge waterspout was seemingly headed for the yacht on which I had been left as shipkeeper, but when near at hand it fortunately sheered off and passed by about 100 yards away. To this day I have a vivid recollection of the irresistible power of this whirling wind and water. A natural history correspondent in Louisiana (E. A. McIlhenny, of Avery Island) once wrote me of a small waterspout on a fresh-water distributary in the Mississippi delta, which broke just in front of his fishing boats and then filled boats with water and fishes. He knew of other like phenomena in that region. Such a waterspout might pick up dead fish (if such were present) as well as live ones. Everything movable would be sucked up in the whirling vortex. Furthermore, whirlwinds, originating inland, will not only progress over land, picking up various objects, but over ponds and lakes—becoming waterspouts. As such they will there pick up frogs, fresh-water fishes, snails, etc. and carry these away over the land. Sometimes the fishes are found in a long, narrow, fairly straight row over some distance, evidently having been dropped as the waterspout progressed over the country with lessening speed and carrying power.

When the waterspout or whirlwind, with its load of fishes, breaks, or when these and the typhoon and monsoon winds lose their velocity to a point where their carrying power is less than the pull of gravity on the fishes, water and fishes will fall as a "rain of fishes."

In my four collective articles about 78 reports are noted. Their time span is about 2,350 years, and their range in space, the six continents and various islands in the two great oceans. Recorded are rains from Canada (5), United States (17), England (5), Scotland (9), Germany (11), France (1), Greece (1), Paroe Islands (1), Holland (1), India (13), Malaya (2), East Indies (2), Australia (7), South Africa (1), South America (1), Scandinavia (1). These accounts have been collected from works on meteorology, history, travel, and natural history and from various scientific journals, mainly those devoted to natural history in general. These accounts were written by all sorts and conditions of men—ordinary citizens, persons interested in natural history, and scientific men of high reputation for veracity and for accuracy of observation. Among the latter are James

Prinsep, already mentioned (1833); C. W. Grant (1838), of the Bombay Engineers; J. E. Dekay, in his *Fishes of New York* (1861); Pieter Harting (1861); Sir Emerson Tennent, in his *Natural history of Ceylon* (1861); Count Castelnau, the ichthyologist (1861); E. Warren, of the Natal Museum, South Africa (1909); Alexander Meek, of the Dove Marine Laboratory (1918); and J. D. Ogilby (1907) and A. R. McCulloch (1925), well-known Australian ichthyologists. These men not infrequently narrated these accounts before scientific societies and later published in scientific journals.

Most of the nonscientific observers and some of the scientists had no knowledge of what other men in their own lands and especially in foreign countries had seen and written about. Some of the observers had seen the fishes while falling, some had been struck by the fishes, and some had eaten of the freshly fallen fishes. The mass of evidence is as prodigious in volume as it is widespread in time and space. To disregard all this evidence ranging from hearsay to scientifically attested, and to brand as "credulous" all those who, from personal observation or after much study of published accounts, accept much of it as credible, seems, as I wrote in Article I, to indicate a refusal to consider the evidence offered or an inability to evaluate it.

To my very great regret I have never witnessed a rain of fishes, as I have never seen some of the other unusual and extraordinary things about fishes of which I have written in the past 40 years. But if such things have not been physically impossible, and when after careful and critical consideration of the reports (from hearsay to scientific) from widespread sources the world around and from many reputable observers (some known to me personally)—reports which in detail corroborate each other, then I have ample justification for giving them credence, and so I still believe that:

Fishes fall from the sky with rain.

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Geopathology or Ethnopathology?

In referring to Francis Dieuaide's article (*Science*, 1945, **102**, 656), Frederick Sargent, II (*Science*, 1946, **103**, 316) states that "geopathology" is really a branch of biometeorology.

Actually, Dr. Dieuaide's "geopathology" has basically very little to do with biometeorology. True, climate, topography, food, and habit are correlative factors in both; however, they are not the principal factors in "geopathology." Dr. Dieuaide, among others, specifically mentions the "effect of social conditions" and "perhaps hereditary racial traits." In this connection it might also be mentioned that it is somewhat puzzling why Dr. Dieuaide appears to infer that hereditary racial traits are only of secondary importance.

Since we have the opinions of a medical man and a biometeorologist, I wonder if it might not be wise to call upon an anthropologist as an arbiter in this argument. I frankly doubt if anyone would care to lead with his chin. The fact remains, as Dr. Dieuaide very correctly pointed out, that "Geopathology is in its infancy." Nevertheless, it is my personal opinion that Dr. Dieuaide's article is laudable, in spite of the fact that a few minor comments appear debatable.

First, I believe that *Natural resistance and clinical medicine*, by Perla and Marmorston (Little, Brown, 1941) covers a good many of the problems mentioned by Dr. Dieuaide. Second, I believe that American medicine has been somewhat asleep in this regard. It had been my good fortune to obtain several papers in Japan prior to the war which dealt with some studies and research in this field. As a matter of fact, the Imperial Japanese Armed Forces collaborated in some of those studies.

Finally, in answer to Dr. Dieuaide's proposed term, "geopathology," I wonder if the term "ethnopathology" might not be more specific.

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A New Pennsylvania Meteorite

Recently one of my students, C. R. Bruce, brought to the laboratory for identification a specimen which had been resting in family cupboards for 61 years. The story was that in September 1886 a man was cutting corn on the Deutihl property, two and a half miles southwest of Bradford Woods, or seven miles northwest of Pittsburgh in Allegheny County, Pennsylvania. He heard an explosion and a rushing noise and ran to the home of George Hillman, who, on going to the field, found the specimen imbedded in the road and still warm. It has been in possession of the family ever since and is now owned by Mrs. Charles Amsler of Baden, Pennsylvania.

Inasmuch as it is in private hands, no opportunity has been afforded for detailed study, but preliminary examination indicates that it is a true stony meteorite or aerolite. As such, it is of considerable interest since it is the first recorded aerolite found in Pennsylvania. R. W. Stone (*Meteorites found in Pennsylvania.* Pennsylvania Topographic and Geologic Survey, Bull. G 2, 1932) lists five meteorites found in the state, but all these were of the metallic type, or siderites.

The Bradford Woods meteorite measures $55 \times 65 \times 85$ mm. and weighs 762 grams. It is shaped somewhat like an old-fashioned pan biscuit with one smooth, curved surface like the biscuit top and three more square faces like the broken faces of a biscuit. The surface has the glazed, varnishlike, pitted surface characteristic of meteorites and is nearly black. It would seem that it is a part of a smooth, pebblelike, elliptic body which, as it reached the earth's atmosphere, exploded, the broken surfaces becoming fused and pitted in the rush through the atmosphere.

A freshly broken corner of the mass made it possible to examine its mineral composition. It is made up of fine-grained, greenish, silicate material which is highly birefringent and has a high index of refraction and an