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Chiridopsis rubromaculata n. sp. from India, and notes on its
bionomy and immature stages
(Coleoptera: Chrysomelidae: Cassidinae)

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ABSTRACT. A new species *Chiridopsis rubromaculata* is described from India (Maharashtra). Descriptions of its immature stages and notes on bionomy are also given.

Key words: entomology, taxonomy, new species, bionomics, immature stages, *Coleoptera*, *Chrysomelidae*, *Cassidinae*, *Chiridopsis*, India.

The genus *Chiridopsis* SPAETH, 1922 comprises 59 species distributed in Afrotropical and Oriental Regions (BOROWIEC 1999). In the Oriental Region most species are grouped in Indian Subcontinent and 19 species were recorded from India and Ceylon, including two described recently (BOROWIEC & GHATE 1999, BOROWIEC & ŚWIĘTOJAŃSKA 2000). During field investigation in Maharashtra State a new species of the genus *Chiridopsis* was found. Its description and notes on immature stages and bionomy is given below.

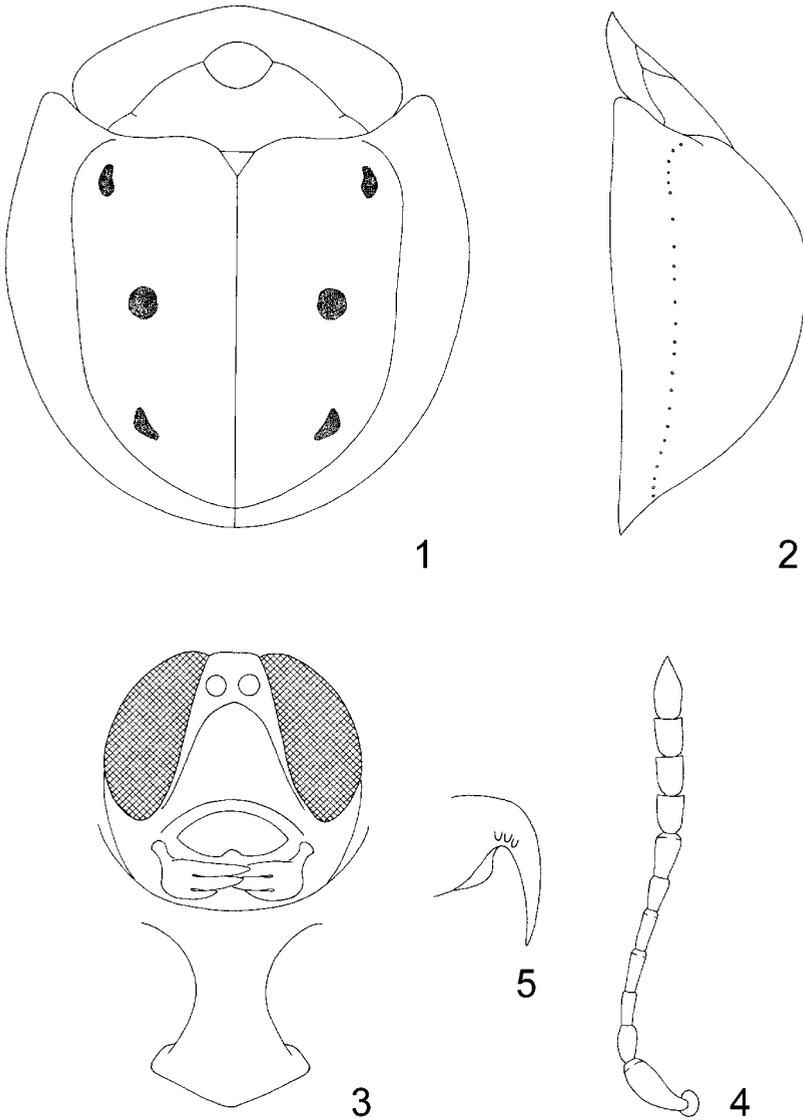
***Chiridopsis rubromaculata* n. sp.**

Etymology

Named after its reddish elytral spots.

DIAGNOSIS

A very distinct species, well distinguished from all Oriental members of the genus by its red elytral spots (in life they are red surround by metallic golden ring, in dried specimens reddish-brown, without ring). At first glance the most similar species is *Ch. bipunctata* (L.), a form with six elytral spots, but it differs in colour



1-5. *Chiridopsis rubromaculata*: 1 – body dorsal, 2 – body lateral, 3 – head and prosternum, 4 – antenna, 5 – tarsal claw

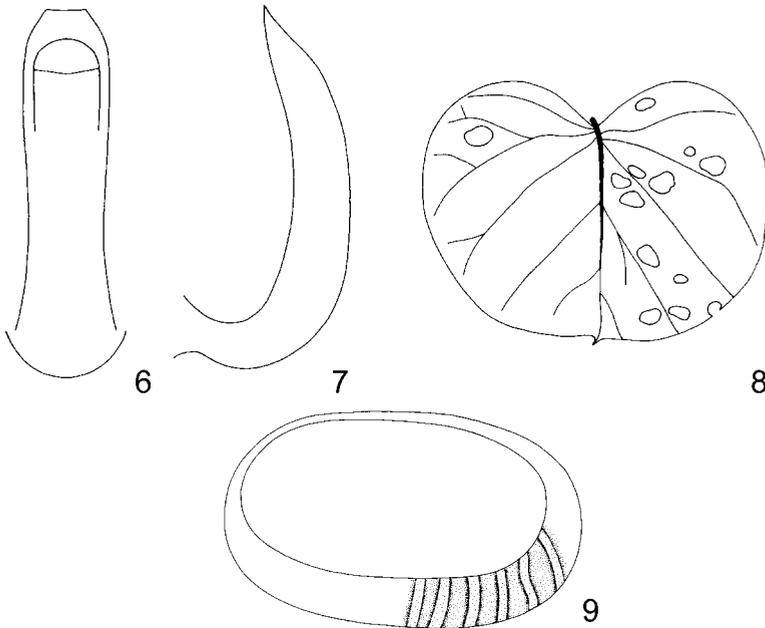
of spots being black. *Ch. rubromaculata* is much rounded than *Ch. bipunctata*, has slightly wider explanate margin of elytra, and less rounded anterior margin of pronotum.

DESCRIPTION

Length: 5.3-6.05 mm, width: 4.5-5.2 mm, length of pronotum: 1.7-2.2 mm, width of pronotum: 3.3-3.8 mm, length/width ratio: 1.10-1.21, width/length ratio of pronotum: 1.64-2.06. Body almost circular (fig. 1).

Pronotum uniformly yellow. Elytra light green with faint red spots, surrounded by metallic gold ring, golden line along the suture and along the entire margins of the pronotal and elytral discs (fig. 14). The characteristic colour pattern with golden borders appears after 15 to 19 days from eclosion. In dried specimens elytra yellow, each elytron with three small, reddish-brown spots: first on humeral callus, second the largest in middle of elytron, and third in posterolateral part of disc (fig. 1). Head, ventrites, legs, and antennae yellow, only apex of last antennal segment slightly infuscate.

Pronotum elliptical, its anterior margin very softly rounded, maximum width of pronotum distinctly before middle, sides rounded. Disc convex, smooth and glabrous. Explanate margin distinctly bordered from disc, smooth and glabrous. Scutellum large, triangular, without sulci. Base of elytra distinctly wider than pronotum, humeral angles form almost straight angle. Disc strongly convex, with



6-9. *Chiridopsis rubromaculata*: 6, 7 – aedeagus (6 – dorsal, 7 – lateral), 8 – feeding pattern, 9 – ootheca

top of convexity in postscutellar area, without impressions (fig. 2). Puncturation fine, regular, rows distinct on whole length of disc, not impressed. In 1st and 2nd row punctures dense, with distance between punctures mostly as wide as puncture diameter, on sides of disc punctures sparser but slightly coarser than in two sutural rows, with distance between punctures up to four times wider than puncture diameter. On slope punctures gradually smaller. Marginal row distinct, its punctures only slightly coarser than punctures on sides of disc. Intervals flat, in sutral half of disc five to six times wider than rows, on sides three to four times wider than rows. Surface of intervals smooth and glabrous. Explanate margin broad, c. 0.4 times as wide as width of each disc of elytron, its surface smooth and glabrous. Apex of elytral epipleura bare. Clypeus almost flat, 1.27 times wider than long, its surface smooth and glabrous (fig. 3). Antennae slim, length ratio of antennal segments: 100:44:48:60:52:48:52:50:52:52:88, third segment only slightly longer than second, segments 8-10 longer than wide (fig. 4). Claws with distinct basal tooth (fig. 5).

Aedeagus unmodified, apex without bidentate plate (which is characteristic for many species from India), shallowly emarginate apically. Ventral side of aedeagus without carina. In lateral view aedeagus slightly bent ventrad (figs 6, 7).

HOST PLANT

Convolvulaceae: Rivea hypocrateriformis (CHOIS.).

MATERIAL

Holotype: "INDIA, Maharashtra State, Dist. Ahmednagar, Rehekuri Sanctuary, 11 VII 2000, on *Rivea hypocrateriformis*, leg. S. RANADE". Two paratypes (one freshly ecdoded): the same data; two prepupal larvae and two pupae were collected with adults (holotype preserved at the Department of Systematic Zoology and Zoogeography, Wrocław University, Wrocław, Poland; paratypes at the Department of Systematic Zoology and Zoogeography, Wrocław University, Wrocław, Poland, and at the Department of Zoology, Modern College, Pune, India).

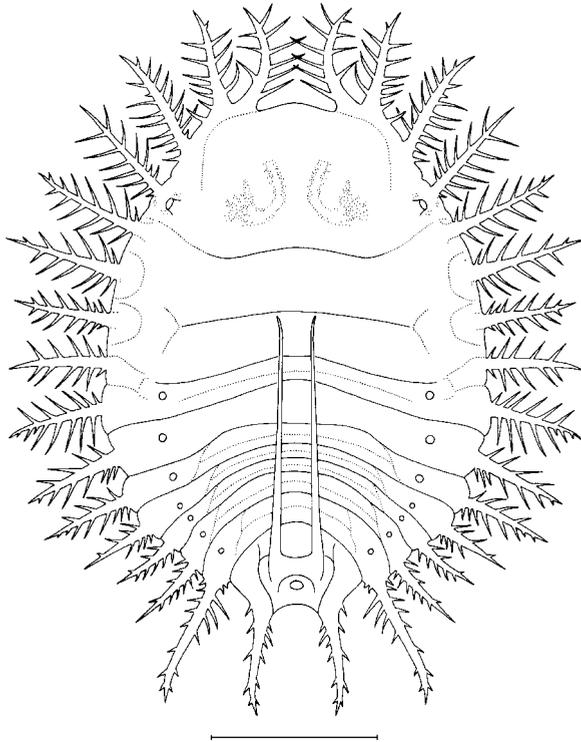
BIONOMICS

Habitat: The Rehekuri Sanctuary is located in the drier parts of the state and the dominant vegetation is grass. *Rivea*, which is a climber, grows on plants like *Acacia* and *Ziziphus*, which are interspersed in this grassland. The average annual rainfall received during the monsoon varies from 500 to 700 mm. During the colder season the temperature can be as low as 12 degrees Centigrade while in summer it can reach 45 degrees. The area is almost flat without any hills and it is situated at about 150 m a. s. l. The sanctuary is created mainly for conservation of the blackbuck.

Material: 2 larvae, 2 pupae and 3 imagines (out of which there was one mating pair) were collected in the field. 1 imagine ecdoded from the collected pupa, while 1 larva pupated and imagine ecdoded.

In all 5 oothecae were deposited in the laboratory by the mating pair. Out of the 5 oothecae, 4 larvae were allowed to hatch and in all 3 were preserved at different stages (1 1st instar, 1 4th instar and 1 5th instar); 1 was allowed to pupate from which the adult eclosed.

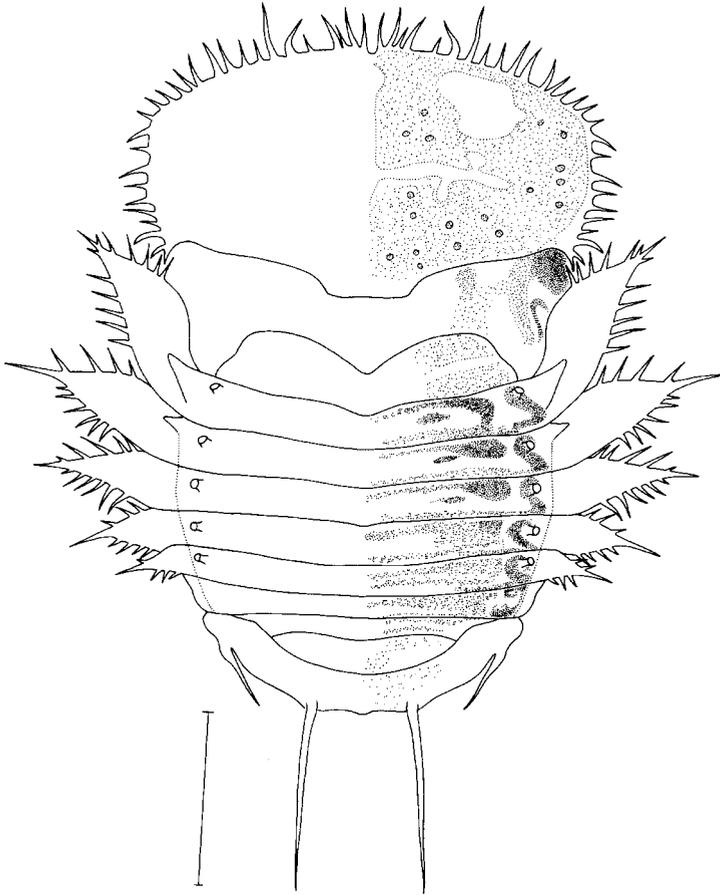
Observations: The adults (two mature and one freshly eclosed), two prepupal larvae and two pupae were hand-picked and brought to the laboratory in small plastic bottles, along with leaves of the host plant, and then transferred to large 0.5L PET[®] jars. The jars were covered with muslin cloth and kept at 25° C in a B.O.D. incubator. The jars were regularly cleaned and the insects were provided with fresh leaves of the host plant *Rivea*. Observations were carried out with a KYOWA stereozoom microscope which is calibrated for measurement using stage micrometer. Line drawings to the scale were prepared using a camera-lucida technique. We could rear a few larvae under the laboratory conditions and study different life history stages.



10. *Chiridopsis rubromaculata*, prepupal larva (scale 1 mm)

The adults collected luckily turned out to be a sexually mature, mating pair in which mating behaviour was noticed immediately the next day (size of the male: length 5.5 mm, breadth 4.7 mm; female: length 6.0 mm, breadth 5.2 mm). The mating continued for about one and a half day after which the pair separated.

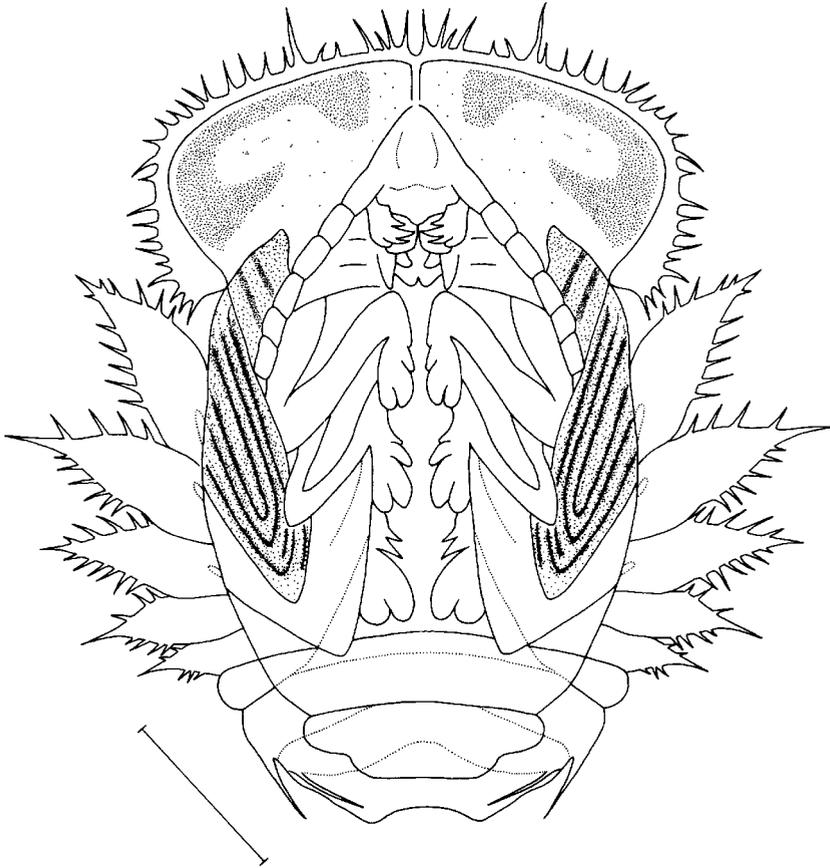
The adults were found to prefer the upper surface of the leaves and were found to be feeding from the upper surface. When disturbed or exposed to very bright light, these beetles tried to hide beneath the leaves. At night also the adults were found to be sitting quietly underneath the leaves. The adults and larvae were found feeding during early evening period. The feeding involved making small round holes in the case of adults, while larvae feed simply by scrapping the epidermis and the layer beneath. The faecal matter was deposited on the upper surface of leaves in the form of semi solid, greenish black, strings.



11. *Chiridopsis rubromaculata*, pupa dorsal (scale 1 mm)

On the third day after mating the female (in the laboratory) deposited a total of 5 oothecae on the upper surface as well as on the lower surface of the leaf. Each ootheca was somewhat oval in shape (average length: 2.2 mm and width: 1.6 mm) and contained a single egg. Each egg was elongated (average length: 1.7 mm and width: 1.4 mm), greenish yellow and externally covered by a transparent membrane which showed a fringed structure at the periphery, with many ridges and furrows. It is likely that the female had mated earlier so the exact duration between mating and egg-laying is uncertain. The female died soon after.

The larvae hatched in about four days. These first instar larvae are translucent green in colour. They start feeding after about 2 hours and start depositing the faecal matter on their supra-anal spines. The size of the each larval instars and their duration is given in table 1.



12. *Chiridopsis rubromaculata*, pupa ventral (scale 1 mm)

Two brown spots appear on the prothorax in the second larval instar, which become prominent in the prepupal stage. The colour of all the larval instars is green except two days prior to pupation, when it becomes yellow. This prepupal stage is non-feeding and part of its ventral abdominal surface is attached to the leaf. After each moult the larvae carry the moulted skin, along with the faecal matter, on the supra anal processes.

Prepupal larva (fig): Body ovate, broad in the middle. Colour yellowish brown, pronotal patches and head capsule deep brown, while supra anal processes light brown.

Lateral processes 16: first two fused at the base and directed anteriorly, next six gradually directed to lateral side, while 9th lateral process is perfectly perpendicular to the body length. From 10th to 16th the lateral processes are gradually becoming posteriorly directed; the 16th pair is almost parallel to the body; 11th to 14th lateral processes are smaller while the 15th and 16th are the longest. Lateral processes with long spinules that almost touch those of the neighbouring process.

Spiracles 8 pairs: the prothoracic spiracle larger than the other spiracles. Spiracles pale coloured and slightly elevated. Spiracles of the posterior abdominal segments are smaller.

The larvae carry the faecal matter along with the previous larval skins on the supra anal processes. The composite shield of the faecal matter and skins is dense, compact and triangular in shape. The angles of this triangle are broadly rounded. This triangular shield is large and thick so that only lateral processes of the larvae are visible from above.

Comparative notes: last instar larvae of five species of *Chiridopsis* were described hitherto, two in detail - *Ch. bipunctata* (L.) and *Ch. promiscula* [sic] sensu TAKIZAWA¹ = *Ch. selecta* (WEISE) - by TAKIZAWA (1980), and three superficially - *Ch. scalaris* (WEBER), *Ch. bowringii* (BOH.) and *Ch. punctata* (WEBER) - by ZAJCEV (1988). Larva of *Ch. rubromaculata* distinctly differs from both species described by TAKIZAWA (1980) in smaller size (length 5.5 mm, instead of 6-7 mm), stouter body, and longer supra anal processes. Larva of *Ch. selecta* has distinctly thinner faecal mass carried only on marginal areas of cast skins, while in *Ch. rubromaculata* the faecal mass is large, compact, forming a triangular shield. Larva of *Ch. scalaris* differs in elongate body and perforate fecal mass with 3-4 transverse pores (compact in *Ch. rubromaculata*); *Ch. punctata* differs in thinner faecal mass carried only on marginal areas of cast skins, like in *Ch. selecta*; larva of *Ch. bowringii* is the most similar, with the same body shape and similar shape of faecal shield, but its inappropriate description does not offer diagnostic characters to distinguishing *Ch. bowringii* from *Ch. rubromaculata*.

¹ The identification was corrected by BOROWIEC and TAKIZAWA (1991): *Ch. promiscula* sensu TAKIZAWA = *Ch. binduta* (MAULIK). The name *Ch. binduta* was synonymized with *Ch. selecta* (WEISE) by BOROWIEC and GHATE (1999).



13-15. *Chiridopsis rubromaculata*: 13 – habitat, 14 – beetles in life (photo by A. CAPTAIN), 15 - pupa

Pupa: Body dorso-ventrally flattened, slightly narrowed posteriorly, length 5.5 mm, width 3.7 mm at pronotum, 3.0 mm at 3rd abdominal segment. Body is yellowish with a distinct dorsal and ventral colour pattern. The prothorax is brown with an inverted "T" in the centre. There are two yellowish patches in the two lateral halves and small yellowish spots (lacking the brown pigment) throughout the pronotum.

Mesothorax shows brown triangular streaks and patches laterally - something similar to the pupae of other *Chiridopsis*.

There are dark brown patches around the abdominal spiracles and also a brown stripe running along the breadth of the abdomen, which is not connected to the spiracle and is also broken mid dorsally by a faint yellow line. Ventral colour pattern is characteristic in that the developing elytral region shows brown lines.

Pronotum shows 56 anterior marginal spinules, of which two pairs are distinctly stouter and longer than others as seen in many other tortoise beetles.

Dorsum of the pupa is finely wrinkled, the yellowish spots on the pronotum look elevated. Abdominal surface is finely granular.

The first five abdominal segments show usual leaf like lateral processes. The 1st process is antero-laterally directed.

The height of the spiracles increases posteriorly, whereas its diameter decreases posteriorly. The 4th and 5th spiracle much elevated and tubular.

The 6th abdominal segment is without any lateral process. The 7th abdominal processes are long, spine like, present lateral in position and are directed backwards. The processes of the 8th segment are shorter than that of 7th segment, present ventrally and directed medially. The 9th segment with long apical (supra anal) processes that reach up to the anterior border of the 5th abdominal segment. These last processes are weakly chitinised.

Table 1

Instar	Size in mm		Duration in days
	Average length*	Average width*	
First larva	1.3	0.7	4-5
Second larva	1.8	1.0	3-4
Third larva	2.9	1.8	3-4
Fourth larva	3.5	2.2	5-6
Fifth larva	5.3	3.4	5-6
Pupa	5.5	3.7	7-8

*Length and width: excluding supra anal and lateral processes

Comparative notes: pupae of two species of *Chiridopsis* were described hitherto in detail - *Ch. bipunctata* (L.) and *Ch. promiscula* [sic] sensu TAKIZAWA¹ = *Ch. selecta* (WEISE) - by TAKIZAWA (1980), and two superficially - *Ch. scalaris*

(WEBER), and *Ch. punctata* (WEBER) - by ZAJCEV (1992). All differ from *Ch. rubromaculata* in less developed dark pattern of dorsal part of body, and lacking pattern on ventral part of body.

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REFERENCES

- BOROWIEC, L., 1999. A world catalogue of the *Cassidinae* (Coleoptera: Chrysomelidae). Biologica Silesiae, Wrocław, 476 pp.
- BOROWIEC, L., GHATE, H.V., 1999. *Chiridopsis nigropunctata* n. sp. and notes on *Ch. selecta* (Weise) (Coleoptera: Chrysomelidae: Cassidinae). Genus, **10**: 103-108.
- BOROWIEC, L., ŚWIĘTOJAŃSKA, J., 2000. *Chiridopsis ghatei*, a new species from India (Coleoptera: Chrysomelidae: Cassidinae). Genus, **11**: 53-57.
- BOROWIEC, L., TAKIZAWA, H., 1991. Notes on chrysomelid beetles (Coleoptera) of India and its neighboring areas. Part 10. Japan. Journ. Ent., **59**: 637-654.
- TAKIZAWA, H., 1980. Immature stages of some Indian *Cassidinae* (Coleoptera: Chrysomelidae), Insecta Matsumurana, N.S., **21**: 19-48.
- ZAJCEV, J. M., 1988. Lichinki zhukov-shchitonosok triby *Cassidini* (Coleoptera, Chrysomelidae, Cassidinae) iz Vietnama. In: Fauna i ekologiya nasekomykh Vietnama, Nauka, Moskwa, 143-159.
- , 1992. Kukulki zhukov-listoedov podsemeistva *Cassidinae* (Coleoptera, Chrysomelidae) iz Vietnama. In: Sistematyka i ekologiya nasekomykh Vietnama. Moskwa, 168-185.