

**Occurrence of the African Sergeant,
Abudefduf hoefleri (Steindachner, 1881)
(Actinopterygii: Pomacentridae)
in the Canary Islands Waters**

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ABSTRACT

Pomacentridae is one of the most numerous families of fishes (both in number of species and number of individuals). Pomacentrids are mainly distributed in tropical seas, especially in the Indo-Pacific, but some members occur at subtropical and temperate latitudes. During a scientific diving at the North-East of Gran Canaria Island, October 2014, two individuals of the African sergeant, *Abudefduf hoefleri* (Steindachner, 1881) (Actinopterygii: Pomacentridae), were sighted and photographed in a rocky reef, 39 m depth. The presence of the species in the Canary Islands waters increase the number of tropical affinity fish species in this archipelago. The arrival of these warm-affinity species could be related to some human activities (e.g. shipping and oil platforms traffic); while increased sea surface temperature in the last decades may also contribute to facilitate the dispersion of such species.

Key words: tropical fish, tropicalization, Pomacentridae, Gran Canaria Island.

RESUMEN

Pomacentridae es una de las familias más numerosas de peces (en número de especies y de individuos). Se distribuye principalmente en los mares tropicales, especialmente en el Indo-Pacífico, pero también en latitudes subtropicales y templadas. Durante una inmersión científica realizada al Noreste de la isla de Gran Canaria, Octubre de 2014, dos in-

dividuos de ‘sargento africano’, *Abudefduf hoefleri* (Steindachner, 1881) (Actinopterygii: Pomacentridae), fueron avistados y fotografiados en un arrecife rocoso, a 39 m de profundidad. Su presencia en aguas canarias incrementa el número de especies de peces de afinidad tropical en el archipiélago. La llegada de algunas de estas especies podría estar relacionada con determinadas actividades antrópicas (e.g. tráfico de buques y plataformas petrolíferas); mientras el incremento de la temperatura del agua del mar en Canarias en las últimas décadas puede contribuir también a la dispersión de las mismas.

Palabras clave: pez tropical, tropicalización, Pomacentridae, Isla de Gran Canaria.

1. INTRODUCTION

Damselfishes and clownfishes (Pomacentridae) include, approximately, 29 genera and 394 species (ESCHMEYER, 2015). Pomacentrids are distributed mainly in tropical seas, especially in the Indo-Pacific, but some members can be also found in subtropical and temperate latitudes. These are marine species, rare in brackish waters. These fishes inhabit coral and rocky reefs, but are also common on other shallow-water habitats, including sand and rubble patches, silty embayments, harbours, and seagrass meadows. Pomacentrids are one of the most numerous groups occurring on tropical reefs, in terms of both number of species and number of individuals. Most species are highly territorial, especially during reproductive periods, when males guard and aerate eggs. Food habits are variable (e.g. herbivorous, omnivorous, planktivorous). Larger species, such as various member of the genus *Abudefduf*, are sometimes seen in markets, but the family is not considered as an important economic resource in terms of human consumption. Their most important commercial use is as aquarium fishes (ALLEN, 2001). The genus *Abudefduf* comprise 103 species (FROESE & PAULY, 2015), and is characterized by teeth incisiform in a single row; upper and lower edges of caudal-fin base without projecting spines; vertical scale rows about 28; horizontal scale rows from lateral line to origin of anal fin less than 12; horizontal scale rows above middle of lateral line usually 3 to 3 ½ (ALLEN, 2001; CARTER, 2002). In this work, some bio-ecological data on the observation of specimens of *Abudefduf hoefleri* in the Canary Islands waters are given and discussed.

2. MATERIAL AND METHODS

Recreational or professional scuba diving focused on biodiversity observations and underwater photography proved useful instrumental in providing information about the presence and distribution of fish fauna, including the most easily overlooked species (RIOLO & BETTI, 2015). Fish were observed during a scientific diving at the North-East of Gran Canaria Island, 27°58'N 15°36'W, October 2014, in a rocky reef, 28°02'41.8"N 15°22'28.25"W. Sea surface temperature during the observation was 23.5°C. The reef is an isolated rocky outcrop, located ca. 1.5 km away from the coast, 39 m depth. The rocky substratum is an urchin-grazed barren, as a result of overgrazing by the sea urchin *Diadema africanum* Rodríguez, Hernández & Clemente, 2010. The reef is surrounded by sand and concentrates schools of coastal fishes (e.g. *Boops boops*, *Sarpa salpa*, *Diplodus vulgaris*,



Figure 1.- Specimens of the African sergeant *Abudefduf hoefleri* (Steindachner, 1881) recorded at Baja de Jinámar, North-East of Gran Canaria Island (Canary Islands).

Pagellus acarne); the characteristics fish species associated with this type of habitat in the Canary Islands are abundant here (e.g. *Thalassoma pavo*, *Chromis limbata*, and *Similiparma lurida*).

3. RESULTS

Two individuals of the African sergeant, *Abudefduf hoefleri* (Steindachner, 1881) (Actinopterygii: Pomacentridae), were sighted and photographed (Figure 1). One individual was ca. 20 cm total length (TL), and exhibited a colour pattern of a territorial male: the body is blue, with the margins of dorsal, pelvic and anal fins sharp blue; pectoral and caudal fins are dark; characteristic draw of black spots in front of the head; margins of the preopercule and opercule in black; upper and lower parts of the mouth in black (see Figure 1 and 2, and photo by P. WIRTZ in www.fish-base.org). The other individual was ca. 15 cm TL, and exhibited the same colour pattern. They showed a shy behaviour respect the divers, swimming quickly near the wall of the reef, and hiding in small crevices and holes between the rocks.



Figure 2.- Detail of the head of *A. hoefleri*

4. DISCUSSION

The African sergeant is distributed in the tropical Eastern Atlantic, from Senegal to Benin, including the Cape Verde Islands, Ilheu das Rolas and São Tomé, inhabiting rocky reefs on littoral waters (EDWARDS, 1986; LLORIS & RUCABADO, 1990; WIRTZ *et*

al., 2007, 2013; HANEL & JOHN, 2015). The maximum length reported for this species is 20 cm TL (REINER, 1996). Up to day, Pomacentridae comprise three species in the Canary Islands: *Chromis limbata* (Valenciennes, 1833); *Similiparma lurida* (Cuvier, 1830), previously cited as *Abudefduf luridus* (BRITO, 1991; BRITO *et al.*, 2002), this species was recently reassigned to *Similiparma* (COOPER *et al.*, 2014), only known off the Azores, Madeira, Selvagens, Canary and Cape Verde archipelagos; and *Abudefduf saxatilis* (Linnaeus, 1758) a rare species in the Canary Island (BRITO *et al.*, 2002). The last species exhibits large morphologic and colour pattern similarities with *A. hoefleri* (EDWARDS, 1986), the main difference between these two species is the colour pattern of the adult males. *Abudefduf hoefleri* was first recorded in the Canary Islands waters by TRIAY-ORTELLA *et al.* (2015, in press). These authors caught and studied some individuals in and around the Port of Las Palmas: one resting female, 22.8 cm TL, Pier Reina Sofia, 28°07'N 15°24'W, 18-19 m over a bottom of 21 m depth, March 2015, rocky breakwater; and four maturing males, 19.3-22.0 cm TL, off San Cristóbal, 28°04'N 15°24'W, 18 m, April 2015, rocks with sand. The same authors indicate that the origin of individuals of *A. hoefleri* could be related to the heavy overseas traffic of oil platforms, with destination toward the Port of Las Palmas. These records were made at ca. 0 and 4.4 km from Las Palmas Port; while the observation of this work was 8.8 km away and southward from Las Palmas Port, in a wild environment, indicating a relative spreading of this species in the waters of Gran Canaria Island.

The colour pattern of the two males sighted is according to the distinct pairing during breeding in this species (BREDER & ROSEN, 1966), and suggests that the species could be reproducing in Gran Canaria Island, and probably spreading through littoral waters. An example of introduced species with colonization success is *A. saxatilis*, recorded for the first time in the Canary Islands by BRITO (1991, as *A. marginatus*) based on one individual caught at Port of Santa Cruz de Tenerife, and one more individual sighted in a beach near the same port (BRITO *et al.*, 2002). Since these records, *A. saxatilis* is spreading (BRITO *et al.*, 2005), and currently exhibits well established population around Gran Canaria Island (TRIAY-ORTELLA *et al.*, 2015, in press). Climatically driven changes may affect competitive interactions between non-indigenous species and native species, due to the onset of new thermal optima (OCCHIPINTI-AMBROGI, 2007). What is more, studies on interspecific competition in Pomacentridae have demonstrated that territorial species of large size can control the abundance and habitat use of congener species (ROBERTSON, 1996). This suggests that the spread of the large species, i.e. *A. saxatilis* and *A. hoefleri*, in the Canary Islands waters could have ecological implication for native species, especially for *S. lurida*, a smaller size benthic territorial species.

The number of tropical-affinity species is increasing in the Canary Islands waters. Recently, BRITO *et al.* (2011) recorded the African hind, *Cephalopholis taeniops* (Valenciennes, 1828), from Gran Canaria, and GARCÍA-MEDEROS & TUSET (2014) recorded the African brown snapper, *Lutjanus dentatus* (Duméril, 1858), from the same island. The gradual displacement of warm-affinity fishes toward septentrional latitudes had been pointed out in many works, including the Central and Eastern Atlantic, i.e. Azores, Madeira, Canaries, Galicia, the West coast of Portugal, and the Mediterranean Sea (see BRITO *et al.*, 2005 and references therein; HORTA COSTA *et al.*, 2014). In the Canary Islands, 80% of the 30 new records of actinopterygians littoral fishes, between 1991 and 2005, corre-

sponded to species of tropical origin (BRITO *et al.*, 2005). Furthermore, this phenomenon of ‘tropicalization’ has been recorded in some areas of the Canarian Archipelago (see FALCÓN *et al.*, 2002 and ESPINO *et al.*, 2014). Recently, two species of tropical fishes were found in Gran Canaria Island: *Echiophis punctifer* (Ophichthidae) (A. BOYRA pers. obs.), a species distributed in tropical areas of the Eastern and Western Atlantic; and *Hypleurochilus* sp. (Blenniidae) (A. UBIERNA pers. com.). In addition, other warm-affinity species observed in Gran Canaria Island were: *Rhincodon typus* (Rhincodontidae), *Grammonus longhursti* (Bythitidae), *Holocentrus adscensionis* (Holocentridae), *Caranx crysos* (Carangidae), *Lutjanus goreensis* (Lutjanidae), *Prognathodes marcellae* (Chaetodontidae), *Gnatholepis thompsoni* (Gobiidae), *Acanthurus monroviae* (Acanthuridae), *Canthidermis sufflamen* (Balistidae) and *Chilomycterus reticulatus* (Diodontidae). Of these, only *G. thompsoni* and *C. reticulatus* seem to have stable populations in the island. The way that these species reached the Canarian waters is not clear, although it seems that the introduction related to the transport of ballast water in ships and oil rigs is the principal way (BRITO *et al.*, 2011; PAJUELO *et al.*, 2015, in press; TRIAY-PORTELLA *et al.*, 2015, in press); another way is the dispersion by their own dispersal abilities, especially in species with large pelagic larval stage, which is facilitated by increased sea surface temperatures in the Canaries in the last decades (BRITO *et al.*, 2005, 2011).

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6. REFERENCES

- ALLEN, G. R. 2001. Pomacentridae. pp. 3337-3356. In: Carpenter, K. E. & V. H. Niem (Eds.). *Species identification guide for fishery purposes. The living marine resources of the Western Central Pacific*, Vol. 5. Bony fishes part 3 (Menidae to Pomacentridae). FAO. Rome.
- BREDER, C. M. & D. E. ROSEN. 1966. *Modes of reproduction in fishes*. T. F. H. Publications, Neptune City, New Jersey. 941 pp.
- BRITO, A. 1991. Catálogo de los Peces de las Islas Canarias. Francisco Lemus Editor. 230 pp.
- BRITO, A., P. J. PASCUAL, J. M. FALCÓN, A. SANCHO & G. GONZÁLEZ. 2002. *Peces de las Islas Canarias. Catálogo Comentado e Ilustrado*. Francisco Lemus Editor. 419 pp.
- BRITO, A., J. M. FALCÓN & R. HERRERA. 2005. Sobre la tropicalización reciente de la ictiofauna litoral de las islas Canarias y su relación con cambios ambientales y actividades antrópicas. *Vieraea*, 33: 515-525.
- BRITO, A., S. CLEMENTE & R. HERRERA. 2011. On the occurrence of the African hind, *Cephalopholis taeniops*, in the Canary Islands (eastern subtropical Atlantic): in-

- roduction of large-sized demersal littoral fishes in ballast water of oil platforms? *Biological Invasions*, 13: 2185-2189.
- CARTER, J. A. 2002. Pomacentridae. pp. 1694-1700. In: Carpenter, K. E (Ed). *Species identification guide for fishery purposes. The living marine resources of the Western Central Atlantic*, Vol. 3. Bony fishes part 2 (Opistognathidae to Molidae). FAO. Rome.
- COOPER, W. J., R. C. ALBERTSON, R. E. JACOB & M. W. WESTNEAT. 2014. Re-description and reassignment of the damselfish *Abudefduf luridus* (Cuvier, 1830) using both traditional and geometric morphometric approaches. *Copeia*, 14: 473-480.
- EDWARDS, A. 1986. A new damselfish, *Chromis lubbocki* (Teleostei: Pomacentridae) from the Cape Verde Archipelago, with notes on other Eastern Atlantic pomacentrids. *Zoologische Mededelingen*, 60: 181-207.
- ESCHMEYER, W. N. (Ed.) 2015. Catalog of fishes: genera, species, references. www.research.calacademy.org/research/ichthyology/catalog/fishcatmain.asp (accessed 15 may 2015).
- ESPINO, F., J. A. GONZÁLEZ, A. BOYRA, C. FERNÁNDEZ, F. TUYA & A. BRITO. 2014. Diversity and biogeography of fishes in the Arinaga-Gando area, east coast of Gran Canaria (Canary Islands). *Revista de la Academia Canaria de Ciencias*, 26: 9-25.
- FALCÓN, J. M., A. BRITO, P. PASCUAL, G. GONZÁLEZ, A. SANCHO, M. CABRERA, A. BÁEZ, P. MARTÍN-SOSA & J. BARQUÍN. 2002. Catálogo de los peces de la Reserva Marina de La Graciosa e Islotes al norte de Lanzarote. Tropicalización reciente del poblamiento íctico. *Revista de la Academia Canaria de Ciencias*, 14: 119-138.
- FROESE, R. & D. PAULY. 2015. FishBase. World wide web electronic publication. www.fishbase.org (accessed 15 may 2015).
- GARCÍA-MEDEROS, A. M. & V. M. TUSET. 2014. First record of African brown snapper *Lutjanus dentatus* in the Canary Islands (north-eastern Atlantic Ocean). *Marine Biodiversity Records*, 7 (e65): 1-3.
- HANEL, R. & H. C. JOHN. 2015. A revised checklist of Cape Verde Islands sea fishes. *Journal of Applied Ichthyology*, 31: 135-169.
- HORTA COSTA, B., J. ASSIS, G. FRANCO, K. ERZINI, M. HENRIQUES, E. J. GONÇALVES & J. E. CASELLE. 2014. Tropicalization of fish assemblages in temperate biogeographic transition zones. *Marine Ecology Progress Series*, 504: 241-252.
- LLORIS, D. & J. RUCABADO. 1990. Pomacentridae. pp. 842-850. In: Quéro, J. C., J. C. Hureau, C. Karrer, A. Post & L. Saldanha (Eds.). *Check-list of the Fishes of the Eastern Tropical Atlantic* (CLOFETA). JNICT, Lisbon; SEI, Paris; and UNESCO, Paris. Vol. 2.
- OCCHIPINTI-AMBROGI, A. 2007. Global change and marine communities: Alien species and climate changes. *Marine Pollution Bulletin*, 55: 342-352.
- PAJUELO, J. G., J. A. GONZÁLEZ, R. TRIAY-PORTELLA, J. A. MARTÍN, R. RUIZ-DÍAZ, J. M. LORENZO & Á. LUQUE. 2015. Introduction of non-native marine fish species to the Canary Islands waters (central-eastern Atlantic) through oil rigs. *Hydrobiologia*, (in press).

- REINER, F. 1996. Catálogo dos peixes do Arquipélago de Cabo Verde. *Publicações avulsas do IPIMAR* No. 2. 339 pp.
- RIOLO, F. & F. BETTI. 2015. First record of Europe's smallest marine fish *Lebetus guileti* (Gobiidae) in the Italian seas. *Marine Biodiversity Records*, 8 (e12): 1-3.
- ROBERTSON, D. R. 1996. Interspecific competition controls abundance and habitat use of territorial Caribbean damselfishes. *Ecology*, 77: 885-899.
- TRIAY-PORTELLA, R., J. G. PAJUELO, P. MANENT, F. ESPINO, R. RUIZ-DÍAZ, J. M. LORENZO & J. A. GONZÁLEZ. 2015. New records of non-indigenous fishes (Perciformes and Tetraodontiformes) from the Canary Islands (north-eastern Atlantic). *Cybbium*, (in press).
- WIRTZ, P., C. E. L. FERREIRA, S. R. FLOETER, R. FRICKE, J. L. GASPARINI, T. IWAMOTO, L. ROCHA, C. L. S. SAMPAIO & U. K. SCHLIEWEN. 2007. Coastal fishes of São Tomé and Príncipe islands, Gulf of Guinea (eastern Atlantic Ocean) – an update. *Zootaxa*, 1523: 1-48.
- WIRTZ, P., A. BRITO, J. M. FALCÓN, R. FREITAS, R. FRICKE, V. MONTEIRO, F. REINER & O. TARICHE. 2013. The coastal fishes of the Cape Verde Islands – new records and an annotated check-list. *Spixiana*, 36: 113-142.