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Scientific note

The glassy sweepers' way: seeking a versatile wrasse to be cleaned

Cristina Sazima*,**, João Paulo Krajewski*,
Roberta Martini Bonaldo* and Ivan Sazima*

Diurnal reef fishes compose the bulk of clients that seek cleaner fishes' services, but some nocturnal species that shelter at daytime also seek the cleaners. While doing so the nocturnal clients must leave their hiding places and thus they get exposed to potential diurnal predators. We report here on the cleaning interactions between a daytime cleaner wrasse (*Thalassoma noronhanum*) and a night time active client (*Pempheris schomburgki*) that usually remains sheltered at daytime. We recorded *P. schomburgki* leaving their shelter at daytime and heading towards *T. noronhanum*, whenever the cleaner swam by the shelter. Since *T. noronhanum* is able to tend temporary cleaning station near the safety of the shelters of its clients, *P. schomburgki* lessens a possible risk of predation by seeking this versatile cleaner.

Peixes recifais diurnos compõem a maioria dos clientes nas estações de peixes limpadores. Entretanto, algumas espécies com hábitos noturnos também procuram os peixes limpadores, ficando expostas a potenciais predadores diurnos quando precisam deixar seus abrigos. Registramos aqui as interações de limpeza entre um labrídeo diurno (*Thalassoma noronhanum*) e um cliente com hábitos noturnos (*Pempheris schomburgki*), que permanece abrigado durante o dia. Esta espécie de cliente deixa seu abrigo durante o dia e nada em direção a *T. noronhanum* quando este limpador desloca-se próximo aos esconderijos. Uma vez que *T. noronhanum* é capaz de manter estações de limpeza temporárias, próximas aos abrigos dos clientes, *P. schomburgki* diminui uma possível exposição aos predadores quando procura esta espécie versátil de limpador.

Keywords: *Pempheris schomburgki*, *Thalassoma noronhanum*, cleaning symbiosis, reef fishes, SW Atlantic.

Several reef fish species get rid of their ectoparasites by seeking cleaner fishes that feed on these noxious organisms, in an apparently cooperative association (Grutter, 1999; Côté, 2000). However, the activities of cleaner fishes are restricted to daytime, whereas parasite infection occurs both during day and night (Losey, 1971; Grutter, 1999). Diurnal reef fish species are the main clients of fish cleaners (e.g., Sazima *et al.*, 1999, 2000), as this kind of interaction depends mostly on visual signals (Losey, 1971). Nocturnal fish species that shelter at daytime may search for alternative forms of relief, e.g., rub themselves against the substrate or seek nocturnal shrimps (Côté, 2000). Alternatively, they may leave their shelters and thus have to cope with the potential risk posed by diurnal predators while on the way to cleaning stations. Thus, a dilemma is created for these nocturnal fishes – to shelter or to be cleaned.

The Noronha wrasse, *Thalassoma noronhanum* (Boulenger, 1890) is a reef-associated labrid (Fig. 1) endemic to the Brazilian coast, being regarded as a planktivore, a zoobenthivore, and a cleaner of several reef fishes (Francini-Filho *et al.*, 2000; Rocha *et al.*, 2001; Froese & Pauly, 2004). It was recently recorded to 'follow' green turtles and reef fishes to capitalize upon drifting particles raised by their feeding activities and faeces, which demonstrates that the Noronha wrasse is a versatile forager (Sazima *et al.*, 2004; Sazima *et al.*, in press). Like other

*Departamento de Zoologia e Museu de História Natural, Caixa Postal 6109, Universidade Estadual de Campinas, 13083-970 Campinas, São Paulo, Brazil. e-mail: csazima@unicamp.br
**Departamento de Zoologia, Caixa Postal 199, Universidade Estadual Paulista, 13506-900 Rio Claro, São Paulo, Brazil.

cleaner fishes the Noronha wrasse is a diurnal species, retreating to its nocturnal shelter early at dawn (Francini-Filho *et al.*, 2000). The Noronha wrasse is a mid-water cleaner that tends cleaning stations close to the reef, where it forms aggregations of 10-450 individuals about 2-5 cm total length-TL, and displays high daily cleaning interaction frequencies (Francini-Filho *et al.*, 2000). Additionally, the Noronha wrasse cleans non-dangerous as well as potentially dangerous species outside the cleaning stations near the bottom, such as species of Haemulidae, Holocentridae, Lutjanidae, and Serranidae (Francini-Filho *et al.*, 2000).

We report here on the nocturnally active glassy sweeper, *Pempheris schomburgki* Müller & Troschel, 1848 (Pempheridae) leaving its shelter at daytime to seek cleaning. A possible risk of predation by diurnal piscivores is lessened by the sweeper as it seeks the services of the Noronha wrasse, a versatile cleaner. Our records were made on a shipwreck at 4-8 m depth at Fernando de Noronha Archipelago (03°50'S, 32°25'W), off northeast Brazil, SW Atlantic.

Pempheris schomburgki is a poorly known species but is regarded as a nocturnally active fish (Randall, 1967; Humann, 2002 Froese & Pauly, 2004;) that hides at daytime in large aggregations and shelters in holes, crevices and grottos (Fig. 2). The glassy sweeper leaves its shelters in a dense column at dusk, and forage for plankton in the water column at night, in small groups, pairs or even alone (Starck & Davis, 1966; Carvalho-Filho, 1999; our pers. obs.). At our study site, however, they promptly left their shelters at daytime when the Noronha wrasses were around.

We recorded 22 instances of the Noronha wrasses passing close (from 20 to 40 cm) to glassy sweepers shelters. In all instances the sweepers moved out from their hiding places in small groups and streamed towards the wrasses (Fig. 3). The glassy sweepers (groups of five to 35 individuals) aggregated near the cleaners, which in turn tended temporary cleaning stations near the posing sweepers (Fig. 4). The Noronha wrasses (mostly one but up to four individuals at the same time) shortly inspected and cleaned a posing sweeper (cleaning interaction with a given individual lasted up to 3 sec), moving from one individual to another. The interactions between the sweepers and the wrasses were always recorded in mid-water aggregations up to one meter above the substrate (Fig. 4). We noticed that the sweepers sought exclusively wrasses that passed close to their cover and retreated to it when the wrasses moved more than 1.5 m away from their shelter. Additionally, roving predatory fishes (jacks – Carangidae and snappers – Lutjanidae) passing nearby caused the glassy sweepers to immediately retreat back to their shelters.

Cleaner gobies, *Elacatinus randalli* (Böhlke & Robins, 1968) tended about 20 cleaning stations at the same shipwreck, one of them about 1 m from a glassy sweepers' shelter. In the absence of a Noronha wrasse nearby, a few sweepers (2-5 individuals) occasionally posed to the gobies but we recorded no cleaning interactions.

Fig. 1. A small Noronha wrasse (*Thalassoma noronhanum*) individual, displaying the characteristic colour pattern of the initial phase.

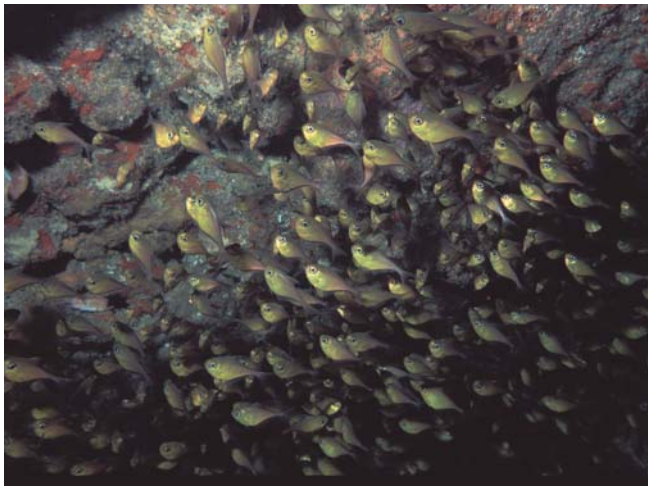

Fig. 2. A large glassy sweeper (*Pempheris schomburgki*) aggregation hiding at daytime in a grotto formed by a large boulder.

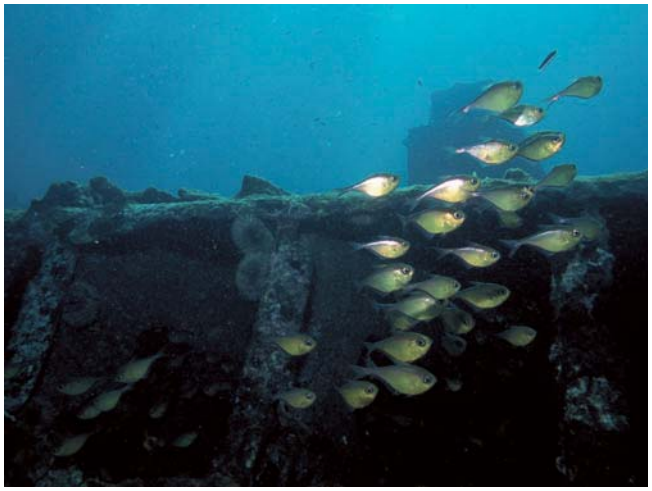

Fig. 3. A small group of glassy sweepers (*Pempheris schomburgki*) leaving their daytime shelter and streaming towards a small Noronha wrasse (*Thalassoma noronhanum*) individual (elongate fish on upper right side) to be cleaned.

Fig. 4. Two sub-groups of the glassy sweeper (*Pempheris schomburgki*) hovering in the open, each sub-group being cleaned by a Noronha wrasse (*Thalassoma noronhanum*) (elongate fish with dark dorsum and white belly mingled with the sweepers).

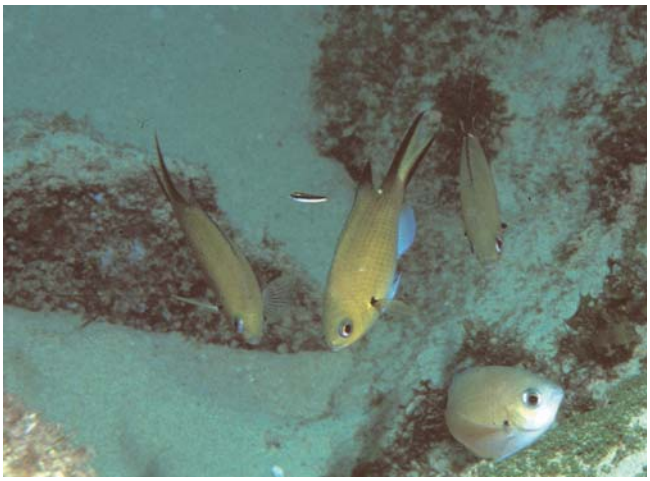

Fig. 5. A recently founded cleaning station with a very small Noronha wrasse (*Thalassoma noronhanum*) hovering amidst a small group of posing brown chromis (*Chromis multilineata*).

In the presence of the Noronha wrasses, the nocturnal glassy sweepers behaved much like the most preferred wrasse clients: diurnal plankton-eating fish species that hover at mid-water, arrive in groups, and crowd at the cleaning stations (Francini-Filho *et al.*, 2000). Thus, despite their having not concurrent activity periods, the Noronha wrasse would be expected as the cleaner fish most suited to interact with the glassy sweepers, and these indeed left their daytime shelters only to be cleaned.

Other than *T. noronhanum*, the goby *E. randalli* acts as a cleaner fish of several reef fish species at Fernando de Noronha (e.g., Sazima & Moura, 2000; our pers. obs.). Unlike the wrasse, however, the goby is a bottom-associated cleaner species that rarely leaves its stations, usually based on coral heads or rocky ledges, a situation also recorded for the coastal *E. figaro* (Sazima *et al.*, 2000). The bottom-based stations are placed at conspicuous sites and reef fishes are apparently able to recognize and learn their location (e.g., Youngbluth, 1968; Losey, 1971). However, seeking fixed bottom-based cleaning stations at daytime may expose nocturnal clients like the glassy sweeper to potential diurnal predators, if not at the station, at least on the way to get there. Therefore, we suppose that in the surveyed area *P. schomburgki* would face higher risk of predation while seeking the goby stations than waiting for *T. noronhanum* to show near their shelter and then following the wrasse for a short distance to be cleaned.

Records of a very small (1.5 cm TL) *T. noronhanum* at four different points of the reef, which cleaned posing fish clients at a given spot (Fig. 5) indicate that cleaning stations are founded by a single fish, joined latter by other individuals which thus start and tend these stations at any suitable place on the reef, including the neighbourhoods of nocturnal fishes' shelters. Thus, while seeking for the Noronha wrasse' services the sweepers lessen the potential risk posed by the alternative of seeking any other cleaner fish, since the wrasse is able to offer them a temporary cleaning station near the safety of their daytime shelters. As the glassy sweeper is not listed among the client assemblage recorded in an extensive study of the Noronha wrasse's cleaning activity (Francini-Filho *et al.*, 2000), we surmise that the sweeper-wrasse interactions occur only under particular circumstances (such as those recorded here, i.e., in shipwrecks or near grotto openings). Additionally, as the Noronha wrasse is able to start cleaning stations at any suitable place and/or time during its foraging activity, the glassy sweepers' dilemma is lessened by this cleaner's versatility.

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Literature Cited

Carvalho-Filho, A. 1999. Peixes: costa brasileira. Melro, São Paulo, 304 p.

Côté, I. M. 2000. Evolution and ecology of cleaning symbioses in the sea. Pp. 311-355. In: Gibson, R. N. & M. Barnes (Eds.). Oceanography and Marine Biology: an Annual Review volume 38. Taylor and Francis, London.

Francini-Filho, R. B., R. L. Moura & I. Sazima. 2000. Cleaning by the wrasse *Thalassoma noronhanum*, with two records of predation by its grouper client *Cephalopholis fulva*. Journal of Fish Biology, 56:802-809.

Froese, R. & D. Pauly (Eds.). 2004. FishBase. World Wide Web electronic publication. www.fishbase.org.

Grutter, A. S. 1999. Cleaner fish really do clean. Nature, 398:672-673.

Humann, P. 2002. Reef fish identification: Florida, Caribbean, Bahamas. New World Publications, Jacksonville, 481 p.

Losey, G. S. 1971. Communication between fishes in cleaning symbiosis. Pp. 45-76. In: Cheng, T. C. (Ed.). Aspects of the Biology of Symbiosis. University Park Press, Baltimore.

Randall, J. E. 1967. Food habits of reef fishes of the West Indies. Studies on Tropical Oceanography, 5:665-847.

Rocha, L. A., R. Z. P. Guimarães & J. L. Gasparini. 2001. Redescription of the brazilian wrasse *Thalassoma noronhanum* (Boulenger, 1890) (Teleostei: Labridae). Aqua, Journal of Ichthyology and Aquatic Biology, 4(3):105-108.

Sazima, C., R.M. Bonaldo, J.P. Krajewski & I. Sazima. *In press.* The Noronha wrasse: a jack-off-all trades follower. Agua, Journal of Ichthyology and Aquatic Biology.

Sazima, C., A. Grossman, C. Bellini & I. Sazima. 2004. The moving gardens: reef fishes grazing, cleaning, and following green turtles in SW Atlantic. Cybium, 28(1):47-53.

Sazima, I., R. L. Moura & C. Sazima. 1999. Cleaning activity of juvenile angelfish, *Pomacanthus paru*, on the reefs of the Abrolhos Archipelago, western South Atlantic. Environmental Biology of Fishes, 56(4):399-407.

Sazima, I., C. Sazima, R. B. Francini-Filho & R. L. Moura. 2000. Daily cleaning activity and diversity of clients of the barber goby, *Elacatinus figaro*, on rocky reefs in southeastern Brazil. Environmental Biology of Fishes, 59(1):69-77.

Sazima, I. & R. L. Moura. 2000. Shark (*Carcharhinus perezi*), cleaned by the goby (*Elacatinus randalli*), at Fernando de Noronha Archipelago, Western South Atlantic. Copeia, 2000(1):297-299.

Starck, W. A. & W. P. Davis. 1966. Night habits of fishes of Alligator Reef, Florida. Ichthyologica, 38:313-356.

Youngbluth, M. J. 1968. Aspects of the ecology and ethology of the cleaning fish *Labroides phthirophagus* Randall. Zoologie Tierpsychologie, 25:915-932.

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