

There are in addition at least four instances of lakes divided or very nearly divided into two by ice-built ramparts of boulders—Double Lagoon, First Bar Lake, Second Bar Lake and Lake Ina. The names of the first three do of course draw attention to their special character of twin lakes. These are briefly referred to in the paper of mine cited above but had previously been observed and interpreted by Professor S. W. Carey of the University of Tasmania. The first three are shallow lakes in glacial drift, the last is partially rock-rimmed and partially moraine-dammed. The drift derived from dolerite consists of large dolerite boulders set in a fine matrix as a rule, with usually comparatively little material of intermediate size. These lake-dividing ramparts must be due to ice push from different centres of expansion, operating on the boulders projecting from the shallow drift floors.

As in New England, ice expansion seems more important than the work of ice-floes, though the latter do play some part on the larger lakes of the Central Plateau.

J. N. JENNINGS

*Geography Department,  
Research School of Pacific Studies,  
Australian National University,  
Canberra  
12 November 1957*

SIR, *Exceptional glacier advances in the Karakoram*

When I met Professor Desio in Rawalpindi in 1954, he told me about the astonishing advance of the Kutiāh Glacier which he later reported in your *Journal*.<sup>1</sup> In that article Professor Desio wrote that, as far as his knowledge went, no such rapid advance in historic times of a glacial front such as this had been reported. In fact, there is another report of a similar advance; Hayden<sup>2</sup> stated that in 1904 or 1905 the Hasanabad Glacier, which flows in a tributary valley of the Hunza in the Karakoram advanced some 10 km. within two and a half months.

These rates of flow are quite remarkable. Whereas Alpine glaciers move with maximum velocities of less than 1 m. a day (which would be considered a very high value), some Greenland glaciers such as the Jakobshavns Isbræ and the Stor Glacier, reach 20 m. a day. The Rinks Isbræ, also in Greenland, even attains 28 m. a day.<sup>3</sup> Professor Desio's report of the Kutiāh Glacier implies an advance of 113 m. a day in 1953, while Hayden's paper similarly implies that the Hasanabad Glacier moved forward at a mean rate of no less than 130 m. a day; he also stated that the Yengutz Har in the Nagar Valley advanced some 2600 m. very suddenly. Now in all these cases the velocity of the ice within the glacier must have been much the same as the velocity of the glacier front, the ablation there being comparatively small in such short times. When the Vernagtferner in the Eastern Alps was advancing in 1898, the ice velocity there was more than ten times greater than in the normal state of the same glacier.<sup>4</sup> Obviously the reason can only be a pressure from the ice masses behind which must have increased greatly in a relatively short time.

Professor Desio, too, had already found these reports of Hayden when I wrote to him.

*Bischof-Konrad-Str. 14,  
Regensburg  
12 October 1957*

WILHELM KICK

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Reviews of works received are published in *Ice*, the News Bulletin of the Society.