of the Chernobyl layer in Austrian glaciers is 339 Bq/kg (^{40}K equivalents; measurement: November 1986). However, great regional differences have been observed (Ambach and others, 1987). The contamination of the Chernobyl layer is greater by a factor of about 10 on the Austrian glaciers investigated in comparison with the glaciers of the Western Alps (Pourchet and others, 1988). From gamma spectral analysis, a part of 60% of the total gamma activity is due to ^{137}Cs. It can be expected that the high gross β-activity in the Chernobyl layer will be detectable over many decades and therefore can be used as a further reference level for dating snow.

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8 July 1987

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SIR,

The influence of J.G. Goodchild

Geoffrey Boulton's recent review of progress in glacial geology over the past 50 years is a very readable but highly personal account. In the light of Professor Boulton's own writing, it has an expected actualistic bias and, although he recognizes work on sediments of past glaciers, he evidently does not consider it to have had much impact on modern glacial sedimentology. If anything, he presents it as having retarded progress. I welcome this opportunity to make an equally personal comment on how I see this perception leading to an injustice.

Boulton (1987, p. 28) writes: "Roughly contemporary attempts to infer processes only from their ancient products, such as those of Goodchild (1875) and Carruthers (1947–48), led others into scientific *cul de sacs* ... ." While I agree that subsequent sedimentological research has shown Carruthers to have been largely mistaken, the work of Goodchild is a benchmark in glacial geology that remains highly relevant (Haldorsen and Shaw, 1982). Goodchild first established that parts of the great ice sheets stagnated and down-wasted, and went on to deduce the nature of subglacial deposition beneath such ice bodies. The vivid picture he painted is as current now as in 1875.

> "When the great ice-sheet began to melt, the stones that were nearest the bottom of the ice, ... began to be deposited on the floor of the glaciated rock, or on patches of the true *moraine profonde* where these existed. The water resulting from the melting of the bottom ice would find its way here and there towards the sea along channels in the slowly thickening deposit of till ... . As the currents shifted they must have allowed till to accumulate in parts where nothing but sand and gravel had been laid down; while on the other hand, they must frequently have cut into banks of till and afterwards filled the denuded hollows with waterworn materials as their course slowly changed." (Goodchild, 1875, p. 95.)

This beautiful and accurate description of the formation of melt-out till and its associated glaciofluvial sediment explains many glacigenic sequences and applies exactly to depositional processes observed beneath modern stagnant glaciers. As Garwood and Gregory (1898) noted, Goodchild had predicted deposition by melt-out and it was only later that they observed this process at modern glaciers.

Goodchild's conclusions on the stagnation of ice sheets and deposition by melt-out have been re-stated many times over the past 100 years (see the discussion on the history of the melt-out till concept in Haldorsen and Shaw (1982)). A very recent work following in the Goodchild tradition of interpreting sediments in detail is Möller's (1987) excellent monograph on glacial land forms and sediments in southern Sweden.

Clearly, it is my view that J.G. Goodchild is a grandfather figure in glacial geology. I am sorry to see his research method diminished and dismissed as a dead end. It is particularly distressing when Boulton in his review only acknowledges melt-out till, which was so elegantly described in 1875 by Goodchild, after its description from modern glaciers in 1972. In my view of the development of glacial sedimentology, this undue emphasis on actualistic evidence distorts our history and is contrary to the proper practice of sedimentology. There are parallels between the study of tills and turbidites; much has been learned about the genesis of both by the study of the sediments themselves. Of course, direct observation of processes is desirable, but it is not a be all and end all. Both modern process studies and evidence from the products of past glaciers are useful in our quest to understand glacial land forms and sediment. Denial of the importance of studies of land forms and sediments themselves tarnishes the memory of such outstanding geologists as J.G. Goodchild.

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3 March 1988

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ERRATUM

Vol. 34, No. 116, p. 89-91, Figs 5, 6, and 7

The illustrations and captions for Figures 5, 6, and 7 have been transposed. The illustration above the caption for Figure 5 is in fact Figure 7; the illustration above the caption for Figure 6 is in fact Figure 5; the illustration above the caption for Figure 7 is in fact Figure 6.