For one reason or another, excavation is a dominant feature of our present activities; and, however shallow it may be, every hole is likely to reveal something of interest. Modern methods of excavation are so speedy and mechanized that much of their revelations can be observed only by perpetual watching. Here the local society can find scope for important and urgent work. Every society should acquire a large-scale map of its area, and plot on it every site where a glimpse, however fleeting, of the subsoil has been possible. Pin-pricks on the map, with numbers written against them, to correspond with card-index entries giving all the particulars, would soon make the map a priceless record. Only accuracy and persistence are wanted to achieve results that could not fail to increase the knowledge that all local societies are nominally out to acquire. Probably most societies include one or more members with the business experience needed to keep the records in order, and every member could contribute to them directly or indirectly. The volume of local knowledge already stored in the minds of residents is impressive; if that knowledge were to be methodically recorded, it would outlive its original possessors and so contribute to something more permanently satisfying than reminiscent causeries.

The suggestions for activity outlined above may seem to be more concerned with the relation of scientific societies to science than with their reaction on the community at large. Such a view is not only narrow, but out of date. In the present critical times, statistics of the resources and character of the country are being feverishly compiled. There could surely be no better compilers than those residents in any district who have trained themselves to observe facts and to tabulate them methodically. Such problems as the yield of springs and wells, the availability of road-metal, sand and gravel, the quality of the soil, the incidence of blight and the usefulness or otherwise of our fellow inhabitants, are all of a nature that demand accurate observation on the spot. Many of them may involve elaborate technical study as well; but the first stage of all of them is within the capacity of any reliable observer. All who love their country (in both senses of the word) can find here congenial and valuable work that is needed urgently.

The proportion of the population likely to join, and participate in, a scientific society is inevitably small; but that is no reason why it should not serve as a leaven. The study of natural history produces a philosophic outlook that should supply a much-needed corrective to the world, and can mitigate the worst attacks of the flesh and the devil. The mere existence of a company of people declaring their interest in matters bigger than the squabbles of the political nursery, preferring to contemplate wider problems and vistas than those of the daily headline, should be enough to ensure a nucleus of stability in the quicksands of opportunism. Science is a search after the truth; its devotees should be sure of their gospel, and declare it in a world of falsehoods: *Magna est veritas, et praevalebit.*

WHERE DO METEORITES COME FROM?[1]

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SINCE the days of Schiaparelli and H. A. Newton, astronomers have considered three possible answers to the oft-repeated question, "Where do meteorites come from?" The three answers considered are: (1) that they come from the distances of the fixed stars; (2) that they come from the outer portions of the solar system, like most comets; and (3), that, like the closer asteroids, they have been traveling in orbits little larger than that of Mars.

Schiaparelli and others were impressed with the fact that the great majority of velocities as determined for the meteors dropping meteorites were high. They were so high that, if real, the meteors must have come from the distances of the stars. H. A. Newton, however, found that most meteors dropping meteorites came from the general direction of the anti-apex of the earth's motion. That is, before the meteors entered the earth's gravitational field, they had been traveling in the same general direction as the earth itself. This indicated that the meteors had been traveling in orbits little larger than the orbit of the earth, so Newton and others suspected that the high velocities found for bright meteors were fictitious.

When meteor work was instituted at Iowa some twelve years ago, it appeared that greater accuracy in the paths and velocities for spectacular detonating meteors was needed. To attain this greater accuracy, measurements of the angles and durations have been secured by personal interviews. The observer is asked to stand exactly where he was when the meteor was seen, and the angles are measured as he points them out. If there was definite action at the time of the fall of the meteor, he is asked to "reenact the scene," and the duration is determined with a stop-watch.

[1] Condensed from a paper presented before the American Astronomical Society at Berkeley, California, August 9, 1939.

This work has shown that the estimates received from the general public on spectacular meteors are subject to large systematic errors, which make the velocities much too high. If a sufficient amount of information is at hand, however, a person familiar with these psychological errors can eliminate most, and determine a path reasonably close to the truth, even from the information received by letter. Some of the more famous meteors of years ago have been studied in the light of this information.

Orbits have been calculated recently for a number of spectacular meteors; and six have been selected as representative. The first four are recent ones falling in the middle western United States, for which the paths and velocities are based on personal interviews, as explained above. The four meteors selected fell in the months of August, July, January and November, respectively. Numbers (2) and (3) fell in the evening hours, number (4) fell in the early morning hours just before dawn, and number (1) dropped meteorites in broad daylight.

The fifth meteor, which fell on February 9, 1913, in Canada, was selected because it is referred to as one whose path through the atmosphere was several thousand miles long. The information collected by Professor C. A. Chant, however, was sufficient to determine a reasonably accurate path, whose length was calculated as 116 miles.

The sixth meteor, which dropped meteors at Pultusk, in Poland, on January 30, 1868, was selected because it is referred to as coming in from the distance of the fixed stars. Dr. J. G. Galle, the discoverer of the planet Neptune, collected a great amount of material on this meteor. From this information we have calculated the elements of the orbit.

Table 1 gives for the orbits of the six representative bright meteors, the period in years, the mean distance from the sun in millions of miles, the inclination of the orbit to the orbit of the earth and the eccentricity.

TABLE 1

	(1)	(2)	(3)	(4)	(5)	(6)
Period in years..	1.87	1.70	1.92	3.59	1.62	2.37
Mean distance ..	141	133	143	217	128	165
Inclination	7°.6	1°.9	7°.0	0°.9	17°.5	0°.8
Eccentricity	0.47	0.36	0.55	0.78	0.33	0.46

For comparison we give the same information in Table 2 for three of the closer asteroids.

TABLE 2

	Adonis	Eros	1932 HA
Period in years	2.55	1.76	1.80
Mean distance	173	135	137
Inclination	1°.4	10°.8	6°.4
Eccentricity	0.76	0.22	0.56

In Table 3 we give also this information for Encke's comet, which has the shortest period of any known comet, and for Halley's comet, which has the shortest period of any bright comet.

TABLE 3

	Encke	Halley
Period in years	3.3	76.4
Mean distance	205	1670
Inclination	12°.9	162°.3
Eccentricity	0.85	0.97

For an object coming from the distance of the fixed stars, the hypothesis favored by Schiaparelli and some later astronomers, the period would be millions of years (or infinity), and the eccentricity would be 1.00 or greater.

A comparison of the values shows that the orbits of these bright meteors resemble the orbits of the nearer asteroids much more closely than they resemble the orbits of the closer comets. Obviously, none came from the distance of the fixed stars or even from the distance of the average comet.

SCIENTIFIC EVENTS

THE NEW FISHERY RESEARCH LABORATORY IN PUERTO RICO

METHODS for the development of a modern fishing industry in Puerto Rico, which at present imports about 90 per cent. of the cured and canned fish used in local consumption, will be sought, according to *The Fishery Service Bulletin,* through scientific research by the U. S. Bureau of Fisheries.

With recent tabulations indicating that about 36,000,000 pounds of cured and canned fish are imported into Puerto Rico annually, it is obvious that many new avenues of employment would be provided if the fisheries industries of the island were expanded.

Preliminary plans call for the construction of a new $25,000 laboratory building on a site yet to be selected, where special studies may be made of fish preserving and marketing problems confronting not only Puerto Rico, but also the Virgin Islands and the Latin-American republics.

Situated at the "cross-roads" between North and South American waters and as the result of recent investigations by the President's Educational Commission on Puerto Rico, the new laboratory is designed to serve as the focal point for all fisheries research in the tropical areas.

Benefits from the research work of the laboratory