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Revision of *Pagastia* Oliver, 1959 (Diptera, Chironomidae) of the Holarctic region

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Some results of revision and key of the Holarctic *Pagastia* are presented. A new larva of *Pagastia* sp. 1 from Middle Asia is described.

Key words: Chironomidae, Diamesinae, *Pagastia,* taxonomy, distribution

Introduction

The genus *Pagastia* was described by Oliver (1959) from North America and during long time included only four Nearctic species: *P. orthogonia* Oliver, *P. partica* (Roback.), *P. sequax* (Garrett) and *Pagastia* sp. A. (Oliver 1959, 1983, 1986, 1989, Oliver and Roussel 1982). Later, Makarchenko (1981, 1985, 1989, 1994) revised some *Syndiamesa* K. and *Pseudodiamesa* Goetgh. from the East Palaearctic and placed the species *S. orientalis* Tshernovskij., *S. angarensis* Linevich and *S. lanceolata* Tokunaga into *Pagastia.* At the same time Kerkis (1992), Kerkis et al. (1994) investigated karyotypes of *P. orientalis* and *P. lanceolata* and helped to separate by chromosomal features of larvae these species and the new species *P. altaica* (Makarchenko et al. 1997).
Thus, up to the May 1997 we had information about distribution in Holarctic region of four Palaearctic and four Nearctic species of *Pagastia.*
During 1996 and the first part of 1997 Makarchenko revised additional *Pagastia* material from Japan and North America which was sent him by H. Niitsuma, D. R.Oliver and D. C.Hansen, and believed that earlier determination *of P. lanceolata* (Makarchenko 1994, 1996, Kerkis 1992, Kerkis et al. 1994) was mistaken and this species must be identified as *P. nivis* (Tokunaga, 1936). It had happened because the holotype of *P. lanceolata* was lost and *P. nivis* was described by female (Tokunaga 1936). For the male of *P. nivis* a very short description was published (Tokunaga 1964), but it was impossible to find of a paratype.
Also after study of the North American *Pagastia* specimens it became possible to compare the close related species of *P. orthogonia, Pagastia* sp. A, *P. lanceolata* and to decide the problem with synonyms of *P. orthogonia* and *Pagastia* sp. A.
Below we present some results of the revision of Holarctic *Pagastia* with description of a new larva *Pagastia* sp. 1 from Middle Asia. The complete revision will be publish in separate paper.

Pagastia Oliver

Pagastia Oliver, 1959: 49 (Type species *Pagastia orthogonia* Oliver 1959); 1983: 119; 1986: 123; 1989: 136; Oliver and Roussell 1982: 849; Makarchenko 1985: 45; 1994: 824.
Hesperodiamesa Sublette, 1967: 305. *Syndiamesa* authors, nec Kieffer, 1918: 101.

Remarks

Eight species of *Pagastia* are known from the Holarctic region and only two species are recorded for the Oriental region by larvae (Roback and Coffman 1987). The genus *Pagastia* is close to *Pseudodiamesa* Goetgh. and in some earlier papers Makarchenko (1989) believed that it is subgenus of *Pseudodiamesa.* But after karyological investigations of Kerkis (1992) and Kerkis et al. (1994) we have changed our point of view about the status of *Pagastia* and we are now inclined to think that *Pagastia* must be considered as a separate genus.

Key for known species *of Pagastia* Oliver of Holarctic region

Males

1. Eyes hairy. Aedeagal lobes reduced; basal lobe of gonocoxite is very small ....*Pagastia (Hesperodiamesa) sequax* (Garrett, 1925) (Nearctic)
- Eyes pubescent. One or two aedeagal lobes present.....2
2. Median and lateral aedeagal lobes present. AR 2.5-4.2 3
- Lateral aedeagal lobe presents only. AR 1.7-2.1 6
3. Median aedeagal lobe digitated and widest in distal part 4
- Median aedeagal lobe widest in middle and sharp-clawed in apical ....*P. (Pagastia) partica* (Roback, 1957) (Nearctic)
4. Gonostylus subapical with "heel".....*P. (P.) nivis* (Tokunaga, 1936) = *P. lanceolata* (Tokunaga); (Makarchenko 1994) (Palaearctic)
- Gonostylus subapical without "heel" 5
5. Gonostylus subapical angled..... *P. (P.) orientalis* (Tshernovskij, 1949) (Palaearctic)
- Gonostylus subapical rounded..... .....*P. (P.) altaica* Makarchenko, Kerkis, Ivanchenko, 1997 (Palaearctic)
6. Anal point widest in basal part and thin in apical, pointed and often with peg ....*P. (P.) lanceolata* (Tokunaga, 1936) (Palaearctic) = *P. angarensis* (Linevich, 1953); Makarchenko 1994
- Anal point finger-shaped, in apical rounded and without peg..... ..... *P.(P.) orthogonia* Oliver, 1959 (Nearctic)

Pupae

1. Median seta of anal lobe branched..... *P. (P.) nivis* (Tokunaga, 1936)
P. (P.) orientalis (Tshernovskij, 1949)
P. (P.) partica (Roback, 1959)
- Median seta of anal lobe simple..... *P. (P.) lanceolata* (Tokunaga, 1936)
P. (P.) orthogonia Oliver, 1959

Larvae of 4th instar

1. Head capsule with dark markings 2
- Head capsule without dark markings 3
2. Middle tooth of mentum with several apexes..... *Pagastia (P.)* sp. 1 (Palaearctic)
- Middle tooth of mentum simple.....*P. (P.) nivis* (Tokunaga, 1936)
P. (P.) partica (Roback, 1957)
3. AR > 1.6 4
- AR< 1.2 ..... *P. (P.) lanceolata* (Tokunaga, 1936)
P. (P.) orthogonia Oliver, 1959
4. Apical tooth of mandible shorter than combined width of inner teeth..... .....*P. (P.) orientalis* (Tsnernovskij, 1949)
P. (P.) altaica Makarchenko, Kerkis, lvancnenko, 1997
- Apical tooth of mandible longer than combined width of inner teeth..... .....*P. (H.) sequax* (Garrett, 1925)

***Pagastia (H.) sequax* (Garrett)**
Prodiamesa sequax Garrett, 1925: 7.
Hesperodiqmesa sequax (Garrett); Sublette 1967: 305.
Pagastia sequax (Garrett); Serra-Tosio 1971: 136; Oliver and Roussel 1982: 853.

Remarks. Very rare species. Two males, two pupae and larvae exsuviae are known only.
Distribution. Canada (British Columbia, Alberta) (Sublette, 1967; Oliver, Roussel, 1982).

***Pagastia (P.) altaica* Makarchenko, Kerkis et Ivanchenko**
Pagastia altaica Makarchenko, Kerkis, Ivanchenko, 1997: 3-6.

Remarks. Pupae and larvae cannot be distinguished from *P. orientalis* by morphological features. Larvae can be identified by chromosome features only (Makarchenko et al. 1997).
Distribution. *P. altaica* is known from type locality only: Katun River, Altai Mountains.

***Pagastia (P.) lanceolata* (Tokunaga)**
Syndiamesa lanceolata Tokunaga, 1936: 530; Tokunaga 1937: 47; Goetghebuer 1939: 25; Sasa 1989: 65,140.
Syndiamesa angarensis Linevich, 1953: 162, syn. n.
Potthastia angarensis Linevich, 1984: 127, syn. n.
Pagastia lanceolata (Tokunaga); Hashimoto 1985: 347, fig.10.
Pseudodiamesa (Pagastia) oliveri Makarchenko, 1989: 270, syn. n.
Pagastia angarensis (Linevich); Makarchenko 1994: 832, syn. n.

Remarks. Very close to *P. orthogonia* from the Nearctic. Pupae and larvae of these species cannot be separated.
Distribution. Far East: Japan, Honshu; Russia, Sakhalin, Kunashir, Primorye. East Siberia, rivers of Baikal Lake basin.

***Pagastia (P.) nivis* (Tokunaga)**
Syndiamesa nivis Tokunaga, 1936: 535; Tokunaga 1964b: 21.
Pagastia nivis (Tokunaga); Hashimoto 1985: 347, fig.10.
Pseudodiamesa (Pagastia) orientalis insularis Makarchenko, 1989: 268-269, syn. n.
Pagastia lanceolata (Tokunaga); Makarchenko 1994: 825-830, syn. n.

Remarks. Adult male, pupa and larva are very close to *P.orientalis* from continental part of the Far East and *P. partica* from North America. Male of *P. nivis* can be distinguished from other species only by having the "heel" in apical part of gonostylus. Pupae of these species cannot be separated from other ones yet. The larvae can be distinguished from others only by presence of dark markings on the head capsule and by chromosomes (Kerkis 1992, Kerkis et al. 1994).
Distribution. Far East, Honshu, Hokkaido (Japan), Sakhalin (south part), Kunashir, Iturup and Urup Islands (Russia).

***Pagastia (P.) orientalis* (Tshernovskij)**
Syndiamesa orientalis Tshernovskij, 1949: 99; Linevich 1959: 21, Pankratova 1970: 72, Makarchenko, 1977: 118.
Pagastia orientalis (Tshernovskij) Makarchenko 1981: 93; 1985: 46.
Pagastia orientalis orientalis Makarchenko, 1989: 268.
Distribution. Wide distribution East Palaearctic species. Known from Altai Mountains to continental part of Far East, China (Liaoning, Jilin, Heilonging), South Korea. We have some

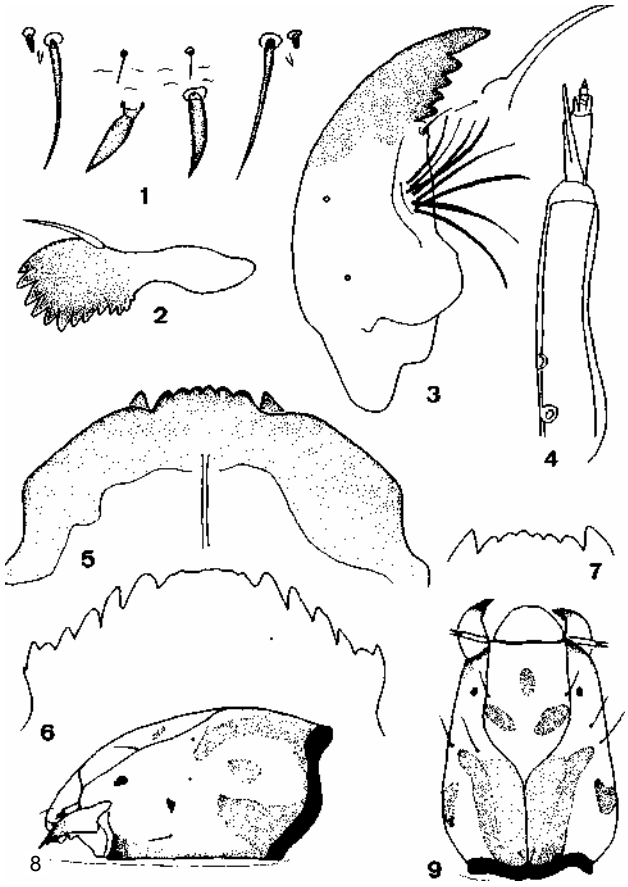
larvae from Alaska which can be determined as *P. orientalis.* Unfortunately, males or larvae for karyological study are absent.

***Pagastia (P.) orthogonia* Oliver**
Pagastia orthogonia Oliver, 1959: 51.
Pagastia sp. A Oliver and Roussel, 1982: 854, syn. n.

Remarks. Very close to the Palaearctic species *P. lanceolata.* Males can be distinguished only by features given in the key.
Distribution. USA (Alaska, Michigan, North Dakota).

***Pagastia partica* (Roback)**
Syndiamesa partica Roback, 1957: 4.
Pagastia partica (Roback) Oliver, 1959: 52; Oliver and Roussel 1982: 853.

Remarks. Pupae and larvae now cannot be distinguished from *P. nivis.*
Distribution. Canada (Yukon Territory), USA (Alaska, Utah, Wyoming, North Dakota, Washington).



Figs. 1-9. Larva *of Pagastia* sp. 1. 1. Labral setae SI-IV. 2. Premandible. 3. Mandible. 4. Antenna. 5-6. Mentum. 7. Median part of mentum. 8. Head, dorsal view. 9. Head, lateral view

***Pagastia* (*P.*) sp. 1**

Material: 18 larvae, Middle Asia, Kirgizstan, Turgen River, 20.08.1984 (N. Petrova leg.). Larva of 4th instar. Body length 11.0-12.4 mm (n=2). Head capsule with dorsal and dorsolateral dark markings (Fig. 8-9). Head head width 0.70-0.80 mm (n=2); head length/head width 1.2. Eye spot consists of 2 parts. SI tapering, similar to leaf-shaped (Fig. 1). Premandible with 12-13 teeth; lateral spine length 52-57n,m (Fig. 2). Antenna length/mandible length 0.5 (n=2); two ring organs (diameter 6.0 n,m) on basal 1/3 of first segment; blade extending to level of end of fourth segment (Fig. 4); AR=2.5-2.7 (n=8). Mandible with apical tooth which is shorter than combined width of inner teeth; seta interna with 8-10 simple branches; seta subdentalis long and sabreform (Fig. 3). Mentum with 6-7 pairs of lateral teeth, middle tooth with several apexes (Fig. 5-7). Procercus with 8 anal setae. Adults and pupa are unknown.

Distribution. Middle Asia.

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