

Elongation of the Dorsal Spine and Reproductive Season in Males of *Eviota abax* and *E. prasina* (Pisces: Gobiidae)

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Abstract In fishes, elongation of the fin spines is found in males of various species as a sexual dimorphism. We examined seasonal fluctuation in elongation of the dorsal spines in two gobiid fishes, *Eviota abax* and *E. prasina*. Observations were made from April to October, 1997 at Boso Peninsula, central Japan for the former, and from April to December, 1983 at Kagoshima, southern Japan for the latter. Males of *E. abax* with elongated spines appeared from May to August, corresponded with the reproductive season, early summer to August. Reproductive season of *E. prasina* was from June to September, but all males had an elongated spine throughout the study period.

Key words: *Eviota abax*, *E. prasina*, Gobiidae, reproductive season, sexual dimorphism.

In fishes, elongation of the fin spines in males is found in various taxa as a sexual dimorphism, e.g. Callinomidae, Gobiidae, Labridae and Serranidae (see Nakabo, 2002). The gobiid fishes, *Eviota abax* (Jordan and Snyder) and *E. prasina* (Klunzinger), are small (<50 mm in total length), inhabiting shallow rocky or coral reefs (Lachner and Karnella, 1980). The first and second dorsal spines and the first spine notably elongate in adult male *E. abax* and *E. prasina*, respectively. In *E. abax*, females preferentially select males with elongated spines (Kitamura *et al.*, 2002). In the swordtail *Xiphophorus helleri*, females prefer to spend with males having a longer sword (Bassolo, 1990). In the bluehead wrasse *Thalassoma bifasciatum*, males with longer pectoral fins get superior spawning sites (Warner and Schultz, 1992). These reports suggest that such fin elongation in male is closely related to reproductive behavior.

Here, we report seasonal fluctuations in the dorsal fin spine elongation in males of *E. abax*

and *E. prasina*, and briefly discuss relationships between fin elongation and reproductive season.

Materials and Methods

To examine prosperity and decline of dorsal fin spine elongation under natural condition, males of *E. abax* and *E. prasina* were collected in 1997 at neighboring two sites, Takeoka and Iwai, on the west coast of Boso Peninsula, central Japan, and in 1983 at Hanaze, Kagoshima, southern Japan, respectively. They were distinguished from females collected concurrently by the shape of the urogenital papilla (Lachner and Karnella, 1980). Sexually immature individuals of which sex was not distinguished by the shape were omitted. Dorsal fin spine condition of the males was categorized as "non-elongated" or "elongated" (Fig. 1). Specimens of *E. abax* obtained were as follows: four males (22.2–32.0 mm in standard length) on 9 April; nine (22.0–26.8) on 7 May; 24 (26.0–34.8) on 19 June; 17 (24.5–36.5) on 19

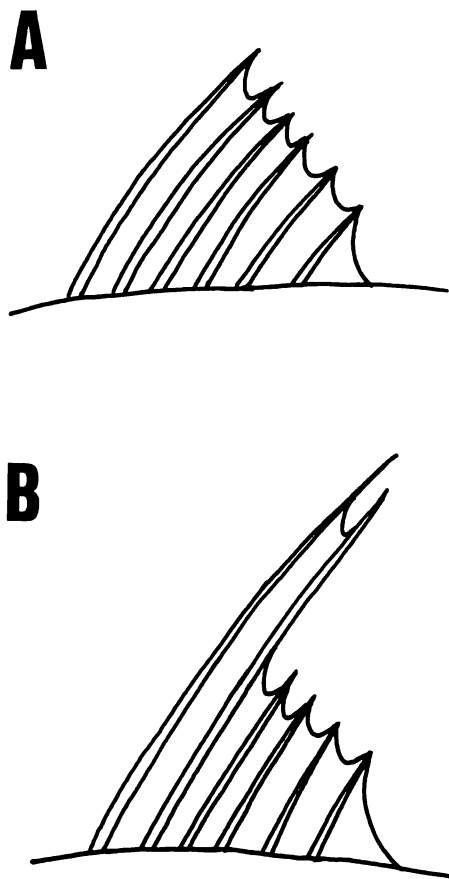


Fig. 1. Categorization of the first dorsal fin spines in male *Eviota abax*. A, Non-elongated; B, elongated.

July; eight (29.8–32.5) on 18 and 19 August; six (28.0–36.5) on 15 October. Those of *E. prasina* were as follows: nine males (15.0–26.0) on 10 April; 23 (16.0–27.6) on 26 May; 25 (18.0–27.5) on 24 June; 10 (20.5–26.2) on 26 July; 11 (19.1–26.0) on 22 August; six (16.0–24.6) on 6 October; seven (15.0–23.1) on 5 December.

Results and Discussion

In *E. abax*, there were no individuals with elongated spines in April and October. Elongation of the dorsal fin spines occurred in early May and all of the males had elongated spines in June. The number of the males that showed no spine elongation increased from July to August (Fig. 2). Reproduction of *E. abax* in Boso Peninsula is completed by the end of August (Taru and Sunobe, 2000). Although the start of the reproductive season is

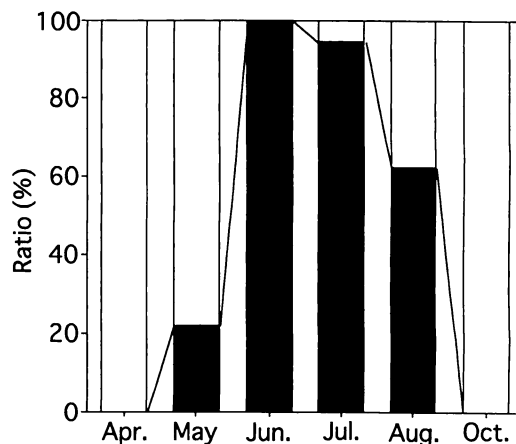


Fig. 2. Seasonal fluctuations in dorsal fin spine elongation in male *Eviota abax* from April to October, 1997. Open, non-elongated; solid, elongated.

unknown in this area, it is most likely to be in early summer (Taru and Sunobe, 2000). The appearance of the males with elongated dorsal spines corresponded closely to the spawning season.

In *E. prasina*, all males collected had an elongated first dorsal spine, indicating no seasonal fluctuation. Reproductive season of this species runs from June to September at Hanaze, Kagoshima (Sunobe and Nakazono, 1999).

Male *E. abax* visits female home ranges for courtship (Taru and Sunobe, 2000, 2002). Females preferentially select males with elongated spines and male-male competition is low (Kitamura *et al.*, 2002). On the contrary, females of *E. prasina* visit nests occupied by large males, and smaller males adopt alternative tactics to access females (Sunobe and Nakazono, 1999), suggesting high male-male competition. Such elongated spine may function for male-male competition through reproductive and non-reproductive season.

Acknowledgments

We are grateful to the following persons for advices and cooperation; T. Furota, H. Hasegawa, T. Nakano, N. Oshima, T. Saisho and H. Suzuki. Thanks are also due to M. Sakurai and an anonymous reviewer for their valuable comments.

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ハゼ科イソハゼおよびナンヨウミドリハゼの雄における第1背鰭棘条の伸長と繁殖期

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ハゼ科イソハゼと同属のナンヨウミドリハゼの雄では、背鰭棘条が性的二型として伸長することが知られている。イソハゼは計 68 個体を 4 月～10 月に千葉県房総半島の竹岡海岸、ナンヨウミドリハゼは計 91 個体を 4 月～12 月に鹿児島県花瀬海岸で調査した。棘条が伸長した雄はイソハゼでは 5 月から 8 月の期間だけ出現し、繁殖期（初夏～8 月）とほぼ一致した。一方、ナンヨウミドリハゼでは 4 月から 12 月といずれの月でも出現し、繁殖期（6 月～9 月）との関係は見られなかった。