

Materials and Methods

The specimens of Zenarchopteridae in ZUMT were identified using following reference: Anderson and Collette (2004); Meisner (2001); Mohr, (1926; 1934) and unpublished data by HK. The synonymy and notation of valid names were followed Kottelat (2013), except for the following two species. Brief description are given for selected specimens. Counts of the unpaired fin rays and vertebrae (total = precaudal + caudal) were obtained from radiographs (Softex, E-3). The hypural centrum was treated as a caudal vertebra. Measurements were followed Meisner (2001). Sexes were identified based on the shape of the andropodium.

Contents included in parentheses following registration numbers as follows: [specimen counts (if plural specimens included in the lot), sex (if possible to identify), standard length (in mm), collection locality, collection date, collector]. Collection data of the specimens are omitted if it matches the immediately following specimen. The collection year and collector for some specimens was estimated by following Koeda et al. (2022).

Although, some of the ZUMT specimens collected by Dr. Abe had not been formally cataloged into the ZUMT collection (and the data of some specimens not retained), such specimens which can recognize by having underbar with the number on the accompanying label, are listed herein with the number ZUMT ABE XXXX, due to the possibility of future discovery of Dr. Abe's remaining catalog books with collection data. Catalog numbers after ZUMT 62000 are newly given during this study. ZUMT-ABE 2700–6000 are recognized as which collected from Palau in 1936–1937 (Koeda et al. 2022).

Collection of Zenarchopteridae in ZUMT

In total, 75 specimens of 2 genera, 7 species were found in ZUMT collection. No types are known for this family in the collection. Most of the specimens were collected from southeast Asia, with part of the series of the specimens donated by Tom Harrison (Sarawak Museum) to Ichiro Tomiyama (ZUMT) when Dr. Tomiyama visited Sarawak on 1961 (Koeda et al. 2022). Although the information of the detailed locality and date of these specimens were not known, it was estimated to collected near Sarawak due to there species composition of the series, and the previous tag number are listed together with newly given ZUMT cataloged number. Only few Japanese specimens which *Z. cf. dunckeri* “コモチサヨリ” from the Yaeyama Islands in Okinawa, Japan, were found from the collection. Four lots of specimens, *Zenarchopterus* spp. (ZUMT 55028–55031, Borneo Island, Sarawak, August 1962, coll. I. Tomiyama) were not found (these lots possibly be held by Bruce B. Collette (National Museum of Natural History, Smithsonian Institution: USNM) or duplicated numbers of ZUMT 62519–62525). Several specimens were considered as undescribed species and/or species complex (see remarks).

Zenarchopteridae コモチサヨリ科

Dermogenys Kuhl & van Hasselt in van Hasselt, 1823

Dermogenys siamensis Fowler, 1934

ZUMT 62423: 4 (1 male: 28.8; 3 females: 27.6–39.6), localities and dates unknown.

Description: Dorsal-fin rays 9–10; anal-fin rays 14–15; vertebrae 39–40 (22–23 + 16–17).

Dermogenys cf. orientalis

ZUMT 62424: 9 females, 40.3–53.9, localities and dates unknown.

Description: Dorsal-fin rays 9–11; anal-fin rays 15; vertebrae 38–40 (24–25 + 15); scales on longitudinal series 40, transverse series 9; body depth at pectoral-fin origin (BDP1) 14.1–15.4 % SL, at pelvic-fin origin (BDP2) 13.5–16.0 % SL.

Remarks: Although the observed lot contained only females and lacked locality information, it was tentatively identified as *Dermogenys orientalis* (Weber, 1894) based on a combination of the following morphological traits: a higher maximum body depth at pelvic-fin origin than females of other congeners except those of *D. vogti* Brembach, 1982 (see Meisner 2001); a smaller number of scales on longitudinal series than that of *D. vogti* (40 vs. 52 in a paralectotype of *D. vogti*: HK unpublished data).

Zenarchopterus Gill, 1864 コモチサヨリ属

Zenarchopterus cf. dunckeri コモチサヨリ

Remarks: The present specimens shared a similar structure of the modified anal-fin rays in males (the sixth ray is thickened and greatly elongated). However the outer shape of the fins differed slightly among the specimens from the three localities. Body depth also differed between the specimens from Indonesia (12.0 % SL in male, 10.4 % in female) and those of the Philippines (12.2–14.1 % SL in males, 11.3–13.5 % in females). These morphological variations suggest that several cryptic species may be present with *Z. dunckeri*. However, we tentatively treated them as a single species due to the uncertain taxonomic status of *Z. dunckeri*. Redescription with lectotype designation for “*Zenarchopterus dunckeri*” is necessary to establish the taxonomic status of these cryptic species.

ZUMT 31853: female, 86.3; **ZUMT 31854:** male, 94.9, Sulawesi Tenggara: Buton I., Indonesia [“Buton, Celebes in Nan-yo (南洋)” in ZUMT specimen ledger], during Sept. 1935 to Jan. 1936, Ryoji Wada (和田遼二).

Description: Dorsal-fin rays 10; anal-fin rays 12; vertebrae 39 (27–28 + 11–12); anterior two dorsal-fin ray origins anterior to anal fin origin; fourth dorsal-fin ray of male elongated and thickened, distal tip of fourth dorsal-fin ray flat and wider than the rest of the ray; head length 26.2–27.7 % SL, body depth at anal-fin origin 10.4–12.0 % SL.

ZUMT 51984, 51989, 51994, 51995, 51997–52000, 52032, 52033, 52037, 52038: 12 males, 67.2–90.1; **ZUMT 51977, 51983, 51988, 51990–51993, 52030, 52031, 52034–52036:** 12 females, 62.8–85.5, Sea of Philippines, Jan. 1936–1937, Yaeko Yamamura (山村八重子) [1938, Umejiro Yamamura (山村樗次郎) in ZUMT specimen ledger].

Description: Dorsal-fin rays 10–12; anal-fin rays 11–13; vertebrae 39–41 (27–29 + 11–13); anterior 1–3 dorsal fin rays anterior to anal fin origin; fourth dorsal-fin ray of male elongated and thickened, distal tip of fourth dorsal-fin ray pointed; head length 26.2–27.7 % SL, body depth at anal-fin origin 10.4–12.0 % SL.

Remarks: Although only the name of U. Yamamura was written on the ZUMT specimen ledger, he did not visit the Philippines after returning to Japan in 1926. The specimens should be collected by Y. Yamamura (daughter of U. Yamamura) who visited and collected many specimens from the Philippines during 1936–1937 (Koeda et al. 2022), and donated them to ZUMT by U. Yamamura in 1938.

ZUMT 52415: male, 53.0; **ZUMT 52416:** male, 58.7; **ZUMT 52417:** female, 58.7; **ZUMT 52418:** female, 48.6; **ZUMT 52419:** juvenile, 12.6, Miyara River, Ishigaki-jima I., Yaeyama Island, Ryukyu Archipelago, Japan.

Remarks: These specimens were reported as the first Japanese record of the species with new standard Japanese “Komochi-sayori” by Meguro (1972).

ZUMT 60010: juvenile, 49.4; **ZUMT 60011:** juvenile, 56.1; **ZUMT 60027,** juvenile, 32.6, Urauchi-gawa River, Iriomote-jima I., Yaeyama Islands, Ryukyu Archipelago, 16 Aug. 1989.

Zenarchopterus ectuntio (Hamilton, 1822)

ZUMT 62523 (former tag: P. 2325): male, 99.8; **ZUMT 62524** (P. 4438): female, 102.9; **ZUMT 62525** (P. 4437): male, 102.4, possibly around Sarawak in Borneo Island, donated from Sarawak Museum.

Description: Dorsal-fin rays 12; anal-fin rays 12; vertebrae 42–44 (30–31 + 12–13); anterior 3 or 4 dorsal fin ray origins anterior to anal fin origin.

Zenarchopterus pappenheimi Mohr, 1926

Remarks: All the specimens in ZUMT were also shared the following characteristics with specimens treated as *Zenarchopterus buffonis* (Valenciennes, 1847) in several previous studies (e.g. Collette 1974; Collette and Su 1985): anterior 3–5 dorsal-fin ray origins anterior to anal-fin origin; 12–13 anal-fin rays; 12 dorsal-fin rays; dorsal-fin rays in males without elongation; distinct dark stripe on the upper jaw; and no black spot on the caudal-fin base. However, Kottelat (2013) designated a lectotype of *Hemiramphus buffonis* as a female individual with a dark stripe on the upper jaw with 9 anal-fin rays, which is outside of the previous definition of “*Z. buffonis*” after Mohr (1926). Therefore, *Zenarchopterus buffonis* may be a junior synonym of *Z. beauforti* or *Z. striga*. The number of vertebrae in selected specimens (with asterisk after ZUMT tag): 41–42 (29–30 + 12–13).

ZUMT 62521* (P. 2166): male, 90.5; **ZUMT 62522*** (P. 2167): female, 75.0, possibly around Sarawak in Borneo Island, donated from Sarawak Museum.

ZUMT ABE 3382*: female, 92.1, Palau, 1936–1937, T. Abe.

ZUMT 51976, 51982, 51996, 52039: 4 males, 77.9–99.4; **ZUMT 51975, 51978–51981, 51985–51987:** 8 females, 91.6–102.9, Sea of Philippines, Jan. 1936–1937, Yaeko Yamamura.

Remarks: For the collection date and collector name see remarks of *Zenarchopterus* cf. *dunckeri*.

Zenarchopterus xiphophorus Mohr, 1934

ZUMT 62519 (P. 1965): male, 83.6; **ZUMT 62520** (P. 1967): female, 70.8, possibly collected around Sarawak in Borneo Island, donated from Sarawak Museum.

Description: Dorsal-fin rays 14; anal-fin rays 12–13; vertebrae 42–43 (29–31 + 12–13); anterior four anal fin ray origins anterior to dorsal fin origin in male, anterior three dorsal fin ray origins anterior to anal fin origin in female; fourth dorsal-fin ray of male elongated and thickened, distal tip of fourth dorsal-fin ray pointed.

Remarks: This species has ever recorded only from Sumatra Island in the original description (Mohr 1934; Collette 2004). Present specimens were possibly suggested newly distribution of the species from Borneo.

Zenarchopterus sp.

ZUMT 43184: male, 89.1; **ZUMT 43186:** male, 87.0; **ZUMT 43183:** female, 94.7; **ZUMT 43185:** female, 85.3; **ZUMT 63759:** juvenile, 48.9: Palau, probably 1937, received Jan. 1938, Yata Haneda (羽根田弥太)]; **ZUMT ABE 3374, 3389, 3418:** 3 females; 89.6–101.1, Palau, 1936–1937, T. Abe.

Description: Dorsal-fin rays 10–11; anal-fin rays 10–12; vertebrae 39 (28 + 11); anterior three dorsal fin ray origins anterior to anal fin origin; fourth dorsal-fin ray of male elongated and thickened, distal tip of fourth dorsal-fin ray pointed; sixth anal-fin ray elongated and thickened, seventh ray slightly widened but shorter than sixth; head length 26.4–29.2 % SL, body depth at anal-fin origin 10.8–12.8 % SL.

Remarks: Although the elongation of the sixth anal-fin ray in male specimens was similar to that in *Z. dunckeri*, these specimens were clearly distinguished *Z. dunckeri* by the small elongation of the sixth anal-fin ray, which did not reach beyond the third part of the caudal fin, even in the larger specimens (vs. reach over the half of caudal fin in *Z. cf. dunckeri*: Fig. 1a, b).

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Figure 1. Specimens of Zenarchopteridae deposited in the Department of Zoology, The University Museum, The University of Tokyo (ZUMT). (a, b) *Zenarchopterus* cf. *dunckeri* [a: ZUMT 31854, male, 94.9 mm standard length (SL); Buton Island, Indonesia; b: ZUMT 51984, male, 88.9 mm SL; Philippines]; (c) *Z. ectuntio* [ZUMT 62525, male, 102.4 mm SL; probably collected from Sarawak, Malaysia]; (d, e) *Z. pappenheimi* [d: ZUMT 51976, male, 94.3 mm SL; e: ZUMT 51979, female, 95.6 mm SL; Philippines]; (f) *Z. xiphophorus* [ZUMT 62519, male, 83.6 mm SL; probably collected from Sarawak, Malaysia]; (g) *Zenarchopterus* sp. [ZUMT 43184, male, 89.1 mm SL; Palau]; (h) *Dermogenys* cf. *orientalis* [ZUMT 62424, 1 of 9 females, 53.8 mm SL; collection locality unknown]