A MICROFACIES ANALYSIS OF A SECTION AT FORNEBU

ROSINE T. TONI

Toni, R. T.: A microfacies analysis of a section at Fornebu. The Middle Ordovician of the Oslo Region, Norway, No. 26. *Norsk Geologisk Tidsskrift*, Vol. 55, pp. 291–295. Oslo 1975.

Microfacies analyses of limestone samples from a Middle Ordovician section in the Oslo district are described. The distributions of bioclastic fragments and insoluble residues are discussed.

Rosine T. Toni, Paleontologisk Museum, Sars gt. 1, Oslo 5, Norway. Present address: Geology Department, Faculty of Science, Alexandria University, Alexandria, Egypt.

This paper deals with the analysis of thin sections of limestones taken from a Middle Ordovician section at Fornebu. The Fornebu section (Fig. 1) is one of several now being used as reference sections for biostratigraphical correlation of the Middle Ordovician of the Oslo–Asker district. The section is situated on the shore of Oslofjorden, immediately below the main car park for Fornebu airport; it was measured by J. F. Bockelie and D. L. Bruton in 1973 and extends from the upper part of stage 4bα to the top of stage 4bδ. However, most of stage 4bγ (interval between 20 m–44 m), and the upper part of stage 4bδ (between 57 m–59.3 m) are not exposed. Shales dominate the succession except for stage 4b β where nodular limestones are common. The limestones studied were selected from fossiliferous samples currently being examined by several workers at Paleontologisk Museum, Oslo.

Thin sections of these limestones have been point-counted, and their bioclastic content has been quantified using the grain-solid methods as discussed and applied by Jaanusson (1972) and Lauritzen (1975). The identification of bioclastic debris in thin section has been treated in detail by Majewske (1969) and Horowitz & Potter (1971). The acid insoluble residues of the limestones were determined by the method of Ellingboe & Wilson (1964). The textural components and insoluble residues (I.R.) of the samples are shown in Table 1. The average contents of bioclastic material and insoluble residue in each 5 metre zone are presented in Fig. 2.

Lithology

Most of the samples are classed as fossiliferous micrites (Folk 1962), although two samples are classed as biomicrites and three as micrites. Silt-size quartz grains are seen in most of the thin sections, but they generally constitute less than 1% of the total rock. Minor secondary pyrite is also found in most of

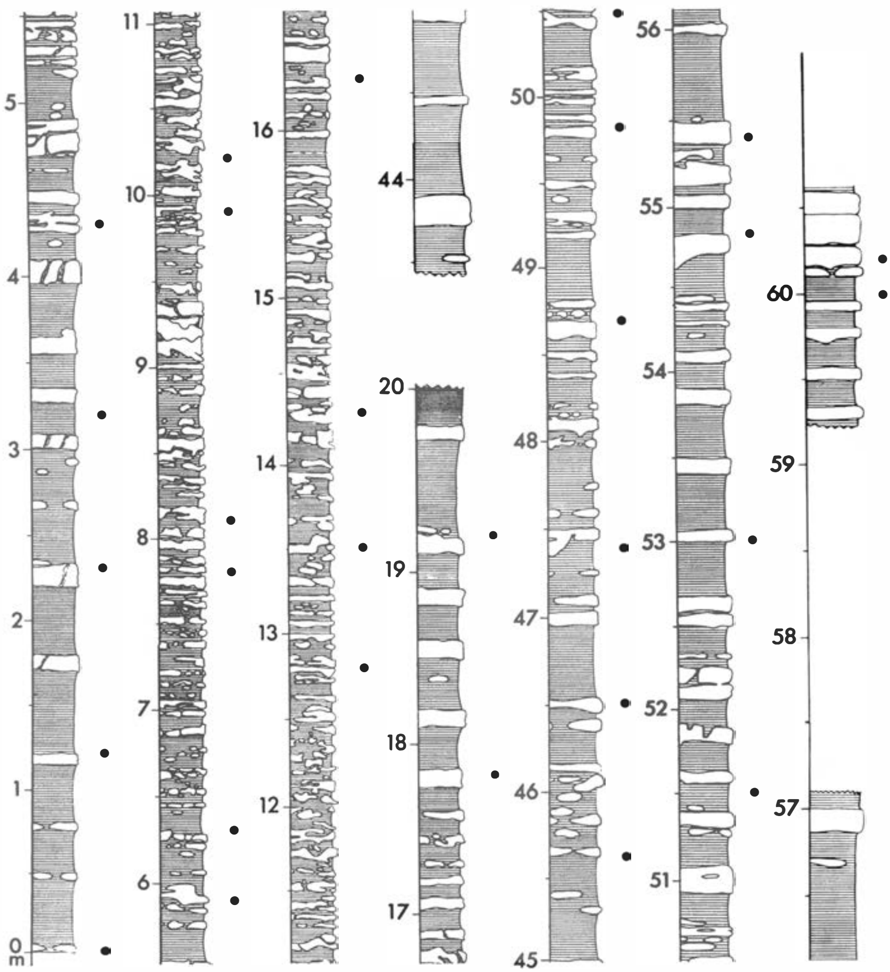

Fig. 1. Fornebu section: a schematic representation of the lithologies present. Shaded beds: shales. White beds: limestone. The boundary between 4bα and 4bβ is at about 4 m above the base of the section, that between 4bβ and 4bγ is at 17.8 m, and that between 4bγ and 4bδ is at 45 m. Solid circles indicate the positions of samples studied here.

the samples. Sparry calcite is usually scarce, but sometimes constitutes up to 7 % of the total rock; it occurs either in the fossils or in small veins in the rock. The insoluble residues of the samples vary between 8 and 38 % (Table 1 and Fig. 2); there seems to be little connection between variation in insoluble residue and fossil content in the section.

Distribution of fossil fragments in thin sections

Fragments of trilobites and echinoderms occur in all thin sections. Bryozoan and brachiopod debris occurs more sporadically, while gastropod and ostra-

Table 1. Analysis of individual samples studied. Textural components and insoluble residues (I.R.) are expressed in percentages to the nearest whole number; + indicates contents of less than 1%. Rock types: biomicrite (B), fossiliferous micrite (F), micrite (M) with bioclastic debris constituting > 10%, 1–10%, and < 1%, respectively of the rock.

Sample height in section (m)	Rock type	TEXTURAL COMPONENTS (%)											I.R. %
		matrix	sparry calcite	quartz	pyrite	Skeletal grains							
						Total	Brach.	Echin.	Bryoz.	Tril.	Ostr.	Gastr.	
0	F	96		+		4		2		1	+		32
1.2	F	92	1	+	+	6		3	+	2	+		30
2.3	F	95		1		3		3		+			35
3.2	F	95		+		4	+	2	+	2			16
4.3	F	95	+	+	+	4	+	2		2			8
5.9	F	97		+		2		2	+	+			15
6.3	F	96		2	+	2		+	+	+			21
7.8	F	96	+	+	+	3		+	2	+			16
8.1	M	96	3	+	+	+		+		+	+		26
9.9	F	92	3	+	+	4	+	1	+	2		+	17
10.2	M	91	7	+	+	+	+	+		+	+		18
12.8	F	95	+	+	+	3	+	+	+	+			23
13.5	F	96	+	1	+	3		1	+	1			31
14.3	F	97		+		2	+	+	+	+			37
16.3	F	96		+	+	2	1	+		+			32
17.8	M	99	+	+	+	+		+		+	+		19
19.2	F	98			+	1		1	+	+			23
45.6	F	98		+		2	+	1		+			25
46.5	F	96	+	+	+	3		3		+			23
47.4	F	97		+	+	2		1		+			27
48.7	F	97	+	+	+	2		1		+			23
49.8	F	94	+			5	1	1	2	+			18
50.5	F	95	+	+	+	4		3		1			23
51.5	B	78	6			16	4	+		12			17
53.0	F	98	+	+	+	1		1		+			23
54.8	F	93	1	+		6	+	5		+			19
55.4	F	89	+	+	+	9	+	5		4			22
60.0	F	92	1	+	+	6		2		3	+		15
60.2	B	84	2	+	+	13	+	4		8	+	+	16

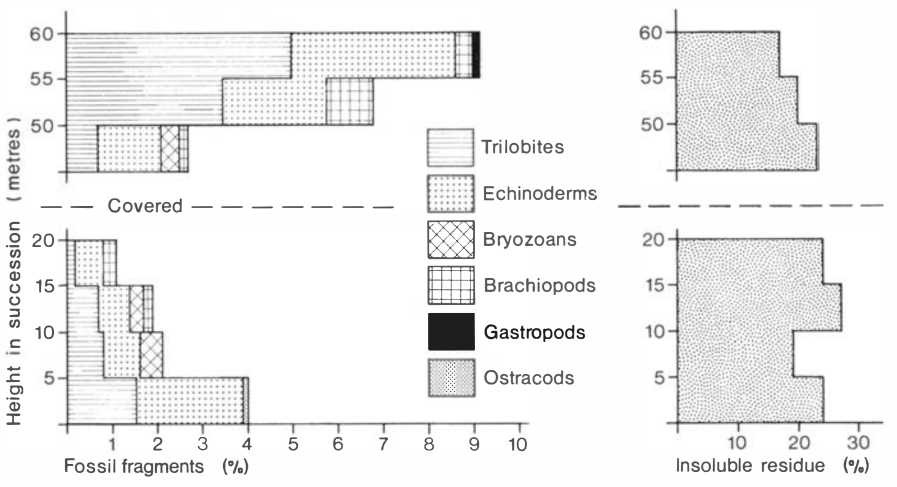

Fig. 2. The data of Table 1 are smoothed by combining all samples in each 5 metre zone throughout the section.

code fragments constitute under 1% of a few samples. The following conclusions can be drawn from Table 1 and Fig. 2:

Trilobite fragments are common in the lower and upper parts of the section, and consist of dissociated body segments.

Echinoderm fragments show a similar distribution to that of the trilobites, viz. they decrease in abundance towards the middle of the section.

Small amounts of *bryozoan* debris occur sporadically, especially in the lower parts of the section.

Brachiopod, ostracode and gastropod fragments are scarce, and occur sporadically throughout the section.

Although the macrofossil content of the section is still being studied, preliminary results (J. Fr. Bockelie pers. comm.) suggest a distribution pattern similar to that shown by the fossil fragments. However, the low bioclastic content of these limestones suggests that large sessile organisms such as brachiopods and bryozoans are probably absent (Jaanusson 1972: 230).

Acknowledgements. – I would like to thank cand. real. Ø. Lauritzen who supervised this work, and Dr. D. L. Bruton and cand. real. J. Fr. Bockelie who supplied me with the samples and the measured section. Leena Klavenes kindly performed the insoluble residue analysis.

June 1974

REFERENCES

Ellingboe, J. & Wilson, J. 1964: A quantitative separation of non-carbonate minerals from carbonate minerals. *J. Sediment. Petrol. 34,* 412–418.

Folk, R. L. 1962: Spectral subdivision of limestone types. *In* W. E. Ham (ed.), Classification of Carbonate Rocks. *Am. Assoc. Petr. Geologists, Memoir 1,* 62–84.

Horowitz, A. S. & Potter, E. P. 1971: *Introductory Petrology of Fossils.* Springer–Verlag, Berlin. 302 pp.

Jaanusson, V. 1972: Constituent analysis of an Ordovician limestone from Sweden. *Lethaia 5,* 217–237.

Lauritzen, Ø. 1975: Methods for the study of microfacies in the Cambro-Silurian of the Oslo region, with an example from stage 4b of Lunner, Hadeland. *Nor. Geol. Tidsskr.* 55, 91–96.

Majewske, O. P. 1969: Recognition of invertebrate fossil fragments in rocks and thin sections. *International Sedimentary Petrographical Series, 13.* E. J. Brill, Leiden. 101 pp.