and percoids with the berycoids and other less important groups together under one suborder. This suborder is subdivided into "groups" so called doubtless to express a separation of convenience rather than of exactness. The following two paragraphs appear respectively under the groups Scombroidei and Percoidea.

Scombroidei.—This group of mackerel-like fishes is not capable of exact definition, its deviations from the ordinary type of spiny-rayed fishes being various and in various directions, so that no set of diagnostic characters will cover them. The group is not a suborder as the term is generally understood; it is incapable of simple definition, and in its divergence some members approach to other groups more nearly than to extreme or even to typical members of their own. The group is, however, a somewhat natural one, as by the common consent of ichthyologists its different types have always been kept near each other in the system of classification.

Percoidea.—A group of fishes of diverse habits and forms, but on the whole, representing better than any other the typical acanthopterygian fish. The group is incapable of concise definition, or, in general, of any definition at all; still, most of its members are definitely related to each other, and bear in one way or another a resemblance to the typical form, the perch, or more strictly, the sea bass of Serranidæ.

Dr. Jordan in his "Guide to the Study of Fishes" (Henry Holt & Co., New York, 1905) places the percoids and scombroids together in a suborder, excluding the other groups before associated with them, but still considering them under separate group names. This seems to be for the present the most rational treatment of the subject.

Edwin Chapin Starks
Stanford University, Cal.

LUMINOUS TERMITE HILLS

Many years ago, while in the Amazon region, I found that the termite hills, which are there such a conspicuous feature in many localities, are luminous at night. My first acquaintance with this phenomenon was made in the vicinity of Santarem, Brazil, upon a nocturnal walk through the forest. In the company of some natives I was following one of the narrow paths which lead to the scattered habitations. The darkness beneath the canopy of foliage was absolute and progress was only possible by the "feel" of the ground under foot. Suddenly there appeared through the foliage a luminous area composed of innumerable points of phosphorescent light which appeared to shift and fuse into each other, thus forming more brilliant patches which were constantly resolving themselves and again appearing. This light suggested the steady diffused glow of the familiar "fox fire" rather than the more brilliant display of the fire-flies, yet the slow and confused movements which seemed to pervade the whole luminous zone were strongly suggestive of insects. Upon my expression of surprise the natives replied laconically, "cupim," the native name for termite.

The luminous area was indeed one of the large termite hills which are scattered through those parts of the forest not subject to inundation. These termite hills rise from the ground in an irregular conical mass to a height of from five or six feet to perhaps ten or twelve. They are constructed of clay and are exceedingly hard. The mounds are perfectly bare of vegetation and on that account have a characteristic appearance of newness. Afterwards I frequently saw these luminous termite hills and they added in no small degree to the mystery and charm of the tropical nights. I remember one display of particular splendor, seen when visiting at a house which commanded a view over a large clearing. Numbers of termite hills were scattered over the clearing, and at night, when these all glowed and scintillated upon the black forest background, the spectacle was one never to be forgotten.

Unfortunately I took it for granted that such a conspicuous phenomenon must be well known to naturalists and so did not investigate it. Since then I have searched the available literature on termites and on luminous insects and have questioned entomologists and botanists in the vain hope of obtaining information on this subject. The phenomenon appears to have remained unknown to naturalists. The only references to it that I

have been able to find are a brief mention in Herbert H. Smith's "Brazil, the Amazons and the Coast," p. 139 (1879), and my own allusion to it in *Entomological News,* Vol. 6, p. 15 (1895). Are the termites themselves luminous or is the phosphorescence due to some fungoid peculiar to the termite hills? Certain it is that the mounds are all phosphorescent. Smith says: "The phosphorescence is in the hills themselves, not, so far as I know, in the insects"; yet, he does not appear to have investigated this question and his statement is merely an opinion. The fact that no luminous neuropteroid insects are known argues against the theory that it is the termites themselves that emit the light, yet observations on nocturnal insects in the tropics, particularly forest insects, are so rare that such a property might easily have escaped notice. Should the light be caused by a fungus it must be one that is peculiar to the termite mounds. In the latter case, however, one would suppose that when, by the clearing of the land, the nests are exposed to the direct rays of the tropical sun the fungus would be killed; but the mounds continue luminous even in the older clearings where they have been exposed to the sun for years.

During my visit to Central America in 1905 I looked for termite nests in the hope of obtaining some data on this subject. However, I saw no termite hills like those so common in the Amazonian forests. The nests of *Eutermes,* the common form in Central America, which are built on trees and constructed of woody particles, gave entirely negative results. On one occasion I broke open one of these nests at nightfall to see if the termites within were luminous, but they showed no trace of phosphorescence.

FREDERICK KNAB

THE PLANT REMAINS OF POMPEII

BEGINNING with the destruction of Krakatoa in August, 1883, within the past twenty-five years, a new era of catastrophism may be said to have begun. The events of 1902 are still fresh in the minds of most people; the destruction by earthquake on January 16 and April 18, respectively, of the towns of Chilpancingo in Mexico and Quetzaltenango in Guatemala; the eruption on May 8 of Pelée with the annihilation of St. Pierre. The partial destruction of San Francisco in April, 1906, due to a fault in the earth's surface along the Pacific coast of America, and the reawakenment of Vesuvius with the burial of Ottajano, at the foot of the volcano, are all too recent catastrophes. These manifestations of nature's force were followed by the destruction of Valparaiso in August, 1906, and Kingston, Jamaica, in January, 1907. The most recent event in which we see earth in the making, occurred at the southern end of Italy on December 28, 1908, when by an earthquake and tidal wave, the cities of Messina, Catania and Reggio were shaken from their foundations. The events of this horror are too recent to need comment, but in view of the wide-spread interest in seismic phenomena, the writer recalls a visit to Pompeii in the summer of 1907, followed later by a visit to the National Museum in the city of Naples, where the art objects and objects of commercial and domestic use are carefully preserved from the destructive action of ash storms, wind and water. A study of the ruins of Pompeii, which was destroyed by ashes, much as Ottajano was destroyed three years ago, gives one the background to picture the civilization of the ancient Pompeiians, while a study of the objects classified in the National Museum enable the student to reconstruct the daily life and industries of that pleasure-loving people. Always interested in such matters in a general way, the writer endeavored to find what materials in such a museum bore upon the study of plants. With this in view, the museum was searched and a small collection of the plant remains of the buried city was found in one corner, and the labels in modern Italian attached to the specimens were copied, making a list of twenty plants or plant parts, that could be identified certainly in the fragmentary condition in which they were preserved in the dwelling houses beneath the layers of ashes and pumice stone vomited forth by the volcano. The list