GEOLOGIA CROATICA	45	15 - 24	2 Pl.		ZAGREB 1992

UDC 551.762.23:561.26 (497.13) Scietific paper

Two New Species of Calcareous Algae (Dasycladaceae) from the Upper Dogger of Southern Dalmatia (Croatia)

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Key words: Calcareous algae, Dasycladaceae, Upper Dogger, Adriatic carbonate platform, Croatia

Two new species of calcareous algae (Dasycladaceae) are described. One - *Salpingoporella croatica* n.sp. - is characterized by a clyindrical skeleton and undivided, phloiophorous to partly vesiculiferous ramifications, arranged in whorls. The other species - *Uragiella ragusina* n.sp. - also has a cylindrical thallus and ramifications arranged in whorls. The shape of the ramifications, however, varies from nodular or tubercular to atypically pyriform and more rarely, to the *Uragiella*-type. The ramifications are often deformed, which is particulary visible in more distal tangential sections. Both species are found in the same sample which belongs, chronostratigraphically, to the Upper Dogger.

Ključne riječi: Vapnenačke alge (Dasycladaceae), gornji doger, Jadranska karbonatna platforma, Hrvatska

Opisane su dvije nove vapnenačke alge (Dasycladaceae), od kojih jedna, cilindričnog skeleta i pršljenastog položaja nepodjeljenih ogranaka floiofornog do nepotpuno formiranog vesikuliferog tipa, pripada rodu *Salpingoporella* (*Salpingoporella croatica* n.sp.).

Druga vrsta također cilindričnog skeleta i pršljenastog rasporeda nepodjeljenih ogranaka, odlikuje se njihovim varijabilnim oblikom, koji može biti gomoljičast, netipično piriforman ili, rijetko uragielskog tipa. Ogranci su često deformirani, što je posebno vidljivo u perifernom tangencijalnom presjeku. S ovim karakteristikama uvrštena je u rod *Uragiella* i opisana kao vrsta *Uragiella ragusina* n.sp. Obje vrste potječu iz istog uzorka koji kronostratigrafski pripada gornjem dogeru.

Family Dasycladaceae KÜTZING, 1843

Genus *Salpingoporella* PIA in TRAUTH, 1918

Salpingoporella croatica n. sp.

Pl. I; Pl. II, Figs. 1-3.

1970. *Pianella*? sp.-RADOIČIĆ, p.100, pl.I, figs.3-4.

Origin of the name: after my native country,Croatia, to which this species is dedicated.

Type locality: outcrops of Upper Dogger limestone in the road cut about 2 kms from Osojnik in the direction of Grebci village; environs of Dubrovnik, south Dalmatia, Croatia. The Greenwich coordinates of the type locality for both species are 18°4'40''E and 42°43'29''N.

Type stratum: light brown, well-bedded, foraminiferal--algal grainstone/packstone, representing reworked and partly washed out lagoonal sediments belonging to the upper part of the Dogger.

Holotype: Tangential-longitudinal section in thin-section 0-79/16, depicted in Pl. I, Fig. 2. The original material is stored at the Institute of Geology, Zagreb. The available material consists of about 150 thin sections, which contain numerous sections of *S. croatica* and somewhat less numerous sections of *S. ragusina*.

Diagnosis: *Salpingoporella croatica* n. sp. has a cylindrical skeleton, characterized by undivided ramifications which show a tendency toward distal swelling, which makes them more similar to the vesiculiferous than to the phloiophorous type, so that a stalk and a distal swelling can be partly distinguished. The ramifications are arranged into clear whorls which are set rather apart from each other. Near to the central cavity they are vertically aligned, whereas more distally they tend to assume an alternate arrangement.

Description: In the available sections, the cylindrical calcareous skeleton consists of recrystallized calcite, and may sometimes be bent to various degrees. The destroying of the outer surface affected also the pores of the distal ends of the ramifications, resulting-as it is also the case in some other species of this genus - in an indented contour of the outer surface. The central cavity (or "main stem") is delineated by a clear and straight line, which indicates an even inner surface, perforated at the levels of whorls by tiny pore channels of the proximal parts of the ramifications. The axial cavity occupies 30-50% of the total diameter, in some cases even seemingly more, as a result of the destroyed peripheral part of the calcite skeleton.

The ramifications are simple, undivided, and arranged into clearly differentiated whorls, which are set quite far apart from each other; this latter characteristic being not directly dependent upon the strong distal widening of the ramifications. Part of sections with less eroded outer walls indicates that the original shape of the ramifications was the one with an uncompletely differentiated stem and a more clearly pronounced distal swelling (Pl. I, Figs. 5, 9-10; Pl. II, Fig. 1.). Generally speaking, this ramification shape may be spoken of as representing an intermediate form between a well developed phloiophorous and an uncompletely developed vesiculiferous type. A part of the available sections seem to show that the ramifications do reach the outer surface but without producing any noticeable protrusions, or

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protuberances, on it. In tangential sections, regardless of their depth, this shape of the ramifications results in circularly shaped pores whose diameter increases slightly in the first half of the ramification's length and more abruptly in the distal part. The arrangement of pores in successive whorls, with regard to each other, is not always the same in all parts. While in deeper tangential sections the pores appear to be more or less aligned into vertical rows (Pl. I, Fig. 3; Pl. II, Fig. 2), in more shallow, i.e. distal, parts a tendency to an alternating arrangement can be discerned (Pl. II, Fig.1).

Dimensions in mm:

Maximum observed lenght of thallus (L)	3.02	Most frequent values
Outer thallus diameter (D)	0.34-0.92	0.42-0.52
Inner thallus diameter (d)	0.14-0.38	0.24-0.28
Maximum diameter of the ramifications (p)	0.08-0.12	0.08-0.10
Distance between the whorls (h)	0.12-0.16	0.12-0.14
Number of ramifications in a whorl (w)	8-14	12

Similarities and differences: *Salpingoporella croatica* n.sp. belongs to the group of *Salpingoporella* species in which the ramifications widen more or less uniformly going toward their distal ends, which, then, results in circular or approximately rounded sections of the pores. This characteristic distinguishes *S. croatica* most clearly from all those species of the genus which have distally flattened ramifications, either vertically or horizontally, so that the comparison can be restricted to the members of the first mentioned group.

As regards its stratigraphic position, *S. croatica* comes most closely to *S. pygmaea*(PIA), *S. enayi* BERNIER, *S. etalloni* BERNIER, and *S. johnsoni* (DRAGASTAN), all of which seem to appear in the Late Kimmeridgian. In spite of very similar, and in some characters even identical dimensions, *S. croatica* clearly differs from *S. pygmaea*. More precisely, *S. croatica* shows smaller ranges of both the outer and inner diameter values, in general smaller values of the maximum ramification diameter, larger distance between the consecutive whorls, and a smaller number of ramifications per whorl, than *S. pygmaea*. In addition, *S. pygmaea* has more or less obliquely situated, and often but not always arcuately bent ramifications, which widen more or less uniformly all along their length. In contrast, in *S. croatica* the ramifications are perpendicular, or almost perpendicular, to the axial cavity and have a more pronounced distal swelling. The dimensional data of *S. pygmaea* used for comparison are from PIA (1924), NIKLER & SOKAČ (1967), BASSOULET et al. (1978), SOKAČ & NIKLER (1973) and BERNIER (1984). With regard to *S. johnsoni*, *S. croatica* has twice as large the outer and inner thallus diameters, considerably larger ramification diameter, and (considerably) larger distances between the consecutive whorls. Besides, the number or ramifications per whorls in *S. croatica* is about 2/3 of that in *S. johnsoni*.

As regards *S. etalloni* and *S. enayi*, in spite of the general similarity and only slight differences in the outer and inner thallus diameters, *S. croatica* shows a larger variation range in both mentioned characters, and, accordingly, in the axial cavity volume, which in *S. croatica* varies from 30-50% of the outer thallus diameter. Most evidently, the number of ramifications per whorls amounts to only 8-14 in *S. croatica*, whereas it is almost twice as much (about 20) in *S. etalloni*, and even as much as 30 (?) in *S. enayi*. The same is valid with regard to *S. tosaensis* (YABE & TOYAMA), which, according to the discription, has as much as 50 ramifications in a whorl, though a number of about 30 seems more probable, as indicated by Fig. 1c in YABE & TOYAMA (1949). *S. croatica* differs from *S. istriana* (GUŠIĆ) in much larger ramification diameter, three to four times larger the distance between the whorls, and half the number of ramifications per whorl. The differences with regard to *S. adriatica*(GUŠIĆ), as revided and emended by DE CASTRO & DE ROSA (1977), are obvious both in much smaller size and the ramification shape, and, therefore, need not be discussed in detail. Compared to *S. steinhauseri* CONRAD, PRATURLON & RADOIČIĆ, which is characterized by uniformly swelling ramifications, the difference concerns the following characteristics: *S. croatica* has a somewhat larger thallus dimensions, perpendicular to sub-perpendicular ramifications (in contrast to the inclination of about 45° in *S. steinhauseri*), and almost twice as much ramifications per whorl (w=7-8 in *S. steinhauseri*). *S. croatica* differs from *S. cemi* RADOIČIĆ in size; it is much smaller (*S. cemi* has two to three times larger outer and inner thallus diameters and larger ramification diameter), regardless of similar shape, position, and number of ramifications per whorl. It is worth mentioning that *S. cemi*, though originally described from, and hitherto restricted to, Barremian-Aptian deposits, has recently been found also in the Kimmeridgian of the Biokovo Mountain, which means that its stratigraphic range should be accordingly widened. Finally, the differences between *S. turgida* (RADOIČIĆ) and *S. croatica* are visible in that *S. turgida* has a much more robust built, a larger thallus, typically phloiophorous and longer ramifications, as well as a larger number of ramifications per whorl.

Stratigraphic position: *Salpingoporella croatica* n.sp. was found together with the next described species, *Uragiella ragusina* n.sp., in a sample with characteristic microfossil assemblage, indicating the upper part of the Dogger. A more detailed presentation of the stratigraphic position of both species will be given below, after the systematic description of *Uragiella ragusina* n.sp.

Genus *Uragiella* PIA, 1924

Uragiella ragusina n.sp.

Pl. II, Figs. 4-22

1966. *Clypeina* (?) sp. - RADOIČIĆ, pl.CIII, fig.1.

1970. Unknown dasyclad D-41 - RADOIČIĆ, p.100; pl. II, figs. 1-2.

Origin of the name: after the old name of Dubrovnik (Ragusa), in the environs of which the type locality is situated.

Type locality: the same as for *Salpingoporella croatica* (see above).

Type stratum: the same as for *Salpingoporella croatica* (see above).

Holotype: oblique section in thin-section 0-79/92, depicted in Pl. II, Fig. 5. The original material is stored at the Institute of Geology, Zagreb.

Diagnosis: The cylindrical skeleton is characterized by a narrow central cavity and comparatively thick calcareous walls. The undivided ramifications, widened from their very bases, are arranged into whorls. The most pronounced species-specific characteristic is the variable shape of the ramifications which may be globular, sack- or bag-shaped, or similar to the pyriform type, depending on whether they widen or thin out going toward the periphery, and very rarely they look like the *Uragiella*-type. The variable shape of the ramifications in one specimen results in variously shaped pores in tangential section. Thus pores may be circular, four-sided or quadrangular, irregular, or triangular, which influences their arrangement, so that in consecutive whorls the pores may be aligned vertically or, more frequently, they assume a roughly alternating arrangement.

Description: The new species, *Uragiella ragusina*, was found in a sample of algal limestone, associated with numerous remains of other dasyclad species, but itself being represented by a comparatively small number of micritized and/or recrystallized sections. This is the reason why some photomicrographs seem to be out of focus, though they are not. The skeleton is cylindrical and comparatively thick-walled, with a narrow axial cavity (or "main stem"). The outer surface appears in thin -sections as a clear and slightly corrugated line, this being probably the result of slight protrusions of individual ramifications on the outer surface (Pl.II, Figs. 4,5,8). The narrow main stem is also delineated by clear and not always fully straight line, which suggests shallow depressions at the entrances of ramifications. The "main stem" occupies from 20 to maximally 30% of the total (outer) thallus diameter.

The ramifications are undivided and arranged into rather loosely spaced whorls, though the ramifications themselves, being very thick, give the impression of being tightly packed. The ramifications are large and distinctly widened near their base, while more distally they can swell even more, or, on the other hand they can become thinner, so that even in the same specimen they may assume various and irregular shapes (Pl. II, Figs. 5, 8). Only a few of the ramifications resemble the *Uragiella*-type, more often they are sack-like or pyriform. In some sections, some thin and narrow ramifications seem to occur among the more numerous large and robust ones, which may bring one to the wrong conclusion about the existence of two types of ramifications. However, this is due to mutal pressure exerted upon the ramifications of the same or of the adjacent whorls, which causes their deformation, resulting in differently shaped pore sections in tangential sections nearer to the surface of the skeleton (Pl. II, Figs. 8-9, 15). The outer surface is frequently eroded, giving the picture of ramifications open on the outer surface. However, better preserved specimens clearly show that the ramifications remain closed within the calcareous envelope. Though they come close to the rim, they do not reach the outer surface. The arrangement of ramifications in adjacent whorls seem to be more or less alternating, though this picture is frequently obscured due to irregular shapes of the ramifications. Sporadically one can see individual spores within the branches cavities (Pl. II, Fig.4, 15-19, 21).

Dimensions in mm:	
Maximum observed length (L)	2.1
Outer thallus diameter (D)	0.48 - 0.60
Inner thallus diameter (d)	0.12 - 0.20
Length of the ramifications (1)	0.14 - 0.22
Number of ramifications in a whorl (w)	8 - 9

Similarities and differences: The new species has been ascribed to the genus *Uragiella* because of the existence of undivided, simple ramifications, whose shape can vary from sack-like or tubercular to atypically pyriform to sporadically developed *Uragiella*-type. According to the observations of available sections, this species includes also the hitherto uncompletely defined charachter of the genus, i.e. the remifications do not reach the outer surface but, rather, remain closed by their distal ends within the calcareous wall. The genus *Uragiella*, according to the present-day knowledge, has a long stratigraphic range - from the Upper Triassic to the Senonian and includes only a small number of species. With regard to Upper Triassic *Uragiella supratriasica* BYSTRICKÝ the new species is clearly distinguished by its variable ramification shape, much smaller overall dimensions, and one half the number of ramifications per whorl than in *U. supratriasica*. Slight similarity exists with Liassic *U. liasica* LEBOUCHE & LEMOINE, which is only partly evidenced by the existence of sack-like and tubercular ramifications in both species. However, the variability of ramifications, especially in individual specimens, is larger in *U. ragusina* than in *U. liasica*. In addition, *U. liasica* is three to four times larger and has 30% more ramifications per whorl. The differences, between the two, with regard to the type-species, are obvious. *U suprajurassica* (GÜMBEL, 1881) PIA 1925, is much larger and has typical *Uragiella*-type ramifications, and about forty ramification in a whorl.The differences are also very clear when compared to stratigraphically youngest species *U. matzi* (SOKAČ & VELIĆ) since *U. matzi* is larger, has almost typical *Uragiella*-like ramifications, and more ramifications per whorl.

Stratigraphic position: Both species described in this paper, *Salpingoporella croatica* n.sp. and *Uragiella*

ragusina n.sp., derive from the same sample of Jurassic limestone. The sample was collected during a detailed logging and sampling of the Jurassic section extending along the road from Osojnik (north of Dubrovnik) to the Grebci village. The stratigraphic level yielding the sample, as well as the sample itself, which has been determined as the algal-foraminiferal grainstone-packstone, contains a comparatively rich microfossil assemblage, dominated by numerous remains of calcareous algae. Besides new described species in the same sample the most frequent are *Selliporella donzellii* SARTONI & CRESCENTI and *Neoteutloporella gallaeformis* (RADOIČIĆ) BASSOULET et al., 1978, which are here conceived in the broadest sence (sensu lato). At this moment I think that it is still uncertain which form exactly, and with what characteristics actualy corresponds to the originally described *S. donzellii*, and whether *N. gallaeformis* really represents a younger synonym of *S. donzellii*, as suggested by BARATTOLO, DE CASTRO & RADOIČIĆ (1988). Though taxonomically important, this question has no importance when we discuss the stratigraphic attribution. In the continuous sequence of limestone layers overlying the algal bearing level, foraminifera are becoming more and more abundant, while calcareous algae gradually disappear. Thus, about 30-40 meters above the algal-bearing sample, the following foraminiferal species have been identified: *Paleopfenderina salernitana* (SARTONI & CRESCENTI), *Kilianina blancheti* PFENDER *Satorina apuliensis* FOURCADE & CHOROWICZ, *Praekurnubia crusei* (REMOND) and other stratigraphically less important foraminifera. This assemblage is typical of the upper part of the Dogger in all the studied Jurassic profiles in the costal zone, but cannot be more precisely defined in chronostratigraphic terms. The RADOIČIĆ's (1970) statement, that *U. ragusina* occurs in the oldest Malm deposits, accompanied by last occurrence of *Teutloporella* and first appearances of *Cladocoropsis*, does not contradict the above attribution, as the microfossil assemblages on both localities are essentially the same. Rather, it is only the question of where we should place the Dogger/Malm boundary. This, however, does not exclude the possibility of newly described algal species to have a broader stratigraphic range than it has been established in their type locality.

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Dvije nove vrste vapnenačkih alga (Dasycladaceae) iz gornjeg dogera južne Dalmacije (Hrvatska)

B. Sokač

Familija Dasycladaceae KÜTZING, 1843
Rod *Salpingoporella* PIA in TRAUTH, 1918
Salpingoporella croatica n.sp.
Tab. I, Tab. II, sl. 1-3.

1970. *Pianella*? sp. - RADOIČIĆ, p. 100, tab. I, sl. 3-4

Podrijetlo imena: vezano je na ime moje domovine Hrvatske (Croatia) kojoj i posvećujem ovu vrstu.

Tipičan lokalitet: izdanci gornjodogerskih vapnenaca u zasjeku ceste cca 2 km udaljeno od Osojnika prema zaseoku Grebci (šira okolina Dubrovnika, južna Dalmacija, Hrvatska). Koordinate po Greenwich za obje nove vrste su: 18°4'40''E, 42°43'29''N.

Tipični slojevi: svjetlosmeđi dobro uslojeni foraminifersko-algalni grejnstoni do pekstoni iz višeg dijela dogera. Istraženo je oko 150 preparata koji su sadržavali brojne primjerke *S. croatica* i rjeđe *U. ragusina*.

Holotip: tangencijalno-uzdužni presjek sadržan u preparatu 0-79/16 prikazan na tab. I, sl. 2. Originalni materijal čuva se u Institutu za geološka istaživanja, Zagreb.

Dijagnoza: *Salpingoporella croatica* n. sp. cilindričnog skeleta karakterizirana je nepodjeljenim ograncima koji pokazuju tendenciju napuknuća u vanjskom dijelu i generalnim oblikom čine se bliži vesikulifernom nego floifornom tipu, pa se donekle može razlikovati stapka i proširenl distalni kraj. Ogranci su u jasno diferenciranim i međusobno dosta razmaknutim pršljenima. Bliže matičnoj stanici stoje jedan iznad drugoga dok prema vani nastoje postići alternirajući raspored.

Opis: cilindričan vapnenački skelet u analiziranim presjecima redovito je izgrađen od rekristaliziranog kalcita i ponekad je više ili manje povijen. Razarenjem vanjske površine zahvaćene su i pore distalnih krajeva ogranaka, što se u presjecima, kao i kod nekih drugih vrsta ovog roda očituje nazubljenim obrisom vanjskog ruba. Centralni kanal ocrtan je jasnom i pravilnom linijom što ukazuje na ravnu unutarnju površinu, koju u nivou pršljena probijaju pore kanalića ogranaka na njihovom proksimalnom kraju. Matična stanica zaprima 30-50% ukupnog promjera, ali u pojedinim slučajevima prividno i više, ovisno o intenzitetu razorenosti perifenog dijela skeleta.

Ogranci su jednostavni, nepodijeljeni i smješteni u jasno diferencirane i međusobno dosta razmaknute pršljenove, što se u ovom slučaju ne čini u potpunosti ovisnim o odebljanju distalnog kraja ogranaka. Dio presjeka s manje erodiranim stijenkama upućuje na oblik ogranaka s nepotpuno diferenciranom drškom i s izrazitijim napuhnućem na distalnom kraju (tab. I, sl. 5, 9-10; tab. II, sl. 1). Generalno, takav oblik ogranaka mogao bi se označiti kao prelazna forma između dobro razvijenog floiofornog i nepotpuno formiranog vesikulifernog tipa. Prema dijelu raspoloživih presjeka, izgleda da ogranci dosežu do vanjske površine ali bez značajnih ispupčenja na njoj. Takav oblik ogranaka očituje se u tangencijalnim presjecima, neovisno o njihovoj dubini, okruglim porama, kojih je promjer do približno polovine ukupne dužine ogranaka u laganom porastu, uz naglije povećanje u vanjskom dijelu. Međusobni položaj ogranaka susjednih pršljenova nije uvijek u svim dijelovima jednak. U dubljim tangencijalnim presjecima pore su više ili manje u vertikalnim nizovima (tab. I, sl. 3; tab. II, sl. 2), dok se prema distalnom kraju zapaža tendencija ka alternirajućem rasporedu (tab. II, sl. 1).

Dimenzije su navedene u engleskom tekstu.

Sličnosti i razlike: *Salpingoporella croatica* n.sp. pripada skupini salpingoporela kod kojih ogranci više ili manje ravnomjerno odebljavaju prema distalnom kraju, pa se u tangencijalnim presjecima odlikuje okruglim ili približno okruglim porama. Ovom značajkom *S. croatica* jasno se razlikuje od onih vrsta ovog roda, kod kojih su ogranci sploštenl bilo u veritkalnom ili horizontalnom smjeru, pa će se njezina usporedba ograničiti na vrste prvospomenute skupine.

Vrsti *S. croatica* stratigrafskim položajem najbliže su *S. pygmaea* (PIA), *S. enayi* BERNIER, *S. etalloni* BERNIER i *S. johnsoni* (DRAGASTAN) kojih su prve pojave poznate iz gornjeg kimeridža. *S. croatica* unatoč vrlo sličnih, a u pojedinim elementima i identičnih dimenzija, očito se razlikuje od *S. pygmaea*. U odnosu na broj analiziranih primjerka, *S. croatica* pokazuje manji raspon variranja vrijednosti vanjskog i unutarnjeg promjera, općenito manju vrijednost maksimalnog promjera ogranaka, veću udaljenost susjednih pršljenova i manji broj ogranaka u pršljenu, nego što je to u *S. pygmaea*. Razlike među ovim vrstama naznačene su i više ili manje koso položenim, i premda ne uvijek, ali često, lučno povijenim ograncima kao i njihovim približno ravnomjernim odebljanjem prema vanjskom kraju kod *S. pygmaea*, dok su u *S. croatica* ogranci okomiti ili subokomiti s izrazitijim odebljanjem u njihovom završnom dijelu, Za usporedbu poslužile su dimenzije koje su u svojim radovima za *S.pygmaea* naveli PIA (1924), NIKLER & SOKAČ (1967), BASSOULLET et al. (1978), SOKAČ & NIKLER (1973) i BERNIER (1984). *S. croatica* u odnosu na *S. johnsoni* dvostruko je većeg vanjskog i unutarnjeg promjera, znatno većeg promjera ogranaka i njihove međusobne udaljenosti sa susjednim pršljenovima, koji osim toga u *S. croatica* nose za trećinu manji broj ogranaka nego u *S. johnsoni*. Prema vrstama *S. etalloni* i *S. enayi*, uz općenitu sličnost ili, barem, male razlike u pogledu vrijednosti vanjskog i unutarnjeg promjera, *S. croatica* pokazuje veću

variabilnost u ukupnom rasponu iznosa vanjskog i unutarnjeg promjera i zapremini "matične stanice", koja u ove vrste iznosi 30-50%. Vidljiva razlika ovdje opisane s dvije prethodno spomenute vrste izražena je brojem ogranaka jednog pršljena, koji za ovu vrstu iznosi 8-14, a približno 20 za *S. etalloni*, odnosno 30? za *S. enayi*. Slično izražena je razlika i prema *Salpingoporella tossaensis* (YABE & TOYAMA) kod koje vrijednost w prema originalnom opisu iznosi 50, dok poprečni presjek (YABE & TAYAMA, 1949, sl. 1c) sugerira približno brojku od 30. *S. croatica* u odnosu na *Salpingoporella istriana* (GUŠIĆ) razlikuje se znatno većim promjerom ogranaka, tri do četiri puta većom udaljenošću susjednih pršljenova i do dvostruko manjim brojem ogranaka u pršljenu. Od vrste *Salpingoporella adriatica* (GUŠIĆ), koje su dopunu dali DE CASTRO & DE ROSA (1977), vrsta *S. croatica* jasno se razlikuje ukupno znatno majim dimenzijama i oblikom ogranaka. U odnosu na vrstu *Salpingoporella steinhauseri* (CONRAD, PRATURLON & RADOIČIĆ), koju karakterizira ravnomjerno odebljavanje ogranaka i njihov izrazito kosi položaj prema dužoj osi talusa (kut aproksimativno iznosi 45°) te 7-8 ogrnaka u pršljenu. *S. croatica* razlikuje se nešto većim dimenzijama talusa, okomitim do subokomitim položajem ogranaka i njihovim većim brojem u pršljenu. Oblikom i položajem ogranaka, te njihovim brojem u pršljenu, *S. croatica* slična je vrsti *Salpingoporella cemi* (RADOIČIĆ), koja se međutim razlikuje dva do tri puta većim promjerom ogranaka. *S. cemi*, dosada ograničena na barem-apt, prema novim nalazima u kimeridžu Biokova proširuje svoj ukupni stratigrafski raspon. Usporedba *S. croatica* sa *Salpingoporella turgida* (RADOIČIĆ) upućuje na razlike izražene većim talusom, izrazito floiofornim i dužim ograncima te njihovim većim brojem u pršljenu kod *S. turgida*, koja se uz to odlikuje i općenito grubljom građom.

Stratigrafski položaj: Vrsta *S. croatica* n.sp. potječe iz uzorka u kojem je sadržana karakteristična fosilna zajednica iz nivoa označavanog gornjim dogerom. Iscrpnija analiza i dokumentacija, potvrde za navedenu stratigrfsku pripadnost biti će dana uz opis slijedeće vrste utvrđene u istom uzorku, a koja je uvrštena u rod *Uragiella*.

Rod *Uragiella* PIA, 1924

Uragiella ragusina n.sp.

Tab. II, sl. 4-22

1966. *Clypeina* (?) sp. -RADOIČIĆ, tab. CIII, sl. 1.
1970. Nepoznata dasikladaceja D-41 - RADOIČIĆ, p. 100; tab. II, sl. 1-2.

Podrijetlo imena: ime vrste veže se na stari naziv grada Dubrovnika (Ragusa) u čijoj je široj okolici smješten tipični lokalitet vrste.

Tipičan lokalitet: izdanci u zasjeku ceste cca 2 km udaljeno od Osojnika prema naselju Grebci (šira okolina Dubrovnika, južna Dalmacija, Hrvatska).

Tipični slojevi: svjetlosmeđi dobro uslojeni foraminifersko-algalni grejnstone do pekstone iz višeg dijela dogera.

Holotip: kosi presjek sadržan u preparatu 0-79/92 prikazan na tab. II, sl. 5. Originalni materijal čuva se u Institutu za geološka istaživanja, Zagreb.

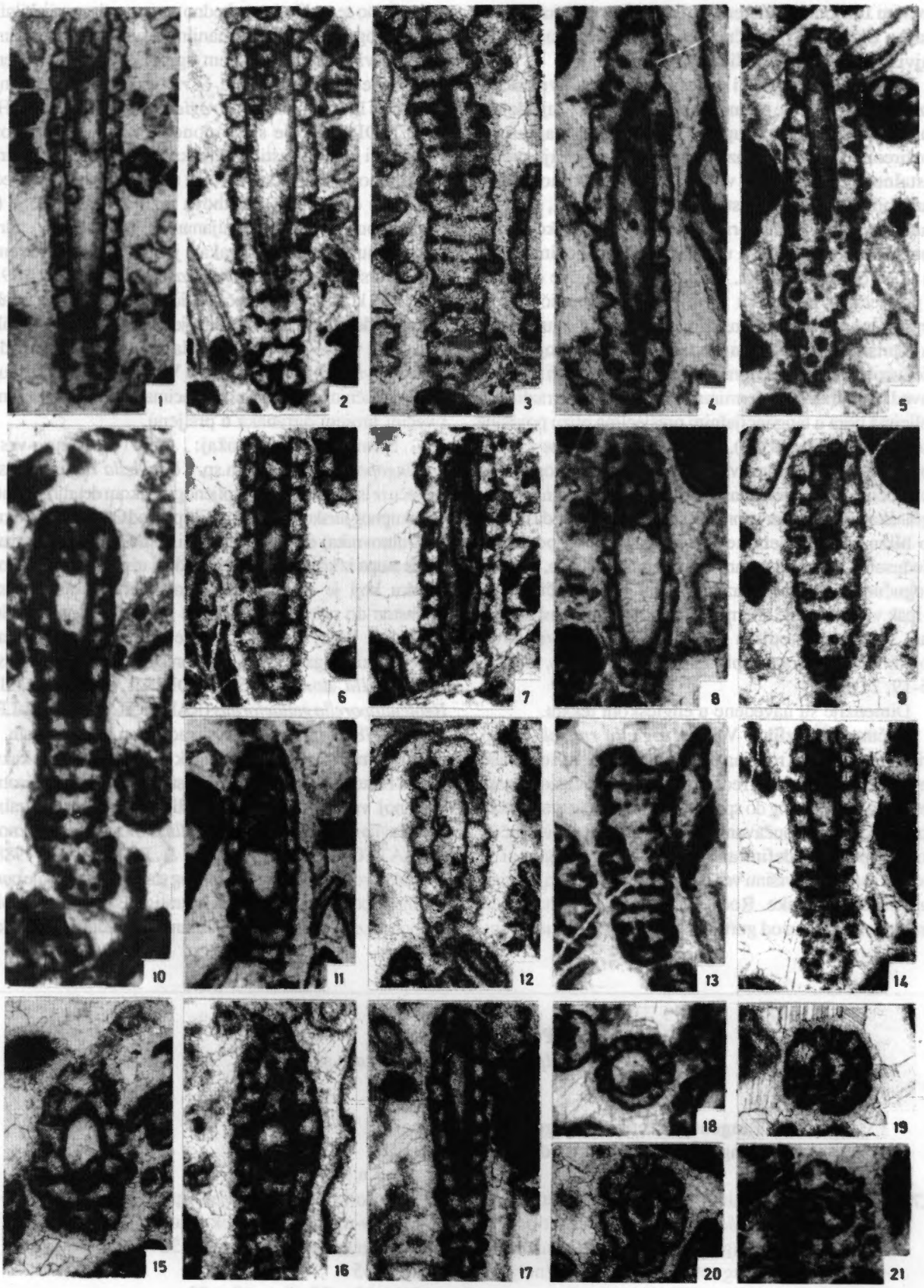
Dijagnoza: Cilindričan skelet karakterizira uska matična stanica i relativno debele vapnenačke stijenke. Nepodjeljeni ogranci prošireni već od same baze smješteni su u pršljene. Izrazita karakteristika vrste naglašena je variranjem oblika ogranaka koji su okruglasti, vrećasti, nalik piriformnim ovisno da li se sužuju ili proširuju prema vanjskom kraju, vrlo rijetko približavaju se izrazito uragielskom tipu. Varijabilni oblik ogranaka na istom primjerku uvjetuje različiti oblik pora u tangencijalnom presjeku. Pore su okruglaste, četvrtaste, nepravilne do trokutaste što se odražava i na njihovom međusobnom rasporedu, pa ogranci susjednih pršljena stoje jedan iznad drugog ili su češće približno alternirajućeg rasporeda.

Opis: Vrsta *Uragiella ragusina* n.sp. potječe iz algalnog vapnenca gdje je uz brojne ostatke drugih vapnenačkih alga (Dasycladaceae) prisutna relativno malim brojem često mikritiziranih i rekristaliziranih primjeraka, što ima za posljedicu zamućene presjeke, a time i ne uvijek jasne fotografije. Odlikuje se cilindričnim skeletom s relativno debelim stijenkama i malom centralnom šupljinom. Vanjski rub u presjecima se ocrtava jasnom plitkom nabranom - neravnom linijom, što je vjerojatno posljedica slabog ispupčenja pojedinih

PLATE - TABLA I

1-21 *Salpingoporella croatica* n.sp.

1,6-7 Longitudinal sections (uzdužni presjeci); figs. 1,6 x 29, fig. 7. x 33
2 Tangential - oblique section - Holotype (tangencijalno-kosi presjek - holotip); x 29
3,13 Tangential sections (tangencijalni presjeci); x 29
4,8,11-12,15-16 Oblique sections (kosi presjeci); x 29
5,9-10,14,17 Oblique-tangential sections (koso-tangencijalni presjeci); figs. 5,9 x 33; figs. 10,14,17 x 29
18-19,21 Transversal sections (poprečni presjeci); x 29
20 Oblique-transversal section (poprečno-kosi presjek); x 29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ogranaka na vanjskoj površini (tab. II, sl. 4-5, 8). Vrlo uska matična stanica također je ocrtana jasnom i ne uvijek ravnom linijom što sugerira plitka ulegnuća na mjestu ulaska ogranaka. Matična stanica zaprema od 20 do najviše 30% ukupnog dijametra.

Nepodjeljeni ogranci smješteni su u relativno dosta razmaknute pršljene, premda odebljali ogranci daju dojam gustog pakovanja. Krupni ogranci često naglašeno prošireni već od same baze suzuju se ili proširuju prema distalnom kraju, pa su više manje nepravilnog često varijabilnog oblika i na istom primjerku (tab. II, sl. 5, 8). Samo pojedini ogranci približavaju se uragielskom tipu, ponekad su vrećastog, a u pojedinim slučajevima nalik su i piriformnom obliku. Uz generalno krupne ogranke u presjecima pojedinih primjerkaka sporadično se i nepravilno pojavljuju i uski ogranci koji mogu navesti na pomisao o eventualnom postojanju dvije vrste ogranaka. Međusobno stiskanje ogranaka istog i susjednih pršljena dovodi do njihovog deformiranja što se odražava različitim oblicima pora u tangencijalnim presjecima blizu površine skeleta (tab. II, sl. 8-9, 15). Unatoč često erodirane vanjske površine s vidljivo prema vani otvorenim porama ogranaka, bolje očuvani primjerci jasno pokazuju da distalni krajevi ogranaka ostaju unutar vapnenačke stijenke i premda dosežu do blizu ruba skeleta ne izlaze na vanjsku površinu. Međusobni raspored ogranaka susjednih pršljena, narušen mogućnošću njihovog različitog oblikovanja, čini se da je ipak više ili manje alternirajući. S obzirom na učestalost kao sporadična odlika može se navesti vidljivost pojedinačnih spora u šupljinama ogranaka (tab. II, sl. 4, 15-19, 21).

Dimenzije su navedene u engleskom tekstu.

Sličnosti i razlike: Vrsta *Uragiella ragusina* n.sp. pribrojena je ovom rodu na osnovi nepodjeljenih ogranaka kojih oblik varira od vrećastog ili gomoljičastog preko netipično piriformnog do sporadično razvijenog uragielskog tipa. Na osnovi proučavanih presjeka ova vrsta uključuje i onu nepotpuno definiranu odliku roda, da ogranci ne prelaze vanjsku površinu već distalnim krajem ostaju unutar vapnenačke stijenke. Rod *Uragiella* prema sadašnjem saznanju u rasponu od gornjeg trijasa do senona uključuje svega nekoliko poznatih vrsta. U odnosu na gornjotrijasku *Uragiella supratriasica* BYSTRICKY 'nova vrsta nedvojbeno se razlikuje prethodno spomenutim varijabilnim oblikom ogranaka, znatno manjim ukupnim dimenzijama i za polovinu manjim brojem ogranaka jednog pršljena nego što je to u trijaske vrste. *U. ragusina* pokazuje manje sličnosti s lijaskom vrstom *Uragiella liasica* LEBOUCHÉ & LEMOINE što je samo donekle izraženo pojavom vrećastih i gomoljičastih ogranaka u obje vrste. Međutim, varijabilnost ogranaka, posebice na istom primjerku veća je u vrste *U. ragusina*. Njihova razlika naglašena je tri do četiri puta većim dimenzijama lijaske vrste koja sadrži i za trećinu veći broj ogranaka u jednom pršljenu. Prema tipskoj vrsti *Uragiella suprajurasica* (GÜMBEL, 1891) PIA 1925, koja je znatno veća i tipičnih uragielskih ogranaka s oko četrdeset u pršljenu, razlika je očigledna. Jasna razlika također je vidljiva i prema dosada stratigrafski najmlađoj vrsti *Uragiella matzi* SOKAČ & VELIĆ, koja se odlikuje gotovo tipičnim uragielskim ograncima, većim dimenzijama i većim brojem ogranaka u pršljenu.

Stratigrafski položaj: Obje opisane vrste *Salpingoporella croatica* n.sp. i *Uragiella ragusina* n.sp. potječu iz istog uzorka prikupljenog prilikom detaljne obrade cjelokupnog jurskog stupa u profilu puta od Osojnika (sjeverno od Dubrovnika) do naselja Grebci. U nešto širem intervalu dijela stupa iz kojega potječe obrađeni uzorak, pa i u samom uzorku koji je determiniran kao algalno-foraminiferski grejnston do pekston, prisutna je relativno bogata fosilna zajednica kojoj osnovno obilježje daju brojni ostaci vapnenačkih algi. Učestali su presjeci i fragmenti vrsta *Selliporella donzellii* SARTONI & CRESCENTI i *Neoteutloporella gallaeformis* (RADOIČIĆ) BASSOULLET et al., 1978. ovom prilikom shvaćenih u širem smislu. U ovom momentu smatram još uvijek neizvjesnim koja i kakva forma i s kojim karakteristikama stvarno odgovara izvorno opisanoj vrsti *S. donzellii* i da li *N. gallaeformis* zaista predstavlja mlađi sinonim *S. donzellii*, što kao sugestiju iznose BARATTOLO, DE CASTRO & RADOIČIĆ (1988). Premda ovo pitanje s taksonomskog stajališta zaslužuje punu pažnju, u pogledu determinacije stratigrafskog položaja nije od bitnog značenja. U kontinuiranom slijedu vapnenačkih

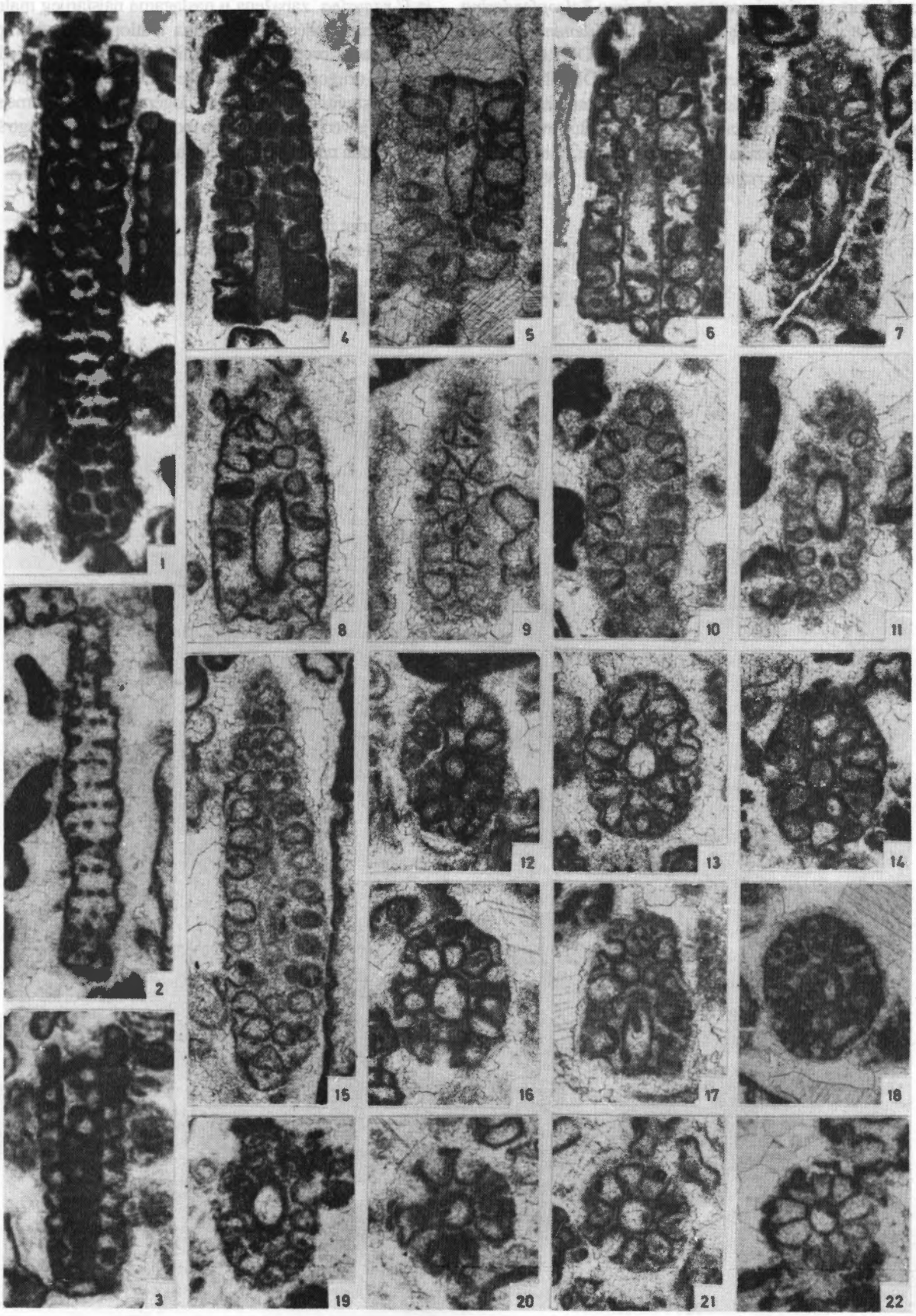
PLATE - TABLA II

1-3 *Salpingoporella croatica* n.sp.

1-2 Tangential sections (tangencijalni presjeci); x 29
3 Longitudinal section (uzdužni presjek); x 29

4-22 *Uragiella ragusina* n.sp.

4,7-8,10-11,15,17 Oblique to oblique-tangential sections (kosi do koso-tangencijalni presjeci); x 35
5 Oblique-longitudinal section - Holotype (koso-uzdužni presjek - holotip); x 35
6 Longitudinal-tangential section (uzdužno-tangencijalni presjek); x 35
9 Tangential section (tangencijalni presjek); x 35
12-14,16,19 Oblique sections (kosi presjeci); figs. 12-14,16 x 35, figs. 19 x 33
18 Transversal section, slightly oblique (poprečni malo kosi presjek); x 33
20-22 Transversal sections (poprečni presjeci); figs. 21-22 x 35; fig. 22 x 33.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naslaga postupno se sve učestalije pojavljuju foraminifere uz istovremeno iščezavanje vapnenačkih alga, pa na 30-40 m iznad uzorka s opisanim vrstama nalazimo *Paleopfenderina salernitana* (SARTONI & CRESCENTI), *Kilianina blancheti* PFENDER, *Satorina apulienensis* FOURCADE & CHOROWICZ, *Praekurnubiacrusei* REDMOND, te više drugih ali manje stratigrafski značaj-nih foraminifera. Ovakva zajednica u nekoliko detaljno analiziranih stupova jure duž obalnog pojasa ukazuje da uzorak s opisanim vrstama *S.croatica* n.sp. i *U.ragusina* n.sp. potječe iz višeg dijela dogera, kojeg nije moguće pouzdanije i detealjnije kronostratigrafski definirati. Navod RADOIČIĆ (1970) da je *U.ragusina* zapažena u naslagama najstarijeg malma u zajednici s posljednjim nalazima teutloporela i prvim pojavama kladokoropsisa nije u koliziji s obzirom na zajednicu jednog i drugog lokaliteta, već je samo u pitanju mjesto gdje će se postaviti granica između dogera i malma. Ovime se ne, isključuje veći stratigrafski raspon opisanih vrsta nego što je on određen na tipskom lokalitetu.

Manuscript received March, 31. 1992.
Revised manuscript accepted July, 7. 1992.