

## Conclusions

The preceding section indicates that "conclusions" are premature at best. However, some conclusions are possible. The orthogeosynclinal history of the Greater Antilles began between Kimeridgian and Aptian times. A considerable amount of detailed geological and geophysical investigation remains to be done in order to determine: (1) the existence of Paleozoic rocks in the western Greater Antilles; (2) the extent and development of pre-orthogeosynclinal sediments, particularly the Paleozoic(?) and the Early-Middle Jurassic; (3) the full age range of the San Cayetano Formation and the metamorphic rocks of Cuba and Hispanola; (4) the time(s) of (a) orogeny during the Late Jurassic and (b) beginning of the orthogeosynclinal history of the island chain; and (5) the origin of the Caribbean Sea. The solution of these problems is fundamental to the solution of any of the other problems raised in the preceding section.

The orthogeosyncline persisted from either Tithonian or Aptian through middle Eocene times. Major orogenies affected different parts of the orthogeosyncline from the beginning. The principal orogenies took place in middle Cretaceous and middle Eocene times, and led ultimately to the breakup of the orthogeosyncline during the Eocene.

Although a "normal" orthogeosyncline (having a foreland or platform, miogeosyncline, median welt, and eugeosyncline) is present in Cuba, only the eugeosyncline can be identified definitely east of Cuba.

Some of the great so-called wrench faults of the orthogeosyncline appear to have become active during the middle Cretaceous. However, a few of these faults may occupy zones of weakness as old as the Paleozoic. Others appear to be Late Cretaceous to middle Eocene in age, and some are middle Eocene or younger. Movements on most of the largest fault zones continue, as shown by the earthquake records, but wrench movements appear to have been of minor importance. Total strike-slip displacements greater than 50 to 200 km are unlikely, and movements as much as 1100 km as suggested by Hess and Maxwell (1953) are refuted by the regional geology (A. A. Meyerhoff, 1966; Dengo, 1968). Vertical movements have been far more important along most of the faults. The Bartlett Trough and Puerto Rico Trench are two of these great fault zones on which vertical movements have predominated. Neither

trench is a Benioff zone beneath an island arc, as numerous workers have either postulated or claimed.

The general configuration of the islands was determined largely by late Eocene time. However, it was not until late Miocene time that the Greater Antilles were uplifted and assumed their present form.

The Greater Antilles are a prime example of a formerly active island arc. The geology can be studied with reasonable thoroughness, although political accessibility has been a handicap in their study. Otherwise, every subaerial part of this former orogenic belt is easily accessible by jeep and by foot, and lengthy pack trips in this area are now a thing of the past. Yet careful surface and subsurface geologic mapping, thorough sedimentary province studies, systematic geochronology investigations, and detailed geophysical surveys have been carried out in very few places within this arc; notable exceptions include unpublished studies by personnel of petroleum companies, difficult-to-obtain publications by Soviet-Cuban groups in Cuba, and mapping by a few U.S. Geological Survey parties in Puerto Rico.

Island arcs are claimed by geologists and geophysicists to be among the fundamental tectonic elements of the earth, but they still are poorly known. For this reason it is incredible that the Greater Antilles islands, exposed as they are and available to thousands of geologists and geophysicists for study, are poorly mapped, poorly studied, and poorly understood. The published literature on Cuba is a maze of contradiction. The basement rocks of none of the islands have been studied with care, yet statements concerning them are voluminous. Only about 31 radiogenic dates have been acquired. The island of Hispaniola is almost totally unknown. The few "detailed" reports from that island are at best reconnaissance studies. Puerto Rico and the Virgin Islands, like Cuba, are becoming sources for numerous contradictory publications as stratigraphic terminology grows but attempts to collate and correlate sections are delayed.

The papers which have been published are no more than beginnings, as most of their authors recognized them to be. The writers sincerely hope that this synthesis—which is just another step at the beginning—will help guide those who ultimately will solve the problems of this area.