Certain precautions were taken in order to keep down the possible error. Stones whose shapes might cause them to fall in some particular direction were disregarded, and those only used that were of square or round base. Furthermore, those columns whose bases were tilted to the extent of possibly giving direction to the fall were eliminated. The writer feels, therefore, that the results herein given are comparatively accurate.

The cemeteries in which the data were obtained are the following: (1) Sunnyside, on Willow Street between California and Orange Avenues, Long Beach; (2) Artesia, just to the northwest of the town of Artesia; (3) Old Downey, south of Downey; (4) Woodlawn, just south and west of Compton, and (5) Wilmington. In the last named there were but two monuments that might be included in the specified types and these fell at right angles to each other, thus vitiating any inferences that might be based on their direction of fall.

Observations on thirteen monuments in the Sunnyside Cemetery showed ten of them to have fallen within the fifteen degree angle between N 5 W–S 5 E and N 20 W–S 20 E. Of twenty-four columns in the Artesia Cemetery twelve were between N 60 W–S 60 E and N 85 W–S 85 E. Six of the seven stones in Old Downey Cemetery lay between N 85 W–S 85 E and S 63 W–N 63 E, and four of the six in Woodlawn fell either east or west. Plotting all the observations made on an accurate map of the region and projecting the lines in both directions, since it is obvious that the columns may have fallen either toward or away from the focus, the results shown in Fig. 1 are obtained.

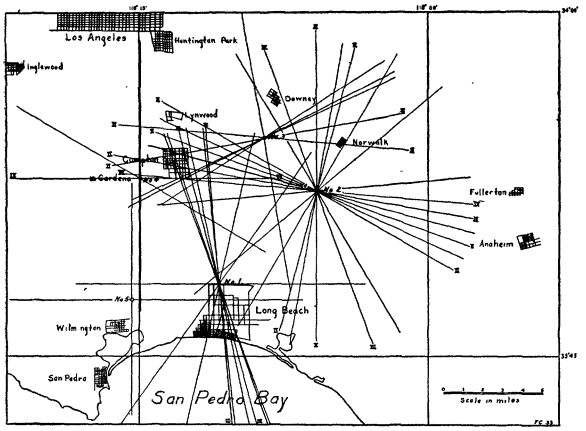

FIG. 1. Map showing direction of fall of tombstones in vicinity of Long Beach, California, March 10, 1933. No. 1, Sunnyside Cemetery; No. 2, Artesia Cemetery; No. 3, Old Downey Cemetery; No. 4, Woodlawn Cemetery; No. 5, Wilmington Cemetery. Roman numerals indicate number of monuments in same direction.

A marked convergence on the Compton area is at once apparent, with over 60 per cent. of the columns having fallen along lines radiating from Compton as a center. It was also noted by the writer in a reconnaissance examination that Compton was the most severely damaged in proportion to its size of any of the cities in the shaken zone. The inference, therefore, is that the epicenter of the earthquake was in and about the city of Compton.

The data from seismographs, however, indicate that the epicenter was on the sea floor a short distance off Newport Beach,[2] disagreeing entirely with the results of the writer. Yet there are inconsistencies with this conclusion other than that indicated by the overthrown columns. Balboa and Newport, built upon material not greatly different from that underlying Compton and Long Beach, and of more or less similar construction, were very much less severely damaged. Neither was there any semblance of a so-called tidal wave, which might have been expected with violent earthquake waves emerging on the sea floor, and this regardless of whether the movement along the fault was vertical or horizontal.

A possible explanation of the disagreement is the following. The first slip, of minor importance, may have occurred off Newport as indicated by the instrumental records. This slip in turn may have acted as a trigger to release accumulated stresses along the same or a near-by fault in the Compton region, the latter movement being much greater in magnitude than the former and causing the principal damage.

In view of the evidence offered, and the further corroboration by personal impressions of two distinct series of shocks, one following immediately upon the other, it is the opinion of the writer that the above explanation is a valid one and that the epicenter of the major shock was in or near Compton, California, at approximately 118 degrees, 13 minutes west longitude and 33 degrees, 54 minutes north latitude. The fault map of California, compiled by Bailey Willis and Harry O. Wood for the Seismological Society of America, shows a possible fault passing through this area approximately parallel with the Inglewood fault. It may have been movement on this fault, activated by an immediately preceding movement on the Inglewood fault off Newport Beach, that caused the damage in Compton and the surrounding area.

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THE VALUE OF AN ANIMAL BARRIER IN MALARIA CONTROL

MALARIOLOGISTS have for a number of years been debating the question of the value of an animal barrier

[2] Personal communication, Mr. H. O. Wood.

as a method of malaria control. One of the chief reasons for doubting the effectiveness of such a method has been the belief that *Anopheles* mosquitoes have definite blood-meal preferences. The anophelines which are effective carriers of malaria have usually seemed to have a distinct preference for human blood. Poor carriers have appeared to prefer animal blood. Precipitin tests have lent weight to this belief.

During the first four months of 1933, the staff engaged in malaria investigations[1] in the Philippine Islands made collections of adult *Anopheles* mosquitoes of the *funestus-minimus* subgroup in the municipality of Aritao in Nueva Vizcaya. The population of the area in which the collections were made was about 800. In the Philippines, as has previously been reported,[2] these mosquitoes can rarely be found inside or under houses. They are, as a rule, seen only out-of-doors, in natural resting places, such as undercut stream banks, where daytime catches can easily be made. Recently, collections of these mosquitoes were made at night, while the insects were feeding on carabaos.

The last catch dissected up to the present time numbered 705 mosquitoes. Of these, 133 were caught along stream banks by day, and 572 on carabáos at night. There were five infected mosquitoes among them. In one (*A. filipinae*) the gut only was positive; in one (*A. minimus v. flavirostris*) the glands only were postive; in one (*A. minimus v. flavirostris*) the glands were positive, but the stomach was not successfully dissected; in two (*A. minimus v. flavirostris*) both gut and glands were infected. One mosquito in which gut and glands were infected was caught along a stream bank. The other four infected insects were caught at night while feeding on carabaos.

Here, then, is strongly presumptive information to the effect that mosquitoes which had first taken blood from an infected human were attracted to carabaos for a subsequent feeding at a time when they were potentially dangerous to man. We have not been able to rule out absolutely the possibility of simian malaria or of carabao infections. Both are highly doubtful. Monkeys are very uncommon in Aritao, and the literature has no records of malaria infection in carabaos. This matter is being checked.

The possible usefulness of an animal barrier would seem to be indicated by these findings. But such barriers uncontrolled are of little use, because in the town of Aritao the blood smear index for malaria is about 30 per cent. A detailed report on this subject will be published eventually.

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[1] The malaria investigations are jointly supported by the International Health Division of The Rockefeller Foundation and the Bureau of Science of the Insular Government of the Philippines.

[2] P. F. Russell, *Philippine Journal of Science*, 46: 639–649, 1931; and P. F. Russell, *Proceedings* of the Entomological Society of Washington, 34: 129–138, 1932.

"MAGMATISM"

THERE seems to be no adequate term for expressing the phenomena attending the primary placement of igneous material both within the earth's crust and upon its surface. In most text-books, the word "vulcanism" (or "volcanism") is made to answer for igneous processes, whether they are deep-seated or at the surface. This term seems inappropriate, since the idea implied applies particularly to volcanoes. The correlative words "volcanic" and "plutonic" are sometimes used to express the place or mode of occurrence of igneous rocks, according to whether they be extrusive or intrusive. Is it any more appropriate to use the word vulcanism than plutonism, for general igneous activities? The one might well be used for subsurface igneous processes; the other, for supersurface processes.

The writer has felt the need of a single term which might do for all igneous processes—to be used in much the same way as vulcanism is now used. For this purpose, he suggests the word "magmatism." The idea of this word is to represent the collective phenomena of volcanoes and their dispositional processes; dikes, laccoliths, batholiths, etc., in respect to the way they were formed—any and all movement of magma and its subsequent primary disposal as solidified crustal material. The old terms "vulcanism" and "plutonism" then could be used if desired, to distinguish the two types of magmatism.

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THE REVERSAL OF THE SODIUM LINE, "D," IN FIREWORKS

SOME years ago the writer noticed, at a glass factory in West Virginia, the reversal of the sodium line, "D," and published a note thereon in SCIENCE. Now we are able to supplement this occurrence in the rather unusual setting of fireworks. It happened at the recent "Fourth," at the beautiful grounds of the Kirtland Country Club, near Mentor, Ohio. The exhibits, while not so extensive or elaborate as those at the Washington inaugurals or at Coney Island, were unique and beautiful. Some of them were of a type new to me; and several gave spectra largely for the sodium compounds. I was using my pocket direct-vision, made by Franz Schmidt & Haensen, of Berlin, Germany. On three occasions, the bright sodium line changed suddenly from the bright form to the dark reversal. I was confirmed in my observation by a friend who sat near me, who saw it all clearly, both the bright and the dark line. The occurrence is un-