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Two new species of *Strandesia* Stuhlmann, 1888 (Crustacea: Ostracoda) from Thailand, with first record of a male *S. martensi* Savatenalinton, 2015

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Abstract. Two new species of *Strandesia* Stuhlmann, 1888 are described from the northeastern part of Thailand: *S. karanovicae* sp. nov. and *S. amnatcharoenensis* sp. nov. *Strandesia karanovicae* is characterized by a tumid carapace in dorsal view, a small anterior overlap, the absence of a dorso-subapical seta on the first segment of the antennule (A1), a large aesthetasc Y on the antenna, an α seta shape with a needle-like tip and a large β seta on the mandibular palp (Md-palp), serrated bristles on the maxilla, a long h1 seta on the second thoracopod (T2) and a slender caudal ramus (CR). *Strandesia amnatcharoenensis* has a small compressed posterior part of the right valves (RV) which makes it closely related to *S. pholpunthini* Savatenalinton, 2015. The new species can be distinguished primarily by a considerably small anterior overlap of the left valve over the right valve (RV), a postero-ventral flange of the RV, a remarkably large claw Ga of the CR and the chaetotaxy of the limbs, especially A1, Md-palp and T2. In addition, in the present study, the sexual population of *S. martensi* Savatenalinton, 2015 is recorded for the first time, and thus the first description of the male is provided here. Moreover, the morphological examination of both males and females revealed differences between asexual and sexual females and also points to the fact that *S. martensi* is a mixed reproduction species. This is the first record of the mixed reproductive mode in the genus *Strandesia* or even in the Cypricercinae.

Keywords. Cypricercinae, ostracods, taxonomy, biodiversity, microcrustaceans.

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Introduction

Ostracods are bivalved microcrustaceans and can be found in several habitat types, in freshwater environments in particular. The Recent non-marine group consists of three superfamilies: Cypridoidea Baird, 1845, Cytheroidea Baird, 1850 and Darwinuloidea Brady & Robertson, 1885 (Meisch *et al.* 2019). Among these, Cypridoidea is the most diverse group which occupies approx. 75.5% of the total species number (Meisch *et al.* 2019). Within this superfamily, 168 species belong to the subfamily Cypricercinae McKenzie, 1971 of the family Cyprididae Baird, 1845 (Meisch *et al.* 2019; Ferreira *et al.*

2020; Kisseih *et al.* 2020; Savatenalinton 2021). Representatives of Cypricercinae can be primarily recognized by the presence of Triebel's loop on the caudal ramus attachment which is a unique character of the subfamily (see Martens 1994; Horne *et al.* 2019). The generic revision of this subfamily was carried out by Savatenalinton & Martens (2009a) which led to the arrangement of 11 genera into three tribes: Bradleystrandesiini Savatenalinton & Martens, 2009, Cypricercini McKenzie, 1971 and Nealecypridini Savatenalinton & Martens, 2009. As one more genus was recently described, there are 12 genera in this subfamily at present, namely *Astenocypris* G.W. Müller, 1912, *Bradleycypri*s McKenzie, 1982, *Bradleystrandesia* Broodbakker, 1983, *Bradleytriebella* Savatenalinton & Martens, 2009, *Cypricercus* Sars, 1895, *Diaphanocypris* Würdig & Pinto, 1990, *Nealecypris* Savatenalinton & Martens, 2009, *Neostrandesia* Ferreira *et al.*, 2019, *Pseudostrandesia* Savatenalinton & Martens, 2009, *Spirocypris* Sharpe, 1903, *Strandesia* Stuhlmann, 1888 and *Tanycypris* Triebel, 1959 (Meisch *et al.* 2019; Ferreira *et al.* 2019). Among these, *Strandesia* is proportionally the most speciose with 102 species (Meisch *et al.* 2019; Ferreira *et al.* 2019; Kisseih *et al.* 2020; Savatenalinton 2021). Moreover, *Strandesia* is the second most diverse genus in Cypridoidea, after *Candona* (Meisch *et al.* 2019). The genus *Strandesia* has been reported from several zoogeographical regions, including the Oriental one which harbors 33 species; 25 of which are endemic to the region. In the last 15 years, the diversity of species of freshwater ostracods in Thailand has been continuously studied, resulting in an increasing number of described taxa in various taxonomic categories, not only at species, but also at genus, tribe and subfamily levels, from the country (see, e.g., Savatenalinton & Martens 2009a, 2010; Savatenalinton 2017a, 2017b, 2018, 2020, 2022a, 2022b, 2022c, 2023a, 2023b). Species of *Strandesia* were also involved in these discoveries. Savatenalinton & Martens (2010) described *S. hornei* Savatenalinton & Martens, 2010 and *S. sanoamuangae* Savatenalinton & Martens, 2010 in their contribution on the Cypricercinae from Thailand. Two more new species, *S. martensi* Savatenalinton, 2015 and *S. pholpunthini* Savatenalinton, 2015, were subsequently reported from the northeastern part (Savatenalinton 2015). All species of Thai *Strandesia* were included in a checklist of the ostracod fauna of the country (Savatenalinton & Suttajit 2016). Recently, *S. prachuapensis* Savatenalinton, 2021 was discovered from the western part of Thailand (Savatenalinton 2021). In the present work, two new species of *Strandesia* are described, together with the first description of the male of *S. martensi* Savatenalinton, 2015.

Material and methods

Ostracods were taken from various types of water bodies (swamps, reservoirs, ponds, rivers, canals, paddy fields) in the northeastern part of Thailand by using a hand net (mesh size 200 μm). Samples were immediately preserved in 70% ethanol in the field and ostracod specimens were picked under a binocular microscope in the laboratory. The identification of species was performed based on the morphology of both soft parts and valves via the following processes. Soft parts and valves were separated under a stereo microscope (Olympus SZ40) and, later, soft parts were dissected in glycerine and sealed on glass slides while valves were dried and kept in micropalaeontological slides. The drawings of soft parts were made with the aid of a camera lucida, attached to a compound lens microscope. Valves and carapaces were examined and illustrated using a Scanning Electron Microscope (JEOL JSM6460LV – at the Faculty of Science, Mahasarakham University, Thailand). The model of limb chaetotaxy proposed by Broodbakker & Danielopol (1982) is followed, along with the updated models of the second antenna contributed by Martens (1987) and Scharf *et al.* (2020) and of the thoracopods provided by Meisch (2000). All type material of species is deposited in the ostracod collection of the Faculty of Science, Mahasarakham University, Maha Sarakham, Thailand.

Institutional abbreviations

MSU = Mahasarakham University, Maha Sarakham, Thailand
MSU-ZOC = ostracod collection of the museum of the Faculty of Science, Mahasarakham University, Maha Sarakham, Thailand

Abbreviations used in text, figures and tables

A1 = first antenna
A2 = second antenna
AT = Afrotropical region
Cp = carapace
CR = caudal ramus
db = dorsal branch of caudal ramus attachment
H = height of valves / carapaces
L = length of valves / carapaces
ls = lateral shield of hemipenis
LV = left valve
Md = mandibula
ms = medial shield of hemipenis
Mx1 = maxillula
NT = Neotropical region
OL = Oriental region
PA = Palaearctic region
R = Rome organ
RV = right valve
T1 = 1st thoracopod (maxilliped)
T2 = 2nd thoracopod (walking leg)
T3 = 3rd thoracopod (cleaning leg)
vb = ventral branch of caudal ramus attachment
W = width of carapace
WO = Wouters organ

Results

Taxonomy

Class Ostracoda Latreille, 1802
Subclass Podocopa G.O. Sars, 1866
Order Podocopida G.O. Sars, 1866
Suborder Cypridocopina Jones, 1901
Superfamily Cypridoidea Baird, 1845
Family Cyprididae Baird, 1845
Subfamily Cypricercinae McKenzie, 1971
Tribe Cypricercini McKenzie, 1971
Genus *Strandesia* Stuhlmann, 1888

Strandesia karanovicae sp. nov.
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Figs 1–4

Diagnosis

Cp medium size (ca 950 μm), elongated in lateral view (length ca 1.95 × of height), LV overlapping RV all free margin, LV with one inner list, A1 seven-segmented with large and long R, WO present, A2 with long natatory setae, β seta on Md-palp large, two large bristles on third endite of Mx1 slightly serrated, d seta on T1 present, T2 with large d1 and d2 setae (length of d1 seta ca 1.5 × of d2 seta), h1 seta markedly long, CR slender, claw Ga less than half length of ramus (length ca 0.4 × of ramus), claws Gp

ca ⅔ of claw Ga, sa seta slightly longer than claw Gp, sp seta slender, reaching slightly beyond tip of ramus, CR attachment with Triebel's loop situated at middle of distal part of main branch.

Etymology

The species is named in honour of Prof. Dr Ivana Karanovic (Hanyang University, South Korea) in recognition of her significant work on the taxonomy of Ostracoda.

Type material

Holotype

THAILAND – **Roi-Et Province** • ♀, soft parts dissected in glycerine on a sealed glass slide and valves stored dry in a micropalaeontological slide; Muang District; 16°2.1′ N, 103°52.6′ E; 23 Oct. 2010; rice field; MSU-ZOC.371.

Paratypes

THAILAND – **Roi-Et Province** • ♀, stored as the holotype; same collection data as for holotype; 23 Oct. 2010; MSU-ZOC.372 • 3 ♀♀, carapaces stored dry in micropalaeontological slides; same collection data as for holotype; 23 Oct. 2010; MSU-ZOC.373 to 375.

Description

Female

Measurements (in μm). Cp (n = 3): L = 945–956, H = 483–497, W = 461–467; LV (n = 2): L = 953–956, H = 492–495; RV (n = 2): L = 920–922, H = 496–500.

Cp. (medium size) (ca 950 μm). Elongated in lateral view (Fig. 1A) (L ca 1.95 × H), anterior margin widely rounded, posterior margin slightly narrowly rounded, LV overlapping RV along all free margins, larger overlapping anteriorly, dorsal margin not strongly arched, greatest height situated in front of mid-length, valve surface with irregular dark patches and set with tiny tubercles and sparse thin rim-pore setae, tiny tubercles more prominent posteriorly than anteriorly and less abundant at middle part.

Cp in dorsal view (Fig. 1B). Elongated and tumid with greatest width situated at mid-length, anterior margin of LV slightly more protruded than RV.

LV in interior view (Fig. 1C, E–F). With groove along valve margin, wide anterior fused zone, dorsal margin gently arched, greatest height situated in front of mid-length; gently sloping down to anterior and posterior margin, the former widely rounded, the latter slightly less widely rounded, postero-dorsal part angulated, ventral margin somewhat straight; calcified inner lamella relatively wide anteriorly, with one inner list, posteriorly narrower.

RV in interior view (Fig. 1D, G–H). With marginal selvage, inner lamella without inner list, anteriorly broader than posteriorly, ventral margin somewhat straight.

A1 (Fig. 2A). First segment with two long ventro-apical setae, WO large (dorso-subapical seta absent). Second segment slightly wider than long, with one short dorso-apical seta (not reaching mid-length of next segment) and large and long R. Third segment bearing one long dorso-apical seta (reaching mid-length of fifth segment) and one ventro-apical seta with intermediate length (reaching beyond tip of next segment). Fourth segment with two long dorsal setae and two (one short, one longer) ventral setae, short seta reaching tip of next segment, longer seta reaching mid-length of sixth segment. Fifth segment dorsally with two long setae, ventrally with two (one long, one shorter) setae, shorter one reaching mid-length of terminal segment. Penultimate segment with four long setae. Terminal segment with three

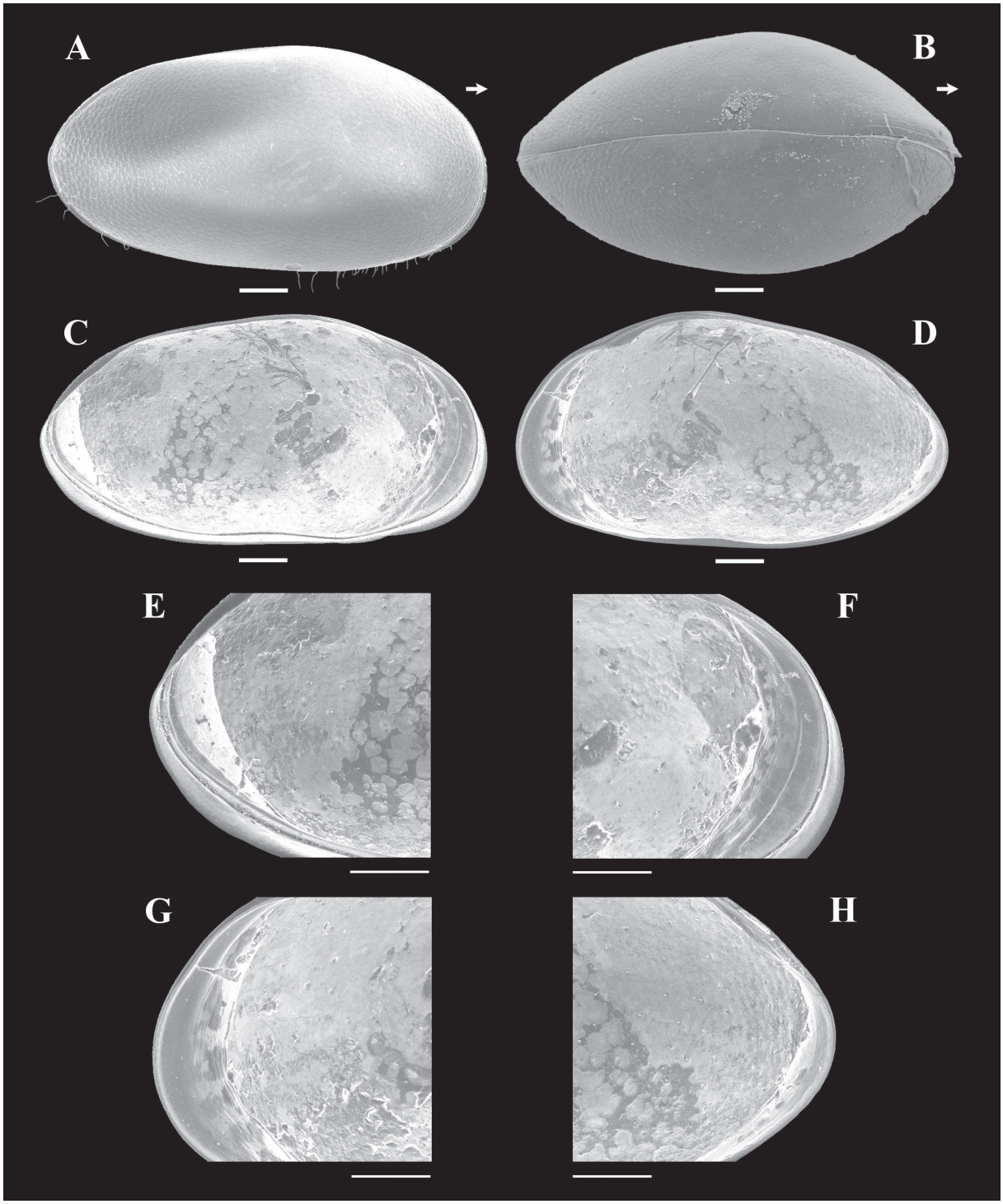

Fig. 1. *Strandesia karanovicae* sp. nov., ♀. **A–B**. Paratype (MSU-ZOC.373). **A**. Cp, lateral right-side view. **B**. Cp, dorsal view. **C–H**. Holotype (MSU-ZOC.371). **C**. LV, internal view. **D**. RV, internal view. **E**. Posterior part of LV, internal view. **F**. Anterior part of LV, internal view. **G**. Anterior part of RV, internal view. **H**. posterior part of RV, internal view. Scale bars: 100 μm. Arrows point to anterior side. Abbreviations: see Material and methods.

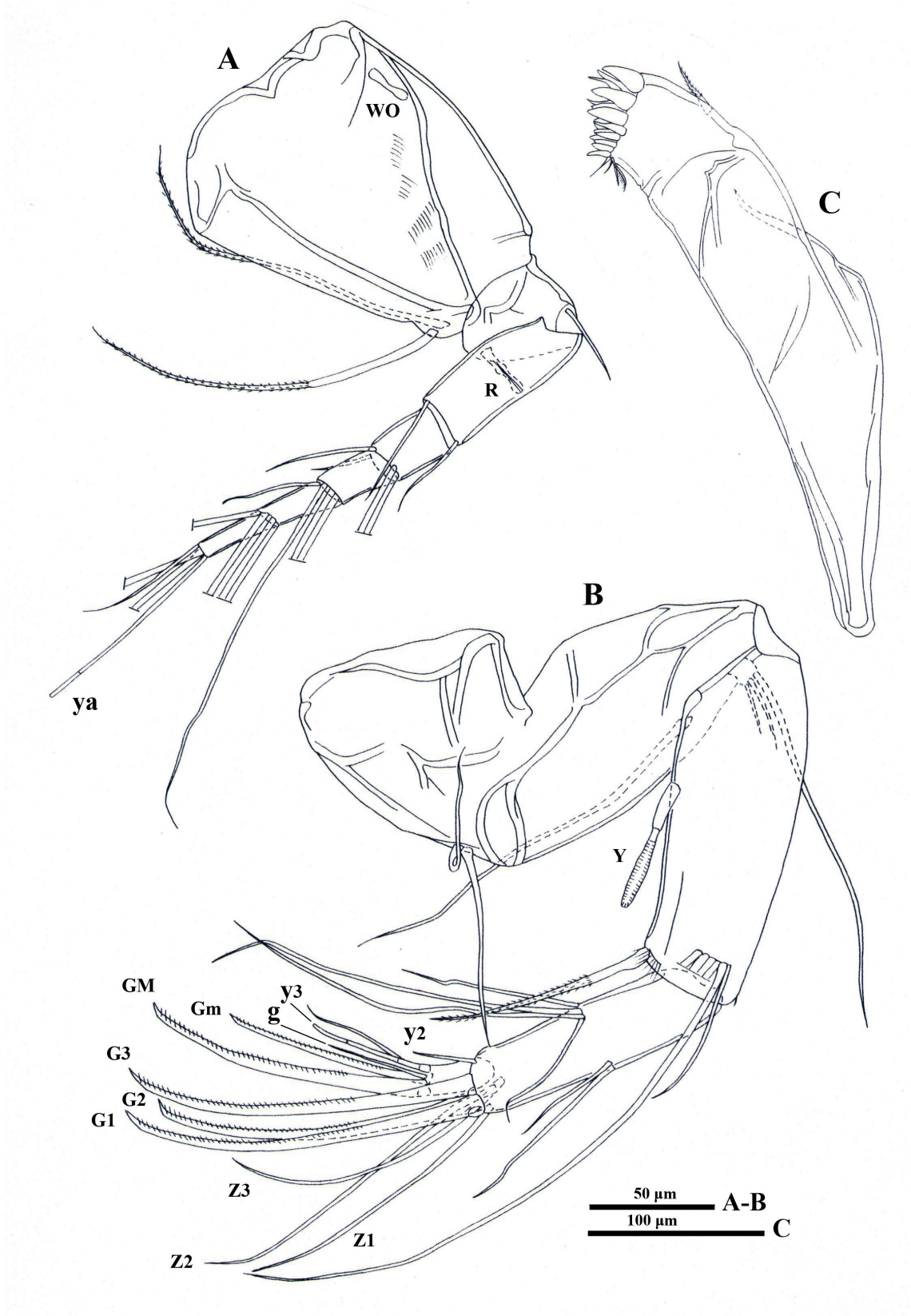

Fig. 2. *Strandesia karanovicae* sp. nov., ♀, holotype (MSU-ZOC.371). **A**. A1. **B**. A2. **C**. Md-coxa. Abbreviations: see Material and methods.

(two long, one short) apical setae and aesthetasc y_a, length of short one ca ⅔ of that of aesthetasc y_a, aesthetasc y_a markedly long (ca 2.75 × that of terminal segment).

A2 (Fig. 2B). Protopodite with two ventro-proximal setae and one long ventro-subapical seta. Exopodite with three (one long, two short) setae, long one reaching beyond tip of first endopodal segment. First endopodal segment with five long natatory setae (not reaching tip of terminal claws) and one shorter accompanying seta, length of shorter seta reaching half way penultimate segment, aesthetasc Y large, insertion situated slightly in front of mid-length of segment, ventro-apical seta long, almost reaching tip of terminal segment. Penultimate segment undivided, distally with three serrated claws (G1–G3), aesthetasc y2 long (reaching slightly beyond tip of terminal segment), z1–z3 setae long; this segment medially with two (one long, one shorter) dorsal setae (length of short one ca ½ of that of the long one) and four ventral setae of unequal length (t1–t4). Terminal segment with two serrated claws (GM and Gm), g seta and aesthetasc y3, length of Gm ca ¾ of that of GM, length of aesthetasc y3 ca ⅗ of that of Gm and slightly shorter than accompanying seta, length of g seta ca ¾ of aesthetasc y3.

Md-coxa (Fig. 2C). Elongated, distally set with rows of teeth (large dorsally and smaller ventrally) and small setae, and with one dorso-subapical seta, latter short (not reaching base of teeth).

Md-palp (Fig. 3A–B). First segment with two large setae (S1 and S2), one slender, long seta and long, smooth α seta, the latter with wide proximal part and needle-like tip. Second segment dorsally with three unequal long apical setae, length of shortest seta ca ⅓ of that of longest seta; ventrally with group of three long hirsute setae, one shorter hirsute seta and β seta, latter large, plumose, cone-shaped and with pointed tip. Penultimate segment consisting of three groups of setae: dorsally with group of four unequal, long, subapical setae; laterally with apical γ seta and three further apical setae, former stout, hirsute, long (length ca 2.3 × that of terminal segment); ventrally with two (one long, one short) apical setae, latter reaching half way of terminal segment. Terminal segment bearing three claws and three setae.

Mx1 (Fig. 3C). With two-segmented palp, three endites and large branchial plate; basal segment of palp with group of five long, unequal apical setae, one long subapical setae and laterally one shorter subapical seta, latter reaching tip of terminal segment, terminal segment elongated, apically with three claws and three setae. Two large bristles on third endite slightly serrated. Sideways-directed bristles on first endite unequally long.

T1 (Figs 3D–E, 4A). Protopodite with two a setae (intermediate length), long b and d setae, distally with 14 (10 apical, four subapical) hirsute setae of unequal length. Endopodite weakly built palp with three unequal apical setae, length of shortest seta less than ⅓ of long one.

T2 (Fig. 4B). With large d1 and d2 setae, length of d1 seta ca 1.7 × that of d2 seta. Second segment with short e seta (reaching slightly beyond mid-length of penultimate segment). Penultimate segment divided, proximal segment bearing long f seta (reaching tip of terminal segment), distal segment with long g seta (reaching beyond tip of terminal segment) and tiny spine-like seta. Terminal segment with two (one dorsally, one ventrally) apical h1 and h3 setae and serrated claw (h2), h1 seta markedly long, and longer than h3 seta (ca 2 × that of h3), length of claw h2 longer than that of penultimate segment.

T3 (Fig. 4C–D). Cleaning limb. First segment with long d1, d2, dp setae. Second segment bearing apical e seta of intermediate length (reaching mid-length of next segment). Third segment with medially f seta (reaching tip of segment). Terminal segment with apical pincer and three setae, one short h1 seta, one claw-like h2 seta and one reflexed subapical h3 seta, length of latter ca ⅘ of that of third segment.

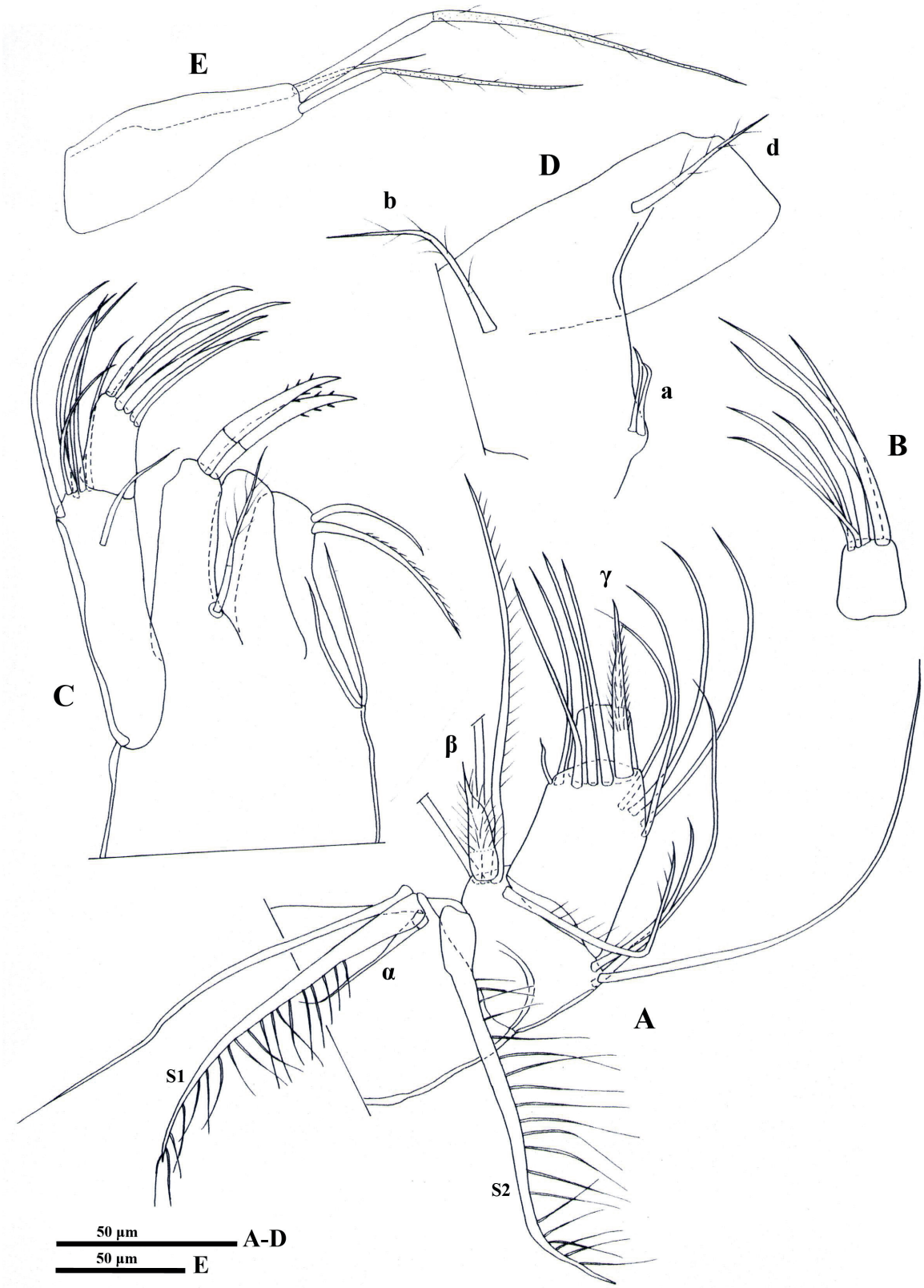

Fig. 3. *Strandesia karanovicae* sp. nov., ♀, holotype (MSU-ZOC.371). **A**. Md-palp. **B**. Terminal segment of Md-palp. **C**. Mx1. **D**. T1. **E**. Endopodite of T1 (palp). Abbreviations: see Material and methods.

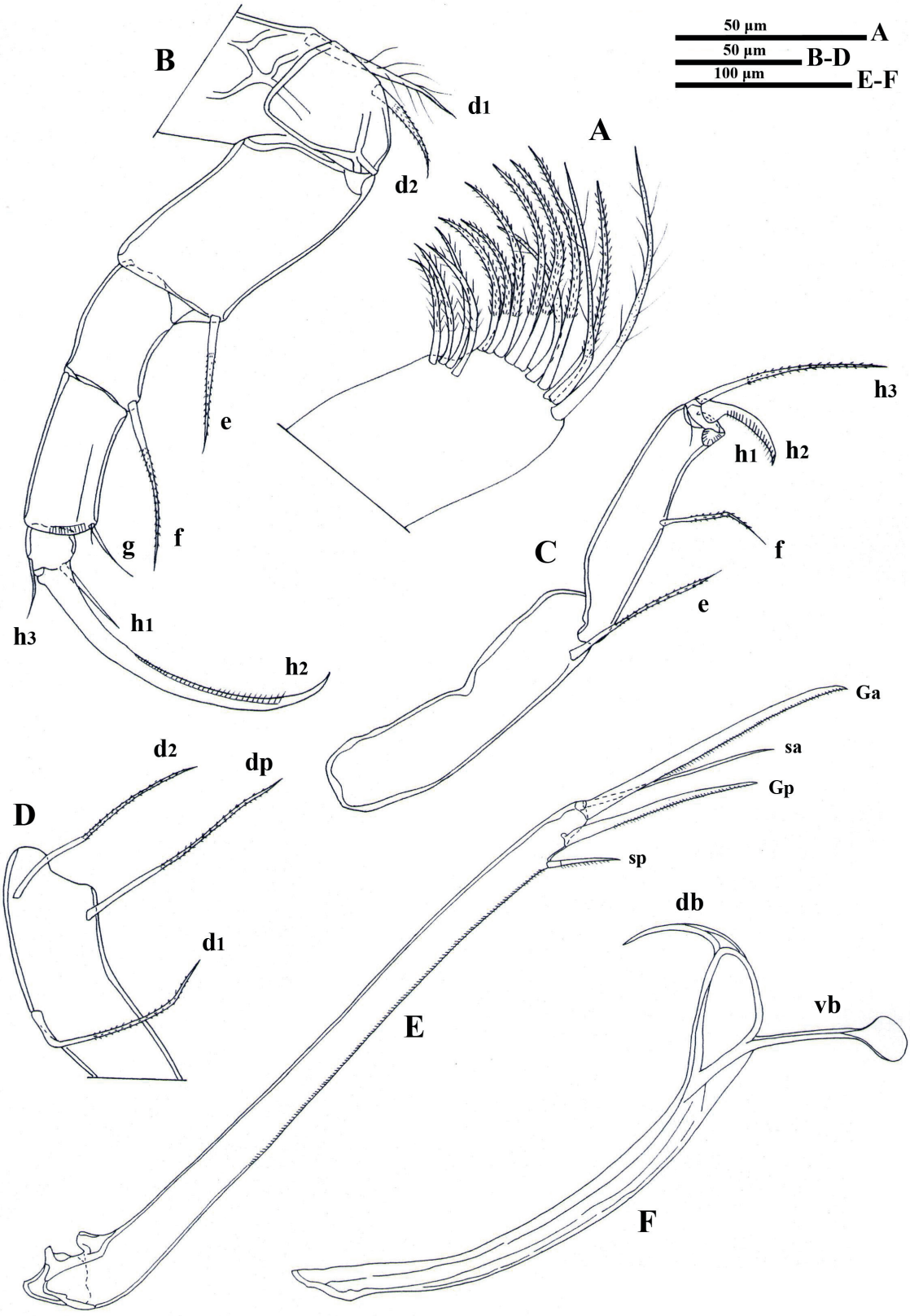

Fig. 4. *Strandesia karanovicae* sp. nov., ♀, holotype (MSU-ZOC.371). **A**. Terminal part of T1 protopodite. **B**. T2. **C**. T3. **D**. First segment of T3. **E**. CR. **F**. CR attachment. Abbreviations: see Material and methods.

CR (Fig. 4E). Slender, ventral margin of ramus with tiny setules. Claws Ga and Gp weakly serrated, length of claw Ga less than half length of that of ramus, length of claw Gp ca $^{3}/_{5}$ of that of claw Ga, sa seta slightly longer than claw Gp, sp seta slender, reaching slightly beyond tip of ramus.

CR ATTACHMENT (Fig. 4F). Stout with Triebel's loop situated at middle of distal part of main branch, db and vb well-developed.

Male

Unknown.

Type locality

A total of 4 female specimens were collected at the type locality on 23 Oct. 2010. Accompanying ostracod fauna: *Pseudocypretta maculata* Klie, 1932, *Pseudostrandesia calapanensis* (Tressler, 1937), *P. phetchabunensis* Savatenalinton & Martens, 2010, *P. striatoreticulata* (Klie, 1932), *Strandesia kraepelini* (G.W. Müller, 1906), *Strandesia* sp. and *Tanycypris eugenkempfi* Savatenalinton, 2017

Strandesia amnatcharoenensis sp. nov.

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Figs 5–8

Diagnosis

Cp medium size (ca 1090 μm), elongated in lateral view (L ca 1.8–2 × of H), LV slightly overlapping RV anteriorly, RV overlapping LV posteriorly, RV with posterior flange and external side with slightly compressed posterior end, A1 seven-segmented with large R, WO present, A2 with long natatory setae, aesthetasc Y slender, β seta on Md-palp large, two large bristles on third endite of Mx1 serrated, d seta on T1 present, T2 with large d1 and d2 setae (length of d2 seta more than half length of d1 seta), f and h3 setae long, CR robust, claw Ga large and long (length more than half length of ramus), claws Ga and Gp with tiny spine-like setules, ventral margin of ramus set with 5–6 groups of tiny spine-like setules, setules gradually smaller to posterior direction in each group, sa seta longer than claw Gp, sp seta slender with cilia-like tip, reaching slightly beyond tip of ramus, CR attachment stout with Triebel's loop situated at middle of distal part of main branch.

Etymology

The species is named after Amnat Charoen Province, where the new species was discovered.

Type material

Holotype

THAILAND – **Amnat Charoen Province** • ♀, soft parts dissected in glycerine on a sealed glass slide and valves stored dry in a micropalaeontological slide; Nong Sam Kha (swamp), Hua Taphan District; 15°41.5′ N, 104°29.5′ E; 10 Feb. 2011; MSU-ZOC.376.

Paratypes

THAILAND – **Amnat Charoen Province** • 2 ♀♀, stored as the holotype; same collection data as for holotype; MSU-ZOC.378, 380 • ♀, carapace stored dry in a micropalaeontological slide; same collection data as for holotype; MSU-ZOC.377 • 3 ♀♀, soft parts dissected in glycerine on a sealed glass slides and valves kept in ethanol; same collection data as for holotype; MSU-ZOC.379, 381 to 382.

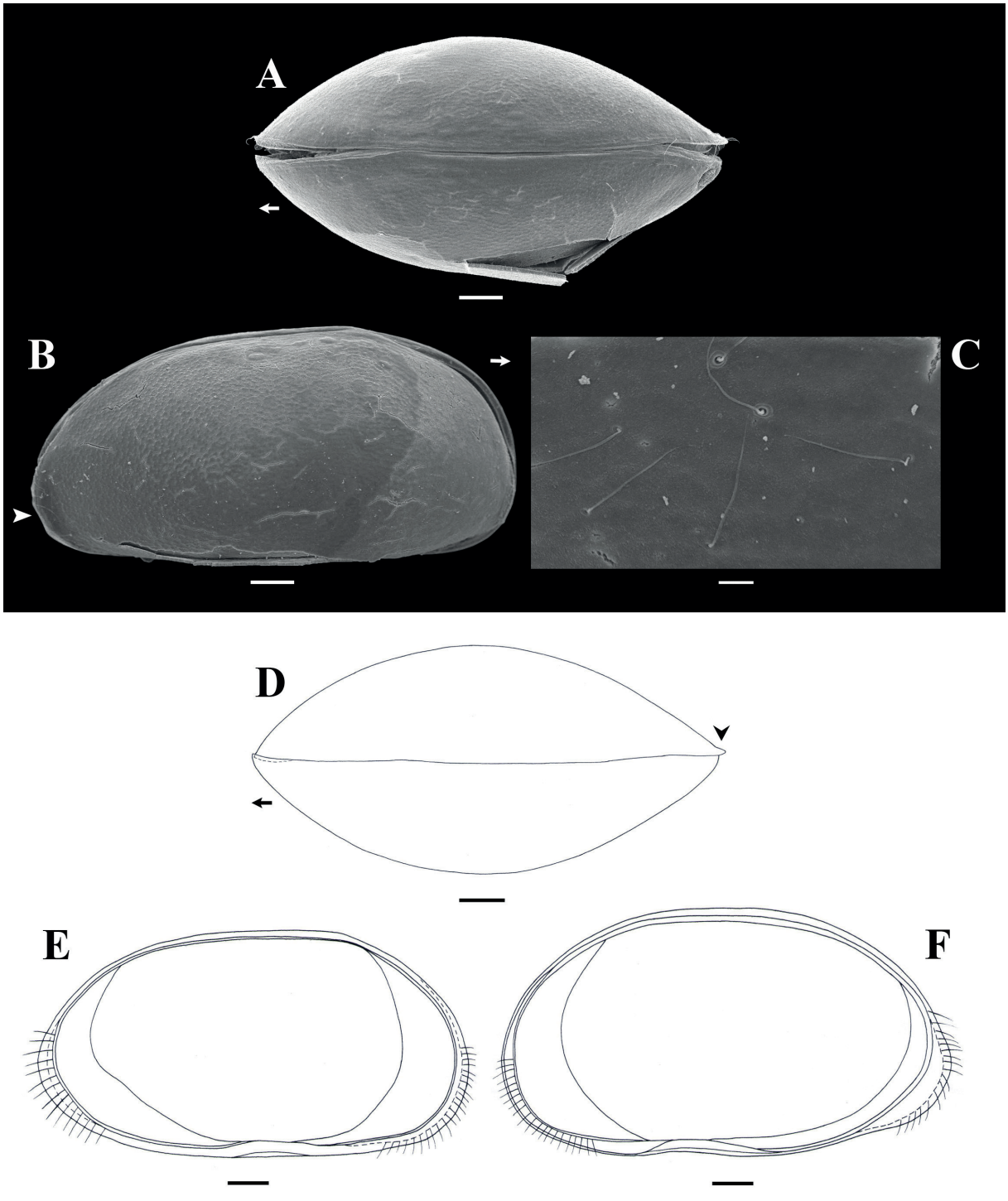

Fig. 5. *Strandesia amnatcharoenensis* sp. nov., ♀. **A–D**. Paratype (MSU-ZOC.377). **A**. Cp, dorsal view. **B**. Cp, right lateral view. **C**. valve surface of Cp, right lateral view. **D**. Cp, dorsal view. **E–F**. Paratype (MSU-ZOC.379). **E**. LV, internal view. **F**. RV, internal view (ditto). Scale bars: A–B, D–F = 100 μm; C = 10 μm. Arrows point to anterior side, arrowheads point to a small external compression on the RV posterior. Abbreviations: see Material and methods.

Description

Female

Measurements (in μm). Cp (n = 2): L = 1080–1107, H = 592–615, W = 535–560; LV (n = 4): L = 1057–1080, H = 560–585; RV (n = 4): L = 1080–1106, H = 589–614.

Cp. (medium size) (ca 1090 μm). Elongated in lateral view (Fig. 5B) (L ca 1.85–2 × H), anterior margin widely rounded, posterior margin slightly narrowly rounded, LV slightly overlapping RV anteriorly, RV overlapping LV posteriorly, dorsal margin gradually arched, greatest height situated in front of mid-length, valve surface weakly reticulated and set with dispersed rimmed-pore setae and tiny tubercles at posterior half.

Cp in dorsal view (Fig. 5A, D). Subelliptical, with greatest W situated at mid-length and pointed anterior and posterior extremities, posterior margin of RV slightly more protruded than LV and external margin with slightly compressed posterior end.

LV in interior view (Fig. 5E). With groove along valve margin, anterior fused zone as wide as in posterior fused zone, dorsal margin slightly arched, greatest height situated at ca ⅓ of length; gently sloping down to anterior and posterior margins, the former widely rounded, the latter slightly less widely rounded, ventral margin slightly sinuated at mid-length; calcified inner lamella relatively wide anteriorly, without inner list, posteriorly narrower.

RV in interior view (Fig. 5F). With anterior marginal selvage and posterior flange, calcified inner lamella without inner list, anteriorly broader than posteriorly.

A1 (Fig. 6A). First segment with one thin dorso-subapical seta of intermediate length (reaching beyond tip of segment) and two long ventro-apical setae, WO present. Second segment slightly wider than long, with one markedly short dorso-apical seta (length ca ¼ of that of third segment) and a long R. Third segment bearing two (one dorso-apical and one ventro-apical) setae of intermediate length, both reaching mid-length of fifth segment. Fourth segment with two long dorsal setae and two (one short, one longer) ventral setae, short one reaching mid-length of next segment, longer one reaching mid-length of penultimate segment. Fifth segment dorsally with two long setae, ventrally with three (one long, one shorter and one very short) setae, shorter one reaching tip of terminal segment, shortest one reaching mid-length of next segment. Penultimate segment with four long setae. Terminal segment with three (two long, one short) apical setae and aesthetasc y_a, shortest seta slightly longer than aesthetasc y_a, aesthetasc y_a long (ca 2.4 × terminal segment).

A2 (Fig. 6B–C). Protopodite with three proximal setae (two ventrally, one laterally), exopodite with three (one long, two short) setae, long one reaching beyond tip of first endopodal segment. First endopodal segment with five long natatory setae (not reaching tip of terminal claws) and one accompanying seta of intermediate length (almost reaching half way the penultimate segment), aesthetasc Y small (short and slender), insertion situated ca ⅓ of segment, ventro-apical seta long, reaching tip of penultimate segment. Penultimate segment undivided, distally with three serrated claws (G1–G3), aesthetasc y2 long (reaching beyond tip of terminal segment), z1–z3 setae long; this segment medially with two (one long, one shorter) dorsal setae (length of long one ca 2 × that of short one) and four ventral setae of unequal length (t1–t4). Terminal segment with two serrated claws (GM and Gm), g seta and aesthetasc y3, length of Gm ca ⅔ of that of GM, aesthetasc y3 remarkably short (length ca ⅓ of that of Gm and ca ½ of that of accompanying seta), length of g seta subequal to aesthetasc y3.

Md-coxa (Fig. 6D). Elongated, distally set with rows of teeth (large dorsally and smaller ventrally) and small setae, and with one dorso-subapical seta, latter short (not reaching base of teeth).

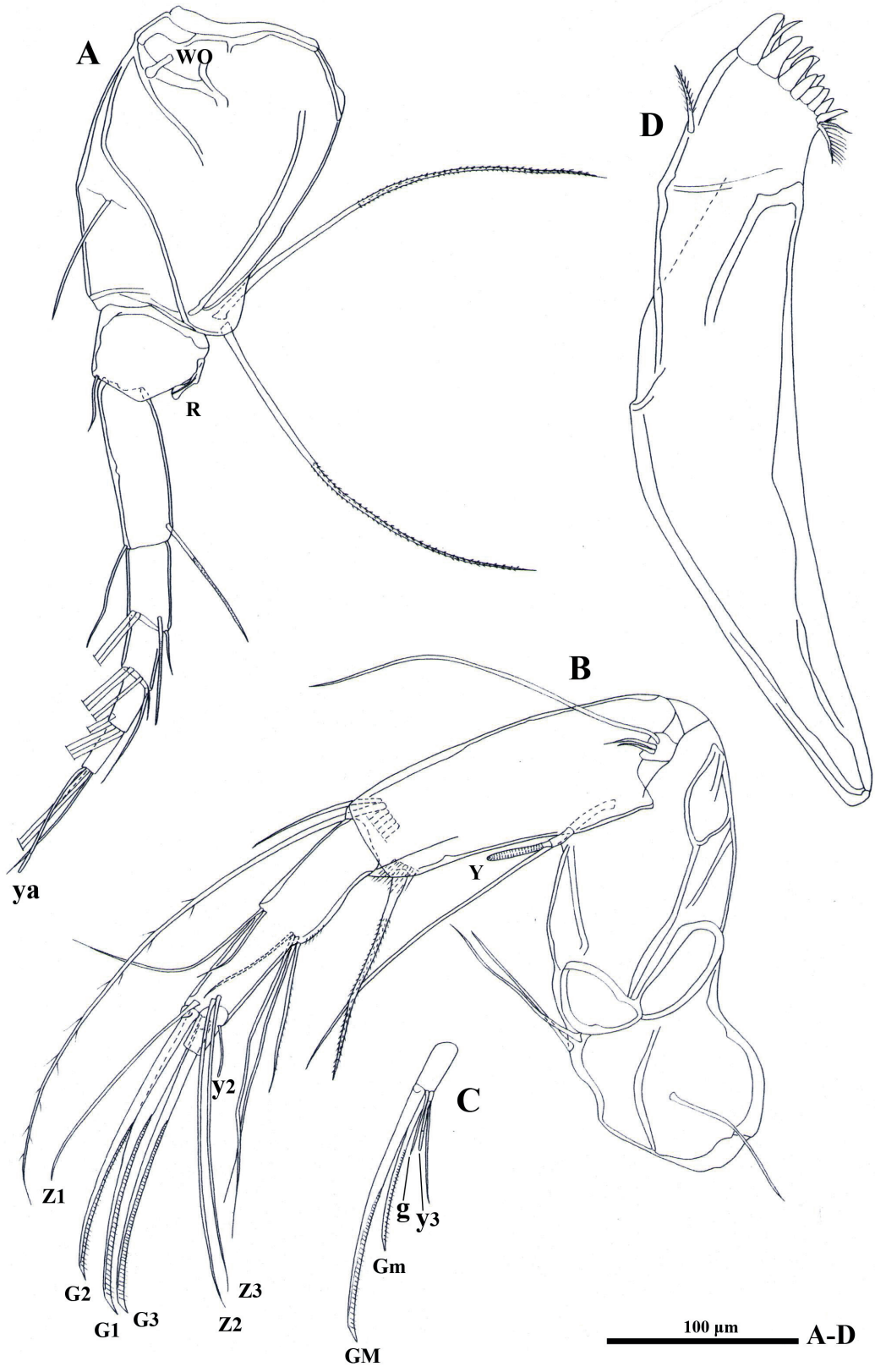

Fig. 6. *Strandesia amnatcharoenensis* sp. nov., ♀, holotype (MSU-ZOC.376). **A**. A1. **B**. A2. **C**. Terminal segment of A2. **D**. Md-coxa. Abbreviations: see Material and methods.

Md-palp (Fig. 7A–B). First segment with two large setae (S1 and S2), one long, slender seta and long, smooth α seta with wide base and needle-like tip. Second segment dorsally with three unequal long apical setae, length of longest seta ca 3.8 × that of shortest seta; ventrally with group of three long hirsute setae, one shorter hirsute seta and the β seta, latter large, plumose, cone-shaped and with needle-like tip. Penultimate segment consisting of three groups of setae: dorsally with group of four unequal, long, subapical setae; laterally with apical γ seta and three apical setae, former stout, hirsute, long (length ca 1.8 × that of terminal segment); ventrally with two (one long, one short) apical setae. Terminal segment bearing three claws and two setae.

Mx1 (Fig. 7C). With two-segmented palp, three endites and large branchial plate; basal segment of palp with group of five long, unequal apical setae, one long subapical seta and one short subapical setae medially, latter reaching half way of terminal segment, terminal segment elongated, apically with four claws and one seta. Two large bristles on third endite serrated.

T1 (Fig. 7D–F). Protopodite with two short a setae, long b- and d setae, distally with 14 (10 apical, four subapical) hirsute setae of unequal length. Endopodite weakly built palp with three unequal apical setae, shortest one less than ⅓ of length of longest one.

T2 (Fig. 8A –B). With large d1 and d2 setae, length of d1 seta ca 1.7 × that of d2 seta. Second segment with e seta of intermediate length (reaching beyond mid-length of penultimate segment). Penultimate segment divided, proximal segment bearing long f seta (reaching far beyond tip of terminal segment), distal segment with long g seta (reaching far beyond tip of terminal segment). Terminal segment with two (one dorsally, one ventrally) apical h1 and h3 setae and serrated claw (h2), h3 seta long and subequal in length to h1 seta, length of claw h2 longer than that of penultimate segment.

T3 (Fig. 8C). Cleaning limb. First segment with long d1, d2, dp setae. Second segment with long apical e seta (ca ¾ of next segment). Third segment with medially short f seta (not reaching tip of segment). Terminal segment with apical pincer and three setae, one short h1 seta, one claw-like h2 seta and one reflexed subapical h3 seta, length of latter ca ½ of that of third segment.

CR (Fig. 8D). Robust, claw Ga large and long (length more than half length of ramus), claws Ga and Gp with tiny spine-like setules, length of claw Gp ca ⅔ of that of claw Ga. sa seta longer than claw Gp. sp seta slender with cilia-like tip, reaching slightly beyond tip of ramus. Ventral margin of ramus set with 5–6 groups of tiny spine-like setules, setules gradually smaller to posterior direction in each group.

CR attachment (Fig. 8E). Stout with Triebel's loop situated at middle of distal part of main branch, db and vb well-developed.

Male

Unknown.

Type locality

A total of 7 female specimens were collected at the type locality on 10 Feb. 2011. Accompanying ostracod fauna: *Bradleystrandesia weberi* (Moniez, 1892), *Cypretta aculeata* Savatenalinton, 2018, *C. triangulata* Savatenalinton, 2018, *Dentocypria smithi* Savatenalinton, 2017, *D. chantaranothaii* Savatenalinton, 2017, *Pseudostrandesia striatoreticulata* (Klie, 1932), *Strandesia kraepelini* (G.W. Müller, 1906), *S. martensi* Savatenalinton, 2015.

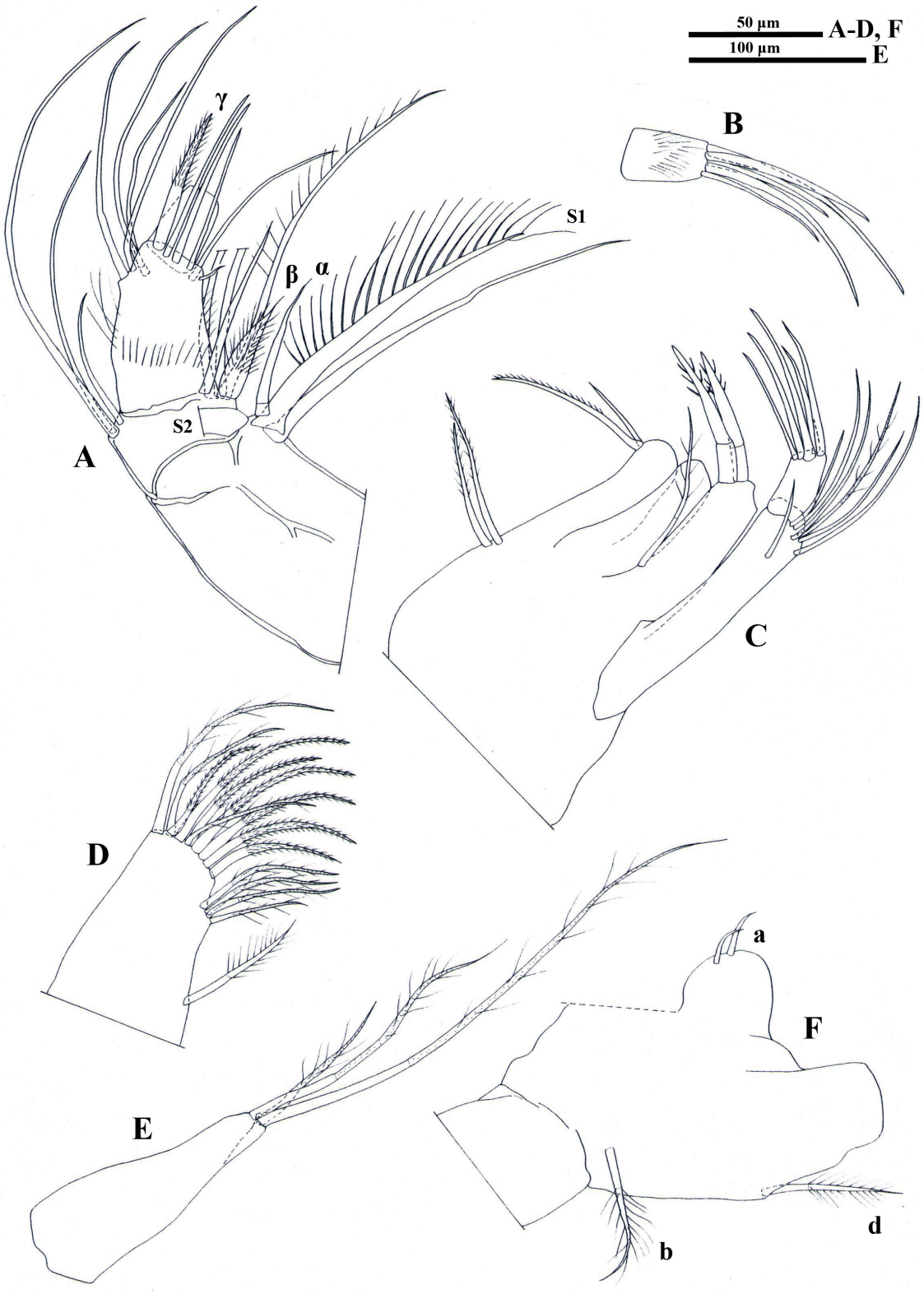

Fig. 7. *Strandesia amnatcharoenensis* sp. nov., ♀, holotype (MSU-ZOC.376). **A**. Md-palp. **B**. Terminal segment of Md-palp. **C**. Mx1. **D**. Terminal part of T1 protopodite. **E**. Endopodite of T1 (palp). **F**. T1. Abbreviations: see Material and methods.

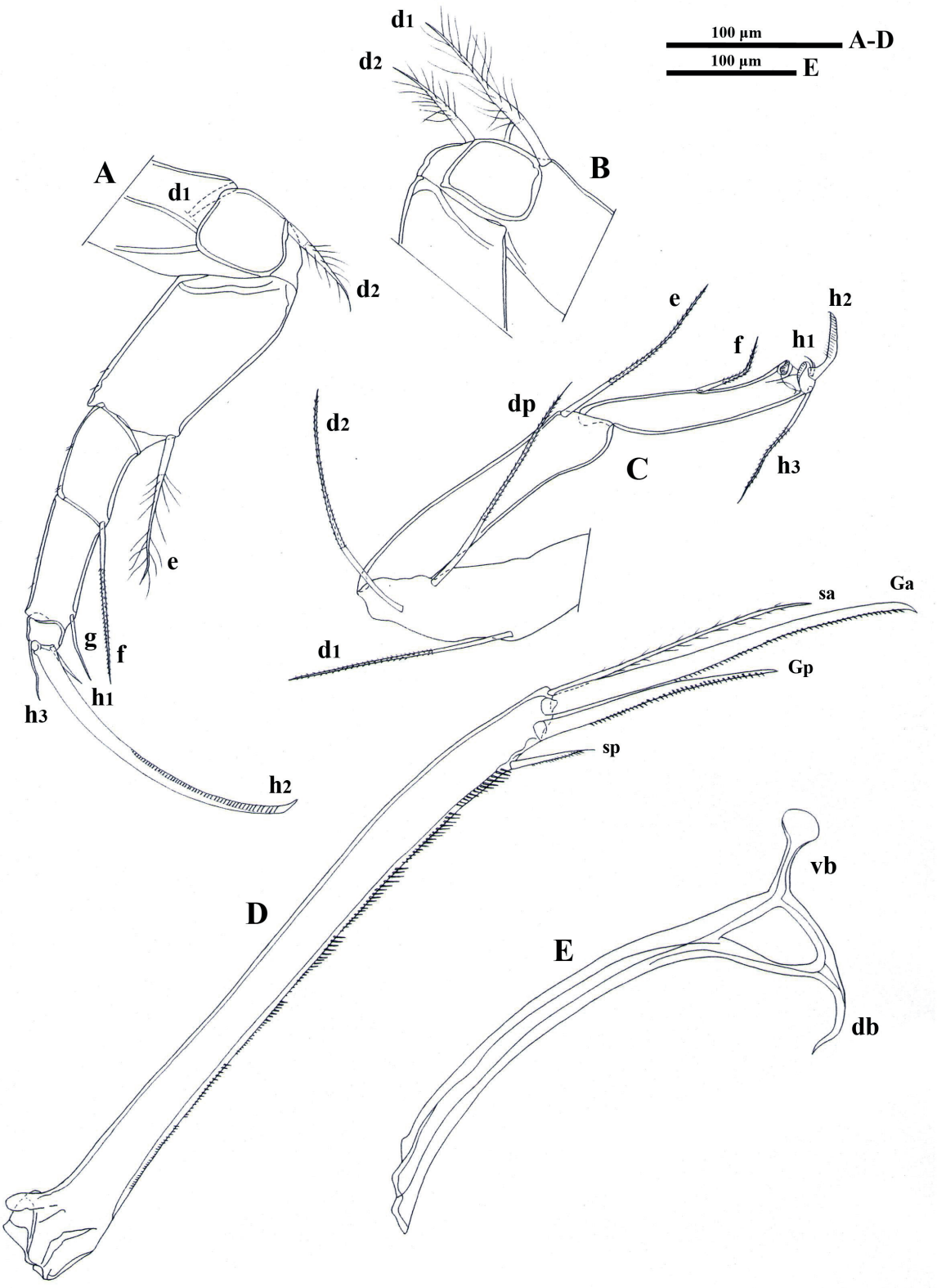

Fig. 8. *Strandesia amnatcharoenensis* sp. nov., ♀, holotype (MSU-ZOC.376). **A**. T2. **B**. Knee segment of T2. **C**. T3. **D**. CR. **E**. CR attachment. Abbreviations: see Material and methods.

Remarks

As the Cp in lateral view (Fig 5B) was slightly deformed appearing in a faintly compressed shape vertically, its height is thus not taken into account. Several individuals decalcified resulting in the deformation of valves after drying in the micropalaeontological slides, so separated valves of some specimens were kept in ethyl alcohol.

Strandesia martensi Savatenalinton, 2015
Figs 9–11

Material examined

THAILAND – **Amnat Charoen Province** • 4 ♂♂, with soft parts dissected in a sealed glycerine slide, valves stored dry in a micropalaeontological slide; Nong Hoi (swamp), Sawang Daen Din District, Sakon Nakhon Province; 17°38.85′ N 103°59.99′ E; S. Savatenalinton leg.; 18 Nov. 2021; MSU-ZOC.383 to 385, 388 • 4 ♂♂, undissected, stored dry in micropalaeontological slides; same collection data as for preceding; MSU-ZOC.386 to 387 • 2 ♀♀, with soft parts dissected in a sealed glycerine slide, valves stored dry in a micropalaeontological slide; same collection data as for preceding; MSU-ZOC.389 to 390 • 1 ♀, undissected, stored dry in a micropalaeontological slide; same collection data as for preceding; MSU-ZOC.391 • several ♂♂, several ♀♀, undissected, kept in 70% ethyl alcohol; same collection data as for preceding; MSU-ZOC.392.

Dsecription

Measurements (in μm). Asexual female. Cp (n=15): L=865–888, H=553–568, W=410–412; LV (n=2): L=824–853, H=535–541; RV (n=2): L=800–838, H=524–553. Sexual female. Cp (n=2): L=798–800, H=550–551; LV (n=2): L=800–803, H=553–555; RV (n=2): L=776–779, H=550–553. Male. Cp (n=2): L=735–771, H=494, W=318; LV (n=2): L=794–796, H=500–502; RV (n=2): L=735–738, H=488–491.

Cp and valves. As in female (see Savatenalinton 2015), although somewhat smaller (Fig. 9). All limbs as in female, except for last two segments of A2, T1 and reproductive organs (Fig. 10). Penultimate segment of A2 undivided and with claw-like z1 and z2 setae and with claw G1 and G3 reduced to setae; terminal segment with claw Gm modified appearing strong spines on distal half of claw and with claw GM reduced to short seta (Fig. 10A–B); T1-endopodites forming asymmetrical prehensile palps; left palp (Fig. 10C) anteriorly with elongated, hook-like curved lobe and two apical spines, right palp (Fig. 10D) anteriorly with triangular lobe and two apical spines (one very large).

Hemipenis (Fig. 10E). With ms rounded, ls elongated with blunt tip. Postlabyrinthal spermiduct curved, with 2 loops. Zenker organ (Fig. 10F) set with ca 19–22 spiny whorls, length about 3.7 × width, distal and proximal end plates forming crown of petal-like structures.

Locality

Sexual population: Nong Hoi (swamp), Sawang Daen Din District, Sakon Nakhon Province; 17°38.85′ N 103°59.99′ E; collected by S. Savatenalinton, 18 Nov. 2021. Other localities see Table 1.

Discussion

***Strandesia karanovicae* sp. nov.**

At first sight, *Strandesia karanovicae* sp. nov. is superficially similar to *Pseudostrandesia mamarilorum* (Victor & Fernando, 1981) and *Strandesia kraepelini* (G.W. Müller, 1906). However, the existence of the d seta on the T1 points to the fact that this Thai species cannot belong to the genus *Pseudostrandesia*

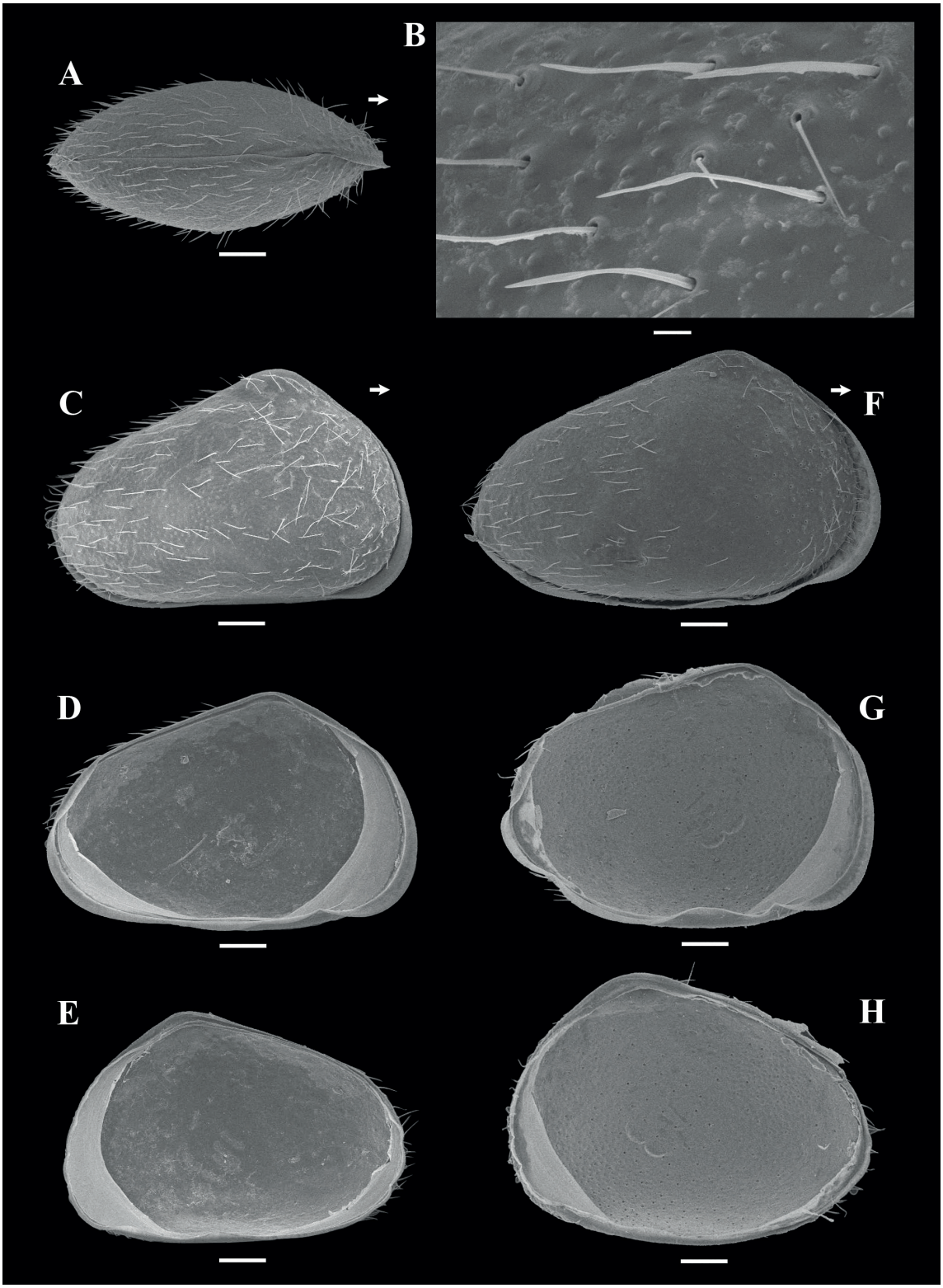

Fig. 9. *Strandesia martensi* Savatenalinton, 2015. **A–E**. ♂. **F**. ♀, asexual. **G–H**. Sexual. **A**. Cp, dorsal view (MSU-ZOC.386). **B**. Valve surface of Cp, right lateral view (MSU-ZOC.387). **C**. Cp, right lateral view (ditto). **D**. LV, internal view (MSU-ZOC.383). **E**. RV, internal view (ditto). **F**. Cp, right lateral view (MSU-ZOC.391). **G**. LV, internal view (MSU-ZOC.389). **H**. RV, internal view (ditto). Scale bars: A, C–H = 100 μm; B = 10 μm. Arrows point to anterior side. Abbreviations: see Material and methods.

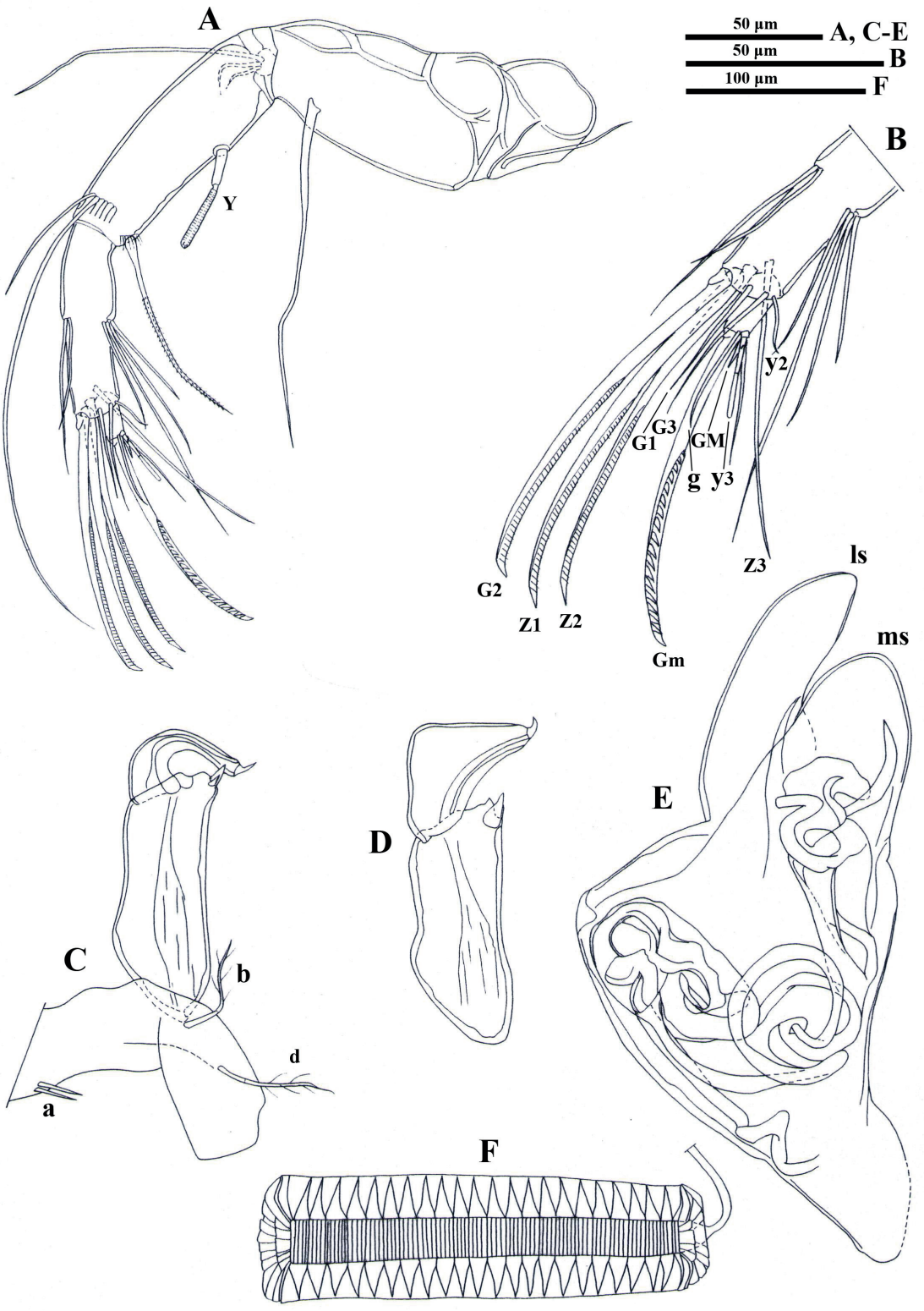

Fig. 10. *Strandesia martensi* Savatenalinton, 2015, ♂ (MSU-ZOC.383). **A**. A2. **B**. Terminal part of A2. **C**. Left T1. **D**. Right palp of T1. **E**. Hemipenis. **F**. Zenker organ. Abbreviations: see Material and methods.

(see Savatenalinton & Martens 2009a). *Strandesia karanovicae* and *S. kraepelini* have a similar pattern of valve surface which is roughly decorated with tiny tubercles, together with short setae. It can be discriminated from *S. kraepelini* by the larger size (757–772 μm for *S. kraepelini* – see Savatenalinton & Martens 2010), the more tumid Cp in dorsal view, the wider anterior and posterior ends of the Cp in dorsal view, the small anterior overlap (large anterior overlap in *S. kraepelini*), the less arched dorsal margin of Cp in lateral view, the wide anterior fused zone of the LV (narrow fused zone in *S. kraepelini*) and

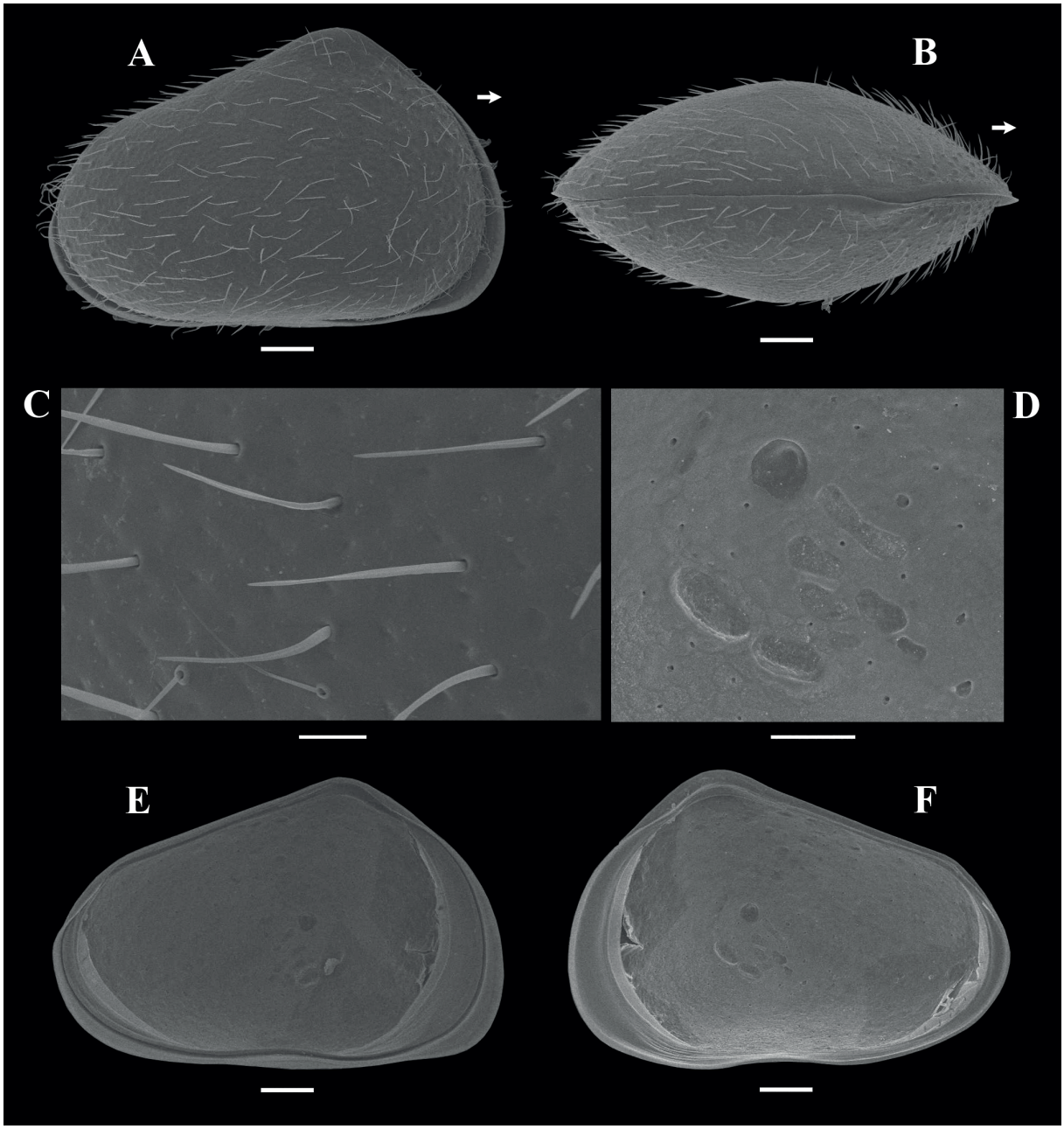

Fig. 11. *Strandesia martensi* Savatenalinton, 2015, ♀, asexual. **A**. Cp, right lateral view (MSU-ZOC.393). **B**. Cp, dorsal view (MSU-ZOC.394). **C**. Valve surface of Cp, right lateral view (MSU-ZOC.393). **D**. Muscle scars of RV (MSU-ZOC.392). **E**. LV, internal view (ditto). **E**. RV, internal view (ditto). Scale bars: A–B, E–F = 100 μm; C = 20 μm; D = 50 μm. Arrows point to anterior side. Abbreviations: see Material and methods.

the complete anterior inner list on the LV (incomplete inner list in *S. kraepelini*) (see Savatenalinton & Martens 2010). Additionally, the differences can be seen in the morphology of the soft parts, for example the longer accompanying seta of the A2 natatory setae, the more slender β seta on the Md-palp, the more robust d1 and d2 setae and the longer h1 seta of the T2 and the morphology of the CR.

It appears that the A1 provides several diagnostic characters at various taxonomic levels, such as the number of segments (see Karanovic 2011; Savatenalinton 2023a), the occurrence (presence / absence) of the WO (see, e.g., Smith & Matzke-Karasz 2008), the size and segmentation of the R (see Shearn *et al.* 2014; Savatenalinton 2022a). Recently, Savatenalinton (2023a) revealed a potential feature of the two apical ventral setae of the first segment as one of the indicative characters of the species / genus. On the same segment, another seta that should be mentioned is the subapical dorsal one which usually exists in all members of the family Cyprididae, including Cypricercinae. Given the fact that many past descriptions of species of *Strandesia* usually ignored this limb, resulting in incomplete descriptions, a poor illustration or even the lack of the A1 drawings, the occurrence of this seta is thus difficult to clarify. However, at present, the absence of this seta is determined in two species: *S. kraepelini* (see Savatenalinton & Martens 2010) and *S. karanovicae* sp. nov. This is similar to the situation in the genus *Tanycypris* in which this seta is missing in some species, namely *T. centa* Chang *et al.* 2012 and *T. siamensis* Savatenalinton & Martens 2009 (see Savatenalinton & Martens 2009a; Chang *et al.* 2012; Nagler *et al.* 2014). Therefore, the occurrence of this seta has proven to be a valid character to discriminate at the species level within the genera *Strandesia* and *Tanycypris* (see also Nagler *et al.* 2014).

Based on the ontogenetic series of *Eucypris virens* (Jurine, 1820), which revealed that the subapical dorsal seta on the A1 first segment emerges in the A-2 stage (see Smith & Martens 2000), the species without the subapical dorsal seta is thus assumed to be more primitive as the absence of this seta is the situation of the earlier stages (prior to the A-2 stage). Nonetheless, it is known that the seta disappearance in adult stage possibly represents the derived state which evolved via paedomorphosis (either neoteny or progenesis) or progressive loss of setae. Additionally, the fact that this aspect (the absence of this seta) exists in a small proportion of species also strengthens its derived character and thus these four species of *Strandesia* and *Tanycypris* could belong to a more advanced group. It is furthermore noteworthy that *Strandesia* and *Tanycypris* belong to different lineages (tribes), according to the morphological phylogenetic analysis of Cypricercinae reported by Savatenalinton & Martens (2009a), and thus the co-existence of the absence of the seta (heterochronic feature) in the two genera possibly developed independently. Another fact is that the absence of a subapical dorsal seta on the A1 first segment has so far been restricted only to Southeast and East Asian lineages. Since its discovery in Java, Indonesia (G.W. Müller 1906), *S. kraepelini* has so far been reported only from Southeast Asian countries (see Victor & Fernando 1981; Savatenalinton & Suttajit 2016) and thus it has been an endemic species of this region for a long time. *Tanycypris siamensis* and *T. centa* were described from Thailand (Savatenalinton & Martens 2009a) and South Korea (Chang *et al.*, 2012), respectively, and they are endemic to their own countries. However, as mentioned above, the incomplete descriptions and insufficient illustrations provided for *Strandesia*, a generic revision with detailed investigations, and also integrative data, are needed to clarify the morphological evolutionary trend of this lineage.

***Strandesia amnatcharoenensis* sp. nov.**

Strandesia amnatcharoenensis sp. nov. resembles *Strandesia pholpunthini* Savatenalinton, 2015, especially for the presence of the external compression at the posterior part of the RV (see Savatenalinton 2015). Both species have the LV overlapping the RV anteriorly and the RV overlapping the LV posteriorly. Other similarities are also seen in the valve structures, such as the presence of a postero-ventral flange of the RV, submarginal anterior selvages of the LV, a marginal anterior selvage of the RV and an external valve surface with tiny tubercles and rimmed-pore setae (see Savatenalinton 2015: fig. 4). Also, the

Table 1. List of localities of *Strandesia martensi* Savatenalinton, 2015.

sample code	province	locality	coordinates	sampling date	sex	remarks
–	Udon Thani	Phan Reservoir (swamp)	17°50.1′ N, 103°4.4′ E	31 Jan. 2011	female	type locality (see Savatenalinton 2015)
–	Bueng Kan	Kud Thing (swamp)	18°20.6′ N, 103°39.9′ E	30 Jan. 2011	female	see Savatenalinton 2015
–	Bueng Kan	Bung Khong Long (swamp)	17°57.6′ N, 104°2.1′ E	30 Jan. 2011	female	see Savatenalinton 2015
SK21				17 Nov. 2021	female	1 morphotype
SK06	Nakhon Phanom	Nong Thum (swamp), Tha Uthen District	17°42.4′ N, 104°21.7′ E	15 Nov. 2021	female	1 morphotype
SK07	Nakhon Phanom	Nong Sarai (swamp), Tha Uthen District	17°41.9′ N, 104°20.3′ E	15 Nov. 2021	female	1 morphotype
SK08	Nakhon Phanom	Nong Sang (swamp), Tha Uthen District	17°43.0′ N, 101°19.2′ E	15 Nov. 2021	female	1 morphotype
SK09	Nakhon Phanom	Huai Bo (reservoir), Tha Uthen District	17°41.6′ N, 104°18.5′ E	15 Nov. 2021	female	1 morphotype
SK14	Nakhon Phanom	Nong Ma Klap Reservoir, Si Songkhram District	17°38.6′ N, 104°19.7′ E	16 Nov. 2021	female	1 morphotype
SK15	Nakhon Phanom	Huai Ela Reservoir, Si Songkhram District	17°38.9′ N, 104°18.6′ E	16 Nov. 2021	female	1 morphotype
SK16	Nakhon Phanom	Huai Khon Reservoir, Si Songkhram District	17°36.4′ N, 104°15.7′ E	16 Nov. 2021	female	1 morphotype
SK18	Nakhon Phanom	Huai Bo (pond), Si Songkhram District	17°39.4′ N, 104°12.5′ E	16 Nov. 2021	female	1 morphotype
SK19	Nakhon Phanom	Nong Chai Wan (swamp), Si Songkhram District	17°39.3′ N, 104°10.7′ E	16 Nov. 2021	female	1 morphotype
SK20	Nakhon Phanom	Nong Sing Yai (swamp), Si Songkhram District	17°37.9′ N, 104°8.5′ E	16 Nov. 2021	female	1 morphotype, sperm presence
SK27	Sakon Nakhon	Nong Khon Mao (swamp), Akat Amnuai District	17°41.0′ N, 104°2.9′ E	17 Nov. 2021	female	1 morphotype
SK28	Nakhon Phanom	Nong Samhong (swamp), Si Songkhram District	17°42.2′ N, 104°8.8′ E	17 Nov. 2021	female	1 morphotype, sperm presence
SK29	Sakon Nakhon	Nong Hoi (swamp), Akat Amnuai District	17°38.9′ N, 103°59.9′ E	18 Nov. 2021	male, female	2 morphotypes of female, sperm presence
SK34	Nakhon Phanom	Nong Dut (swamp), Na Wa District	17°35.5′ N, 104°5.9′ E	18 Nov. 2021	female	1 morphotype

size is similar although *S. amnatcharoenensis* is slightly smaller with a length of about 1093 µm (1135 µm in *S. pholpunthini*). Nonetheless, they are different in several aspects. Although both species have the RV posterior compression, this feature is smaller in the new species. The anterior and posterior overlaps are also smaller in *S. amnatcharoenensis*, especially the anterior one which shows a rather small overlap, and thus, in dorsal view, the anterior and posterior extremities have a considerably less pronounced tip of the valves. In lateral view, the Cp of the new species is slightly more elongated and the dorsal margin is less arched. The anterior fused zone of the RV is wider in the new species. *Strandesia amnatcharoenensis* can also be distinguished from *S. pholpunthini* by the markedly long R, the presence of WO, the two serrated bristles on the Mx1, the longer claw Ga, the shorter and different shape of the sp seta of the CR and the markedly long h3 seta of the T2. The large β seta on the Md-palp is recognized in both species, but it is more slender in *S. amnatcharoenensis*.

In the genus *Strandesia*, the presence of a posterior flange on the RV is a rare feature, as it exists in a small number of species. This structure is different in size and position among species. For example, it is large and situated at the postero-ventral part which is seen in the two Thai representatives (*S. pholpunthini* and *S. amnatcharoenensis* sp. nov. – see also Savatenalinton 2015), whereas it is small to medium size and located at the posterior or postero-dorsal part in a Kenyan species (*S. caudata* Klie, 1939 – see Klie

1939) and the South American-West Indies taxa (*S. mutica* (Sars, 1901), *S. nupelia* Higuti & Martens, 2013, *S. obtusata* (Sars, 1901), *S. tolimensis* Roessler, 1990 – see Higuti *et al.* 2013; Ferreira *et al.* 2020). Thus, the species possessing this feature have so far been limited to three lineages: Southeast Asian, African and South American-West Indies.

Strandesia martensi

Morphotypes and reproduction

The key characters of *S. martensi* are the large dorsal hump on both valves, the large anterior overlap, the remarkably long sp seta of the CR and the pitted ornamentation of the valve surface with long spines and long rimmed-pore setae. The recent investigation of ostracods in the Lower Songkhram River Basin revealed additional 14 localities of *S. martensi* (see Table 1). Among these, the sexual population was found at one locality (SK29) and thus the male description is firstly presented here. In the male, the A2 has sexually modified features appearing claw-like z1 and z2 setae and reduced claws G1 and G3 which is the typical pattern of sexual dimorphism in the male A2 in Cyprididae (see also Martens 1987; Savatenalinton 2022b). In *S. martensi*, the sexual modifications are also recognized in the claws GM and Gm. The claw Gm is obviously modified with a strong serration and claw GM is strongly reduced to a very small seta. Apart from the seven species mentioned in Scharf *et al.* (2020), such modifications of the claws GM and Gm, additionally, were also seen in some other species of *Strandesia*, such as *S. bicornuta* Hartmann, 1964 (see Martens & George 1992), *S. pistrix* Broodbakker, 1983 and *S. venezolana* Broodbakker, 1983 (see Broodbakker 1983), but the claw GM of *S. martensi* is even more reduced.

Strandesia martensi was described based only on female specimens collected from three swamps in Udon Thani and Bueng Kan Provinces in the northeastern part of Thailand (Savatenalinton 2015). The male specimens discovered at locality SK29 show a morphology congruent to that of females, except for the smaller size. In addition, at this locality, two morphological forms of the females were recognized. Such morphological difference of females could be a variation of specimens at different ages in the population. If this were the case, specimens of both forms should be morphologically uniform at adulthood. However, this possibility is rejected by the fact that the females of both forms at locality SK29 were adults. Hence, the morphological difference of the females is more logically considered as different morphotypes which can presumably be interpreted in at least two traits: the intraspecific morphological variation and the different forms of reproductive (asexual/sexual) females. Given the fact that, in a species, the variation of the external morphology (if present) commonly happens between different populations (localities) caused by, e.g., an ecophenotypic effect (see, for example, Yin *et al.* 1999; Martens *et al.* 2023), but it usually does not occur in the same population as was observed at locality SK29. This weakens the possibility of the former trait. On the other hand, the latter trait is most likely to be the possibility of the current case which one form could be considered as the asexual form (Figs 9F, 11A) because it is similar to the previously described females collected from all-female populations whereas another form shows differences in size (smaller) and shape (less elongated) of the Cp which is assumed as the sexual form (Fig. 9G–H). This phenomenon resembles the case of *Cypridopsis vidua* (O.F. Müller, 1776) which was recently reported as a mixed reproduction species (see Martens *et al.* 2023). Also, the morphology of asexual and sexual females of *S. martensi* corresponds to that of *C. vidua* in terms of sexual females being slightly smaller and more highly arched. Interestingly, sperm was found in these two morphotypes of females at locality SK29 which suggests that males can inseminate both female forms. It is also known that copulation between males and asexual (parthenogenetic) females is possible as was demonstrated in *E. virens*, although the insemination could not be confirmed (see Horne *et al.* 1998). Hence, the current investigation in *S. martensi*, together with the previous work for *C. vidua* (see Martens *et al.* 2023), could be evidence for the insemination in both sexual and asexual females in species of Cyprididae.

At the remaining localities, only females were found and their shape is that of the asexual form. Hence, the reproductive mode seems to be parthenogenesis in these sites. Nonetheless, two of the remaining localities (localities SK20 and SK28) provided an interesting scenario that, although only asexual females were found, many specimens contained sperm inside. This implies that males existed in these populations and the reproduction could occur via sexual and parthenogenetic pathways. Apart from these three localities (SK20, SK28, SK29), the parthenogenesis seems to be the reproductive mode in populations by the lack of males and of sperm in any asexual females. It should also be noted that the absence of males in the collected samples could be due to the fact that males in these populations were overlooked or simply that there were no males. The former scenario seems to be the case for localities SK 20 and SK 28 while the latter one could be valid for all sites, except for SK20, SK28 and SK29.

In conclusion, *S. martensi* is thus shown to be a species with mixed reproduction, as asexual and sexual females as well as males occurred in the population. This is the first report of such reproductive mode in the genus *Strandesia* or even in the Cypricercinae. The present results represent a preliminary step towards the understanding of the reproductive mode in this lineage.

Distribution

According to the extensive survey of ostracods in Thailand with 293 water bodies in 32 provinces belonging to three parts of the country: North, Northeast and Central parts, *S. martensi* was reported only from three localities in two provinces: Udon Thani and Bueng Kan provinces (Savatenalinton 2015; Savatenalinton & Suttajit 2016). However, the study of ostracods from 35 localities in the Lower Songkhram River Basin showed that *S. martensi* inhabited another 14 localities in two provinces (Nakhon Phanom and Sakon Nakhon) (see Savatenalinton 2023c). Thus far, its distribution has been restricted to these four provinces. It should be emphasized that all localities with *S. martensi* have until now been found in the Songkhram River Basin, commonly in the lower part of this river basin (Nakhon Phanom Province, see Table 1).

In the genus *Strandesia*, males have so far been found in 16 species inhabiting four zoogeographical regions (AT, NT, OL and PA), most of them occurring in the OL (Table 2). *Strandesia martensi* is the second species, after *S. wierzejskii* (Grochmalicki, 1915) (see Grochmalicki 1915; Victor & Fernando 1981), in Southeast Asia.

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Table 2. List of species of *Strandesia* Stuhlmann, 1888 with sexual populations. Abbreviations: see Material and methods.

zoogeographical region	species	distribution	references
AT	*S. mercatorum* (Vávra, 1895)	Tanzania	Vávra 1895; Savatenalinton & Martens 2009a
AT	*S. unicolor* Klie, 1944	Burundi	Klie 1944
NT	*S. botosaneanui* Broodbakker, 1983	Cuba	Broodbakker 1983
NT	*S. carteri* Klie, 1930	Paraguay	Klie 1930
NT	*S. intrepida* Furtos, 1936	Mexico	Furtos 1936
NT	*S. obtusata* (Sars, 1901)	Brazil, Colombia, West Indies	Martens & Behen 1994; Ferreira *et al.* 2020
NT	*S. pistrix* Broodbakker, 1983	Haiti	Broodbakker 1983
NT	*S. venezolana* Broodbakker, 1983	Venezuela	Broodbakker 1983
OL	*S. bicornuta* Hartmann, 1964	India	Hartmann 1964; Martens & George 1992
OL	*S. hartmanni* Victor *et al.*, 1980	India	Victor *et al.* 1980
OL	*S. indica* Hartmann, 1964	India	Hartmann 1964
OL	*S. labiata* Hartmann, 1964	India	Hartmann 1964
OL	*S. saetosa* Hartmann, 1964	India	Hartmann 1964
OL	*S. martensi* Savatenalinton, 2015	Thailand	Savatenalinton, 2015
OL	*S. wierzejskii* (Grochmalicki, 1915)	Indonesia, Malaysia, Philippines, Sri Lanka	Grochmalicki 1915; Neale 1977; Victor & Fernado 1981
OL, PA	*S. reticulata* (Daday, 1898)	Sri Lanka, France	Daday 1898; Farkas 1957, Meisch *et al.* 1989

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