First record of Carolines parrotfish (*Calotomus carolinus*) and king angelfish (*Holacanthus passer*) around the Clipperton Atoll-La Passion Island (North-Eastern Tropical Pacific)

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by

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Résumé. – Première identification du poisson perroquet des Carolines (*Calotomus carolinus*) et du poisson ange bleu (*Holacanthus passer*) autour de l'île de Clipperton-La Passion (Océan tropical Nord-Est).

En août 2018, une mission sur l'île de Clipperton-La Passion (Océan tropical Nord-Est) a permis d'identifier la présence inédite de deux spécimens de poisson perroquet à œil étoilé (*Calotomus carolinus*) et d'un spécimen de poisson ange royal (*Holacanthus passer*).

Key words. – Scaridae – Pomacanthidae – Colonization – Geographic distribution – First record.

The first significant local list of fishes inhabiting the coastal waters of the Clipperton-La Passion atoll (Fig. 1A) described 115 species (Robertson and Allen, 1996). This list was recently extended along with an assessment of the completeness of the inventory at Clipperton (Fourrière *et al*., 2014). Following these authors, Clipperton waters host 197 fish species from 62 families, including 106 corresponding to reef fishes, with an endemism of 6.6% (robustness of 95%). The colonization of this atoll by new vagrants is ongoing, as Clua *et al*. (2016) recently added the giant trevally *Caranx ignobilis* (Forsskål, 1775) to this list.

Here we present the first records of the Carolines parrotfish and the king angel in the waters surrounding the Clipperton atoll.

MATERIAL AND METHODS

A scientific mission took place at the Clipperton atoll from 6 to 13 August 2018, which included several scuba diving sessions dedicated to underwater visual censuses and capture of reef fishes. A total of 30 scuba dives of an average duration of 60 min were implemented in depths ranging from 5 to 20 m, all around the atoll (Fig. 1B). When a new species was visually identified, the specimen was speared, then measured with a ruler, genetically sampled and photographed. The DNA samples are held within the library of the CRIOBE USR 3278.

RESULTS AND DISCUSSION

A specimen of a Carolines parrotfish, *Calotomus carolinus* (Valenciennes, 1840), was sighted and collected by one of the authors (EC) on the 09 August 2018 on the south-eastern side slope of the Clipperton atoll at an approximate depth of 10 m (Fig. 1B). It was swimming and feeding along with several specimens of *Scarus rubroviolaceus* Bleeker, 1847. The specimen captured was an

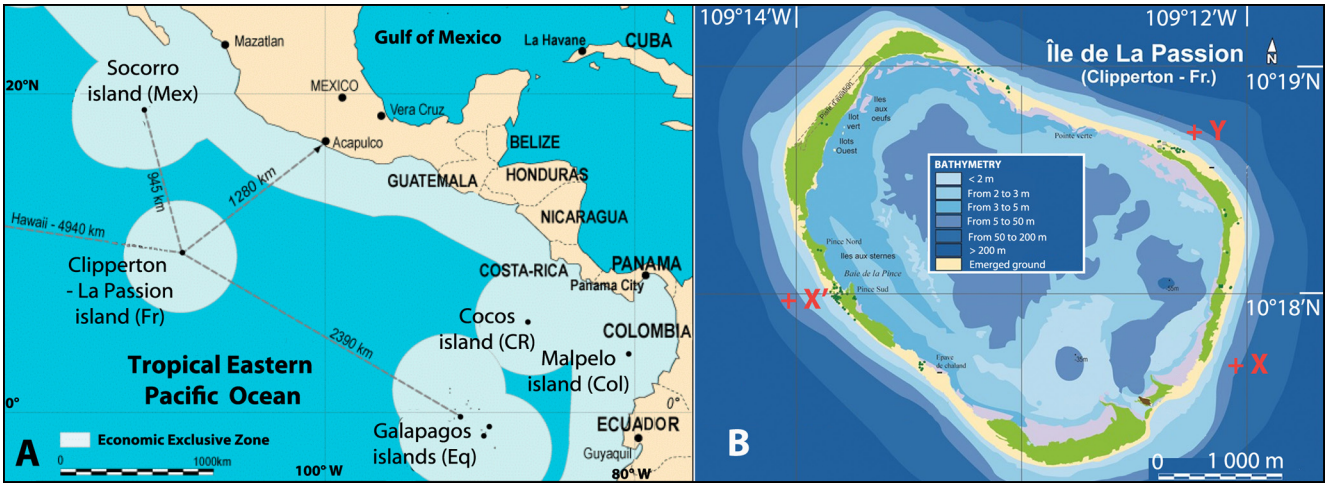

Figure 1. – **A**: Clipperton-La Passion Island (France), Tropical Eastern Pacific Ocean. **B**: Approximative location of the sighting and capture of the adult female individual of *Calotomus carolinus* (X) and the sighting of the male individual (X') on the 11 and 13 August 2018, respectively. Approximative location of the sighting and capture of the juvenile individual of *Holacanthus passer* (Y) (maps modified from "Cartes de l'île de la Passion" by C. Jost, 2015).

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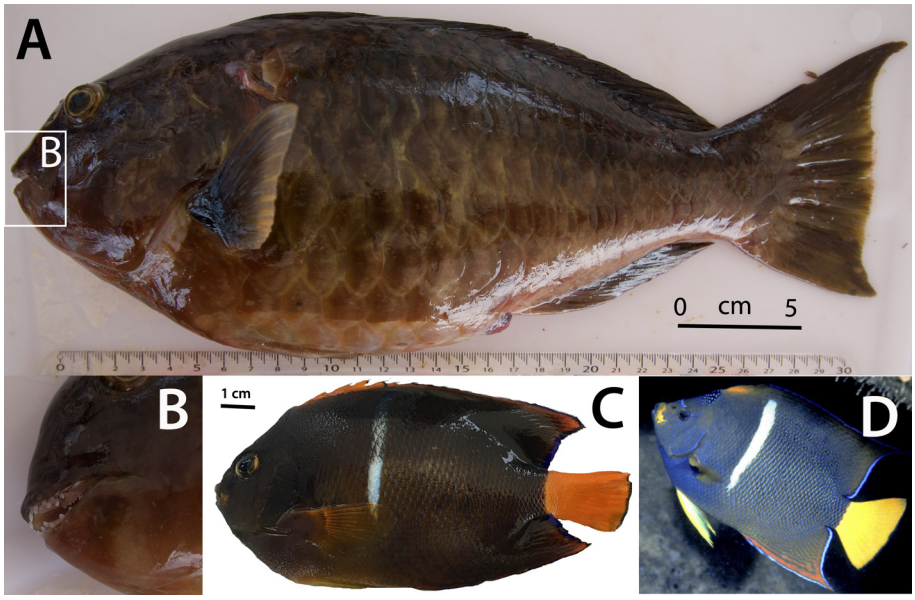

Figure 2. – **A**: Photograph of the female adult individual of *Calotomus carolinus* with a close up showing the details of the separated teeth (**B**), that are specific to this species (Photos E. Clua). **C**: Photograph of the juvenile individual of *Holacanthus passer* (Photo S. Planes) along with an adult individual (**D**) (Photo H. Debelius) in its natural environment, showing the specific vertical white stripe, which is present both in adult and juvenile individuals.

adult female fish of 30 cm of total length (TL) (Fig. 2A). A male individual, visually assessed at ca. 40 cm TL, was sighted two days later by both authors on the western coast of the atoll at a depth of 10 m; it could not be captured.

A specimen of a king angelfish, *Holacanthus passer* Valenciennes, 1846, was sighted and collected by one of the authors (SP) on the 11 August 2018 on the eastern side slope of the Clipperton atoll at an approximate depth of 6 m (Fig. 1B). The specimen was a juvenile fish of 12 cm TL (Fig. 2C). Both species are unmistakable, mainly due to the separated teeth for the Carolines parrot fish (Fig. 2B) and the white stripe on both sides of the king angelfish, as well as the yellow tale (Fig. 2C, D), respectively.

Since just a single individual of the king angelfish was observed at Clipperton, it should be considered as a vagrant, such as, for example – and without being exhaustive – the giant trevally *Caranx ignobilis* (Clua *et al*., 2016), the whitespotted surgeonfish *Acanthurus guttatus* Forster, 1801 (Béarez and Séret, 2009), and the clarion angelfish, *Holacanthus clarionensis* Gilbert, 1890 (Robertson and Allen, 2015). Given the strong competition that is usually observed among the species of pomacanthids (Hourigan *et al*., 1989) and the high densities of the endemic Clipperton angelfish *Holacanthus limbaughi* Baldwin, 1963 (Clua *et al*., 2019), a long-lasting settlement of *H. passer* seems so far unlikely. However, this species can be found in high densities among the eastern continental shelves and neighbouring archipelagos (such as Revillagigedo Islands), from which larvae can be expected to regularly fuel the local waters of the Clipperton atoll. Then, it would be interesting to observe within the next years if cases of hybridization between *H. passer* and *H. limbaughi* do happen around the Clipperton-La Passion atoll, as it was described between *H. passer* and *H. clarionensis* in the Sea of Cortez (Sala *et al*., 1999).

As a different perspective, the fact that two specimens of Carolines parrot fish, one female and one male, were sighted around the atoll, suggests that a local reproduction may happen for this species that could be more rooted to the atoll. However, until further information, these individuals should still be considered as vagrants like many other species in such a tiny and isolated island (Robertson and Allen, 2015). Such a pattern of geographic extension toward the West is not surprising for this species, as a gene flow from the Eastern toward the Central Pacific for reef fishes was shown by Lessios and Robertson (2006). Although it comes from the west, this species has settled populations on the continental shelves and in archipelagos further to East, such as Revillagigedo and Galápagos islands (Robertson and Allen, 2015). A local settlement in Clipperton might then be possible in a next future.

From a prospective point of view, genetic tests on all these populations could allow the assessment of the genetic connectivity between them, and potentially their recent migratory patterns.

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REFERENCES

CLUA E., BESSUDO S., LABRECQUE M. & HOYOS-PADILLA M., 2016. – First record of giant trevally (*Caranx ignobilis*) around the Clipperton Atoll-La Passion Island (North-Eastern Tropical Pacific). *Cybium*, 40(3): 259-260.

CLUA E., BESSUDO S., CASELLE J.E., CHAUVET C., JOST C. & FRIEDLANDER A. M., 2019. – Population assessment of the endemic angelfish *Holacanthus limbaughi* from Île de La Passion-Clipperton Atoll (Tropical Eastern Pacific). *J. Endang. Sp.*, 38: 171-176.

FOURRIÈRE M., REYES-BONILLA H., RODRÍGUEZ-ZARAGOZA F.A. & CRANE N., 2014. – Fishes of Clipperton Atoll, Eastern Pacific: checklist, endemism and analysis of completeness of the inventory. *Pac. Sci.*, 68(3): 375-395.

HOURIGAN T.F., STANTON F.G., MOTTA P.J., KELLEY C.D. & CARLSON B., 1989. – The feeding ecology of three species of Caribbean angelfishes (family Pomacanthidae). *Environ. Biol. Fish*., 24(2): 105-116.

JOST C., 2015. – Rapport de l'expédition scientifique internationale PASSION 2015 à l'île de Clipperton, UPF/UNC/ULR/UNAM/AFD. Maedi/MoM. Tahiti, Polynésie française.

LESSIOS H.A. & ROBERTSON D.R., 2006. – Crossing the impassable: genetic connections in 20 reef fishes across the eastern Pacific barrier. *Proc. R. Soc. Lond.,* B: Biol. Sci., 273(1598): 2201-2208.

ROBERTSON D.R. & ALLEN G.R., 1996. - Zoogeography of the shorefish fauna of Clipperton Atoll. *Coral Reefs*, 15(2): 121-131.

ROBERTSON D.R. & ALLEN G.R., 2015. – Shorefishes of the Tropical Eastern Pacific: online information system. Version 2.0 Smithsonian Tropical Research Institute, Balboa, Panamá. https://biogeodb.stri.si.edu/sftep/en/pages.

SALA E., ABURTO-OROPEZA O. & ARREOLA-ROBLES J.L., 1999. – Observations of a probable hybrid angelfish of the genus *Holacanthus* from the Sea of Cortez, México. *Pac. Sci*., 53(2): 181-184.