to open the route to commerce. The boundary is to be determined, and then operations will commence at once.

The services of M. Thouar have been recognized by the Bolivian congress, which has voted him a gold medal, five square leagues of land, and thirty thousand francs, for the publication of his maps and reports. The Argentine government has promoted the officers of his escort, and given a month's extra pay to the private soldiers. The explorer himself will devote himself to the perfection of the methods projected for the promotion of commerce on the Pilcomayo.

SURFACE-COLLECTING ON THE ALBATROSS.

DURING the past year surface-collecting has been very successfully carried on by the fish-commission steamer Albatross, and not only have many additions been made to the surface-fauna off our coast, but, what is at least of equal importance, rare forms have been taken in numbers sufficient for detailed microscopic study.

The nets chiefly employed in this work are ten feet long and of half-inch mesh; their mouths are four feet in diameter. The outer two-thirds are lined with a fine webbing, and the end is closed by several turns of stout lashing put on with care, to protect these linings from strain. They are suspended from the swinging booms, and. five-eighths submerged, towed at the rate of two knots an hour; each net, under these conditions, straining nearly twelve thousand gallons of water per minute. They are not, of course, adapted to the capture of the smallest forms of life, for which purpose fine silk nets of much less diameter are employed.

As might be supposed, the amount of material taken in this way is large. When surface-life is at all abundant, surface-fish and the young of some bottom-fish, the mature and immature forms of crustacea, various pelagic forms of mollusca, and jelly-fish of all sizes, are represented in the average haul.

Perhaps special mention should be made of the capture of argonauts and of several species of file-fish (Balistidae). Argonauta argo has been taken a number of times clinging to gulf-weed; and a fine specimen of another species of argonaut was taken from the under surface of a jelly-fish, to which it tenaciously clung. Unsuccessful efforts have been made to bring in alive argonauts captured during the short summer cruises of the steamer from Wood's Holl, Mass.: perhaps failure was due to the change from the warm water of the Gulf-Stream region to the cold water inshore. In an aquarium these animals swim about with a slow, undulating, rhythmic motion, sometimes holding themselves poised for a while, and then, by a sudden turn of the siphon, darting with ease in any desired direction. When swimming, the expanded and partially transparent membrane of the dorsal arm adheres so smoothly to the side of the shell, that it requires close observation in a strong light to detect the fact that it is covered.

The file-fish is found under gulf-weed, and is captured when the ship slows down for dredging or sounding. A specimen of this fish three inches and a half long, together with a piece of drift-wood covered with barnacles (Lepas), was placed in an aquarium. It immediately began to prey upon the barnacles thus: holding itself in readiness, it waited for the intended victim fully to extend its cirri, which the fish then, by a sudden onslaught, seized, and, backing swiftly away, dragged the greater portion of the animal from its shell. The attack of the fish was not always well-timed, and, failing in its purpose, its solid jaws brought up with a sharp click against the closed shell within which the coveted morsel had safely retreated.

Science has already noted the fact that the electric light is an important aid in surface-collecting. A single Edison-light bulb protected by a wire cage, and furnished on the upper side with a shade, is lowered a few inches under water by an insulated cable, which is then made fast. Light, silk bolting-cloth scoop-nets, fastened to long bamboo poles, are held in readiness above the illuminated area. The larger part of the material collected by these nets, especially in shallow water, is composed of small crustacea and worms, which the light often attracts in swarms.

At Wood's Holl, small schools of herring (Clupea) frequented the lighted area to devour the sexual form of certain worms (Nereis limbata and N. megalops). A number of specimens of this fish were taken with flies improvised to resemble these worms. The argonaut has been captured under the light, probably by accident. Squids, however, appear in numbers, apparently allured from some distance. The flying-fish often swims sluggishly towards the light, its wing-like pectoral fins more or less extended on the surface of the water, and quite motionless. If startled, it rises instantly in the air, and disappears in the darkness like a frightened bird. When taken unharmed from the scoop-net, it exhibits a wing-movement like that of the humming-bird or sphinx-moth, and seems to demonstrate its claim to true flight.

With the abundant material for close structural

study secured by these combined methods, it is to be hoped that we soon shall be as well acquainted with the surface-fauna off our coast as we now are with the bottom-fauna.

James E. Benedict,
Resident naturalist of the Albatross.

EARTHQUAKE OBSERVATIONS.

The occurrence of an earthquake, although not such an uncommon event in this country as most people suppose, rarely finds observers alert enough to make observations which, when sifted of hearsay and ambiguity, contain facts of much value to science either as to quantity or quality. As a guide to the information desired, it would be well to bear in mind the list of questions adopted in the circular to be issued by the U. S. geological survey, as follows: —

1. Was an earthquake shock felt at your place on the day of , 18 ? (A negative answer is as important as an affirmative one.)

2. At what hour, minute, and second of standard time was it felt?

3. How long did its perceptible motion continue?

4. Was it accompanied by any unusual noise? If so, describe it.

5. Was more than one shock felt? If so, how many?

6. Which of the following measures of intensity would best describe what happened in your vicinity? No. 1. Very light, noticed by a few persons, not generally felt; No. 2. Light, felt by the majority of persons, rattling windows and crockery; No. 3. Moderate, sufficient to set suspended objects, chandeliers, etc., swinging or to overthrow light objects; No. 4. Strong, sufficient to crack the plaster in houses or to throw down some bricks from chimneys; No. 5. Severe, overthrowing chimneys, and injuring the walls of houses.

7. Do you know of any other cause for what happened than an earthquake?

This list was proposed by Capt. C. E. Dutton, in charge of the division of volcanic geology, with the advice of Profs. C. G. Rockwood, T. C. Mendenhall, W. M. Davis, and H. M. Paul. A negative answer to the first question, from an observer near the disturbed region, is of course valuable as showing the limits of the disturbance. The second question, as to the time, is the most important of all; and an immediate comparison of the time-piece used, with standard time at the nearest railway-station or elsewhere, is particularly desirable.

Experiments are now being made as to the best form of seismoscope for the use of selected observers, while more refined observations with seismograph and chronograph can of course only be undertaken where there are special facilities, as at regular observatories, etc.

GEOGRAPHICAL NOTES.

Uape Indians of the Amazon. — We derive from Henri Coudreau some interesting notes on the ancient race of Amazonian Indians known as the Uapè. These people are generally below the average height of Europeans, and their complexion varies from light brown to something like a chocolate tint. Their hair is black and smooth; with rare exceptions, reddish or even blond. They possess a personal odor almost as strong and disagreeable as in some Africans, but which is not due to want of cleanliness, as they bathe several times a day. Though quiet in their manners, they are very independent in their habits, and when intoxicated, which often occurs, are insolent, violent, and cruel. They have religious and secular festivals called respectively 'cachiri' and 'dabucuri.' These consist chiefly of dancing and indulgence in intoxicating preparations of coca, wild hemp, and other herbs, and ceremonial tobacco-smoking. The cachiri-drink is made in a canoe-shaped wooden vessel, around which both sexes dance in a sort of procession, each individual putting his right hand on the shoulder of the person preceding him. The line is led by the chief singing, while the rest join in a refrain. They are deceitful and perfidious, and do not hesitate to use poison against ememies. The drug is extracted from a species of arum, and, in small doses, produces death by anaemia and innutrition after a month or two: strong doses produce immediate insanity. Their food comprises game, fish, fruits, and manioc-farina; they are very fond of several sorts of large ants. Their houses are built of wood, long, with a door at each end, thatched, and accommodating as many as fifteen families under one roof. They are generally dirty and ill-smelling. The furniture consists of hammocks, pottery, trunks of Brazilian manufacture, and a variety of odds and ends, beside their weapons, nets, and baskets. At one side is a small shed, where the farina is cooked on a hearth. There is often a small flotilla of canoes belonging to the inhabitants. These people make excellent canoes, some of which are large enough to seat thirty people, and sell readily for a handsome price at the Brazilian towns. The most singular of their industries is that by which they obtain salt. A plant grows in the district of Carurù, a stout herb