preventive medicine in the School of Medicine of the University of Pittsburgh and director of the Singer Research Laboratories.

AT the annual meeting of the Association of Consulting Chemists and Chemical Engineers, held on October 22, several members brought up the definition of the term "scientific opinion" employed in the Copeland Bill. This bill, which provides for food and drug regulations, has passed the Senate and now rests with the House Committee on Interstate and Foreign Commerce. In it the term "scientific opinion" is defined as "the opinion, within their respective fields, of competent pharmacologists, physiologists or toxicologists." Believing that this definition is inaccurate and narrow the association passed a resolution suggesting the substitution of the present definition by "Scientific opinion is the opinion, within their respective fields, of competent specialists in the basic or applied sciences."

DISCUSSION

GEOLOGICAL MAPPING OF THE OCEAN BOTTOM

IT is becoming more evident all the time that in the long neglect by geologists of the study of the ocean floor a gold mine of information has been left untouched. The common belief among geologists that the continental shelves represent great piles of sediment built out from the lands onto the deep ooze and clay-covered ocean basins has naturally deterred stratigraphers from attempting to trace the rock formations of the ocean floor. While this belief will probably continue to be taught to budding geologists for another generation, it is perfectly evident to all of us who are investigating the problem that there are extensive areas of rock bottom on the continental shelves, on the continental slopes and even on the deep ocean floors. Reports of rock bottom have been made for years by the various coastal surveys of the world and various fragments of the rock have been brought up from time to time, including some dredged by the writer. In the summer of 1934 H. C. Stetson, of Woods Hole Oceanographic Institution, succeeded in breaking off fragments of rock from a submarine canyon wall with fossils of definite age. During the past summer, working with the Scripps Institution and later with the California Fish and Game Commission boat, the writer, using similar equipment—that is, a heavy dredge attached to the boat by heavy wire —was able to obtain rock from five canyons off the California coast. Excellent fossils were dredged from the walls of the Monterey Canyon which preliminary examination have shown to be of Pliocene or Pleistocene age. Less certain fossils were obtained from the walls of La Jolla submarine canyon, but the character of the rock made it possible to establish the age as Eocene from comparison of nearby outcrops on land. Also, the age of the rock into which the canyon north of the Mexican Coronados Islands was cut appears to be Miocene or Pliocene on stratigraphic grounds. That rock is not difficult to find may be indicated by the fact that about four out of five of the attempted dredgings were successful.

It need not be supposed that these reports of what constitute real geological mapping of the ocean floor come from very unusual localities which are especially favorable for such results. To be sure, the sides of canyons are good places to obtain rock, but soundings show that these submarine canyons are to be found around the continental margins off practically all coasts of the world. Judging from the success of dragging the walls of these canyons and also from the many reports of rock bottom by coast surveys on the shelves and slopes, it seems likely that a large part of the millions of square miles of territory included in the continental shelves and slopes may be added to the geologically mappable areas.

Regarding the deep ocean the problem is more complicated. Fragments of rock have been brought up by the various oceanographic expeditions from abyssal depths, although it has generally been assumed that these blocks represented erratics dropped by icebergs or floating vegetation. The blocks were always obtained while dredging for some biological purpose and as a rule have been thrown overboard or subsequently lost or at any rate neglected. There are reports of lava obtained from the deep Pacific. There should be good possibilities of obtaining rock by dragging up the sides of some of the precipitous slopes which echo soundings are showing to be not uncommon in the deep oceans. Probably dredging around the oceanic islands where there has been recent vulcanism would also bring up volcanic products.

It is interesting to speculate on the results which extensive dredgings would have on the geological science. It has often been said that the continental shelves probably contain many fragments of the stratigraphic record which were not preserved on land partly because of epochs when the inland seas were practically completely withdrawn. Now with the steep walls of submarine canyons, often many thousands of feet high, to draw upon, it is certainly highly probable that some parts of this lost record will be discovered. Incidentally new diving apparatus makes it perfectly possible to go down and look at these walls to depths of over a thousand feet and perhaps to as much as 3,000 feet.

One of the most debated problems in geology has been concerning the cause of similarities shown now

and in the past between continents and islands which are separated by deep oceanic barriers. If the ridges of the ocean represent submerged land bridges, it is highly probable that dredging their walls, which are proving to be very steep, will bring to light evidence of their former emergent condition. If, on the other hand, the continental drift hypothesis has caused the formation of parts of the ocean in recent times, no ancient formations should be revealed on the ocean floor in these places. In the same connection the nature of deep oceanic lavas has been the subject of much speculation.

The accumulated evidence in regard to submarine canyons has made it difficult to avoid the conclusion that these canyons were cut as a result of a lowering of sea level of at least 6,000 feet in not very remote times. If this sea level lowering has actually occurred, it should have left its imprint on the rock of at least the upper mile of the ocean floor. Dredging rock from various parts of the ocean remote from the localities where submarine canyons have been discovered will probably check this interpretation. Such things as weathered formation surfaces, the presence of pholad borings and the presence of shallow water incrustations would be evidence in favor of the general lowering.

These possibilities represent only a few of the results which may be expected from a program of intensive geological research in this new field. The time is ripe for geologists to join the oceanographers in the exploration of the seas.

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THE MAYA BREADNUT IN SOUTHERN FLORIDA

THE native flora of southern Florida is distinctly tropical, comprising hundreds of genera of forest trees, epiphytes and undergrowth plants that are shared with the West Indies and with the land of the ancient Maya civilization in southern Mexico and eastern Guatemala. Some of the Maya country is much like southern Florida, a succession of limestone reef formations, with swamps or sandy stretches between, though mostly covered now with dense continuous forest. Much of the interior of Florida is denuded and in the winter becomes very dry and frosty, but the need of restoring the forest cover is being recognized, and some of the Maya trees may contribute to the tropical reclamation. The Maya architecture is being imitated in northern cities, but in Florida could have a natural setting of palms and other stately trees, the same as in Mayaland.

One of the Maya trees that may be useful in Florida is *Brosimum alicastrum,* related to the true breadfruit of the Pacific Islands, *Artocarpus communis.* Though most of the breadfruits are seedless, other varieties have large starchy seeds that are boiled or roasted and taste like Spanish chestnuts. The seeded breadfruits are called "breadnuts," and Brosimum shares this name in British Honduras and Jamaica, because the seeds are similar in texture and taste to those of the seed-bearing varieties of Artocarpus. The Brosimum fruits are single-seeded, but the trees bear well and the nuts are gathered by the Mayas for making their native bread when stocks of maize run low. The Maya name of the Brosimum tree is *ox* or *osh,* the same word being applied to the primitive taro-like root-crop, Xanthosoma, and to stocks of shelled maize kernels, although the general name for maize is *ixim.* An age of root-crops probably preceded maize culture, and an original use of *osh* for Xanthosoma may explain why this word also designates the numeral 3, the large "elephant ear" leaves of Xanthosoma being conspicuously 3-cornered.

Another outstanding Maya tree is *Achras sapota* or *Achras chicle,* hardly to be distinguished from the well-known sapodilla tree of the West Indies, that thrives in southern Florida and even escapes from cultivation, especially on the Keys. The chicle fruits are the same as sapodillas, russet-skinned, juicy and delicious, with the texture of high-quality pears. The chicle latex is the principal source of chewing-gum, and the wood has amazing durability, as shown by many chicle-wood lintels still in place over the ancient temple doorways, dating centuries back.

The chicle and breadnut trees are found in special abundance among the ruins of the Maya cities, and are largely responsible for the archeological discoveries of the last half-century. The chicle gum provided the inducement for exploring and cutting trails through the forests, while the breadnut foliage foddered the mules that carried the *chicleros,* and later the archeologists. At every forest camp breadnut trees are felled and the branches lopped for the animals to browse on the leaves and twigs. Such fodder is called *ramon* in Spanish, and this name is applied to Brosimum and to several fodder trees in other regions.

The ancient Mayas had no livestock, but may have gathered and stored the breadnuts, like breadfruits and taro in the Pacific Islands. The Maya cities were equipped with great numbers of subterranean storehouses, sometimes taken for water-cisterns, but small and flat-bottomed like primitive food cellars in other parts of the world. These are the so-called "chultunes," bottle-shaped, smooth-walled chambers eight to ten feet deep and nearly as wide, entered by a small central opening through the hard surface rock, fitted with a stone lid and sealed with clay.

In view of Brosimum being related to the bread-