



## REINTERPRETATION OF DEPOSITIONAL PROCESSES IN THE SINIVIR FORMATION / NORIAN-TOARCIA(N.P.P)/ IN LUDA KAMCHIA EASTERN STARA PLANINA MTS. (BULGARIA)

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The Sinivir Formation (Fm.) was introduced as official lithostratigraphic unit by Чумаченко & Чернявска (1989) for an alternation of sandstones and mudstones, lying below the Balaban and Kotel Fm. These rocks were individualized for the first time by Berndt (1934) as "Schieflysch", later described by Ганев (1961) as Senonian flysch, and by Кънчев & Енчева (1967) and Кънчев (1995) as "Флишка задруга" (5Tn 3) with Norian age. Чумаченко & Чернявска (1989) and Tchoumatchenco et al. (1992) described them as siliciclastic turbidites, structured predominantly by the Ta and Tb Bouma intervals – all previous authors stressed on the attribute "flysch" as a synonym of "turbidite".

The term "turbidite" was subjected to revisions by Shanmugam and Moiola (1995) for the last time. For these authors turbidite sediments are only these with complete Bouma intervals – Ta-Tb-Tc-Td-Te. Deposits interpreted by different authors as proximal or distal turbidites are not a result of turbidite currents but are predominantly interpreted as debrites - the result of mass debris flows (sandy or muddy), and sediments of bottom currents, which reworked the suspension settling mudstones representing the background sediments.

In this paper we studied the best exposed section across the Sinivir Fm., situated along the forest road in the Cheshme Bair Hill in the valley of Balaban Dere, south of Dobromir Village, district of Varna. Here the sediments (Fig. 1, 2) consist of mudstones - marls to calcareous argillites and argillites (interpreted as the result of suspension settling processes), interbedded by two types of sediments: (1) calcareous biotrititic sandstones to gravellitic biotrititic limestones, with sharp lower and upper boundaries, thick from 10-50 cm up to 100 cm. In many cases they are massive in the basal part and thinner bedded in the upper part (for example unit 44).

These sediments are interpreted by us as debrites, resulted from sandy debris flow; (2) Generally the biotrititic sediments are capped by 10 to 70 cm fine grained, horizontally laminated sandstones (in single cases – unit 37, followed by 5-10 cm rippled laminated interval). The mudstones are interbedded by 5-20cm (rarely thicker) fine grained sandstones with horizontal lamination. The fine grained and laminated sandstones (in both cases) when they cap the bioclastic debrites and interbed the mudstones are interpreted as a result of bottom currents depositional processes.

We interpret the Sinivir Fm. as a result of the suspension settling mudstones, reworked by bottom currents and by sandy debris flows. In the region of railway station Dropla black shales with cobbles predominantly of different Triassic limestones crop out. These rocks are not presented in the Balaban Dere Valley, and are interpreted now as deposited by muddy debris flow. These muddy debrites represent the sediments of a fan, coming from the shelf of the paleo basin.

Age. The Sinivir Fm. is attributed by Чумаченко & Чернявска (1989, 1990) to Lower Jurassic – to the Pliensbachian and to the Toarcian (p.p), and by Кънчев & Енчева (1967) and by Кънчев (1995) to the Upper Triassic – Norian. Budurov et al. (2004), based on the fact that Чумаченко & Чернявска (1989,1990) collected their material from the uppermost parts of the Sinivir Fm. and Кънчев (1995) – from the lower part – concluded that the Sinivir Fm. is dated as Norian up to the lower Toarcian age, and the Triassic/Jurassic boundary crosses its sediments.

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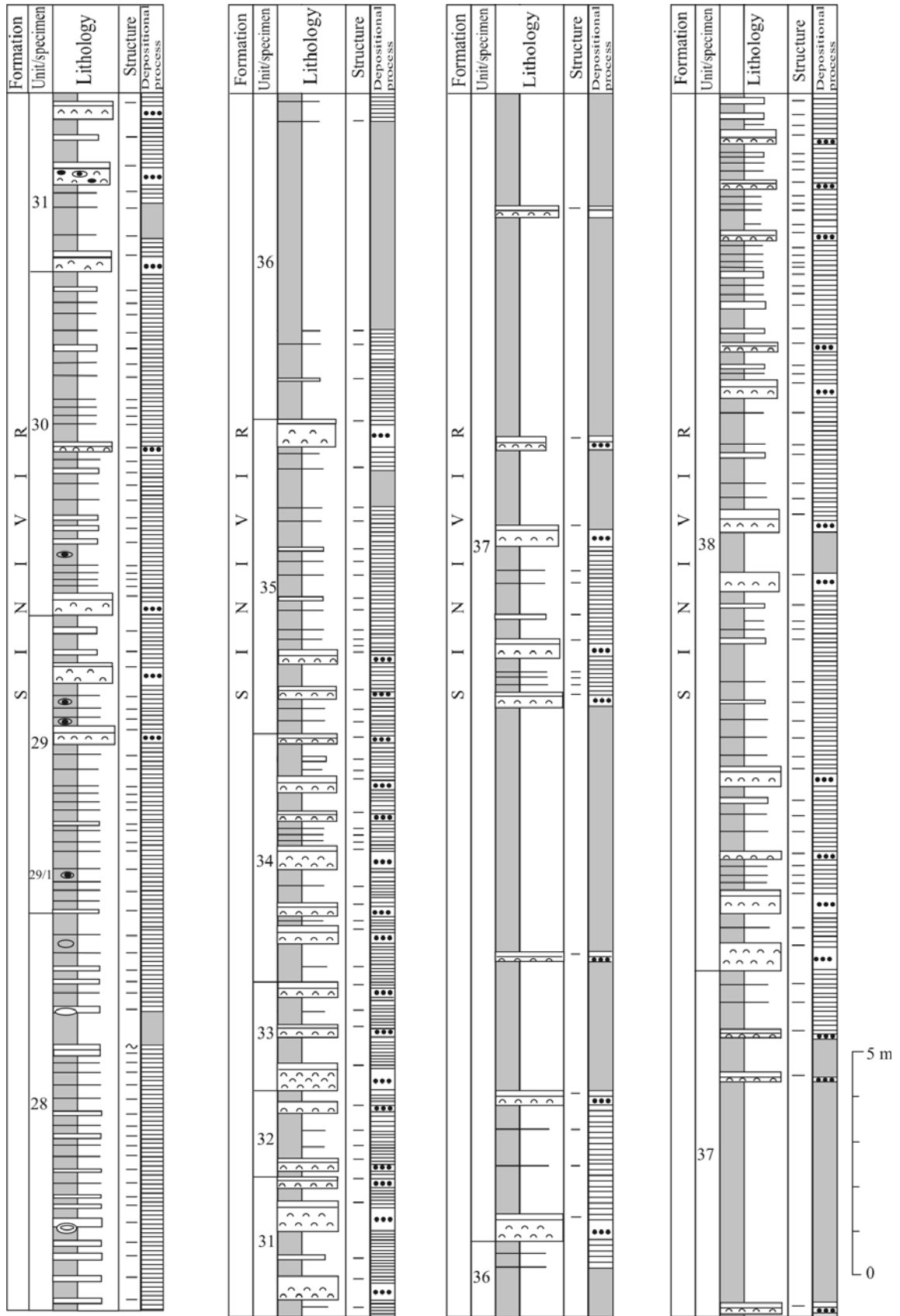


Fig. 1. Sedimentological log showing the lower part (units 28-38 *pro parte*) of Sinivir Formation along the forest road in Cheshme Bair Hill, Balaban Dere Valley, South of Dobromir Village. Legend as in Fig. 2.

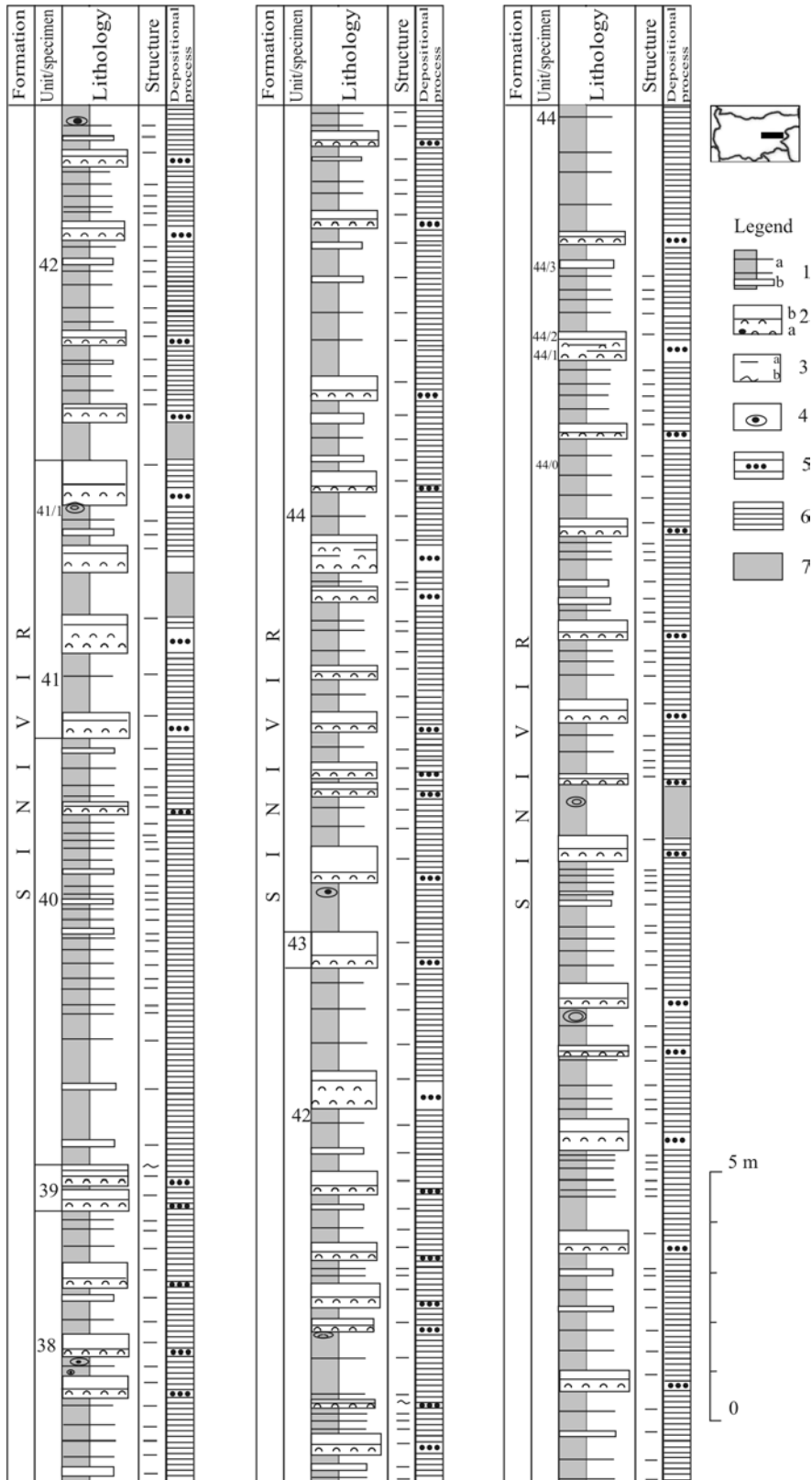


Fig. 2. Sedimentological log showing middle part (units 38 *pro parte*-44) of Sinivir Formation along the forest road in Cheshme Bair Hill, Balaban Dere Valley, South of Dobromir Village.

Legend: *Lithology*: 1a. Mudstone, 1b. Sandy intercalations; 2a. Sandstone with bioclasts and/or lithoclasts to gravelitic biodetrital limestones, 2b. Sandstones, fine grained, with horizontal lamination; 3. Structure of sandstones: 3 a. horizontal lamination, 3 b. ripple lamination; 4. Sideritic concretions; *Depositional Processes*: 5. Sandy debris flow; 6. Suspension settling and bottom currents; 7. Suspension settling.

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