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FORAMINIFERAL EVIDENCE FOR THE CARBONIFEROUS AGE OF EXOTIC BLOCKS WITHIN THE KOPRÍA MÉLANGE, RHODOS (GREECE)

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Abstract. Blocks embedded within the Kopría Mélange of western Rhodos yield well-preserved, abundant microfossils including early Middle Pennsylvanian fusulinacean faunas represented by species belonging to the genera *Eoschubertella, Profusulinella, Pseudostaffella* and *Ozawainella*.

A less diagnostic fauna mainly composed of the genus *Paraarchaediscus* and an undetermined species of *Howchinia* has been also recorded and referred to a probable Mississippian age.

This tropical to subtropical microfauna with Urals-Paleotethyan paleobiogeographic affinity provides new constraints for the paleogeographic interpretation of the Aegean region during the still poorly understood transition from the Variscan to the Alpine deformational cycle. In one olistolith, fusulinid-bearing strata are underlain by a basal conglomerate horizon whose composition indicates both "recycled orogenic" provenance and significant chemical weathering in a warm, humid climate. Sedimentologic and petrographic data, combined with the age and Urals-Paleotethyan affinity of the microfossil assemblages, are evidence for a major transgression that coincided in time with the end of the Variscan Orogeny. This may suggest original deposition of the mélange on the northern European margin of Paleotethys, although a southern origin cannot be ruled out. Subsequent accretion to the External Hellenides, on the southern, Gondwanan margin of Paleotethys, could have taken place during the Eo-Cimmerian orogeny at the end of the Middle Triassic, shortly before the opening of the Pindos Basin.

Riassunto. Alcuni olistoliti inclusi nel Kopría Mélange di Rodi contengono un' abbondante associazione microfaunistica ben preservata costituita da un'associazione a fusulinacea riferibile alla parte inferiore del Pennsilvaniano medio e costituita da specie appartenenti ai generi *Eoschubertella, Ozawainella, Profusulinella* e *Pseudostaffella*, mentre in altri campioni la presenza di faune meno diagnostiche (*Pararchaediscus* ed *Howchinia*) indicano un probabile Mississippiano. Le associazioni micropaleontologiche tropicali-subtropicali mostrano affinità con quelle del dominio Urali-Paleotetide e forniscono nuovi indizi per una migliore comprensione del quadro paleogeografico della regione Egea durante le ancora poco comprese fasi di passaggio tra ciclo Varisico e ciclo Alpino. In un grande olistolite, calcari impuri a fusuline seguono con limite transizionale un conglomerato basale la cui composizione petrografica indica una provenienza orogenica e una forte alterazione chimica in climi caldo-umidi. Le osservazioni sedimentologiche e petrografiche dunque concorrono con l'età medio-Carbonifera e l'affinità Europea di parte della microfauna a documentare una importante trasgressione che coincide temporalmente con la fine dell' orogenesi Varisica. Questo potrebbe indicare una originaria deposizione sul margine settentrionale europeo della Paleotetide, anche se una origine meridionale non può essere esclusa. L'accrezione alle Ellenidi Esterne sarebbe avvenuta in tempi successivi, possibilmente durante l'orogenesi Eo-cimmerica alla fine del Triassico Medio, immediatamente prima dell' apertura del bacino del Pindo.

Geologic framework

Rhodos is the largest of the Dodecanese islands (1404 km^2), and is part of the Aegean outer ridge extending to Karpathos and Crete and facing the Hellenic Trench (Duermeijer et al. 2000). Several thin-skinned thrust sheets characterized by different Mesozoic sedimentary successions and syn-orogenic Paleogene turbidites are exposed on the island. The thrust stack is overlain with angular unconformity by a post-orogenic sedimentary succession of late Oligocene to early Pleistocene age (Fig. 1; Vati Group, Levantinian and Sgourou Formations; Mutti et al., 1970). All units are affected by vertical faulting related to Aegean extension, and by recent uplift (Kontogianni et al., 2002).

Continental-margin to oceanic successions within thrust sheets documented by Mutti et al. (1970), Leboulenger & Matesco (1975), Koepke et al. (1985), Harbury & Hall (1988), and Lekkas et al. (2002) include:

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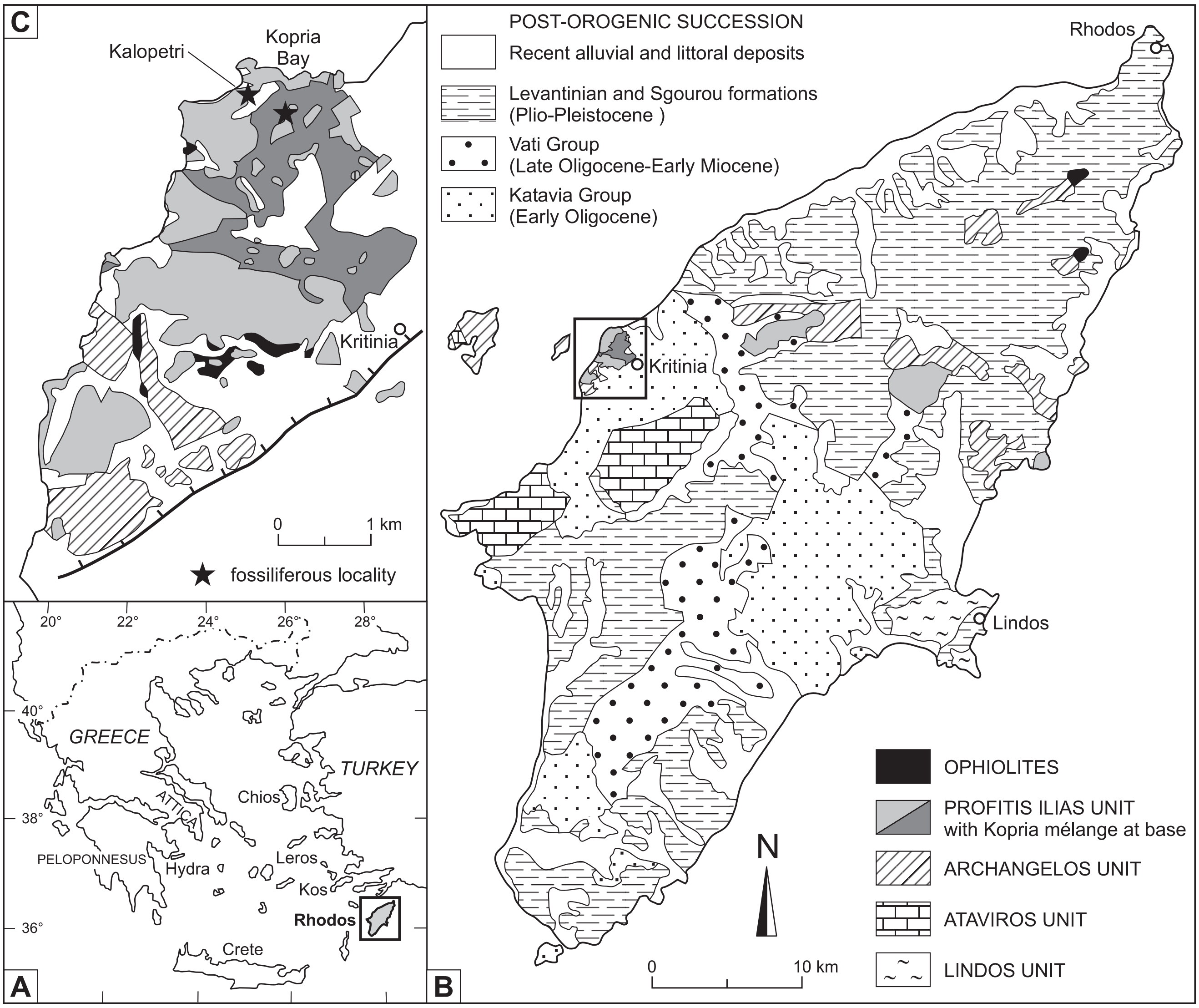

Fig. 1 - Geographical and geological setting of the Kopría Mélange, including fossiliferous exotic blocks of mid-Carboniferous age. A) Location of Rhodos Island and other localities mentioned in the text; B) Geological sketch map of Rhodos Island (after Mutti et al. 1970; Bornovas & Rondogianni-Tsiambadu 1983; Lekkas et al. 2002); C) Pre-Tertiary units exposed in the Kritinia area, with location of fossiliferous localities (after Mutti et al. 1970).

- dark bluish, thin-bedded meta-carbonates (Cretaceous-Eocene; Lindos Limestone), overlain by Lower Oligocene meta-turbidites;
- slope carbonates, including cherty and marly limestones (Upper Jurassic-Eocene; Ataviros Group), overlain by quartzose turbidites with sedimentary, volcanic, metamorphic, and serpentinite lithic fragments (early Oligocene; Katavia Flysch);
- platform carbonates (Carnian-Paleocene; Archangelos Group), unconformably overlain by ophioliticlastic turbidites (Eocene; Archipolis Flysch);
- pelagic cherty limestones, red marls and radiolarites (Carnian-Cretaceous; Profitis Ilias Group);
- ophiolite sequences including harzburgite, gabbro, plagiogranite, diabase, pillow lava, and chert (Koepke et al. 2002).

These distinct successions are assignable to the Ionian (Ataviros Group), Gavrovo-Tripolitza (Archangelos Group) and Pindos (Profitis Ilias Group) Zones of the External Hellenides (Dercourt et al. 1980; Jacobshagen et al. 1986; Lekkas et al. 2002). Upper Paleozoic fossils studied in the present work are contained within exotic blocks ranging from pebbles to meter-sized boulders, embedded within a ~150 m-thick mélange unit exposed along the west coast of Rhodos ("Kopría Diabase-Radiolarite" of Mutti et al. 1970). The mélange is tectonically sandwiched between the Katavia Flysch and the Profitis Ilias Group, and is directly overlain by Upper Oligocene post-orogenic conglomerates (Thari Formation; Edgington & Harbury 1993).

Stratigraphic and structural relationships are unclear because of intense polyphase tectonic deformation.

		Samples											
	Taxa	**R12**	**R13**	**R15**	**R16**	**R17**	**R18**	**R19**	**R20**	**R22**	**R23**	**R24**	**R25**
F	indet. Eostaffellidae	X	X									X	X
F	*Calcivertella* spp.	X	X									X	
A/P	*Calcisphaera laevis*	X										X	X
F	*Profusulinella* sp.	X	X										X
F	*Aljutovella sp.*	X											
A/P	*Proninella strigosa*	X										X	
F	indet. Endothyridae	X	X							?		X	X
F	*Novella / Seminovella* sp.	X											
F	indet. Palaeotextulariidae	X	X									X	X
F	*Eostaffella* spp.	X										X	X
F	*Turrispiroides multivolutus*	?	X									X	X
F	*Eoschubertella* spp.	X	X									X	X
F	*Palaeonubecularia* spp.	?	X									X	X
F	*Globivalvulina bulloides*	X	X									?	X
F	*Ozawainella* spp.	X										X	X
A/P	*Diplosphaerina inaequalis*	X	X							X		X	X
A/P	*Tuberitina* sp.	X											
F	*Eoschubertella gracilis*		X										
F	*Plectostaffella reitlingeri*		X										
F	*Pseudoglomospira* spp.		X									X	X
F	syzygial cyst		X									X	
A/P	*Stacheoides* spp.		X										X
A/P	*Girvanella* spp.		X							X			
F	*Tetrataxis* spp.		X							X		X	X
F	*Bradyina* spp.		X									X	X
A/P	*Fourstonella johnsoni*		X										
F	*Staffella* spp.		X									X	X
F	*Endotaxis brazhnikovae*		X										
F	*Glomospiroides borealis*		X									X	X
A/P	*Paraepimastopora* sp.		X										
F	*Endothyranella* sp.		X									X	
A/P	*Komia abundans*		?										X
	barren of calcareous microfossils			X		X					X		
F	indet. Miliolida				?			?					
F	indet. Lagenida						X		X				
F	indet. encrusting forams							X				X	X
F	*Earlandia* spp.							?					
F	indet. cornuspirid							?					
F	indet. Biseriamminidae									X		X	X
F	*Trepeilopsis* sp.									?		X	X
F	cf. *Howchinia* sp.									X			
F	indet. Fusulinida									X			
F	indet. Kasachstanodiscinae									X			
F	*Ozawainella pseudorhomboidalis*											X	X
F	*Endothyra* spp.											X	
F	*Monotaxinoides transitorius*											X	
F	*Haplophragmina* sp.											X	X
F	*Pseudostallella* ex gr. *P. irinovkensis*											X	
F	*Pseudostaffella* spp.											X	X
A/P	*Donezella lutugini*											X	X
F	*Spireitlina conspecta*											X	
A/P	*Tubisalebra calamiformis*											X	
F	*Ozawainella rhomboidalis*												X
F	*Planoendothyra* sp.												X
A/P	*Nostocites vesiculosa*												X
F	*Eoschubertella* ex gr. *E. pauciseptata*												X
A/P	*Anthracoporellopsis* sp.												X
A/P	*Masloviporidium delicata*												X
F	*Mediocris breviscula*												X
F	indet. Fusulinidae (fluted septa)												X

F = foraminifers; A/P = algae/problematica

Fig. 2 - Microfossil distribution chart showing foraminiferal and algal/problematical occurrences in examined samples.

According to Harbury & Hall (1988, p. 294-296), deeply weathered lavas capped by volcaniclastic conglomerates in the Kopría area (Kamiros and Calopetri Formations of inferred Ladinian age) represent the original substratum of the Profitis Ilias Group, and pre-Triassic blocks may document older, tectonically-disrupted intervals at the base of this outer-continental-margin succession.

The Exotic Blocks

Mutti et al. (1970, p. 119) reported the following exotic block lithologies and their contained fossils embedded in the Kopría Mélange, although many of the fossil identifications are suspect:

a) quartzose conglomerate with the foraminifers *Ammodiscus*, *Agathammina*, *Tetrataxis*, *Endothyra*, and *Profusulinella*, together with echinoid and gastropod fragments;

b) dark grey coquinoid limestone with *Enteletes lamarcki*, *Mizzia*, *Tuberitina*, *Fusulinella*, crinoid, brachiopod, and gastropod fragments;

c) brown-weathered encrinite with *Poteriocrinites*?, *Cyathocrinites* cf. *goliathus*, *Urushtenia* cf. *pseudomedusa*, *Neospirifer* cf. *poststriatus*, *Spiriferella* cf. *draschei*, *Tuberitina*, *Globivalvulina*, *Triticites*, algae, bryozoan, brachiopod, crinoid and gastropod fragments;

d) black marly limestone with *Tuberitina*, tetracoral and brachiopod fragments;

e) thin-bedded bituminous limestone with radiolaria;

f) olive-grey sandstone with crinoids.

Upper Paleozoic fossils in the mélange at Kopría were first reported by Migliorini (1925, p. 345), all of whose samples were collected from isolated blocks within cultivated fields and stone walls, mostly found ~200 m south of Kopría Bay. Recovered faunal assemblages subsequently were assigned Middle to Late Carboniferous (Migliorini & Desio 1931) or Early Permian (Mutti et al. 1970) ages. Rich microfossil assemblages from the Kopría Bay, including foraminifers and algae of Late Moscovian age, were studied in detail by Lys & Leboulenger (1977).

One of us (EG), during field mapping of the Kritinia area (Fig. 1), collected new samples from exotic blocks in the Kopría Mélange at Kopría (R24, R25, R46) and Kalopetri (R11, R12, R13). Samples from Kopría were taken from a stone wall at the same locality described by Migliorini (1925), and so they cannot be placed in stratigraphic context. In contrast, the Kopría Mélange crops out at Kalopetri where the following intact stratigraphic section is preserved within a large block (from bottom to top):

i. light grey, thick-bedded limestones;

ii. sharp unconformable contact;

iii. quartzose conglomerates (sample R11) with moderately-sorted, well-rounded pebbles (maximum diameter 6 cm; mean diameter 1 cm), including foliated grey metamorphic and black chert rock fragments. Thickness 5 to 6 m;

iv. greenish-grey, very coarse-grained to microconglomeratic calcareous sandstones (sample R12), passing upward to granule-bearing, fossiliferous hybrid arenites (sample R13). Thickness 1 m;

v. dark grey, foetid limestones possibly follow (outcrop condition is poor). Greenish sandstones exposed nearby are probably part of a different block.

We interpret this as a transgressive succession from fan-delta to lagoonal environments (units iii through v) following a subaerial unconformity (surface ii).

Petrography and provenance

The basal conglomerates to pebbly sandstones (unit iii; sample R 11) include sublitharenites with abundant, predominantly polycrystalline, quartz grains (Q85 F0 L15). Monocrystalline quartz of possibly recycled (rounded outlines) and volcanic origin (straight extinction) also occurs. Feldspars are lacking. Metamorphic rock fragments include low-rank (fine-grained quartz-sericite or quartz-chlorite) to high-rank (coarse-grained quartz-muscovite) metapsammite grains, and possibly rare chloritoschist grains. Sedimentary rock fragments include brown/black radiolarian chert to cherty mudrock lithic grains. Shale to quartzarenite grains, probably present in subordinate amounts, are difficult to recognize within the supporting cataclastic quartz/phyllosilicate matrix. Felsite to quartz-phyric rhyolite grains also occur. Accessory minerals include muscovite flakes and zircon. Deformed silicate peloids and clasts of yellow-green to brownish siliceous clay are interpreted as intrabasinal in origin and grown at the expense of unstable grains in shallow-marine environments during transgression (Garzanti 1991). Calcite and oxides precipitated mainly along brittle fractures during late diagenetic stages.

The provenance of these basal conglomerates was from continental basement rocks including greenschist-facies metapsammites and cover units including felsic volcanic rocks and cherts. Quartzo-lithic composition with a variety of metamorphic, sedimentary, and volcanic lithic grains suggests a "recycled-orogenic" provenance (Dickinson 1985). Relatively high mineralogical stability suggests selective destruction of unstable grains by intense chemical weathering in the source area and/or during diagenesis. Detrital modes are thus thought to significantly over-estimate the durable component of detritus at the expense of the labile fraction.

Foraminiferal biostratigraphy

Petrographic thin sections were prepared from a variety of Upper Paleozoic clast lithologies in order to allow age determination on the basis of contained foraminifers. Many of the examined clasts are barren of identifiable microfossils, and thus their age remains problematic (e.g., samples R15-R20, R23). Other samples, however, contain diverse foraminiferal assemblages that facilitate dating. In particular, samples R12 and R13 from the Kopría Mélange at Kalopetri, and samples R24 and R25 from the Kopría Mélange at Kopría, contain distinctive early Middle Pennsylvanian fusulinacean faunas. Sample R22, collected from scree at Kalopetri, contains a less diagnostic fauna that is probably Mississippian in age. The faunas are discussed below. Recovered taxa from all examined samples are recorded on the occurrence chart in Fig. 2, and selected age-diagnostic taxa are illustrated in Plates 1 and 2.

Kalopetri (Samples R12 and R13)

The Kopría Mélange at Kalopetri yielded clasts whose foraminifers are very characteristic of early Moscovian strata in the historical reference areas of the stage in the South Urals and Russian Platform, respectively (e.g., Reitlinger 1950; Rauser-Chernousova et al. 1951; Sinitsyna & Sinitsyn 1987; Groves 1988; Kulagina et al. 2001). The most useful elements of the fauna are *Eoschubertella gracilis* (Rauser-Chernousova in Rauser-Chernousova et al. 1951), *Eoschubertella mosquensis* (Rauser-Chernousova in Rauser-Chernousova et al. 1951) and indeterminate species in *Ozawainella*, *Profusulinella* and *Aljutovella*. The type specimens of *E. mosquensis* and *E. gracilis* are from the lower Moscovian Vereisky Horizon and Kashirsky Horizon, respectively, on the Russian Platform. In the South Urals reference sections described by Kulagina et al. (2001), *Eoschubertella* ex gr. *E. mosquensis* first appear in the uppermost part of the lower Bashkirian Substage (upper Akavassky Horizon), and they range upward into the lower Moscovian Substage. Similarly, in the South Urals primitive species in *Ozawainella* first appear in the upper Akavassky Horizon, whereas more typical species in the genus are characteristic of the upper Bashkirian Substage and overlying Moscovian Stage. *Profusulinella* spp. throughout the East European-Uralian province first appear in the upper lower Bashkirian substage and then become abundant in the upper Bashkirian through lower Moscovian (Rauser-Chernousova et al. 1951; Kulagina et al. 2001; Isakova 2001). *Aljutovella* spp. in both the Russian Platform and South Urals are characteristic of the lower Moscovian Vereisky and Kashirsky horizons (Rauser-Chernousova et al. 1951; Kulagina et al., 2001; Isakova 2001). They are not known to occur in underlying Bashkirian strata. Thus, on the basis of known ranges, foraminiferal assemblages from clasts at Kalopetri are assigned an early Moscovian age.

Kopría (Samples R24 and R25)

Clasts from the Kopría Mélange at Kopría yielded foraminiferal assemblages that are generally similar to those from Kalopetri. Samples from the Kopría locality also are Moscovian in age on the basis of additional elements not present at Kalopetri. Sample R24 contains a normal assemblage of Moscovian smaller foraminifers along with a very distinctive form identified equivocally as *Pseudostaffella* ex gr. *P. irinovkensis* Leontovich in Rauser-Chernousova et al. 1951. This form resembles *P. irinovkensis* in its broadly nautiloid shape, large number of volutions, and large size, but it differs in possessing generally better developed chomata. The types of *P. irinovkensis* are from the uppermost Bashkirian of the Russian Platform, with other specimens known from the lower Moscovian (Rauser-Chernousova et al. 1951). The present specimens exhibit more advanced evolutionary grade than the types, and therefore we believe they are Moscovian in age. Sample R25 does not contain *P.* ex gr. *P. irinovkensis*, but it does contain other large pseudostaffellins along with the schubertellin *Eoschubertella pauciseptata* (Rauser-Chernousova 1938), originally described from the lower Moscovian. Sample R25 also contains an indeterminate species in *Profusulinella*, which could be either late Bashkirian or Moscovian, plus a fragment of a larger, fusiform fusulinid with strongly fluted septa. This fragment, although not identifiable even at the genus-group level, is clearly post-Bashkirian, as we are not aware of forms with such strongly fluted septa from Bashkirian strata. The fragment may be referrable to a species in *Fusulina* or *Eofusulina*, both of which are characterized by strong septal fluting, and both of which are known from Moscovian strata throughout Eurasia. The fragment somewhat resembles ones illustrated by Lys and Leboulenger (1977) as *Fusulina mjachkovensis* Rauser Chernousova in Rauser-Chernousova et al. 1951 from upper Moscovian samples near Kopría Bay. Finally, both samples R24 and R25 contain relatively large, keeled specimens assigned to *Ozawainella pseudorhomboidalis* Rauser-Chernousova *in* Rauser-Chernousova et al. 1951. The types of *O. pseudorhomboidalis* are from the lower Podolsky Horizon of the upper Moscovian Substage on the Russian Platform.

Kalopetri scree (Sample R22)

Sample R22, collected from the scree immediately below the exposed Kopría Mélange at Kalopetri,

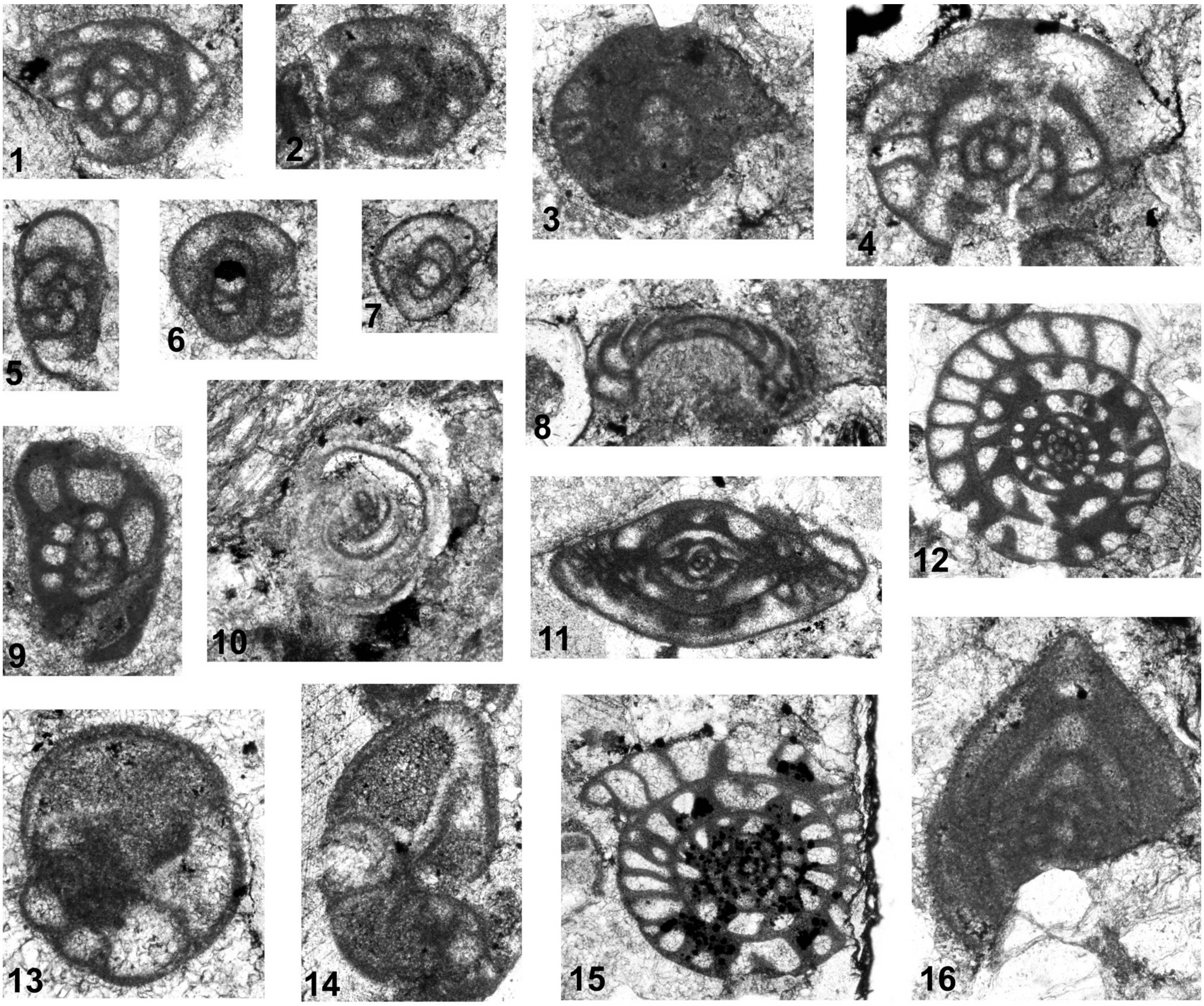

PLATE 1

Fig. 1-3 - *Eoschubertella mosquensis* (Rauser-Chernousova in Rauser-Chernousova et al. 1951), ×100. 1, slightly oblique axial section, sample R13; 2, oblique axial section, sample R13; 3, oblique sagittal section, sample R12.
Fig. 4 - *Eoschubertella gracilis* (Rauser-Chernousova in Rauser-Chernousova et al. 1951), ×100, oblique sagittal section, sample R13.
Fig. 5 - *Plectostaffella reitlingeri* Groves in Groves et al. 1994, ×100, axial section, sample R13.
Figs. 6, 7 - *Eoschubertella* ex gr. *E. mosquensis* (Rauser-Chernousova in Rauser-Chernousova et al. 1951), ×100, axial sections of juvenile specimens, both from sample R13.
Fig. 8 - *Howchinia* sp., ×100, oblique axial section, sample R22.
Fig. 9 - *Glomospiroides borealis* (Reitlinger, 1950), ×100, oblique section, sample R13.
Fig. 10 - indeterminate Kasachstanodiscinae, ×100, oblique section, sample R22.
Fig. 11 - *Aljutovella* sp., ×40, tangential axial section, sample R12.
Figs. 12, 15 - *Profusulinella* sp., ×40. 12, tangential sagittal section, sample R12; 15, slightly oblique sagittal section, sample R13.
Figs. 13, 14 - *Globivalvulina bulloides* (Brady, 1876), ×100. 13, sagittal section, sample R12; 14, sagittal section, sample R13.
Fig. 16 - *Ozawainella* sp., ×100, fragmentary axial section, sample R12.

yielded older foraminifers than those recovered from the Kopría and intact Kalopetri localities. This sample contains a single kasachstanodiscin that exhibits non-planispiral coiling, a completely open lumen, and a compound wall made up of a dark inner layer and a lighter radial outer layer (Pl. 1, fig. 10). The specimen is not well oriented and thus cannot be identified at the genus-group level, but its morphology is consistent with the concept of *Paraarchaediscus* articulated by Brenckle et al. (1987). According to Brenckle et al. (1987), the stratigraphic range of *Paraarchaediscus* is early Visean through Serpukhovian, and possibly into the Bashkirian. Sample R22 also contains a single specimen that we assign with question to *Howchinia*, a genus

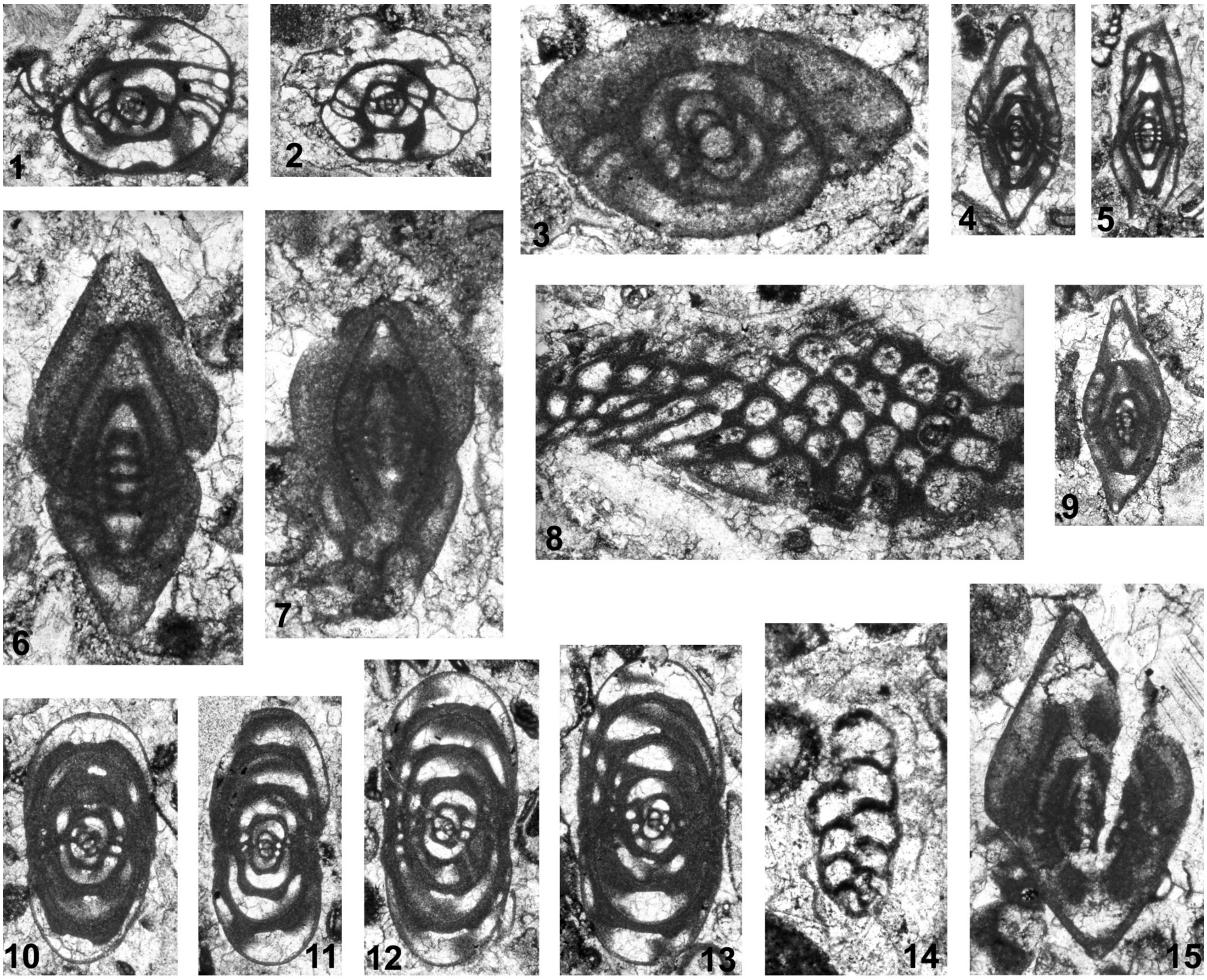

PLATE 2

Fig. 1,2 - *Eoschubertella* ex gr. *E. pauciseptata* (Rauser-Chernousova, 1938), ×40, both oblique sagittal sections from sample R25.

Fig. 3 - *Eoschubertella* sp., ×100, oblique sagittal section, sample R25.

Figs. 4, 5, 9 - *Ozawainella pseudorhomboidalis* Rauser-Chernousova in Rauser-Chernousova et al. 1951, ×40, axial sections. 4, sample R25; 5, sample R24; 9, sample R25.

Figs. 6, 7 - *Ozawainella rhomboidalis* (Putrya, 1940), ×100, tangential axial sections, both from sample R25.

Fig. 8 - indeterminate Fusulinidae, ×40, tangential section showing pronounced septal fluting, sample R25.

Figs. 10-13 - *Pseudostaffella* ex gr. *P. irinovkensis* Leontovich in Rauser-Chernousova et al. 1951, ×40, variably tangential axial sections, all from sample R24.

Fig. 14 - *Spireitlina conspecta* (Reitlinger, 1950), ×100, longitudinal section, sample R24.

Fig. 15 - *Ozawainella* sp., ×100, axial section, sample R25.

characterized by a trochospirally coiled conical test with coarse, diaphanous umbilical deposits. In western Europe (Perret 1973; Fewtrell et al. 1981; Conil et al. 1991) *Howchinia* ex gr. *H. bradyana/gibba* occur in upper Visean through upper Serpukhovian strata. In the Moscow Basin the range is late Visean through late Serpukhovian (Protvinsky) (Makhlina et al. 1993; Gibshman 2001), and in the Donbass it is from late Visean to late Serpukhovian (Zapaltyubinsky) (Aizenverg et al. 1983; Vdovenko 2001). Kulagina et al. (1995, 2001) reported *H. bradyana/gibba* from the lower Bogdanovsky Horizon at the Muradymovo section in the southern Urals. In eastern Kazakhstan/Uzbekistan (Mikhno & Balakin 1975) the range is late Visean through Serpukhovian. Thus, on the basis of an equivocal specimen of *Paraarchaediscus* and an indeterminate species in *Howchinia*, we conclude that sample R22 is Mississippian or earliest Pennsylvanian in age, being no older that late Visean and no younger than early Bashkirian.

Paleogeographic implications

Blocks containing tropical to subtropical mid-Carboniferous microfaunas with Urals-Paleotethys affinity, incorporated within the Kopría Mélange, represent by far the oldest rocks exposed on Rhodos. Similar, crinoid-bearing Upper Paleozoic strata have been reported to occur in other Dodecanese islands (Kos, Leros; Migliorini & Desio 1931) and in Attica (Lys 1988; pg. 105).

Even though their ultimate origin is hard to establish because of mode of occurrence and limited outcrop conditions, the studied blocks provide important new information on the Carboniferous paleogeographic framework of the Aegean area. Sedimentologic features, the orogenic signature of conglomeratic detritus, the age of fossils and their Urals-Paleotethys affinity combine to indicate a major transgression that coincided with the end of the Variscan Orogeny. Variscan magmatism and metamorphism are well documented along the Pelagonian Zone, the active northern margin of Paleotethys (Kotopouli et al. 2000; Vavassis et al. 2000; Zanchi et al. 2003). Variscan metamorphic rocks also occur on Crete (Seidel et al. 1982), where they have been interpreted either as basement within the External Hellenides (Dornsiepen et al. 2001) or as blocks detached from the external part of Pelagonia and later incorporated into mid-Triassic mélange (Stampfli et al. 2003).

We suggest that the Kopría blocks may have been derived from the southernmost part of the northern Paleotethyan margin. A similar instance is the occurrence of limestone blocks with mid-Carboniferous faunas (including *Profusulinella* and *Eostaffella*; Vachard in Stampfli et al. 2003) in the Liri Unit of Evia. The latter represents one of several mélanges marking the Paleotethyan suture in the Hellenic realm, and found at the base of post-Middle Triassic sequences of both Internal (Pelagonian Zone) and External Hellenides (Pindos and Gavrovo-Tripolitza zones; De Bono et al. 1998; Stampfli et al. 2003). The stratigraphic record of Rhodos Island thus provides new elements to unravel the complex sequence of geodynamic events preceding the Alpine cycle in the Aegean area, including the Variscan and Eo-Cimmerian orogenies.

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