on which the striations and boulders occur was snow-covered in 1937. A film of melt water covering the lower surface partly obscured the striations and prevented the taking of photographs. However, the many new striations and associated boulders provided unmistakable evidence that snow sliding during the past winter had actually produced results similar to those noted the year before and then inferred to have had such an origin.

Further, many of the new grooves exhibited a characteristic not previously seen. This new type terminated in a distinctly zigzag course (Fig. 1) at the

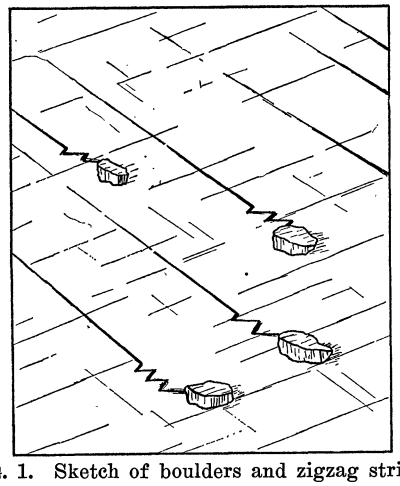

FIG. 1. Sketch of boulders and zigzag striae.

lower end adjacent to the boulder which produced it. A completely adequate explanation for such a termination has not been reached. It is presumed that the zigzags are due to sudden cessation in motion of a relatively fast-moving snowslide. This interpretation is in agreement with the writer's deductions[2] regarding the general nature of the phenomenon developed after the first study of the site.

A somewhat similar occurrence of striations has been described by Gakuro Imamura[3] from the Japanese Alps. These striations, Imamura states, are nivational in origin, new ones being formed each year. In a later paper[4] (pp. 11, 37 and 53) he mentions nivational moraines as being common and conspicuous features in the vicinity of the striations and elsewhere. From this it may be inferred that the moraines are composed, in part at least, of the materials responsible for engraving the grooves which Imamura records.

These findings of Imamura and the writer can not help but disprove the belief, still held by some, that well-defined striations on bed-rock are ultimately conclusive evidence of the former presence of glaciers.

[2] *Op. cit.*, p. 556.

[3] Gakuro Imamura and Takeo Hirabayasi, *Proc. Imp. Acad. Japan*, 11: 8, 331–333, 1935.

[4] Gakuro Imamura, *Sc. Rep. Tokyo Bunrika Daigaku*, Sect. C, 2: 7, 1937.

It is hoped that among the readers of SCIENCE there may be some one who can further elucidate the zigzags.

J. L. DYSON

CORNELL UNIVERSITY

A NEW LOCALITY FOR TRYPANOSOMA CRUZI CHAGAS IN CALIFORNIA[1]

AMERICAN human trypanosomiasis is an incurable disease caused by the protozoan, *Trypanosoma cruzi* Chagas, and has been known in South America since 1909. It was discovered by Kofoid and Donat[2] in San Diego County, California, in the western cone-nose bug, *Triatoma protracta* (Uhler), and by Kofoid and Whitaker[3] in the cone-nose bug, *Triatoma uhleri* Neiva, from Tucson, Arizona.

During August, 1937, 152 *Triatoma protracta* (24 adults, 128 nymphs) were collected from woodrat nests in Eaton Canyon, between Altadena and Sierra Madre, Los Angeles County, California. Fifty-seven bugs (12 adults, 45 nymphs) or 37.5 per cent. were infected with a trypanosome.

To determine the identity of this trypanosome, two southern parasitic mice, *Peromyscus californicus insignis* Rhoads, were inoculated intramuscularly with feces from the infected bugs. Both mice were adult females, showing no protozoa in their peripheral blood before inoculation. Fresh blood examinations of one mouse showed: 5th and 7th days, negative; 9th, 6 long slender trypanosomes; 11th, 1 trypanosome; 13th, 1 trypanosome; 15th and 17th, negative; 19th, 1 trypanosome. Fecal samples of four non-infected *Triatoma protracta* (2 adults, 2 nymphs) which were fed on this mouse on the 19th day showed heavy infections with crithidias and trypanosomes 53 days later. Fresh blood examinations of the second mouse showed: 5th, 7th, and 9th days, negative; 11th, 1 trypanosome; 12th, 2 trypanosomes; 13th, negative. Fecal samples of three non-infected nymphs of *Triatoma protracta*, fed on this mouse on the 13th day, showed infections with crithidias and trypanosomes 56 days later.

On the basis of the morphology and characteristic locomotion of the living organisms in fresh mouse blood and *Triatoma* feces, their structural appearance in stained smears of feces of naturally and experimentally infected bugs, their transmissibility from infected to non-infected bugs through a mammal host, the degree of polychromasia and the differential blood picture in the infected mammal, it is concluded that this flagellate is a non-virulent form of *Trypanosoma cruzi* Chagas. These findings extend the known range

[1] The writer wishes to thank the University of California at Los Angeles for use of equipment and materials in the Department of Zoology.

[2] C. A. Kofoid and F. Donat, *Calif. and West. Med.*, 38: 245–249, 1933.

[3] C. A. Kofoid and B. G. Whitaker, *Jour. Parasit.*, 22: 259–263, 1936.

of infected insect vectors approximately 110 miles north into the largest population center of California.

SHERWIN F. WOOD

LOS ANGELES JUNIOR COLLEGE

COMPARISON BETWEEN PRE-COLONIAL AND PRESENT-DAY OYSTERS

THE American Indian, who, prior to the sixteenth century, inhabited that area which is now the coastal region of Charleston County, South Carolina, made extensive use of *Ostrea virginica* as food. This is attested by the large number of Indian shell heaps found throughout the area. Any one familiar with the present-day oyster industry examining these shell piles immediately realizes that the size and evident quality of these pre-colonial oysters far surpassed those gathered to-day.

On the west bank of the Ashley River, about eight miles above Charleston, S. C., there is a large shell heap containing over 3,200 bushels of oyster shells. The geographic location of this shell pile is such that the oysters therein must have come from the nearby river. Practically all the oyster shells in this mound are over 3.50 inches from hinge to bill. To-day the Ashley River produces no oysters commercially, and even experimentally it is doubtful if any oysters could be gathered which would compare favorably with those from the Indian shell heap. Of course, the Ashley River is and has been for some years heavily polluted with sewage and mill waste. This pollution may have been the cause of the decrease in the size of the oysters of to-day.

In order to compare the size of pre-colonial oysters with present-day oysters in areas not affected by pollution, shells were collected from a large Indian shell heap on the edge of Sewee Bay, Charleston County, S. C. These shells came from oysters quite evidently gathered in the vicinity of Sewee Bay, which is far removed from any source of pollution. The largest individual oyster shell in this collection measured 8.00 inches long and 2.75 inches wide. Of 10 specimens selected as being the largest, the average length was 6.54 inches, with an average width of 2.56 inches. The average measurements of all specimens (50) were 4.29 inches by 2.51 inches.

From the same general locality, 290 live oysters were gathered from 15 different commercial beds. One hundred and forty of these specimens were chosen for their size, that is, the beds were carefully examined and these 140 individuals were selected as being the largest. The largest oyster in this group was 4.75 inches by 2.25 inches. The average of the group was 3.91 inches by 1.93 inches. In addition to this group, 150 oysters were gathered at random from the same beds. These were considered as being fairly representative of the oysters which could be gathered by commercial oystermen from this particular section of South Carolina. This group averaged 2.67 inches in length by 1.76 inches in width.

From these comparative measurements, the selected pre-colonial oysters were found to be 58.78 per cent. longer and 75.39 per cent. wider than selected present-day oysters. The ordinary pre-colonial oysters were found to be 62.23 per cent. longer and 76.89 per cent. wider than the ordinary present-day oysters, all of which were gathered in the vicinity of Sewee Bay.

These observations probably do not indicate that *Ostrea virginica* has become a smaller species in the past four hundred years. In all probability the small size of the present-day oyster is due entirely to intensive commercial fishing which does not allow it to reach its maximum growth.

G. ROBERT LUNZ, JR.

CHARLESTON MUSEUM

QUOTATIONS

THE ADVANCEMENT OF SCIENCE AND SOCIETY

DR. F. R. MOULTON, permanent secretary of the American Association for the Advancement of Science, addressed a communication to *Nature* which was printed in the issue of March 19, 1938. It reads:

Members of the American Association for the Advancement of Science have read with much interest the comments on their resolution on international cooperation of scientists which appeared in *Nature* of January 22, p. 150. As gratifying as these comments are, in one respect they differ somewhat from the spirit of the resolution.

Since I wrote the resolution and am suggesting to the Executive Committee that it extend formal invitations for an international conference of representatives of scientific societies to be held in London this coming summer, I should like the privilege of explaining the spirit of the resolution, which I believe represents the present sentiment of a large majority of the members of the American Association. By frank expressions of opinions well in advance of the contemplated conference we shall be able to make progress towards mutual understandings of possible slightly different points of view and thus prepare the way for constructive action at the conference, if it should be held.

The resolution passed by the American Association on December 30 was published in the article in *Nature* referred to above.

The preamble to the resolution consists of two distinct parts, the first of which acknowledges the profound effects of science upon society and thereby admits a heavy re-