In varieties of *Antirrhinum* the four pigments, cyanidin, pelargonidin, apigenin, and luteolin, are formed. But there is no correlation between their presence in the epidermis. Cyanidin or pelargonidin can be found either with apigenin or luteolin.

General considerations would suggest that possibly in the flower flavone pigments result from de-amination connected with growth and development; anthocyan pigments with de-amination connected with senescence.

[1] The investigations of Karrer and his co-workers are published in *Helv. Chim. Acta*; those of Robinson and his co-workers in *J. Chem. Soc.* and *Biochem. J.* Details of the data on genetics can be found in the *J. Genetics* and Onslow's "Anthocyanin Pigments of Plants".
[2] NATURE, **128**, 373, Aug. 29, 1931.
[3] *Biochem. J.*, p. 1687, 1931.

## The Eruptions in the Andes

By Dr. CHARLES DAVISON

EARLY in the morning of April 10, eruptions began in several volcanoes of the southern Andes, most of which were supposed to be dormant or but rarely in action. The volcanoes affected, from north to south, are Tupungato, Overo, Tinguiririca, Peteroa, Descabezado, Las Yeguas, and Quizapu. Their heights diminish southwards, from 21,810 ft. for Tupungato to 11,342 ft. for Las Yeguas. All of them were in action simultaneously, though the distance that separates the extreme mountains is about 200 miles.

The principal feature of the eruptions is the great amount of the solid materials ejected. Loud explosions were heard at Santiago on the west side, and throughout the department of San Rafael on the east side, one hundred miles or more from the nearest volcano. But they were evidently not to be compared with those during the eruption of Krakatau in 1883, the sounds of which were heard at several places more than 2000 miles from the island, and at one place 2968 miles distant. Some observers in an aeroplane crossed the great crater of Las Yeguas (apparently on April 12). Every half-minute, loud explosions occurred within it, and blocks weighing many tons were thrown upwards more than 200 ft. These, it was said, gave the impression of being pulverised in mid-air.

During the three days of activity—the eruptions had almost ceased on April 13—all the towns near the volcanic zone were in a state of semi-darkness owing to the steady fall of fine dust and ashes. On the west side, the country from Santiago to Talca was covered with a layer of whitish dust, in places more than two inches deep. On the east side, the fall was much heavier. In the department of San Rafael, the layer of dust was a foot in depth, in other places more than two feet, and in one nearly three feet, so that trains were stopped from running. Even at Montevideo, about 850 miles from the nearest volcano, there was a steady fall of dust for many hours. Over Buenos Ayres (730 miles), it is estimated that more than 3000 tons of debris have fallen. The whole country there is coated with grey dust, so that cattle have to be fed with hay and artificial foods. Even if the average thickness of the dust over the whole area of deposition were no more than one-tenth of an inch, the total volume of the fallen dust would be about five cubic miles.

Several villages in the province of Mendoza were shaken by earthquakes, the stronger, no doubt, among many hundreds felt in the neighbourhood of the volcanoes. The shocks that accompany a volcanic eruption, though sometimes destructive within a small area, are seldom felt more than a few miles from their origins. Occasionally, as in Hawaii in 1868 and Sakura-jima in 1914, a tectonic earthquake strong enough to be registered all over the world may occur in the immediate neighbourhood of the volcano, but such disturbances are rare.

About one hundred years ago, on Feb. 20, 1835, an earthquake of somewhat similar type overthrew Concepcion, and with it a long stretch of the Chilean coast was uplifted, in one place by 10 ft. One month before this, as Darwin describes in his great memoir, "On the Connexion of Certain Volcanic Phenomena in South America . . .",* eruptions occurred in three volcanoes, Osorno, Aconcagua, and Coseguina, all beginning within six hours. The first two mountains are separated by 550 miles. The third is so distant from either that, as Darwin says, we cannot be too cautious in assuming that the phenomena were connected. At the moment of the Concepcion earthquake, the volcanoes of Osorno and Minchinmadom, 150 miles apart, burst into action. Some months later, on Nov. 11 of the same year, a severe earthquake occurred at Talcahuano, the port of Concepcion, and on the same day, Osorno and Corcovado, separated by 205 miles, burst into violent action.

To us at a distance, a question of great interest is whether the eruptions will be followed in due time by such wonderful sunsets as were observed all over the world for months after the Krakatau eruption of 1883. With regard to the amount of dust projected into the atmosphere, there can be little doubt. The question is whether enough could rise to heights of from eight to ten miles. As Capt. Cave remarks in a letter to the *Times* (April 14), the explosions seem to have been less violent than those of Krakatau. On the other hand, the height of Krakatau was 2623 feet, while the Andean volcanoes rise from two to three miles higher. On April 13, Capt. Ralph Wooten, the U.S. Air Attaché at Santiago de Chile, flew across Quizapu at an altitude of 14,000 ft. He estimated that the smoke column was then reaching 5000 ft. above the crater, but he considers that, on April 10, at the moment of greatest activity, it must have risen to a height of 30,000 ft. If this estimate is correct, or nearly so, it seems possible that, within a few months, sunset glows may be visible in Great Britain. The eruption of Krakatau, it will be remembered, occurred on Aug. 26–27. The sunset glows were not observed in England until the end of November.

* *Trans. Geol. Soc.*, vol. 5, pp. 601-631; 1840.