

## **Dr. Menard makes scientific discovery**

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A sedimentary "snow fall" of fossils from microscopic shells whose intense weight accumulated for more than 15 million years has pushed islands 900 feet below the surface of the Pacific Ocean at an inch every 2,000 years, was revealed here today by a San Diego scientist.

He is Dr. Henry W. Menard, professor of geology at Scripps Institution of Oceanography, University of California at San Diego.

Dr. Menard led a major part of, and coordinated planning for, Scripps' two-ship Nova Expedition that logged 73,114 miles over a 5 million square mile area of the central and southwest Pacific and that ended today (Tuesday, Dec. 19) when the research vessel Argo docked at Scripps' Nimitz Marine Facility.

The discovery Dr. Menard cited was among several made by an international team of scientists during the eight-month expedition funded by \$1,500,000 in contracts and grants through the U.S. Office of Naval Research and the National Science Foundation.

More than 25 scientists from Australia, New Zealand, New Caledonia, France, England, Japan, and Switzerland and from several universities in the United States participated in Nova, whose prime goals were to study the origin of island and land masses and possible continental drift in the Pacific.

Argo sailed from San Diego last April to join her sister ship, Horizon, which took part in Nova for six months before returning home in mid-October. Argo, with Capts. Laurence Davis and Alan W. Phinney in charge, and Horizon, captained by Noel Ferris and Terry Hansen, logged 31,439 miles and 41,675 miles, respectively.

The ships' ports of call included Noumea, Suva, Auckland, Brisbane, Pango Pango, Honolulu and Hilo, as well as the remote islands, in the Melanesian region, of Tonga, Rotuna, and Futuna, and the Explorer Islands.

Because of the length of the expedition and nature of work involved, Argo crews were rotated home in July and September and Horizon crews in April and June. Horizon had put to sea earlier Feb. 7 and concluded Scripps' two-month Carmarsel Expedition in the Pacific just before teaming up with Argo for the Nova research.

The "snow fall" of fossils was discovered along a 600-mile line of submerged volcanoes, or guyots, about 500 miles east of Australia along the north-South Lord Howe Rise.

The intense pressure from the incredibly large amounts of falling sediment had gone on long enough that it was sufficient literally to push the gigantic volcanoes below the surface of the ocean," Dr. Menard said.

"The remarkable fact about the line of guyots was their uniform depth. We were able to pinpoint the age of the area by dredging an outcropping of rock on the Lord Howe Rise exposed by swirling deep-ocean currents that had disturbed the thick sedimentary ooze."

One of the expedition's major accomplishments was the successful tabulation of data while both ships were cruising "After all, what can you do at sea except work?" the geologist asked - and the resultant preparation of

new maps the first several weeks which were distributed to scientists and crews of the two vessels for use during the ensuing months.

"This meant that we did not have to return to home port, compile our data, chart new tracks, then put out to sea again to continue the expedition," Dr. Menard said. "Actually, we saved thousands of dollars by charting our future tracks, not to mention two or three years' time."

Another major discovery during the expedition was an explanation as to why the ocean area under study is so curiously shallow.

"For example, we found the Fiji Plateau to be higher than it was originally thought because the earth's mantle is pushing it up from below," Dr. Menard said.

"Also, the ocean bottom has a thick crust elsewhere in the area and that makes for shallower water. There is also more sedimentary ooze than we thought, and this contributes toward a shallower region."

The Fiji Plateau also provided another source of new information, Dr. Menard said, "We discovered an extremely large area on this plateau in which the outward flow of heat from the earth was more than twice the earth's normal heat flow.

"We don't know just what to ascribe this to, but we do feel that in this area a very large-scale phenomenon of activity is going on, and we know also that the Fiji Plateau is the highest ocean plateau in which such a high heat flow has been recorded.

"It is actually somewhat comparable to the rate of heat flow discovered by Scripps' scientists west of Japan in 1966 during the Institution's Zetes Expedition."

As to sea-floor spreading, the scientists learned that there have been a great many earthquakes on the ocean bottom west of Fiji.

"We found many narrow, deep trenches 500 miles long separated by ridges," Dr. Menard said. "These trenches are the locus of the quakes. The area appears to be a place in which the sea floor is spreading, ever so slightly, however, just as it is doing in the Atlantic Ocean along the Mid-Atlantic Ridge.

"As our data are studied in detail in the months ahead, we feel safe in saying that other new aspects about the geology of the Pacific will be added to man's knowledge of the region."

Nova's participating scientists will be busy for months, checking and recording data and verifying information for eventual publication in scientific journals. An interesting phase, Dr. Menard said, should come with the assaying of the value of phosphorite deposits discovered during the expedition.

Participating as scientific leaders in the 16 "legs" or segments of Nova from Scripps Institution and the University of California at San Diego, were, in addition to Dr. Menard, Drs. Harmon Craig, Edward D. Goldberg, George G. Shor, Jr., E.L. Winterer, William G. Van Dorn, Robert L. Fisher, and A.E. Engel; Prof. Victor Vacquier, T. E. Chase, Stuart M. Smith, Perry Crampton, and Daniel Karig.

Nova plans were coordinated with related expeditions of the U.S. Coast and Geodetic Survey, Lamont Geological Observatory of Columbia University, the Hawaii Institute of Geophysics, and several organizations in the southwest Pacific.