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Alona siamensis sp.n., a new species of Cladocera from South-East Asia, related to *Alona dentifera* (Sars, 1901) (Anomopoda: Chydoridae)

Alona siamensis sp.n., новый вид ветвистоусых раков из Юго-Восточной Азии, родственный *Alona dentifera* (Sars, 1901) (Anomopoda: Chydoridae)

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КЛЮЧЕВЫЕ СЛОВА: Cladocera, *Alona*, новый вид, Юго-Восточная Азия, систематика, морфология.

ABSTRACT. A new species of family Chydoridae, *Alona siamensis* sp.n., inhabiting Malaysia and Thailand, is described. *A. siamensis* was previously reported from these countries as *A.* cf. *dentifera* (Sars, 1901). *A. siamensis* differs from the most species of *Alona* in the shape of postabdomen, long, straight basal spine of the postabdominal claw, truncated rostrum, presence of posteroventral denticles, and in IDL armed with two massive, hook-like setae. It differs from *A. dentifera* in the presence of major head pores (*A. dentifera* lacks them), prominent sculpture of valves, trunkated rostrum and in hook-like IDL setae.

РЕЗЮМЕ. Описан новый вид семейства Chydoridae, *Alona siamensis* sp.n., обитающий в Малайзии и Таиланде. Этот вид ранее указывался для этих стран как *A.* cf. *dentifera* (Sars, 1901). *A. siamensis* отличается от большинства видов рода *Alona* формой постабдомена, длинным прямым базальным шипом постабдомена, срезанным ростумом, наличием зубцов на задне-нижнем углу створок, и вооружением внутренней дистальной доли первой ноги в виде двух массивных, крючкообразных щетинок. От вида *A. dentifera* его отличает наличие главных головных пор (у *A. dentifera* они отсутствуют), хорошо развитой скульптурой створок, срезанного рострума и крючковидных щетинок внутренней дистальной доли.

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Introduction

The Cladoceran fauna of tropical and subtropical Asia are not yet studied adequately, the taxonomic status of many species remains unclear. Frequently, populations from this area were identified as a widely distributed species, described from other regions [see Idris, 1983]. Recent studies of cladocera from South-East Asia, especially Thailand, lead to clarification of several such cases and reveal rare and endemic species in the area [Sanoamuang, 1998; Kotov et al., 2005a, b; Sinev et al., 2007; Korovchinsky, Sanoamuang, 2008].

A South American taxon *Alona* cf. *dentifera* (Sars, 1901) was reported from Malaysia [Idris, Fernando, 1981; Idris, 1983] and subsequently from Thailand [Maiphae et al., 2004, 2005; Sanoamuang, Faitakum, 2005; Nachai, 2006]. *Alona dentifera* s. str. was recently revised by Sinev et al. [2004]. Study of detailed morphology of the species justified its translocation from genus *Alonella* to *Alona*, and revealed that another taxon, *Alonella brasiliensis* Bergamin, 1935 is a junior synonym of *Alona dentifera*. The unique character of this species is an absence of major head pores in all but the first juvenile instar, which has two connected pores. However, specimens from Malaysia, studied by Idris & Fernando [1981], have three major head pores. According to their description, these specimens are very close to *A. dentifera* s. str. in general morphology, especially in the shape of postabdomen, and obviously differ from all other species of the genus. Sinev et al. [2004] concluded that these specimens belong to

a new, not yet described species of *Alona*. Investigation of detailed morphology, description of this species and determination of its relationships within the genus were the aim of the present study.

Material and methods

Studied material included 14 parthenogenetic females and 3 juvenile female of instar II from a rice field at Ban Bayao Baghe Subdistrict, Phannanikhom District, Sakhonnakhon Province, Northeast Thailand, 01.09.2004, several parthenogenetic females from a swamp at Rasisarai Subdistrict, Rasisarai District, Surin Province, Northeast Thailand, 27.10.2000, and from a swamp at Zhang Subdistrict, Seka District, Nong Khai Province, Northeast Thailand, 31.08.2003. The animals were selected from samples under a binocular stereoscopic microscope, placed on slides (in a drop of a glycerol-formaldehyde mixture) and studied under an optical microscope in toto. Several specimens were dissected for the analysis of appendages. Six specimens from Ban Bayao sample were lyophilized, mounted on an aluminium stub, coated with gold, and examined under a LEO 1450VP scanning electron microscope. Measurements were conducted using an eyepiece-micrometer, all drawings were made with a *camera lucida*.

Abbreviations. *In the list of material*: ZMMU — Zoological Museum of Moscow State University. *In illustrations and text*: I–V — thoracic limbs I–V; as — accessory seta of limb I; e1–3 — endites 1–3 of limb I; ep — epipodites, ex — exopodites of limbs; IDL — inner distal lobe of limb I; IP — interpore distance (distance between anterior and posterior major head pores); ODL — outer distal lobe of limb I; PP — postpore distance (distance between posterior head pore and posterior corner of head shield); s — sensillum. Numeration of limb setules given from epipodite to gnathobase, without any notion of homology.

Alona siamensis **sp.n.**
Figs 1–30.

Idris et Fernando, 1981: 247–248, fig. 52–56 (cf. *dentifera*); Idris, 1983: 100, fig. 46 (cf. *dentifera*).

MATERIAL. Holotype: parthenogenetic female, ZMMU, Ml-73. Paratypes: 2 parthenogenetic females, ZMMU, Ml-74.

TYPE LOCATION. Rice field at Ban Bayao Baghe Subdistrict, Phannanikhom District, Sakhonnakhon Province, Thailand, 01.09.2004.

DIAGNOSIS. *Female.* Of moderate size, length up to 0.42 mm. Body oval, of moderate height, length about 1.5–1.7 times maximum height, maximum height before the middle of the body. Ventral margin with about 45 setae. Postero-ventral corner with 2–3 denticles. Carapace and head shield covered by narrow longitudinal lines. Head shield with broadly rounded, wavy posterior margin, rostrum short, truncated. Three major head pores with narrow connection between them. PP about 1.1–1.5 IP. Lateral head pores located at about 1 IP distance from midline. Labral keel oval, with rounded apex, without clusters of setules on posterior margin.

Postabdomen short and wide, truncated, length about 2.5 height. Distal margin straight, distal angle obtuse. Dorsal margin weakly convex in preanal part, straight in anal part, and weakly convex to straight in postanal part. Distal part of dorsal margin 3 times longer than preanal one, with preanal portion 1.7–1.8 times longer than anal. Preanal angle as prominent protrusion with rounded apex, postanal angle not defined. Postanal margin with 3–4 long, single marginal denticles and with about 5 clusters of 3–4 smaller denticles, anal margin with 3–4 clusters of setules. About 10 lateral fascicles of setules, 6–7 distalmost fascicles broad, distalmost setule in each fascicle being longest, longer than marginal denticles. Postabdominal claw curved, 1.5 times longer than preanal portion of postabdomen, basal spine long, straight, about 0.4 length of claw.

Antennula with nine terminal aesthetascs and antennular seta arising near the top of antennule. Antennal formula, setae 0-0-3/1-1-3, spines 1-0-1/0-0-1. Seta arising from basal segment of endopodite as long as endopodite itself. Spine on basal segment of exopodite longer than middle segment. Apical spines longer than apical segments.

Thoracic limb I with short accessory seta, IDL of limb I with two setae in shape of of massive, sharp curved hooks. Exopodite of limb III with six setae, seta 3 being longest. Exopodite IV with six setae. Exopodite V with four setae. Epipodites IV and V with projections longer than exopodite itself. Limb VI absent.

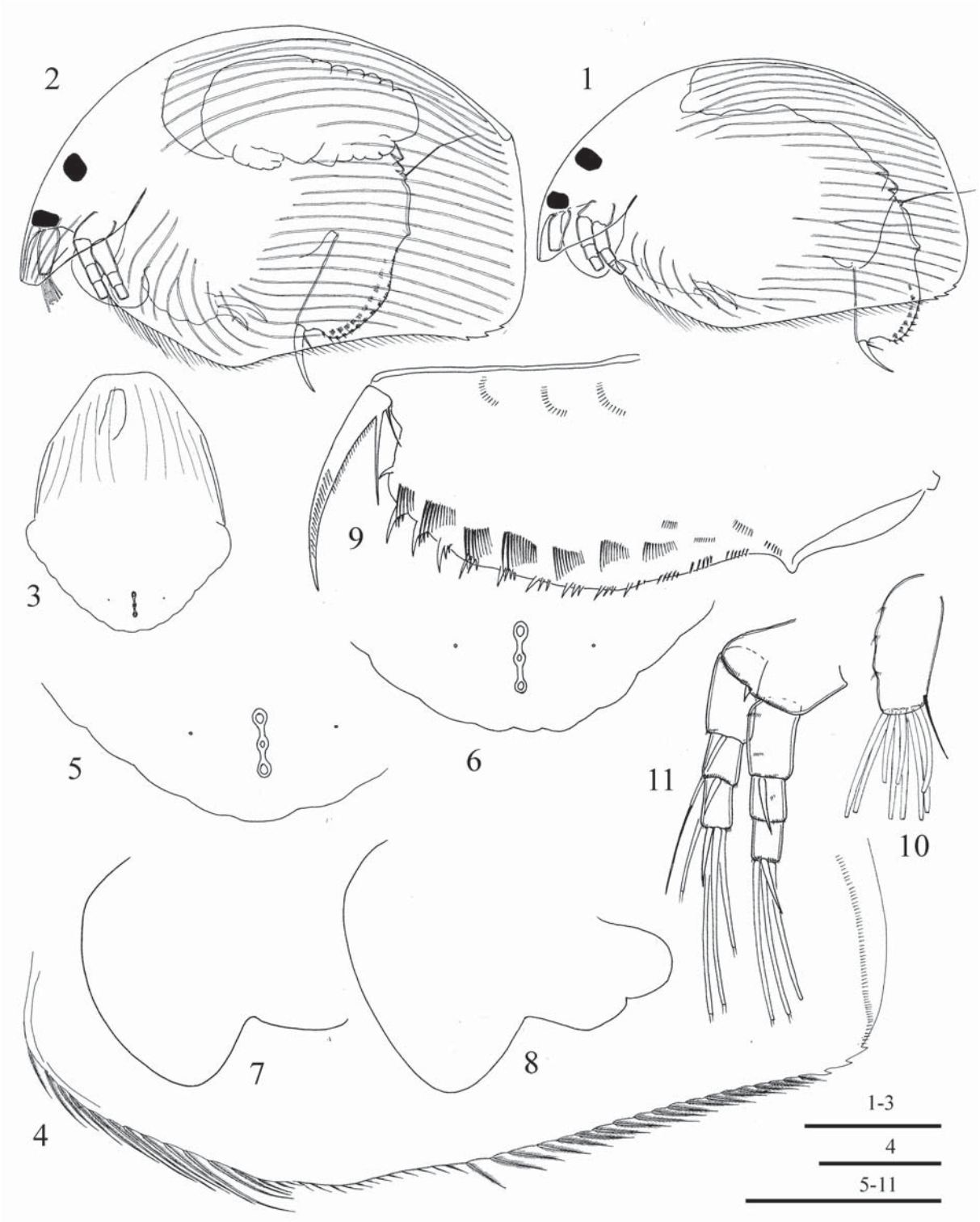
Male unknown.

DESCRIPTION. *Parthenogenetic female.* Body elongated (Figs 1–2, 12), of moderate height (body height/body length about 1.5–1.7), with maximum height before the middle, moderately compressed laterally (Fig.13). Dorsal margin evenly curved. Postero-dorsal angle weakly defined to rounded, posterior margin almost straight. Postero-ventral angles broadly rounded, provided with 2–3 large denticles protruding downwards, there are no setules present between the denticles (Fig. 3). A row of about 60 very short setules along posterior margin on inner side of carapace. Ventral margin with distinctive rounded angle at 1/3 length from the beginning, both anterior and posterior portions of margin almost straight. About 45 ventral setae, 10–12 anteriormost setae long, next 15 setae short, posteriormost 20 setae of intermediate length. Antero-ventral angle rounded. Valves with prominent sculpture in shape of longitudinal, non-anostomosing lines, in posterio-ventral portion of valves lines curved upward.

Head in lateral view appears broad, rostrum short, truncated, protruding forwards and downwards. Ocellus large, slightly smaller than eye. Distance from tip of rostrum to ocellus slightly larger than that between ocellus and eye. Head shield wide, with prominent longitudinal sculpture in anterior part (Figs 4, 14). Maximum width of head shield behind mandibular articulation. In dorsal view, rostrum short, truncated (Fig. 15). Posterior part of head shield broadly rounded, with wavy margin. Three major head pores with narrow connection between them (Figs 5–6, 16). Central pore smaller than two others, located in the middle. PP about 0.5–0.7 IP. Lateral head pores located at about 1 IP distance from midline, at the level between anterior and central major pores.

Labrum (Figs 5–8) of moderate size, labral keel oval, moderately wide (height about 1.5 width), with rounded apex, without any clusters of setules on the posterior margin.

Postabdomen (Figs 9, 17–18) short and wide, truncated, length about 2.5 height. Ventral margin almost straight. Basis of claws bordered from distal margin by clear incision. Distal margin straight, distal angle obtuse. Dorsal margin weakly convex in preanal part, straight in anal part, and



Figs 1–11. *Alona siamensis* sp.n. from rice field at Ban Bayao Baghe Subdistrict, Phannanikhom District, Sakhonnakhon Province, Thailand, 01.09.2004: 1 — juvenile female of instar II, 2–11 — parthenogenetic female: 2 — lateral view, 3 — ventral margin of valves, 4 — head shield, 5–6 — head pores, 7–8 — labrum, 9 — postabdomen, 10 — antennule, 11 — antenna. Scale bars: 0.1 mm for 1–3, 0.05 mm for 4, 5–11.

Рис. 1–11. *Alona siamensis* sp.n., рисовые чеки в Ban Bayao Baghe Subdistrict, Phannanikhom District, Sakhonnakhon Province, Таиланд, 01.09.2004: 1 — ювенильная самка второго возраста, 2–11 — партеногенетическая самка: 2 — вид сбоку, 3 — брюшной край створок, 4 — головной щит, 5–6 — головные поры, 7–8 — лябрум, 9 — постабдомен, 10 — антеннула, 11 — антенна. Масштаб: 1–3 — 0,1 мм; 4, 5–11 — 0,05 мм.

weakly convex to straight in postanal part. Distal part of dorsal margin 3 times longer than preanal one, with preanal portion 1.7–1.8 times longer than anal. Preanal angle as prominent protrusion with rounded apex, postanal angle not defined. Postanal margin of postabdomen provided distally with 3–4 long, single marginal denticles, with small denticles on proximal margin, and basally with about 5 clusters of 3–4 smaller denticles. Anal margin with 3–4 clusters of marginal setules. About 10 lateral fascicles of setules, 6–7 distalmost fascicles broad, distalmost setule in each fascicle being longest, longer than marginal denticles, basalmost fascicles short and narrow.

Postabdominal claw (Fig. 19) curved, 1.5 times longer than preanal portion of postabdomen. Basal spine long, straight and thin, about 0.4 length of claw itself, 1–2 long setules located near its base.

Antennule (Fig. 10) with length about 2.5 widths, with 3 transverse rows of short setules at anterior face. Antennular seta thin, of about 1/2 length of antennule, arising near the top of antennule. Nine terminal aesthetascs of different length, longest of them about 3/4 length of antennule itself.

Antenna relatively short (Figs 11, 15). Antennal formula, setae 0-0-3/1-1-3, spines 1-0-1/0-0-1. Branches short, with numerous clusters of setules, basal segments of both branches two times longer than middle and apical segments. Seta arising from basal segment of endopodite as long as endopodite. Seta arising from middle segment of endopodite of same size with apical setae. Apical setae of both branches not differentiated. Spine on basal segment of exopodite longer than middle segment. Apical spines longer than apical segments.

Thoracic limbs: five pairs.

Limb I (Figs 22–23). Epipodite oval, without finger-like projection. Accessory seta three times shorter than ODL seta. ODL seta clearly two-segmented, with small setules in distal half. IDL with only two setae, 1st IDL seta absent. Both IDL setae (Figs 21–22) in shape of massive, sharp curved hooks, distal part of seta short and thin, armed with thin setules. 3rd IDL seta especially large, longer than ODL seta, 2nd IDL seta two times smaller than 3rd. Endite 3 with four setae subequal in length. Endite 2 with three setae setulated in distal part, longest of them 1.5 times longer than ODL seta. Endite 1 with two 2-segmented setae and a long flat seta setulated in distal part pointed to the limb base. Six rows of long setules on ventral face of limb. Two ejector hooks, one two times larger than other.

Limb II subtriangular (Fig. 24). Exopodite (Fig. 25) elongated, with seta three times shorter than exopodite itself. Inner portion of limb ("endopodite") with eight scraping spines, scrapers 1–5 long, increasing progressively in length distally, scrapers 6–8 two times shorter than scraper 5, and armed with more robust denticles. Distal armature of gnathobase with four elements. Filter plate II with seven setae, the posteriormost member shorter than others.

Limb III (Fig. 26). Epipodite oval, without projection. Exopodite with six setae, seta 3 being longest, setae 4–6 of about 1/4 length of seta 3, setae 1–2 short. Setae 1–4 flat, plumose, seta 5 with long denticles in distal part, seta 6 thin, with thin setules at the middle. Distal endite (Figs 20, 27) with 3 setae and a small sensillum. Two distalmost setae almost straight, sharp, with strong denticles in distal part; basalmost seta shorter, geniculated, with long thin setules. Basal endite with 4 stiff, feathered in distal part setae, increasing in size in basal direction. Gnathobase not clearly separated from basal endite. Four soft setae increasing in size basally, an elongated sensillum near the distalmost soft seta. Distal armature of gnathobase with 4 elements. The first one an elongated, narrowing distally sensillum, the second geniculated seta, third and fourth two short spines. Filter plate III with seven setae.

Limb IV. Epipodite (Fig. 28) oval, with finger-like projection 1.5 times longer than epipodite itself. Exopodite rounded, with 6 setae, seta 3 being longest, setae 1–2 of about 1/3 length of seta 3, setae 5–6 of about 1/2 length of seta 3, seta 4 very short. Setae 1–4 flat, plumose, setae 5–6 thin, with weak setulation at the middle. Inner portion of limb IV with four setae (Fig. 29). Scraping seta without distinctive denticles, first flaming-torch seta broad, with 7–9 long setules, two other flaming-torch setae slender, with thinner, shorter setules. Sensillum narrowing distally. Three soft setae increasing in size basally. Gnathobase with a long 2-segmented seta and a small hillock distally. Filter plate with five setae.

Limb V (Fig. 30). Epipodite oval, with finger-like projection1.5 times longer than epipodite itself. Exopodite not separated into two lobes, with four plumose setae, setae 1–3 subequal in length, seta 4 three times shorter. Inner limb portion as wide oval lobe, with long setules on the inner margin. At inner face, two setulated distally setae, the distal one 1.5 times longer than proximal. Filter plate absent.

Ephippial female and male unknown.

Size in studied material, length of adult female was 0.35–0.42 mm, height — 0.24–0.27 mm. Length of juvenile females of instar II — 0.29–0.32 mm, height 0.19–0.21 mm.

DIFFERENTIAL DIAGNOSIS. *A. siamensis* differs from the most species of *Alona* in the characteristic shape of postabdomen, a long, straight basal spine of the postabdominal claw, truncated rostrum, characteristic posteroventral denticles, and in IDL armed with only two massive, hook-like setae. In general appearance it is similar to *A. dentifera*, but differs from it in the presence of major head pores (*A. dentifera* lacks them), prominent sculpture of valves, truncated rostrum and in hook-like IDL setae.

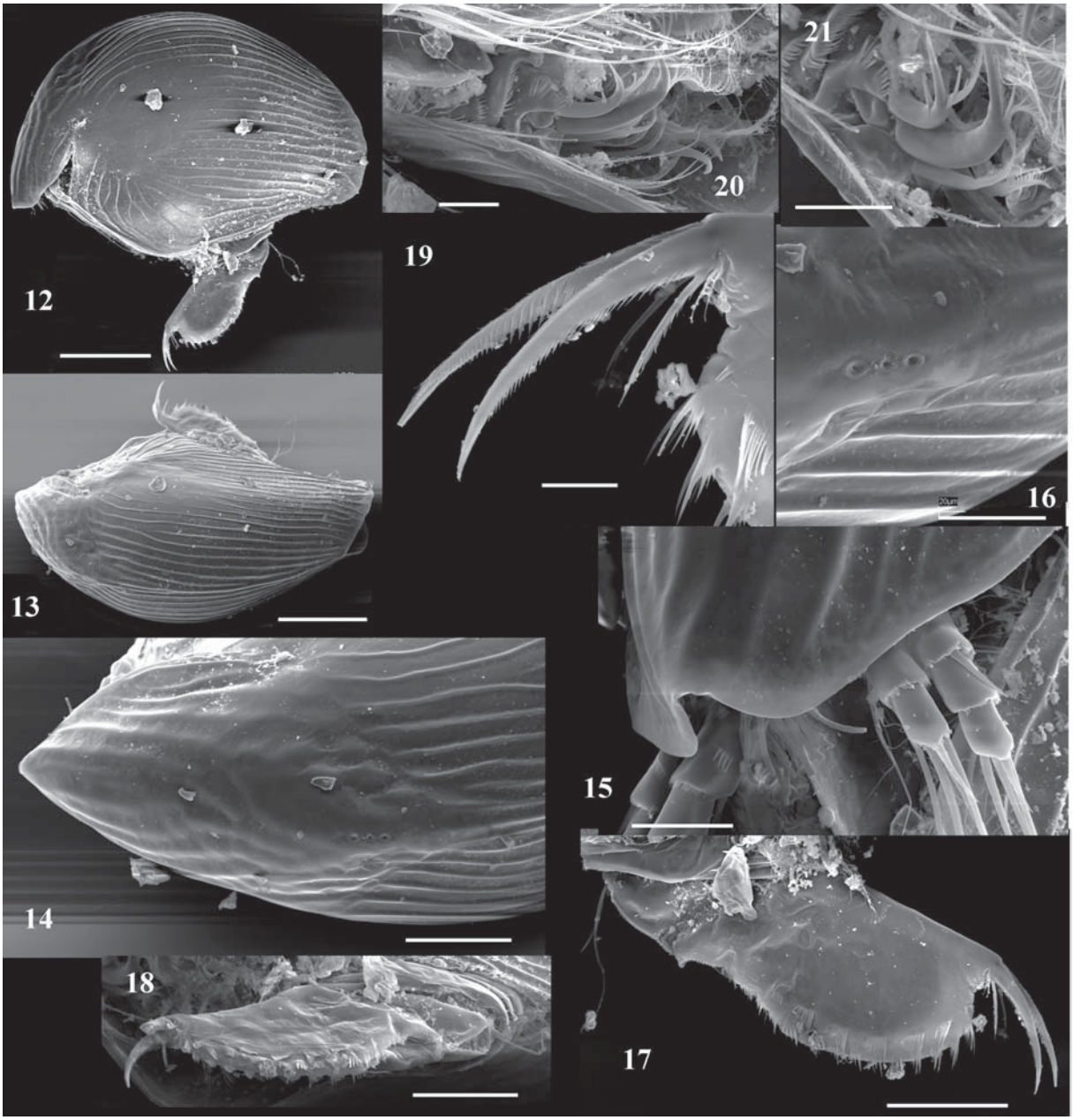
ETYMOLOGY. This species is named after Siam, the previous name of Thailand, and also reflect its distribution in areas around the Gulf of Siam.

DISTRIBUTION. At present, *A. siamensis* is known only from Malaysia and Thailand, being a rare species in both countries but wider distribution is expected. In Malaysia it was recorded only once, in Mayfield Estate, Seberang Prai, Penang. In South Thailand, it was found only once at Lum, Surat Thani Province [Maiphae et al., 2005]. In Northeast Thailand, in addition to our localities, the species was found in the floodplain of river Mun and in the Songkhram river basin [Sanoamuang, Faitakum, 2005; Nachai, 2006]. It is recorded in shallow, vegetated water bodies, like swamps and rice fields.

Discussion

Alona siamensis shares numerous affinities with *A. dentifera* [see Sinev et al., 2004] which suggests close relationship between these two species despite the gross differences in the morphology of the head shield and pores. The common features between the species are too numerous to be coincidental, and some of them are rare for the genus. They include:

Large denticles on postero-ventral angle of valves with no setules between them. Majority of *Alona* species lacks them. In other species with denticulated valves, like *A. monacantha* Sars, 1901, *A. protzi* Hartwig, 1900 and *A. affinis* (Leydig, 1860) var. *den-*



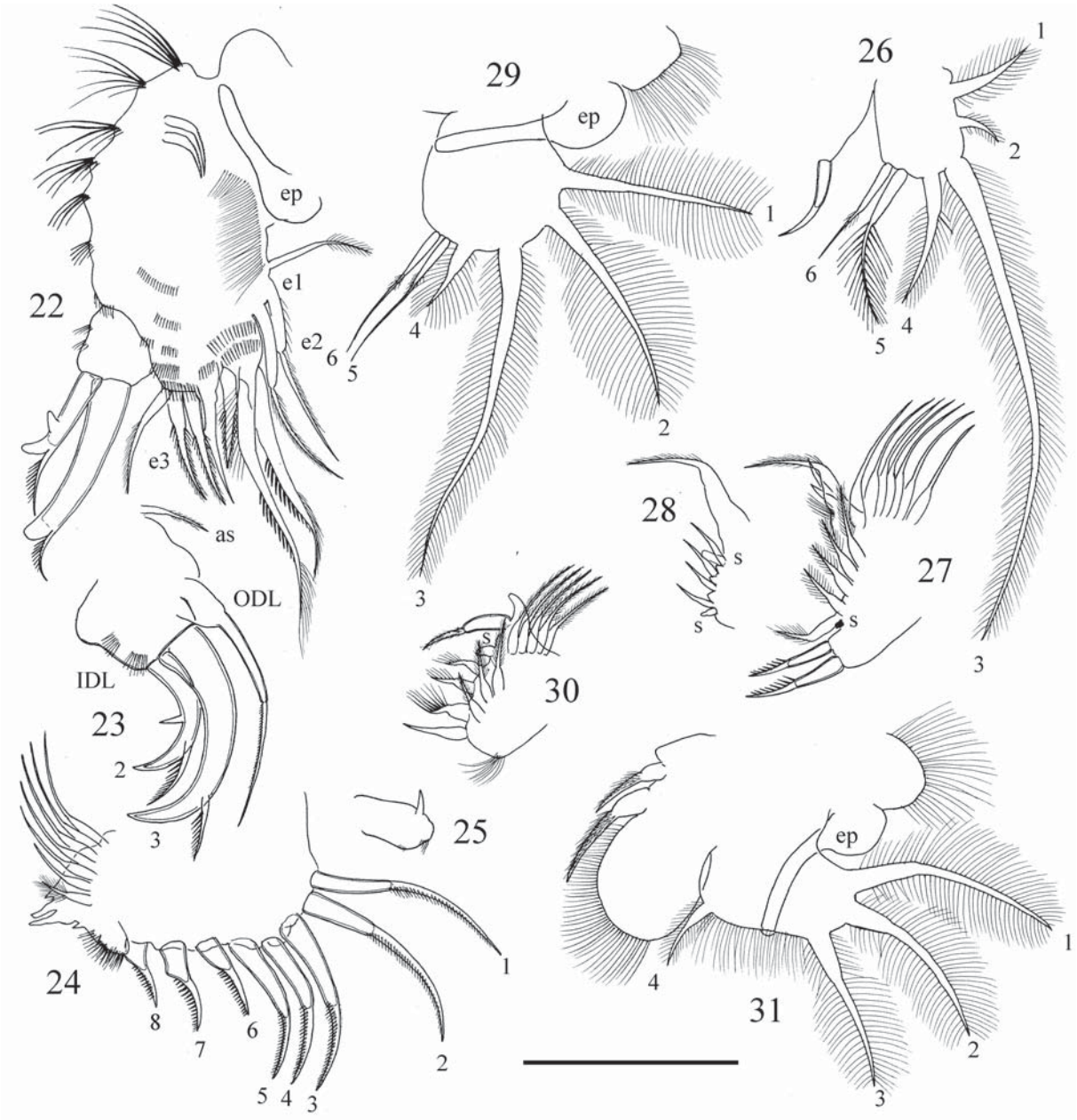
Figs 12–21. *Alona siamensis* sp.n. from rice field at Ban Bayao Baghe Subdistrict, Phannanikhom District, Sakhonnakhon Province, Thailand, 01.09.2004, parthenogenetic female: 12 — lateral view, 13 — dorsal view, 14 — head shield, 15 — rostrum, 16 — head pores, 17–18 — postabdomen, 19 — postabdominal claws, 20 — labrum plate and thorchic limbs, 21 — inner distal lobe of limb I. Scale bars: 0.1 mm for 1–3; 0.05 mm for 4, 5–11; 0,02 mm for 15, 16, 19–21.

Рис. 12–21. *Alona siamensis* sp.n., рисовые чеки в Ban Bayao Baghe Subdistrict, Phannanikhom District, Sakhonnakhon Province, Таиланд, 01.09.2004, партеногенетическая самка: 12 — вид сбоку, 13 — вид со спинной стороны, 14 — головной щит, 15 — рострум, 16 — головные поры, 17–18 — постабдомен, 19 — когти постабдомена, 20 — пластинка губы и грудные ноги, 21 — внутренняя дистальная доля ноги I. Масштаб: 1–3 — 0,1 мм; 4, 5–11 — 0,05 мм; 15, 16, 19–21 — 0,02 мм.

tata denticles are smaller, widely spaced, triangular, and there are setules present between them. *A. broaensis* Matsumura-Tundisi & Smirnov, 1984 has single denticle similar in shape to that of *A. dentifera* and *A. siamensis*.

Characteristic shape of postebdomen, with protruding preanal angle. This shape of postabdomen is very rare in the species assigned to the genus *Alona*, being present only in two other species — *A. poppei* Richard, 1987 and *A. broaensis*, both of them are not fully described.

Postabdominal claw with long, straight and thin basal spine. Such claw is rare within the genus, it is present in *A. macronyx* Daday, 1898, *A. poppei,* and *A. broaensis,* most species of the genus have shorter, curved basal spine.



Figs 22–30. *Alona siamensis* sp.n. from rice field at Ban Bayao Baghe Subdistrict, Phannanikhom District, Sakhonnakhon Province, Thailand, 01.09.2004, thorachic limbs of parthenogenetic female: 22 — limb I, 23 — IDL and ODL of limb I, 24 — limb II, 25 — exopodite of limb II, 26 — exopodite of limb III, 27 — inner portion of limb III, 28 — exopodite of limb IV, 29 — inner portion of limb IV, 30 — limb V. Scale bar 0.05 mm.

Рис. 22–30. *Alona siamensis* sp.n., рисовые чеки в Ban Bayao Baghe Subdistrict, Phannanikhom District, Sakhonnakhon Province, Таиланд, 01.09.2004, грудные ноги партеногенетической самки: 22 — нога I, 23 — внешняя и внутренняя дистальные доли ноги I, 24 — нога II, 25 — экзоподит ноги II, 26 — экзоподит ноги III, 27 — внутренняя часть ноги III, 28 — экзоподит ноги IV, 29 — внутренняя часть ноги IV, 30 — нога V. Масштаб 0,05 мм.

The armament of postabdomen is also very similar in *A. dentifera* and *A. siamensis.* The diversity of the both denticles and lateral fascicles in the genus is great, and similarities are usually observed within the groups of related species. Both species have wide lateral fascicles of long setules, and moderately developed marginal denticles.

The shape and armament of exopodites III–V are almost same in these species. Exopodite III of *A. siamensis* differs from that of *A. dentifera* only in much shorter seta 4, exopodite IV — in the seta 5 and 6 being of equal length. Both species also have long processes on exopodites IV and V.

Also, these species have numerous other common features — two IDL setae, presence of quite long flat seta pointed to the limb base on endite 1 of limb I, six setae on exopodite III, absence of limb VI, similar

proportions of antennal segments, similar shape of labrim, and so on. Similarities in such features are always observed within the species-group of the genus. Most differences between of *A. siamensis* and *A. dentifera* are also of same rank as these observed between species of same group. Differences in general shape, sculpture of valves, length of antennal spines, and proportions of some limb setae are among the common differences between related species.

Morphology of IDL setae is quite different within these species. Strong variations in morphology of these setules can be observed in groups of closely related species. In *verrucosa*-group, *A. verrucosa* has hook-like IDL seta similar to these of *A. siamensis*, and closely related *A. pectinata* and *A. brandorrfi* have thinner, straight setae with long thin denticles [see Sinev, Hollwedel, 2002; Elias-Gutierrez, Suarez-Morales, 1999].

The main difference between species lies in the morphology of head pores. *A. siamensis* has three connected major head pores and dot-like lateral pores, as the majority of *Alona*. *A. dentifera* has two connected major head pores present in only in the juvenile instar I, and lack then in the juvenile instar II and adults. Lateral head pores were not found in this species [see Sinev et al., 2004]. This is the second cause of strong differences in head pores morphology between closely related species, the first one recorded by Sinev [1999] for species of the *costata*-group.

The differences in the head shield morphology are also prominent. *A. siamensis* has a peculiar head shield with truncated rostrum, *A. dentifera* — head shield with rounded anterior portion and no rostrum as such. At first glance, these shapes are completely different from each other, but, amazingly, the same situation is observed within the genus *Euryalona* [see Rajapaksa & Fernando, 1987]. *Euryalona orientalis* (Daday, 1898) have head shield with truncated rostrum [Rajapaksa, Fernando, 1987, Figs 2–3], similar to that of *A. siamensis*, but developed to a lesser degree, and *E. fasciculata* Daday, 1905 have shield similar to that of *A. dentifera* — with broadly rounded anterior margin and no separated rostrum [Rajapaksa, Fernando, 1987, Fig. 50]. Both types are quite different from the common type of *Alona* head shield, with a short broadly rounded rostrum. Only one species of the genus, *A. macronyx*, have a head shield similar to that of *A. siamensis*, even with similar sculpture in the anterior part, but with much longer rostrum [see Rajapaksa & Fernando, 1985]. Differences in rostrum morphology are observed within several other genera of Aloninae — *Leydigiopsis*, *Bryospilus*, and *Camptocercus,* the shape of rostrum is an important diagnostic feature in these genera [see Frey, 1980, Smirnov, 1998; Sinev, 2004].

The position of *A. dentifera* and *A. siamensis* within the genus is uncertain. Sinev et al. [2004] stated that the placement of *A. dentifera* within the genus *Alona* should be accepted only as a temporary measure, the one of the reasons of such placement was to avoid the creation of one more monotype genus within the subfamily. On the other hand, *A. siamensis*, in spite of its numerous peculiarities, fits well within the present concept of *Alona* s. lat. The revealed relationship between *A. dentifera* and *A. siamensis* somewhat strengthen the position of the former within the genus. Now it is possible to outline the *dentifera*-group of species of *Alona*. Obviously, this group is not a "core" group of the genus, and will be removed from the genus in future, but in present state of *Alona* systematics its position within the genus is quite acceptable.

A. dentifera and *A. siamensis* have some affinities with two other species of the genus, but they are neither numerous no especially striking. *Alona macronyx,* other "marginal" species of the genus, has the head shield similar to that of *A. siamensis,* body shape close to that of *A. dentifera*, long straight basal spine, and thoracic limb morphology similar to the *dentifera*-group — including two IDL seta, six setae on exopodite III, lack of limb VI. Shapes of exopodites III–V are also similar to these of *dentifera*-group [see Rajapaksa & Fernando, 1985]. On the other hand, there are strong differences between them in body length, shape and armament of postabdomen, morphology of antennula and antenna, head pores and postero-ventral angle of valves. *Alona poppei* has long straight basal spine, two IDL setae similar to these of *A. dentifera*, and short postabdomen with prominent preanal angle [see Rey & Vasques, 1986]. The detailed morphology of this species remains unknown. In both cases, these affinities are not strong enough to confirm the close relationship between these species and *dentifera*-group.

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References

Elias-Gutierrez M., Suarez-Morales E. 1999. *Alona pectinata* (Crustacea: Anomopoda: Chydoridae), a new freshwater cladoceran from Southeast Mexico // Rev. Biol. Trop. Vol.47. Suppl.1. P.105–111.

Frey D.G. 1980. The non-swimming chydorid Cladocera of wet forests, with descriptions of a new genus and two new species. // Int. Revue ges. Hydrobiol. Vol.65. No.5. P.613–641.

Idris B.A.G. 1983. Freshwater zooplankton of Malaysia (Crustacea: Cladocera). Perenbit University, Pertanian, Malaysia. 153 pp.

Idris B.A.G., Fernando C.H. 1981. Cladocera of Malaysia and Singapore with new records, redescriptions and remarks on some species // Hydrobiologia. Vol.77. P.233–256.

Kotov A.A., Štifter P., Sanoamuang L. 2005. Notes on the genus *Ilyocryptus* Sars, 1862 (Cladocera: Anomopoda: Ilyocryptidae). 8. *Ilyocryptus isanensis* sp.n. from North-East Thailand // Arthropoda Selecta. Vol.14. No.3. P.229–239.

Kotov A.A., Maiphae S., Sanoamuang L. 2005. Revision of *Macrothrix paulensis*-like species (Anomopoda, Cladocera, Branchiopoda) in Asia, and phylogeny of the *paulensis*-

group // Arch. Hydrobiol., Monogr. Stud. Vol.151. No.3. P.269–299.

Korovchinsky N.M., Sanoamuang L. 2008. Overview of Sididae (Crustacea: Cladocera: Ctenopoda)of Northeast and East Thailand, with description of a new species of the genus *Diaphanosoma* // Zootaxa. Vol.1862. P.45–61.

Maiphae S., Pholpunthin P., Sanoamuang L., Dumont H.J. 2004. Taxonomic problems of the Anomopoda: a study based on specimens from Southern Thailand, with specific references to *Alona* Baird, 1843 // Journal of Scientific Research, Chulalongkorn University. Section T.3. P.45–55.

Maiphae S., Pholpunthin P., Dumont H.J. 2005. Species richness of the Cladocera (Branchiopoda: Anomopoda and Ctenopoda) in southern Thailand, and its complementarity with neighboring regions // Hydrobiologia. Vol.537. P.147–156.

Nachai S. 2006. Species diversity and distribution of Cladocera in Songkhram River Basin, Thailand. Master of Science Thesis, Department of Biology, Faculty of Science, Khon Kaen University. 87 pp.

Rajapaksa R., Fernando C.H. 1985. Reallocation of *Indialona macronyx* (Daday, 1898) (Cladocera, Chydoridae) to the genus *Alona* // Can. J. Zool. Vol.63. No.4. P.970–976.

Rajapaksa R., Fernando C.H. 1987. A redescription of *Euryalona orientalis* (Daday, 1898), with a consideration of the other species in the genus *Euryalona* (Cladocera: Chydoridae) // Hydrobiologia. Vol.150. P.75–90.

Rey J., Vasquez E. 1986 Cladocères de quelques corps d'eaux du bassin moyen de l'Orénoque (Venezuela) // Annls. Limnol. Vol.22. No.2. P.137–168.

Sanoamuang L. 1998. Contributions to the knowledge of the Cladocera of north-east Thailand // Hydrobiologia. Vol.362. P.45–53.

Sanoamuang L., Faitakum S. 2005. Species diversity of cladocerans and copepods in the floodplain of the River Mun, northeast Thailand // Khon Kaen University Research Journal. Vol.10. No.2. P.106–113. [in Thai with English abstract].

Sinev A.Yu. 1999. *Alona costata* Sars, 1862 versus related palaeotropical species: the first example of close relations between species with a different number of main head pores among Chydoridae (Crustacea: Anomopoda) // Arthropoda Selecta. Vol.8. No.3. P.131–148.

Sinev A.Yu. 2004. Redescription of two species of the genus *Leydigiopsis* Sars, 1901 (Branchiopoda, Anomopoda, Chydoridae) // Invertebrate Zoology. Vol.1 No.1. P.75–92.

Sinev A.Yu., Kotov A.A., Van Damme K. 2004. Morphology of a Neotropical cladoceran *Alona dentifera* (Sars, 1901), and its position within the family Chydoridae Stebbing, 1902 (Branchiopoda: Anomopoda) // Arthropoda Selecta. Vol.13. No.3. P.99–107.

Sinev A.Yu., Hollwedel W. 2002. *Alona brandorffi* sp. n. (Crustacea: Anomopoda: Chydoridae) — a new species from Brazil, related to *A. verrucosa* Sars, 1901 // Hydrobiologia. Vol.472. P.131–140.

Sinev A.Yu., Nachai S., Sanoamuang L. 2007. Occurence of the Australian cladoceran *Armatalona macrocopa* (Sars, 1894) (Cladocera: Anomopoda: Chydoridae) in Thailand // Invertebrate Zoology. Vol.4. No.1. P.25–29.

Smirnov N.N., 1998. A revision of the genus *Camptocercus* (Anomopoda, Chydoridae, Aloninae) // Hydrobiologia. Vol.386. P.63–83.