



Scientific Note

Simultaneous reproductive event of two species of the genus *Labrisomus* (Labrisomidae) in Northeastern Brazil

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Abstract. This article reports on the simultaneous reproductive behavior of two reef fish, *Labrisomus nuchipinnis* and *L. cricota* in Brazil is recorded. The average time of the posture and eggs fertilization was 9, with a “rest” interval of 21 seconds for *L. nuchipinnis*. *L. cricota* presented a faster cycle, of 6 and 9 seconds, respectively.

Key words: simultaneous reproduction, reef fishes, cryptobentic

Resumo. Evento reprodutivo simultâneo de duas espécies do gênero *Labrisomus* spp (Labrisomidae) no nordeste do Brasil. A reprodução simultânea dos peixes recifais, *Labrisomus nuchipinnis* e *L. cricota* no Brasil é registrada. O tempo médio de postura e fertilização dos ovos foi de 9, com intervalo de 21 segundos para *L. nuchipinnis*. *L. cricota* apresentou ciclo mais curto, com 6 e 9 segundos respectivamente

Palavras chave: reprodução simultânea, peixes recifais, criptobênticos

Fishes of the Labrisomidae family live in coral reef areas, are of small size, present external sexual dimorphism and are carnivorous, feeding upon small invertebrates (Randall, 1967; Thresher, 1984; Cervigón, 1994; Froese & Pauly, 2011).

Labrisomus nuchipinnis (Quoy & Gaimard, 1824) inhabits continental coastal regions and shallow island waters (0-10m), within the consolidated substratum or among algae (Carvalho-Filho, 1999). This species presents cryptic habits and territorial behavior (Sazima, 1986; Gibran *et al.*, 2004). *L. cricota* Samiza, Gasparini & Moura 2002, is endemic to Brazil and can be found from the

northeastern region to the southern state of Santa Catarina. This species is also cryptobentic, being generally found in locations where there is a growth of algae in shallow rocky reef areas (Sazima *et al.* 2002).

Labrisomus nuchipinnis and *L. cricota* are sympatric and relatively common in many shallow reef areas in the coast of Brazil. These species are fished, especially for ornamental purposes (Sampaio & Nottingham, 2008).

On March 31, 2009, we registered the simultaneous reproductive behavior of these species, on the rocky reef of Farol da Barra, located at the entrance of

Baía de Todos os Santos (state of Bahia, northeastern Brazil). The reproductive behavior was observed through snorkelling, using the “focal group” method (Altmann 1974). The presence of three researchers allowed simultaneous observation. Our observation occurred at low tide, at 1,5 m in depth, with horizontal visibility varying between 3-4 m, in the new moon phase. The total time of observation was 60 minutes, between 10:00 and 11:00 a.m. The behavior was recorded on plastic writing boards and photographed using a Canon G10 in waterproof case.

Initially, a *L. nuchipinnis* couple (male's total length of about 17 cm and female's 14 cm) was observed in reproductive behavior. The male presented reproductive coloration: upper head, anterior part of body and fins, yellowish-green; lower head and mouth, bright red; sides whitish with vertical black stripes (Figure 1). *L. cricota* couple (male with about 7 cm and female with 9 cm) was found 7 m away, also in reproductive behavior. The coloration of this male during courtship was head orangish with tiny white pale spots, fins greenish, and body light brown with black vertical stripes (Fig 2).



Figure 1: Male of *Labrisomus nuchipinnis* with courting color pattern (Photo by D.V. Medeiros).

The reproductive behavior of both species can be summarized in five events: 1- The females approach the males. 2- The males bite the sides of the females and rub their bodies in a shivering manner (Fig 3 and 4). 3- The females move their lower bodies against the substratum and spawn.

4- The females move away. 5- The males swim over the spawned eggs, fertilizing them. The average time of the posture and eggs fertilization was approximately 9 seconds, with a “rest” interval of 21 seconds for *L. nuchipinnis*. *L. cricota* presented a faster cycle, of 6 and 9 seconds, respectively. During

the events, aggressive behavior was recorded: the *L. nuchipinnis* male chased a *Stegastes fuscus* (Pomacentridae) which was trying to approach the spawning area, as did the *L. cricota* with an *S. variabilis*.

We considered the reproductive behavior of these species as being similar. However, we found differences in the characteristics of the spawning

microhabitats. The reproductive event of the *L. nuchipinnis* took place in a reef fissure, covered with coralline and filamentous algae, zoanthids (*Palythoa* sp. and *Zoanthus* sp.) and with the presence of sea urchins (*Echinometria lucunter*), while the observed event of the *L. cricota* occurred in a more exposed location, made up of foliaceous algae, sand, zoanthid (*Paythoa* sp.), coralline and filamentous algae.



Fig 2: Male of *Labrisomus cricota* with courting color pattern (Photo by J.A.C.C. Nunes).

Reproduction of *Labrisomus* spp is in accordance with the general pattern of the Blennioidei, (i.e. the production of demersal eggs that are defended by males that drive females away after spawning; cf. Keenleyside, 1979; Thresher, 1984; Rasotto, 1995; Gibran, *et al.*, 2004). The *L. cricota* males are territorial and bite the females strongly during courtship, as was also observed for *L. nuchipinnis* (Gibran *et al.* 2004). Bites and nudges performed by

males apparently serve to incite females to spawn (Thresher, 1984; Gibran *et al.* 2004). There are records of two females interacting together or

alternatively with a single male for *L. nuchipinnis* (Gibran *et al.* 2004). We did not observe the presence of a third party in any of our recordings.

The adhesive demersal eggs are deposited in small reefs covered with algae, in locations of elevated hydrodynamics, placed within the male's territory, which promotes a higher survival rate of the young (De Martini, 1978; Giorgi & Congleton, 1984). For demersally spawning fish, it is often assumed that mortality resulting from egg predation is minimized (Kodric-Brown 1988, Magnhagen & Kvarnemo 1989, Petersen 1990, Raffetto *et al.* 1990, Itzkowitz 1991). However, coral reef communities

contain numerous opportunistic carnivores known to consume fish eggs, including fish (Jones *et al.* 1991, Warner & Schultz 1992, Araújo *et al.* 2004) and invertebrates (Gross & McMillan 1981, Rahel 1989).

Information on the spawning time of Labrisomids are scarce, but it is determined to occur during the day; it is not restricted to dawn or dusk periods (Thresher, 1984). Several species that present adhesive spawning deposit their eggs according to the lunar cycle. Usually spawning is

according to a new or full moon (Deloach, 1999). Investigating the reproduction of small reef fishes, Kramer *et al.* (2009) did not obtain strong evidence of a spawning pattern related to the moon phases for five species of Gobidae, but *Coryphopterus dicrus* and *C. thrix* presented a preference for spawning during a new moon. We believe that more information is needed on the spawning period of the *L. nuchipinnis* and *L. cricota* in order to further explain the relationship to the moon cycle.



Fig 3: Reproductive event of the *Labrisomus nuchipinnis* (Photo by J.A.C.C. Nunes).

This is the first record of simultaneous reproduction in Brazilian waters for species of cryptobenthic habits that have adhesive demersal spawning. Simultaneous reproductive events involving reef fishes with pelagic spawning are known in literature

(Whaylen *et al.* 2004). These episodes facilitate the occurrence of hybridism among the involved species. Apparently the type of the spawning of *Labrisomus* spp. requires recognition of partner. However, there are records of specimens with

intermediate characteristics between the two species in the Brazilian coast, hybrids between *L. cricota* and *L. nuchipinnis* in Brazilian waters (Sazima, I. pers. com).

Recently, Medeiros *et al.* (2009) observed a

reproductive event of *Alphestes afer* (Bloch, 1793) in the same location; thus, the present paper reinforces the hypothesis that rocky reefs at the entrance of Baía de Todos os Santos make up an important area for reproduction of reef fishes.



Fig 4: Reproductive event of the *Labrisomus cricota* (Photo by J.A.C.C. Nunes).

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References

- Altmann, J. 1974. Observational study of behavior: sampling methods. **Behaviour**, 49: 226 – 265.
- Araújo, M.E.; Paiva, A.C.G. & Mattos, R.G. 2004. Predações de ovas de *Abudefduf saxatilis* (Pomacentridae) por *Elacatinus figaro* (Gobiidae) em poças de maré, Serrambi, PE. **Tropical Oceanography** 32(2): 1-9.
- Carvalho-Filho, A. 1999. **Peixes: costa brasileira**. Melro. São Paulo, SP. 3 ed, pp. 198-199.
- Cervigón, F. 1994. **Los peces marinos de Venezuela** Vol. - III. Editorial Ex Libris.
- De Martini, E. E. 1978. Spatial aspects of reproduction in buffalo sculpin, *Enophrys bison*. **Environmental Biology of Fishes**, 3: 331-336.
- Deloach, N., 1999. **Reef Fish Behavior**: Florida, Caribbean, Bahamas. Florida: New World Publications, Inc.
- Froese, R & Pauly, D. (Eds). 2011. **Fishbase**. World Wide Web electronic publication. www.fishbase.org
- Gibran, F. Z., Santos, F. B., Santos, H. F. & Sabino, J. 2004. Courtship behavior and spawning of the hairy blenny *Labrisomus nuchipinnis* (Labrisomidae) in southeastern Brazil. **Neotropical Ichthyology**, 2(3): 163-166.

- Giorgi, A. E. & Congleton, J. L. 1984. Effects of current velocity on development and survival of lingcod, *Ophiodon elongatus*, embryos. **Environmental Biology of Fishes**, 10: 15-27.
- Gross, M.R. & McMillan, A.M. 1981. Predation and the evolution of colonial nesting in the bluegill sunfish. **Behavioral Ecology and Sociobiology**, 8: 163-174.
- Itzkowitz, M. 1991. Habitat selection and subsequent reproductive success in beaugregory damselfish. **Environmental Biology of Fishes**, 30: 287-293.
- Jones, G. P. 1991. Postrecruitment processes in the ecology of coral reef fish populations: a multifactorial perspective. pp. 294-328. *In*: P.F. Sale (ed.). **The Ecology of Fishes on Coral Reefs**, Academic Press, San Diego
- Keenleyside, M. H. A. 1979. **Diversity and Adaptation in Fish Behaviour**, Springer-Verlag, Berlin, 208p.
- Kodric-Brown, A. 1988. Effects of sex ratio manipulations on territoriality and spawning success of male pupfish, *Cyprinodon pecosensis*. **Animal Behaviour**, 36: 1136-1144.
- Kramer, A., Van Tassell, J. L. & Patzner, R. A. 2009. Aspects of spawning behaviour in five gobiids of the genus *Coryphopterus* (Pisces: Gobiidae) in the Caribbean Sea. **The Open Fish Science Journal**, 2: 50-54.
- Magnhagen, C. & Kvarnemo, L. 1989. Big is better: the importance of size for reproductive success in male *Pomatoschistus minutus* (Pisces, Gobiidae). **Journal of Fish Biology**, 35: 755-763.
- Medeiros, D. V., Nunes, J. A. C. C. & Sampaio, C. L. S. 2009. A mutton hamlet *Alphestes afer* (Bloch, 1793) reproductive event in northeast Brazil. **Pan-American Journal of Aquatic Sciences**, 4(2): 212-215.
- Petersen, C. W. 1990. Occurrence and dynamics of clutch loss and filial cannibalism in two Caribbean damselfishes. **Journal of Experimental Marine Biology and Ecology**, 135: 117-133.
- Raffetto, N. S., Baylis, J.R. & Serns, S.L. 1990. Complete estimates of reproductive success in a closed population of smallmouth bass (*Micropterus dolomieu*). **Ecology**, 71: 1523-1535.
- Rahel, F. J. 1989. Nest defence and aggressive interactions between a small benthic fish (johnny darter) and crayfish. **Environmental Biology of Fishes**, 24: 301-306.
- Randall, J. E. 1967. Food habits of reef fishes of the West Indies. **Studies in Tropical Oceanography**, Miami. 5: 665-847.
- Rasotto, M. B. 1995. Male reproductive apparatus of some Blennioidei (Pisces: Teleostei). **Copeia**, 1995: 907-914.
- Sampaio, C.L.S. & Nottingham, M. C. 2008. **Guia para Identificação de Peixes Ornamentais Volume I: Espécies Marinhas**. Edições IBAMA, 205 p.
- Sazima, I. 1986. Similarities in feeding behaviour between some marine and freshwater fishes in two tropical communities. **Journal of Fish Biology**, 29: 53-65.
- Sazima, I., Gasparini, J. L. & Moura, R. L. 2002. *Labrisomus cricota*, a new scaled blenny from the coast of Brazil (Perciformes: Labrisomidae). **Journal of Ichthyology and Aquatic Biology**, 5(3): 127-132.
- Thresher, R. E. 1984. **Reproduction in Reef Fishes**. T.H.F. Pub. 399p.
- Warner, R. R. & Schultz, E.T. 1992. Sexual selection and male characteristics in the bluehead wrasse, *Thalassoma bifasciatum*: mating site acquisition, mating site defence and female choice. **Evolution**, 46: 1421-1442.
- Whylen, L., Pattengill-Semmens, C. V., Semmens, B. X., Bush, P. G. & Boardman, M. R. 2004. Observations of a Nassau grouper, *Epinephelus striatus*, spawning aggregation site in Little Cayman, Cayman Islands, including multi-species spawning information. **Environmental Biology of Fishes**, 70(3): 305-313.

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