

An association of *Stenula bassarginensis* (Gurjanova, 1948) (Crustacea: Amphipoda: Stenothoidae) and *Tubularia* cf. *indivisa* Linnaeus, 1758 (Cnidaria: Tubulariidae) in the coastal waters of the Sea of Japan

I. Marin^{1,2}, S. Sinelnikov³

¹A.N. Severtsov Institute of Ecology and Evolution of RAS, Moscow, 119071, Russia

²Biological Department, Altai State University, Barnaul, 656049, Russia, E-mail: coralliodecapoda@mail.ru

³I.D. Papanin Institute for Biology of Inland Waters of RAS, Borok, Russia, E-mail: sinelnikoff@yandex.ru

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Amphipod *Stenula bassarginensis* (Gurjanova, 1948) (Crustacea: Amphipoda: Stenothoidae) is described in association with oaten pipe hydroid *Tubularia* cf. *indivisa* Linnaeus, 1758 (Cnidaria: Tubulariidae) from Vostok Bay of the Sea of Japan and Busse lagoon in Aniva Bay of the Sea of Okhotsk (new record). Previously representative of the genus were known as associated of hermit crabs and anemones only.

Keywords: Hydrozoa; associations; hydroids; symbiosis; Amphipoda; Stenothoidae; *Stenula*; *Tubularia*; Sea of Japan; Sea of Okhotsk

The amphipod family Stenothoidae Boeck, 1871 (Crustacea, Amphipoda) presently includes nearly 34 genera and about 200 known valid species of mostly symbiotic marine benthic amphipods recorded from subtidal communities to depths of more than 3000 meters (Barnard & Karaman, 1991; Bellan-Santini, 2005; Desbruyères et al., 2001; Gurjanova, 1951; Horton et al. 2013; Krapp-Schickel & Koenemann, 2006; Krapp-Schickel, 1976, 2006, 2009, 2011, 2015; Tandberg & Vader, 2009; Krapp-Schickel & Brutto, 2015; Krapp-Schickel & Vader, 2015; Vader & Tandberg, 2013, 2015; WoRMS). Representatives of the family are known to be associated with different large marine invertebrates such as hydroids (Pirlot, 1932, Krapp-Schickel, 1993, Vader & Krapp-Schickel, 1996, Krapp-Schickel & Vader, 2015, Tandberg & Vader, 2015; Marin & Sinelnikov, 2017, 2018), sea anemones (Vader 1984, Vader & Krapp-Schickel, 1996, Krapp-Schickel & Vader, 1998), bivalves (Vader, 1972, Vader & Beehler, 1983; Tandberg et al., 2010), hermit crabs and other crustaceans (McGrath 1978, Thomas & Cairns, 1984, Marin & Sinelnikov, 2012, 2016, Marin et al., 2013). Nevertheless, the diversity, ecology and range of associations of these animals are not well studied. Most of stenothoid species are just morphologically described without any data on their ecology.

Stenothoides bassarginensis Gurjanova, 1948 was described based on specimens collected in the Peter the Great Bay and Tatar Strait of the Sea of Japan (Gurjanova, 1948). No data on the ecology of the species were presented and since the description the species has not been reported in scientific literature or re-described. During the sampling in Vostok Bay and Aniva Bay of the Sea of Japan at the depth from 3-5 meters large stenothoids were found on hydrants of oaten pipe hydroid *Tubularia* cf. *indivisa* Linnaeus, 1758 (Cnidaria: Tubulariidae) (Fig. 1). Careful identification revealed that they belong to *Stenula bassarginensis* (Gurjanova, 1951) (Crustacea: Amphipoda: Stenothoidae) clearly identifying by the chela of gnathopods II.

Materials and methods

The collection of the material has been accomplished in coastal waters of the Vostok Bay of the Sea of Japan in July 2013 and the Busse Lagoon (southern Sakhalin Island) in the Aniva Bay of the Sea of Okhotsk in summer of 2014. Hydroids were photographed *in situ* and then collected underwater using SCUBA equipment. Underwater hydroid colonies were carefully separated from the substrate and placed in sealed plastic bags, eliminating the loss of symbionts. Flushing of symbionts from hydroids was carried out in the laboratory through a net with a diameter of a screen of 70 µm with a 5-10% solution of ethanol. Further, the collected animals and colonies were fixed in 70% solution of ethanol. The photos were done using the digital camera Canon PowerShot G11 and stereomicroscope Olympus with the digital camera.

Processing of material was carried out at A.N. Severtsov Institute of Ecology and Evolution of RAS, Moscow. The symbiotic assemblage from each colony was viewed under the binocular microscope; fixed animals were sorted into groups. The amphipod species identification was carried out according to Guryanova (1951). Only primary synonyms are given. The material is deposited in the author's collection at A.N. Severtsov Institute of Ecology and Evolution of RAS, Moscow (LEMMI).

Results

Family Stenothoidae Boeck, 1871

Genus *Stenula* J.L. Barnard, 1962

Remarks. The type species – *Stenula latipes* (Chevreux & Fage, 1925) (= *Stenothoides latipes* Chevreux & Fage, 1925). The genus presently includes 16 valid species (after Krapp-Schickel & Vader, 2015) known from the Northern Atlantic (4 species), North Western Pacific (9 species), North Eastern Pacific (2 species) and Arctic (1 species).

Short diagnosis. Antenna 1 lacking nasiform process on article 1; accessory flagellum absent; palp of mandible 1-articulate; palp of maxilla 1 1-articulate; inner plate of maxilla 2 ordinary; inner plates of maxillipeds well separated. Gnathopod 1 small, almost simple, article 4 incipiently chelate; article 5 elongate, unlobed; article 6 almost linear. Gnathopod 2 slightly enlarged, palm weakly oblique, article 5 short, lobed. The genus *Stenula* possesses only pereopod 3 with slender article 2 and pereopods 4–5 with broad and inflated article 2. The main difference of the relative genus *Stenothoides* is in morphology of article 2 of pereopods 3–5: the latter species possess pereopods 3–4 with slender article 2 and only pereopod 5 with expanded article 2 (after Barnard, 1962).

Stenula bassarginensis (Gurjanova, 1948)

(Figs. 1 *f*, *g*, 2)

Stenothoides bassarginensis Gurjanova, 1948: 314, fig. 19 [type locality – Sea of Japan].

Stenula bassarginensis. – Barnard, 1962: 137.

Material examined. 7 ovigerous females, 5 males (LEMMI) – Sea of Japan, Vostok Bay, in front of scientific station “Vostok”, 42°53'36.0"N 132°43'54.0", 3–5 m, on *Tubularia* cf. *indivisa*, SCUBA, coll. I. Marin, July 2013; 3 ovigerous females, 2 males (LEMMI) – Sea of Okhotsk, Aniva Bay, Busse Lagoon, 46°32'42.2"N 143°21'10.4"E, 1–3 m, on *Tubularia* cf. *indivisa*, SCUBA, coll. I. Marin, 2014.

Remarks. The specimens of *S. bassarginensis* (Fig. 2) clearly belong to described by Gurjanova (1948, 1951) and can be identified by characteristic margin of chela of gnathopod 2 (Fig. 2 *c*, *f*). The species belong to the genus *Stenula* after Barnard's (1962) genera recognition possessing pereopod 3 with slender article 2 and pereopods 4 and 5 with broad and inflated article 2 (Fig. 2 *a*). Krapp-Schickel & Vader (2015) provided a key to all known species of the genus *Stenula*.

Host and ecology. The species was found in association with large oaten pipe hydroid *Tubularia* cf. *indivisa* Linnaeus, 1758 (Cnidaria: Tubulariidae) (Fig. 1 *a–e*) both in Vostok Bay and Busse lagoon of Aniva Bay. Large specimens (possibly females) usually occupy the hydrants of hydroids solitary with a lot of small juveniles (see Fig. 1 *d*, *e*). The ecology of the species is probably similar to *Metopa alderi* (Bate, 1857) (Crustacea: Amphipoda: Stenothoidae) associated with *Ectopleura larynx* (Ellis, Solander, 1786) (Cnidaria: Tubulariidae) in the White Sea (see Marin & Sinelnikov, 2017). Representatives of the genus *Stenula* are known in associations with hermit crabs (*S. latipes* after McGrath, 1978) and sea anemones (*S. solsbergi* and *S. pugilla* after Krapp-Schickel & Vader, 2015). Another amphipod species found in the same samples is *Ischyrocerus* cf. *enigmaticus* Gurjanova, 1934 (Amphipoda: Ischyroceridae).

Distribution. The species is known exclusively in the Sea of Japan from Tatar Strait to the Peter the Great Bay (Gurjanova, 1948) and Busse lagoon of Sakhalin Island in Aniva Bay of the Sea of Okhotsk (new record).

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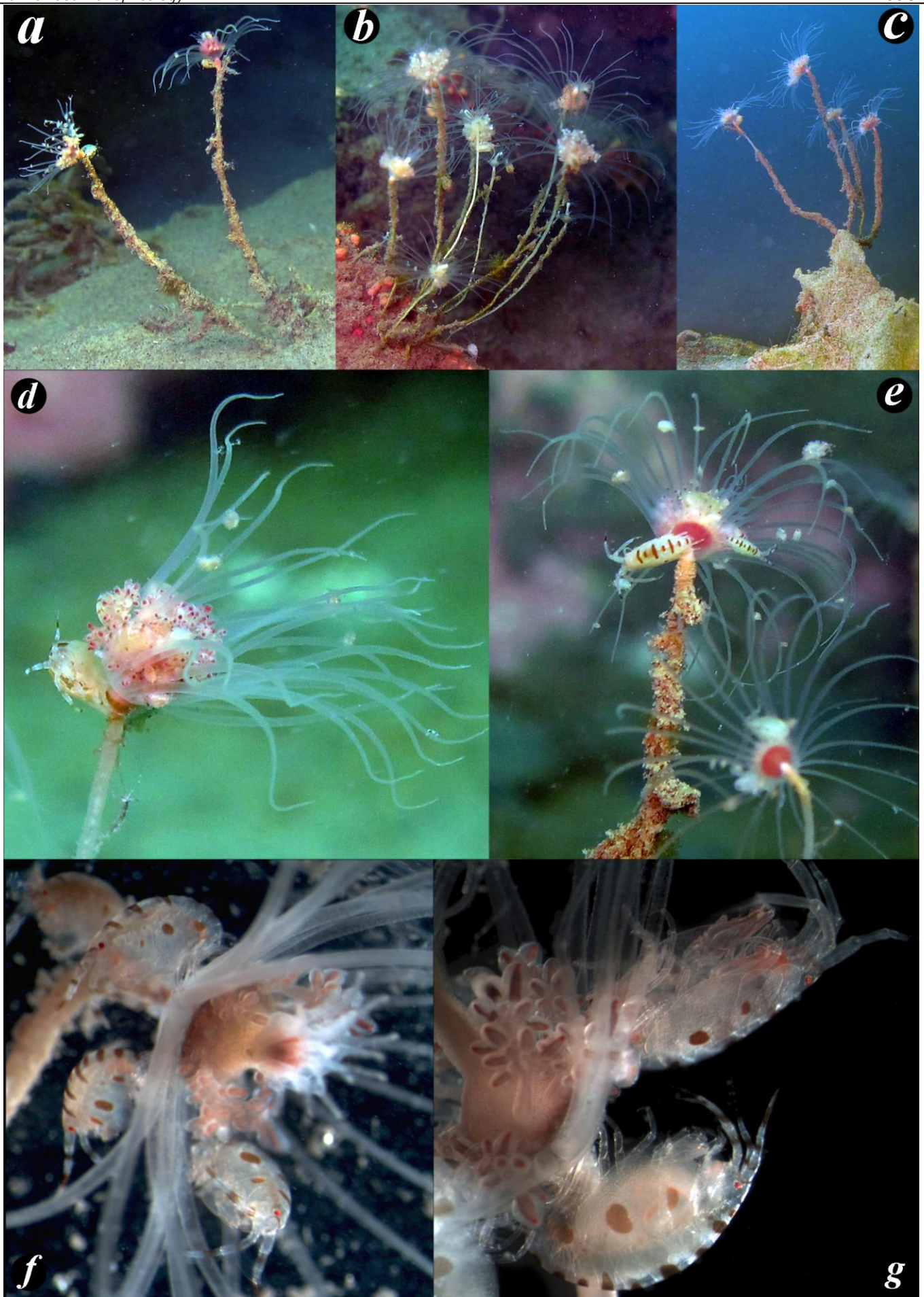


Figure 1. *Stenula bassarginensis* on its host *Tubularia cf. indivisa* Linnaeus, 1758: *a-c* – general view of hydroid colonies *in situ*; *d, e* – hydrants with amphipods *in situ* (probably female and group of juveniles); *f, g* – photo of *S. bassarginensis* on hydrants made in laboratory

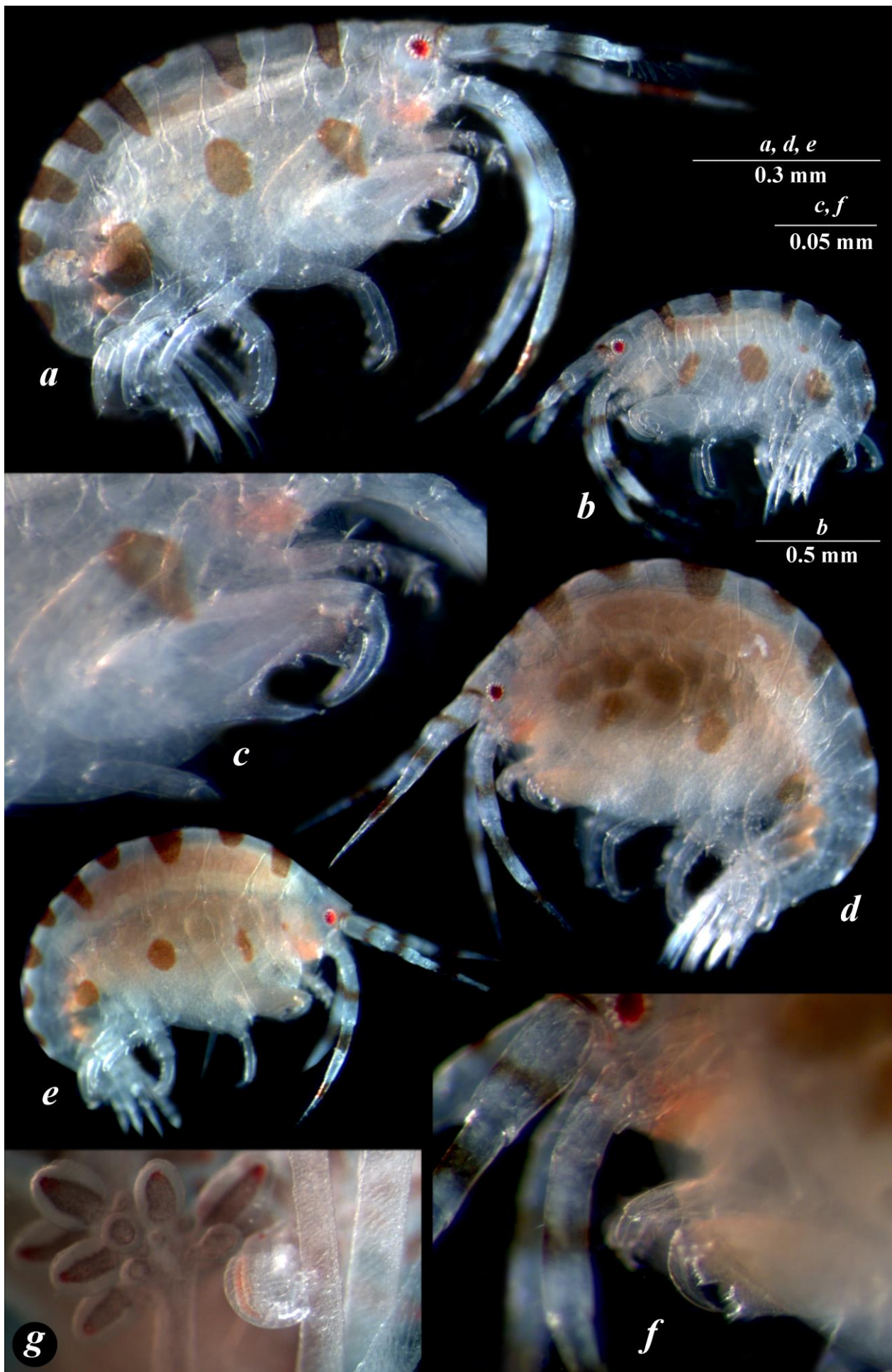


Figure 2. *Stenula bassarginensis* (Gurjanova, 1948): *a, b* – mature male, general view; *c, f* – gnathopod 2; *d, e* – mature females, general view; *g* – juvenile.