of the minerals which are the sources of radio-active substances, and by the spinthariscope.

The research paper by Professor C. E. Chambliss, 'Notes on the Rhinoceros Beetle,' was read by title.

The fifty-third regular meeting was held on March 24, at 8 P.M. Professor S. W. Reaves presented a paper on 'The Problem of the Duplication of the Cube.' Dr. F. H. H. Calhoun gave a report upon 'The Origin of the Mont Pelée Mud Flow.' A careful examination of the dust comprising this flow showed that it had been formed by the grinding of crystal-bearing rocks at temperatures below the melting point. Volcanic dust usually consists of small isotropic glass particles with or without a small per cent. of crystalline material. The particles in the flow from Mont Pelée were crystalline, broken, and some of the quartz crystals showed the wavy extinction due to strain. This of course may have been developed in the original rock mass instead of at the time of the formation of the dust itself. The following minerals were recognized in the dust: quartz, feldspar, hornblende, mica, an opaque iron mineral, and a pyroxene. The crystals were so shattered and strained that accurate determination was impossible.

Informal communications were presented on 'the tantalum lamp,' 'life and work of Professor A. S. Packard,' and 'the engineering problems involved in the raising of the Maine' by Professors W. M. Riggs, Haven Metcalf and P. T. Brodie, respectively.

HAVEN METCALF,
Secretary.

DISCUSSION AND CORRESPONDENCE.

SUGGESTIONS TOWARD A PHYTO-GEOGRAPHIC NOMENCLATURE.

THE terms formation and association are, perhaps, now used by most plant ecologists and geographers with something like scientific exactness. The word *formation* suggests the idea of an area of vegetation of a character marked enough to be essentially different from contiguous areas, the prominent forms of vegetation in this area having the same general aspect and adaptations corresponding with distinct physiographic positions. Such formations do not show an even mixture of plants, because such plants are collected into definite groups, or societies dependent somewhat upon the general conditions of the environment, but more especially because of the influence of historic or edaphic factors. Such assemblages of plants are called properly *associations*. The members of the association are looked upon as *vegetation forms*. The term *facies* is also a phytogeograpic concept, happily used with scientific accuracy. But the term *zone* is used somewhat loosely for very different ideas. The word is used in a latitudinal or climatic sense, and we speak of temperate and tropic zones. It is used for the areas at different elevations on the mountain side, hillside or bluff face. Again it is used to denote the arrangement of marine algæ on the sea coast, or for the concentric growth of aquatic plants about the lagoon of a pond or lake.

Humboldt (1805) applied the word zone to the vegetation, the distribution of which was determined by latitude. Schouw (1823) followed Humboldt and Bonpland in the use of the word in the latitudinal sense, and Kabsch (1855) also. It seems then that the word should be used in the restricted sense of a particular portion of the earth's surface determined by referring its position to the parallels of latitude. The concept of bands of vegetation on the mountain side, hillside or bluff face with respect to the altitudinal distribution of plants is best preserved by the use of the word *belt,* and we would speak of forest belt, subalpine belt, alpine belt, and where necessary this application could be extended to zonation on a bluff face. This usage is suggested, notwithstanding the importance of emphasizing the identity of zonation due to climate and that due to altitude, because for practical reasons the two ideas must be kept distinct. The writer wishes to suggest for the concentric bands of vegetation at times so clearly marked in lakes or pond, the term *circumarea,* for in mathematics, circumarea is the area of a circumscribed circle. We might then speak of a water-lily circumarea, a cat-tail circumarea, a shrubby

circumarea. To express the submerged zonation on the sea coast, the English word *shelf* can be used. This is authorized by every-day speech, for we refer to a shelf of rock, a continental shelf, or a shelving beach. To speak of the marine shelves, *i. e.*, the *Fucus* shelf, the *Laminaria* shelf, would be to use the word with exactness. For the zonation of a beach, strand, river shore or prairie edge, the writer suggests the word *strip*. We should then speak of the shrubby strip, the grassy strip, the forest strip, etc. The idea of zonation on a river island, where the vegetation of a particular band runs completely around the island, and not continued lengthwise, as the word strip implies, the term *girdle* could be used. For forest zonation, where it is vertical, the term *layer* (stratum), or story ought to be accepted.

These terms are proposed because it seems to the writer that as the time approaches for the convocation of the Botanical Congress at Vienna in June, a full ventilation of nomenclatorial views should be made, not only for discussion, but also as suggestions to those who will take part in the deliberations of the congress.

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SPECIAL ARTICLES.

ON THE HABITS OF THE GREAT WHALE SHARK (RHINEODON TYPUS).

One of the most interesting of fishes and by far the largest of all is the *Rhineodon typus* (better known by the later name *Rhinodon typicus*). This has received the quasi-vernacular name whale shark, although, under the native Indian name (Mhor) it has been the object of a regular fishery for a long time along the northwestern coast of India (Sind). One might naturally suppose that the animal was so rare that nothing was known of its range or habits if the most recent works, popular as well as scientific, were consulted, but really, scattered through various volumes, many data may be found. A gentleman desirous of learning the history of the fish was unable to find data I informed him about, even after I had told him in what periodicals they were published. I, therefore, found them for him, and the difficulty that had been experienced by him, and may be by others, leads me to summarize the information that may be gleaned.

The species was first named *Rhineodon** *typus* by Dr. Andrew Smith in 1829, in the *Zoological Journal,* and the genus was adopted by Bonaparte in 1832 in the *Giornale arcadico di Scienze,* etc. (vol. 52). The numerous subsequent modifications of the name and notices of the species do not demand consideration in this place.

In 1850 an article, 'On Shark Fishing at Kurrachee' was communicated by George Buist to the *Proceedings of the Zoological Society* (pp. 100–102) and in it is an unmistakable reference to the whale shark, but which has been overlooked and not identified by Indian or other zoologists. From this and other recent sources the following account is compiled.

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The greatest—the most gigantic—of the sharks is one not uncommon in the Indian Ocean, but which, on account of its huge size, is represented by remains in very few museums and is little known. It is the *Rhineodon typus,* the type not only of the genus *Rhineodon,* but of an independent family—Rhineodontids; the not inappropriate name whale shark has been coined for it.

The whale shark is a huge animal occasionally, it is said, attaining to a length of sixty feet, although the average size is much less; it may be considered a pelagic species, not willingly often approaching land. It is a slow, apathetic animal, mostly living near the surface of the ocean and often resting, idly floating along and supposed to be 'sleeping.'

Its gigantic size is in inverse ratio to its food. Unlike the giant *Carcharodon* or man-eater, it has extremely small teeth and its food consists of very minute animals. Its teeth, indeed, are quite similar (in a general way)

* The generic name was misprinted *Rhincodon* —evidently a typographical error.