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Nest characteristics of three labrid species in the Gulf of Trieste (northern Adriatic Sea)

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Temperate Labrid species are nest builders with nests usually made out of plant material or detritus. During the summer of 2004, 131 nests of three wrasses (Symphodus roissali, S. ocellatus *and* S. cinereus) *were studied by SCUBA diving in the Slovenian coastal sea (northern Adriatic) in order to compare nest parameters and microhabitat preferences among the species. For the description of the structure of each nest, algal species, benthic invertebrates and type of substrata within the nest were determined, as well as the features of each microhabitat. A Redundancy Analysis (RDA) was performed in order to highlight the distribution of the three species in relation to environmental variables and their preferences for different biotic and abiotic variables in the construction of nests. Labrid species were found to be more abundant on rocky bottoms, where the* Cystoseiretum barbatae *association is dominant. It seems that the studied species show a preference for some microhabitats, although are building their nests using the most abundant algal material in the environment. Only* S. ocellatus *seems to select shrub-forming algae as the main nest-forming material.*

Key words: Labridae, construction of nests, microhabitat preferences, Gulf of Trieste, Adriatic

INTRODUCTION

Wrasses (the family Labridae) are one of the most abundant groups in the coastal fish assemblage on tropical reefs around the world and in temperate seas as well. They are the second largest family of marine fish comprising approximately 500 species and are a very important element in food webs. Nineteen wrasses have been recorded in the Mediterranean Sea (QUIGNARD & PRAS, 1986). Eighteen live in the Adriatic Sea (JARDAS, 1996; DULČIĆ *et al*., 2006). These species are mainly coastal, living in shallow waters, often intertidally and sometimes in brackish waters. They are solitary or live in small schools. Most of them are active only during the daytime, hiding themselves in rock crevices or seagrass meadows at night; some of them bury themselves in the sand. Some data about the habitat preference of labrid species in Slovenian waters were presented by LIPEJ *et al.* (2003) and ORLANDO-BONACA & LIPEJ (2005).

Some temperate wrasse species, those from the tribe Labrini, are demersal nest builders with nests usually made out of plant material or detritus. A lot of energy is expended in reproduction by the bourgeois males of the genus *Symphodus*, which defend territories (against both conspecific neighbours and members of other species), build and maintain nests, court females, keep reproductive parasites at bay and fan and protect demersal eggs until hatching (WARNER & LEJEUNE, 1985; TABORSKY, 1998). In the European ocellated wrasse, *Symphodus ocellatus* (Forsskaĺl, 1775), researchers found four types of males (TABORSKY, 1998; ALONZO *et al*., 2000). Bourgeois males have access to mates and show paternal care; satellites join nesting males in their defence against reproductive parasites, but also participate in spawning; sneakers just parasitize nesting males' spawn; non-reproductive males are too young to be involved in reproduction. Males are non-reproductives, sneakers or satellites in their first reproductive season, while they behave as satellites or bourgeois when 2 years old (TABORSKY, 1998; ALONZO & WARNER, 1999, 2000; ALONZO *et al*., 2000; ALONZO, 2004). Sex change, from female to male, is common in the Blacktailed wrasse *S. melanocercus*, rare in the Peacock wrasse *S. tinca* and absent in *S. ocellatus* and in the Five-spotted wrasse *S. roissali* (WARNER & LEJEUNE, 1985).

Data on the nesting activity of wrasses in the Adriatic Sea are rare and in particular (ŠOLJAN, 1930a,b, 1964, 1968; VUKOVIĆ, 1958; ONOFRI, 1970). ŠOLJAN (1930a, b) studied the breeding ecology of *S. ocellatus* and *S. roissali* (Risso, 1810). VUKOVIĆ (1958) described some nesting features of the grey wrasse *S. cinereus* (Bonnaterre, 1788). ONOFRI (1970) reported that only *S. ocellatus* is a nesting species, while QUIGNARD & PRAS (1986) and JARDAS (1996) mentioned nine nesting species of wrasse.

The aim of the study was to compare nest parameters of three species of wrasse (*S. roissali, S. ocellatus* and *S. cinereus*) inhabiting rocky

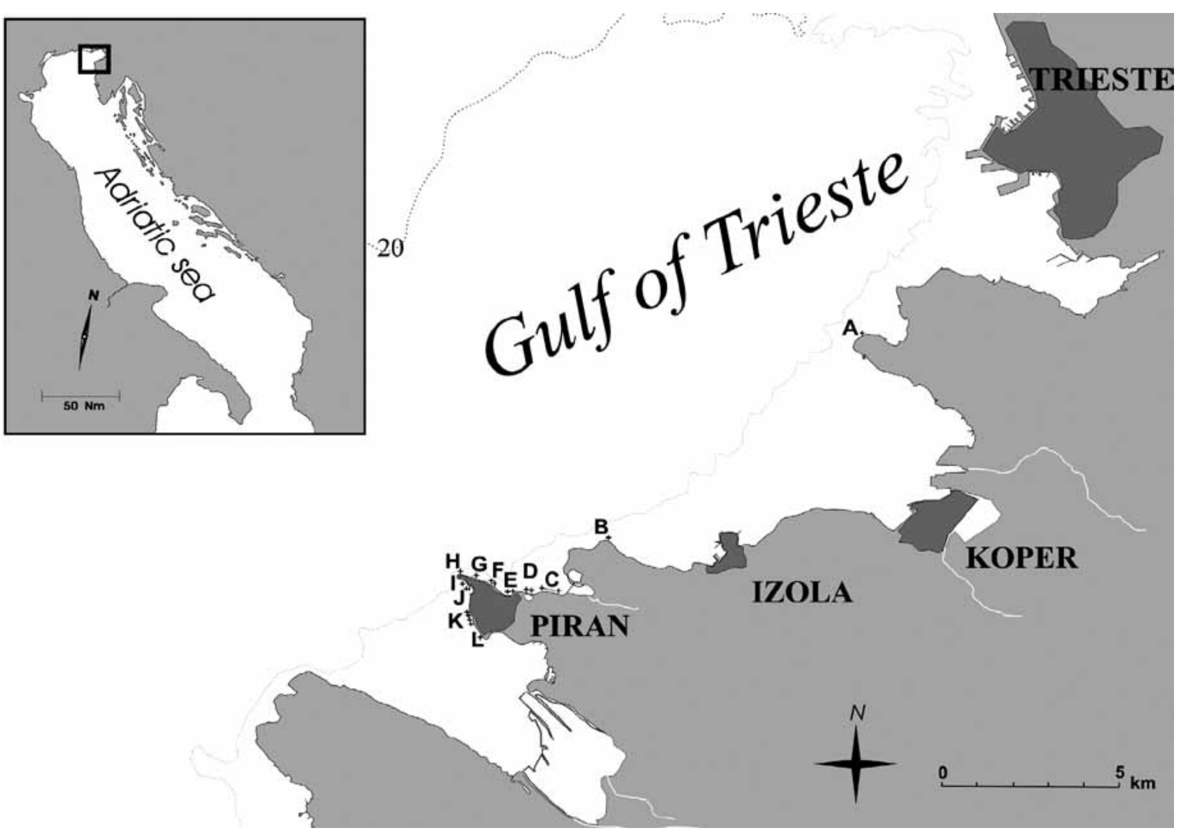

Fig. 1. The map of the study area with sampling sites. A – Debeli rtič, B – Cape Ronek, C – Salinera, D – Pacug, E – Fiesa, F – coast from Fiesa to Piran, G – under Piran's church, H – Cape Madona's northern part, I – Cape Madona's southern part, J – Piran's platform, K – in front of the Marine Biology Station, L – Bernardin

bottoms in shallow waters of the southern part of the Gulf of Trieste. Another purpose was to verify if these species show a clear preference for algal species in the construction of nests, even when in their habitat a high variety of algal species are present.

MATERIAL AND METHODS

Nest censuses

Surveys of nests of three species of wrasse were conducted by SCUBA diving at studied sites in the Slovenian coastal sea during the period from mid June to the end of August 2004. The study area is the northernmost part of both the Adriatic and the Mediterranean Seas. It is a shallow semi-enclosed gulf with a maximum depth of 33 m off Piran. The Slovenian coastline is approximately 46 km long. Nests were searched haphazardly in different habitat types in the infralittoral belt. During the survey period, 42.5 SCUBA diving hours were performed over a depth range of 0 to 12 m, at 18 sites situated in 12 locations (Fig. 1). For each site at least 1.5 SCUBA diving hours were performed.

Nest and microhabitat variables

Each nest found was accurately described on a diver slate. The features of nests assessed were: the wrasse species that built the nest, the form of the nest (hollow depression, hollow with funnel, basket), depth, internal and external nest diameter, nest depth, exposition, inclination and nest structure. The internal and external diameter and the depth of the nest were measured by the use of a plastic caliper to the nearest mm. By inclination was meant the slope of the nest from the horizontal axis of the bottom. The exposition was defined as the direction of the nest's opening. In order to describe the structure of the nest, algal species and benthic invertebrates in the nest were determined. The coverage of each dominant floristic or faunistic element was expressed as a percentage of the whole nest surface. The presence of the male at the nest and its behaviour was also taken into consideration while sampling. Some other data such as the minimal distance between two nests of the same or different species were also measured.

In order to compare different nesting aspects of the studied wrasses, the microhabitat variables of the site where the nest was found were also measured. For this purpose, algae and benthic invertebrates found within a 60 x 60 cm square were determined and the dominant elements expressed as a percentage of the habitat coverage. At the same time, abiotic variables such as bottom substrate composition and granulometry adapted according to LARSONNEUR, 1977 (in UNEP, 1998) were annoted and described: boulders (> 2m; 2 - 1 m; 1 – 0.50 m), rocks (50 - 10 cm), pebbles (10 – 2 cm), gravel (2 – 0.2 cm), sand (2 –0.05 mm) and mud (< 0.05 mm), as well as organic detritus such as animal shells.

Data analysis

The choice of nesting ground by labrids is affected by many biotic and abiotic factors. To distinguish environmental factors that are relevant in microhabitat preference and in the building of nests by three labrid species, a Redundancy Analysis (RDA) was performed with the package CANOCO version 4.5. RDA is a direct gradient analysis based on linear models with a short gradient length (tested using Detrended Correspondence Analysis; DCA) and is used to explain patterns in species data by environmental variables (TER BRAAK & VERDONSCHOT, 1995; LEGENDRE & ANDERSON, 1999; WIJNHOVEN *et al.*, 2002). The method was used twice; first to determine the structure of the nests and secondly to show the microhabitat preferences of single nest-builder species. Prior to the RDA, the statistical significance of the effect of each variable was tested by a Monte Carlo permutation test (TER BRAAK & VERDONSCHOT, 1995). Therefore, of the 59 variables measured in the field, 25 were used in the RDA for nest construction and 21 for microhabitat choice.

Other analyses of the nest's parameters were performed using non-parametric statistics, since the data did not meet the assumption of parametric testing. The internal and external nest diameters, the depth of the nest, its inclination and the depth of the water where it was found were compared by using the one-way ANOVA and MANOVA tests. Both revealed a statistical difference between the mean scores of the three species ($p<0.00001$). Subsequently, the Tukey unequal sample size HSD-test with 95% family-wise confidence level was applied (FOWLER & COHEN, 1986).

RESULTS

A total of 131 nests were censused during the sampling period (Table 1). *S. roissali* and *S. cinereus* were nesting in June and July, while *S. ocellatus* was nesting in July and August. Then, all three species were found nesting contemporaneously in July. At each locality, on average 7.2 nests were found. For all three species nests were detected in shallow waters, with only *S. roissali* also nesting in the first meter of depth. Tukey HSD tests showed a statistical significance of difference between *S. roissali* and *S. cinereus* in terms of water depth ($p=0.006$), internal diameter ($p=0.004$), depth of the nest ($p=0.00001$) and its inclination ($p=0.0005$). Between *S. ocellatus* and *S. cinereus* significant differences were found for the external diameter ($p=0.02$) and the depth of the nest (0.0003). After all, Tukey HSD tests revealed significant differences between *S. roissali* and *ocellatus* for water depth ($p=0.000009$), external ($p=0.00005$) and internal diameter of nest ($p=0.01$)

Factors influencing the structure of nests

Twenty-seven macroalgae taxa and 2 seagrasses were found in the nest made by *S. cinereus*. The most frequently found taxa were *Cladophor*a spp., present in 60% of the 40 nests (Table 2). Algae in the nests were almost always present but never abundant. Animal species were only occasionally present in nests (Table 2).

Table 1. Nests' features for three species of wrasse in the Gulf of Trieste. Mean value and standard deviation are given in parentheses

	S. roissali	**S. cinereus**	**S. ocellatus**
Number of nests	55	40	36
Depth (m)	0.3 – 10 (2.8±2.3)	1.2 – 11 (4.5±3.3)	1.3 – 9 (5.5±2.2)
External nest diameter (cm)	7.5-25.5 (12.5±4.0)	9.5-29.5(13.8±4.1)	9.7-26.5(16.2±3.4)
Internal nest diameter (cm)	3.2-16.0 (6.4±2.5)	4.4-20.0 (8.0±3.0)	4.9-10.8(7.9±1.6)
Depth of nest (cm)	1.8-13.5 (6.3±2.3)	1.7-8.7 (4.2±1.8)	2.4-9.7 (6.2±1.8)
Inclination	0º – 31%	0º – 67.5%	0º – 44.5%
	10-30º – 42%	20-30º – 15%	20-30º – 36%
	60º – 22%	60-70º – 15%	60º – 14%
	80º – 5%	90º – 2.5%	80º – 5.5%
Exposition - *Hidden*	24%	10%	3%
Partially hidden	0%	25%	0%
Not hidden at all	76%	65%	97%
Distance between two nests (m)	0.15 – 10	0.15 – 10	3 – 10
Presence of the male (% of all cases)	84%	77.5%	97%

Table 2. Frequency of occurrence (%) of environmental variables in nests of three Symphodus *species. Only the macrophyte taxa showing at least 10% frequency of occurrence were included in the table*

	S. roissali	***S. cinereus***	***S. ocellatus***
Macrophyte taxa	frequency of occurrence (%) in nests		
Ceramium spp.	69.0	45.0	75.0
Chaetomorpha sp.	13.0		
Cladophora spp.	71.0	60.0	61.0
Cutleria multifida	42.0	12.5	22.0
Cystoseira barbata			50.0
Dictyota dichotoma	33.0	27.5	14.0
Dictyota linearis	51.0	47.5	86.0
Halimeda tuna			44.0
Haliptilon virgatum		10.0	
Laurencia spp.		10.0	
Nanozostera noltii	13.0	17.5	
Padina pavonica	47.0	32.5	44.0
Peyssonnelia squamaria	27.0		14.0
Polysiphonia spp.	14.5		11.0
Sphacelaria cirrhosa	42.0	20.0	36.0
Ulva sp.	14.5	10.0	
Valonia utricularis	22.0	17.5	11.0
Wrangelia penicillata	24.0		
Animal taxa			
Aglaophenia sp.	2.0	2.5	
Alvania sp.		2.5	
Anemonia sulcata		2.5	
Bittium reticulatum		2.5	
Cacospongia scalaris	2.0		11.0
Ceritium rupestris		2.5	
Chondrilla nucula			5.5
Diodora sp.		2.5	
Hinia sp.		2.5	
Mytilus galloprovincialis	2.0		
sedentary Polychaeta		2.5	
Protula tubularia	2.0		
Rissoa sp.		2.5	
Verongia areophoba	2.0	2.5	17.0
Abiotic factors			
pebbles (5-10 cm)	96.0	65.0	92.0
pebbles (2-5 cm)		15.0	8.0
gravel (0,2-2 cm)	5.5	67.5	14.0
sand (0,05-2 mm)	5.5	67.5	14.0
mud (<0,05 mm)	2.0	27.5	6.0

In more than 65% of the nests sand, gravel and pebbles were present.

In the nests built by *S. roissali* 33 algae taxa and 2 seagrasses were found. The highest frequency of occurrence was that of *Cladophora* spp., present in 71% of the 55 nests (Table 2). Animal species were only occasionally present in nests (Table 2). More than 90% of the nests were built on pebbles, which were part of the nest itself.

In the nests of *S. ocellatus*, 26 algae taxa and 2 seagrasses were found, with *Dictyota dichotoma* found in more than 85% of the censused nests (Table 2). Sponges were the only animal species found in nests of *S. ocellatus* (Table 2). Around 90% of the nests were built on pebbles or small rocks, mainly positioned on sandy bottoms.

Using RDA, a diagram was obtained that shows the distribution of the three species in relation to the environmental variables that proved to be important in the preparation of nests (Fig. 2). Only axes 1 and 2 are presented and they cumulatively account for 37.2% of the total variance. The species-environment correlations of each axis were 0.372 (Axis 1), and 0.346 (Axis 2). Axis 1 is strongly related to the algae *D. dichotoma* and *Cutleria multifida*, which results in the separation of *S. ocellatus* from the other two species. This wrasse mainly uses those algae while making its nest. Axis 2 is principally correlated with pebbles larger than 5 cm and different species of algae, which accentuate the preference of *S. roissali* for these structures in the preparation of nests. The third species, *S. cinereus*, presents a strong positive correlation with abiotic structures such as animal shells, gravel, sand and small pebbles when building nests.

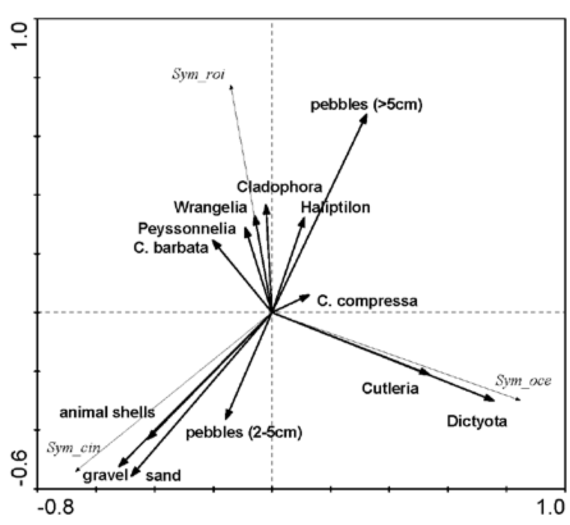

Fig. 2. *RDA ordination diagram for the nests of three* Symphodus *species showing the distribution of the species along each relevant nest variable. It seems that these wrasses are using the most abundant algal material in their environment to build their nests and are not exhibiting a real preference for algal species in the constructions of their nests.* Sym_cin – Symphodus cinereus; Sym_roi – Symphodus roissali; Sym_oce – Symphodus ocellatus

Microhabitat use

In the microhabitats where *S. cinereus* was mostly recorded 16 algae taxa and 1 seagrass were found, though the vegetation was never abundant. The most frequent algal and animal species were *Padina pavonica* and *Verongia aerophoba*, respectively (Table 3). In these microhabitats the bottom was rarely composed of big boulders, while it was mostly covered by sand, gravel, pebbles and rocks.

Seventeen algae taxa were found in the microhabitats selected by *S. roissali*. *P. pavonica* was present in 86% of the examined microhabitats while, among animal species, *Cacospongia scalaris* was recorded in 12% of samples (Table 3).

One seagrass and 17 algae taxa were found in the microhabitats of *S. ocellatus,* with *D. dichotoma* found to be present in 94% of samples. Among animal species, two sponges were frequently found in these microhabitats: *V. aerophoba* and *C. scalaris* (Table 3).

The results of the RDA for the microhabitat preferences of the three labrid species studied are shown in Fig. 3. The ordination diagram shows the species-specificity of the environmental parameters. The most influential biotic and abiotic factors were used to calculate the correlation with the distribution of the labrids. Only axes 1 and 2 are presented and they cumulatively account for 32.4% of the total variance. The species-environment correlations of each

Table 3. Frequency of occurrence (%) of environmental variables in microhabitats inhabited by three Symphodus *species. Only the macrophyte taxa showing at least 10% frequency of occurrence were included in the table*

	S. roissali	***S. cinereus***	***S. ocellatus***
Macrophyte taxa	frequency of occurrence (%) in microhabitats		
Acetabularia acetabulum			12.0
Cladophora spp.	31.0	24.0	22.0
Cutleria multifida			18.0
Cymodocea nodosa		12.0	
Cystoseira barbata	61.0	57.0	16.0
Dictyota dichotoma	46.0	57.0	94.0
Dictyota linearis			22.0
Flabellia petiolata			16.0
Halimeda tuna	22.0	20.0	38.0
Haliptilon virgatum	40.0	13.0	12.0
Padina pavonica	86.0	93.0	81.0
Peyssonnelia squamaria	20.0	17.0	27.0
Sphacelaria cirrhosa	30.0		12.0
Ulva sp.	20.0		
Wrangelia penicillata	26.0	17.0	
Animal taxa			
Anemonia sulcata	4.0	13.0	
Cacospongia scalaris	12.0	10.0	31.0
Chondrilla nucula	4.0	2.0	9.0
Haliclona rosea		2.0	
Verongia areophoba	6.0	23.0	41.0
Abiotic factors			
boulders (>2 m)	22.0	13.0	3.0
boulders (1-2 m)	8.0	10.0	12.0
boulders (0,5-1 m)	12.0	18.0	18.0
rocks (10-50 cm)	69.0	87.0	76.0
pebbles (2-10 cm)	58.0	83.0	78.0
gravel (0,2-2 cm)	40.0	82.0	77.0
sand (0,05-2 mm)	38.0	82.0	77.0
mud (<0,05 mm)	13.0	18.0	40.0

axis were 0.324 (Axis 1) and 0.176 (Axis 2). Axis 1 is strongly related to *D. dichotoma* coverage which results in the separation of *S. ocellatus* from the other two species (as in Fig. 2). In the microhabitat of *S. ocellatus* the presence of mud was a dominant feature, as well. Axis 2 is principally correlated with the presence of sand. This kind of microhabitat was that most preferred by *S. cinereus*. The third species, *S. roissali,* occurred mainly in microhabitats with high vegetation coverage, where the brown algae *Cystoseira barbata* was the dominant species. Other abundant algae in these microhabitats were *Sphacellaria cirrhosa, Haliptilon virgatum, Wrangelia penicillata, P. pavonica* and *Ulva* sp.

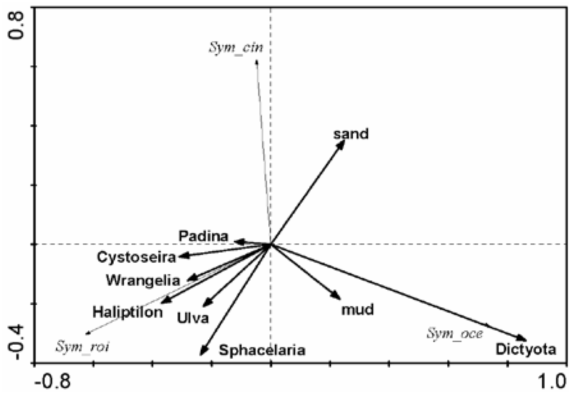

Fig. 3. *RDA ordination diagram for the microhabitat preferences of three* Symphodus *species showing the main pattern of variation in the assemblage composition as accounted for by the environmental variables. Although* S. ocellatus *is mainly found inhabiting the same* Cystoseiretum barbatae *association (macrohabitat) that* S. roissali *does, it is showing a preference for different microhabitats.* Sym_cin – Symphodus cinereus; Sym_roi – Symphodus roissali; Sym_oce – Symphodus ocellatus

DISCUSSION

The preference of wrasses for shallow rocky substrates colonised by macroalgae, as observed in this study, is well known for the whole Mediterranean Sea (BELL, 1983; GARCÍA-RUBIES & ZABALA, 1990; JARDAS, 1996; MOUILLOT *et al*., 1999; RUITTON *et al*., 2000) and has also been reported for the Adriatic Sea (VUKOVIĆ, 1958; GUIDETTI & BUSSOTTI, 2000). Labrids are day-time feeders and they comprise a distinct group of mesophagic carnivores that feed extensively on invertebrates associated with vegetation, and so are found at shallow sites (BELL & HARMELIN-VIVIEN, 1983; GARCÍA-RUBIES & ZABALA, 1990). RUITTON *et al*. (2000) found that *Symphodus* species were always more abundant in erect algal cover sites, which allows them access to abundant prey (amphipods, polychaetes) and offer the availability of shelter and nesting sites. MOUILLOT *et al*. (1999) found that *S. ocellatus* densities were higher over rocky bottoms than over seagrass beds throughout the year for the large size class, whereas for the medium size class, yearly density was higher on *Posidonia oceanica* meadows. For the present study we inspected *Cymodocea nodosa* meadows, but only a small number of *S. ocellatus* nests were found in that habitat type, while the majority were found on beds of pebbles or small rocks with mixed vegetation.

The first description of wrasses nesting in the Adriatic Sea was made by ŠOLJAN (1930a,b), who described the pattern of how *S. ocellatus* prepares its nest with different algal species, which is in agreement with the results of the present study. For the construction of nests all the studied wrasses used algal species that were present in the inhabited microhabitats (Figs. 2,3; Tables 2,3), with the exception of the seagrass *Nanozostera noltii* that was present in nests but not in microhabitats preferred by *S. roissali* and *S. cinereus*. Therefore, it seems more likely that these wrasses are using the most abundant algal material in their environment to build their nests and are not exhibiting a real preference for algal species in the constructions of their nests. A high number of macroalgae taxa are, however, abundant in the summer period on rocky bottoms in Slovenian coastal waters. The ecological status of the infralittoral vegetation was assessed as Good/High and was classified into two *Cystoseiretum crinitae* subassociations: *Halopithetosum incurvae* and *Cystoseiretosum compressae*, and into a *Cystoseiretum barbatae* association (ORLANDO-BONACA *et al*., 2008). Labrid species resulted to be more abundant at sites with higher sedimentation rates, where *Cystoseiretum crinitae* subassociations are substituted by *Cystoseiretum barbatae* (VUKOVIČ, 1976, 1980). Therefore, the conservation of the current quality level of the benthic vegetation in Slovenian waters is clearly very important also for the preservation of populations of many Labrid species.

The highest variety of algal species was found in the microhabitats occupied by nesting males of *S. roissali*, as well as in their nests. In *S. roissali* nests the most frequently found algae were *Cladophora* spp., *D. dichotoma* and *Ceramium* spp., while ŠOLJAN (1930b) found mostly *Cystoseira* spp. Also, VUKOVIĆ (1958) rarely reported the presence of *Cladophora* spp. for *S. roissali* nests near Dubrovnik (south Adriatic), but concluded that *S. roissali* could build nests in different locations with different types of algae, without using *Cystoseira* spp. even though they are available in the habitat. ONOFRI (1970) found the eggs of *S. roissali* attached to a *Cystoseira* thallus, but the author did not classify it as a real nest. During our research, nests of *S. roissali* in the form of a funnel, which do not resemble the typical shape of a nest, were also found. RAVENTOS (2004) pointed out that for the success of the reproductive cycle of *S. roissali*, wave motion seems to be very important. The author concluded that the wave's height has to be lower than 1 m to avoid damaging the nests of *S. roissali*. RAVENTOS (2006) also reported that nesting males of *S. roissali* select nest sites mainly on flat substrata (which is in accordance with our findings) and close to the margin in the rocky littoral strip.

Although *S. ocellatus* was mainly found inhabiting the same *Cystoseiretum barbatae* association (macrohabitat) that *S. roissali* did, it was showing a preference for different microhabitats (Fig. 3) and, in the construction of nests, seemed to have a strong preference only for shrub-forming algae such as *Dictyota* species (Fig. 2; Table 2). In our opinion, further research in the future could confirm that *S. ocellatus* chooses and uses typical algal species in the construction of nests, even when a high variety of algal species are present in its habitat.

The majority of *S. cinereus* nests were found in location G (Fig. 1) where a sandy-muddy bottom is present. Therefore, it is not surprising that sand resulted to be the most important environmental variable in the microhabitat around nests of *S. cinereus*. In 60% of the 40 nests of this species *Cladophora* sp. was present. VUKOVIĆ (1958) previously noted that species from the genus *Cladophora* are the main representative algae in the nests of *S. cinereus* from the Great Lake on the island of Mljet (southern Adriatic). The same author found that more than 50% of the total weight of organic components of the nest originated from plants from the land which was, however, not found in this study.

During our survey the presence of satellites or sneakers next to bourgeois males in the nests was also recorded. In 35% of all nests there were 2 or more males. The presence of the second male was recorded not only in *S. ocellatus* nests, as TABORSKY (1998) and ALONZO *et al.* (2000) reported, but also in nests of the other two species. The hypothesis of the existence of different types of males in other *Symphodus* species needs further field work to be confirmed.

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Značajke gnijezda triju vrsta usnjača u tršćanskom zaljevu (sjeverni Jadran)

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SAŽETAK

Usnjače umjereno toplih mora su graditelji gnijezda koja su najčešće izgrađena od biljnog materijala ili detritusa. Tijekom ljeta 2004. godine, 131 gnijezdo triju vrsta usnjača (*Symphodus roissali*, *S. ocellatus* i *S. cinereus*) je istraživano pomoću SCUBA ronjenja u slovenskim priobalnim vodama (sjeverni Jadran) sa svrhom uporedbe parametara gnijezda i sklonosti prema mikrostaništima unutar vrsta. Za opise strukture svakog gnijezda, određivane su vrste algi, bentoski beskralješnjaci i tipovi substrata unutar gnijezda, isto kao i odlike svakog mikrostaništa. RDA analiza je korištena sa svrhom da se rasvijetle saznanja o raspodjeli svake vrste u odnosu na kolebljive parametre okoliša i njihove sklonosti prema različitim biotičkim i abiotičkim sadržajima u izgradnji gnijezda. Ove vrste usnjača su znatno brojnije na kamenitim dnima, gdje asocijacija *Cystoseiretum barbatae* prevladava. Izgleda da istraživane vrste pokazuju određene sklonosti prema nekim mikrostaništima, ali grade svoja gnijezda koristeći najbrojnije alge koje se mogu zateći u okolišu. Samo *S. ocellatus* izgleda odabire grmolike alge kao glavni materijal za izgradnju gnijezda.

Ključne riječi: Labridae, građenje gnijezda, mikrostaništa, tršćanski zaljev, Jadran