Revisions of the tectonostratigraphy of the Otta-Røros tract

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Various models of the tectonostratigraphy of this region, have been proposed, all invoking a complexity of nappes, and there is a long history of the development of such ideas, brought together in the 1:250,000 map compilation of Nilsen & Wolff (1989). Recent remapping of a large part of this area has shown that a number of major revisions have to be made to the previous models. The remapping of map-sheets Vågå and Otta (1:50,000) has allowed a definitive stratigraphy/tectonostratigraphy (Fig.1 in Nilsson & Sturt, this volume) to be proposed (Sturt et al. 1991, Bøe et al. 1993), based in part on Strand (1951). The nomenclature is essentially after Strand (1951) with the two main sedimentary/volcanic sequences called the **Heidal** and **Sel Groups**. The basal gneisses of the **Otta Nappe** are referred to as the **Høvringen Gneiss Unit** and the ophiolitic rocks which intervene between the Heidal and Sel Groups constitute the **Vågåmo Ophiolite**. As can be seen from Fig.1 in Nilsson & Sturt (this volume) the whole assemblage is truncated by the overlying **Jotun Nappe**.

A number of major changes have been made in the interpretation of relationships between the traditional stratigraphic and tectonostratigraphic units, and in their formal status :

• The basal gneiss unit of the Otta Nappe has been renamed the **Høvringen Gneiss Unit**, as it is excellently exposed in the Høvringen district. The gneisses were referred to by Strand (1951) in different areas as the Rudihø and Vardhø gneisses, and in other areas described as metasomatic gneisses. As these have now been remapped and shown to be a common unit, they have been given a common name to remove confusion. The basal gneiss unit consists mainly of a coarse-grained augen gneiss intruded into an older gneissic basement consisting mainly of tonalitic gneisses, anorthosites and anorthositic gabbros. This older basement is well exposed at a number of localities, e.g. in the Rudihø massif and at the southern end of the Tjørnsæter prong. The protolith of the augen gneiss is exposed in a stream section at Høvringen, where it is a coarse megacrystic granite with K-feldspar megacrysts up to 20 cm across. The augen gneiss at Høvringen has been dated by U/Pb on zircon at 1180 + 1.0 Ma (Sturt, Tucker et al. in prep.).
The gneisses are unconformably overlain by the Heidal Group. The unconformity is well preserved at Rosten and in the Sjoa Valley, where the contact is seen to be a primary stratigraphic one and the overlying conglomerates to contain abundant clast material derived from the substrate. Although the contact facies of both the augen gneiss and the overlying rocks of the Heidal Group are in general highly deformed, with mylonitic fabrics developed from both of them, the contact is an unconformity albeit modified by subsequent high strain. As a consequence of this the nappe named as the **Risberget/Dalvolsjø Nappe** (see Nilsen & Wolff 1989) does not exist as an independent unit. The relationships between the Høvringen Gneiss Unit and the Heidal Group are those of a classic basement/cover pairing, although the contact is commonly strongly strained, thus obscuring its true nature.

• The Heidal Group maps continuously around the closure of the Jønndalen recumbent syncline, in the Vågå district, where it becomes the same as the Gula Group, and thus in this area the two groups are identical. In this contribution we propose to use the term Heidal Group as Strand (1951) defined a type area for this in the Sjoa Valley; and as will be seen, a number of major modifications must be made to the Gula in the tract under consideration.

• The **Vågåmo Ophiolite** (Sturt et al. 1991) was thrust in above already folded and metamorphosed rocks of the Heidal Group in earliest Ordovician times. A number of ultramafic rock bodies representing fragments of ophiolitic mantle and lower cumulate rocks were also thrust in, at this time, in the tract between Folldal and Feragen (Nilsson & Sturt, this volume) probably on a common thrust plane (Ottadalen Thrust). These ultramafic bodies are virtually all located at the Sel-Heidal/Hommelfjell boundary. The detailed relationships are particularly well displayed on Fåsteen (SW of Tynset), where the serpentinised hartzburgite/dunite assemblage is underlain by a thrust-plane and unconformably overlain by rocks of the Sel Group. Locally, the ultramafite is overlain by a basal breccia. The lower part of the Sel Group contains many deposits of serpentinite conglomerates and sandstones, and polymict varieties presumably derived from active fault scarps developed in the substrate (Bøe et al. 1993). The ophiolite fragments, together with the subjacent units, were folded, uplifted and deeply eroded prior to the deposition of the sedimentary/volcanic assemblages of the Sel Group (Sturt et al. 1991, Bøe et al. 1993). The unconformity oversteps onto the rocks of the subjacent Heidal Group showing that it is of a *terrane-linking* nature.

• The recognition of the regional nature of the basal Sel unconformity, also extending into the north Østerdalen area, has profound implications for our understanding of the tec-

tonostratigraphy of this region. A major consequence is that the subjacent rocks of the Heidal/Hommelfjell Groups and those of the overlying Sel Group are stratigraphically linked together and that they are not separated by a thrust plane. This shows that neither the **Remsklepp Nappe Complex** nor the **Røros Nappe Complex** (see Nilsen & Wolff 1989) exist as independent units in the area under consideration.

• Recent remapping in the Folldal area (Bjerkgård & Bjørlykke 1994) shows clearly that the Fundsjø Group volcanites are an integral part of the Sel Group and are not separated from either the structurally underlying or overlying rocks by thrust planes. Thus, the **Meråker Nappe** (see Nilsen & Wolff 1989) does not exist as an independent unit in the Otta-Røros district. Bjerkgård & Bjørlykke (1994) have also reported that the Folldal trondhjemite has a U/Pb zircon age of 488 + 2 Ma, thus providing a minimum age for the unconformity at the base of the Sel Group.

• The basal Sel unconformity is exposed at many localities in the Otta-Vågå area (Bøe et al. 1993). It is also exposed in the streams of Verkensåe and Buåe in Grimsdalen (Sturt et al. 1995); and on the southeastern flanks of Ørnhovda (2.5 km WNW of Folldal). The mapping of the unconformity in the Folldal- Haltdalen belt has shown that the whole of the Åsli Formation and indeed the uppermost part of what was previously assigned to the Singsås Formation are above the unconformity and hence are an integral part of the Sel Group (Fig.1). This implies that the Nordaunevoll mica schist (at Råå , 10km NNE of Ålen) with its Dictyonema fauna, which is part of the Åsli Formation, is also above the unconformity (*confirmed, 1997*). In the Dovre area a partly preserved chemical weathering profile, now metamorphosed in upper greenschist facies, is present beneath the unconformity, though in many areas it has presumably been removed by sub-Sel erosion. The unconformity also marks a major metamorphic break, where the substrate is characterised by medium-high amphibolite-facies assemblages (variably retrograded) and the Sel by upper greenschist-facies assemblages. It is also clear both from direct cross-cutting relationships at the unconformity and from internal fabrics in pebbles and cobbles from conglomerates of the Sel Group, that the Heidal rocks had also undergone polyphasal deformation prior to uplift, erosion and deposition of the rocks of the Sel Group (Bøe et al. 1993)

The contact between the Gula and the overlying Sel Group is thus of a stratigraphic nature, and the unconformity is a first-order one. The presence of the unconformity in this belt, between the 'Gula' and the Sel, also shows that the **Gula Nappe** (see Nilsen & Wolff 1989) does not exist as such in this area, and the contact between the two groups is a normal stratigraphic one. A reassessment of the status of the **Gula Group** is now a matter of urgency.

The results of this study have very considerable implications for the understanding not only of the stratigraphy/tectonostratigraphy of the Otta-Røros tract but also for its tectonic development, the patterns and age of mineralisation, and also for the palaeogeographical reconstruction of this part of the Scandinavian Caledonides.

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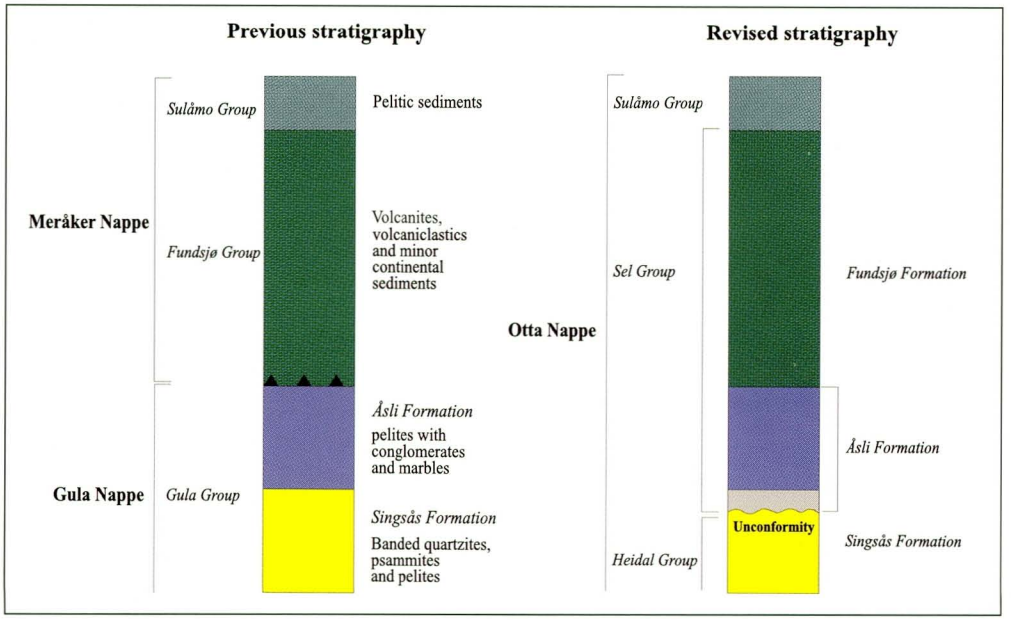

Fig. 1. Former and revised stratigraphy of the Otta-Røros tract.