

DISCUSSION

TABLE MOUNTAINS AND "TUYAS"

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W. H. Mathews (1947) described in this JOURNAL a number of flat-topped, steep-sided volcanoes from northern British Columbia, which he called "tuyas." These "tuyas" bear great resemblance to the "table mountains" of northern Iceland, recently described by the authors (1955).

As Mathews suggests (p. 569-570) that confirmation of his hypothesis on the origin of tuyas might be obtained by a study of the Icelandic "table mountains," the following remarks to this purpose can be offered.

Both tuyas and table mountains, were formed by volcanic eruptions in "intraglacial" lakes, thawed through the ice cover by volcanic heat.

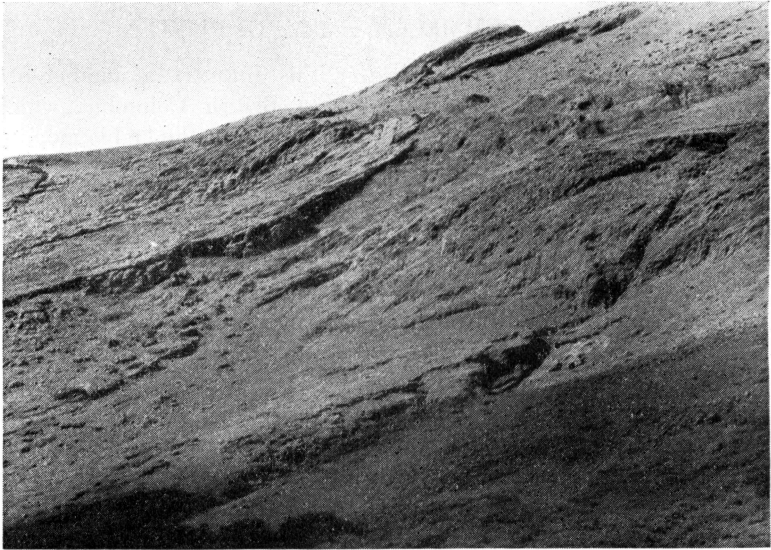
In their lower parts these flat-topped volcanoes consist of granulated material of basaltic composition with a few pillows or basalt globes near the top, whilst they are covered by some flat-lying basalt flows, a few tens to almost 100 feet in thickness.

There is only one apparent difference between tuyas of British Columbia and the table mountains of Iceland. According to Mathews' descriptions, the poorly consolidated fragmental material dips outward from one or more points within the tuya with inclinations of about 30° (Isspah Butte, for instance), whereas the authors found only level strata—or no stratification at all in the palagonitic tuffs and breccias which form the base of the Icelandic table mountains.

However, strong inclinations do also occur in the stratified "pseudo-palagonites" of Iceland, which form a cover of recemented scree material along the sides and slopes of the table mountains. These pseudo-palagonites may completely conceal the underlying palagonite tuffs. They dip outward at about the same angle as the slopes (about 30°), forming a series of stratified layers up to several tens of meters thick. They are of recent formation and rest upon the present-day topography of the mountain's slope, but at a distance the "pseudo-palagonites" may strikingly resemble primary dips of clastic beds of a volcanic cone.

The accompanying photograph, made by the junior author in 1953, shows a cover of such "pseudo-palagonites" on the southern slope of Armannsfell, north of Thingvellir, in the southwestern part of the Central Icelandic graben. They were extensively studied by both authors in 1950, during their Odáðahraun expedition, in the northern part of the Central Icelandic graben. As these stratified covers of volcanic tuffs and breccias on secondary sites at first in the field were mistaken by them for volcanic ejectamenta on primary sites, they suppose that the dips observed by Mathews in the slopes of tuyas in northern British Columbia belong also to recemented scree deposits of volcanic tuffs and breccias on secondary sites; the clastic volcanic deposits at primary sites in the core of the tuyas might also be unstratified or of an almost horizontal stratification. If so, the genesis of the tuyas might be completely analogous to that of the Icelandic table mountains, as described by the authors (1955, chap. 7, figs. 41 and 42).

PLATE 1



Cover of "pseudo-palagonites" on the southern slope of Armannsfell, north of Thingvellir, southwestern part of Central Icelandic graben. Photograph, M. G. Rutten.

REFERENCES

- Bemmelen, R. W. van, and Rutten, M. G., 1955, Table mountains of northern Iceland (and related geological notes): Leyden, Holland, Ed. Brill.
 Noe-Nygaard, Arne, 1940, Subglacial volcanic activity in ancient and recent times: *Folia Geographica Danica*, v. 1, no. 2, K. Dansk. Geog. Selsk.
 Mathews, W. H., 1947, "Tuyas," flat-topped volcanoes in northern British Columbia: *AM. JOUR. SCI.*, v. 245, p. 560-570.

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COMMENTS

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The following observations from the original field study of tuyas in 1942 are pertinent:

(1) Glacial erosion still proceeding on the north flank of Kawdy Mountain has worked back several hundred feet from the original outer surface of the volcano exposing throughout this distance inclined beds striking at an appreciable angle to the present cirque wall.

(2) No flat-lying beds have been revealed beneath the basalt cap, either at Kawdy Mountain or at any of the other somewhat less dissected tuyas.

(3) Those inclined beds which were regarded as being in situ extend up to a rather well defined line at the base of the basalt cap rather than lapping up to varying elevations over the outcrops of the basalt cap, as they would were they a secondary talus deposit.

These observations suggest that the inclined beds now exposed on the outer slopes of the volcanoes are truly part of the core rather than superficial talus.

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