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Source: Paleontological Research, 7(4) : 357-362

Published By: The Palaeontological Society of Japan

URL: https://doi.org/10.2517/prpsj.7.357

Paleontological Research, vol. 7, no. 4, pp. 357–362, December 31, 2003

First notice of the family Coleiidae Van Straelen (Crustacea: Decapoda: Eryonoidea) from the upper Triassic of Japan

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Received May 14, 2003; Revised manuscript accepted August 3, 2003

Abstract. ***Coleia uzume*** **sp. nov., a lobster of the polychelidan family Coleiidae, is described from the upper Triassic (Carnian) Nakatsuka Formation of the Mine Group in Yamaguchi Prefecture, southwest Japan. The discovery of *C. uzume* greatly extends the geologic range for the genus back to the late Triassic. This species represents the first and oldest records of a Triassic decapod in the western Panthalassic realm.**

Key words: Coleiidae, Crustacea, Decapoda, Japan, Mine Group, Triassic

Introduction

The Coleiidae Van Straelen, 1924, an extinct family within the superfamily Eryonoidea De Haan, 1841, is a small group including five genera, *Coleia* Broderip, 1835, *Hellerocaris* Van Straelen, 1924, *Proeryon* Beurlen, 1928, *Pseudocoleia* Garassino and Teruzzi, 1993, and *Tropifer* Gould, 1857 (Glaessner, 1969; Duffin, 1978; Garassino and Teruzzi, 1993; Schweigert, 2000). In his review of the genus *Coleia* Broderip, 1835, Pinna (1968) recognized 13 species from the lower Jurassic of Europe. Subsequently, Teruzzi (1990) described two additional new species from the lower Jurassic of Italy. *Coleia* occurs outside Europe in the lower Jurassic of Siberia (Tschernyshev, 1930), the lower Jurassic of India (Feistmantel, 1877), and the upper Jurassic of Madagascar (Secretan, 1964). Schweigert and Dietl (1999) removed *Eryon longipes* Fraas, 1855, from the upper Jurassic of Germany, from *Palaeopolycheles* Von Knebel, 1907 (Polychelidae Wood-Mason, 1874) to *Coleia* based upon examination of well-preserved specimens. Garassino and Teruzzi (2001) assigned *Proeryon banzensis* Kuhn, 1952, from the lower Jurassic of Europe to *Coleia*. Thus, most members of *Coleia* are known from the lower-upper Jurassic in the western Tethys realm and only *Coleia siberica* Tschernyshev, 1930, occurs from the lower Jurassic in the northeast Panthalassic realm.

The purpose of this paper is to describe a new species of *Coleia* from the Nakatsuka Formation of the Mine Group (upper Triassic), deposited on the Akiyoshi Terrane, southwest Japan. The specimens were collected from shale of the Nakatsuka Formation exposed at Tsubuta (Loc. MN-1; 34°1′30″N, 131°7′20″E), Sanyo-cho, Yamaguchi Prefecture (Figure 1). *Coleia* occurred in association with fragments of a penaeoid, pelecypods, *Halobia* spp., ammonites, and plants. Tokuyama (1962) indicated based upon pelecypods that the geologic age of the Nakatsuka Formation was Carnian (late Triassic). The presence of *Trachyceras* cfr. *T. desatoyense* Johnston, 1941, from the formation further shows that its geologic age is early Carnian (Ishibashi *et al.*, 1990).

The described specimens are housed in the Mine City Museum of History and Folklore, Omine, Mine, Yamaguchi 759–2292, Japan.

Systematics

Infraorder Polychelida Wood-Mason, 1874
Superfamily Eryonoidea De Haan, 1841

Remarks.—The Eryonoidea has traditionally been included within the infraorder Palinura Latreille, 1802 (i.e., Glaessner, 1969; Holthuis, 1991; Martin and Davis, 2001). However, Scholtz and Richter (1995) and Schram (2001) showed based upon cladistic analysis that the Palinura was a paraphyletic taxon and the Polychelida was the most basal clade within the reptantian decapods. According to Scholtz and Richter (1995), the Eryonoidea is here placed within the Polychelida.

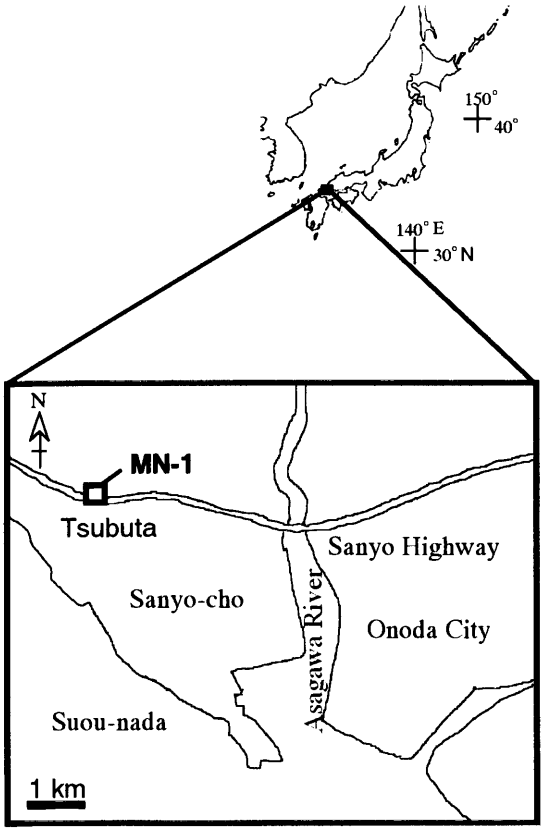


Figure 1. Locality map.

Family Coleiidae Van Straelen, 1924

Emended diagnosis.—Carapace ovate or rectangular, flattened dorsoventrally, longer than wide; rostrum indented medially; orbital sinus deep; cervical and postcervical incisions usually well developed; lateral margin convex; posterior margin concave; median postrostral carina and postorbital carinae distinct; cervical groove usually deep; postcervical groove shallow; median postcervical carina and branchial carinae distinct. Abdominal somites broad, depressed dorsoventrally; all terga with median tergal carina; pleura of somites 2–6 developed; telson lanceolate or triangular; uropodal endopod truncate or ovate; exopod ovate with diarensis. Eye present. Pereiopods 1–4 chelate.

Genus ***Coleia*** Broderip, 1835

Emended diagnosis.—Carapace ovate, flattened dorsoventrally, much longer than wide; rostrum indented medially; orbital sinus deeply concave or V-shaped; cervical and postcervical incisions deep; lateral margin convex; posterior margin concave; median postrostral carina and postorbital carinae present; cervical groove deep and postcervical groove shallow; median postcervical carina and branchial carinae present. Abdominal somites broad, depressed dorsoventrally; tergum of somite 1 short, fused pleura; all terga with median tergal carina; pleura of somites 2–6 well-developed; telson lanceolate or triangular; uropodal endopod and exopod ovate; exopod with diarensis. Antennal scaphocerite large, ovate. Eye present. Pereiopods 1–4 chelate; pereiopod 1 usually slender, elongate.

Type species.—*Coleia antiqua* Broderip, 1835 by monotypy.

Other species.—*Coleia* cfr. *antiqua* (*in* Pinna, 1968); *Coleia banzensis* (Kuhn, 1952); *Coleia* cfr. *C. banzensis* (*in* Garassino and Teruzzi, 2001); *Coleia barrovensis* (McCoy, 1849); *Coleia* cfr. *C. barrovensis* (*in* Feistmantel, 1877); *C. bredonensis* Woods, 1925; *C. brodiei* (Woodward, 1866); *C. crassichelis* (Woodward, 1866); *C. edwardsi* (Moriére, 1864); *C. escheri* (Oppel, 1862); *C. incerta* Secretan, 1964; *C. longipes* (Fraas, 1855); *C. mediterranea* Pinna, 1968; *C. morierei* (Renault, 1889); *C. pinnai* Teruzzi, 1990; *C. popeyei* Teruzzi, 1990; *C. siberica* Tschernyshev, 1930; *C. sinuata* Beurlen, 1928; *C. tenuichelis* Woods, 1925; *C. uzume* sp. nov.; *C. vialli* Pinna, 1968; *C. wilmcotensis* (Woodward, 1866).

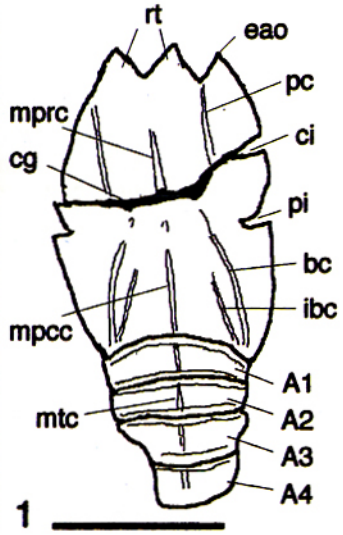
Geologic range.—Late Triassic to late Jurassic.

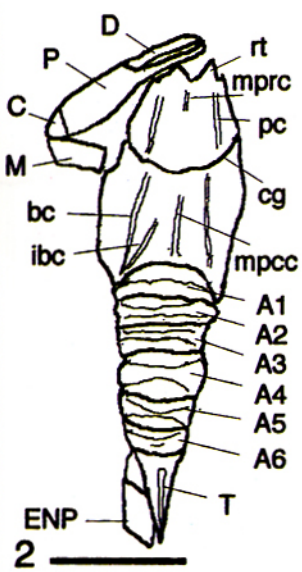
Coleia uzume sp. nov.

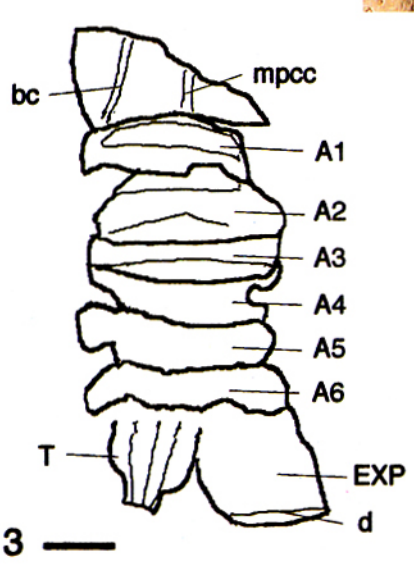
Figures 2.1–2.5, 3

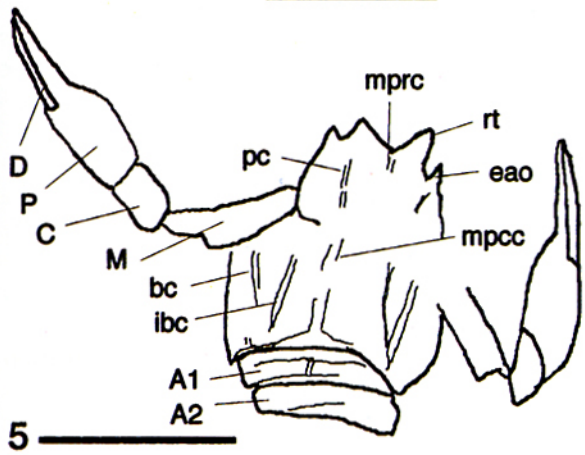
Diagnosis.—Moderate to small-sized *Coleia*. Carapace ovate, much longer than wide, widest at midlength, finely granulated dorsally. Rostrum with two triangular teeth. Orbital sinus V-shaped. Cervical and postcervical incisions deep. Median postrostral carina and postorbital carinae smooth, raised. Cervical groove deep, arcuate. Postcervical groove shallow. Median postcervical carina and branchial carinae smooth, raised. Inner branchial carina smooth, ridged, strongly convergent anteriorly. Terga of abdominal somites 1–6 finely granulated dorsally

➡ **Figure 2.** *Coleia uzume* sp. nov. **1.** MMHF-00039 (holotype), external mould. **2.** MMHF-00040 (paratype), external mould. **3.** MMHF-00043 (paratype), internal mould. **4.** MMHF-00042 (paratype), internal mould. **5.** MMHF-00041 (paratype), external mould. Scale bars = 1 cm. Abbreviations: A1, abdominal somite 1; A2, abdominal somite 2; A3, abdominal somite 3; A4, abdominal somite 4; A5, abdominal somite 5; A6, abdominal somite 6; bc, branchial carina; C, carpus of pereiopod 1; ci, cervical incision; cg, cervical groove; D, dactylus of pereiopod 1; d, diarensis; eao, external angle of orbital sinus; ENP, uropodal endopod; EXP, uropodal exopod; ibc, inner branchial carina; M, merus of pereiopod 1; mpcc, median postcervical carina; mprc, median postrostral carina; mtc, median tergal carina; P, propodus of pereiopod 1; pc, postorbital carina; pi, postcervical incision; rt, rostral teeth; T, telson.









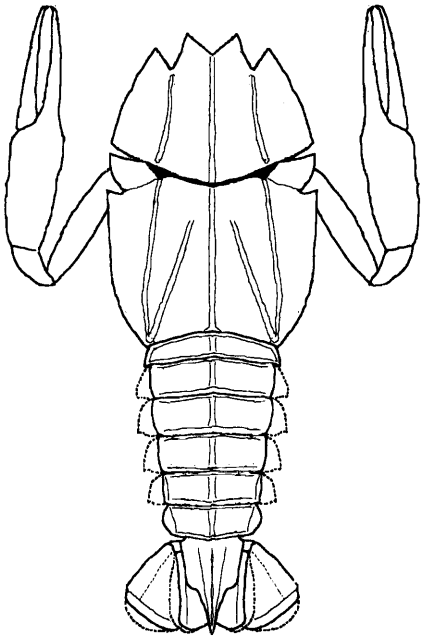


Figure 3. Reconstruction of *Coleia uzume* sp. nov.

with smooth, ridged median tergal carina. Telson much longer than wide, lanceolate, tapering posteriorly, with median carina and submedian carinae. Pereiopod 1 chelate; dactylus and fixed finger slender, elongate, each about as long as palm; carpus short, about 1/3 propodus length; merus about equal to propodus length.

Etymology.—The specific name is formed from "*uzume*", the name of a god of dancing in the Japanese language.

Description. — Body moderate to small for genus. Carapace ovate, flattened dorsoventrally, much longer than wide, width about 3/4 its length, widest at midlength. Rostrum consisting of two triangular teeth, separated by wide, sulcate, V-shaped emargination. Orbital sinus deep, V-shaped. External angle of orbital sinus triangular, much shorter than rostral teeth. Anterolateral margin gently convex. Cervical and postcervical incisions deep, well developed. Lateral margin gently convex with small spines posterolaterally. Posterior margin concave. Dorsal surface covered with fine granules. Median postrostral carina and postorbital carinae well developed without tubercles and spines; postorbital carinae gently converging anteriorly. Cervical groove deep, arcuate, well defined. Postcervical groove shallow. Median postcervical carina swollen, well developed, without tubercles and spines. Branchial carinae swollen, slightly converging anteriorly, without tubercles and spines. Inner branchial carina smooth, ridged, strongly convergent anteriorly, diverged from posterior end of branchial carina, but not joining cervical groove.

Abdomen about as long as carapace. Abdominal somites broad, depressed dorsoventrally, poorly preserved. Terga of somites 1–6 finely granulate dorsally, with marginal furrow and smooth, ridged median tergal carina. Tergum of somite 1 short, fused pleura; ventrolateral margin slightly convex with sharp posteroventral corners. Pleura of somites 2–4 not preserved; pleura of somites 5 and 6 poorly preserved; pleura of somite 6 bounding tergum by weak, transverse ridge, with rounded ventrolateral margin. Telson much longer than wide, lanceolate, tapering posteriorly, with median carina and submedian carinae dorsally. Uropodal endopod and exopod poorly preserved; exopod with diarensis.

Pereiopod 1 chelate, slender. Dactylus slender, elongate, about as long as palm, with ventrally hooked tip. Fixed finger also slender, elongate, equal to dactylus length, with upturned tip. Carpus short, about 1/3 propodus length. Merus about as long as propodus.

Pereiopods 2–5 unknown.

Material examined.—MMHF-00039 (holotype), MMHF-00040-00043 (paratype).

Discussion.—*Coleia uzume* sp. nov. possesses characters of the carapace and pereiopods 1 most like those of *C. tenuichelis* Woods, 1925, from the lower Sinemurian of Lyme Regis, England. However, the presence of inner branchial carinae on the dorsal carapace readily distinguishes the present species from *C. tenuichelis*. *Coleia uzume* resembles *Coleia antiqua* Broderip, 1835 from the lower Sinemurian of Lyme Regis (Broderip, 1835; Woods, 1925), but differs in having inner branchial carinae on the carapace and shorter propodi of pereiopods 1. In *Coleia antiqua*, the dactyli and fixed fingers are much shorter than the palm, while in *C. uzume* they are about half the propodus length.

In his review of Mesozoic decapods from Japan, Karasawa (2001) listed 22 species in 17 genera from lower Jurassic (Toarcian)-upper Cretaceous (Maastrichtian) deposits. Among these, *Uncina pacifica* Schweigert *et al.*, 2003 (Uncinidae Beurlen, 1928), described from the Toarcian Toyora Group in Yamaguchi Prefecture by Karasawa (2002) and Schweigert *et al.* (2003), has been the previously known oldest record in Japan. *Coleia uzume* is the first and oldest recorded occurrence of a Triassic decapod in Japan.

Two coleiid genera have been previously known from upper Triassic deposits: *Pseudocoleia* Garassino and Teruzzi, 1993, from the Norian-Rhaetian of Italy (Garassino and Teruzzi, 1993; Garassino *et al.*, 1996) and *Tropifer* Gould, 1857, from the Rhaetian of England (Duffin, 1978). The discovery of *Coleia uzume* from the Carnian of Japan represents the oldest record for not only the genus but also the family.

The Eryonoidea is represented by four families,

Coleiidae, Eryonidae De Haan, 1841 (late Triassic–early Cretaceous), Polychelidae Wood-Mason, 1874 (middle Jurassic–Recent), and Tetrachelidae Beurlen, 1930 (late Triassic). Most genera excluding polychelids have been known from the western Tethys realm. Fossil members of the Polychelidae are recorded from the middle-upper Jurassic of Europe (Glaessner, 1969), the upper Jurassic of Antarctica (Aguirre-Urreta *et al.*, 1990), and the lower Oligocene of western North America (Schweitzer and Feldmann, 2001). The recent polychelids are cosmopolitan in distribution (Galil, 2000). Among eryonoid genera *Rosenfeldia* Garassino *et al.*, 1996, *Pseudocoleia*, *Tetrachela* Reuss, 1858, and *Tropifer* are known from upper Triassic deposits. The recognition of *Coleia* from Japan greatly extends the known geographic range for the Triassic Eryonoidea to the west side of the Panthalassic Ocean.

Acknowledgments

We thank J. S. H. Collins (London), A. Garassino (Museo Civico di Storia Naturale, Milan), and G. Schweigert (Staatliches Museum für Naturkunde, Stuttgart) for providing literature. We are deeply indebted to C. E. Schweitzer (Kent State University, Ohio) for reading our manuscript and providing useful comments. Special thanks are due to H. Kato (Natural History Museum and Institute, Chiba) for his review of the manuscript.

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