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Some remarks on the genera *Palaeodasycladus* (PIA, 1920) PIA, 1927 and *Eodasycladus* CROS & LEMOINE, 1966 ex GRANIER & DELOFFRE, 1993 (Green Algae, Dasycladales)

Einige Bemerkungen zu den Gattungen *Palaeodasycladus* (PIA, 1920) PIA, 1927 und *Eodasycladus* CROS & LEMOINE, 1966 ex GRANIER & DELOFFRE, 1993 (Grünalgen, Dasycladales)

by

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BARATTOLO, F., DE CASTRO, P. & PARENTE, M., 1994. Some remarks on the genera *Palaeodasycladus* (PIA, 1920) PIA, 1927 and *Eodasycladus* CROS & LEMOINE, 1966 ex GRANIER & DELOFFRE, 1993 (Green Algae, Dasycladales). — Beitr. Paläont., **19**:1–11, 1 Figure, 1 Table, 2 Plates, Wien.

Contents

Abstract

In this paper we reconsider the genus *Palaeodasycladus* on the basis of observations carried out on material coming from the type-localities of *P. mediterraneus* and *P. barrabei*.

For *P. mediterraneus* we supply a different interpretation on the type of intusannulation and some remarks on the presence of structures that we interpret as reproductive organs lying inside the branches. Moreover a neotype is designated because the type-material is not present in the PIA's collection.

Our observations on *P. barrabei* led to the conclusion that this species belongs to a different genus: for the presence of modified secondary branches with an alleged reproductive function *P. barrabei* is placed in the genus *Eodasycladus* and the new combination *Eodasycladus barrabei* is proposed.

The status of *P. gracilis* (=*P. mediterraneus* var. *elongatulus*) is uncertain: the question whether the morphotypes showing the characters of *P. gracilis* represent a different taxon or whether they have to be considered as part of the morphological range of *P. mediterraneus* is still unsolved.

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Zusammenfassung

Die Gattung *Palaeodasycladus* wird anhand von Material von den Typus-Lokalitäten von *P. mediterraneus* and *P. barrabei* neu untersucht.

Für *P. mediterraneus* wird eine neue Interpretation des Typus der „Intusannulation" gegeben und Strukturen beschrieben, die als Reproduktionsorgane interpretiert werden, die sich innerhalb der Äste befinden. Zusätzlich wird ein Neotyp festgelegt, weil das Typusmaterial nicht in der PIA-Kollektion wiedergefunden wurde.

Die Beobachtungen an *P. barrabei* führten dazu, daß diese Art in eine andere Gattung gestellt werden muß. Modifizierte sekundäre Äste mit wahrscheinlicher Reproduktionsfunktion erfordern eine Zuordnung zur Gattung *Eodasycladus* und die neue Kombination *Eodasycladus barrabei* wird vorgeschlagen.

Der Status von *P. gracilis* (=*P. mediterraneus* var. *elongatulus*) bleibt unsicher. Die Frage, ob jene Morphotypen, die die Merkmale von *P. gracilis* zeigen, tatsächlich ein eigenständiges Taxon repräsentieren oder ob sie in die morphologische Variabilität von *P. mediterraneus* fallen, bleibt ungelöst.

1. Introduction

The genus *Palaeodasycladus* (type-species *Palaeodasycladus mediterraneus*) was erected by PIA (1920) and subsequently emended by the same author (PIA, 1927). Besides its type-species two more taxa have been ascribed to this genus: *P. barrabei* LEBOUCHÉ & LEMOINE, 1963 and *P. gracilis* CROS & LEMOINE, 1967 (= *P. mediterraneus* var. *elongatulus* PRATURLON, 1966).

In a recent paper DELOFFRE & LAADILA (1990) proposed an emendation both of the genus and of its type-species and, on the basis of their emended diagnosis of

P. mediterraneus, reconsidered the other two taxa of the genus *Palaeodasycladus*. According to these authors *P. barrabei* is a junior synonym of *P. mediterraneus*.

P. barrabei and *P. gracilis*, have been recently validated by GRANIER & DELOFFRE (1993) who designated a lectotype for each of these taxa among the "cotypes" indicated by the original authors. As a consequence the exact citations (art.46.3 ICBN 1988) are now respectively *P. barrabei* LEBOUCHÉ & LEMOINE, 1963 ex GRANIER & DELOFFRE 1993 and *P. gracilis* CROS & LEMOINE, 1967 ex GRANIER & DELOFFRE, 1993.

In this paper we take into consideration the genus *Palaeodasycladus* and the three taxa currently accepted in this genus before the revision by DELOFFRE & LAADILA (1990). Our observations are based on the study of abundant and well preserved material coming from the type-localities of *P. mediterraneus* and *P. barrabei*.

P. mediterraneus is a very common species in Liassic carbonate facies. Its occurrence has been frequently cited but almost nothing has been added to its original description. In this paper we supply some new remarks on *P. mediterraneus*: our observations are only a first step toward a full knowledge of the morphology of this species but they allow to make some comments on the emendation proposed by DELOFFRE & LAADILA (1990).

P. barrabei is a rather rare species; few reports may be found in literature and very few are accompanied by figures. In this paper we supply some new remarks on morphology of *P. barrabei*: a revision of this species is proposed suggesting the transferral to the genus *Eodasycladus* with the new combination *E. barrabei*. Therefore it is implicit that we do not accept to consider *P. barrabei* a junior synonym of *P. mediterraneus* as proposed by DELOFFRE & LAADILA (1990).

The problem of the taxonomic status of *P. gracilis* (= *P. mediterraneus* var. *elongatulus*) is quite controversial. In our opinion this taxon can not be considered either a variety or a subspecies of *P. mediterraneus* but further study is necessary to decide whether it is a different taxon or whether it represents only morphotypes falling in the range of *P. mediterraneus*.

2. Systematic description

Order Dasycladales PASCHER 1931
Family Dasycladaceae KÜTZING 1843
Genus ***Palaeodasycladus*** (PIA 1920) PIA 1927

Palaeodasycladus mediterraneus (PIA 1920) PIA 1927
(Pl. 1, Figs. 1–4)

This species was erected by PIA (1920) with the name *Palaeocladus mediterraneus*; subsequently the same author (PIA, 1927) changed the genus name to *Palaeodasycladus*. The author aknowledged that, owing to the scarce material at his disposal, his description left many doubts and his reconstruction was very hypothetical.

P. mediterraneus is one of the most frequently cited dasycladalean species (see JAFFREZO, 1973 and EMBERGER & JAFFREZO, 1975). Notwithstanding its frequent occurrence and numerous citations almost nothing has been changed from or added to the original description given by PIA (1920) until the recent revision proposed by DELOFFRE & LAADILA (1990). This revision is discussed in more detail in a following paragraph.

Our observations on topotypic material of *P. mediterraneus* have allowed to supply some details on the morphology of this species, partly contrasting with the interpretative reconstruction supplied by PIA (1920), at least for what concerns the intusannulation of the calcareous skeleton. Moreover we report the observation of structures interpreted as reproductive organs lying inside the branches. However many doubts are still present and a detailed description of *P. mediterraneus* will be object of a forthcoming paper.

The type-locality indicated by PIA (1920) for his species is "Mt. Pottina" in the Serra Dolcedorme massif (Calabria, southern Italy). "Serra Dolcedorme" is a place-name indicating the highest peak in the M. Pollino massif; on the contrary the place-name "Mt. Pottina" does not exist and probably was only a mistake for Mt. Pollino. Incidentally this mistake was corrected a few years later by PIA himself (PIA, 1927: caption to Fig. 62).

PIA (1920) figured and described five sections of *P. mediterraneus* but he did not designate a **holotype**. In september 1993, during the "Alpine Algae" meeting, we had the occasion to see the PIA's collection, temporarily stored at the Institut für Paläontologie of the University of Wien. In the catalogues of this collection we could not find any thin section with *P. mediterraneus* coming from the type-locality. All the thin sections listed in the catalogue of this collection under the headings "*P. mediterraneus*" come from localities different from the type-locality indicated by PIA (1920) but those numbered CVIII.1–2, that have no indication as to locality. Unfortunately among the specimens contained in these thin sections we could not find those cited in the protologue and figured by PIA (1920). Therefore it seems that the original material on which the description of *P. mediterraneus* was based is not present in PIA's collection so we are left with no material basis to select a **lectotype** (art.7.4 ICBN).

Our samples coming from the type-locality contain very abundant and quite well preserved specimens of a dasycladalean alga whose dimensions and morphological characters conform almost entirely with those of the specimens figured by PIA (1920). On this basis we propose as a **neotype** for *Palaeodasycladus mediterraneus* PIA, 1920 the specimen figured in Pl. 1 Fig. 1 of this paper. The **neotype** is contained in the thin section BA.108.26 obtained from a sample collected in the Liassic

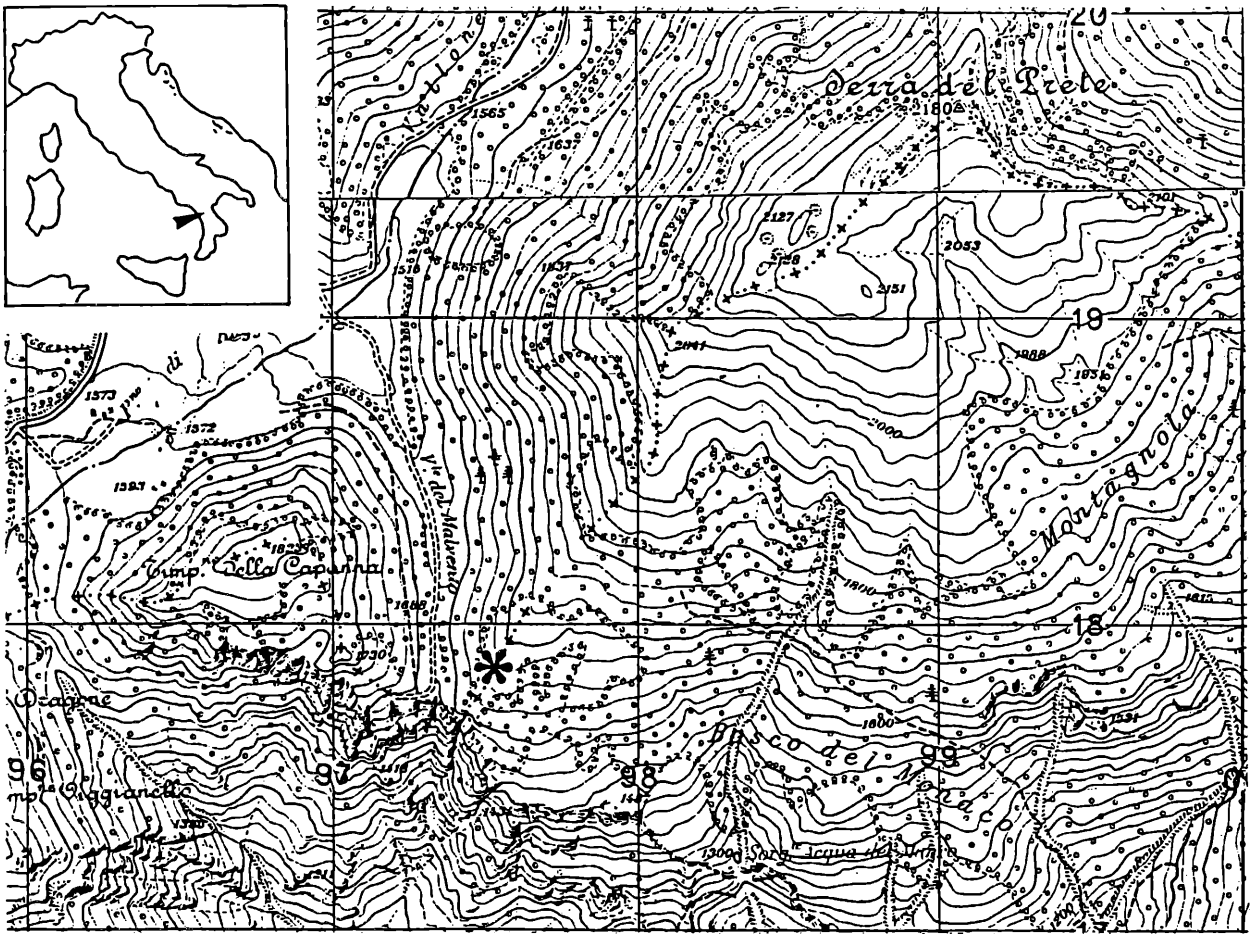

Figure 1: Geographical setting of the type-locality of *Palaeodasycladus mediterraneus* PIA, 1920. The ubication of sample BA.108 is indicated by an asterisk on the topographical map. IGM maps 1:25000 221 IV NE "Viggianello" and 221 IV SE "Morano Calabro" (reproduced by permission of IGM, Istituto Geografico Militare, authorization n.3969, 8 march 1994).

levels outcropping on the SSW slope of Serra del Prete (Mt. Pollino massif, Calabria, southern Italy; see Fig. 1 for geographical setting and ubication of the sample). The sample BA.108 and the thin sections obtained from it are deposited at the Dipartimento di Paleontologia of the University of Naples, collection Barattolo.

R e m a r k s *P. mediterraneus* has a slightly club-shaped very elongated thallus. The wall of the axial stem is not always clearly observable but whenever it is preserved it outlines a rather narrow cylindrical central cavity whose diameter never exceeds 40% of the outer diameter of the thallus. On the contrary several specimens show a quite large central cavity not clearly delimited and passing rather undistinctly to the portion of the thallus occupied by the whorls of branches. We suppose that in these cases the calcification did not attain the central stem wall. The general impression is that whenever the central cavity shows rather large and not well delimited the primary branches and probably the proximal portion of secondary ones are not preserved.

All the specimens with a well delimited narrow central cavity shows three order of branches. Primary branches are always rather stout and stumpy; they are very close eachother, both those lying in the same whorl and those lying in adjacent whorls, and, owing to their low inclination, lay against the central stem wall for most of their lenght. For these reasons their calcification is very faint or, often, is totally lacking. The cavity ensuing from the defective calcification of primary branches originates the feature described by PIA (1920) as intusannulation. Therefore in our opinion this "intusannulation" can not be attributed, as PIA did, to the alternance of calcified and not calcified whorls of primary branches

In several specimens we have observed rounded or elongated structures that we interpret as cladospore reproductive organs lying inside the branches (Pl. 1, Figs. 1 & 3).

The emendation of *P. mediterraneus* by DELOFFRE & LAADILA (1990) – DELOFFRE & LAADILA (1990) described from the Lias of Morocco some specimens of a dasycladalean alga that they attributed to *P. mediterraneus* PIA, 1920. According to these authors this taxon would be characterized by a club-shaped thallus made by a very swollen rounded head attached to an almost cylindrical narrow stem. Primary branches, when preserved, would be more or less

inclined or also perpendicular to the central stem. Secondary and tertiary branches would follow the primary ones. In the swollen upper portion of the thallus only tertiary branches and part of the secondary ones would be observable.

The main differences between the description given by DELOFFRE & LAADILA (1990) and that given by PIA (1920) are the presence of a swollen head connected to a far narrower stem and the occurrence of perpendicular primary branches. This last character is used by the authors to propose an emended diagnosis of the taxon.

Of course since the swollen head, as stressed by DELOFFRE & LAADILA (1990), had never been observed before in *P. mediterraneus*, it seems reasonable to presume that only the characters of the stem can be used to identify their taxon as *P. mediterraneus*.

Among these characters the presence of perpendicular primary branches not only contrasts with Pia's description and with what shown by the specimens figured by him but also it has never been found in the very abundant material, coming from type-locality, studied by us. As additional remarks we would add that: a) the most important biometric parameters of the taxon described by DELOFFRE & LAADILA (1990) are remarkably different from those so far known for *P. mediterraneus*; b) some of the most typical characters of *P. mediterraneus* PIA, as the intusannulation and the well known constrictions of last order branches, are never observable in the specimens figured by DELOFFRE & LAADILA (1990); c) none of the figures given by the authors shows three orders of branches. For all these reasons in our opinion the taxon described by DELOFFRE & LAADILA (1990) should not be ascribed to *P. mediterraneus*.

Genus *Eodasycladus* CROS & LEMOINE 1966 ex GRANIER & DELOFFRE 1993

Eodasycladus barrabei (LEBOUCHÉ & LEMOINE, 1963 ex GRANIER & DELOFFRE 1993) nov.comb. (Pl. 2, Figs. 1–8)

1963 *Palaeodasycladus barrabei* n. sp.; LEBOUCHÉ & LEMOINE, Pl. III, Figs. 1–7.

? 1967 *Palaeodasycladus barrabei* HERAK, Pl. 9, Fig. 5.

non 1968 *Palaeodasycladus barrabei* NIKLER & SOKAC, Pl. I, Fig. 4.

non 1969 *Palaeodasycladus barrabei* NIKLER & SOKAC, Pl. V, Fig. 5.

1970 *Palaeodasycladus barrabei* BOUROULLEC & DELOFFRE, Pl. V, Figs. 1–4, 6, 7; Pl. VI, Figs. 1–3, 7; Pl. V, Figs. 5, 8 (?); Pl. VI, Figs. 4–6 (?).

? 1971 *Palaeodasycladus* cf. *barrabei* COUSIN & NEUMANN, Pl. 2, Figs. 4, 7.

Material Our observations are based on well preserved and abundant material coming from the type locality of *Palaeodasycladus barrabei* that is in the surrroundings of Canders (Languedoc – southern France).

Emended diagnosis Thallus simple, cylindrical, showing ondulation and intusannulation, from very faint to well developed. Three orders of branches. First order branches arranged in very spaced whorls, very short and stout, akrophorous or slightly phloiophorous; always nearly perpendicular to the central stem. Each primary branch bears a tuft of 6–8 secondary branches, more elongated, akrophorous or slightly phloiophorous. Some specimens show very swollen secondary branches whose diameter is considerably larger than that of the other branches of the same tuft; some others show well developed rounded pores that may be interpreted as choristospore reproductive organs at the center of the tuft of secondary branches. Each seconday branch bears a tuft of 4 third order branches consisting of a sequence of three segments separated by distinct constrictions; terminal segments probably forming a cortex.

Remarks The calcareous skeleton of *E. barrabei* may show a faint to well developed ondulation (Pl. 2, Figs. 2–3) whose depressions correspond to the boundaries between tufts of tertiary branches of adjacent whorls. The well developed micritized rim often observable at the outer surface of the calcareous skeleton suggests that the effect of ondulation may have been somewhat lowered or totally obliterated by micritization and abrasion.

As already stated by LEBOUCHÉ & LEMOINE (1963) intusannulation is quite common in this species. It may be from very well developed (Pl. 2, Fig. 8) to very faint or absent. It results in regularly alternating swellings and constrictions of the central cavity with the constrictions corresponding to the points of insertion of primary branches into the central stem and the swellings corresponding approximately to the point lying in the middle between two whorls. There seems to be a direct relation linking distance between whorls and degree of intusannulation but this is only a general relation and not a strict rule. The coupled effect of the depressions ensuing from ondulation and swellings caused by intusannulation individuates zones of minor resistance of the calcareous skeleton. It may therefore be broken into articles each composed of a single whorl (Pl. 2, Fig. 6).

Usually in *E. barrabei* secondary branches of the same tuft have almost the same shape and size but in some specimens we have observed very swollen branches whose diameter is considerably larger than the diameter of the other branches of the same tuft (Pl. 2, Figs. 2 & 7). Moreover in some specimens we have observed very swollen rounded pores that might be interpreted as choristospore reproductive organs lying at the center of the tufts of secondary branches (Pl. 2, Figs. 1 & 5). Both the swollen secondary branches and the alleged reproductive organs seems to be present only in the upper whorls of some large (adult?) specimens and they might represent different stages of reproductive development as already suggested for *E. ogilviae* by CROS & LEMOINE (1966) and by VALET (1979).

In *E. barrabei* the tufts of secondary branches of the same whorl are very close eachother so that it is difficult

	E. barrabei BA.579 (this paper)	*P. barrabei* Lebouche & Lemoine 1963	*E. ogilviae* Cros & Lemoine 1966
D	1.242–2.484 **1.733±0.276** *(51)*	1.6–2.3	1.7–3.5
d	0.460–1.334 **0.725±0.140** *(51)*	0.6	0.6–2
d/D	0.343–0.617 **0.420±0.051** *(51)*		
e	0.322–0.805 **0.504±0.098** *(51)*		
p	0.069–0.184 **0.114±0.026** *(35)*	0.12–0.2	0.15
l	0.115–0.230 **0.147±0.031** *(35)*	0.15–0.2	0.2–0.3
w	21–28 **24.5±2.431** *(12)*	20–25	
h	0.552–0.851 **0.723±0.094** *(14)*	0.7–1.1	**1.1**
p'	0.069–0.230 **0.100±0.030** *(40)*	0.07–0.16	0.1
l'	0.138–0.345 **0.224±0.048** *(38)*	0.2–0.3	0.3–0.4
w'	6 – 8	6	4–6
p"	0.069–0.092 **0.084±0.011** *(26)*	0.07–0.12	0.1
l"	0.092–0.345 **0.243±0.065** *(23)*	0.21–0.3	0.3
w"	4	4	3–5
ls			0.5–0.7
ds	0.230–0.276		0.4

Table 1: Main biometrical parameters of *Eodasycladus barrabei* nov. comb. and *Eodasycladus ogilviae* CROS & LEMOINE, 1966 ex GRANIER & DELOFFRE, 1993. For each parameter the range is given in roman type, mean and standard deviation are given in bold type and the number of measurements in italics, between brackets. All size parameters are given in millimeters. D: outer diameter of the calcareous skeleton; d: inner diameter of the calcareous skeleton; e: thickness of the calcareous wall; p: width of primary branches; l: lenght of primary branches; w: number of primary branches per whorl; h: distance between two subsequent whorls; p': width of secondary branches; l': lenght of secondary branches; w': number of secondary branches per tuft; p'': width of tertiary branches; l'': lenght of tertiary branches; w'': number of tertiary branches per tuft; ls: lenght of swollen pores interpreted as choristospore reproductive organs; ds: diameter of swollen pores interpreted as choristospore reproductive organs.

to recognize the individual tufts in tangential section in order to count the number of branches composing them. LEBOUCHÉ & LEMOINE (1963) indicated that each tuft is composed by 6 branches; our observations suggest that this number may commonly rise up to 8.

Third order branches consist of a sequence of segments separated by distinct constrictions. In some specimens we have distinctly observed that each branch is composed by three segments (Pl. 2, Figs. 3–4); the first two are almost cylindrical whereas the third seems to end in a cup-like swelling. The terminal segments of third order branches probably form a cortex at their distal end. The presence of specimens showing third order branches characterized by 1 or 2 segments only is probably due to abrasion of the outer part of the calcareous skeleton: this is suggested by the frequent evidence of a well developed micritized rim.

The main biometrical parameters of *E. barrabei* nov. comb., measured on the specimens contained in the thin sections of sample BA.579, coming from the type-locality, are given in tab.1. In the same table are given also the biometrical parameters taken from LEBOUCHÉ & LEMOINE (1963) for *P. barrabei* and from CROS & LEMOINE (1966) for *E. ogilviae*.

Discussion The presence of very swollen secondary branches with an alleged reproductive function and of well developed rounded structures interpreted as choristospore reproductive organs has led us to emend the diagnosis of *P. barrabei* and to propose the transferral of this species to the genus *Eodasycladus* with the new combination *E. barrabei*. This character has been distinctly observed only in a few specimens but it is worth remembering that also in *E. ogilviae* CROS & LEMOINE, type-species of the genus, only some large-size specimens show well developed sporangia, some others show swollen secondary branches with an alleged reproductive function, and the remaining specimens are said by the authors to be very similar to *P. barrabei*.

Comparisons: Of course the species that appears to be most closely related to *E. barrabei* is *E. ogilviae*. As already recalled above when erecting this species CROS & LEMOINE (1966) described three different morphologies that they interpreted as belonging to different regions of the same alga or as representing different developmental stages. The authors pointed out that sterile regions (or sterile specimens) of *E. ogilviae* (type I and type II morphologies of their paper) were very similar to *P. barrabei*. Of course our observations on *P. barrabei*, reporting the presence of fertile specimens with swollen

secondary branches or with well developed rounded structures interpreted as choristospore reproductive organs, makes even more evident the similarities between these two species. At present we do not know whether *E. ogilviae* is a different species or whether it should be considered a junior synonym of *E. barrabei*. Comparing our description and figures with those supplied by CROS & LEMOINE (1966) it would seem that the differences, if any, are just a matter of biometrical parameters (see also tab.1). Therefore the problem may be correctly addressed and solved only by means of a statistical comparison of biometrical parameters based on the study of abundant material coming from the type-locality of *E. ogilviae*.

In their recent revision of the genus *Palaeodasycladus* DELOFFRE & LAADILA (1990) stated that *P. barrabei* must be considered a junior synonym of *P. mediterraneus*. Our emendation of *P. barrabei*, with the transferral of this species into the genus *Eodasycladus*, has added further elements leading to question the synonymy proposed by DELOFFRE & LAADILA (1990). In any case we believe that also sterile specimens of *E. barrabei* show plenty of differences from *P. mediterraneus*. The main differences, apart from the biometric values, are found in the inclination of primary branches (perpendicular in *E. barrabei*, inclined upwards in *P. mediterraneus*), in the distance between subsequent whorls (much more spaced whorls in *E. barrabei*), in the different kind of intusannulation, and in the number of secondary branches per primary branch (up to 8 secondary branches per primary branch in *E. barrabei*, only 4–5 in *P. mediterraneus*).

3. The taxonomic status of *Palaeodasycladus gracilis* CROS & LEMOINE 1966 ex GRANIER & DELOFFRE 1993 (= *P. mediterraneus* var. *elongatulus* PRATURLON 1966).

The taxonomic status of *P. gracilis* is quite controversial: this taxon has been given different names and considered by some authors a variety, by some others a species.

PRATURLON (1966) described *Palaeodasycladus mediterraneus* var. *elongatulus* from the Lias of Monte Palombo (Marsica – central Italy). In the original diagnosis he stated explicitly that his taxon would differ from *P. mediterraneus* in having a larger central cavity, more slender and long branches, nearly parallel to the axis, "assimilating filaments" never widening in distal portions.

CROS & LEMOINE (1967) described *Palaeodasycladus gracilis* from the Lias of the Alpe Fanes (Dolomites, northeastern Italy). In a footnote of their paper the authors acknowledged that their species had to be considered a junior synonym of *P. mediterraneus* var. *elongatulus*. Notwithstanding the opinion expressed by CROS & LEMOINE the name *P. gracilis* was used several times by subsequent authors (GRACIANSKY et al., 1967; COLACICCHI, 1967; BRUNN et al., 1970; OTT, 1974; BERNOUILLI et al., 1974).

In the meantime SOKAC & NIKLER (1967) proposed an emendation of the taxon erected by PRATURLON (1966) raising it to the rank of species and transferring it to the genus *Teutloporella* with the new combination *Teutloporella elongatula*. Also the name *T. elongatula* was subsequently used by some authors (CRESCENTI, 1969; CHRISTODOLOU, 1969; RADOICIC, 1970; GUSIC et al., 1971).

DELOFFRE (1972) reinstated the taxon in the genus *Palaeodasycladus* but proposed to raise it to the rank of species with the name *Palaeodasycladus elongatulus*. This solution was adopted by BASSOULLET et al. (1978) who included in the sinonymy of *P. elongatulus* both *P. gracilis* and *T. elongatula*.

Finally DELOFFRE & LAADILA (1990), in their recent revision of the genus *Palaeodasycladus*, lowered again the rank of this taxon considering it a local variety of *P. mediterraneus*.

In a recent paper, mainly devoted to resolve problems of nomenclature, GRANIER & DELOFFRE (1993) considered *P. mediterraneus* var. *elongatulus* a nomen nudum because PRATURLON (1966) did not designate a type. The same occurred with *P. gracilis* for which CROS & LEMOINE did not indicate the **holotype** but designated several "cotypes" The solution adopted by GRANIER & DELOFFRE (1993) has been to validate *P. gracilis* designating a **lectotype**, choosen by Cros and Lemoine among their "cotypes"; therefore *P. gracilis* has been reinstated and *P. mediterraneus* var. *elongatulus* has lost his priority. In any case GRANIER & DELOFFRE (1993, pag. 37) cosidered *P. gracilis* as a younger synonym of *P. mediterraneus*.

As can be seen by the historical notes given above two types of problems have been set by the authors dealing with *P. gracilis*: 1) the generic appartenance *(Palaeodasycladus* vs. *Teutloporella)*; 2) the taxonomic status (species or variety). In our opinion the appartenance of *P. elongatulus* to the genus *Palaeodasycladus* is well documented: its placement in the genus *Teutloporella* may be excluded on the basis of the occurrence of three orders of branches.

Of course the second problem is by far more difficult to solve. Our experience is that specimens showing the characters of *P. mediterraneus* var. *elongatulus*, as expressed by PRATURLON (1966), can be often observed in the same sample along with specimens showing the characters of the typical *P. mediterraneus*. The question whether the morphotypes showing the characters of *P. mediterraneus* var. *elongatulus* represent a different taxon or whether they are to be considered as part of the morphological range of *P. mediterraneus* is not solved in this study.

4. Conclusions

In this paper we have taken into consideration the genus *Palaeodasycladus* and its species. The main results

attained by our research are some new remarks on the morphology of *P. mediterraneus*, type-species of the genus, and of *P. barrabei*. This last species is transferred to the genus *Eodasycladus* with the new combination *E. barrabei*.

For *P. mediterraneus* our description differ from that given by PIA (1920) in several points: some are a matter of different interpretation of the same features observed in thin section (type and origin of intusannulation), some are new remarks on features not observed by previous authors (presence of structures interpreted as reproductive organs inside the branches).

The same may be said for *P. barrabei*: we have supplied some different opinions on some features (number of secondary branches per primary branch, ondulation, morphology of tertiary branches) but also in this case our emendation is mainly justified by the observation of a feature not reported in the original description (presence of modified, swollen secondary branches and of structures interpreted as choristospore reproductive organs).

Both for *P. mediterraneus* and for *P. barrabei* our conclusions are based on material coming from type-locality and wholly conforming with that described and figured by the original authors apart from the different interpretations and the new features leading to our revisions.

In conclusion as a final remark of our paper we wish to stress the obvious advantages of basing taxonomic revisions on material coming from type-locality especially when type-material is not available or scarce and poorly preserved.

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PLATE 1

Palaeodasycladus mediterraneus (PIA 1920) PIA, 1927, middle Lias of Serra del Prete (Pollino massif, Calabria, southern Italy).

Fig. 1. **Neotype**; oblique section. The branching divisions of first order branches are well evident in the middle left portion of the figure. For the rounded structures inside the branches (lower portion of the figure) see what said in the caption to Fig. 3 of this plate. Thin section BA.108.26, magnification 25 x.

Fig. 2. Oblique section. At the center of the upper portion of this figure it is clearly visible a branching division originating the secondary branches;a little above secondary branches divide into tertiary branches. Thin section BA.108.5, magnification 25 x.

Fig. 3. Detail of the lower portion of Fig. 1. Notice the small circular pores inside the larger pores corresponding to the lumen of the branches. These smaller pores may be one or more per branch. In some cases the pores of the branches are obliterated and only the structures lying inside them may be seen. We interpret these smaller pores as corresponding to reproductive structures. Thin section BA.108.26, magnification 100 x.

Fig. 4. Portion of a longitudinal section showing the transition from a region of the thallus where the wall of the central stem is preserved and the pores corresponding to primary branches can be clearly seen to a region where the stem wall is still preserved but primary branches are obliterated by the intusannulation. Thin section BA.108.14, magnification 25 x.

PLATE 1

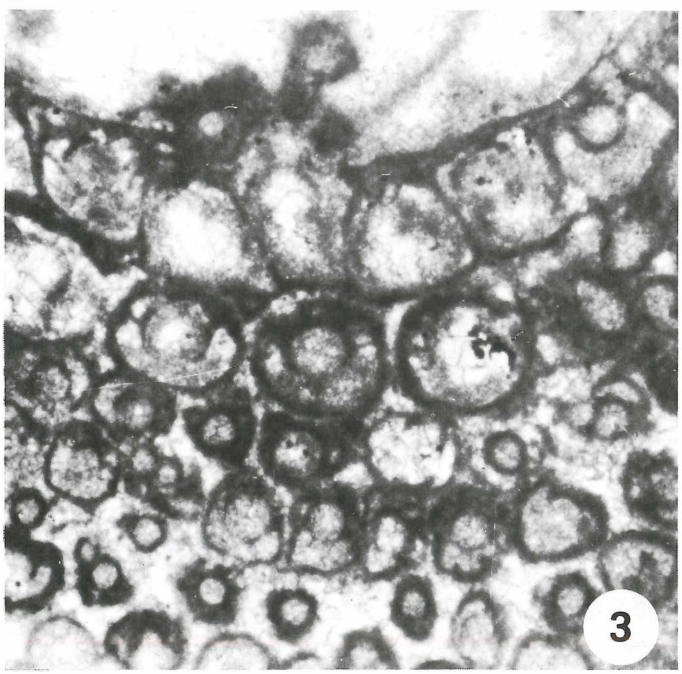

PLATE 2

Eodasycladus barrabei (LEBOUCHÉ & LEMOINE, 1963 ex GRANIER & DELOFFRE, 1993) nov. comb., middle Lias of Canders (St. Chinian, Languedoc, southern France).

Fig. 1. Oblique section. Notice in the upper portion of the figure the large circular pores corresponding to swollen secondary branches (see caption to Fig. 5).The effect of the abrasion is very evident in this specimen showing a distinct micritized rim and a sharp difference between the thickness of the calcareous skeleton on the opposite sides of the central stem. Thin section BA.579b.16, magnification 25 x.

Fig. 2. Axial section of a specimen showing a very faint intusannulation and a faint ondulation. The tufts of secondary branches seem to be composed by 4 branches in a vertical plane. In the upper whorls some of the secondary branches are considerably swollen (see what said below, in the caption to Fig. 7). Thin section BA.579b.30, magnification 25 x.

Fig. 3. Axial section showing faint intusannulation and ondulation. On the left it is clearly visible that tertiary branches are composed by a series of three segments separated by distinct constrictions. Thin section BA.579b.25, magnification 25 x.

Fig. 4. Slightly oblique transversal section. In several points it is clear that there are two secondary branches per primary branch in an horizontal plane; this evidence coupled with that of 4 branches in a vertical plane, desumed from Fig. 2, would lead, for reasons of simmetry, to 8 secondary branches per primary branch. Also in this specimen tertiary branches are composed by 3 segments separated by constrictions. Thin section BA.579b.10, magnification 25 x.

Fig. 5. Detail of Fig. 1. The large circular pores encircled by smaller pores correspond to very swollen secondary branches, probably more than one per tuft, with an alleged reproductive function. Thin section BA.579b.16, magnification 60 x.

Fig. 6. Axial sections of two articles, each composed by a single whorl. The coupled effect of intusannulation and ondulation would favour the mechanical breakage of the calcareous skeleton into separate articles, each composed by a single whorl of branches. Thin section BA.579b.25, magnification 25 x.

Fig. 7. Detail of Fig. 2. Notice that in the central tuft two secondary branches have a diameter that is considerably larger than the diameter of the other ones. These swollen branches could represent a different stage of maturation in the reproductive process leading to the very swollen secondary branches observed in the specimen of Figs. 1 & 5. Thin section BA.579b.30, magnification 60 x.

Fig. 8. Oblique section of a specimen showing a distinct intusannulation with the axial cavity enlarging between the insertion points of subsequent whorls. The micritized rim at the outer surface of the calcareous skeleton is what remains after an almost complete abrasion of third order branches. Thin section BA.579a.6, magnification 25 x.

PLATE 2