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Scientific Note

Hypoplectrus gemma (Teleostei, Serranidae) is not endemic to southern Florida waters

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Abstract. The blue hamlet, *Hypoplectrus gemma*, is a small reef fish considered to be endemic to Florida (USA). However, we recorded the occurrence of thirteen individuals in the Alacranes Reef, a reef platform off the northern Yucatan Peninsula, Mexico.

Key words: *Hypoplectrus*, Alacranes Reef, Reef Fish, Yucatan Peninsula, Gulf of Mexico

Resumo: *Hypoplectrus gemma* (Teleostei, Serranidae) não é endêmico das águas do sul da Flórida. O hamlet azul, *Hypoplectrus gemma*, é um peixe pequeno do recife é endémico da Flórida (USA). No entanto, nós registramos a ocorrência de treze indivíduos no Recife do Alacranes, uma plataforma do recife ao norte da Península de Yucatán, México.

Palavras-chave: *Hypoplectrus*, Recife Alacranes, peixe recifal, Península de Yucatán, Golfo de México

The hamlets (Teleostei, Serranidae) are a group of relatively small, reef associated fishes inhabiting exclusively in the Greater Caribbean region (Heemstra *et al*. 2002). These fishes belong to the genus *Hypoplectrus* from which at least 10 color morphs are currently considered valid species (Heemstra *et al*. 2002). A concern largely prevailed on the viability of such species, since the only apparent difference among them is color variation (Domeier 1994). However, recent studies showed that *Hypoplectrus* morphs have recently experienced speciation (Ramon *et al*. 2003, Puebla *et al*. 2008).

The geographical distribution of *Hypoplectrus* species varies remarkably throughout their Greater Caribbean range (Domeier 1994). Some are widely distributed and common while others narrowly distributed, yet others more narrowly distributed and uncommon in some places (Domeier 1994, Heemstra *et al*. 2002). Such variation in distribution may imply an interaction of local and regional oceanographic and biological processes, notwithstanding the 22-day, planktonic larval phase in hamlets (Domeier 1994).

Among those narrowly distributed hamlets, the blue hamlet, *Hypoplectrus gemma* Goode & Bean, 1882, is considered to be endemic (*sensu* Domeier 1994) to Florida waters where it is very abundant, particularly in the Dry Tortugas and Marquesas. It is common in the Florida Keys (Jeffrey *et al*. 2001), and according to Heemstra *et al*. (2002) it is rare in The Bahamas but not found elsewhere. In this work through underwater reef fish surveys, we recorded the occurrence of thirteen individuals of *H. gemma* in reefs from the Alacranes Reef platform, in the southern Gulf of Mexico off the northern Yucatan Peninsula.

Alacranes Reef (22°31'28"N, 89°42'44"W) is the largest and easternmost reef complex on the Campeche Bank, southern Gulf of Mexico (Fig. 1). It is a shallow-water, semi-elliptic reef platform (maximum length and width 26.79 km and 14.61 km, respectively) rising above the general surface of the continental shelf from depths of 50 m and located 135 km off the Yucatan Peninsula of Mexico (Korniker *et al*. 1962, Bonet 1967, Jordán-Dahlgren & Rodríguez-Martínez 2001). The platform includes a long, arcuate reef which forms the windward side, a deeper and less sharply defined belt of reef growth

outlining the leeward margin, and a multitude of "patch" reefs of various shapes and sizes in the enclosed reef lagoon. Prevalent winds come from northeast to southeast with the easterly component (15 to 20 km/h).

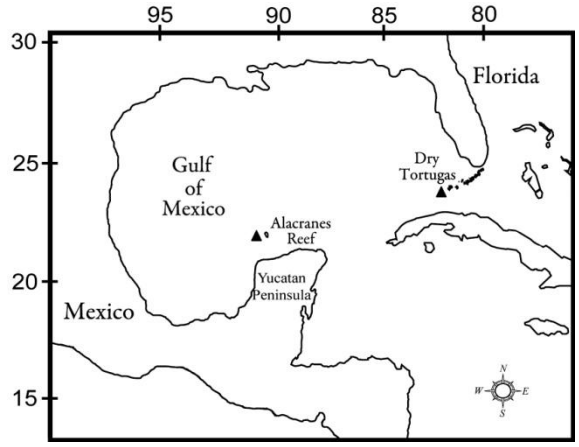

Figure 1. Location of the Alacranes Reef, off the northern Yucatan Peninsula, Mexico.

During underwater SCUBA incursions for verifying potential spawning aggregation sites for groupers (mostly Epinephelidae), we spotted the occurrence of individuals of *H. gemma* in various locations in the Alacranes Reef. We videotaped and photographed such individuals for documenting their presence, coloration or any other particular characteristic, and recorded basic environmental conditions of the locations.

The blue hamlet, *H. gemma*, shows an iridescent blue covering uniformly its entire body. The dorsal and ventral margins of the caudal fin are pigmented black; such pigmentation extends from the origin of the caudal to the end of the fin (Domeier 1994). It has the most deeply incised caudal fin of all species of *Hypoplectrus* and is slightly more elongate than the others (Randall & Randall 1960). The maximum body size recorded is 13 cm (Heemstra *et al*. 2002). This hamlet is relatively easy to identify underwater due to its coloration and pigmentation on the margins of caudal fin.

A total of thirteen *Hypoplectrus gemma* (Fig. 2a, b) were sighted in the Alacranes Reef in several locations. Three individuals were sighted in a relatively shallow (<10 m) site covered with patch reefs and sand areas located inside the reef platform (22°29.945N; 89°38.091W) to 2 miles southwestern the shipwreck known as the "Vapor" (northeastern Alacranes reef, close to windward): on January 12 (one individual 7 cm TL) at 3 m depth, on February 12 (one 7 cm TL) at 6 m depth, and on March 14 (one 5 cm TL) at 3 m depth. These latter individuals were hovering over patch reefs comprised mainly by *Montastrea annularis*. Each dive lasted ~ 45 min and covered a distance of 100 m. On February 14, another individual (8 cm, TL) was sighted but at 20 m in depth in coral crevices in a site located at the leeward side (22°33.046N; 89°47.091W) of the Alacranes Reef platform, 22 km north to Isla Pérez and relatively close to Isla Desterrada. Some other reef fishes were close to *H. gemma*, particularly the blue chromid (*Chromis cyanea*). On March 16, three individuals (one 9 cm TL, and two of 6 cm in TL) were sighted on a site located inside the reef platform (22°25.605N; 89°37.058W) and relatively close to the windward side. On March 17, six individuals (one 4 cm, three of 8 cm, one 6 cm, and one 7 cm TL) were sighted on a site located to 100 m in distance to the previous site. Both latter dives were conducted at 10 m depth and lasted ~ 50 min over a 150 m transect.

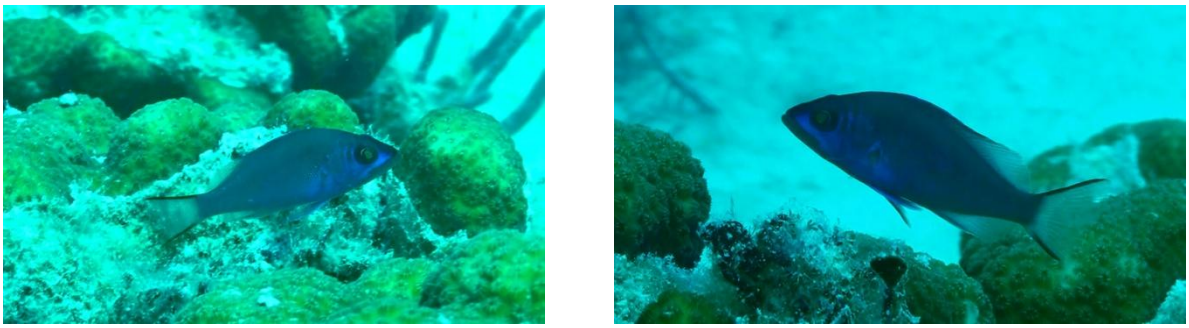

Figure 2 (a, b). The Blue hamlet, *Hypoplectrus gemma*, overhanging a patch coral of *Montastrea annularis* in the Alacranes Reef, southern Gulf of Mexico, off the northern Yucatan Peninsula.

Until now, *Hypoplectrus gemma* used to be considered common (even endemic *sensu* Domeier 1994) to southern Florida waters, particularly in the Dry Tortugas and the Marquesas (Domeier 1994), and not found elsewhere (Heemstra *et al*. 2002). However, this study from the Alacranes Reef showed that *H. gemma* occurs in other areas. At least thirteen individuals were sighted in this reef

platform located 135 km off the northern coast of the Yucatan Peninsula, Mexico, in the southern Gulf of Mexico.

In the Dry Tortugas, Florida, *Hypoplectrus gemma* figures among the twenty most common species in coral reefs ranking 63.5% in sighting frequency, and it is consistently observed in the Dry Tortugas more than other regions of the keys (Jeffrey *et al*. 2001). In fact, in Long Key, Florida, it ranked 22% in abundance over 16 km^2 surveyed (Barreto & McCartney 2008). While in the Alacranes Reef we did not directly evaluate its abundance and density, it was sighted at least once in 8 dives (out of 12) conducted during the survey period. During a 150 m transect survey, 6 individuals were recorded.

Shortly after Domeier (1994) wrote his paper, he discovered some individuals suspected of *H. gemma* in Belize. However, Smith *et al*. (2001) considered that such blue hamlet from Belize is a variety resembling *H. gemma* and called it the "Mayan hamlet" (currently under description by P.S. Lobel). This latter hamlet is the same one that Ramon *et al*. (2003) refer as the "Belize blue" and Heemstra *et al*. (2002) refer as *Hypoplectrus* sp. "Belize" and it is relatively similar to the Florida endemic (*sensu* Ramon *et al*. 2003); however, it differs in morphology. The "Belize blue" lacks the black pigmentation along the dorsal and ventral margins of the caudal fin (Heemstra *et al.* 2002). Ramon *et al*. (2003) called the attention on the possibility that the "Belize blue" may reflects either a dispersal north-south from Florida to Belize or the evolution in Belize of a novel species through hybridization. Despite the presence of the "Belize blue" in the Caribbean region, the individuals sighted in the Alacranes Reef clearly correspond to the taxonomic description of *H. gemma*.

In terms of geographical distribution, how is that *H. gemma*, which is very common and abundant in Florida waters, is also found in the Alacranes Reef, southern Gulf of Mexico? Would that be the same population? We propose two hypotheses for explaining the presence of *H. gemma* in the Alacranes Reef. These hypotheses stem on a combination of oceanographic conditions (marine currents) and biological characteristics (spawning timing, larval duration): 1) The population of *H. gemma* derives from that in the Dry Tortugas, Florida through larval dispersal due to marine currents and 2) The population of *H. gemma* in the Alacranes Reef is not related to that of the Dry Tortugas. In the case of the hypothesis 1) the combination of location (Alacranes Reef is 726 km southwest to Dry Tortugas and Marquesas) and the planktonic larval duration (22-day planktonic phase larvae, Domeier 1994) of *Hypoplectrus* may imply larvae may cross certain distance under given oceanographic and biological conditions. In fact, Sponaugle *et al*. (2005) demonstrated that the passage of cyclonic mesoescale eddies and sub-mesoscale frontal eddies moving downstream along the Florida reef tract are important mechanisms of reef fish larval transport and delivery to settlement habitats. However, there is not any oceanographic study illustrating the possibility that eddies may transport fish larvae from Florida waters into the Alacranes Reef platform. In the case of the hypothesis 2), and a more plausible scenario, involves the Loop Current, a large flow of warm water intruding the Gulf of Mexico through the Yucatan Channel (Yucatan current) and circulating northward the Campeche bank deflecting to Florida (Florida current) (Candela *et al*. 2002). The Loop Current may act as a barrier preventing fish larvae dispersal from the Florida keys to southern Gulf of Mexico (including the Alacranes Reef). In order to address those two hypotheses, further work should focus both on demographic and molecular marker studies to determine the possibility that *H. gemma* population in the Alacranes Reef is connected to that of the Dry Tortugas.

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