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## NEW RESULTS ON THE AGE OF BİTLİS METAMORPHICS

M. Cemal GÖNCÜOĞLU\* and Necati TURHAN\*

**ABSTRACT.** — The presently continuing field studies in the Bitlis massif has shown the presence of a metamorphic basement of Pre-Devonian age. Platform carbonate sedimentation on this metamorphic basement, which was in existence in Middle Devonian, continued at least up to Upper Trias when there was a change in the sedimentation pattern with the incoming of volcanosediments. The whole sequence has then undergone Alpine metamorphism. Senonian ophiolites, which have separately undergone an ocean floor metamorphism, have been emplaced on the Bitlis metamorphics before Upper Maestrichtien. In the area studied the youngest sediments on the Bitlis metamorphics are of Upper Eocene age.

### INTRODUCTION

New data on the stratigraphy and age of the Bitlis Massif have been obtained during the 1978 field season under a joint project (MTA-TPAO) in the pilot area between Muş-Sason-Tatvan and Baykan (SE Turkey). The first detailed stratigraphy of this region is given by Boray (1975), Yılmaz (1975) and Yılmaz (1978). All these workers divide the metamorphics into a Lower and Upper Unit, but their stratigraphic sections are quite different in detail. This division into two units has been accepted in the present work. However, the present authors by studying the tectonic slices, which make up the metamorphic sequence, in a much wider area and by tracing the marker horizons from one tectonic slice to another, have established a generalised stratigraphic column which is believed to be valid for the whole area.

### STRATIGRAPHY

The rocks of the Bitlis Massif is divided into: a) a pre-Devonian Lower Unit, b) an Upper Unit consisting of rocks that range in age from Devonian to Upper Triassic, c) Guleman Group made up of metaophiolites, d) Kinzu Flysch and e) Paleocene to Upper Eocene sediments of the Maden Group.

#### Lower Unit

This unit consists of gneisses, amphibolites, micaschists and hornblende-schists; it covers large areas in the regions of Hizan-Bölükyaşı, north of Mutki and Huyut. The lower contact of this unit is thrust faulted. Dominant mineral assemblage in the gneisses is: quartz + albite + biotite + muscovite + garnet. Albite porphyroblasts, epidote/clinozoisite and chlorite are thought to be products of a second metamorphic event that effected the Lower Unit. The common assemblage in metabasites is: plagioclase + dark green amphibole + sphene ± garnet. The albitization and formation of yellow — green amphibole, epidote/clinozoisite and chlorite are thought to be related to the retrograde assemblages as the gneisses and differ from the gneisses by their texture.

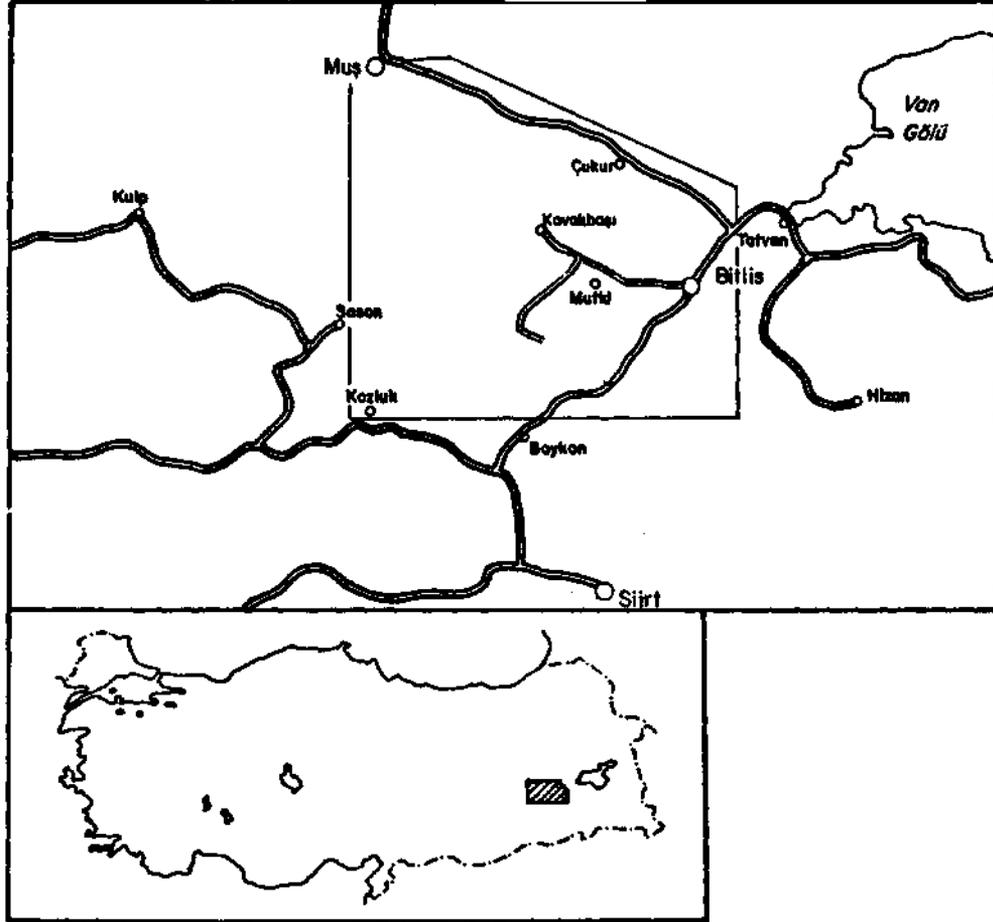


Fig. 1 - Location map.

### Upper Unit

This unit shows fairly complete sequences south of Norsin, southwest of Muş, northeast of Sason and southeast of Bitlis. Carbonates are the dominant rock type in this unit. The Upper Unit starts with quartzites that unconformably overlie the rocks of the Lower Unit. North of Mutki the Lower Unit is overlain by a limestone microconglomerate. South of Norsin the quartzite bears micropebbles of the Lower Unit. Towards the top of the sequence, the increasingly abundant carbonates are intercalated with sericite-schists, chlorite-schists, actinolite-schists and calcschists. The common mineral assemblages in these non-carbonate layers are: quartz + albite + green biotite + chlorite + muscovite  $\pm$  stilpnomelane and quartz + albite + actinolite + chlorite + epidote/clinozoisite  $\pm$  chloritoide. Bioherms north of Hizan consisting of corals, bryozoa and crinoids include *Thamnopora* sp., *Favosites* sp., *Crinoide discs* and *Actinostroma* sp., *Actinostroma alathratum* Nich. which indicates that the age of the shelf carbonates of the Upper Unit extend back to the Middle-Upper Devonian (Givetian-Frasnian).

Carbonates from the higher levels of the Upper Unit has given *Yatsengia ibuhiensis* Minato, *Parafusilina* sp., indicative of Lower Permian and *Pachyphloia* cf. *schwageri*, *Waagenopyllum* sp., *Hemigordius* sp., *Schwagerina* sp., indicative of Upper Permian.

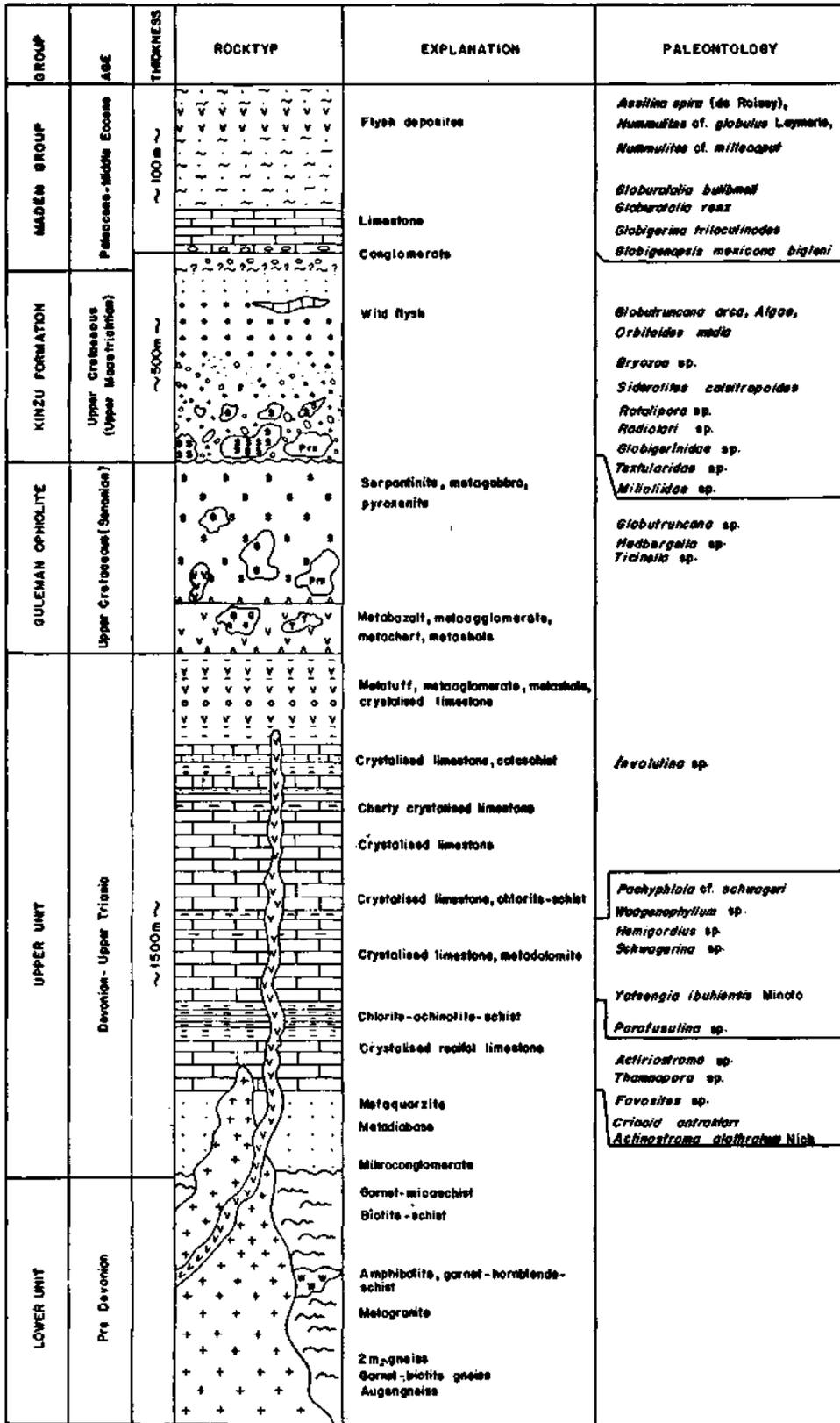


Fig. 2 - Generalized columnar section of Bitlis Metamorphics.

Further up in the sequence passage from widespread monotonous carbonate deposition through thin metashale and calcschist interlayers to a sequence of fine-grained recrystallised limestone, metamudstone, metashale, metachert and metatuff indicates a change in the depositional environment. The discovery of *Involutina* sp. at this critical facies change northwest of Mutki (Savcı *et al.*, 1979) and south of Bitlis indicates that the deposition of the Upper Unit continued at least up to Upper Trias and that the overlying pelagic sediments are younger than Upper Trias. Metavolcano-sediments at the top of the Upper Unit have the paragenesis: albite + actinolite + chlorite and albite + sericite + chlorite.

Extensive granodiorites north of Mutki and southwest of Muş are generally confined to the Lower Unit; only aplites are found in the Upper Unit. These granitic rocks have not been effected by the metamorphism of the Upper Unit. The basal conglomerate of Eocene age which is transgressive over the Bitlis Massif contains fragments of these granitic rocks.

#### Guleman Group

Guleman ophiolites (Özkaya, 1978) sits with a tectonic contact on the metavolcano-sediments of the Upper Unit. It consists of slices; the lower slice is made up of pillowed metabasalts, meta-cherts, metaagglomerate and metamudstone. A Cenonian (Campanian) age is given by *Hedbergella* sp., *Ticinella* sp. and *Globotruncana* sp. determined from the micritic interlayers. The albit + glaucophane + phengite + epidote/clinozoisite + chlorite + hidromuscovite paragenesis in the metabasalt differentiantes them from the metavolcano-sediments of the Upper Unit. Serpentinite, pyroxenite and metagabbro is commen in the upper slice of the Guleman Ophiolite.

#### Kinzu Flysch

Guleman ophiolites are overlain by Upper Maestrichtian flysch. This unit which has wild flysch characteristics to the base passes up to a normal flysch sequence.

#### Maden Group

Rocks of the Maden Group, which are of Paleocene to Middle Eocene age, are transgressive over all the other units in the area studied.

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