

## A reply to 'A discussion on the Torfinnsbu Window, Jotunheimen'

TREVOR F. EMMETT

*T. F. Emmett, Department of Science (Geology Section), Cambridgeshire College of Arts and Technology, Collier Road, Cambridge CB1 2AJ, England.*

I thank Hossack & Garton (1982) for their discussion of my paper concerning the Torfinnsbu window (Emmett 1980). Their refutation of my conclusions are based mainly on the observations that (i) they cannot recognize the rocks around Torfinnsbu as similar to any members of the Valdres Group which they have mapped in detail, and (ii) that they have found enclaves of hornblende – biotite gneiss amongst the sheared rocks. They therefore correlate the Torfinnsbu rocks with those occupying a major shear zone that cuts through the Jotun kindred gneisses in the vicinity of Eidsbugarden.

In my paper I note that the Torfinnsbu rocks are dissimilar to those of the Olefjell Formation exposed at Bygdin, but my own field studies around Bessheim have revealed intercalated pelitic, biotite-rich, and muscovite-rich rocks, as well as stripey sparagmites which are, at least superficially, similar to some of the rocks at Torfinnsbu. Hossack & Garton assign the rocks around Bessheim to the presumably metasedimentary Olefjell Formation. In addition, both Battey (pers. comm. 1981) and D. Twist have commented on the striking resemblance between the Torfinnsbu rocks and deformed supracrustals which occur along Leirdalen and Bøverdalen on the northwestern margin of the Jotun massif (e.g. Twist 1979). The problem of distinguishing between highly deformed metasediments and crystalline basement is long-standing in Norwegian geology, as unambiguous field criteria are not always available. As a limited contribution of firm data, I have obtained chemical analyses of two amphibolites from the Langedalsåi section. Though it is not possible to be unequivocal about such a small sample, at least one of these rocks appears to be of para-amphibolite character, using the discrimination diagrams of Misra (1971) and the Cr – TiO<sub>2</sub> diagram of Leake (1964). Petrographic evidence suggesting that the Torfinnsbu rocks are not sheared Jotun kindred

gneisses is summarized in my paper, but I would like to re-emphasize that quartz, muscovite and, to a lesser extent, brown carbonate, share the distinction of being virtually absent from the Svartdalen Gneiss and dominant in the Torfinnsbu rocks.

Finally, I would like to consider Hossack & Garton's suggestion that the Torfinnsbu rocks can be correlated with the rocks of a major shear zone which runs through Eidsbugarden. Dr. Battey and I have studied many shear zones within the Jotun kindred gneisses of the central part of the Jotun Nappe, and none of them display the lithological variability and penetrative schistosity of the Torfinnsbu rocks; certainly that at Eidsbugarden does not. The rocks along such shear zones within the Jotun gneisses are folded, but this is usually pygmatic in style, and it is not possible to work out a coherent deformation sequence. The structural history at Torfinnsbu, however, is practically identical to that recorded in metasediments at Bygdin (Hossack 1968).

There is little *unambiguous* data concerning the nature of the rocks in the Torfinnsbu window, but I feel it is not possible to completely reject, as Hossack & Garton have done, the possibility that they are metasediments. To my mind, the balance of the evidence available favours the conclusions as published in my original paper.

I thank Dr. Battey for helpful discussion on this matter. My field work around Bessheim was financed by the Royal Society of London and the University of Keele.

Received June 1981, revised January 1982

## References

- Emmett, T. F. 1980: Geology of the Torfinnsbu window, central Jotunheimen, Norway. *Nor. Geol. Tidsskr.* 60, 255–261.  
 Hossack, J. R. 1968: Structural history of the Bygdin area, Oppland. *Nor. geol. unders.* 247, 78–107.

Hossack, J. & Garton, M.: A discussion of the Torfinnsbu window. *Nor. Geol. Tidsskr.* 62 (this issue).

Leake, B. E. 1964: The chemical distinction between ortho- and para-amphibolites. *J. Petrol.* 5, 238–254.

Misra, S. N. 1971: Chemical distinction of high – grade ortho- and parametabasites. *Nor. Geol. Tidsskr.* 51, 311–316.

Twist, D. 1979: *The structure and geochemistry of rocks along the NW margin of the Jotunheimen massif, southern Norway.* Unpubl. Ph. D. thesis, University of Newcastle – upon – Tyne.