

Haania doroshenkoi, a new species of mantises from Cambodia
(Mantina: Mantidae: Thespinae) and a case of mirror symmetry in
the structure of the male genitalia of mantises

Haania doroshenkoi, новый вид богомола из Камбоджи
(Mantina: Mantidae: Thespinae) и случай зеркальной симметрии
в строении гениталий богомолов

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КЛЮЧЕВЫЕ СЛОВА: Dictyoptera, Mantidae, *Haania*, новый вид, Камбоджа, зеркальная симметрия

ABSTRACT. *Haania doroshenkoi*, a new species of mantises from Cambodia are described. An unusual case of mirror symmetry in structure of the male genitalia of the new species is discovered.

РЕЗЮМЕ. Описывается новый вид богомола, *Haania doroshenkoi*, из Камбоджи. У нового вида обнаружена необычная зеркальная симметрия гениталий самцов.

The genus *Haania* includes small and slender mantises of very peculiar appearance. All known species of it (8, including a new species) are distributed in South-East Asia [Beier, 1952].

In terminology of the male genitalia the authors follow Klass [1997], in parentheses the terminology of Kaltenbach [1998] is given. Because of mirror symmetry of it, the terms associated with right and left phallomeres are given in quotation marks, inasmuch as “right” and “left” phallomeres are really to trade places.

Haania doroshenkoi Anisyutkin & Gorochov, sp.n.
Figs 1–17

MATERIAL. Holotype: ♂ — Cambodia, southern part of Elefan mountains, Phnom-Bokor mountain, Bokor National park, 700–1000 m, 18–22.IX.2003, A. Gorochov & M. Berezin. Paratypes: 1 ♂, 2 ♀♀ — same data as for holotype.

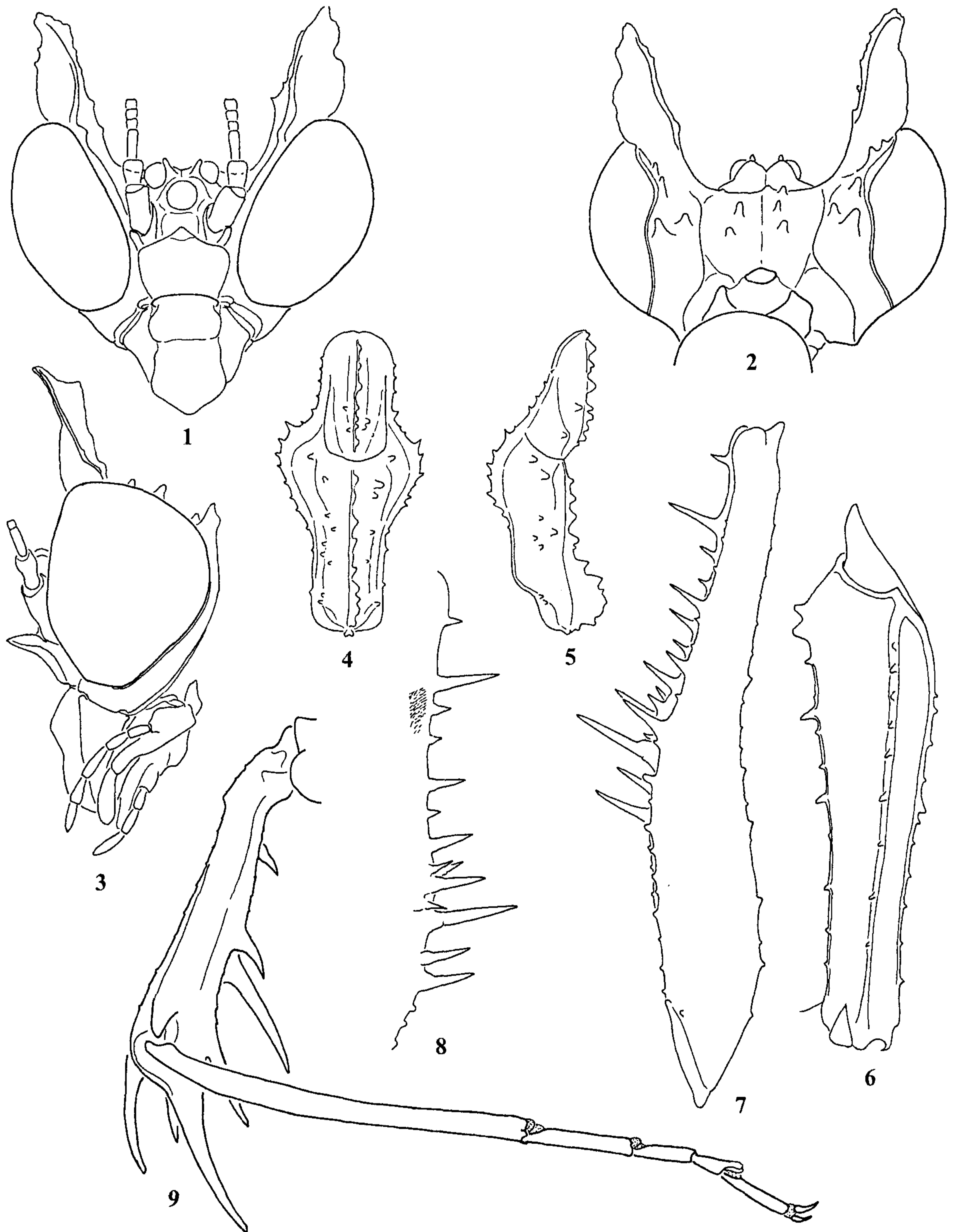
The material is kept in Zoological Institute, Russian Academy of Sciences, St. Petersburg.

DESCRIPTION. **Male** (holotype). Small and slender insect. General colour brownish yellow (life-time colour greenish) with scattered small brown spots; head, fore legs and tegmina with more large dark brown indistinct spots; latter spots mainly consisting of small spots; eyes and distal segments of maxillary and labial palpi (except yellowish apices of palpi) blackish; antennae yellowish proximally, darkened distally; trochanters with black spots on inner side; middle and hind legs annulated with indistinct brown spots.

Head subtriangular (Fig. 1); supraocular outgrowths large, directed forward and slightly outward, leaf-like, with longitudinal carinae and uneven margins; vertex wide, with pair of longitudinal sutures and rows of tubercles (Fig. 2); frontal shield wider than height (Fig. 1), its upper edge produced into a pointed outgrowth, directed forward (Figs 1, 3); eyes large and rounded (Fig. 3); ocelli large, two small outgrowths situated between lateral ocelli; antennae with scape most robust, pedicellum smaller, 3rd segment thin and elongated, following segments bead-like (Fig. 1).

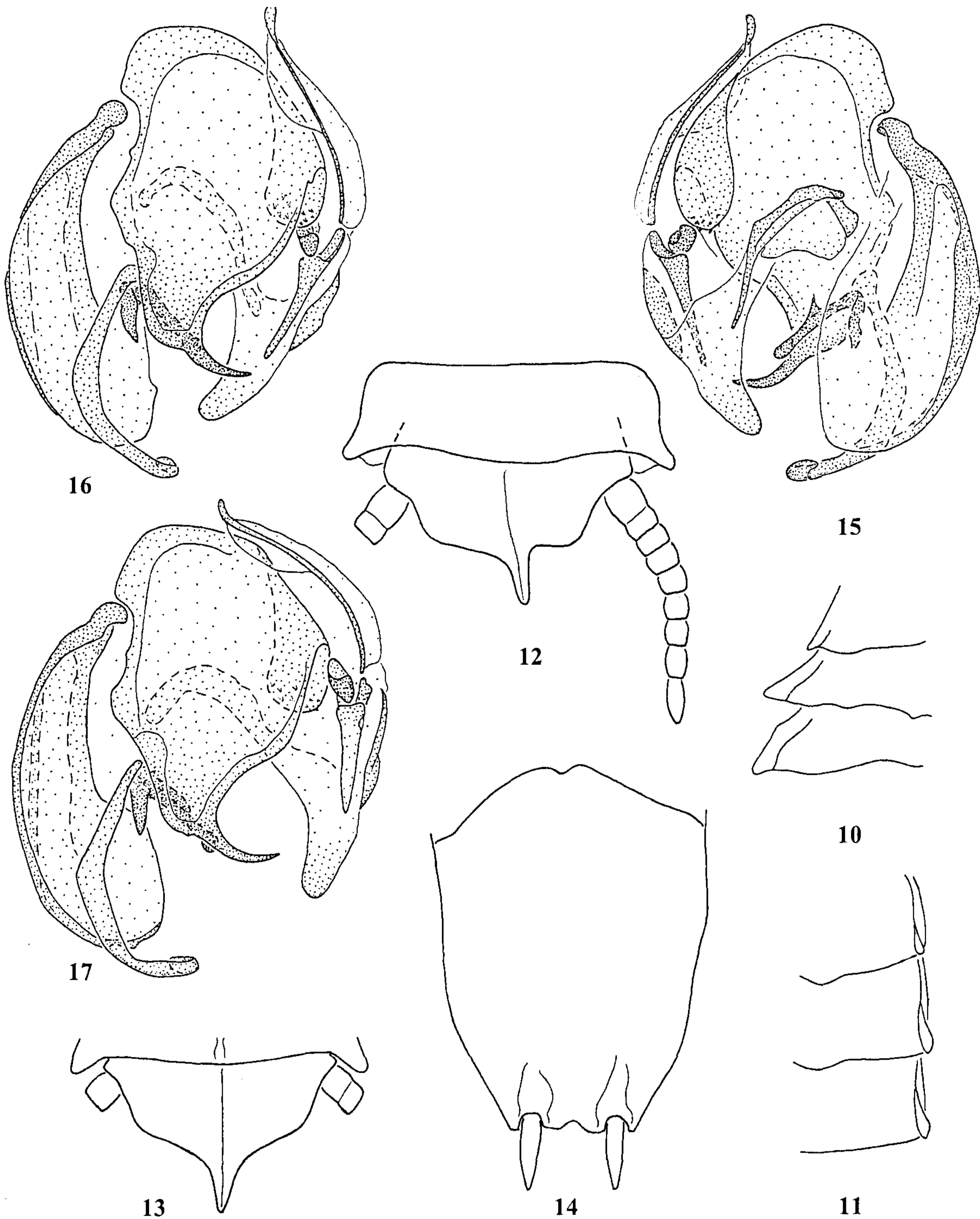
Pronotum comparatively robust, with numerous tubercles and lateral margins dentate (Figs 4, 5); supracoxal expansion placed nearly medially (Fig. 4); median keel well expressed, elevated on the posterior portion of metazona (Fig.5). Fore coxae with three dentate longitudinal keels: upper, medial, and lower (Fig. 6). Fore femora slightly sinuate, with upper and lower margins uneven and tuberculated (Fig. 7); discoidal spines 4: 1st and 2nd subequal, medium-sized, 3rd longer, and 4th smaller; 1st, 3rd and 4th discoidal spines placed more or less in middle of lower side of femora, 2nd one displaced to inner margin; external spines 3; internal spines 10 (Figs 7, 8). Fore tibiae short (Fig. 9), with 2 external, 4 internal, and 1 apical spines. Fore tarsus about 1.5 times as long as tibia (including apical spine) (Fig. 9): metatarsus not much longer than other segments combined; arolium absent. Middle and hind legs: coxae with longitudinal elevated keel; femora and tibiae subcylindrical, with weak longitudinal keels, but without any widening or lobes; femora distinctly incrassate proximally; tarsi long, slightly longer than tibiae; hind metatarsus about twice as long as rest of segments combined; arolium absent. Tegmina and wings completely developed, longer than abdomen.

Abdomen elongated; abdominal tergites with small lobes on postero-lateral angles (Fig. 11). Anal plate (ultimate tergite) with posterior margin medially pro-



Figs 1–9. Morphological characters of *Haania doroshenkoi* sp. n., ♂ (holotype): 1 — facial part of head; 2 — head from above; 3 — head from side; 4 — pronotum from above; 5 — pronotum from side; 6 — fore coxa from outside; 7 — fore femur from outside; 8 — armament of fore femora from inside; 9 — fore tibia and tarsus from outside.

Рис. 1–9. Морфологические признаки *Haania doroshenkoi* sp. n., ♂ (голотип): 1 — лицевая часть головы; 2 — голова сверху; 3 — голова сбоку; 4 — пронотум сверху; 5 — пронотум сбоку; 6 — передний тазик снаружи; 7 — переднее бедро снаружи; 8 — вооружение переднего бедра изнутри; 9 — передняя голень и лапка снаружи.



Figs 10-17. Morphological characters of *Haania doroshenkoi* sp. n.: 10-11 — lateral parts of 2-4 abdominal tergites from above (10 — ♀, paratype; 11 — ♂, holotype); 12-13 — apex of abdomen ♂ from above (12 — holotype; 13 — paratype); 14 — hypandrium from below (♂, holotype); 15 — genitalia ♂ from above; 16-17 — genitalia ♂ from below (15, 16 — holotype; 17 — paratype). Dotted area shows membranous sclerotized parts (15-17).

Рис. 10-17. Морфологические признаки *H. doroshenkoi* sp. n. 10-11 — боковые части 2-4 тергитов брюшка сверху (10 — ♀, паратип; 11 — ♂, голотип); 12-13 — вершина брюшка ♂ сверху (12 — голотип; 13 — паратип); 14 — гипандрий снизу (♂, голотип); 15 — гениталии ♂ сверху (голотип); 16-17 — гениталии ♂ снизу (15, 16 — голотип, 17 — паратип). Пунктировкой обозначены склеротизованные участки (15-17).

jected (Fig. 12) and weak longitudinal keel (visible asymmetry of anal plate obviously abnormal); cerci elongated. Hypandrium with posterior margin medially emarginated (Fig. 14); styli comparatively short, pointed apically.

Male genitalia (Figs 15–17) mirror-images as compared with usual structure of mantises [Beier, 1968; Klass, 1997; Kaltenbach 1998], well sclerotized. “Left” phallomere (really lie on right side): dorsal wall occupied by large sclerite L4B, with proximal, medial and outer stripes mostly sclerotized (inner part weakly sclerotized); ventral wall membranous; ventral lobe via (ventral phallomere) with ventral wall nearly completely occupied by sclerite L4A, L4A with bent up fold on left side (this fold with small denticles) and sharp, claw-like process pda (hypophallus); sclerite L2 (titillator) well sclerotized, in shape of long and curved plate, posteriorly with apical hook; process afa (pseudophallus) V-shaped and strongly sclerotized. “Right” phallomere (really lie on left side): sclerite R3 (basal sclerite) well sclerotized, thin and elongated; sclerite R1b (apophysis) strongly sclerotized, ridge pia extending to apex of fda; sclerite R1A occupied mostly apical and external parts of fda.

Female. Similar to male but differs from it in following features: ocelli distinctly smaller, tegmina and wings relatively shorter, abdomen medially widened, abdominal tergites with larger subtriangular lobes on postero-lateral angles (Fig. 10), genital plate with deep medial notch.

Variability. Anal plate (ultimate tergite) of male paratype quite symmetrical (Fig. 13). One of females (preserved in alcohol) with eyes yellowish; other female with 9 and 10 internal spines on fore femora, left and right respectively.

Measurements (mm). Length. Head: male 2.9 (2.9), female 3.6; pronotum: male 4.7 (4.8), female 5.8–5.9; fore coxae: male 4.2 (4.2), female 4.6–4.9; fore femora: male 5.2 (5.3), female 5.8–6.2; fore tibiae (with apical spine): male 2.5 (2.7/2.5 — on left and right tibia), female 2.9/3.1 (on left and right tibia) — 3.2; hind femora: male 6.2 (6.4), female 6.9; hind tibiae: male 5.6 (5.6), female 5.9–6; tegmina: male 15.6 (16), female 10.6–11.4. Width. Head: male 2.5 (2.5), female 2.7–2.9; pronotum: male 2.3 (2.2), female 2.9–3. Measurements in parenthesis are those of holotype.

COMPARISON. The above described species is most closely related to *H. vitalisi* Chopard, 1920 described from Laos [Chopard, 1920]. *H. doroshenkoi* sp. n. differs from it in the following features: frontal shield wider than height (higher than wide in *H. vitalisi*); eyes widely rounded (elongated in *H. vitalisi* — Ibid, Fig. 2); 2nd discoidal spine displaced to inner margin (3rd in *H. vitalisi*). From the *H. hainanensis* (Tinkham, 1937), the new species readily differs in the armament of fore femora: 3 external and 9–10 internal spines (4 and 7 respectively in *H. hainanensis* — Ibid), more robust pronotum (slenderer in *H. hainanensis* — Ibid, Fig. 3) and emarginate posterior margin of hypandrium (round-

ed in *H. hainanensis* — Ibid).

H. hainanensis was described in the monotypic genus *Ceratohaania* Tinkham, 1937 from Hainan [Tinkham, 1937]. Later, this species was considered a synonym of *H. vitalisi*, and *Ceratohaania* was synonymized with *Haania* [Beier, 1952]. However, the differences in descriptions of *H. vitalisi* and *H. hainanensis* raise a question about appropriateness of synonymy of these species.

ETYMOLOGY. The new species is named in honour of Nikolaj Doroshenko, gerpetologist who makes large contribution in Cambodian nature conservation.

DISCUSSION. The most distinctive feature of a new species is a mirror symmetry of the male genitalia. It is the author's opinion that the completely normal and similar structure in two studied exemplars of males is evidence of normality of such station. Any abnormality in the male genitalia of *H. doroshenkoi* are absent. More of them, the presence of some asymmetry in the anal plate of one of specimens (Figs 12, 13) do not influence on the structure of its male genitalia (Figs 15–17).

A case of mirror symmetry in the male genitalia of cockroaches was considered by Bohn [1987]. To explain such type of modifications of the male genitalia, it was suggested a hypothesis about mutation of a developmental gene regulating the symmetry of the last abdominal sternites [Ibid]. In cockroaches species with male genitalia of different types of mirror symmetry can be found within one genus *Ectobius* [Bohn, 1987]. Unfortunately, the structure of the male genitalia of other representatives of the genus *Haania* and related groups of mantises is still unknown.

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