Lower and Middle Triassic foraminifera from the Eros Limestone, Hydra Island, Greece

R. Rettori1, L. Angiolini2 & G. Muttoni2
1Dipartimento di Scienze della Terra dell’Università degli Studi di Perugia, 06100 Perugia, Italy
2Dipartimento di Scienze della Terra dell’Università degli Studi di Milano, 20133 Milano, Italy

ABSTRACT - The systematics and stratigraphic ranges (constrained by conodont dating) of abundant and well preserved foraminiferal faunas from six sections in the Lower and Middle Triassic Eros Limestone of central and western Hydra (Argolis Peninsula, Greece) are described. A joint analysis of the conodonts, foraminifera and bivalves has enabled the Scythian and Anisian stages to be recognized with some certainty within the Eros Limestone carbonate platform. The foraminifera have affinities with those of many other Tethyan localities, in particular the Dinarides, Balkans, Carpathians and the Southern Alp. J. Micropalaeontol. 13(1): 25–46, September 1994.

INTRODUCTION
The small Island of Hydra is located in the Aegean just to the south of the Argolis Peninsula (Peloponneseus, Greece) (Fig. 1). Its sedimentary succession ranges from Permian to Jurassic in age.

Triassic rocks have been studied by Renz (1906–31), Wendt (1973), Römermann (1968), Römermann et al. (1981), Schäfer & Senowbari-Daryan (1984) and by Angiolini et al. (1992). From the base, they consist of the Aghios Nikolaos Formation, the Eros Limestone, the Han Bulog Limestone, the Quartz Keratophyric Tuffs and part of the Adhami Limestone and Pantokrator Limestone (Fig. 2). The Lower and Middle Triassic portion of this succession, constituting the carbonate platform of the Eros Limestone, was initially studied by Römermann (1968–9), Römermann et al. (1981) and subsequently has seen extensive work by Angiolini et al. (1992).

This paper seeks to improve our knowledge of the biostratigraphy of the Eros Limestone by providing new important data on the distribution of some of the Triassic foraminifera, calibrated to the standard stages and substages of the Triassic, using mainly conodonts.

THE EROS LIMESTONE
The Eros Limestone was named by Römermann (1968) after the highest mountain of Hydra (Mount Eros, 589 m). It constitutes a well-developed carbonate platform, 600–670 m thick, of Early to Middle Triassic age. It overlies the Aghios Nikolaos Formation (quartzarenites; Early Triassic) or directly the Episkopi Limestone (bioelastic limestone; Late Permian) and is bounded at the top by the Han Bulog Limestone (red nodular limestone; latest Pelsonian–latest Illyrian/Ladinian) or directly by the Adhami Limestone (grey cherty limestone; Early Ladinian–Late Triassic).

Angiolini et al. (1992) subdivided the Eros Limestone on the basis of microfacies and field analyses. The present work improves these analyses. Six stratigraphic sections are presented here (Fig. 4): sections 1, 3, 4, 5 and 6 were sampled by the present authors, section 2 by M. Richards (University of Lausanne). We have divided the Eros Limestone into four subunits: the lower lithozone, the Eros Limestone sensu stricto, the dark member and the upper lithozone.

The lower lithozone (25–100 m thick) constitutes the base of the Eros platform (Fig. 2) and consists of grey oolitic limestone with a variable content of quartz grains; yellow siltstone interbeds with species of the bivalve genera Unioinites and Eumorphoites of Spathamian age (determination by R. Posenato, University of Ferrara) are also present.

There is a gradual transition from this lithozone into the overlying Eros Limestone sensu stricto (500–600 m thick), itself subdivided into four main microfacies, from the base to top (Fig. 5): microfacies 1, consisting of oolitic grainstones and packstones with rare bioclasts (gastropods, echinoderms, ostracods, bivalves and foraminifera). It is locally (Aghios Marina) overlain by microfacies 2, consisting of mudstones and wackestones with oolites, intraclasts, peloids and rare bioclasts, or more commonly, it is overlain by microfacies 3, made up of packstones and wackestones with cements and bioclasts (foraminifera, bivalves, ostracods, echinoderms, gastropods, algae, stromatolites and prob-
Microfacies 4 has been detected only at O. Malies and consists of bindstones made by encrusting problematica organisms (Tubiphytes obscurus, Porostromata and Spongiostromata).

The dark member (0–200 m thick) interfingers with the Eros Limestone sensu stricto (Fig. 2) and consists of well-bedded platy beds (centimetres to decimetres thick) of dark limestone with chert. Massive beds of intraformational breccias are present and a later dolomitization is also evident.

The dark member and the Eros Limestone sensu stricto are overlain by the upper lithozone (10–30 m thick), made up of red matrix-bearing calcareous breccias with bioclastic clasts.

SCYTHIAN FORAMINIFERAL ASSEMBLAGE

This foraminiferal assemblage is recorded mainly in the lower lithozone, in the dark member of the Eros Limestone and also in microfacies 1 of the Eros Limestone s.s. (Fig. 4, sections 1, 2, 4, 5; Table 1). It is characterized by: Glomospira spp., Glomospirella spp., Pilammina praedensa Urosevic, Meandrospira pusilla (Ho), Meandrospira cheni (Ho) and Krikoumbilica pileiformis He. The occurrence of the conodont Neospathodus homeri (Bender) and the Spathian bivalves (Unionites sp. and Eurnorphotis sp.) in the dark member and lower lithozone of the Eros Limestone, respectively, confirms the Scythian age of this foraminiferal association.

Of interest is the occurrence of Krikoumbilica pileiformis He in the Scythian stage; this species, up until now, is known...
Fig. 3. Geological sketch map showing the distribution of the Eros Limestone (modified after Angiolini et al., 1992).

Fig. 4. Stratigraphic sections (left to right: 1–6) measured in the Eros Limestone and their correlation based on foraminiferal and conodont biostratigraphy (for more detailed conodont distribution see Angiolini et al., 1992). To keep the figure more readable, the Eros Limestone s.s. microfacies have not been included. Make reference to Fig. 5, using plotted sample numbers, to locate these microfacies. Section location is as follows: Section 1, southwestern slope of O. Zakoni from 200 m a.s.l. to the summit; Section 2, southeastern slope of O. Zakoni; Section 3, westward of the village of Gherakina from 240 m a.s.l. to the southern coast; Section 4, from the ancient village of Episkopi to Ag. Marina chapel; Section 5, from 290 m a.s.l. on the southern slope to 380 m a.s.l. on the northern slope of O. Purgos; Section 6, along the new road from 180 m a.s.l. above C. Riga towards the northeast (Ag. Triada).
only in the Middle Triassic of southern Guizhou (China). Furthermore, in Hydra, the stratigraphic range of *M. pusilla* (Ho) also extends into the Anisian (see below), whereas *M. cheni* (Ho) appears to be restricted to the Scythian.

**ANISIAN FORAMINIFERAL ASSEMBLAGE**

The Anisian foraminiferal assemblage of Hydra is very rich, diverse and well preserved in most samples. It occurs in the Eros Limestone s.s. mainly in microfacies 3 and 4, more rarely in microfacies 2 (Figs 4–5). These foraminifera belong to the Early and Middle Anisian time interval on the basis of the conodont association (listed above) recorded in the upper lithozone of the Eros Limestone, which directly overlies microfacies 3 and 4 of the Eros Limestone s.s. The typical Anisian foraminiferal assemblage is represented by (*Fig. 4, sections 2, 3, 4, 5, 6; Table 1): *Glomospira* spp. (Pl. 1, fig. 11), *Glomospirella grandis* (Salaj), *Glomospirella* spp., *Pitammina densa* Pantic, *Ammobaculites*/*Reophax* sp., *Earlandia amplimuralis* (Pantic) Fig. 6.2, *Earlandia tintiniformis* (Misik) (Fig. 6.3), *Endothyra aff. E. salaji* Gazdzicki (in Gazdzicki et cl., 1975), *Endothyra* aff. *E. salaji* Gazdzicki (in Gazdzicki et al., 1975), *Endothyra* sp. (PL 2, fig. 9, 10), *Endothyra* sp., *Endothyranella wirzi* (Koehn-Zaninetti), *Palaeomiliolina judicariensis* (Premoli Silva), *Meandrospira pusilla* (Ho), *Meandrospira* dinarica Kochansky-Devidé & Pantic, ‘*Meandrospira*? deformata Salaj, *Meandrospira* sp., *Turritiglomina magna* (Urosevic), *Ophthalmidium* spp. (Figs 6.5, 6.6), *Spirillina* sp. (Pl. 6, fig. 4, 5), *Turritiglomina prealpina* Zaninetti & Brönnimann (in Zaninetti et al., 1972a), *Triadodiscus* or *Aulotortus* n. sp., *?Lamelliconus* sp. (Pl. 6, fig. 9) and
Austrocolumina sp. (Fig. 6.5). Duostominidae (Figs 6.1, 6.4), Nodosariidae and a single section of a specimen tentatively assigned to the family Aulotorridae or Triadodiscidae (Pl. 6, fig. 10) were also found. Tubiphytes obscurus Maslov, encrusting foraminifera (Nubecularia sp.), dasyclad algae, echinoderm fragments, Gemeridella minuta Borza & Misik and Bacinella irregularis Radoicic are also present.

In the Eros Limestone (upper lithozone), the joint occurrence of Meandrospira pusilla and M. dinarica has been detected in sample GL 155 (Tsingri Bay, in front of Tsingry Island, see Fig. 3); the age of this assemblage is Pelsonian on the basis of conodonts. This points to a Scythian–Anisian distribution of M. pusilla.

In the overlying Han Bulog Limestone, T. mesotriasica (Koehn–Zaninetti) has been discovered in association with an Illyrian conodont fauna characterized by Gondolella excelsa (Mosher) and Gladigondolella tethydis (sample H4, Vlichos).

The fauna recorded in the Eros Limestone s.s. of Hydra is very similar to that occurring in the Anisian bioclastic limestone underlying the Han Bulog Limestone of southern (former) Bosnia-Herzegovina, Yugoslavia (Brönnimann et al. 1973a,b). Moreover, it also shows affinities to assemblages of most of the Tethyan Anisian successions recorded by many authors (among others Kochansky-Devidé & Pantic, 1966; Koehn-Zanietti, 1969; Premoli Silva, 1971; Zaninetti et al., 1972a; Efimova, 1974; Gazdicki et al., 1975; Dager, 1978; Trifonova, 1978a,b; Salaj et al. 1967; Salaj, 1969; Salaj et al., 1983; He, 1984; Oravecz-Scheffer, 1987; Urosevic, 1977, 1981, 1988).

**DISCUSSION**

**Biostratigraphic considerations**

Angiolini et al. (1992) described the stratigraphy of the Eros Limestone of Hydra, their dating being mainly with the aid of conodont assemblages.

In the present paper we have described the foraminiferal fauna recorded in the same stratigraphic interval, providing further data on the occurrence of some important Early and Middle Triassic foraminifera (Table 2) in the Tethyan realm. Of particular importance are the following:

(A) *Pilammina praedensens* the Scythian range reported by Urosevic (1988) is here confirmed on the evidence of the associated conodonts and bivalves.

(B) *Pilammina densa* in Hydra, this species has been recorded only in the Pelsonian.

(C) *Meandrospira*: in the Eros Limestone the distribution of this genus suggests the existence of a lineage (M. cheni–M. dinarica) evolving laterally from *M. pusilla*. The arguments supporting this interpretation are: first, the Scythian portion of the Eros Limestone hosts both *M. pusilla* and *M. cheni*; secondly, during the Early Anisian *M. dinarica* appears, surviving until the Pelsonian, together with rare specimens of *M. pusilla*; and thirdly, *M. cheni* has been found only in the Spathian substage.

(D) *Krikoumbilica pileiformis*: previously, this species has been known only in the Middle Triassic of China. Therefore, its Scythian occurrence in Hydra indicates that it must have appeared first in the Early Triassic.

(E) *Glomospirella grandis*: in Hydra, it has been found only in the Anisian (as high as the Pelsonian), in association with *Meandrospira dinarica*, thus confirming the restriction of this species to the Anisian.

(F) *Endotebra*: the Upper Permian genus *Endotebra* is reported in the Triassic (Pelsonian) for the first time. A more detailed analysis of Triassic ‘Endothyrys’ is needed to confirm this record.

(G) *Endothyranella wirzi*: this species, also known in the Ladinian (Zaninetti, 1976), is here recorded in the Early Anisian, as high as the Pelsonian. We can confirm that elsewhere this species ranges through the Middle Triassic.

(H) *Palaeomiliolina judiciensis*: appears to be restricted to
the Pelsonian (dating based on associated conodonts); this conclusion is confirmed by other authors (i.e. Premoli Silva, 1971; Trifonova, 1979; Oravecz-Scheffer, 1987).

(I) *Turriglomina magna:* this species was described by Urosevic in the Carnian-Norian of the Balkans, whereas in Hydra it occurs in the Pelsonian. This confirms the presence of this species in the earliest Middle Triassic, as already suggested by Zaninetti et al. (1990).

(J) *Turriglomina mesotriasia:* on the co-occurrence of conodonts, the Middle Triassic range of this species is here confirmed.

(K) *Turrispirillina prealpina:* was recorded for the first time by Zaninetti et al., 1972a in the Late Anisian, whereas in Hydra the species is also present in the Early Anisian only as high as the Pelsonian stage.

(L) *Lamelliconus:* reported in the Pelsonian stage, apparently for the first time.

(M) A new species of *Triadodiscus* or *Aulotortus* has been discovered in the Pelsonian portion of the Eros Limestone s.s. There is an affinity between it and specimens recorded by Brönimann et al., 1973a,b (as *Involutina sinuosa pragosoides*) in the Anisian limestone of Bosnia-Herzegovina.

The stratigraphic ranges of the main foraminifers collected in Hydra are shown in Table 2; these results are integrated with data already known from the literature. We do not propose any new foraminiferal zonation but our data has been compared with the zonations proposed by Zaninetti et al. (1972a), Salaj et al. (1988), and Trifonova (1992). In the schemes of Salaj et al. (1988) and Trifonova (1992), a subdivision of the Scythian consisting of a lower, *Meandrospira cheni* Interval Zone and an overlying, *Meandrospira pusilla* Interval Zone, was proposed. In Hydra, *M. cheni* appears after the acme of *M. pusilla* in association with rare specimens of *M. pusilla,* disappearing at the end of the Scythian, whereas *M. pusilla* continues into the Anisian in association with *M. dinarica.*

In terms of systematics, it is noteworthy that we refer to *M. pusilla* the smallest forms belonging to the genus *Meandrospira* of the type-material from China described by Ho (1959), maintaining the name *pusilla* according to the
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Table 2. Stratigraphic range of some important Triassic foraminifera according to the literature and from new data from the Island of Hydra. See text for discussion.

| Table 2 | Stratigraphic range of some important Triassic foraminifera according to the literature and from new data from the Island of Hydra. See text for discussion. |
|---------|-----------------------------------------------------------------------------------------|
| SCYTHIAN| ANISIAN                                                                               | LADINIAN | CARNIAN |
| Gynaeceae | Dinarian                                           | Sarnian | Sarnian | Bathyian | Pelsonian | Ladinian | Langhian |
| Meandrospira pusilla | Meandrospira cheni | Meandrospira dinarica | Glomospirella grandis | Pilammina densa | Palaeomiliolina judicariensis | Endothyranella wirzi | Turriglornina mesotriasica | Turriglornina magna | Turrispinitina prealpina |

law of priority (see synonymy). We refer to M. cheni those specimens with morphology and dimensions intermediate between M. pusilla and M. dinarica, as figured by Ho (1959) (see synonymy). During a visit to the Department of Geology and Palaeontology of the Academic Sinica (Nanjing), one of us (R.R.) examined the original collection of Ho Yen and established the true nature of M. cheni.

Salaj et al. (1988) established a M. dinarica Interval Subzone (Bithynian–Pelsonian) in the lower part of the Pilammina densa Range Zone (Bithynian–Illyrian). Trifonova (1992) basically agrees with this zonation but differs in the detail of her subdivisions of the Pelsonian. The M. dinarica Subzone was raised to a full Zone by Zaninetti et al. (1972a).

In Hydra, M. dinarica appears at the base of the Anisian and continues to the top of the Pelsonian, whereas P. densa appears during the Pelsonian. According to our data, the range of M. dinarica is therefore lower compared to previous zonations. Furthermore, we have found M. dinarica in association with Aulotortus or Triadodiscus n.sp. (= Involitina sinuosa pragensis sensu Brönnimann et al., 1973a).

Palaeogeographic considerations
Palaeogeographically, there is a particular similarity between the foraminiferal fauna of Hydra and that recorded by Brönnimann et al. (1973a,b) from the Anisian of southern Bosnia-Herzegovina, as well as in other localities of the Dinarides (Kochansky-Devidé & Pantic, 1966; Urosevic, 1977, 1981, 1988). Lithological and faunal similarities suggest a possible correlation between the Dinarides and the Subpelagonian Zone of the Internal Hellenides (Hydra Island).

Our faunas also show many affinities with those reported from the Middle Triassic of the Southern Alps (Gaetani & Gorza, 1989), the Carpathians (Gazdzicki, et al., 1975; Trifonova, 1978a,b; Oravecz-Scheffer, 1987), the Kocaeli Peninsula (Turkey) (Dager, 1878), the Caucasus (Efimova, 1974) and from China (He, 1984).

In the M. Facito Formation auct. of the Lagonegro area (Southern Apennines), an Illyrian–Landian foraminiferal fauna, calibrated with conodonts (Ciaprica et al., 1990; Mietto et al., 1991), has been studied. This foraminiferal assemblage is similar to the Illyrian fauna recorded in Hydra; particularly they share, amongst others, the species Turriglornina magna, T. mesotriasica and Endothyranella wirzi. During the Pelsonian the carbonate platform of Hydra was characterized by the occurrence of Meandrospira dinarica, Pilammina densa, Palaeomiliolina judicariensis, and Triadodiscus/Aulotortus n.sp. This fauna is completely absent in the Lagonegro sequence: in fact, during this period Lagonegro is affected by terrigenous influxes, causing carbonate sedimentation to occur only from Illyrian time.

In conclusion, the two successions of Hydra and Lagonegro show affinities, testifying to a similar evolution of the passive continental margin, even if they were developed at slightly different times. In Hydra, the carbonate platform (Eros Limestone) which had developed from Scythian to Pelsonian time, becoming drowned during the Pelsonian, whereas the carbonate platform of the Lagonegro area is referable to the Illyrian–Longobardian and became drowned at several different times within the Ladinian.

SYSTEMATIC DESCRIPTIONS
Citations, post-1976, are given in full to show the wide distribution within Tethys of these important foraminifera and as a supplement to the detailed synonymies given by Zaninetti (1976). The reader is referred to Tables 1 and 2.
for the distribution of the species in Hydra. For the position of the samples and for the lithologies quoted in the text below, see also Figs 4, 5.

Order Foraminiferida Eichwald, 1830
Superfamily Ammodiscacea Reuss, 1862
Family Ammodiscidae Reuss, 1862
Subfamily Ammoveretellininae Saidova, 1981
Genus Glomospirella Plummer, 1945

Glomospirella grandis (Salaj, in Salaj, Biely & Bistricki, 1967) (Pl. 1, figs 9, 10)

For synonymies before 1976, see Zaninetti (1976: 101).
1977 Glomospirella grandis (Salaj); Pantic-Prodanovic & Radosevic: 79, pl. 4, figs 3, 4.
1978 Glomospirella grandis (Salaj); Dager: 50, pl. 1, fig. 3.
1983 Pilaminellina grandis Salaj; Salaj et al.: 68, pl. 12, figs 1, 2.
1983 Pilaminellina semiplana (Kochansky-Devidé & Pantic); Salaj et al.: 69, pl. 12, fig. 3, 4.
1989 Glomospirella semiplana (Kochansky-Devidé & Pantic); Gaetani & Gorza: 46, pl. 11, figs 7, 8.
1989 Glomospirella grandis (Salaj); Gaetani & Gorza: 46, pl. 12, fig. 1.
1990 Glomospirella falsosfordi (Salaj, Borza & Samuel); He & Wang: 67, pl. 1, figs 12, 13.
1990 Glomospirella grandis (Salaj); He & Wang: 66, pl. 1, figs 15, 16.
1992 Pilaminellina semiplana (Kochansky-Devidé); Trifonova: 21, pl. 1, fig. 10.

Remarks. Among the Triassic glomospirrillias it is the largest in size (with a maximum diameter of 1.5 mm according to Zaninetti, 1976). The species is very distinctive as it is characterized by a wide, streptosparially enrolled initial part and then by a planispiral stage (3–5 whorls).

G. grandis has been recorded in the Anisian throughout Tethys, often associated with Pilaminella densa and Meandrospira dinarica. The species was named, but not figured, by Ramovs (1972) from the Carnian of Dinarids.

In Hydra, our specimens are associated with M. dinarica, ?Lamelliconus sp. and Turrispirillina prealpina and range from Early Anisian to Pelsonian, on the basis of associated conodonts faunas.

Occurrence. O. Purgos, Eros Limestone s.s., section 5, sample H 122, GL 60.

Genus Pilammina Pantic, 1965

Pilammina densa Pantic, 1965 (Pl. 2, figs 1, 2, 3?, 4, 5?)

For synonymies before 1976, see Zaninetti (1976: 89). 1977 Glomospira densa (Pantic); Urosevic & Dumurdanov: 93, pl. 2, fig. 4.

1977 Glomospira densa (Pantic); Pantic-Prodanovic & Radosevic: 79, pl. 4, figs 5, 8.
1977 Glomospira densa (Pantic); Gazdicki & Smit: 326, pl. 3 figs 4–9.
1977 Glomospira densa (Pantic); Urosevic: pl. 2, figs 6, 7.
1978 Glomospira densa Pantic; Dager: 49, pl. 1, fig. 2.
1983 Pilammina densa Pantic; Salaj et al.: 66, pl. 9, figs 1–4.
1084 Glomospira densa (Pantic); He Yan: 422, pl. 1, figs 1–6, 7?.
1986 Pilammina densa Pantic; Sudar: 352, pl. 17, figs 1–4.
1988 Glomospira densa (Pantic); Piridemi: 147, pl. 1, figs 8, 9.
1990 Glomospira (Pantic); He & Wang: 65, pl. 1, figs 1–10.
1990 Glomospira densa Pantic (sic); Lualdi & Bianchi: 48, fig. 10 (8).
1992 Pilammina densa Pantic; Trifonova: 20, pl. 2, figs. 10, 11; pl. 4, fig. 15.

Remarks. The specimens from Hydra are comparable with Pantic's original material, except for the high number of convolutions in the latter (40–60 in Pantic, 1965).

P. densa is known from the Anisian of many Tethyan localities (i.e. Dinarides, Hellenides, W. Carpathians, Giudicarie Alps, Northern Calcareous Alps, Swiss Prealps, Kocači Peninsula (Turkey), Qinghai and Guizhou provinces of China). The species is frequently mentioned in association with Meandrospira dinarica and Glomospirella grandis. We have found P. densa, together with the same Involutinacea (Triadodiscidae or Aulotortidae) recorded by Brönnimann et al. (1973a,b) and assigned by these authors to Involuitina sinuosa pragsoidei (Oberhauser), but we have never found P. densa either with M. dinarica or Glomospirella grandis.

Our specimens occur in the upper part of the stratigraphic sections (5 and 6), attributed to the Pelsonian on the basis of the conodont association (G. bulgarica, G. b. bifurcata, G. b. hanbulogi, Gl. tethydis).

Occurrence. O. Malies, Eros Limestones s.s., section 6, samples GL 183, GL 185; O. Purgos, Eros Limestone s.s., section 5, sample GL 63; Aghios Marina, Eros Limestone s.s., section 4, sample GL 346; Gherakina, Eros Limestone s.s., section 3, samples H 55, H 59.

Pilammina praedensa Urosevic, 1988 (Pl. 1, figs 3, 4)
1988 Pilammina praedensa Urosevic: 377, pl. 1, figs 1–6.

Remarks. The species can be distinguished from P. densa Pantic in being smaller in size, in having a smaller number of convolutions and less tightly coiled initial whorls.

Pilammina praedensa is known from the Scythian of the Inner Belt of eastern Serbia. The age of P. praedensa is confirmed in Hydra by the presence of Spathian bivalves (Unionites sp. and Eumorphoites sp.) and Scythian conodonts (N. homeri).

He & Cai (1991) determined two specimens recorded in

Explanation of Plate 1

Fig. 1. Meandrospira pusilla (Ho), sample: H105, stratigraphic section 5. Fig. 2. Meandrospira cheni (Ho), sample: H105, stratigraphic section 5. Figs 3, 4. Pilammina praedensa Urosevic, sample: GL75, stratigraphic section 1. Fig. 5. Krikoumitheca pieiformis He, sample: H103, stratigraphic section 5. Figs 6, 7, 8. Undetermined foraminifera, sample: GL76, stratigraphic section 1. Figs 9, 10. Glomospirella grandis Salaj, samples: fig. 9, GL60, stratigraphic section 5; fig. 10, H122, stratigraphic section 5. Fig. 11. Glomospira sp., sample: H51, stratigraphic section 3.
the Middle Triassic Guohua Formation (Guangxi, China) as *Glomospira sygmoidalis* (Rauser) (pl. 1, figs 3, 4). In our opinion these specimens are very similar to *P. praedensa* and possibly synonymous.

**Occurrence.** O. Zakoni W, Eros Limestone, dark member, section 1, sample GL75.

Superfamily Endothyrae Brady, 1884

Family Endothyridae Brady, 1884

Subfamily Endothyranospinae Reytinger, 1958

Genus *Endothyra* Phillips, 1846,

*Endothyra* aff. *E. salaji* Gazdzicki in Gazdzicki, Trammer & Zawidzka, 1975

(Pl. 2, figs 6–8)

aff. 1975 *Endothyra salaji* Gazdzicki in Gazdzicki, Trammer & Zawidzka: 289, pl. 5, figs 1–6.

1977 *Endothyra malayensis* Gazdzicki & Smit: 324, pl. 8 figs 1–3.

1983 *Endothyra salaji* Gazdzicki; Salaj et al.: 90, pl. 38, figs 3, 5.

1984 *Endothyra salaji* Gazdzicki; He: 426, pl. 3, fig. 10.

**Remarks.** Our specimens are very similar to the type-material figures in Gazdzicki et al., 1975, but they show larger dimension. The shape and arrangement of the chambers in the last whorls, together with their tendency to uncoil, suggests an affinity with *E. salaji*.

In our opinion, the species *E. malayensis* Gazdzicki & Smit, from the (probably Ladinian) Kodiang Limestone (Kedah, North West Malaysia) must be synonymized with *E. salaji* as it is not possible to recognize significant morphological, dimensional and stratigraphical differences to justify a separate species.

As already pointed out by Koehn-Zaninetti (1969), the presence of tectum and diaphanotheca in the wall of Triassic endothyras is never clear; this is related to an evolutionary simplification of the wall or to diagenetic processes. Vachard & Razgallah (1988) suggested that most of the Triassic endothyras and endothyranellas are directly linked with their new genus *Endoteba*, described from the Permian of Jebel Tegba, Tunisia.

*Endothyra salaji* was recorded by Gazdzicki et al. (1975) in the Fassanian Muschelkalk of Poland; Oravecz-Scheffler (1987) found, but did not figure the species in the Anisian Falsoör Limestone of Hungary; *E. salaji* also occurs in the Pelsonian–Illyrian of the West Carpathians (Salaj et al., 1983) and possibly also in the Carnian–Norian of the same region (Salaj et al., 1983); it was also recorded in the Middle Triassic of Guizhou (China) (He, 1984). In Hydra, E. aff. *E. salaji* is Early Anisian to Pelsonian in age.

**Occurrence.** O. Purgos, Eros Limestone s.s., section 5, samples H 130, GL 65.

Genus *Endoteba* Vachard & Razgallah, 1988

*Endoteba* sp.

(Pl. 2, fig. 11)

**Remarks.** Only one specimen, an equatorial cross-section, corresponds to the morphology of the genus *Endoteba* as described by Vachard & Razgallah, 1988 (type species *Endoteba controversa*, found in the Permian of Jebel Tegba, Tunisia).

Previously, *Endoteba* was known only from the Permian, but here it is recorded in the Triassic. However, Vachard & Razgallah suggest that many Triassic endothyras are morphologically very close to *Endoteba* and propose a phylogenetic trend between the two genera.

In the Hydra section the genus *Endoteba* occurs in the Pelsonian.

**Occurrence.** O. Malies, Eros Limestone s.s., section 6, sample H 175.

Genus *Endothyranella* Galloway & Harlton, 1930

*Endothyranella wirzi* (Koehn-Zaninetti, 1968)

(Pl. 2, fig. 12; Pl. 3, figs 1, 2, 3?, 6; Pl. 4, fig. 5b)

For synonymies before 1976, see Zaninetti (1976: 129)

1977 *Endothyranella wirzi* (Koehn-Zaninetti); Gazdzicki & Smit: 323, pl. 7 fig. 10.

1978 *Endothyranella wirzi* (Koehn-Zaninetti); Dager: 54, pl. 1, fig. 19.

1979? *Endothyranella wirzi* (Koehn-Zaninetti); He: 1168, pl. 73, fig. 2.

1983 *Endothyranella wirzi* (sic) (Koehn-Zaninetti); Salaj et al.: 93, pl. 45, figs 2, 3; pl. 61, figs 1–4.

1983? *Endothyranella aff. wirzi* (sic) (Koehn-Zaninetti); Salaj et al.: pl. 48, fig. 1.

1986 *Endothyranella wirzi* (Koehn-Zaninetti); Dager: 209, pl. 18, fig. 4.

1987 *Endothyranella wirzi* (Koehn-Zaninetti); Oravecz-Scheffler: 95, pl. XX, figs 1–2, 4, 7–9.

1987 *Endothyranella cf. wirzi* (Koehn-Zaninetti); Oravecz-Scheffler: pl. 20, figs 3, 5.

1987 *Endothyranella? sp.*: Oravecz-Scheffler: pl. 20, fig. 6.

1988 *Endothyranella wirzi* (Koehn-Zaninetti); Pirdeni: 147, pl. 1, fig. 10.

1988 *Endothyranella sp.*; Pirdeni: pl. 1, fig. 11.

1989 *Endothyranella wirzi* (Koehn-Zaninetti); Gaetani & Gorza: 44, pl. 12, fig. 2.

1989 *Ammobaculites radstadiensis* (sic) Kristan-Tollmann; Gaetani & Gorza: pl. 12, fig. 3. [Note the mistake in the explanation of the plate: the caption of fig. 4 must be referred to fig. 3 and vice versa].

1990 *Endothyranella wirzi* (Koehn-Zaninetti); Ciarapica et al.: 154, Fig. 5E.

1991 *Ammobaculites radstadiensis* Kristan-Tollmann; He & Cai: pl. 1, figs 20–22.

**Explanation of Plate 2**

Figs 1, 2, 3?, 4, 5? *Pilaminina densa* Pantic, samples: fig. 1, H183, stratigraphic section 6; fig. 2, H59, stratigraphic section 5; fig. 3, H55, stratigraphic section 3; figs 4, H185, stratigraphic section 6; fig. 5, GL346, stratigraphic section 4. Figs 6–8. *Endothyra aff. E. salaji* Gazdzicki, samples: fig. 6, H130, stratigraphic section 5; fig. 7, H130, stratigraphic section 5; fig. 8, GL65, stratigraphic section 5. Figs 9, 10. *Endothyra* sp., samples: fig. 9, H171, stratigraphic section 6; fig. 10, H173, Stratigraphic section 6. Fig. 11. *Endoteba* sp., sample: H175, stratigraphic section 6. Fig. 12. *Endothyranella wirzi* Koehn-Zaninetti, sample: H64, stratigraphic section 3.
Remarks. All the specimens assigned to *E. wirzi* have characteristics comparable with those mentioned in the original description by Koehn-Zaninetti (1969), although it was not always possible to observe the coiled stage. The globular embracing chambers, the terminal aperture produced on a neck in the uniserial part and the thin microgranular or finely agglutinating wall are diagnostic characteristics of the species.

The specimen figures in our Pl. 2, fig. 12 and others from the literature show a change of coiling plane in the spiral part, this character confirming the attribution of the species to *Endothyranella* Galloway & Harlton, rather than to *Ammobaculites* Cushman, as originally described.

*Endothyranella wirzi* is known in the Tethyan Middle Triassic, occurring in the Anisian (Koehn-Zaninetti, 1969) and in the Ludinian (Zaninetti, 1976). In Hydra we have recorded the species in the Early Anisian (as high as the Pelsonian).

Occurrence. Gherakina, Eros Limestone s.s., section 3, sample H 64; O. Purgos, Eros Limestone s.s., section 5, samples H 126, H 128, H 129; O. Malies, Eros Limestone s.s., section 6, sample H 176.

Superfamily *Cornuspiracea* Schultzze, 1854
Family *Meandrospiridae* Saidova, 1981
Subfamily *Meandrospirinae* Saidova, 1981
Genus *Meandrospira* Loeblich & Tappan, 1946
*Meandrospira pusilla* (Ho, 1959)

1959 *Trochamminoides pusillus* Ho: 416, pl. 7, figs. 18–29; pl. 8, figs. 1–5.
1959 *Trochamminoides fosculosformis* Ho: 416, pl. 8, figs. 6–10.
1959 *Trochamminoides insolitus* Ho: 416, pl. 8, figs. 11?, 12?, 13–15.
1959 *Trochamminoides cheni* Ho: 416 (in part), pl. 8, figs 18, 19 not figs 16, 17.
1964 *Citella iulia* Premoli Silva: 661, pl. 48, figs 1–20; pl. 49, figs 1–20; pl. 50, figs 1–7; pl. 51, fig. 5.
For other synonyms before 1976, see Zaninetti (1976: 135), 1976 *Meandrospira pusilla* (Ho); Zaninetti: 135, pl. 1, figs 5–7, 9–11, not fig. 8.
1976 *Meandrospira forma pusilla* Farabegoli et al.: 679, figs 6a, b, f.
1976 *Meandrospira forma insolita* or *pusilla* Farabegoli et al.: fig. 6e.
1976 *Meandrospira julia* (Premoli Silva); Urosevic & Dumurdanov: 93, pl. 1, fig. 2.
1976 *Meandrospira pusilla* (Ho); Urosevic & Dumurdanov: 93, pl. 1, fig. 6.
1977 *Meandrospira iulia* (Premoli Silva); Pantic-Prodanovic & Radoscic: 76, pl. 2, figs 6–7.
1977 *Meandrospira pusilla* (Ho); Trifonova: 32, pl. 2, figs 1, 2; pl. 3, fig. 3.

1977 *Meandrospira pusilla* (Ho): Gazdzicki & Smit: 326, pl. 4, figs 8–10.
1978 *Meandrospira pusilla* (Ho): Dager: 55, pl. 2, figs 7, 8.
1983 *Meandrospira pusilla* (Ho): Salaj et al.: 101, pl. 55, figs 1–15.
1983 *Meandrospira insolita* (Ho): Salaj et al.: 100, pl. 55, figs 16–19, 17–19a, 19b.
1983 *Meandrospira cheni* (Ho): Salaj et al.: 99, pl. 56, figs 6, 8, 10, 11, 12, 14–18.
1987 *Meandrospira pusilla* (Ho): Oravecz-Scheffner: 113, pl. 8, fig. 15; pl. 9, figs 1, 2, 4, pl. 11, figs 1, 4, 5.
1988 *Meandrospira pusilla* (Ho): Pirdeni: 146, pl. 1, figs 1–4.
1988 *Meandrospira pusilla* (Ho): He: 89, pl. 2, figs 10, 12.
1988 *Meandrospira immatura* He: 92, pl. 2, figs 13, 14.
1988 *Meandrospira insolita* (Ho): He: 89, pl. 2, figs 15–18.
1988 *Meandrospira pusilla* (Ho): Trifonova & Catalov: 80, pl. 1, fig. 15.
1990 *Meandrospira pusilla* (Ho): Lualdi & Bianchi: 46, Fig. 10 (2a).
1990 *Meandrospira pusilla* (Ho): Baroz et al.: 28, pl. 4, figs 1–6, 9, 11, 12.

Remarks. Although very rare in our samples from Hydra, our few specimens are morphologically referable to some of the type specimens illustrated by Ho (1959) from the Lower Triassic Chialingkiang Limestone (He, 1979, 1988) of South Szechuan (China) (see also above). *M. pusilla* is very common in the lower Triassic of all parts of Tethys. It is associated with *M. cheni* in sample H104, Scythian (probably Spathian) in age, and with *M. dinarica* in the sample GL 155 (Pelsonian in age on the basis of conodonts). The presence of rare specimens of *M. pusilla* in the Anisian has already been established by several authors (i.e. Salaj et al., 1967; Bechstädt & Bradner, 1970; Brönnimann et al., 1973a,b; Farabegoli et al., 1976). In Hydra the coexistence of *M. pusilla* and *M. dinarica* in sediments containing Pelsonian conodonts confirms that even if the acme of *M. pusilla* does occur during the Early Triassic, in favourable palaeoecological conditions (Zaninetti, 1976; Farabegoli et al., 1976; Oravecz-Scheffner, 1987) this species continues into the Anisian.

Occurrence. O. Purgos, Eros Limestone s.s., section 5, sample H 104, H 105; Tsingri Bay, Eros Limestone, upper lithozone, sample GL 155.

*Meandrospira cheni* (Ho, 1959

1959 *Trochamminoides cheni* Ho: 416 (in part), pl. 8, figs 16, 17, not figs 18, 19.
1976 *Meandrospira pusilla* (Ho): Zaninetti: 135, pl. 1, fig. 8.
1976 *Meandrospira forma gigantea* Farabegoli et al.: 679, fig. 6d, g, h.
1983 *Meandrospira pusilla* (Ho): Salaj et al.: 101, pl. 56, figs 1–5, 7?, 9, 13?, 15?, 16?, 17?, 19.

**Explanation of Plate 3**

Figs 1, 2, 3?, 6. *Endothyranella wirzi* Koehn-Zaninetti, samples: fig. 1, H126, stratigraphic section 5; fig. 2, H176, stratigraphic section 6; fig. 3, H129, stratigraphic section 5; fig. 6, H64, stratigraphic section 3. Figs 4, 7, 8. *Ammobaculites sp./Reophax sp.*, samples: fig. 4, H126, stratigraphic section 5; fig. 7, H130, stratigraphic section 5; fig. 8, GL62, stratigraphic section 5. (The vertical scale bar refers to figs 7, 8). Figs 5, 9. *Palaecomiliolina judicariensis* (Premoli Silva), samples: figs 10, 11, H125, stratigraphic section 5; fig. 12, H126, stratigraphic section 5.
Lower and Middle Triassic Foraminifera, Greece
Remarks. In association with rare specimens of M. pusilla in the Scythian of Hydra, we have recorded a few specimens distinguishable from M. pusilla on the basis of a reduced number of zigzag bends, together with a smaller size of test and deuterolocus. Morphologically these specimens are comparable with part of the type-material of Meandrospira cheni (= Trochamminoides cheni Ho, 1959) from China. This species has long been considered a synonym of M. pusilla. Recently, Baroz et al. (1990) asserted the validity of M. cheni, recorded together with M. pusilla, in the Lower Triassic of the Oreokastro mountain belt (Greece) and we agree with them in considering M. cheni a transitional form between M. pusilla and M. dinarica. A phylogenetic lineage within this group had already been commented upon by Farabegoli et al. (1976) and by Oravecz-Scheffer (1987). These authors proposed, however, a link through the informal taxon ‘Meandrospira forma gigantea’ of Farabegoli et al. (1976), recorded in association with both M. pusilla and M. dinarica. As already noted by Baroz et al. (1990), Farabegoli et al.’s specimens of ‘M. forma gigantea’, found in association with M. pusilla, show affinities with M. cheni, whereas those associated with M. dinarica fall within the intraspecific variation of M. dinarica. Specimens of ‘M. gigantea’ figured also by Oravecz-Scheffer (1987) (pl. 13, figs 1–4) seem to belong to dinarica.

In conclusion, we can confirm that in Hydra M. cheni occurs together with rare specimens of M. pusilla at the base of the Eros Limestone s.s., in the Scythian (probably Spatian), and it is never found above this level. In contrast, M. pusilla is present also in the later, Pelsonian portion of Eros Limestone (upper lithozone) together with M. dinarica.

Occurrence. O. Purgos, Eros Limestone s.s., section 5, sample H 105.

Meandrospira dinarica Kochansky-Devidé & Pantic, 1966
(Pl. 3, figs 10–12; Pl. 4, figs 1–13, 15; Pl. 5, figs 1–2)
1966 Meandrospira sp.: Kochansky-Devidé & Pantic: pl. 4, fig. 11.
1966 Meandrospira sp.: Kochansky-Devidé & Pantic, pl. 4, fig. 11.
For other synonymies before 1976, see Zanninetti (1976: 133)
1976 Meandrospira dinarica Kochansky-Devidé & Pantic: Urosevic & Dumarudanov: 93, pl. 2, fig. 1, 2.
1977 Meandrospira dinarica Kochansky-Devidé & Pantic; Pantic-Prodanovic & Radosevic: 79, pl. 4, figs 1, 2.
1978 Meandrospira dinarica Kochansky-Devidé & Pantic: Dager: 54, pl. 2, fig. 6.

1983 Meandrospira dinarica Kochansky-Devidé & Pantic: Salaj et al.: 99, pl. 47, fig. 4; pl. 51, figs 1–8; pl. 52, figs 1–8.
1983 Meandrospiranella (Kochansky-Devidé & Pantic: 1966) n. sp.; Salaj et al.: 28, fig. 8.
1984 Meandrospira dinarica Kochansky-Devidé & Pantic: Hec: 429, pl. 3, figs 4–67, 7–9.
1986 Meandrospira dinarica Kochansky-Devidé & Pantic; Sudar: pl. 19, figs 1–5.
1987 Meandrospira dinarica Kochansky-Devidé & Pantic: Oravecz-Scheffer: 113, pl. 19, figs 17, 27, 37, 4–11, 14.
1988 Meandrospira dinarica Kochansky-Devidé & Pantic; Pirdeni: 1437, pl. 1, fig. 7.
1989 Meandrospira dinarica Kochansky-Devidé & Pantic; Gaetani & Gorza: pl. 10, fig. 2; pl. 1, fig. 5 (not named).
1990 Meandrospira dinarica Kochansky-Devidé & Pantic; Baroz et al.: 30, pl. 5, figs 4–9.
1990 Meandrospira dinarica Kochansky-Devidé & Pantic; Lualdi & Bianchi: 48, fig. 10 (7).

Remarks. The Hydra specimens are close to the original description of the species, even though they are smaller in size (diameter of the test 0.20–0.35 mm) than those figured by Kochansky-Devidé & Pantic (1966). The specimen figured by Kochansky-Devidé & Pantic (1966, pl. 4, fig. 11) and named Meandrospira sp. was distinguished by them because ‘...die kleiner als die M. dinarica und mehr nautiloid ist, dünne Wände und einen noch langsameren Zuwachs hat...’ (1966: 27). The same specimen was considered by Salaj et al. (1983) to be a new species belonging to the genus Meandrospiranella Salaj, but they did not elaborate further in the text. In our view, this specimen is an axial cross-section of M. dinarica whose dimensions and morphology can be considered as intraspecific variation.

M. dinarica has been recorded in the Anisian of all Tethyan regions. In Hydra, M. dinarica occurs in the Early Anisian as high as the Pelsonian.

Occurrence. Gherakina, Eros Limestone s.s., section 3, samples H 60, H 66; Episkopi, Eros Limestone s.s., section 4, sample GL 342; O. Purgos, Eros Limestone s.s., section 5, samples H 125, H 126, H 127, H 128, GL 61, GL 58, GL 59, GL 60; O. Malies, Eros Limestone s.s., section 6, sample H 167; Tsingri Bay, Eros Limestone, upper lithozone, sample GL 155.

‘Meandrospira’ ?deformata Salaj in Salaj, Biely & Bistricky, 1967
(Pl. 5, figs 3–7)

Remarks. In sample GL 334 we have found some specimens consisting of a globular proloculus and an undivided, tubular second chamber irregularly coiled; the wall is porcelaneous. These forms are very close to those

Explanation of Plate 4
Figs 1–4. Meandrospira dinarica Kochansky-Devidé & Pantic, samples: figs 1, 2, H126, stratigraphic section 5; figs 3, 4, H127, stratigraphic section 5. Fig. 5a (left) Meandrospira dinarica Kochansky-Devidé & Pantic; b (right) Endothanella wirzi Kohen-Zanninetti, sample: H178, Stratigraphic section 6. Figs 6–13. Meandrospira dinarica Kochansky-Devidé & Pantic, samples: fig. 6, H128, stratigraphic section 5; fig. 7, H128, stratigraphic section 5; fig. 8, GL59, stratigraphic section 5; fig. 9, GL59, stratigraphic section 5; fig. 10, GL342, stratigraphic section 4; fig. 11, GL60, stratigraphic section 5; fig. 12, GL155, Eros Limestone, upper lithozone; fig. 13, GL155, Eros Limestone, upper lithozone. Fig. 14. Meandrospira pusilla (Ho), sample: GL155, Eros Limestone, upper lithozone. Fig. 15. Meandrospira dinarica Kochansky-Devidé & Pantic, sample: H60, stratigraphic section 3.
figured by Trifonova (1972, pl. 2, figs 4, 5) and Salaj et al. (1983, pl. 54, figs 1–6) and included in the taxon *Meandrospira deformata* Salaj, 1967 by them. Similar specimens have also been identified by Gazdzicki et al. (1975, pl. 7, figs 9–16) as *Meandrospira? deformata* Salaj. In our opinion all these specimens, including those from Hydra, do not correspond in shape and dimension to the holotype of *Meandrospira deformata* as figured originally by Salaj et al. (1967, pl. 2, fig. 3d) and by Salaj et al. (1983, pl. 53, fig. 4). The Hydra specimens were recorded near the base of the Pelsonian substage.

**Occurrence.** Between Episkopi and Aghios Marina, Eros Limestone s.s., section 4, sample GL 334.

Genus *Meandrospiranella* Salaj, 1969

*Meandrospiranella?* sp.

(Pl. 5, figs 8–11; Pl. 6, fig. 1)

**Remarks.** Our specimens have been assigned to *Meandrospiranella* with reservation because only a slight tendency to uncoil can be observed. The Hydra species, at present left in open nomenclature, can be distinguished in having a larger test (0.55–0.6 mm) and deuterolocular tendency to uncoil can be observed. The Hydra species, at present interpreted as original by Limongi et al. in Salaj (1987) to be synonymous with *T. mesotriasica*. In fact, the diagnostic parameters of *T. lataxis* fall within the intraspecific variation of *mesotriasica*, as originally given by Koehn-Zaninetti.

*T. mesotriasica* is known from the Middle Triassic of many Tethyan regions (Zaninetti, 1976): the Balkans, Kocaeli Peninsula (Turkey), Carpathians (Czechoslovakia, Hungary), Southern Apennines (Italy), and Guansh and Sichuan Provinces (China). In Hydra it has been found in association with an Ilyrian conodont fauna characterized by *G. excelsa* and *G. tethydis* (see above).

**Occurrence.** Vlichos, Han Bulog Limestone., sample H 4.

*Turritiglomina magna* (Urosevic, 1981) (Pl. 6, fig. 2)

1977 ‘*Turritiglomina* mesotriasica’ Koehn-Zaninetti; Urosevic: pl. 1, figs 1–9, 10?, 11–15.

1981 *Turritiglomina magna* Urosevic: 114, pl. 2, figs 1–2

1987 *Turritiglomina mesotriasica* (Koehn-Zaninetti); Limongi et al.: 13, figs 2A, B.

1987 *Turritiglomina mesotriasica* (Koehn-Zaninetti), forme B, ou *Turritiglomina* n. sp., ou *Turritiglomina* n. sp. ou *Turritiglomina*?; Zaninetti et al.: 177, pl. 1, fig. 2.

1988 Glomoturritiglomina magna (Urosevic); Urosevic: 377, pl. 2, figs 1, la–5.

1990 *Turritiglomina magna* (Urosevic); Ciarpica et al.: figs 4B, C.

1990 cf. *Turritiglomina magna* (Urosevic) (forme B?); Zaninetti et al.: 295, pl. 1, figs 4, 7, 8?.

1990 *Turritiglomina magna* (Urosevic) (forme B?); Zaninetti et al.: pl. 1, figs 5, 6.

1990 cf. *Turritiglomina magna* (Urosevic) (forme A?); Zaninetti et al.: pl. 1, figs 10–11.

1991 *Turritiglomina guangxiensis* He in He & Cai: 228, pl. 2, figs 15–18, 21–24; pl. 4, figs 1–4, 9.
Remarks. Our specimen is morphologically (particularly dimensions, height 0.4 mm) very similar to Turriglomina magna (Urosevic, 1981) (= Glomoteriellella magna (Urosevic, 1981, 1988)), originally recorded from the Carnian–Norian of the Balkans. Urosevic (1981) claimed to have observed the existence of dimorphism in this species, but the morphological differences of the two supposed generations are not clear. Neither we nor Zaninetti et al. (1990) could recognize dimorphism in our material, but can confirm the occurrence of the species in the Middle Triassic of Hydra and the Southern Apennines (M. Facito Formation act). respectively. In Hydra we have recorded it in the lower part of the Pelsonian.

The Chinese species Turriglomina guangxiensis He (in He & Cai, 1991) is here considered to be a synonym of T. magna, since the morphology and the dimensional parameters are the same in the two species.

Occurrence. O. Purgos, Eros Limestone s.s., section 5, sample GL 57.

Superfamily Miliolacea Ehrenberg, 1839
Family Spiroloculinidae Wiesner, 1920
Genus Palaeomiliolina Antonova, 1959
Palaeomiliolina judicariensis (Premoli Silva, 1971)
(Pl. 3, figs 5, 9)
1971 Agathammina judicariensis Premoli Silva: 343, pl. 29, figs 1, 2, 3, 5, 6.
1975 Agathammina judicariensis Premoli Silva; Gazdzicki et al.: pl. 6, figs 1–2.
1976 Agathammina judicariensis Premoli Silva; Zaninetti: 132, pl. 5, figs 8, 9.
1977 Agathammina judicariensis Premoli Silva; Urosevic: pl. 2, figs 1–5.
1979 Palaeomiliolina judicariensis (Premoli Silva); Trifonova: 9, pl. 1, figs 1–6.
1987 Palaeomiliolina judicariensis (Premoli Silva); Oravecz-Scheffer: pl. 15, fig. 14.

Remarks. In 1971 Premoli Silva described a new bilocular foraminifer coiled in about five planes (as in Quinquiloculina) and with two or three planispiral whorls, assigning this taxon to Agathammina Neumayr, 1887. Later, Trifonova (1979) referred this species to the genus Palaeomiliolina Antonova, 1959, because her new analysis demonstrated that it has chambers with a quinquiloculine coiling which sometimes have a tendency to a sigmoidine arrangement in the last whorls. The chamber arrangement of our specimens is in agreement with the generic placement of judicariensis within Palaeomiliolina as proposed by Trifonova (1979). According to Premoli Silva (1971), P. judicariensis appears in the Pelsonian at about the same time as the disappearance of Meandrospira dinarica (= Citarella dinarica in Premoli Silva, 1971). Trifonova found P. judicariensis in Pelsonian limestones in Bulgaria and gazdzicki et al. (1975) and Oravecz-Scheffer also recorded the species in the Pelsonian (the Muschelkalk) of Poland and Hungary (Felsöö Limestone), respectively. In Hydra, P. judicariensis and M. dinarica occur at the same stratigraphical level in the Pelsonian substage; even if we have never found the two species in the same sample, it is possible that the two could coexist.

Occurrence. Episkopi, Eros Limestone s.s., section 4, sample GL346; O. Malies, Eros Limestone s.s., section 6, sample H 177.

Suborder Spirillinina Hohenegger & Piller, 1975
Family Spirillinidae Reuss & Fritsch, 1861
Genus Turrispirillina Cushman, 1927
Turrispirillina prealpina Zaninetti & Brönnimann (Zaninetti, Brönnimann & Baud, 1972a)
(Pl. 6, figs 6, 7)
1972a Turrispirillina prealpina Zaninetti & Brönnimann in Zaninetti, Brönnimann & Baud: 480, pl. 6, figs 1–18; pl. 7, figs 4–7, 9, 10; pl. 9, figs 21, 22, 25–35; pl. 11, fig. 14.
1976 Turrispirillina prealpina Zaninetti & Brönnimann; Zaninetti: 155, pl. 14, figs 26–30.
1983 Turrispirillina prealpina Zaninetti & Brönnimann; Salaj et al.: 131, pl. 7, fig. 1.

Remarks. Our specimens are very similar to those described by Zaninetti et al., 1972a. The test is evolute with a high spire, but our cross-sections are always oblique, so that it is not possible to evaluate the exact apical angle, which however, appears to be fall within the same interval (90–140°) given by the original authors. The ratio of height versus basal diameter is about 1, allowing T. prealpina to be distinguished from T. minima Pantic, whose ratio ranges from 1:2 to 2:3. The distinction between these two species is also based on the fact that, in section, the deuterolocus of T. minima is not as circular as that of T. prealpina and the coiling is semi-involute.

The calcareous hyaline wall of T. prealpina is not well preserved in our material, because of the presence of an encrusted surface.

According to Zaninetti et al. (1972a, b), T. prealpina occurs in the late Anisian of the Swiss Prealps. In Hydra, it occurs in Early Anisian to Pelsonian strata.

Occurrence. O. Purgos, Eros Limestone s.s., section 5, samples GL 60, H 127.

Superfamily Involutinacea Bütschli, 1880
Family Triadodiscidae Zaninetti, 1984 or Aulotortidae Zaninetti, 1984
Subfamily Triadodiscinae Zaninetti, 1984 or Aulotortiniae Zaninetti, 1984

Explanation of Plate 6
Fig. 1. Meandrospiranella sp., sample: GL342, stratigraphic section 4. Fig. 2. Turriglomina magna (Urosevic), sample: GL57, stratigraphic section 5. Fig. 3. Turriglomina mesotriusica (Koehn-Zaninetti), sample: H4, Han Bulog Limestone, Vilchos, Figs 4, 5. Spirillina sp., sample: GL60, stratigraphic section 5. Figs 6, 7. Turrispirillina prealpina Zaninetti & Brönnimann, samples: fig. 6: GL60, stratigraphic section 5; 7, H127, stratigraphic section 5. Fig. 8. Triadodiscus or Aulotortus n.sp., sample: H185, stratigraphic section 6. (The vertical scale refers to fig. 8). Fig. 9. ?Lamelliconus sp., sample: GL60, stratigraphic section 5. Fig. 10. Triadodiscidae or Aulotortidae, sample: GL61, stratigraphic section 5.
Lower and Middle Triassic Foraminifera, Greece
Genus *Triodiscus* Piller, 1983 or *Aulotorus* Weynschenk, 1956

*Triodiscus* or *Aulotorus* n. sp.

(Pl. 6, fig. 8)

1973a *Involutina sinuosa pragsoides* (Oberhauser): Brönnimann et al.: 315, pl. 19, figs 1–18; pl. 20, figs 1–7, 9, 10, 13, fig. 1a–t.

1975 *Involutina sinuosa pragsoides* (Oberhauser): Gazdzicki et al.: pl. 10, fig. 9.

**Remarks.** The specimens from Hydra are like those figured by Brönnimann et al. (1973a) from the Anisian of Bosnia-Herzegovina and named by them as *Involutina sinuosa pragsoides* (Oberhauser). In our opinion, the new species can be distinguished from *I. sinuosa pragsoides* in having much larger test diameter (1.1 mm), a very small diameter of the deuteroloculus (0.05 mm in the early whorls) and a marked peculiar rhomboid shape. A detailed revision of the material by Brönnimann, Cadet & Zaninetti (1973a) is necessary before this species can formally be described and assigned to the correct genus.

It is also present in the Pelsonian Muschelkalk of Southern Poland (Gazdzicki et al., 1975); in Hydra, on the basis of the presence of the conodonts *G. b. bifurcata, G. b. hanbulogi* and *G. bulgarica*, its occurrence is Late Pelsonian in age.

**Occurrence.** O. Purgos, Eros Limestone s.s., section 5, sample H 103.

**Lituolidae of uncertain generic classification**

(Pl. 3, figs 4, 7–8)

In our material there are several sections of foraminifera with agglutinated or microgranula walls, often large in size. These have been assigned to *Ammobaculites sp./Reophax sp.* as their cross-sections do not show the initial part, which could be planispiral or uniserial. Sometimes in the literature, authors (i.e. Premoli Silva, 1971; Salaj et al., 1983, Oravecz-Scheffer, 1987; Trifonova, 1992) have assigned these specimens to *Earlandinita*. We do not agree with this assignment because the initial spire, which is the main diagnostic character used to distinguish the different genera, is never recognizable.

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