First Records of Striped Boarfish *Evistias acutirostris* and Ornate Butterflyfish *Chaetodon ornatissimus* from Easter Island

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First Records of Striped Boarfish *Evistias acutirostris* and Ornate Butterflyfish *Chaetodon ornatissimus* from Easter Island[1]

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Abstract: Here we report on two new reef fish species from the remote and isolated Easter Island—the striped boarfish *Evistias acutirostris* and the ornate butterflyfish *Chaetodon ornatissimus* were observed during scuba dives and underwater video around Easter Island, as well as at nearby Apolo Seamount. These observations are the first records of these species for the southeastern Pacific, which represents a major extension to their distributions and raises questions about the origins and persistence of reef fishes in remote subtropical locations.

Easter island and Salas y Gómez Island are among the most isolated islands in the Pacific Ocean, lying approximately 3,700 km from mainland Chile and >2,000 km from the closest island, which is Pitcairn (Fisher and Norris 1960, Randall and Cea 2011, Friedlander et al. 2013). These islands are part of the Easter Island ecoregion and are situated along the Salas y Gómez Ridge, with a series of seamounts connecting these two emergent land masses (Newman and Foster 1983, Ray et al. 2012, Friedlander et al. 2013) (Figure 1*A*). These seamounts are considered of high biodiversity and are important due to their high species richness and endemism (Morato et al. 2010). The fish fauna of Easter Island is extremely impoverished with only 164 shore and epipelagic species presently known (Randall and Cea 2011). However, >20% of fish species are endemic to Easter and Salas y Gómez Islands, and regional endemics, which include Pitcairn, Rapa, and the Gambier Islands, compose >70% of local reef fish abundance, making these assemblages unique and irreplaceable (Randall and Cea 2011, Friedlander et al. 2013). Here we report the presence of two reef fish species *Evistias acutirostris* (Temminck & Schlegel, 1844) and *Chaetodon ornatissimus* Cuvier, 1831, newly reported for the remote and isolated Easter Island.

materials and methods

Underwater photographs of *E. acutirostris* were taken by scuba divers at Motu Tautara in October 2013 and Make Make (27° 06′ S, 109° 25′ W) in December 2014; at Motu Nui in April 2013, and Motu Iti in April 2014 (27° 12′ S, 109° 27′ W). Additionally, videos of *E. acutirostris* were taken on September 2014 from a remotely operated vehicle (Mariscope Commander MK II) at Apolo Seamount, located ~7 nautical miles from Easter Island. *Chaetodon ornatissimus* was photographed underwater at Omohi on the northwestern side of Easter Island in 2002 and 2010 (27° 03′ S, 109° 23′ W) (Figure 1*B*). Species identification was based on Randall (2005).

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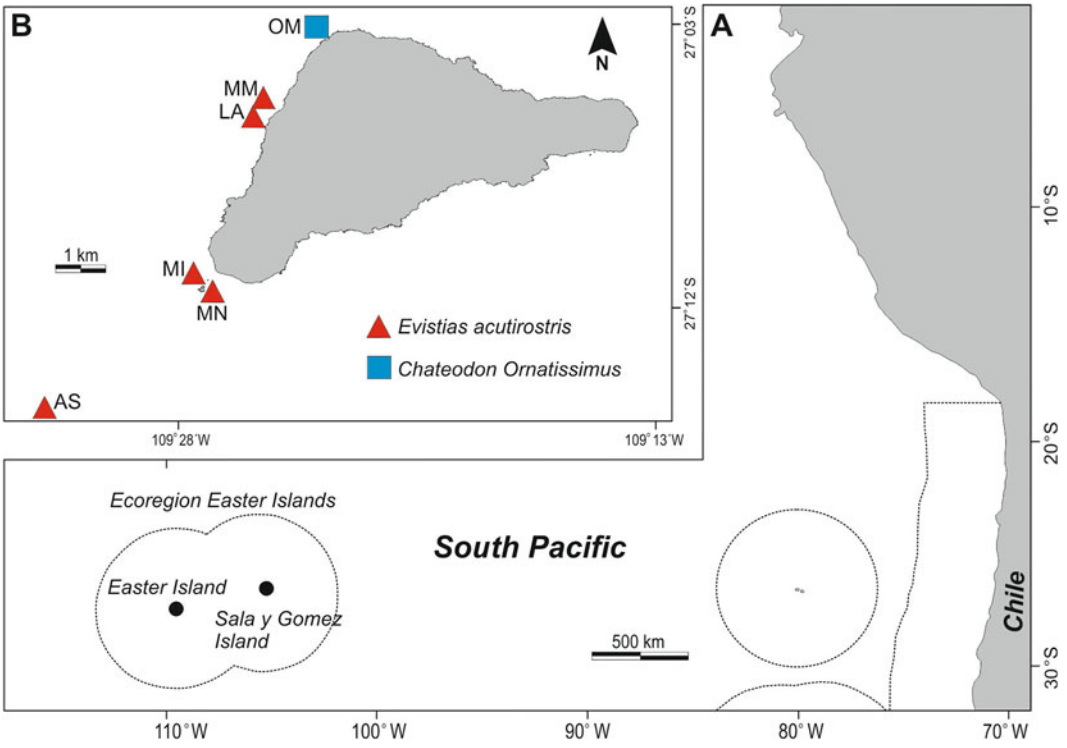

FIGURE 1. Locations of the Easter Island ecoregion off Chile. (*A*) Exclusive Economic Zone of Chile represented by lines, including Easter Island and Sala y Gómez Island. (*B*) Locations where *Evistias acutirostris* and *Chaetodon ornatissimus* were sighted around Easter Island. MN = Motu Nui, MI = Motu Iti, MM = Make Make, LA = Lost Arch at Motu Tautara, OM = Omohi, AS = Apolo Seamount.

RESULTS

The striped boarfish, *E. acutirostris* was sighted at four different locations around Easter Island. A single individual was seen at Motu Nui in April 2013 at 60 m, with another two individuals observed at Motu Iti in April 2014 at 50 m. These individuals were observed on vertical bedrock walls covered with cauliflower coral (*Pocillopora* spp). Additionally, two individuals were observed at Motu Tautara and three at Make Make (Figures 2*A*, *B*). These fish were observed swimming under lava arches with small caves and scattered coral at depths of 30–40 m. During an exploratory investigation at Apolo Seamount, a remotely operated vehicle took video of five individuals of *E. acutirostris* swimming on a lava platform at 150 m covered by sea urchins and corals of several species (Supplemental Video S1 [available online from www.BioOne.org]).

The ornate butterflyfish *C. ornatissimus* has only been observed at Omohi, on the northern point of Easter Island. Two individuals were observed swimming along a rocky bottom covered with *Porites lobata* and *Pocillopora* spp. corals at 15–30 m (Figures 2*C*, *D*).

DISCUSSION

The striped boarfish *E. acutirostris* and the ornate butterflyfish *C. ornatissimus* have not been previously recorded from Easter Island, despite the ichthyofauna having been extensively described and studied since the 1980s (DiSalvo et al. 1988, Randall and Cea 2011, Friedlander et al. 2013). These observations represent very isolated records in the

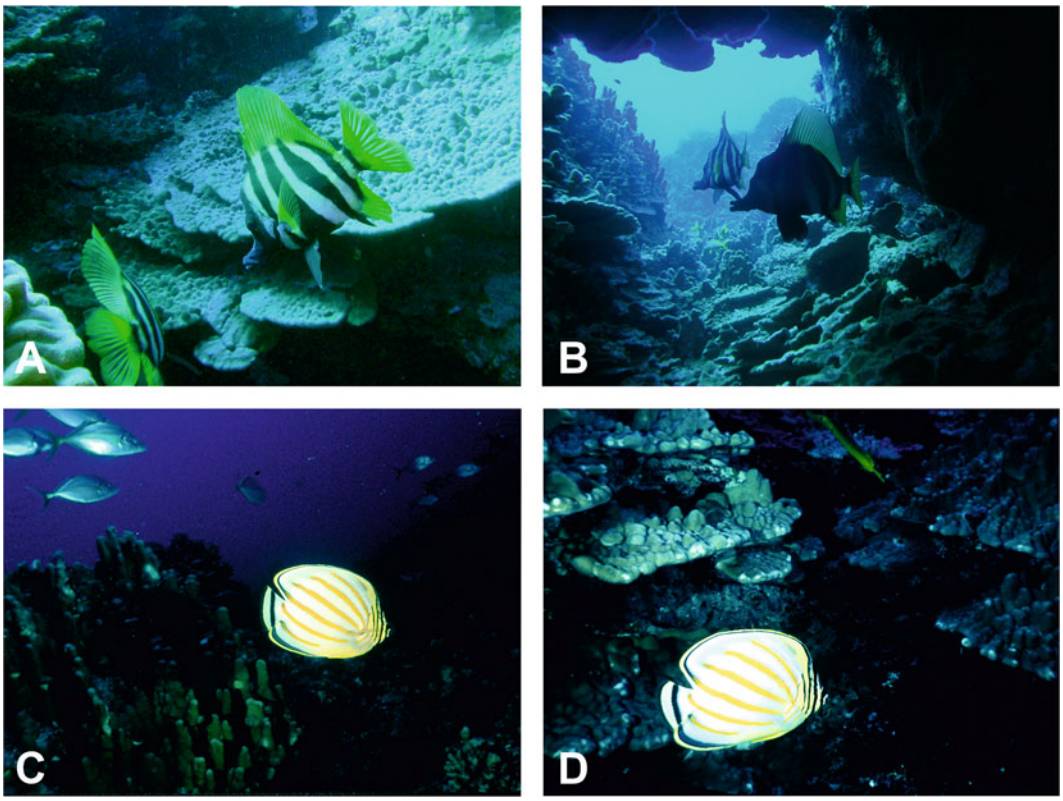

FIGURE 2. (*A*,*B*) Two individuals of *Evistias acutirostris* photographed at Make Make. (*C*,*D*) Single individuals observed at Omohi.

southeastern Pacific, and considering the great distances from the known geographic distributions, these records should be considered as a major extension to their range of occurrence.

These species have very different global distribution patterns. The striped boarfish has an antitropical distribution and is known only from Japan, Hawai'i, Australia, New Zealand, Lord Howe, Norfolk, and the Kermadec Islands (Froese and Pauly 2011, Francis 2012). The closest known records for this species are the Kermadec Islands (~6,650 km) in the southern hemisphere and Hawai'i (~7,150 km) in the northern hemisphere. The species is thought to consume mostly crustaceans and fecal pellets, although a specimen in Hawai'i revealed pieces of brittle stars (Randall 2007).

In contrast, *C. ornatissimus* is widespread through the Indo-Pacific, ranging from Sri Lanka to Hawai'i, the Marquesas, the Pitcairn Islands, north to southern Japan, south to Lord Howe, and Rapa in the Austral Islands. The closest known observation for this species to Easter Island is Ducie Atoll in the Pitcairn Group (~1,550 km). This species is characterized as an obligate corallivore (Berumen et al. 2011) and will therefore likely be negatively affected by the loss of corals associated with climate change, reducing the richness and density of coral reef fishes and other organisms as well (Hoegh-Guldberg and Bruno 2010).

Young geological age (~2.5 million years), isolation, small island size, and a low diversity of marine habitats may all be factors explaining the low number of shore fish species at Easter Island (Kulbicki et al. 2013). Despite this low species richness, the island has extremely high biodiversity value due to the

large proportion of endemic species and the high representation of these endemics in the ecology of the nearshore fish assemblage (21.7%) (Randall and Cea 2011, Friedlander et al. 2013, Kulbicki et al. 2013). Only Hawai'i has a higher proportion of endemism (25%) in the tropical Pacific region, and the fish assemblages between these two islands share a number of similarities. The low rate of colonization and limited connectivity with other reefs in the region may help explain the fish assemblage structure observed and contributes to the distribution of antitropical species that we see today. In this context, the island integration hypothesis (Rotondo et al. 1981, Springer 1982) predicts that Hawaiian endemics should be closely related to species found within the southeastern Pacific plate owing to the geological origins of the Hawaiian Archipelago. In addition to the high endemism at these two locations, there are also other species only found from Easter Island and Hawai'i (Hensley and Suzumoto 1990). It would be valuable to reexamine the phylogeographic patterns of these reef species to determine their origins, especially those with antitropical distributions.

Due to the extreme isolation of Easter Island and Salas y Gómez Island in the southeastern Pacific, it is likely that local recruitment accounts for most of the population replenishment. Striped boarfish and ornate butterflyfishes, similarly to most coral reef fishes, are broadcast spawners, consequently recruitment may be restricted to local connectivity within Easter Island and/or between Easter Island and Salas y Gómez Island. Several seamounts found between both islands are shallow enough to act as stepping-stones to promote connectivity and reproduction of reef fishes in the Easter Island ecoregion. However, further research is needed to study the ichthyofauna of these seamounts from the Easter Island ecoregion and establish the degree of connectivity of the species from adjacent ecosystem to Easter Island. Our findings greatly expand the ranges of a common tropical and somewhat common antitropical species to the extreme southeastern region of the tropical Pacific and raise a number of questions about the origins and persistence of remote reef fish assemblages.

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