

## Three species of the genus *Pseudocrangonyx* Akatsuka et Komai, 1922 (Crustacea: Amphipoda) from subterranean fresh waters of the Island of Sakhalin

Три вида бокоплавов рода *Pseudocrangonyx* Akatsuka et Komai, 1922 (Crustacea: Amphipoda) из подземных вод острова Сахалин

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КЛЮЧЕВЫЕ СЛОВА: систематика, зоогеография, Сахалин, бокоплав. *Pseudocrangonyx*.

**ABSTRACT:** Three amphipod species, *Pseudocrangonyx relictus* Labay, 1999, *P. susunaensis* Labay, 1999, *P. birsteini* Labay, 1999, are redescribed on the basis of material collected from brook sources in Sakhalin, Far East of Russia. *P. relictus* is close to *P. bohaensis* (Derzhavin, 1927), differing by the armature of maxilla I outer plate bearing 6–7 spines along the upper margin (5 spines in *P. bohaensis*), as well as the armature of 6th joint of gnathopods I back margin with 5 spines not bunches of setae. *P. susunaensis* is distinguishable from *P. bohaensis* and *P. relictus* by the absence of a row of 5 spines on the back margin of 6th joint of gnathopods I, the weak armature of uropods II, the armature of uropods III outer ramus 1<sup>st</sup> joint with 3 spine groups along front and back margins (instead of 4). *P. birsteini* is distinguishable from *P. susunaensis* by the presence of 1 middle spine on pereopods III–V 4<sup>th</sup> joint front margin (instead of 2), the weaker armature of all epimeral plates and uropods II, the telson apex scarcely notched. This genus apparently penetrated into Sakhalin within Miocene-Pliocene, when a bridge existed on the place of present mt. ranges: Aleksadrovsk-Sakhalinskiy, Vostochno-Sakhalinskiy, Susunayskiy and Tonino-Anivskiy. Transgressions of sea isolated separate populations formed present species.

**РЕЗЮМЕ:** Из горных источников Сахалина, российский Дальний Восток, переописаны 3 редких вида: *Pseudocrangonyx relictus* Labay 1999, *P. susunaensis* Labay, 1999, *P. birsteini* Labay, 1999. *P. relictus* отличается от наиболее близкого ему *P. bohaensis* (Derzhavin, 1927) вооружением наружной лопасти максилл I — 6–7 шипов вдоль верхнего края вместо 5, вооружением 6-го членика гнатопод I, задний край которого несет ряд из 5 шипов, а не пучки щетинок. *P. susunaensis* отличается от *P. relictus* и *P.*

*bohaensis* отсутствием в вооружении заднего края 6-го членика гнатопод I ряда из 5 шипов, более слабым вооружением уropод II, вооружением 1-го членика наружной ветви уropод III, состоящим из 3 групп шипов вдоль переднего и заднего краев (вместо 4). *P. birsteini* отличается от *P. susunaensis* вооружением переднего края 4-го членика III–V переопод — 1 срединный шип (вместо 2), более слабым вооружением эпимеральных пластинок и II уropод, слабо выраженной апикальной выемкой тельсона. Данный род проник на Сахалин в миоцен-плиоценовое время по сухопутному мосту, существовавшему на месте современных Александровск-Сахалинских, Восточно-Сахалинских, Сусунайских и Тонино-Анивских гор. Позднейшие трансгрессии моря обособили отдельные популяции, давшие начало современным видам.

For long time *Pseudocrangonyx bohaensis* (Derzhavin, 1927) was the only subterranean amphipod species recorded in the fresh waters of Sakhalin. This species is known only from the type locality in the north of the island. Recently in the mountain springs of the Waida and Susunayskiy mt. ridges three previously unknown species of the genus *Pseudocrangonyx* Akatsuka et Komai 1922 were found. Due to some circumstances, the key to the Malacostraca of the fresh and brackish waters of Sakhalin [Labay, 1999] where these species were included was published prior to the present paper. Therefore the species descriptions must be dated according to the year of publication of the above paper. Here we present detailed redescriptions and other necessary data on these recently described amphipod species. The type material is deposited in the Zoological Institute, Russian Academy of Sciences in St. Petersburg (ZISP).

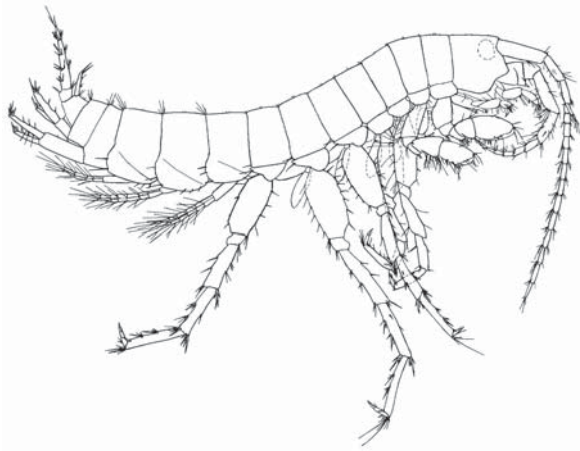


Fig. 1. *Pseudocrangonyx relictus* Labay, paratype, ♂, length 7.1 mm.

Рис. 1. *Pseudocrangonyx relictus* Labay, паратип, ♂, длина 7,1 мм.

*Pseudocrangonyx relictus* Labay, 1999  
Figs 1–4.

Labay, 1999: 64, fig. 6a.

MATERIAL. Holotype. ♀, length 6.5 mm; Sakhalin, spring at south-western slope of Waida Ridge, 16 km to SE of Pervomaiskoe, under stones, water temperature 4°C, 12.05.1996, V.S. Labay & L.A. Styrts coll. (ZISP 1/88219).

Paratypes. 10 ♂♂ and ♀♀ from the same locality (ZISP 2/88220).

DESCRIPTION. Body colourless, rolled, no ridges and teeth. Dorsal surfaces of body somites bearing 2 bunches of

setae: in middle and on posterior margin, 4 additional long setae set on posterior margin each of abdominal somite. A barely visible concentration of ommatidia on place of eyes. Head with a lateral lobe and an antennal sinus.

1<sup>st</sup> peduncular joint of antenna I slightly shorter than 2<sup>nd</sup> and 3<sup>rd</sup> joints, with a bunch of setae in anterior part of upper and lower margins and 3 setae on distal margin. Peduncular joints 2 and 3 with bunches of setae on distal margins and a bunch in middle of lower margin; flagellum consisting of 11–13 articulated, each article with short setae and oval calceolas, short accessory flagellum consisting of 2 articles, 1.5 times longer than article 1 of main flagellum. Antenna II massive, joints 4 and 5 of peduncle equal in length, proximal thirds of above joints ending with bunches of setae, similar bunches being on distal margins.

Mouthparts as characteristic for genus. Mandibles with a well developed *lacinia mobilis* with marginal teeth, a spine and a bunch of thin short setae on anterior margin, one plumose seta on posterior margin; molar surface with 2 serrate lamellae. Mandibular palp consisting of 3 joints: joints 2 and 3 subequal in length, 2<sup>nd</sup> joint with 4 strong plumose setae and 3 long setae on posterior side, 3<sup>rd</sup> joint has 7 short plumose setae on distal half of posterior margin continuing to apical bunch of 4 long plumose setae; 2 simple setae in centre of anterior margin. Outer lobe of maxilla I with 6–7 spines on upper margin: 4 of them with one side serrated and 2 or 3 bifid. Inner margin with thin short setae; palp 2-segmented, 2<sup>nd</sup> joint 2 times longer than 1<sup>st</sup>, with 4 spines on distal end and thin weak setae along inner and outer margins; inner lobe with 3 strong plumose setae on distal margin and a row of thin setae weak setae on inner margin. Inner lobe of maxilla II wider and 1.3 times shorter than outer, bearing 6 setae on distal margin, 3 strong subapical setae on inner margin and an oblique row of 3 setae; outer lobe with 10–11 setae on upper margin,



Fig. 2. *Pseudocrangonyx relictus* Labay, holotype, ♀: a — antenna I x40, b — antenna II x40, c — mandible x100, d — maxilla I x100, e — maxilla II x100, f — upper lip x100, g — lower lip x100, h — maxilliped x100.

Рис. 2. *Pseudocrangonyx relictus* Labay, голотип, ♀: a — антенна I, x40, b — антенна II, x40, c — мандибула, x100, d — максилла I, x100, e — максилла II, x100, f — верхняя губа, x100, g — нижняя губа, x100, h — ногощель, x100.

additional marginal thin weak setae on both lobes. Inner lobe of maxilliped producing beyond middle of outer lobe, with 2 apical and 2 subapical spines and 6–7 plumose setae; outer lobe nearly reaching middle of 2<sup>nd</sup> joint of palp having at apex 2 spines and a row of 8–9 plumose setae continuing to inner margin. Palp consisting of 4 joints, 2<sup>nd</sup> joint 2 times longer than 1<sup>st</sup> or 3<sup>rd</sup> joints, with numerous plumose setae on inner margin, 3<sup>rd</sup> joint has 12–13 plumose setae on distal end and an oblique row of 4 plumose setae.

Coxal plate I twice longer than high, anterior lower angle with 2 setae. Coxal plates II–IV trapezoidal, 1.5 times longer than high, anterior margins convex, posterior ones slightly concave, lower angles bearing 2 setae. Coxal plates V–VII with an anterior rounded plate projected ventrally, narrowed posteriorly, with one strong seta on posterior angle.

Gnathopods I shorter and stronger than gnathopod II, 5<sup>th</sup> joint short, cup shaped, posterior margin forming a short wide plate with numerous plumose setae, anterior margin with 1 central seta and a distal bunch of setae; 6<sup>th</sup> joint 2 times as long as 5<sup>th</sup>, with an oblique palm margin which smoothly continuing to posterior margin, being with 5 strong spines: 2 of them located on denticulated palm margin; dactyls with 5 serrations on inner margin. Gnathopods II: 5<sup>th</sup> joint nearly as long as 6<sup>th</sup>, with 5 bunches of setae on posterior margin, anterior margin with 2 median setae and a distal bunch of setae; palm of 6<sup>th</sup> joint oblique and serrated, with 2 or 3 spines, 3 locking spines located on palm angle; dactyls with 5 serrations on inner margin.

Pereopods I–II subequal in length and similar in morphology; basis with glands being visible through transparent cuticle, its length greater than total length of both 3<sup>rd</sup> and 4<sup>th</sup> joints; anterior margin of 4<sup>th</sup> joint of pereopods I with 2 setae, while respective part of pereopods II bearing only 1 seta. Pereopods III shorter than pereopods IV and V, their basis with nearly parallel margins, posterior margin with 3 to 4 groups of setae, anterior margin with 9 to 10 setae; anterior margin of 4<sup>th</sup> joint with a strong central spine and distal group of 3 spines; anterior and posterior margins of 5<sup>th</sup> joint with 1 central and 1 distal group of spines; 6<sup>th</sup> joint of a linear shape, posterior margin with 2 bunches of spines and 2 distal spines locking a claw (dactyl), anterior margin with a distal group of long and short setae. Pereopods IV–V of similar shape; basis slightly narrowing ventrally, with 6 to 8 isolated setae on anterior and posterior margins; 4<sup>th</sup> joint with 2 spines and a distal group of spines on anterior margin and 2 groups of spines on posterior margin, 5<sup>th</sup> joint with 1 median and 1 distal group of spines on posterior margin and 3 groups of spines (distal included) on posterior margin; 6<sup>th</sup> joint with 2 groups of spines and 2 locking spines on posterior margin, pereopods IV with a group of long and short

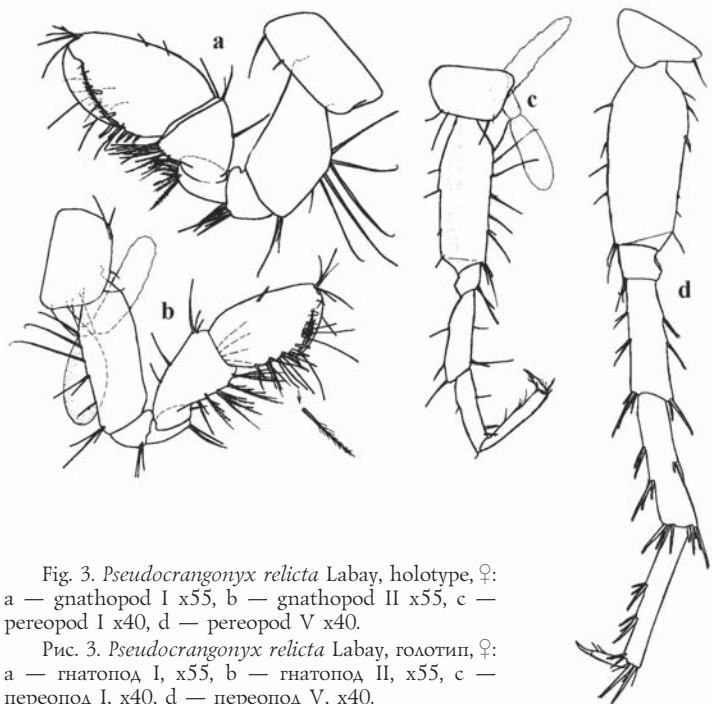


Fig. 3. *Pseudocrangonyx relictus* Labay, holotype, ♀: a — gnathopod I x55, b — gnathopod II x55, c — pereopod I x40, d — pereopod V x40.

Рис. 3. *Pseudocrangonyx relictus* Labay, голотип, ♀: а — гнатопод I, x55, б — гнатопод II, x55, с — переопод I, x40, д — переопод V, x40.



Fig. 4. *Pseudocrangonyx relictus* Labay, holotype, ♀ (a-f): a — epimeral plates I, II, III x60, b — pleopod II x60, c — uropod I x55, d — uropod II x55, e — uropod III x55, f — telson x50; g — paratype, ♂, outer ramus of uropod II.

Рис. 4. *Pseudocrangonyx relictus* Labay, голотип, ♀ (а-ф): а — пластинки эпимер I, II, III, x60, б — плеопод II, x60, с — уропод I, x55, д — уропод II, x55, е — уропод III, x55, ф — тельсон, x50; г — паратип, ♂, внешняя ветвь уропода II.

setae on lower margin of 6<sup>th</sup> joint, pereopods V with long spines and setae on this place; dactyl bearing 2 setae on inner margin.

Posterior lower corner in epimeral plates I–III nearly right-angled, 3 to 4 setae being in hollows of posterior margin, including corner setae; anterior half of ventral margin of epimeral plates II–III with 3 simple setae, those of epimeral plate I smooth. Inner ramus of pleopods I–III 1.2 times longer than outer ramus, its 1<sup>st</sup> article equal to length of the two first articles of outer ramus taken together; distal half of inner margin of a peduncle with a group of 2 serrated spines (7 to 8 serrations being on each one) clinging together the right and left pleopods; rami of pleopods I consisting of 6 to 7 articles, those of pleopods II with 6, while rami of pleopods III with 5 articles.

Length of uropods I 1.3 times as long as length of uropods II; peduncle as long as outer ramus, armed with 1 and 2 spines on anterior and posterior margins respectively, 1 spine is located basally on outer ramus bearing 3 setae on anterior margin and 3 setae on posterior margin, a group of 5 spines of different length located apically; inner ramus one third shorter than outer one, with 2 spines along posterior margin and an apical group of 3 short and 1 long spines. Uropods II: outer ramus bearing 2 groups of spines along posterior margin, apical group with 5 spines of different size; inner ramus one third shorter than outer ramus, with 2 spines along posterior margin and an apical group of 3 short and 1 long spines. Uropods III having a reduced inner ramus; 1<sup>st</sup> joint of outer ramus with 4 groups of spines along anterior and posterior margins, 2<sup>nd</sup> joint 3 times shorter than 1<sup>st</sup>, armed with 3 long apical setae.

Telson bifid with a cleft extending to about 1/7 of length, with 2 dorsal setae (may be absent), and 2 feebly developed lateral setae; lobes with 1 long and 1 small (sometimes missing) spines.

Gills (5 pairs) being coxal projections of thoracic legs II–VIII having a short thick peduncle.

**SEXUAL DIMORPHISM.** Males differ from females by the armature on the anterior and posterior margins of the 4th and 5th joints and those on the posterior margin of the 6th joint of pereopods which have one extra group of spines compared to females. The most characteristic for males is the outer ramus of uropods II which have 2 to 3 serrated spines on the apex besides of normal spines.

**SIZE.** Maximum length of males is 7.1 mm, females — 6.6 mm.

**DIFFERENTIAL DIAGNOSIS.** The present species differs from *Pseudocarangonyx bohaensis* (Derzhavin, 1927) by the armature on the outer plate of maxilla I: 6–7 spines along the upper margin instead of 5 spines in *P. bohaensis*, and by the armature on the posterior margin of 6th joint of gnathopods I which have 5 spines and not bunches of setae. Because of the incomplete description by Derzhavin (whose type material we failed to locate) we can not provide a detailed morphological comparison between these species. The present species differs from *P. susunaensis* Labay, 1999 and *P. birsteini* Labay, 1999 by the armature on the posterior margin of the 6th joint of gnathopods, by stronger armature of uropods II, by the armature of the 1st joint of the outer ramus of uropods III which has 4 groups of spines along the anterior and the posterior margins instead of 3 groups. Besides of this it is different from *P. birsteini* by the armature of the anterior margin of the 4th joint of pereopods III–V which have 2 middle spines instead of 1; and by the apex of the telson which is clearly expressed.

**DISTRIBUTION.** Besides, this species was found in 7 km SE of the type locality: in the brook source in the mountain pass close to Komandnaya Mt.

*Pseudocarangonyx susunaensis* Labay, 1999.  
Figs. 5–7.

Labay, 1999: 64, fig. 66.

**MATERIAL.** Holotype, ♂, length 7 mm; 30.V.96; Sakhalin; Susunayskiy Mt. Range near Yuzhno-Sakhalinsk, brook source, 800 m SE of Presbyterian Church, in soil; waters t°=4°C; V.S. Labay coll., ZISP 1/88221.

Paratypes. 12 specimens, ♂♂, ♀♀ and juveniles, same locality as for holotype, ZISP 2/88222. Additional material, in author's collection. 2♂♂ and 5♀♀ from the source of Otchepukha River; 8 specimens — ♂♂, ♀♀ and juveniles from brook source on the slope of Chekhov Peak; 3 specimens — ♀♀ and juvenile from the source of Podorozhka River; 3♀♀ from the source of Sima River.

**DESCRIPTION.** Body colourless without ridges and teeth. Body segments bearing 2 pairs of weak setae, posterior margin of metasomal segments with 4 long setae. Eyes presented as an accumulation of colourless hardly visible ommatidia. Lateral lobe of head developed and slightly cut down.

Antenna I: articles of peduncle evenly decreasing in size from 1<sup>st</sup> to 3<sup>rd</sup>; distal margin of 1<sup>st</sup> article with 3–4 bunches of setae, 2<sup>nd</sup> article with a bunch of setae medially and distally, 3<sup>rd</sup> — only in distal area; flagellum consisting of 11–12 articles with shifted transparent calceolas at lower margin; accessory flagellum consisting of 2 articles. Antenna II massive; 5<sup>th</sup> article somewhat longer than 4<sup>th</sup>, the latter with strong long setae similar in length, 5<sup>th</sup> article with 5 bunches of setae along lower margin and 3 bunches along upper margin; flagellum consisting of 6 articles, articles with a row of setae on the distal margin, first 3 articles with large, transparent and poorly visible calceola.

Mandible: 2<sup>nd</sup> joint of palp a little shorter than 3<sup>rd</sup>, with 2 short setae in proximal half of posterior margin and a row of 3 long setae in distal half, 3<sup>rd</sup> joint with a row of 9 short setae shifting to apical bunch of 4 long setae. Maxilla I: outer plate bearing 2 rows of 4 serrated and 3 two molar spines apically; 2<sup>nd</sup> joint of palp with 3 thin short setae on apex and a row of thin rare setae along inner and outer margins; inner plate 1.5 times shorter than outer, with 3 apical plumose setae. Maxilla II: inner and outer plates subequal in length, inner plate with 2 rows of apical plumose setae shifting to inner margin; outer plate with 2 rows of apical one side plumose setae. Maxilliped: inner lobe similar in size to outer lobe, not reaching its middle, arm with 2 short thick spines and 4 setae; outer lobe reaching middle of palp 2<sup>nd</sup> joint, bearing 2 apical and 2 subapical plumose setae and a row of rare setae in the inner margin; last joint of palp with a crown of plumose setae and crossed row of 5 plumose setae.

Coxal plates I–IV narrow, trapezoid, length of I–III plates 1.7 times as long as height, length of IV plate 1.5 times as long as height; lower corners with 1 or 2 setae; anterior margins of all coxal plates convex, posterior margin concave. Coxal plates V–VII: anterior half widened, posterior plate narrowed, wedge-shaped, bearing 1 long seta on posterior corner.

Gnathopods I shorter and stronger than gnathopods II; 6<sup>th</sup> joint 2.7 times as long as 5<sup>th</sup>, palm cut down and somewhat shifted posteriorly, bearing 5 spines and rare setae; dactylus with 5 serrations on inner margin. Gnathopods II: 5<sup>th</sup> joint 1.5 times shorter than 6th, with 1 median seta on anterior margin and 4 plumose setae clusters along posterior margin; 6<sup>th</sup> joint with a long row of 4 setae clusters in the inner surface and 3 transverse rows of setae along posterior margin, palm oblique,

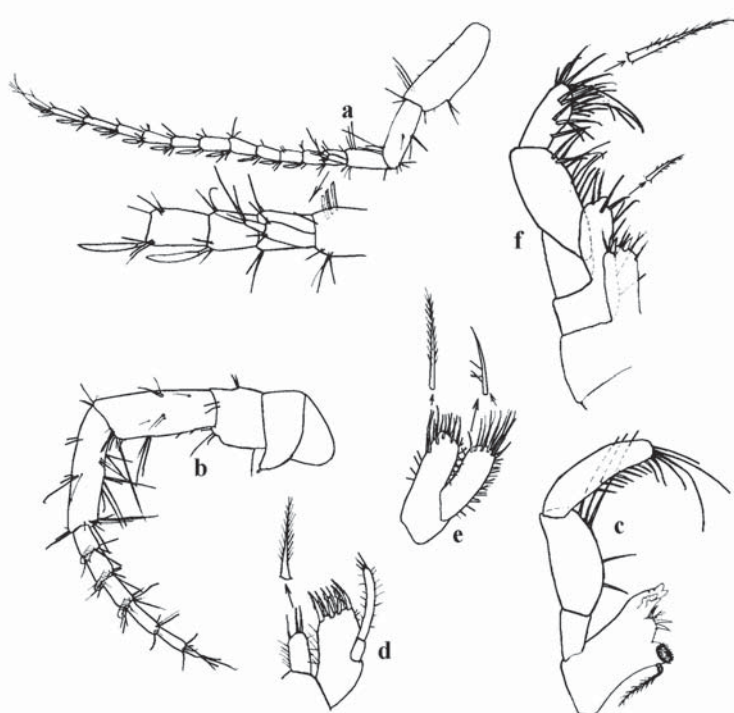


Fig. 5. *Pseudocarangonyx susunaensis* Labay, holotype, ♂: a — antenna I x40, b — antenna II x55, c — mandible x100, d — maxilla I x100, e — maxilla II x100, f — maxilliped x100.

Рис. 5. *Pseudocarangonyx susunaensis* Labay, голотип, ♂: а — антенна I, x40, б — антенна II, x55, с — мандибула, x100, d — максилла I, x100, e — максилла II, x100, f — ногощелюсть, x100.

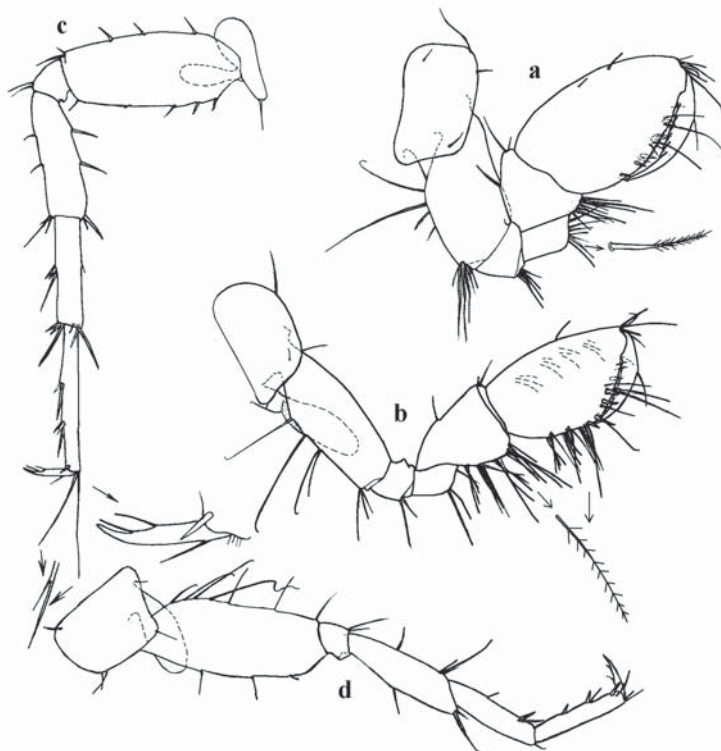


Fig. 6. *Pseudocarangonyx susunaensis* Labay, holotype, ♂: a — gnathopod I x65, b — gnathopod II x65, c — pereopod III x40, d — pereopod II x40.

Рис. 6. *Pseudocarangonyx susunaensis* Labay, голотип, ♂: а — гнатопод I, x65, б — гнатопод II, x65, с — переопод III, x40, d — переопод II, x40.

with 5 to 6 spines and 5 long setae; dactylus with 5 serrations on inner margin.

Pereopods I–II of a typical shape for the genus. Pereopods III–IV: basis with subparallel, slightly narrowed margins having 4–6 setae each; 4<sup>th</sup> joint with 2 spines which mark first and second thirds of anterior margin and 2 small spines locating on posterior margin (only pereopods V having on posterior margin of 4<sup>th</sup> joint 1 median group of 2 spines); 5<sup>th</sup> joint of pereopods III–IV with 1 group of spines on posterior margin, pereopods V bear 2; 6<sup>th</sup> joint of last 3 pairs of pereopods with 2 groups of spines on the back margin, the difference visible only in distal margin; pereopods III bearing 2 very long divided setae, pereopods IV with a group of long and short setae, pereopods V with a group of 3 spines and 2 setae.

Epimeral plate I: posterior lower corner subrectangular with a strong seta; posterior margin with 3 setae. Epimeral plates II–III: posterior lower corner rounded with a strong long seta, posterior margin with 2 or 3 setae, its anterior half with 2 small spines. Outer ramus of pleopods I–III 1.2 times shorter than inner one, both rami consisting of 4 or 5 articles.

Uropods I: outer ramus reaching end of uropods II; pedacle with 2 spines in distal half of back margin, one small spine located on the base of rami; outer ramus with a row of spines of different length apically, 2 spines on posterior margin and a row of 3 proximal setae on anterior margin; inner ramus apically with a group of 4 short spines and 1 spine being equal in length to ramus, posterior margin with 1 spine in the centre. Uropods II: pedacle short and equal to length of inner ramus, with small spine on basis of outer ramus; outer ramus 1.7 times as long as inner ramus, with 2 spines along posterior margin and apical group of 6 spines including 2 serrated ones; inner ramus with apical group of 3 simple and 1 serrated spines. Uropods III: pedacle one third as long as the 1<sup>st</sup> joint of outer ramus; 1<sup>st</sup> joint of outer ramus with 3 groups of spines along anterior and posterior margins, 2<sup>nd</sup> joint one third as long as first.

Telson cleft reaching 1/5 of its length, each terminal lobe with 1 long and 1 short spine and a weak seta.

Females clearly differing from males by the absence of serrated spines on the rami of uropods

**DIFFERENTIAL DIAGNOSIS.** The present species differs from the previous one in the absence of a row of 5 spines on the posterior margin on the 6<sup>th</sup> joint of gnathopods I, by a weaker armature of uropods II, by the armature of 1st joint of the outer ramus of uropods III which has 3 groups of spines along anterior and posterior margins instead of 4. It differs from *P. birsteini* by

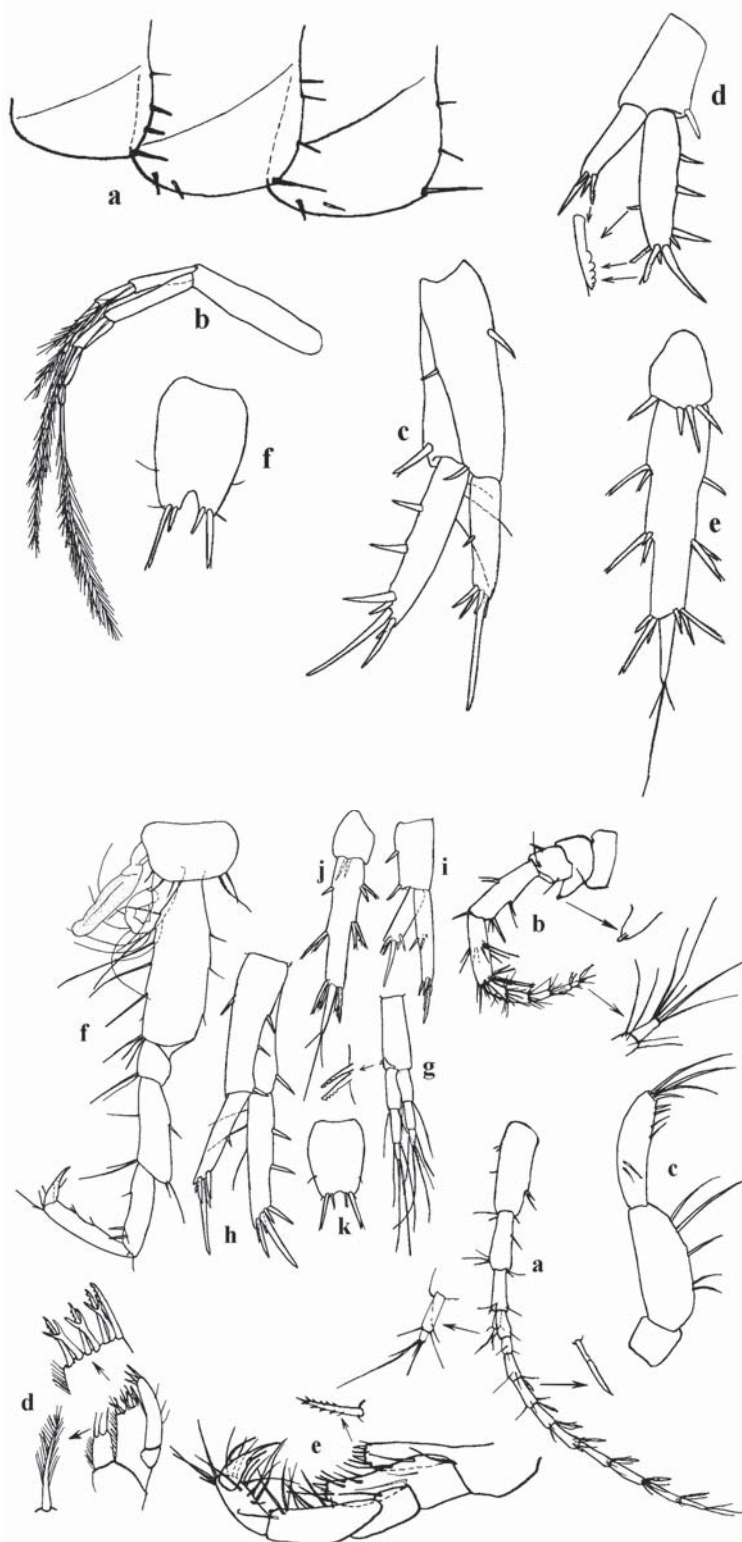


Fig. 8. *Pseudocarrangonyx birsteini* Labay, holotype, ♀: a — antenna I x55, b — antenna II x55, c — mandible x120, d — maxilla I x120, e — maxilliped x120, f — pereopod II x60, g — uropod I x60, h — pleopod II x60, i — uropod II x60, j — uropod III x60, k — telson x60.

Рис. 8. *Pseudocarrangonyx birsteini* Labay, голотип, ♀: а — антенна I, x55, б — антенна II, x55, с — мандибула, x120, д — максилла I, x120, е — ногочелюсть, x120, ф — переопод II, x60, г — уропод I, x60, h — плеопод II, x60, i — уропод II, x60, j — уропод III, x60, k — тельсон, x60.

Fig. 7. *Pseudocarrangonyx susunaensis* Labay, holotype, ♂: a — epimeral plates I, II, III x65, b — pleopod I x65, c — uropod I x65, d — uropod II x65, e — uropod III x65, f — telson x65.

Рис. 7. *Pseudocarrangonyx susunaensis* Labay, голотип, ♂: а — пластинки эпимер I, II, III, x65, б — плеопод I, x65, с — уропод I, x65, d — уропод II, x65, е — уропод III, x65, ф — тельсон, x65.

the armature of the anterior margin of 4<sup>th</sup> joint of pereopods III–V which has 2 median spines instead of 1; the apical cleft of the telson is clearly expressed.

**DISTRIBUTION.** Usually in subterranean sources of brooks and rivers in Susunayskiy Mt. Range.

*Pseudocarrangonyx birsteini* Labay, 1999

Figs. 8–9.

Labay, 1999: 64, fig. 6b.

**MATERIAL.** Holotype. ♀, length 6 mm; 14.V.1996; Susunayskiy Mt. Range, Bol'shevik Mt. near Yuzhno-Sakhalinsk Town, brook source on the west slope, in soil; waters  $t^{\circ}=4^{\circ}\text{C}$ ; V.S. Labay coll. ZISP 1/88223.

Paratypes. 13 ♀♀ and juveniles from type locality, length of the largest 5 mm. ZISP, 2/88224.

**DESCRIPTION.** Body colourless, armed as *P. susunaensis*. Lateral lobe developed, eyes reduced to accumulations of colourless ommatidia

Antenna I as in *P. susunaensis*; flagellum consisting of 10 articles. Antenna II: 4<sup>th</sup> joint of peduncle having its small spine and setae in middle of upper margin and setae cluster in middle of lower margin, anterior lower corner with a strong seta slightly shorter than 1/2 length of joint; 5<sup>th</sup> joint of peduncle with a crown of setae in median and distal parts; flagellum consisting of 6 articles, articles densely covered with setae in distal part, no calceolas.

Mandible: 2<sup>nd</sup> joint of palp slightly longer and twice wider than 3<sup>rd</sup> joint, with 3 short and 2 long setae, 3<sup>rd</sup> joint with a row of 4–5 short setae in distal part of posterior margin merging with apical bunch of 4 setae. Maxillae I–II as in *P. susunaensis*. Maxilliped: inner plate with 2 apical spine-shaped plumose setae and 3 simple setae.

Coxal plate I 2 times as long as high, anterior margin oblique, produced forward, merging with its lower margin, anterior lower corner with 3 setae. Coxal plates II–IV ca. 1.6 times as long as high, anterior margin nearly straight, moving slightly to lower margin, posterior margin produced forward and slightly concave, anterior and posterior corners have 2–3 setae. Coxal plates V–VII widened anteriorly, narrowed in lower part, posterior corner with a seta.

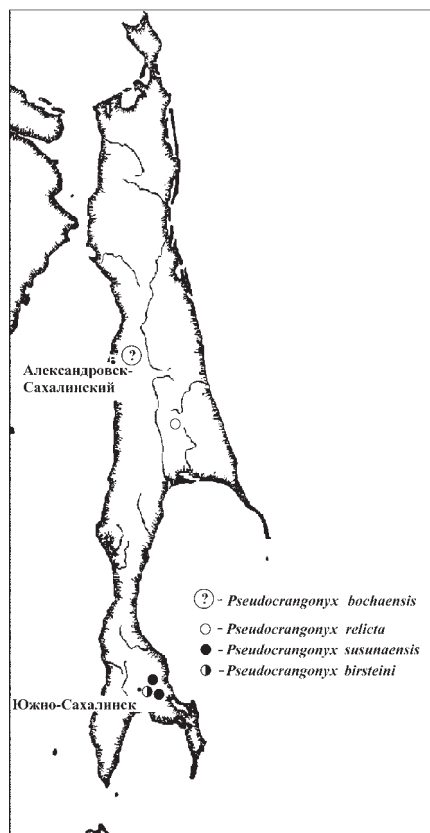


Fig. 10. Distribution of *Pseudocrangonyx* species in Sakhalin.

Рис. 10. Распространение видов рода *Pseudocrangonyx* на Сахалине.

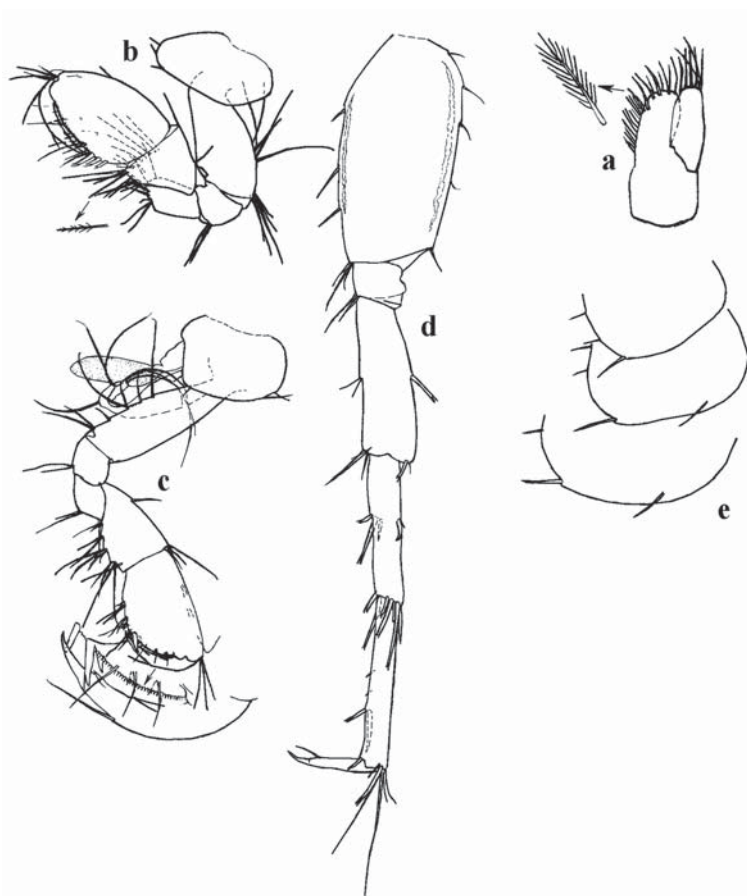


Fig. 9. *Pseudocrangonyx birsteini* Labay, holotype, ♀: a — maxilla II x120, b — gnathopod I x60, c — gnathopod II x60, d — pereopod V x60, e — epimeral plates I, II, III x60.

Рис. 9. *Pseudocrangonyx birsteini* Labay, голотип, ♀: а — максилла II, x120, б — гнатопод I, x60, с — гнатопод II, x60, d — переопод V, x60, e — пластинки эпимер I, II, III, x60.

Gnathopods I: 5<sup>th</sup> joint 1/2 times as long as 6<sup>th</sup>, wide very slightly produced posteriorly lobe with a row of plumose setae; palmar margin of 6<sup>th</sup> joint markedly oblique, continuing to narrow posterior margin, with 1–2 spines, palmar angle with 3 locking spines; dactylus with 3 serrations along inner margin. Gnathopods II: 5<sup>th</sup> and 6<sup>th</sup> joints subequal in length; 5<sup>th</sup> joint with a strong seta at edge of proximal third of front margin, back margin with 4 plumose setae clusters; palm of 6<sup>th</sup> joint oblique with 4 locking spines on the palm angle; dactylus with 2–3 serrations along inner margin.

Pereopods I–II as in *P. susunaensis*. Pereopods III–V: 4<sup>th</sup> joint with a median spine at anterior margin; posterior margin of 6<sup>th</sup> joint of pereopod III with a group of spines.

Epimeral plates I–III with rounded lower corners, posterior margins of all plates with 3 setae, lower margin of epimeral plates II–III with a setae in anterior half. Inner margin of a peduncle of pleopods bearing 2 distal serrated spines, with 4 serrations each.

Uropods I: inner margin of a peduncle with 2 middle spines. Uropods II: inner margin of a peduncle with distal and middle spines; outer ramus 2 times as long as length of inner ramus, with apical group of 6 spines of different size and middle group of spines at posterior margin; inner ramus with apical group of 4 short and 1 very long spines. Uropods III:

peduncle with 2 spines on base of outer ramus; anterior and posterior margins of 1<sup>st</sup> joint of outer ramus with 3 groups of spines each, 2<sup>nd</sup> joint 2.7 times shorter than 1<sup>st</sup>.

Telson: length 1.3 times as long as the wide, apex scarcely notched, each small terminal lobe with 1 long and 1 short spines and 1 weak seta.

Female with developed marsupium found in the first half of May. Males not found.

**DIFFERENTIAL DIAGNOSIS.** The species differs from *P. susunaensis* and *P. relicta* in having 1 median spine at the anterior margin of 4<sup>th</sup> joint of pereopods III–V instead of 2; in a weaker armature of all epimeral plates and uropods II; more clearly difference that telson apex scarcely notched.

This species is named in honour of famous Russian carcinologist Ya.A. Birstein (1911–1970).

Summing up literature data [Derzhavin, 1927; Birstein, 1955; Barnard & Barnard, 1983] and the present material a possible way and time of dispersal of *Pseudocrangonyx* in Sakhalin may be hypothesised. Contemporary distribution of Sakhalin species (*P. bochaensis* — Aleksandrovska-Sakhalinskii Mt. Range, *P. relicta* — Vaida Vostochno-Sakhalinskii Mts., *P. sus-*

*unaensis* and *P. birsteini* — Susunayskiy Mt. Range) and the apparent absence of them in the Western Kamyshovy Mt. Range indicates that the radiation of the Sakhalin species may have taken place in the Miocene-Pliocene when there was a land bridge to the mainland on the place of modern Aleksadrovsk-Sakhalinskiy, Vostochno-Sakhalinskiy, Susunayskiy and Tonino-Anivskiy mts. [Khudiykov et al., 1972; Melnikov, 1974]. The latest transgressions of the sea isolated separate populations which formed the recent species. On this basis we predict that a yet undescribed species may be discovered in the subterranean waters of the Tonino-Anivskiy Mt. Range.

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