

tions, from all possible sources, to help the public separate those of merit from wild claims made by charlatans. Roger N. Hunter, a geophysicist with the Service, says that "because wrong predictions tend to be forgotten, the result of a correct prediction could be instant fame and a great deal of harmful public credulity."

Predictions are given a score based on the amount of information that has been given correctly, and the score is analyzed for its probability based on the usual seismic activity in an area. So far 171 predictions from 32 authors have been recorded, but Hunter says that none achieved a "high enough rating to merit any sort of consideration."

Predictions for the file are being gathered from standard scientific sources as well as from newspapers, reports of psychic visions and private submissions by letter. Predictions can be sent to Roger Hunter, USGS National Earthquake Information Service, Mail Stop 968, Box 25046, Denver Federal Center, Denver, Colo., 80225. "One thing which will not be considered," Hunter says, however, "is a prediction which is only made known after the fact."

* * * * *

Last week NBC-TV aired a story on its nightly television news in which one Henry C. Minturn claimed to have successfully predicted several earthquakes and said that one will hit Southern California on Dec. 20. As a result of the broadcast residents were flooding government and university offices with anxious telephone calls.

Science writer George Alexander examined Minturn's claims and credentials more carefully for an article in the Dec. 5 Los Angeles Times. He found little cause for alarm:

- The only credentials of expertise that Alexander could establish for Minturn were that he had worked as a technical assistant in the geophysical-oil exploration field more than a decade ago.

- The theory on which his predictions are based—that the moon's motion triggers quakes—is an old one that has been tested extensively and unsuccessfully for years by established scientists.

- The data for his predictions reportedly come from a maintenance mechanic, an amateur astronomer who gathers the data from various magazines.

- Minturn is rather cavalier about the size and exact location of his predicted quakes. Of being off his target by 2,400 miles, he is quoted as saying "we hit it right on the nose." At that rate the "Southern California" quake might hit Alaska. He has also predicted a quake—without specifying the size—for the Solomon Islands on Dec. 19. The Solomons experience quakes of magnitude 3.75 or greater on the average of three per day.

- He hopes to be hired as an earthquake predictor for "a simple living . . . something like \$34,000 per annum." □

Iapetus Ocean: History of opening

In the mobile world of plate tectonics, earth scientists know that before the ancient continental mass split 200 million years ago and the Atlantic began opening to its present width, there was a previous sequence of ocean opening and closing along nearly coincident boundaries. During that time the Appalachian Mountains were born, and in 1970 geologists John F. Dewey and John M. Bird showed how the Appalachians contain traces of all the units of that early ocean's floor (SN: 8/15/70, p. 145).

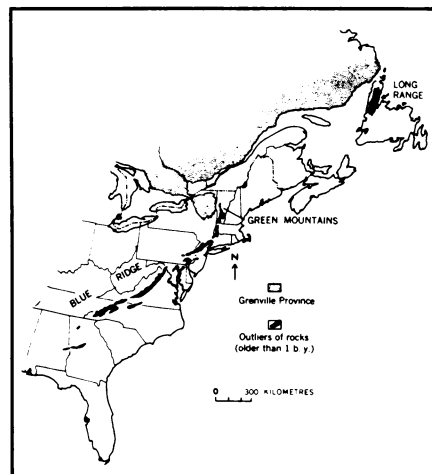
Despite obliteration of much of the evidence by the present cycle of opening, geologists have continued to accumulate a record of the opening and closing of that proto-Atlantic ocean. To avoid confusion with the present Atlantic, it is often termed the Iapetus Ocean.

One of the geologists deciphering that record, Douglas W. Rankin of the U.S. Geological Survey in Reston, Va., last year published in the *AMERICAN JOURNAL OF SCIENCE* (275-A:298) an extensive report outlining evidence from the southern Appalachians of the early episode of rifting. He also showed that the later suturing of the two continental plates left what he termed "some rather startlingly large pieces of the African plate" thrust onto the North American plate. These pieces of Africa, he says, form the modern Piedmont province, along the eastern flank of the Appalachians in Maryland, Virginia and North Carolina.

Now Rankin reports a further unraveling of the mysteries of the late Precambrian continental breakup and opening of the Iapetus Ocean. They concern a series of pronounced bends in the Appalachian structure that have long attracted geologists' attention.

In the Nov. 10 *JOURNAL OF GEOPHYSICAL RESEARCH*, Rankin reports evidence that these bends in the Appalachians are inherited from the initial breakup of a continental mass beginning about 820 million years ago. The evidence indicates, he says, that the breakup occurred at the intersection of rift valleys radiating from what earth scientists call triple junctions—the point at which three crustal plates intersect—at the start of the opening of the Iapetus Ocean.

Rankin suggests that the western margin of a major rift system coincides roughly with the trace of axes of ancient Precambrian rock extending from Tennessee to Newfoundland. He calls this the Blue-Green-Long axis, for the Blue Ridge Mountains, the Green Mountains of Vermont and the Long Range of Newfoundland. The rift system east of this axis, Rankin says, probably did not open far enough to produce significant ocean crust but was an initial stage in the opening of an ocean basin ultimately located still farther east.



Blue-Green-Long axis: Old rift margin.

From composition of the rocks along this axis, Rankin has identified five major bends in Appalachian structural trends that are candidates for former triple junctions generated by hot plumes in the mantle beneath them. Of these five bends, two are in southwestern Virginia (one near Mt. Rogers and one near Roanoke), one in Pennsylvania, one in southeastern New York near New York City, and one in southern Quebec.

These five bends are all potential sites of past triple junctions, Rankin says, and the two convex ones, near Roanoke and near New York City, are triple junctions whose failed arms have been carried away.

Rankin concludes by noting the persistence through time of zones of weakness. Not only are the histories of the opening of the Iapetus and the Atlantic similar; so are the geometries and locations. "The incipient opening of the present Atlantic was essentially parallel to and nearly coincident with the incipient opening of the Iapetus," says Rankin. "In fact some of the same fracture zones may have been involved in both openings." □

Alcoholism: A biochemical marker

Although alcoholism has been defined by many criteria (physiological, clinical, behavioral, psychological, attitudinal), a universally accepted, practical definition has been woefully lacking. Now a team of biomedical researchers at the Bronx (N.Y.) Veterans Administration Hospital has produced a biochemical marker. They believe that it will provide a means of detecting and treating alcoholism early as well as of objectively evaluating the success of different treatments.

A few months ago, two of the researchers, Spencer Shaw and Charles S. Lieber, observed an alteration in the con-

centration of amino acids in the blood of patients diagnosed alcoholics by conventional criteria. Specifically, they noted that the concentration of leucine and other branched-chain amino acids were significantly depressed, whereas the concentration of alpha-amino-n-butyric acid was increased relative to them. Might the increase of alpha-amino-n-butyric acid to leucine serve as a biochemical marker for alcoholism? With VA Hospital colleague Barry Stimmel, they studied the matter.

They drew blood from 42 hospitalized patients who meet conventional criteria for alcoholism and from 20 nonalcoholic subjects, who included persons with non-alcoholic liver injury, and analyzed the A/L ratios in the blood samples obtained. They report in the Dec. 3 SCIENCE that the alcoholics had, on the average, an A/L ratio more than twice as high as that of the controls, including even the subjects with nonalcoholic liver injury, suggesting that an increased A/L ratio might indeed indicate alcoholism.

Then they conducted a primate study in which they fed alcohol, along with an

adequate diet, to baboons for one to four years. All of the baboons showed an increased A/L ratio, confirming the clinical results.

Even more valuable findings emerged from their two subsequent clinical studies. The A/L ratio increases in relation to long-term alcohol consumption, and there is a statistically significant positive correlation between the ratio and the degree of alcoholism. The A/L ratio was elevated in most of the alcoholics identified by one out of three conventional criteria for alcoholism but in *all* of the subjects identified by all three conventional criteria.

The A/L ratio also appears to be a more reliable marker of alcoholism than the amount of alcohol in the blood, the researchers report, since only two of the 42 hospitalized alcoholics in the first study had measurable alcohol in the blood at time of sampling. Similarly, the ratio is a more valuable marker of alcoholism than are changes in the levels of enzymes in the blood, because none of the alcoholics in the third clinical study had significantly higher enzyme levels than controls. □

GAO: Breeder schedule won't be met

In one of the most detailed—and devastating—analyses of the U.S. breeder reactor program, the congressional General Accounting Office concludes that the program schedule proposed by the Energy Research and Development Administration is unrealistically optimistic. Critical delays have already occurred and many uncertainties need to be resolved.

These conclusions are contained in a report submitted to the Congress by the Comptroller General, entitled "Considerations for Commercializing the Liquid Metal Fast Breeder Reactors" (Report No. EMD-77-5).

According to official ERDA estimates, breeders would become the predominant type of reactor coming into use by the end of this century, with 128 plants operating by 1998. GAO's "optimistic" estimate shows less than a dozen plants operating by then, and the "conservative" estimate has less than a half-dozen operating by the year 2000. The critical difference among the three scenarios is the time assumed for private industry to begin heavy investment in commercial breeders.

But even without considering these assumptions, the GAO report points out, there are critical delays in developing fuel cycle technology upon which breeders will depend. For the first commercial fuel fabrication facilities to be in operation by 1988, an advanced fuel laboratory now planned for 1982 should, in fact, have begun operation two years ago. Also, a demonstration fuel fabrication facility should now be in the final design and licensing stage—but ERDA has not yet even announced its plans for this facility. Concludes the GAO report: Commer-

cialization of the breeder "will most likely be paced by fuel cycle technology availability. . . development of fuel fabrication facilities is behind reactor development."

The key to ultimate success, of course, is interest among the public utilities, but "obtaining private sector support will be difficult." To build the first 128 breeders, GAO says, would require a \$150 billion investment (constant 1974 dollars). Such a cost "may pose a formidable barrier to electric utilities."

Finally, says GAO, President Ford's recent statements on nonproliferation (SN: 10/16/76, p. 244) "cast doubts as to the future of nuclear fuel reprocessing. This, in our view, also creates doubts as to whether the [breeder] will become a viable energy source." □

Still another near-earth asteroid

The first of the so-called Apollo asteroids—those whose paths cross the orbit of the earth—was identified in 1932. By late 1975 there were still only 19 known. The last twelve-month period, however, has witnessed a record crop of four such discoveries, the most recent of which is known as 1976 WA, or Fast-Moving Object Schuster. It was first spotted on Nov. 19 by astronomer Hans-Emil Schuster of the European Southern Observatory in Chile, through a 100-centimeter Schmidt telescope. Calculations of its orbit, completed this week by Brian Marsden of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Mass., indicate

that the object comes to within 122.7 million kilometers of the sun, closer than the earth, and ranges out to about 454.8 million kilometers, so that it also crosses the orbit of Mars. The object takes 2.67 years to circle the sun, in a path inclined 23° to the plane of the ecliptic. This year, says Marsden, it passed within 24 million kilometers of the earth, though it was 84 million km away when discovered. "It's a bumper year for Apollos," he says. □

Three receive Lasker awards

The Albert Lasker medical awards, among the highest awards for medical research after the Nobel Prize for Medicine, have been announced for this year. Recipients are Rosalyn S. Yalow, a nuclear physicist and senior medical investigator at the Bronx Veterans Administration Hospital; Raymond P. Ahlquist, professor and chairman of the Department of Pharmacology at the Medical College of Georgia, and J. W. Black, professor and chairman of the Department of Pharmacology, University College of London.

Yalow has won the \$10,000 Albert Lasker Basic Medical Research Award for discovering and developing, along with the late Solomon A. Berson, the technique of radioimmunoassay.

Ahlquist and Black are sharing the \$10,000 1976 Albert Lasker Clinical Medical Research Award for their concept of alpha and beta receptors in the cardiovascular system and the creation of the drug propranolol (Inderal), respectively.

A Special Albert Lasker Public Health Service Award, which is rarely given, has also been granted this year to the World Health Organization for its imminent eradication of smallpox. To achieve this feat, WHO mobilized, supported and directed a global network of smallpox surveillance and research, held conferences at national, regional and grass-roots levels and dispatched workers to even remote villages of the world to vaccinate against the disease (SN: 2/1/75, p. 74; 8/2/75, p. 73; 1/3/76, p. 8). □

Public favors reactors

A Harris poll has found that the public in the United States favors building more nuclear power plants, by a margin of 61 to 22 percent. Many citizens still harbor doubts about the safety of nuclear power, particularly the disposal of radioactive wastes, pollster Louis Harris says, but they generally believe the advantages outweigh the disadvantages. People who actually live near nuclear installations favor them by even larger majorities, and a poll of "environmental leaders" found that 53 percent of these thought nuclear plants were safe. □