Specimens of the order Elopiformes (Actinopterygii: Teleostei) deposited in the Department of Zoology, The University Museum, The University of Tokyo

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Abstract

Specimens of the order Elopiformes deposited in the Department of Zoology, The University Museum, The University of Tokyo included 13 extant specimens of *Elops hawaiensis* Regan, 1909, and 62 of *Megalops cyprinoides* (Broussonet, 1782). No types for the order were found.

Introduction

Fish species included within the order Elopiformes are distributed in warm seas globally. The order, characterized by a leptocephalus larval stage, comprises two families, Elopidae and Megalopidae (Nelson et al. 2016; Betancur-R et al. 2017), the former including a single genus and seven species, known as tenpounders or ladyfishes (McBride et al. 2010). Elopids differ from megalopids in having 95 or more lateral-line scales and the last fin dorsal fin ray not elongate, compared with fewer than 50 scales in the latter and the last fin ray elongate and filamentous (Smith 1999a). The family Megalopidae comprises a single genus and two species, *Megalops atlanticus* Valenciennes, 1847 (a western Atlantic endemic) and *Megalops cyprinoides* (Broussonet, 1782) (Indo-Pacific) (Hatooka 2018). The former has 13–16 dorsal-fin rays (16–21 in *M. cyprinoides*), 21–25 anal-fin rays (23–31), 53–57 vertebrae (66–70), and 41–48 lateral-line scales (30–42). In addition, the pelvic fin is located just below or slightly anterior to the dorsal-fin origin in the former, compared with significantly anterior to the dorsal-fin) (Tanaka 1930; Smith 2002b; Aizawa and Doiuchi 2013b; Nelson et al. 2016).

Although elopiform fishes are not popular as food in Japan, they are abundantly landed and used for human consumption in tropical areas (Losse 1968; Smith 1999b, 2002a, b; Koeda 2019a, b). Moreover, due to their large-sized body, *M. atlanticus* in particular, reaching 2 m in total length (120 kg), elopiforms are popular targets of sport-fishing (Smith 1999a, b, 2002b). Because the megalopid species are euryhaline and can be bred in freshwater, they are sometimes included in the aquarium trade (Pisces Publishers 2004), although their escape into prawn or fish aquaculture ponds may cause problems (Tzeng and Yu 1986). A list of specimens of Elopiformes deposited in the Department of Zoology, The University Museum, The University of Tokyo is provided.

Materials and Methods

Specimens of Elopidae and Megalopidae in the Department of Zoology, The University Museum, The University of Tokyo (abbreviated as ZUMT) were identified during the present study, following Whitehead (1962), Fraser (1973), McBride et al. (2010), and Aizawa and Doiuchi (2013a), and Tanaka (1930), Smith (2002b), Aizawa and Doiuchi (2013b), and Nelson et al. (2016), respectively. Parentheses following registration numbers include standard length, collection locality, collection date, and collector. Collection data of specimens are omitted if the same as that for the previous specimen. The collection year and collector for some specimens were estimated following Koeda et al. (2022).

The ZUMT specimens listed herein were primarily stored in Room 406 (specimen storage room) in the museum building. Most were stored in shelved containers, although some larger specimens were stored in a glass

tank in the same room, with the glass lid sealed with a silicon adhesive (as of July 2022). Although some of the ZUMT specimens, collected by Dr. Tokiharu Abe, had not been registered into the ZUMT collection, with the collection data of most missing, they are listed herein together with their ZUMT ABE number (number with underbar written on the specimen label), in the hope that Dr Abe's catalog books with collection data will be rediscovered in the future. Additionally, specimens with catalogue numbers ZUMT ABE 2700 to 6000 were collected from Palau by Dr. Abe between 1936 and 1937 (Koeda et al. 2022).

Results

As a result of the survey, 13 specimens of *Elops hawaiensis* Regan, 1909 and 62 specimens of *Megalops cyprinoides* (Broussonet, 1782) were confirmed. No types for the family were found. Two specimens (ZUMT 64304, 64305) of *E. hawaiensis* had remained unregistered until the present time, the remaining examples located including 10 ZUMT registrations and one ZUMT ABE specimen. ZUMT 11144, a specimen of *M. cyprinoides* from Ishigaki-jima Island is now deposited in the Field Museum, Chicago, as FMNH 59150.

Although 41 lots, including specimens collected from Basilan, Philippines (ZUMT 48496–48501, 48507, 48508, 48511–48515, 48520, 48523, 48526, 48527, 48535, 48542, 48547, 48548, 48559), Ogasawara Islands (ZUMT 6831, coll. by S. Fujimori), Okinawa-jima Island (ZUMT 17401–17403, coll. by S. Tanabe and Y. Hiyane), Osaka Pref. (ZUMT 7388, coll. by E. Watanabe), Hamana Lake (ZUMT 3179, coll. on Oct. 1910, by T. Aoki), Tokyo Bay (Tsukuda-jima Island; ZUMT 1580, 2 individuals), and Tokyo Market, Japan (ZUMT 3400, 2 individuals) had been registered as "*Elops*" in the ZUMT ledger, all of those from Basilan (22 lots) were identified here as *M. cyprinoides*. Because the remaining 19 registered lots could not be found, it transpired that only 10 of 19 (52.6%) elopoid specimens still remained in ZUMT. Furthermore, because many ledger entries referred to lot numbers only (lacking species names), it is suggested that even more ZUMT specimens may have been lost, for reasons unknown. Such a low retention rate can be compared to those of Istiophoridae (72.7%), Coryphaenidae (81.6%), and Menidae (91.7%) (Hata et al. 2022a, b).

A number of examples of Megalopidae, including 2 lots from Okinawa Prefecture (ZUMT 10381 and 58167) and 24 lots from riverine waters in Basilan, Philippines (ZUMT 42600–42623) [registered as *M. cyprinoides* or ハイレン（"Hairen", Japanese name of *M. cyprinoides*）], were not found. Because some ZUMT specimens of the latter species had been registered under *Dorosoma* (Dorosomatidae; ZUMT 42119), Cyprinidae (ZUMT 15119), *Ilisha* (Pristigasteridae; ZUMT 13961), or *Sciaena* (Sciaenidae; ZUMT 14963), confusion of *M. cyprinoides* with other taxonomic groups at the time of registration is evident. Since an accurate number of registered ZUMT specimens of the family cannot be presently determined, the retention rate of Megalopidae in the ZMUT collection is unclear.

Species accounts

Family Elopidae　カライワシ科

***Elops hawaiensis* Regan, 1909　カライワシ**

JAPAN

ZUMT 15198 [165.9 mm; probably collected from Okinawa Pref.; coll. by S. Sakaguchi (Okinawa Prefectural Daiichi Junior High School), 1920s]

ZUMT 17997 (251.8 mm; rice field along the coast of Naha Bay, Okinawa-jima Island, Okinawa Islands, Ryukyu Archipelago; 11 Oct. 1927; coll. by K. Tashiro)

ZUMT 39714 (56.0 mm; Okinawa-jima Island, Okinawa Islands, Ryukyu Archipelago; 8 July 1936; coll. by S. Inuo)

ZUMT 39862 (117.5 mm; Ryukyu Archipelago; coll. by S. Sakaguchi)

ZUMT 44892 [62.5 mm; probably from Shizuoka Pref.; coll. by N. Onodera (Shizuoka Prefectural Mitsuke Junior High School)]

LOCALITY UNKNOWN

ZUMT 41642 (150.6 mm), ZUMT 41643 (171.0 mm), ZUMT 41644 (152.2 mm), ZUMT 41645 (166.2 mm), ZUMT 41646 (139.5 mm), ZUMT 64304 (249.9 mm), ZUMT 64305 (179.8 mm), ZUMT ABE 6005 (118.2 mm; no data)

Remarks. Tanaka (1912) described and figured this species based on a single specimen landed at Tokyo Market, Japan (ZUMT 3400, 29 cm total length). However, that specimen was not found during this study.

Family Megalopidae　イセゴイ科

Megalops cyprinoides (Broussonet, 1782)　イセゴイ

JAPAN

ZUMT 3192 (153.9 mm; Lake Hamana, Shizuoka Pref.; Oct. 1911)

ZUMT 8967 (160.5 mm; Amami-oshima Island; Amami Islands, Ryukyu Archipelago; 1 July 1919; coll. by H. Kuroiwa)

ZUMT 10640 (84.0 mm; Yaeyama Islands; coll. by H. Kuroiwa, 1910s or 1920s)

ZUMT 10886 (103.3 mm), ZUMT 10889 (110.9 mm; Nagura-gawa River estuary, Ishigaki-jima Island, Yaeyama Islands, Ryukyu Archipelago; 24 Oct. 1922; coll. by H. Kuroiwa)

ZUMT 11143 (150.3 mm; Arakawa-River, Ishigaki-jima Island, Yaeyama Islands, Ryukyu Archipelago; May 1923; coll. by H. Kuroiwa)

ZUMT 11144 [157.7 mm; Arakawa-River, Ishigaki-jima Island, Yaeyama Islands, Ryukyu Archipelago; May 1923; coll. by H. Kuroiwa; currently registered as FMMH 59150 (see Results)]

ZUMT 13961 (160.6 mm), ZUMT 14019 (96.3 mm), ZUMT 14022 (80.3 mm), ZUMT 14023 (95.3 mm), ZUMT 15199 (78.8 mm; probably from Okinawa-jima Island, Ryukyu Islands; coll. by S. Sakaguchi, Okinawa Prefectural Daiichi Junior High School)

ZUMT 17998 (106.4 mm), ZUMT 18000 (105.3 mm), ZUMT 18001 (140.5 mm), ZUMT 18006 (135.2 mm), ZUMT 18007 (153.3 mm; rice field along the coast of Naha Bay, Okinawa-jima Island, Okinawa Islands, Ryukyu Archipelago; 11 Oct. 1927; coll. by K. Tashiro)

ZUMT 21087 (123.5 mm; Hamana Lake, Shizuoka Pref.; coll. by Y. Watanabe, before 1930)

ZUMT 39863 (79.3 mm; Okinawa Pref.; coll. by S. Sakaguchi, 1920s),

ZUMT 45892 (96.9 mm; probably from Okinawa Pref.)

ZUMT 58166 (108.8 mm), ZUMT 58168 (117.4 mm), ZUMT 58169 (102.4 mm), ZUMT 58170 (95.7 mm; Oharada, southeastern part of Iriomote-jima Island, Yaeyama Islands, Ryukyu Archipelago; 11 July 1988; coll. by H. Senou and M. Aizawa)

ZUMT 60371 (101.2 mm; Oharada, southeastern part of Iriomote-jima Island, Yaeyama Islands, Ryukyu Archipelago; 21 Aug. 1989; coll. by H. Senou and M. Aizawa)

TAIWAN

ZUMT 14962 (177.5 mm), ZUMT 14963 (178.3 mm; Tainan; coll. by T. Aoki, 1920s)

ZUMT 25327 (160.5 mm), ZUMT 25334 (111.4 mm; Taiwan; coll. by Y. Yamada)

PHILIPPINES

ZUMT 42119 (155.9 mm; Philippines; Jan. 1936; coll. by Y. Yamamura)

ZUMT 42580 (110.0 mm), ZUMT 42581 (100.2 mm), ZUMT 42599 (105.5 mm), ZUMT 48496 (162.0 mm), ZUMT 48497 (122.9 mm), ZUMT 48498 (102.6 mm), ZUMT 48499 (135.9 mm), ZUMT 48500 (94.9 mm), ZUMT 48501 (110.3 mm), ZUMT 48507 (94.6 mm), ZUMT 48508 (92.1 mm), ZUMT 48511 (132.5 mm), ZUMT 48512 (94.4 mm), ZUMT 48513 (96.9 mm), ZUMT 48514 (126.0 mm), ZUMT 48515 (106.4 mm), ZUMT 48520 (170.6 mm), ZUMT 48523 (124.9 mm), ZUMT 48526 (116.8 mm), ZUMT 48527 (116.2 mm), ZUMT 48535 (114.7 mm), ZUMT 48542 (150.9 mm), ZUMT 48547 (131.1 mm), ZUMT 48548 (85.0 mm), ZUMT 48559 (154.5 mm; freshwater in Basilan; 1926; coll. by U. Yamamura)

PALAU

ZUMT ABE 3026 (163.0 mm), ZUMT ABE 3777 (108.4 mm), ZUMT ABE 5962 (72.7 mm), ZUMT ABE 6011 (71.3 mm; Palau, 1936 or 1937)

SINGAPORE

ZUMT 40739 (165.7 mm; Singapore; 12 Mar. 1910; coll. by I. Iijima and K. Aoki)

LOCALITY UNKNOWN

ZUMT 62048 (419.5 mm; no data)

ZUMT 63072 (64.1 mm; no data; tagged as “23”)

Remarks. ZUMT 3192 was described in detail and illustrated by Tanaka (1930).

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