

# THE AEGEAN ARC DURING BURDIGALIAN AND MESSINIAN; A COMPARISON

by

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## I. INTRODUCTION

The areas of Zakynthos, Epirus, W. Thessaly, Crete and Cyclades were selected for illustrating the different sediments that were deposited during Miocene in the various geotectonic domains of the evolving Aegean Arc (fig. 1). Thus i) in Zakynthos the post-Alpine sediments are hardly distinguished from the Alpine; ii) in Epirus molassic sediments are locally confused with the upper part of flysch; iii) in W. Thessaly molassic basins are developed over a pre-tectonised basement; iv) in Crete only post-Alpine sediments of middle-upper Miocene to Quaternary age occur; and v) in the Cyclades there are upper Miocene- Pliocene sediments like in Crete (Milos) or autochthonous strongly deformed Miocene continental sediments (Samos) or lower Miocene molassic sediments thrust over the metamorphic rocks (Paros).

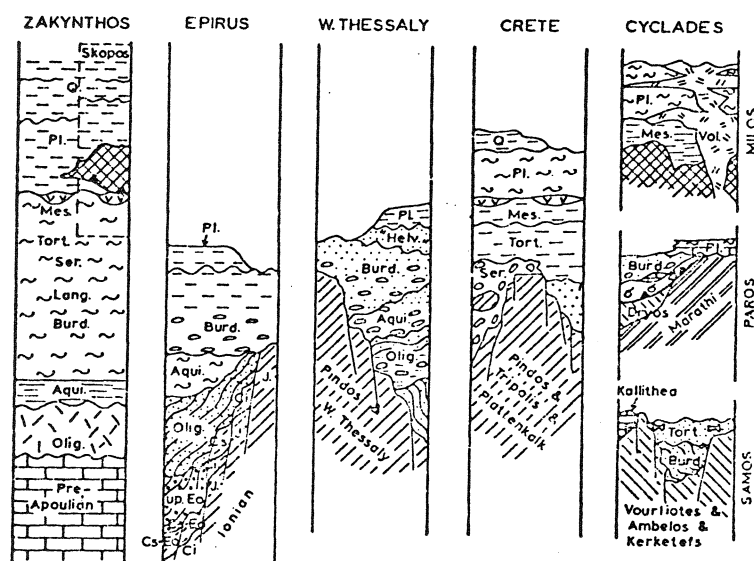


Fig. 1. - Schematic columns for each of the described areas showing the different geotectonic position of each sequence.

## 2. TWO CROSS-SECTIONS DURING BURDIGALIAN AND MESSINIAN

The position of the previously described Miocene sediments within the evolving Aegean Arc can be illustrated by two tectonic sections; one through the northern segment (Zakynthos - W.Thessaly) and the other through the southern segment of the

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arc (Crete-Cyclades). These two sections represent the geometry of the arc during Burdigalian (fig. 2) and Messinian (fig. 3).

A very similar succession of paleogeographic domains is present in both sections during Burdigalian, showing a remarkable geotectonic homogeneity along the arc. Thus, we can distinguish an external domain of a partly emerged ridge (Zakynthos); followed by a trench (flysch and molasse of Ionian and Gavrovo - Tripolis zone), followed by an island arc (Pindic Cordillera along the Chain of Pindos and also down to Peloponnesus and Crete), then followed by a back arc basin receiving molassic sedi-

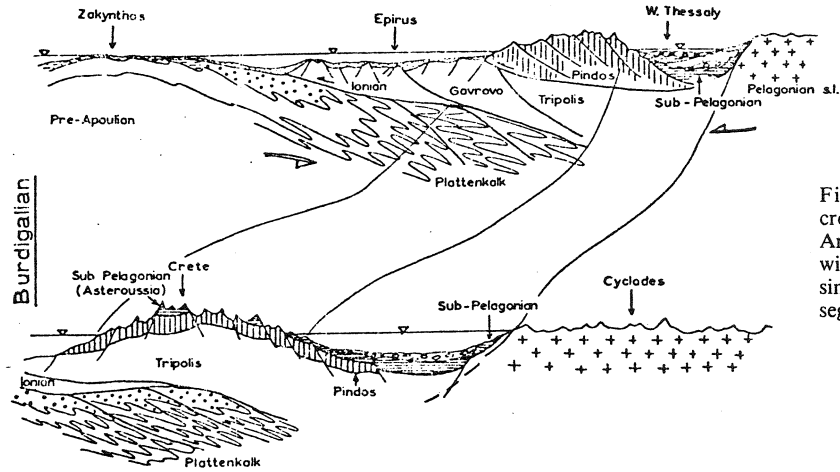


Fig. 2. — Palinspastic cross sections of the Aegean Arc during Burdigalian showing the existence of a very similar geometry in both segments of the arc.

	BURDIGALIAN: Zakynthos	Ionian flysch & molasse	Pindic Cordillera	Mesohellenic & Cycladic basins	Volcanic arc (granite in Cyclades)	Pelagionian cordillera
			Island Arc	back-arc basin		back-arc area
ACTUAL:	"Mediterranean chain"	hellenic trench	Crete	Cretean basin		Cyclades

Fig. 3. — Palinspastic cross sections of the Aegean Arc during Messinian. The geometry is quite different in the two segments of the arc.

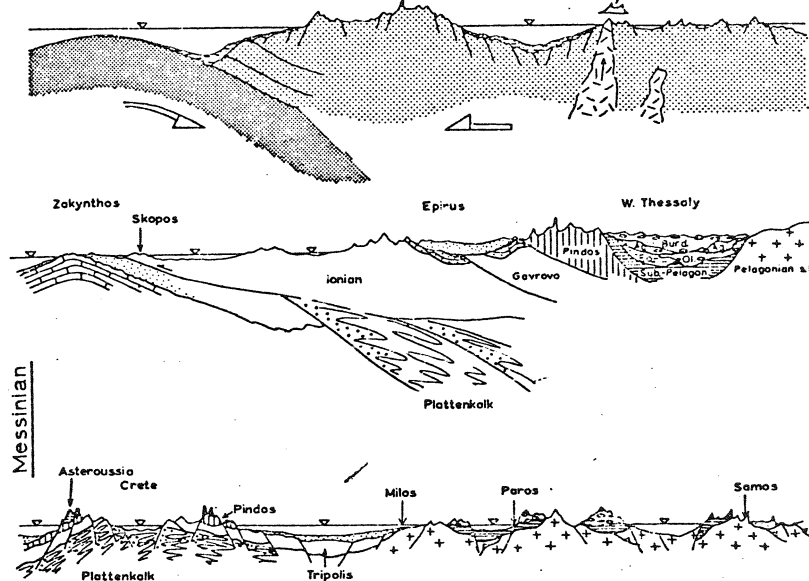


Fig. 4. — Schematic actualistic section of the Aegean Arc and probable equivalence with the geometry of the arc during Burdigalian. During Messinian times there is no island arc in the northern segment, whereas in the southern segment the geometry is similar to the actual as well as to that of the Burdigalian times.

ment (Mesohellenic through and Cycladic basin) and finally by the back arc area (Pelagonian s.l. Cordillera). The above continuity of the same paleogeographic and geotectonic trends is destroyed during Langhian - Tortonian, so that by Messinian times the northern segment becomes a vast land comprising the former Pindic Cordillera together with the Back - arc molassic basin, the back - arc area and part of the trench.

On the contrary at the southern segment the modern Cretan basin has already been created approximately at the same area of the former Cycladic back arc molassic basin, after the decollement of the Cycladic nappe.

In conclusion, a very good correlation of the actual geometry of the Aegean arc with the palinspastic one of Burdigalian times can be established (fig. 4) for the southern as well as for the northern segment of the arc. This geometry is present only at the southern segment of the arc during Messinian times, after the major tectogenetic event that affected the evolving arc during Langhian-Tortonian.

### 3. DISCUSSION

The differentiation along the Aegean arc is a large scale phenomenon, whose reasoning is related to the geodynamic evolution of the Eastern Mediterranean during Miocene times. Two important aspects should be discussed: i) the timing of this event and ii) its mechanism.

As far as the timing, it is clear enough that it is synchronous to the final collision between Arabia and Europe that was initiated during Burdigalian. The movement of Anatolia since upper Miocene has controlled the new paleogeographic and geodynamic pattern of the arc. The comparison of the two segments of the arc showed that the geometry of the northern segment has been completely modified since middle Miocene, whereas the geometry of the southern segment was strongly affected during middle Miocene but it was soon re-established almost in its lower Miocene form since upper Miocene. Thus, somewhere between the two segments we have a differentiated zone initiated during middle Miocene.

The result is a different pattern in the central concave part of the arc, which is still evolving and expanding to the SW, than the pattern of the northern segment which makes no more part of the arc system, but instead it is part of the modern southern European margin.

A detailed list of references exists in:

DERMITZAKIS, M.- PAPANIKOLAOU, D. 1979.- Paleogeography and Geodynamics of the Aegean Area during the Neogene.-*VIIth Int. Congress Medit. Neogene, Athens 1979, Ann. Géol. Pays Hellén., h. série IV.*

