SCIENCE

VOL. 99 FRIDAY, APRIL 14, 1944 No. 2572

SCIENCE: A Weekly Journal devoted to the Advancement of Science. Editorial communications should be sent to the editors of SCIENCE, Lancaster, Pa. Published every Friday by

THE SCIENCE PRESS

Lancaster, Pennsylvania

Annual Subscription, $6.00 Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary in the Smithsonian Institution Building, Washington 25, D. C.

NEW VOLCANOES AND A NEW MOUNTAIN RANGE

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IN Michoacan province, some two hundred miles due west of the city of Mexico, a volcano was born above a cornfield on February 20, 1943, is already more than 1,500 feet in altitude and is still in a lusty growth. It has been christened *El Parícutin.* The event has figured in world news, and the volcano has been visited by throngs of tourists from the city of Mexico. Already an account of this unusual event has been printed in SCIENCE (December 10, 1943) and the occurrence has been pronounced unique in history.

What is so unusual is the birth and growth of a volcanic mountain *away from other volcanoes,* for scores of such mountains have been observed as they have been born upon the flanks of giant volcanoes, such as Etna, and phenomena in all respects comparable to those observed at Parícutin are therefore familiar to volcanologists.

As I shall show, the birth of a volcano like Parícutin, which is some tens of miles distant from other volcanoes, is not unique. Below are listed seven such births recorded in literature, all from the Christian era,[1] and there must have been others which are not of record:

NEW VOLCANOES (IN ORDER OF THEIR BIRTHDAYS)

Monte Nuovo (New Mountain), September 29, 1538. Bay of Naples. 440 feet high. Description by Lyell in "Principles of Geology," Vol. 1, pp. 607–619, on the basis of accounts by contemporary observers. Important gun position in the shelling of Naples, 1943.

Jorullo. September 28, 1759. Province of Michoacan, Mexico. 1,600 feet high. Rose above the plain of Malpais. Described by v. Humboldt in *Cosmos.* Fumerole action as late as 1906.

Izalco. February 23, 1769. San Salvador. 1,900 feet

[1] Strabo in his "Geography" has reported two earlier births, that of Madane during the third century B.C. and a submarine eruption in 196 B.C., both in the Aegean. Many submarine eruptions in new localities are of record, the best known that of Nwöe Island (New Island), thirty miles off Cape Reykianes, Iceland, in May, 1783; and Graham Island between Sicily and Tunisia, July, 1831. Unless eruption is long continued such islands are cut away by the waves and are subsequently marked only by shoals.

a strength of approximately 0.25 per cent. (or a small pinch in about 50 ml of tap water *freshly* prepared *just* before using, selectively bleached the blue color from the background and from all the organisms tested excepting the tubercle bacilli, without affecting the red color of the carbol-fuchsin stained rods or the blue color of the methylene-blue stained non-acid-fast forms of *M. tuberculosis.*

Subsequently, known pure cultures of tubercle bacilli were mixed with non-tuberculous sputums and were stained by the new technic. The results were striking. Acid-fast organisms were red, non-acid-fast forms were blue, partially acid-fast forms mulberry color, while other organisms, tissue cells and mucus formed an effective light green background with the third stain used; this consists of equal volumes of aqueous solutions of 1 per cent. acid green[4] and 1 per cent. acid yellow.[4] Every slide stained by the triple staining method was controlled by a duplicate smear stained by the ordinary Ziehl-Neelsen technic. Thereafter, hundreds of slides of tuberculosis sputum, tissue and body fluids—particularly chest fluids[5]—were stained by the triple stain technic with Ziehl-Neelsen controls, with satisfactory results.

This triple method of staining should be a useful supplement to the usual Ziehl-Neelsen technic since it reveals a number of interesting non-acid-fast forms which ordinarily escape observation.[6] One of these forms is zoogleal, consisting of one or more granules embedded or enmeshed in amorphous material and is not stained by the usual Loeffler's methylene blue or dilute methylene blue counterstains. This form, stained and unstained, has been the subject of intensive study and is being described in detail elsewhere. Ubiquitous saprophytic diphtheroids obtained from a variety of non-tuberculous materials such as normal guinea-pig serum or heart's blood, tap water, or hay, apparently are also able to enter a zoogleal state similar to this newly demonstrated zoogleal state of *M. tuberculosis,* and are distinguished from *M. tuberculosis* by the relative ease and speed with which such forms develop into rods on culture, the non-acid-fast character of all their rod forms, and, of course, by their complete lack of pathogenicity for the guinea pig.

TECHNIC OF THE TRIPLE STAIN FOR TUBERCLE BACILLI

(1) Prepare smears which are not too thick, fix carefully with heat, and stain as usual three minutes with carbol-fuchsin.[7] Decolorize for one to three minutes with acid alcohol (3 per cent. HCl) and wash thoroughly in running tap water.

(2) Flood the slides with a well-ripened Loeffler's methylene blue. Then add with a dropper 6 to 8 drops of normal NaOH with a capillary pipette. Distribute the alkali by tipping the slides gently; let stand for not more than one minute; wash. The NaOH must be freshly prepared about once a month for good results.

(3) Flood the slides one at a time, with sodium hydrosulfite solution (freshly prepared just before using by adding a small "pinch" of hydrosulfite to about 50 ml of tap water in a beaker or flask). Decolorization of the deep blue smear will speedily take place (except for red acid-fast and the non-acid-fast tubercle bacilli, which on microscopic examination appear blue). Wash off quickly in running tap water and immediately flood the slide with the green stain (an aqueous solution of equal volumes of 1 per cent. acid green and 1 per cent. acid yellow). Wash off the green in a few seconds, and blot dry at once. When stained preparations are thick, parts will appear blue rather than green, thus preventing clear differentiation in those areas. On the other hand, if the sodium hydrosulfite solution is too strong, the background and species of bacteria other than the tubercle bacillus will appear grayish.

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[4] National Acid Green L Extra, C.I. No. 666 and National Quinoline Yellow C.I. No. 801 were found suitable.

[5] Most of the material was obtained from the laboratory of Tuberculosis Service at Bellevue Hospital through the kindness of Dr. J. Burns Amberson, director, and Miss Edna Stein, bacteriologist.

[6] E. Alexander-Jackson, *Am. Rev. Tuber.*, 33: 6, 789, 1936.

[7] To protect smears against precipitated particles of carbol-fuchsin stain, it is advisable to lay a strip of clean filter paper across each fixed smear prior to adding the dye.

BOOKS RECEIVED

BARTON, WM. H., JR. *World Wide Planisphere for Finding and Identifying Navigation Stars and Constellations from all Latitudes, North or South throughout the Year.* Addison-Wesley Press, Inc. $2.50.

BARTON, WM. H., JR., and CHARLES O. ROTH, JR. *Basic Problems in Celestial Navigation.* Illustrated. Pp. 56. Addison-Wesley Press, Inc. $1.00.

CHAPIN, WILLIAM H. *Exercises in Second Year Chemistry.* Fourth edition. Revised by WERNER E. BROMUND and L. E. STEINER. Illustrated. Pp. vii + 216. John Wiley and Sons, Inc.

Contributions to American Anthropology and History. Illustrated. Pp. 260. Publication No. 546 of the Carnegie Institution of Washington. $3.50, paper cover; $4.00, cloth binding.

HAUSMANN, ERICH and EDGAR P. SLACK. *Physics.* U. S. Naval Academy edition. Illustrated. Pp. vii + 857. D. Van Nostrand Company, Inc. $5.50.

Selected Papers of William Frederick Durand. Reprinted in Commemoration of the Eighty-fifth Anniversary of His Birth. Pp. 123. California Institute of Technology.

The Technique of Motion Picture Production. A Symposium of Papers presented at the 51st Semi-Annual Convention of the Society of Motion Picture Engineers, Hollywood, California. Illustrated. Pp. viii + 150. Interscience Publishers, Inc. $3.50.