THE AREA AROUND VIKERSUNDBAKKEN, MODUM

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The area is situated approximately 40 km west of Oslo, on the SW-extension of Tyrifjorden. The river system from Drammenselva in this area forms a long, narrow lake called Bergsjø. The Palaeozoic rocks are situated along the eastern shoreline, continuing uphill to the Permian Finnemarka granite complex which makes up the major part of the area south of Tyrifjorden. On the west side of Bergsjø Precambrian rocks are separated by a monoclinal flexure from the Palaeozoic sediments. The flexure is here located within the river system and continues northwards along the western shoreline of Tyrifjorden (Ramberg & Larsen 1978). Precambrian rocks also occur on the east side of Bergsjø in the area of low ground near Vikersund. However, the boundary with the Palaeozoic is covered by Quaternary sand and gravel.

Southwards from Vikersund the main road (RV 35) continues up a steep hill of Carboniferous mænaite sills and Cambrian alum shale. The mænaite sills follow a N-S trend with a slight easterly dip, and continue along strike for a total length of at least 30-40 km. In this area there are two 10-20 m thick and two 1-2 m thick sills. The intrusives are acidic with a high feldspar content. They have been dated to 296 ±6 million years by the Rb/Sr-method (Sundvoll & Wandås in prep.) and are thus amongst the oldest intrusives in the Oslo Region. In this area the alum shale below and between the sills is composed of horizontally bedded shale which apparently lacks limestone nodules and is of probable Middle Cambrian age (Ptychagnostus sp. (lc-ld) has been identified).

Southwards the road is located on top of the mænaite sills. The fields to the east are mostly situated on strongly folded and faulted Upper Cambrian alum shale in contrast to the relatively undisturbed shale below and between the sills.

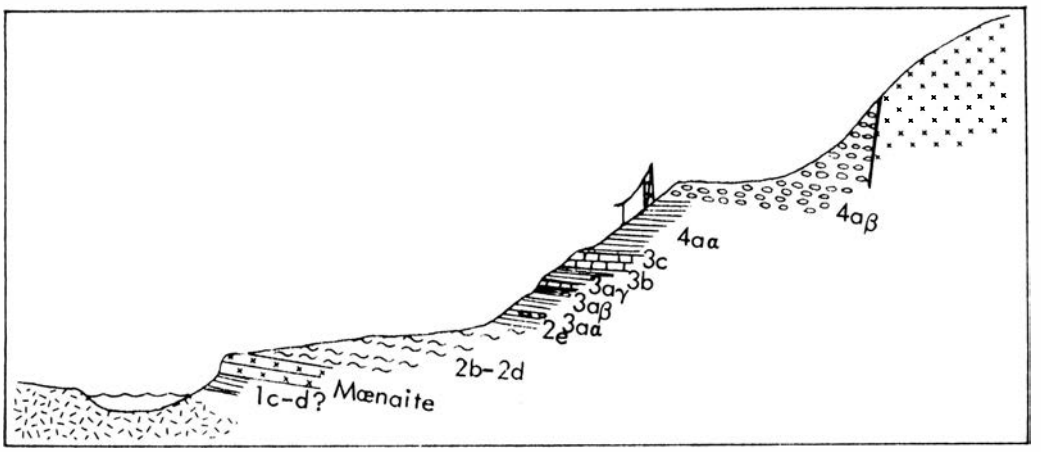

Figure 1. Simplified profile from Bergsjø to Finnemarka granite complex.

The remaining Palaeozoic sediments (Upper Cambrian-Middle Ordovician) between the top of the mænaite sills and the Finnemarka granite complex crop out in a series of tight, strike-faulted, E-W folds. The faults have a maximum throw of approximately 100 m. The folding and faulting was initiated during the Caledonian Orogeny, but the major part of the fault system was activitated (reactivated?) during the penetration of the Finnemarka granite complex. This is shown by the fact that some of the faults cut across the mænaite sills.

STOP 1 ROAD TO ØVRE ØREN/HOVLAND FARMS The embayment of Bergsjø is caused by two larger faults which have lowered the mænaite sills below present water level and caused more extensive erosion of the alum shale inside Sponevika. The stream on the west side of the fields runs on top of the mænaite sills. The contact with the strongly folded and faulted alum shale is exposed to the south where the stream turns northwards. Further upstream (eastwards) there are several exposures of the alum shale. Limestone nodules are packed with trilobites of Upper Cambrian age including: Ctenopyge fletcheri, Sphaerophthalmus humilis and Peltura scarabaeoides of zone 2dγ.

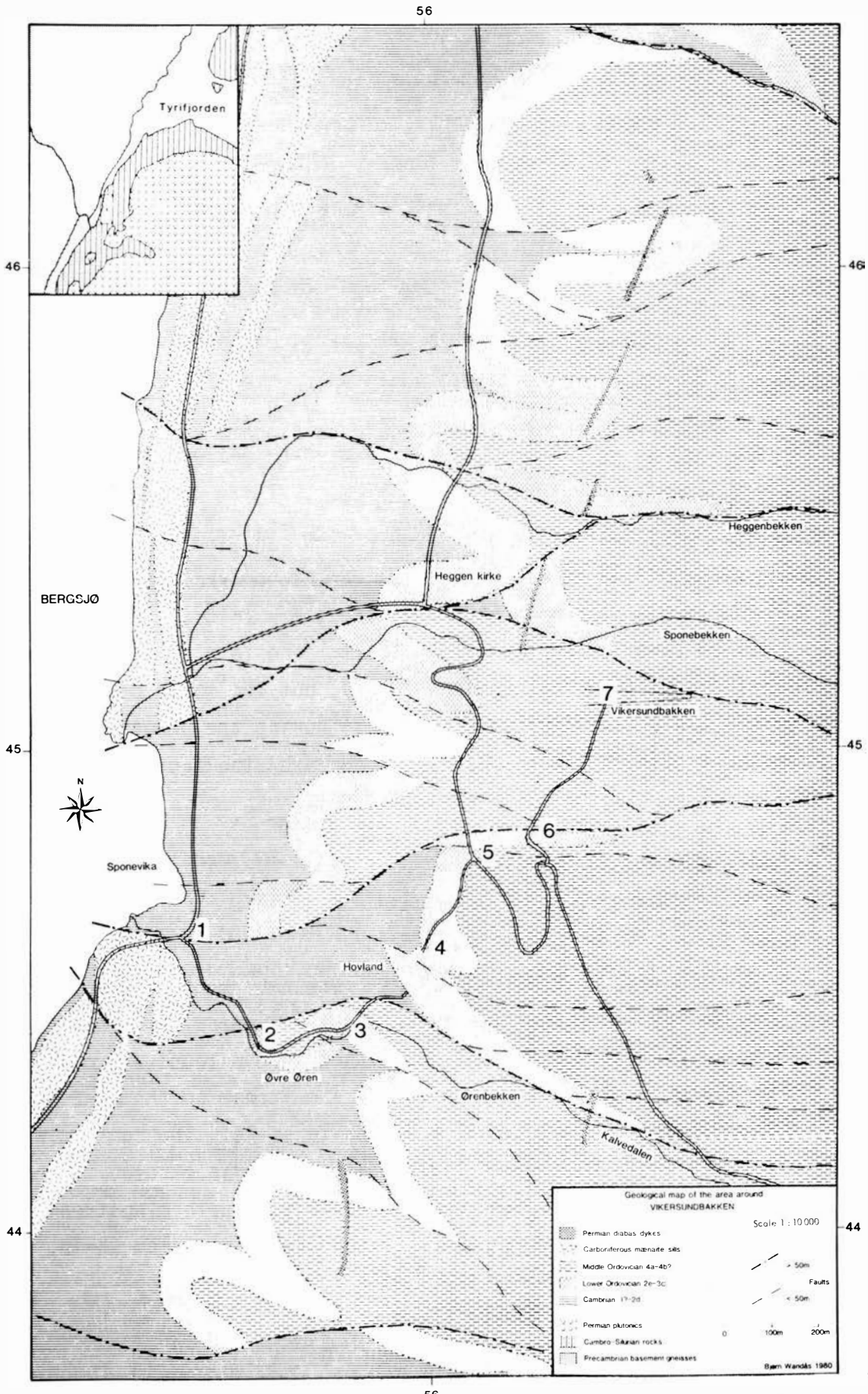

Figure 2. Geological map of the area around the Vikersund ski-jump with stops shown.

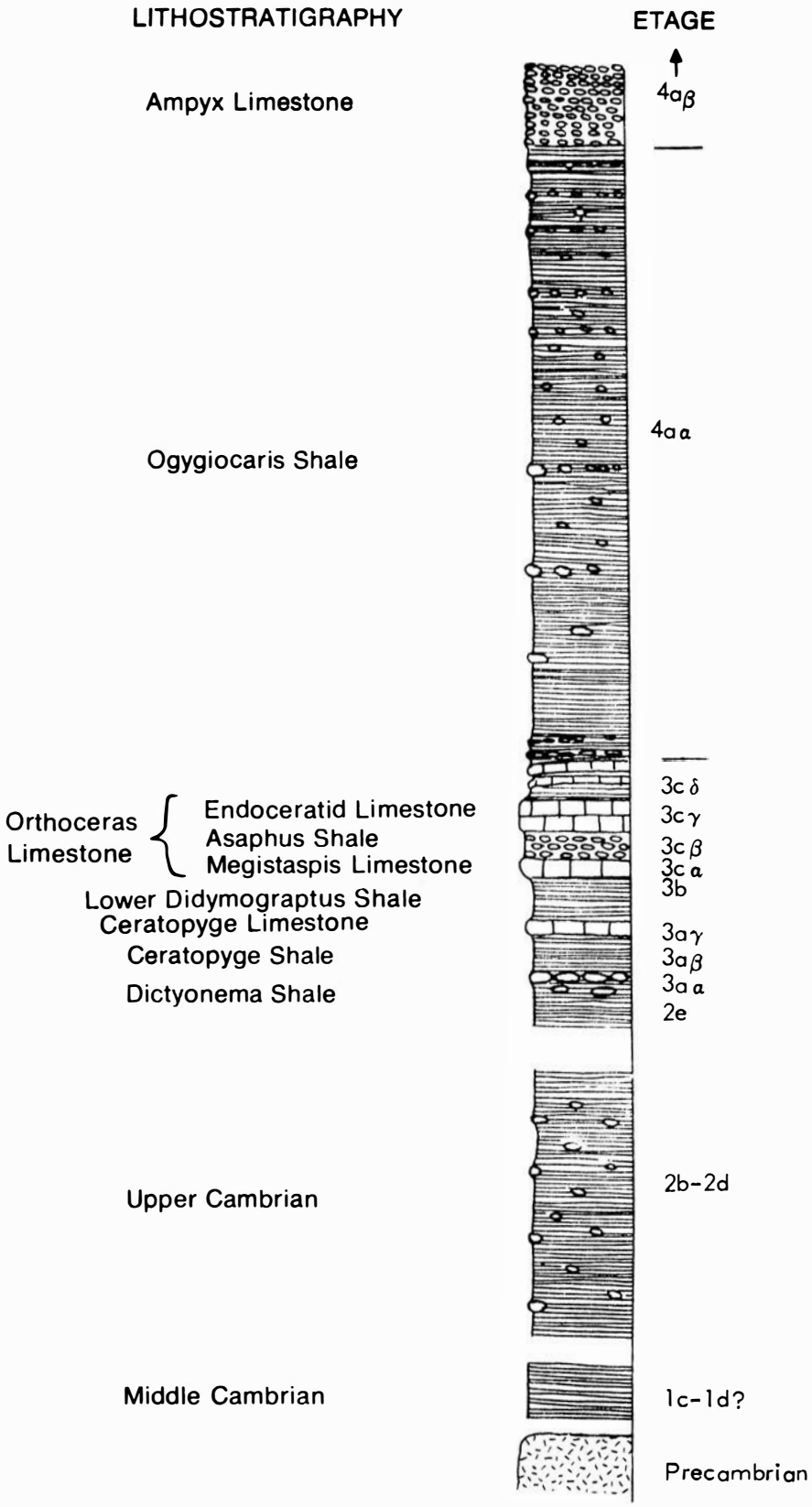

Figure 3. Simplified stratigraphy of the area around Vikersund ski jump.

STOP 2. SHARP BEND ON ROAD TO ØVRE ØREN FARM A continuous profile from the Dictyonema Shale to the Orthoceras Limestone is present. In the Dictyonema Shale, Dictyonema flabelliforme flabelliforme occurs in a thin zone 22.15 m below the Orthoceras Limestone and 5.85 m below a large limestone nodule belonging to the Zone of Platypeltoides. However, the Dictyonema Shale is better exposed at Hovland farm (STOP 4). The large limestone nodule has so far only yielded Peltocare norvegicum but at other localities within the map area equivalent beds have yielded Bienvillia tetragonalis broeggeri? and Platypeltoides incipiens. The limestone nodule is overlain by 7.5 nm of shale

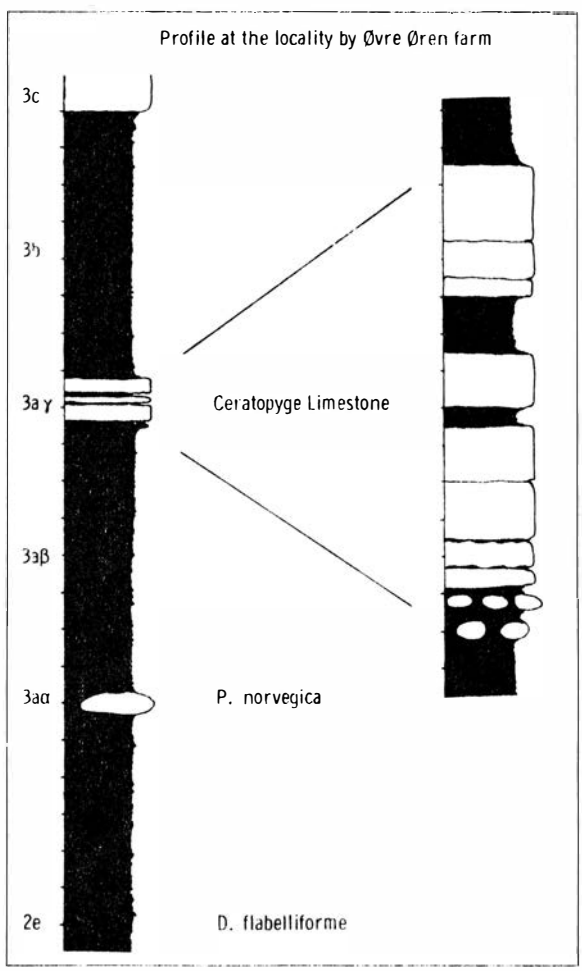

Figure 4. Profile at Øvre Øren.

belonging to the Ceratopyge Shale. The shale is exposed at only a few localities in the area, and is usually poorly fossiliferous. So far only specimens of Obulus sp. and sponge spicules

have been recovered in a section above Hovland farm.

The Ceratopyge Limestone at Øvre Øren farm consists of several 5-20 cm thick limestones with interbedded thin shales. The total thickness, including two nodular limestone beds, is 1.3 m. The limestone nodules and the two lowest limestone beds are especially rich in well preserved fossils, including: Ceratopyge forficula acicularis, Euloma ornatum, Apatokephalus serratus, Niobe insignis, Trinodus mobergi, Harpides rugosus, Triarthrus sp., Shumardia sp., and at least two species of brachiopods. The limestone sequence is followed by 7.5 m of Lower Didymograptus Shale without limestone nodules. The shale contains horizons with abundant graptolites, Didymograptus and Phyllograptus species being particularly common. The sequence is capped by a 0.9 m limestone bed of the succeeding unit, the Megistaspis Limestone.

STOP 3 ROAD BEND SOUTH OF HOVLAND FARM A fault line is crossed and the Lower Didymograptus Shale—Orthoceras Limestone sequence is repeated. Here the Megistaspis Limestone is 0.8 m thick, while the Asaphus Shale is 2.55 m thick.

STOP 4 HOVLAND FARM Another fault line has been crossed and the sequence from the Dictyonema Shale is again repeated. Below the barn bridge a few large limestone nodules are exposed - the most northerly one having yielded Boeckaspis mobergi. Fragments of Dictyonema may be found in the shale just south of the barn bridge, but a 20-30 cm thick zone 4-5 m north of the bridge contains abundant D. flabelliforme flabelliforme. The boundary between the Cambrian and the Ordovicium is not exposed.

STOP 5 PATH TO ROAD INTERSECTION NORTH OF HOVLAND At the road intersection is a good exposure of the Asaphus Shale and Endoceratid Limestone with the succeeding transition beds. The Endoceratid Limestone here is 5.2 m thick (because of faulting?) and the transition beds are 2.7 m. The beds here are on the southern limb of a large fold that continues uphill and crosses the road

the road at STOP 6. Along the road to STOP 6 are several exposures of the Ogygiocaris Shale which is a black and grey shale sequence with numerous small limestone nodule beds and many small scale faults and folds.

STOP 6 ROAD TO THE VIKERSUND SKI JUMP Exposed here are the limbs of the fold mentioned above. The core of the fold consists of Lower Didymograptus Shale with graptolites, and the southern limb shows the tripartite division of the Orthoceras Limestone. A few exposed beds of Asaphus Shale on the southern limb of the fold contain Ranorthis norvegica, and a few ostracods. The southern limb of the fold is slightly overturned, and the transition beds are 3.3 m thick. These and the succeeding 10 m of shale contain an interesting fauna with many large trilobites: Asaphus (Asaphus) striatus (-6 m), Megistaspis (Megistaspidella) sp. (-6 m), Metopolichas celorrhin? (0.2-3.5 m), Geragnostus hadros (0.2-5.4 m), Cyrtometopus clavifrons (0.4-5.5 m), Ampyx nasutus (1.15-11.85 m), Pliomera fischeri (1.28-13.9 m), Megistaspis (Heraspis) laticauda (2.35-5.4 m), Niobe frontalis (2.5-6.7 m), Pseudobasilicus brevicostatus (3.1-4.5 m), Megistaspis (Megistaspidella) maximus (7-14 m), Botrioides? bucculentus (7.9-12,5 m), and Ogygiocaris sarsi ((8?) 10-13 m).

STOP 7 VIKERSUND SKI JUMP The Ogygiocaris Shale is exposed in the roadside and contains abundant specimens of Ogygiocaris. From the ski-jump it is possible to follow some of the beds and faults in the lower terrain. Note the different vegetation of pines growing on the mænaite sills and thornbushes on the limestones. Further uphill there is a marked increase in the degree of contact metamorphism, although the Ampyx Limestone is identifiable to the right of the ski jump scaffold. The total thickness of the Ogygiocaris Shale is 120 m while at least 150 m of nodular limestone succeeds this.