

## Note on the occurrence of the *Paradoxides ölandicus* zone in Nerike

by

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In his paper: »De undre Paradoxideslagren vid Andrarum»<sup>1</sup>, pag. 38, Linnarsson writes: »Next to that zone, i. e., that of *Paradoxides Tessini*, comes the slate with *Paradoxides ölandicus* (Sjögren), which hitherto has been only known with certainty from Öland and Jemtland, but which, to judge from detached blocks, may possibly occur also in Nerike and Östergötland». It is probably impossible to say now what blocks Linnarsson refers to, but perhaps they have been found since the field-work of the Geological Survey in the Silurian region of Nerike was concluded, as no discovery of blocks with *Paradoxides ölandicus* is mentioned either in Linnarsson's monograph on the Cambrian-Silurian formation of Nerike or in the descriptions of the geological maps of those parts of the province in which Cambrian strata occur. Perhaps Linnarsson in the paper above-mentioned refers to some pieces of a blue-green, soft slate containing *Acrothele granulata* (Lns.), which, according to an information kindly given to me by Prof. A. G. Nathorst, were found by him at Värnsta in the parish of Viby and which were afterwards shown to Linnarsson<sup>2</sup>.

However this may be, it is evident that Linnarsson's notice requires confirmation, and for that reason I communicate the observations as to the occurrence of the *Paradoxides ölandicus*-zone in Nerike that I made in the summer of 1890 when travelling in that province as a collector for the Palæontological Department of the Swedish State Museum of Natural History.

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<sup>1</sup> S. G. U. (Geological Survey of Sweden) Ser. C, N:o 54, 1882.

<sup>2</sup> To this find must probably be referred the account of the occurrence of *Acrothele granulata* in Nerike. Cf.: A. G. Nathorst: Om det inbördes förhållandet af lagren med *Paradoxides ölandicus* och *Par. Tessini* på Öland. Geol. Fören. Förhandl., 1881, Vol. V N:o 13, Pag. 623.

At Hjortsberga in the parish of Kumla some of the *Paradoxides*- and *Olenid*-slates are accessible in three small quarries. In the northern wall of that which is situated northernmost there lies uppermost alum-slate dipping  $35^{\circ}$  N. N. E., in the lower part containing ellipsoids of anthraconite with *Olenus truncatus* (Brünn.). Immediately beneath this stratum we find a bed, about one meter in thickness, consisting of blue-gray shale with limestone-ellipsoids of the same colour. In one of them I found numerous specimens of *Acrothele granulata* (Lns.) and a species of *Acrotreta*, nearly related to *A. socialis* (Seeb.). Besides these brachiopoda I also met with fragments of *Paradoxides* and among them one specimen of the characteristic hypostoma of *P. ölandicus* (Sjögr.). Hypostomas, heads and thoracic segments of the same species were found also in a block lying at the bottom of the quarry and without any doubt broken out of the above-mentioned bed. Below this bed I saw some strata dipping almost vertically and consisting of alum-slate with anthraconite containing *Olenus*. Also in other parts of the quarry I found beds of alum-slate sloping in different directions and lying lower than the *Paradoxides*-bed. It is evident that here the succession of strata has been disordered. Probably the *Paradoxides ölandicus*-bed has been displaced by the ice-sheet and pressed in between the *Olenid*-slates. Near the quarry there were lying numerous loose blocks of *Paradoxides*-limestone and anthraconite<sup>1</sup>.

Also in the two other quarries one has a favourable opportunity of studying the effect of the ice on the soft Cambrian slates.

One of them lies at some 80 meters' distance in a southwest direction from the first quarry and contains *Peltura*-slates dipping  $25^{\circ}$  N.

Going 70 meters further in the same direction we come to the third quarry. Slates with *Peltura* here form a sharp anticline striking W. N. W—E. S. E. This was best to be observed in the east wall. In the northern wall, below a stratum of *Peltura*-slate one meter in thickness and dipping  $28^{\circ}$  N., is a bed of till with boulders of gray and red *Asaphid*-limestone, alum-slate and anthraconite, blue-gray *Paradoxides*-limestone, Lower Cambrian sandstone, granite etc.

The occurrence of the *Paradoxides ölandicus*-zone in Nerike probably indicates the line of communication during the *Par. ölandicus*-period between the two regions in the southern part of the Scandinavian Peninsula in which strata belonging to this zone have been found, i. e., Öland—Östergötland on one side and the neighbourhood of Lake Mjösen in Norway on the other.

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<sup>1</sup> In one of the anthraconite-stones I found *Eurycare latum* (Boeck).

