

Sarfatiella sarda (Pecorini, 1972) n. comb. (Dasycladaceae) from the basal Lower Cretaceous of NW Sardinia and some comments on *Lacrymorphus* Radoičić and *Humiella* Sokač & Velić

Antonietta CHERCHI

Dipartimento di Scienze della Terra
Università di Cagliari

Rolf SCHROEDER

Geologisch-Paläontologisches Institut
Universität Frankfurt

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ABSTRACT — *Isolated calcitic bodies from the basal Lower Cretaceous of Punta Malrepos (Nurra, NW Sardinia) are described and interpreted as ampullae of Lacrymorphus catenaeformis sardus Pecorini, 1972. This taxon is attributed to the dasycladacean genus Sarfatiella Conrad & Peybernès, 1974. Some comments on the wall structure of Lacrymorphus Radoičić and Humiella Sokač & Velić, recently discussed by Masse et al. (1984), are made.*

RIASSUNTO — [*Sarfatiella sarda* (Pecorini) n. comb. del Cretaceo inferiore basale della Sardegna nord-occidentale e osservazioni su *Lacrymorphus* Radoičić e *Humiella* Sokač & Velić] — *Vengono descritti elementi calcitici isolati provenienti dalla parte basale del Cretaceo inferiore di Punta Malrepos (Nurra, NW Sardegna), che vengono interpretati come ampullae di Lacrymorphus catenaeformis sardus Pecorini, 1972. Questo taxon viene attribuito al gen. Sarfatiella Conrad & Peybernès, 1974. Viene commentata la struttura della parete di Lacrymorphus Radoičić e Humiella Sokač & Velić, discussa recentemente da Masse et al. (1984).*

INTRODUCTION

During the preparation of the 19th European Micropaleontological Colloquium (Sardinia, 1985) a short section was sampled at Punta Malrepos (Capo Caccia near Alghero, NW Sardinia) to show the transition from the lacustrine « Purbeckian » facies to the marine « Urgonian » facies. One of the thin marine intercalations in the uppermost part of the Purbeckian sequence contains abundant small calcitic bodies, which have already been described by Pecorini (1972, p. 383) as the new subspecies *sardus* of the problematic microfossil *Lacrymorphus catenaeformis* Radoičić, 1967. Pecorini found his material in calcareous intercalations within Purbeckian ostracod-bearing marls and cited the new subspecies from two localities: Punta di Torre della Pegna (approx. 1 km north of Punta Malrepos) and Grascioleddu (near the village of Olmedo).

A detailed examination of the material from Punta Malrepos produced new morphological informations and confirmed the proposal of Pecorini that this taxon could be interpreted as a dasycladacean alga. However, a comparison of *Lacrymorphus catenaeformis sardus*

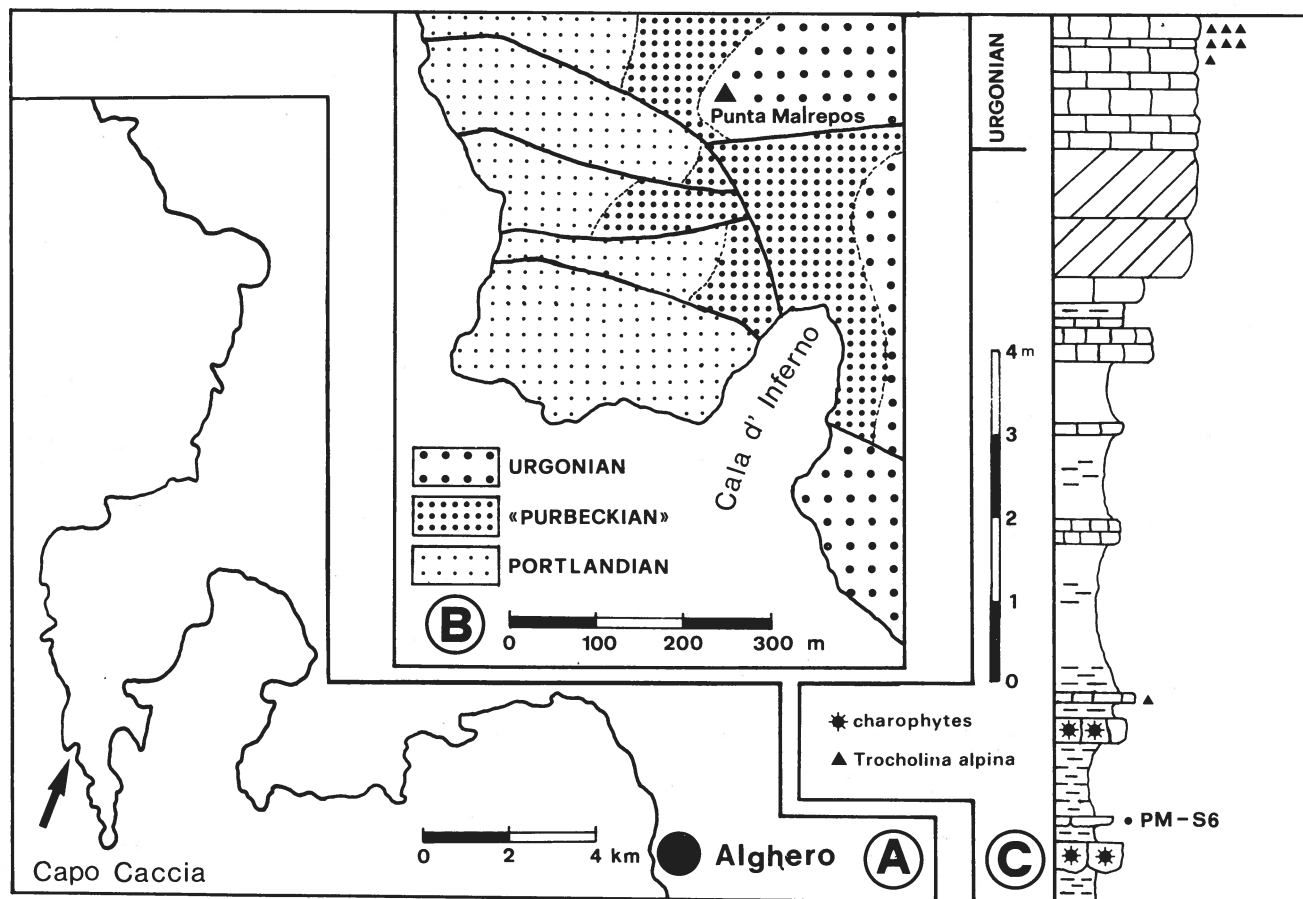
with other dasycladacean genera has shown that this subspecies has to be attributed to the genus *Sarfatiella* Conrad & Peybernès, 1974.

All thin sections containing the specimens described and figured in this paper are deposited at the Institute of Geology and Paleontology of Frankfurt University (Cherchi - Schroeder collection).

STRATIGRAPHIC POSITION OF THE SAMPLE

Punta Malrepos (height 141 m), from which the sample with *Sarfatiella sarda* was taken, is one of the hills forming the Mesozoic coastal chain of the Capo Caccia peninsula, approximately 7 kms. to the west of Alghero [sheet 192 IV S.E. (Capo Caccia) of the Carta d'Italia 1:25.000; see also text-fig.1A]. Immediately to the west of the top of Punta Malrepos, a short section was studied (text-fig. 1B) cutting the uppermost Purbeckian beds and the overlying basal Urgonian limestones.

The Purbeckian of this region (approx. 80 m thick) consists of grey or greyish-green marls and marly limestones, which are very rich in ostracods and charophytes (Colin *et al.* 1985). In particular the upper



Text-fig. 1 - A: Geographic position of Cala d'Inferno (arrow). B: Geological map of Cala d'Inferno - Punta Malrepos region. C: Stratigraphic position of sample PM-S6 within the Punta Malrepos section (« Purbeckian » - Early Valanginian).

part of the series is characterized by numerous thin marine intercalations containing benthic foraminifera and dasycladacean algae. A good example of such a short marine episode is the 0,10 m thick hard grey-

yellowish limestone layer from which the sample PM S6 with *Sarfatiella sarda* was taken. This layer is situated 6.50 m below the dolomites at the base of the marine Urgonian limestones (text-fig 1-C).

EXPLANATION OF PLATE 1

Sarfatiella sarda (Pecorini) n. comb. - Sections through isolated pear-shaped ampullae.

Berriasian-Early Valanginian of Punta Malrepos (Nurra, NW Sardinia). Sample PM S6.

Fig. 1 - Subaxial section showing the pointed distal end. PM S6-2. x 100.

Fig. 2 - Oblique axial section showing the thin proximal peduncle. PM S6-5. x 100.

Fig. 3 - Axial section through a nearly completely recrystallized ampulla showing the funnel-shaped enlarged opening at the proximal end. PM S6-3. x 100.

Fig. 4 - Oblique axial section showing the opening at the proximal end. PM S6-2. x 100.

Fig. 5 - Subaxial section showing the pointed distal end. PM S6-2. x 100.

Fig. 6 - Oblique axial section showing the passage between the peduncle (from which only the distal part is preserved) and the proximal end. PM S6-3. x 100.

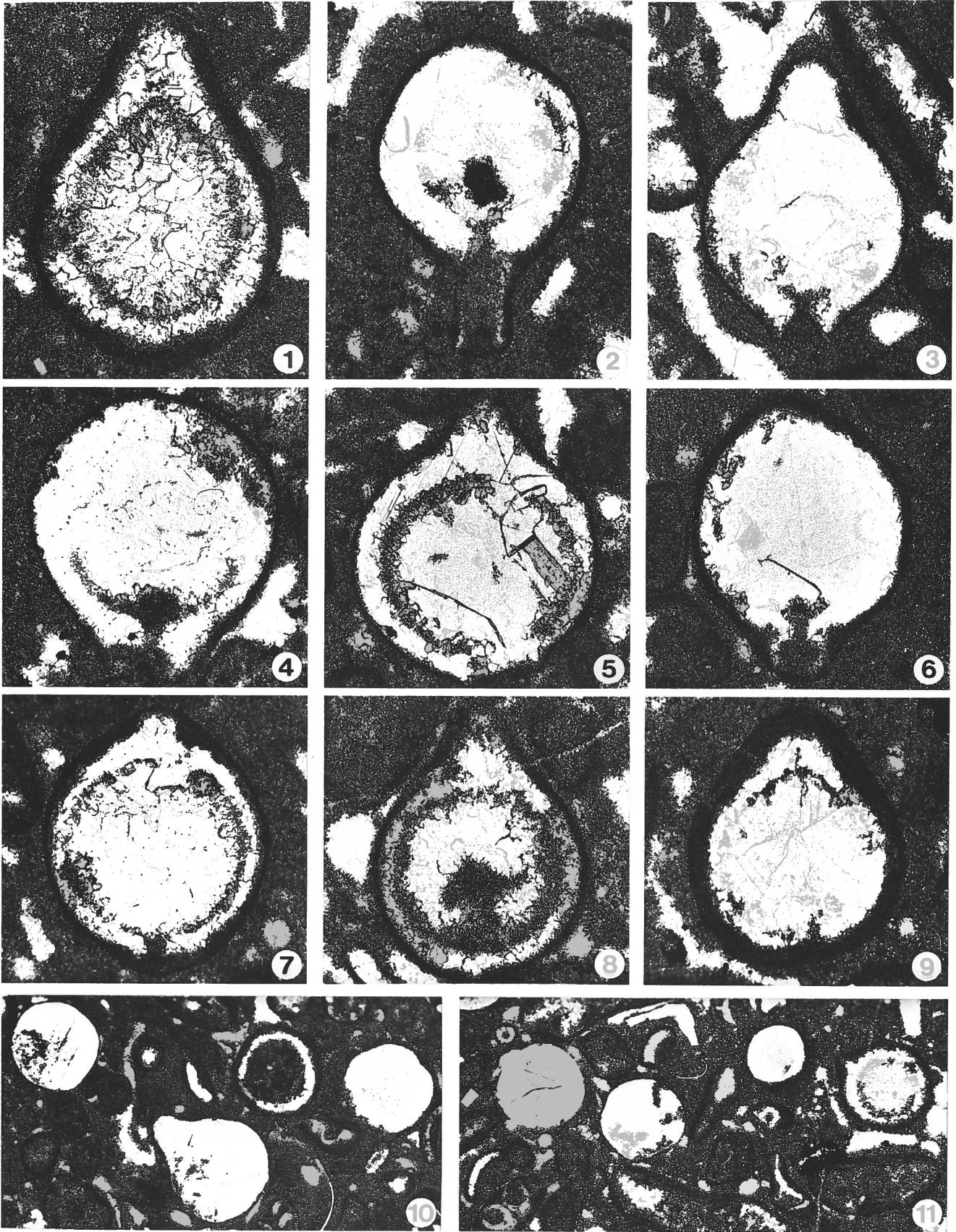
Fig. 7 - Oblique axial section showing the proximal opening. PM S6-5. x 100.

Fig. 8 - Subaxial section showing the pointed distal end. PM S6-2. x 100.

Fig. 9 - Subaxial section showing the pointed distal end. PM S6-5. x 100.

Fig. 10 - Random sections through more or less recrystallized ampullae. PM S6-5. x 40.

Fig. 11 - Random sections through more or less recrystallized ampullae. PM S6-2. x 40.



Sample PM S6 is a bioclastic calcarenite. The clasts (benthic foraminifera, daycladaceans, remains of mollusks, superficial ooids) are embedded in a micrite matrix or in sparite cement. Relatively frequent calcilitic intraclasts contain ostracods and charophytes.

The sample contains the following microflora and microfauna:

Arabicodinium cf. *jurassicum* Dragastan
Cayeuxia sp.
Sarfatiella sarda (Pecorini)
Actinoporella durandelgai (Jaffrezo & Fourcade) (det. F. Barattolo, Napoli)
Salpingoporella sp. (det. F. Barattolo, Napoli)
gyrogonites of charophytes (within the intraclasts)
Feurtillia frequens Maync
Nautilocolina bronnimanni Arnaud-Vanneau & Peybernès
Trocholina alpina (Leupold)
miliolids
ostracods
Favreina sp.
Aeolisaccus dunningtoni Elliott

This assemblage does not contain any important marker which could give a precise age for the sample. However, *Actinoporella durandelgai* was cited from the Berriasian-Lower Valanginian of the Eastern Betic Chains (S Spain) (Fourcade 1973, p. 234). In the Spanish Pyrenees, *Nautilocolina bronnimanni* appears in the Upper(?) Berriasian (Arnaud-Vanneau & Peybernès 1978, p. 73). *Feurtillia frequens* ranges from the uppermost Kimmeridgian to the basal Valanginian (Azéma *et al.* 1977, p. 131).

The lower half of the Purbeckian of Capo Caccia peninsula contains rich ostracod faunas which show strong affinities with assemblages from the Berriasian of Great Britain and Southern France (Colin *et al.* 1985). The lower part of the massive Urgonian limestone overlying directly the uppermost Purbeckian (see text-fig. 1C, upper part) is characterized by *Pseudocyclammina lituus* (Yokoyama), *Pfenderina neocomiensis* (Pfender) and «*Valdanchella*» *miliani* (Schroeder) (Azéma *et al.* 1977, p. 129). The latter species in an excellent Lower Valanginian marker (Azéma *et al.* 1976).

The above faunal data suggest a Late Berriasian (?) - Earliest Valanginian age for the sample PM S6.

DESCRIPTION OF *SARFATIELLA SARDA*
(PECORINI, 1972) N. COMB.

Phylum CHLOROPHYTA

Order DASYCLADALES

Family DASYCLADACEAE

Genus *Sarfatiella* Conrad & Peybernès, 1974

Sarfatiella sarda (Pecorini, 1972) n. comb.

Pl. 1, figs. 1-11

1972 *Lacrymorphus catenaeformis* Radoičić, 1967 *sardus* n. subsp. - PECORINI, p. 383, text-fig. 5a-m.

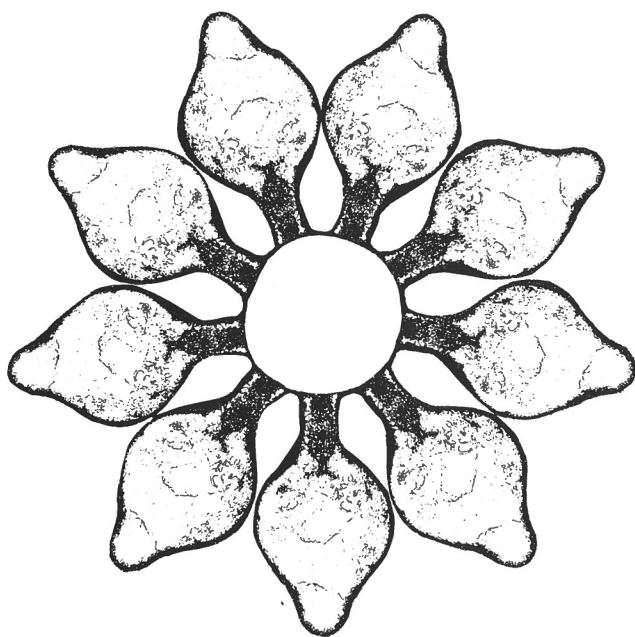
The remains of *Sarfatiella sarda* found in the sample PM S6 are exclusively represented by isolated ampullae which are irregularly dispersed in the sediment (pl. 1, figs. 10-11). This state of preservation is comparable to that of *Coniporella piriformis* Sokač & Velič, whose isolated ampullae have been erroneously interpreted as complete specimens. More or less complete whorls of *S. sarda*, as they have been figured by Pecorini (1962, text-figs. 5e-d, f), seem to lack in our sample.

The ampullae of *S. sarda* are pear-shaped and consist of a globular proximal part passing into a short pointed distal part. This orientation can be deduced from the position of the ampullae within a whorl (Pecorini 1972, text-figs. 5b, f). The calcitic wall of the ampullae is relatively massive with a thick inner sparite layer and a generally thinner outer micritic layer (pl. 1, figs. 1-6). The inner cavity is filled with coarsely grained calcite, but its extreme proximal part sometimes contains a small quantity of micritic sediment, which has penetrated into the ampulla (p. 1, figs. 4, 6). This cavity seems to be limited to the globular part of the ampullae (pl. 1, figs. 1, 5, 8-9), but an exactly axial section figured by Pecorini (1972, text-fig. 5g) shows that a small prolongation extends to the pointed distal part.

A partial or complete recrystallisation has more or less destroyed the inner structures of the ampullae (pl. 1, figs. 3-4, 6), so that the boundary between the wall and the inner cavity cannot be located.

According to Pecorini (1972, p. 383), every ampulla connects immediately with the axial cavity of the thallus by a simple perforation situated at the proximal pole. It is still uncertain if the distal pole of the ampullae is perforated. The proximal perforation, which is sometimes enlarged outwards in the form of a funnel (pl. 1, fig. 3), could be observed in our specimens (see also pl. 1, figs. 4, 6-7). However, one almost axial section (pl. 1, fig. 2) shows a well developed cylindrical peduncle at the base of an ampulla, which was unknown until now. The distal part of another peduncle is visible at the base of the ampulla figured on pl. 1, fig. 6. The very thin wall of the peduncle associated with strong current activity seem to be responsible for the fact that this fragile structural element is nearly always detached or destroyed.

The discovery of a peduncle at the base of the ampullae lead to a new reconstruction of the whorls of *S. sarda* (text-fig. 2), in which the central cavity is much more narrow, as it was believed by Pecorini. In this reconstruction the number of ampullae per whorl (9-10) is deduced from the transverse section of some thalli figured by Pecorini (1972, text-figs. 5a-b, d).



Text-fig. 2 - Schematic perpendicular section of *Sarfatiella sarda* (Pecorini, 1972) n. comb. The model is based upon a combination of the ampullae figured on pl. 1, figs. 2-3.

Dimensions (in mm):

- Diameter of the thallus (after Pecorini): 1.5
- Length of ampullae: 0.5-0.65
- Diameter of ampullae: 0.35-0.45
- Thickness of wall: 0.05-0.065
- Diameter of the basal perforation of ampullae: 0.03
- Length of peduncle (pl. 1, fig. 2): 0.16
- Diameter of peduncle: 0.11
- Thickness of wall of the peduncle: 0.025

We have chosen as lectotype of this species, the transverse section of a nearly complete whorl, figured by Pecorini (1972, text-figs. 5b, f).

GENERIC ATTRIBUTION OF
SARFATIELLA SARDA

Pecorini (1972, p. 383) erected this taxon as a new subspecies of the problematic microfossil *Lacrymophus catenaeformis* Radoičić, 1967, the latter being distinct by its larger dimensions. He believed that *L. catenaeformis* could be interpreted as a dasycladacean alga. Recently, Masse *et al.* (1984, p. 141) came to the same conclusion, apparently without knowledge of the statement of Pecorini.

Lacrymophus catenaeformis, described by Radoičić from the Neocomian of Montenegro and Herzegovina (Jugoslavia), is described by its author (1967,

p. 278) as « more or less regular spherical or oval hollow bodies which in their best state of preservation occur as circular chain-like series of oval-spherical agglomerations, or in open chain-like series, or less often, scattered over a small area. Exceptionally, a very thin wall of these bodies can be vaguely discerned. Their interior is filled with coarse-grained crystalline calcite. The diameter of the calcitic bodies ranges from 0,56 to 1,45 mm and is not uniform in the same series. The diameter of closed series comprising eight to twelve bodies is between 4 and 8 mm.

Although in our opinion there is no doubt that *Lacrymophus catenaeformis* is a dasycladacean alga, its bad state of preservation prevents a sufficient diagnosis and comparisons with other dasycladacean algae. For this reason it seems to be impossible to attribute the taxon *sarda* to this problematic form.

We find it more acceptable to consider the Sardinian form as a species of the well known genus *Sarfatiella* Conrad & Peybernès, whose generotype *S. dubari* Conrad & Peybernès, 1974 was described from the Dogger of the Central and Eastern Pyrenees. This genus is characterized by a cylindrical axial siphon bearing tight whorls of spherical or subspherical ampullae. These ampullae connect with the axial siphon by a peduncle or a proximal narrowing, whose length is shorter than the one of the corresponding ampullae.

Sarfatiella sarda is distinguished from *S. dubari* by its pointed distal part of the ampullae and also by the larger dimensions of all its structural elements. Conrad & Peybernès (1974, pp. 304-305) have given the following sizes (in mm) for *S. dubari* (in brackets: the corresponding sizes of *S. sarda*):

- Diameter of the thallus: 0.32-0.42 (1.5)
- Number of ampullae per whorl: 8-9 (9-10)
- Diameter of ampullae: 0.09-0.12 (0.35-0.45)
- Diameter of peduncle: 0.016-0.023 (0.11)
- Length of peduncle: 0.016-0.039 (0.16)

REMARKS ON THE RELATIONS BETWEEN *HUMIELLA* SOKAČ & VELIĆ AND *LACRYMOPHUS* RADOIČIĆ

The genus *Humiella* with its type-species *H. teutae* was described by Sokač & Velić (1981) from the Neocomian of Southern Herzegovina (Jugoslavia). According to these authors, this genus « primarily consisted of a thin cortical envelope enveloping the soft parts of the plant » (1981, p. 104). It is not possible to define the exact limit between the pear-shaped ampullae and the relatively large peduncles.

Conrad (1982) pointed out that there is no essential difference between *Sarfatiella* Conrad & Pey-

bernès and *Humiella*. *H. teutae* is distinguished from *S. dubari* only by its much larger dimensions and the larger and less developed peduncle. For this reason, Conrad regarded *Humiella* as synonym of *Sarfatiella*.

Recently, Masse *et al.* (1984) described under the name *Humiella catenaeformis* (Radoičić) some incompletely preserved dasycladacean whorls and isolated ampullae from the Hauterivian of the province of Bari (Southern Italy). They have observed that the ampullae of the Italian material are perforated and they suppose that the same characteristic is also present in the specimens of *Humiella teutae*, studied by Sokač & Velić (mainly pl. 2, fig. 8), but often destroyed by subsequent recrystallisation of the wall. However, the enlargement of this latter figure is too small to demonstrate the perforate or imperforate character of the ampullae and neither more enlarged specimens figured by Sokač & Velić (pl. 2, fig. 1) nor additional material studied by Masse *et al.* from the type-locality show a perforated wall. Therefore, the generic attribution of the Italian material to the genus *Humiella* seems to be uncertain at present and needs further studies.

After an examination of the type-material of *Lacrymorphus catenaeformis*, Masse *et al.* affirm that also the ampullae of this species are perforated. Unfortunately, this statement is documented neither by any figure nor by any reference to the figures given by Radoičić (1976). Apparently in view of the poor state of preservation of the Yugoslavian material, Masse *et al.* have chosen a specimen of the Italian material as « neotype of the genus » *Humiella*! This enigmatic notion needs clarification. The generotype of *Humiella* can only be *H. teutae*, because this genus is monospecific. If Masse *et al.*, however, mean the type of the species *catenaeformis*, which was never established by its author, it will be obligatory to choose a *lectotype* from the material of Radoičić and not a *neotype* from the Italian material, which is without any nomenclatorial importance for the definition of the species.

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Antonietta CHERCHI

Dipartimento di Scienze della Terra, Università di Cagliari,
Via Trentino 51, I-09100 Cagliari, Italia.

Rolf SCHROEDER

Geologisch-Paläontologisches Institut,
Universität Frankfurt, Senckenberg-Anlage 32-34,
D-6000 Frankfurt a.M., Federal Republic of Germany