J. Insect Biodiversity 42 (2): 031–034
https://www.mapress.com/jib

Correspondence

ISSN 2538-1318 (print edition)
J. Insect Biodiversity
ISSN 2147-7612 (online edition)

https://doi.org/10.12976/jib/2023.42.2.1
http://zoobank.org/urn:lsid:zoobank.org:pub:802B9F3E-2125-4844-8CC0-1533080633F0

New data on *Urostylis lateralis* Walker, 1867 (Heteroptera, Urostylididae) from the south of the Russian Far East

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Nymphal *Urostylis lateralis* Walker, 1867 were reared in cages from eggs that had overwintered in forest under oak rhytidome in the south of Primorsky Krai, Russia. Instar I–II nymphs hatch before the onset of oak's growing season and develop under rhytidome, feeding on the jelly-like coating of egg clutch and molting. As oak leaves unfold, instars III leave their shelters and begin feeding on leaf sap. Adults live in the oak crown. The sequence of molts of all nymphal instars, their feeding, and the timing of seasonal development of the species in nature are documented.

Key words: true bugs, Heteroptera, Urostylididae, *Urostylis lateralis*, ootheca, overwintering, nymphs, seasonal development, phenology, Primorsky Krai, *Quercus mongolica.*

More than 80 species of Urostylidae are known from the Palearctic (Rider, 2006). They are distributed over the Eastern Hemisphere from the Indomalayan (Oriental) region to the southeastern boundaries of the Palearctic. In East Asia, these species have been recorded from most of the territory of China, the Korean Peninsula, and Japan.

Seven species of the family Urostylididae, belonging to two genera, are known from the south of the Russian Far East. The genus *Urochela* Dallas, 1850 comprises two species: *U.* (*Chlorochela*) *flavoannulata* (Stål, 1854) and *U.* (*U.*) *quadrinotata* (Reuter, 1881). The genus *Urostylis* Westwood, 1837 comprises five species: *U. annulicornis* Scott, 1874, *U. lateralis* Walker, 1867, *U. linguiformis* Ren, 1984, *U. striicornis* Scott, 1874, and *U. trullata* Kerzhner, 1966 (Kanyukova 1988, 2010).

In the Russian Far East, representatives of this genus were collected from oak trees and sometimes from other plants. Field surveys in Primorsky Krai identified two species on the oak *Quercus mongolica* Fisch. ex Ledeb.: *U. annulicornis* and *U. trullata*. Another two species were reported to live on the oaks *Q. mongolica* and *Q. dentana* Thunb.: *U. lateralis* and *U. striicornis*. In the south of the region, only *U. linguiformis* was found on *Q. dentana* (Kerzhner 1966, 1988; Kanyukova 1988).

The biology of urostylidids was studied in a laboratory on Shikoku Island (Kobayashi 1953, 1965). The author described the shape of ootheca (mass of laid egg), egg, and provided diagnoses for five nymphal instars in two species of the genus *Urostylis*: *U. striicornis* (Kobayashi, 1953) and *U. westwoodi* (Kobayashi, 1965). The life cycle in the *Urostylis* species is monovoltine. We studied the duration of ontogeny in *U. annulicornis* from the south of Primorsky Krai. In spring, we reared nymphs and adults from a clutch of eggs, which had been laid by a female in autumn and overwintered under the oak rhytidome, in cages installed in natural conditions. Here, we provide a comparison and differences between the dates of spring hatching of *Urostylis* nymphs in Russia and Japan (Kanyukova *et al*. 2023).

New studies on *U. lateralis* were conducted in forest biotopes in the south of Primorsky Krai (Far East of Russia) from April to October 2022–2023. Mongolian oak trees were examined to assess their occupancy by bugs of the family Urostilididae, egg clutches of hemipterans were described and collected, and photographs were taken. For stationary observations, the collected parts of rhytidome with clutches were kept in portable cages under natural conditions until instar II–III nymphs emerged. To maintain the humidity level, water-soaked moss was used. Instars II and III on rhytidome fragments with remnants of egg clutches were placed in stationary cages (Markova *et al*., 2018) installed on 0.8–0.9-m tall

Received: 14 Aug. 2023; Accepted by Barış Çerçi: 12 Sept. 2023; published: 28 Sept. 2023

seedlings of oak trees, where bugs stayed until they metamorphosed to winged adults. A portion of the material was left in the laboratory conditions. The development and molting of nymphs were continuously monitored, with objects photographed and measured. All field and laboratory studies was carried out by T.O. Markova and M.V. Maslov.

In the text below, *n* is the number of specimens and *m* is the mean value.

Material. Russia. Primorsky Krai, Ussuriysky Urban Okrug, protected area of the Land of the Leopard National Park, Ussuriysky Nature Reserve (43°40′00″ N; 132°30′00″ E), Korean pine/broad-leaved forest. Clutch was collected on April 21, 2023; a winged adult (1 ♂) was obtained under natural conditions on June 23, 2023. Village of Kaymanovka (43°37′49″ N; 132°13′49″ E), garden area with a *Q. mongolica* plantation, inside a building, August 30, 2022 (1 ♀). Vladivostok Urban Okrug, Vladivostok, Akademicheskaya railway station (43°19′09″ N; 131°92′11″ E), sparse oak forest. Clutch was collected on April 20, 2023; winged adults (2 ♂) were obtained under laboratory conditions on June 9 and 12, 2023.

The material is deposited in the Zoological Museum, Far Eastern Federal University (Vladivostok; FEFU).

Distribution. South of the Russian Far East (Primorsky Krai) to Northeast China, Korean Peninsula.

Life cycle. A clutch (ootheca) was found on the inner side of Mongolian oak rhytidome. It was laid on the trunk of an oak tree with a diameter of 0.7 m, on the southern side of the trunk, at a height of 1.1 m from the soil surface; the thickness of the rhytidome above the clutch was 1.4 cm. The ootheca had an elongated shape, 3 × 2.5 mm. About 15 eggs were arranged into approximately four rows covered by a jellied mass (Fig. 1A).

Phenology. Instar I nymphs of *U. lateralis* from eggs were observed to hatch from April 21, 2023. The duration of their development was 9–10 days (*m* = 9.5; *n* = 13). Instar II nymphs appeared from April 29, 2023; the duration of their development was 8–9 days (*m* = 8.5; *n* = 10). Instar III nymphs were recorded since May 6, 2023; the duration of their development was 9–11 days (*m* = 10; *n* = 7) (Fig. 1B). Instar IV nymphs were recorded since May 16, 2023; the duration of their development was 10–12 days (*m* = 11; *n* = 5) (Fig. 2A). Instar V nymphs appeared on May 26–27, 2023 (Fig. 2B) (*n* = 2); the duration of their development was 27 days. The complete formation of winged adults occurred on June 23, 2023 (*n* = 1) (Fig. 3). The postembryonic phase of *U. lateralis* lasted from April 21 to June 23, 2023, i.e. for 63–69 (*m* = 66) days at an average daily air temperature from –1.2 to +28.4°C. When kept in laboratory conditions, adults became winged two weeks earlier: on June 9 and 12, 2023.

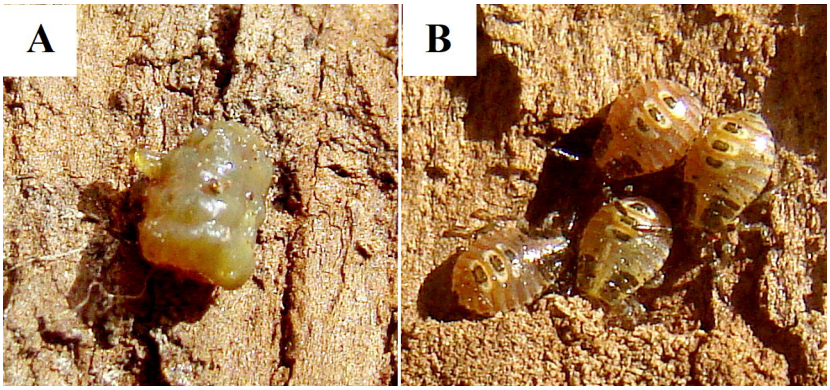

Figure 1. *Urostylis lateralis* Walker, 1867. **A,** Ootheca on the inner side of rhytidome from *Quercus mongolica* Fisch. ex Ledeb., April 21, 2023; **B,** instar III nymph on the inner side of rhytidome, May 6, 2023.

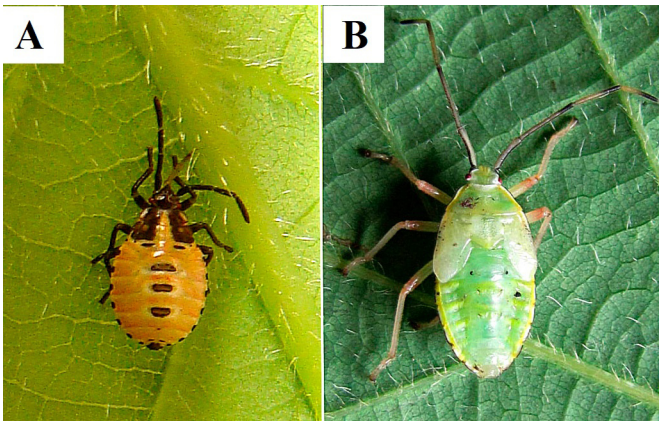

Figure 2. *Urostylis lateralis* Walker, 1867. **A,** instar IV nymph on a leaf blade from *Q. mongolica*, May 16, 2023; **B,** instar V nymph on a leaf blade from *Q. mongolica*, June 22, 2023.

Figure 3. *Urostylis lateralis* Walker, 1867, ♂, winged on June 23, 2023.

The ontogeny of *U. lateralis* consists of two long time periods. The embryonic phase in this bug lasts from autumn to spring. In late autumn, female lays an egg clutch, leaving it to overwinter under rhytidome, and dies. The postembryonic phase begins before oak leaves unfold, and first nymphs feed on the mucous membrane of the ootheca. The development of nymphs until wing formation continues to the beginning of the third ten days of June. As nymphs develop, they climb up the oak trunk and live in the crown.

Acknowledgements

We are deeply grateful to B. A. Korotyaev (Zoological Institute, Russian Academy of Sciences, St. Petersburg) for his help and advice. We remember Yu. A. Semeykin (Vladivostok) with warmth and gratitude for his interest in insects, the photographic material provided, and the oral reports about bugs. Special thanks are also due to E. P. Shvetsov (Vladivostok) for translating this paper into English

Funding

The research was carried out within the framework of the state assignment of Ministry of Science and Higher Education of the Russian Federation (theme No. 121031000120-9).

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