

## Review of the family Gelastocoridae (Heteroptera: Nepomorpha) of south-eastern Asia

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### ABSTRACT

Review of the nine species of *Nerthra* SAY, 1832 (Hemiptera: Heteroptera: Gelastocoridae: Nerthrinae) occurring in south-eastern Asia west of Wallace line is given. The male of *N. nieuwenhuisi* TODD, 1957, the 4<sup>th</sup> instar larva of *N. asiatica* (HORVÁTH, 1892), and 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> instar larvae of *N. indica* (ATKINSON, 1889) are described, and illustrated for the first time. *Nerthra indica* = *N. arunachalensis* THIRUMALAI, 1998 is proposed as a new synonymy, and the variability of *N. indica* is briefly discussed. First exact records are given for *N. nieuwenhuisi* from Sarawak (Malaysia), and *N. indica* from Fujian (China), Laos and Vietnam.

**Keywords:** Gelastocoridae, *Nerthra*, larva, Oriental region, China, India, Indonesia, Laos, Malaysia, Nepal, Vietnam, faunistics

### INTRODUCTION

Toad bugs (Gelastocoridae) are a remarkable group of ‘aquatic’ bugs (Nepomorpha) which are derived from aquatic ancestors and have become secondarily terrestrial (HEBSGAARD et al. 2005). This small family is divided into two subfamilies, Gelastocorinae and Nerthrinae; Gelastocorinae, include the genera *Gelastocoris* KIRKALDY, 1897

and *Montandonius* MELIN, 1929, inhabit wet margins of water bodies in America, from southern Canada in the north to Argentina in the south (e.g., TODD 1955, 1961a; NIESER 1975; SCHNACK & ESTÉVEZ 1979; ŠTYS & JANSSON 1988).

The Nerthrinae includes two genera. The fossil *Cratonerthra* MARTINS-NETO, 2005 (with two species) was recently described from Early Cretaceous sediments of Santana Formation in Ceará state, south-eastern Brazil (LÓPEZ RUF et al. 2005). The only recent genus, *Nerthra* SAY, 1832 (sensu TODD 1955), currently includes 91 valid species (KMENT, in prep.). However CASSIS (2006) and CASSIS & SILVEIRA (2006), have proposed a splitting of the genus based on a phylogenetic analysis of *Nerthra* species to include five genera within the current concept of *Nerthra* sensu lato. *Nerthra* species are distributed in tropical and subtropical regions on all continents (except for Europe). However, the most speciose fauna of *Nerthra* is found in America, Australia, and Malesia (e.g., TODD 1955, 1961a; CASSIS & SILVEIRA 2001, 2002, 2004, 2006; ANDERSEN & WEIR 2004; CHEN et al. 2005). Only one species, *N. grandicollis* (GERMAR, 1837) is restricted to the Afrotropical region including Madagascar (TODD 1955, 1961a). Another nine species of *Nerthra* are known from the south-eastern Asia, west of Wallace's line (TODD 1961b). *Nerthra* species inhabit various littoral (wet banks of fresh waters, sea coasts) as well as truly terrestrial habitats, such as banana plantations (KEVAN 1942), open heathland or forests (CASSIS & SILVEIRA 2001). Some species are thought to be nocturnal, hiding during daytime under stones, plant debris or in humid sand or mud. They are predators of various small invertebrates (e.g., KEVAN 1942, TODD 1955, CHEN et al. 2005).

We have the pleasure to dedicate this paper to Michail Josifov, an outstanding Bulgarian heteropterist, on the occasion his 80th birthday.

## MATERIAL AND METHODS

Dry-mounted specimens were studied under a binocular stereomicroscope MBS-10. Measurements were made with an ocular micrometer. For the study of male genitalia, specimens were softened in hot water with admixture of 70% ethanol. The line-drawings were prepared from photographs taken by an Olympus Camedia C-5060 camera attached to an Olympus SZX9 binocular microscope. Base maps were downloaded from On-line Map Creation <http://www.aquarius.geomar.de/omc/>.

The following codens of the collections are used throughout the paper:

- BMNH Natural History Museum, London, United Kingdom;
- MCSN Museo Civico di Storia Naturale 'Giacomo Doria', Genoa, Italy;
- MMBC Moravian Museum, Brno, Czech Republic;
- MNHN Muséum National d'Histoire Naturelle, Paris, France;
- NHMW Naturhistorisches Museum, Wien, Austria;
- NMEG Naturkundesmuseum, Erfurt, Germany;
- NMPC National Museum, Praha, Czech Republic;

- NZSI National Zoological Collection, Zoological Survey of India, Calcutta, West Bengal, India;
- OXUM University Museum of Natural History, Oxford, United Kingdom;
- PBPC Petr Baňar private collection, Brno, Czech Republic;
- RMNH Nationaal Natuurhistorische Museum, Leiden, Netherlands;
- SEMC Snow Entomological Museum, University of Kansas, Lawrence, Kansas, USA;
- USNM United States National Museum of Natural History, Washington, D.C., USA;
- VSPC Vít Socha private collection, Pardubice, Czech Republic;
- ZJPC Zdeněk Jindra private collection, Praha, Czech Republic;
- ZMAS Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia;
- ZMUH Zoologisches Museum, Universität von Hamburg, Germany.

## REVIEW OF THE SPECIES

### *Nerthra asiatica* (HORVÁTH, 1892)

(Figs 1, 5, 8)

*Mononyx asiaticus* HORVÁTH, 1892: 136 (description, type locality). HOLOTYPE: female, 'China: Flumen Poi-ho (G. N. Potanin)' [= Sichuan, Gar Qu (= Pai Ho River)] (ZMAS) (see KIRITSHENKO 1926 and POLHEMUS 1995).

*Mononyx asiaticus*: OSHANIN (1909): 956 (catalogue, distribution); OSHANIN (1912): 89 (catalogue, distribution); KIRITSHENKO (1926): 226 (taxonomy, synonymy); KIRITSHENKO (1930): 435 (distribution); WU (1935): 559 (catalogue, distribution); HOFFMANN (1933): 250 (catalogue: China); HOFFMANN (1941): 44 (catalogue, distribution).

*Nerthra asiatica*: TODD (1955): 349, 410–411, 472–473 (redescription, figure, key, catalogue, distribution); TODD (1957): 154 (variability, faunistics); TODD (1961a): 466 (catalogue, distribution); TODD (1961b): 93 (faunistics); NIESER & CHEN (1992): 5–6 (comparative note); POLHEMUS (1995): 24 (catalogue, distribution); THIRUMALAI (1998): 192 (key); BAL & BASU (2003): 542–544 (key, distribution, faunistics).

*Nerthra asiaticus*: HUA (2000): 214 (checklist: China).

*Mononyx grossus* MONTANDON, 1899a: 395, 398. SYNTYPES: China, 'Thibet, Mou-pin (A. DAVID 1870)' [= Sichuan, Baoxing (= Mu-p'ing)] & 'Tchouen (A. DAVID 1875)' [not identified] (MNHN & coll. Montandon → BMNH, 1 syntype in SEMC) (see TODD 1955 and POLHEMUS 1995)

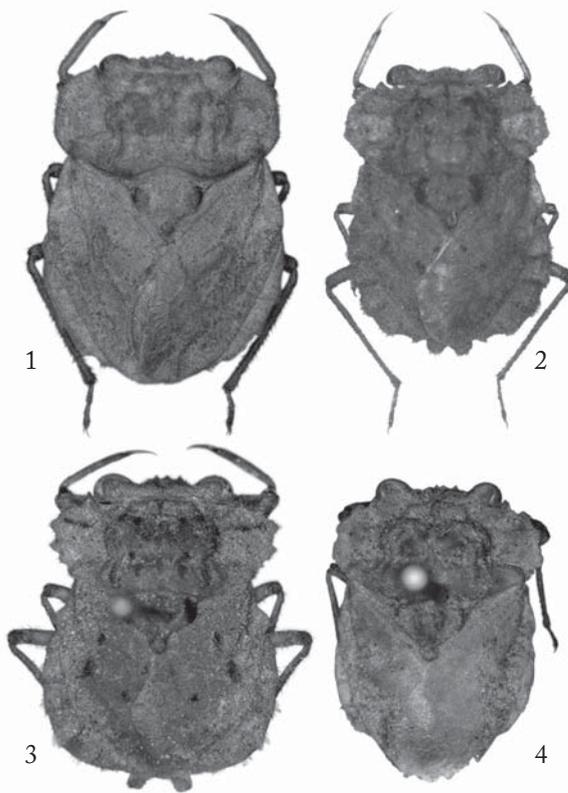
*Mononyx grossus*: DISTANT (1906): 16 (redescription, comparative note, faunistics); OSHANIN (1909): 956 (catalogue, distribution); OSHANIN (1912): 89 (catalogue, distribution); KIRITSCHENKO (1926): 226 (taxonomy, synonymy); WU (1935): 559 (catalogue, distribution).

**Material examined. CHINA:** SICHUAN, Huatan env. (Shpshin), ca 50 km SW of Yáan, 29°47'N 102°41'E, 16.vii.1995, 1 female, M. Trýzna & Ö. Šafránek lgt. (ZJPC); Jiulonggou env., near Dayi, 70 km W of Chengdu, 28.vi.–2.vii.1995, 1 larva, Z. Jindra lgt.

(ZJPC). **INDIA:** ASSAM, Noa Dihing, 1 female, Chennell [lgt.], Distant coll., 1911–383, '*grossus* Montand.' (BMNH).

**Variability of adults.** TODD (1961b) gave the following measurements: body length 11.0–12.2 mm, pronotum width 8.0–8.1 mm, and abdomen width 8.0–8.5 mm. The two examined females in this work are within these ranges, except the pronotum width of the female from Noa Dihing (former measurements belong to the female from India: Noa Dihing, latter to the female from China: Huatan env. (Fig. 1)): total body length 11.3 / 11.6 mm, head width 4.3 / 4.6 mm, inter-ocular width 2.5 / 2.6 mm, pronotum length 3.1 / 3.2 mm, pronotum width 7.3 / 8.0 mm, and abdomen width 8.2 / 8.5 mm, respectively (see also Table 1).

**Description of 4<sup>th</sup> instar larva** (Fig. 5). Body uniformly brown, covered with pale clavate setae; dorsal surface partly covered with muddy crust. Head with five small tubercles in front of eyes, one pair laterally on each side and one medially; one flat elevation on frons and two slightly higher elevations on vertex between eyes. Pronotum flattened laterally, elevated medially; lateral margins not expanded, straight and parallel in posterior 2/3, bent towards eyes in anterior 1/3, weakly sinuate before anterior angles; posterior margin straight. Mesonotum slightly depressed laterally and medially, lateral margins not expanded, straight and parallel; wing pads reaching half length of metanotum. Metanotum with strong depressions sublaterally and submedially, distinctly elevated medially. Abdominal tergites convex, decreasing towards connexivum; lateral margin of connexivum turned upwards, forming distinct groove between tergites and connexivum; lateral margin of connexival segments almost straight, bearing clavate setae in posterior half, postero-lateral angles slightly prominent from the connexival outline,



**Figs 1–4:** Habitus of adults. 1 – *Nerthra asiatica* (HORVÁTH, 1892), female from China, Huatan env. (11.6 mm); 2 – *N. indica* (ATKINSON, 1889), female from India, Peeling env. (9.5 mm); 3 – *N. lobata* (MONTANDON, 1899), female from Indonesia, Gugul (10.5 mm); 4 – *N. nieuwenhuisi* TODD, 1957, male from Malaysia, Mt. Malang (10.2 mm) (Photo: Jan Macek).

tubercles in front of eyes, one pair laterally on each side and one medially; one flat elevation on frons and two slightly higher elevations on vertex between eyes. Pronotum flattened laterally, elevated medially; lateral margins not expanded, straight and parallel in posterior 2/3, bent towards eyes in anterior 1/3, weakly sinuate before anterior angles; posterior margin straight. Mesonotum slightly depressed laterally and medially, lateral margins not expanded, straight and parallel; wing pads reaching half length of metanotum. Metanotum with strong depressions sublaterally and submedially, distinctly elevated medially. Abdominal tergites convex, decreasing towards connexivum; lateral margin of connexivum turned upwards, forming distinct groove between tergites and connexivum; lateral margin of connexival segments almost straight, bearing clavate setae in posterior half, postero-lateral angles slightly prominent from the connexival outline,

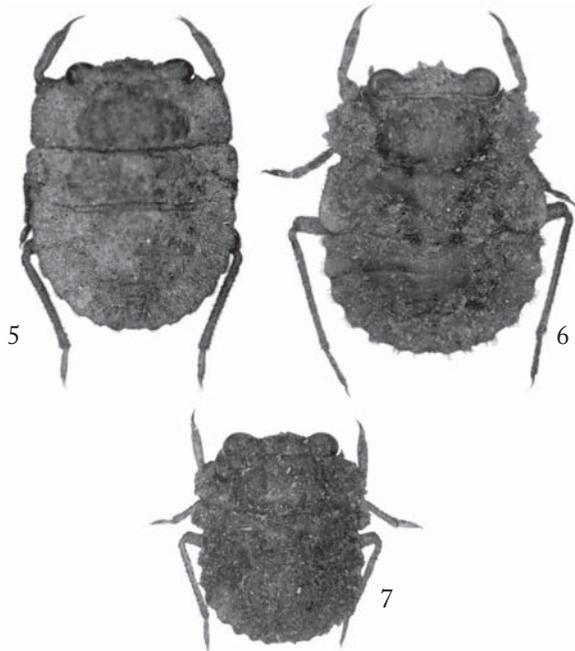
which seems to be serrate. Measurements (see also Table 2).

**Differential diagnosis of larva.** The studied larva was not found in association with adults of *N. asiatica*, however, we consider the similarity of head tubercles and shape of thorax as a basis for their identification. The larva of *N. asiatica* differs from larvae of *N. indica*, in the following characters: Head with five small tubercles in front of eyes (one pair laterally on each side and one median tubercle); pronotum less elevated medially than in *N. indica*; lateral pronotal margins not expanded, parallel, almost without sinuosity before anterior angles; metanotum not expanded laterally, parallel; lateral margins of connexival segments almost straight, posterolateral angles slightly prominent, and connexival outline serrate.

**Ecology.** Collected at 5000 ft [= 1524 m a.s.l.] in Darjiling district, West Bengal (TODD 1961b).

**Distribution** (Fig. 8). China: Sichuan (HORVÁTH 1892; MONTANDON 1899a; TODD 1957), ?Tibet (MONTANDON 1899a). India: Assam (DISTANT 1906), Sikkim (BAL & BASU 2003), West Bengal (TODD 1961b).

**Discussion.** This species is known only from the females. TODD (1955: 411) noted: 'In the shape of the pronotum it would seem to be closely related to *N. spissa* (DISTANT), but the worker has not seen a female of the latter species or a male of *N. asiatica* (HORVÁTH), so no definite comparison can be made between these two species at the present time'. Additional material of both species is needed to resolve the possible synonymy of *N. asiatica* and *N. spissa*.

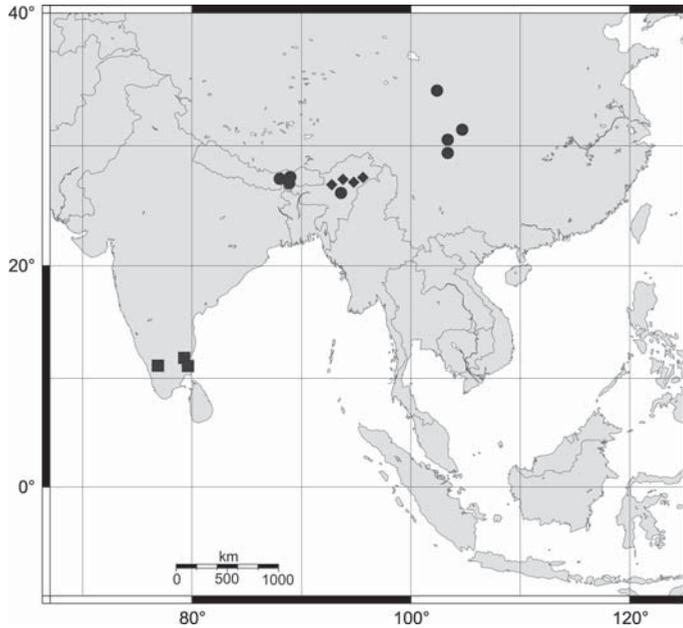


**Figs 5–7:** Habitus of larvae. 5 – *Nerthra asiatica* (HORVÁTH, 1892), 4<sup>th</sup> instar larva from China, Jiulonggou env. (7.1 mm); 6 – *N. indica* (ATKINSON, 1889), 5<sup>th</sup> instar larva from Nepal, SW Sauraha (8.1 mm); 7 – *N. indica*, 3<sup>rd</sup> instar larva from China, Maguan (4.5 mm) (Photo: Jan Macek).

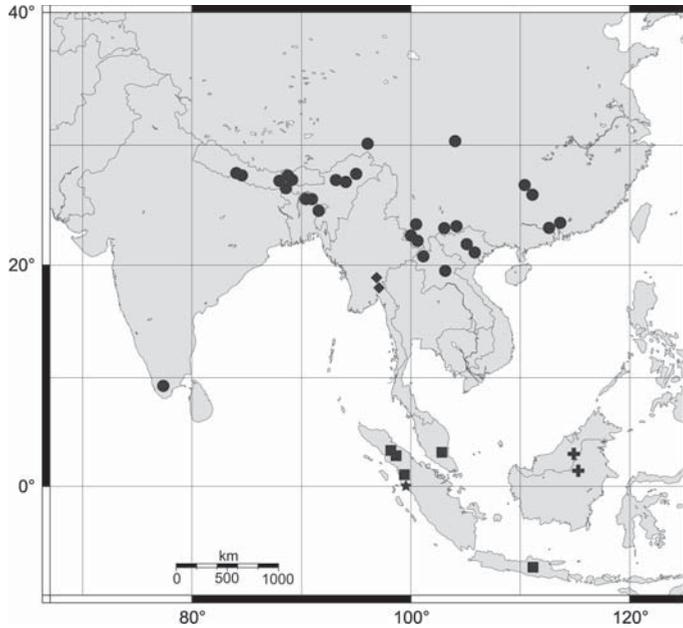
### *Nerthra eximia* TODD, 1957

(Fig. 9)

*Nerthra eximia* TODD, 1957: 153, 155–156. HOLOTYPE: female, Indonesia, Sumatra, 'Tanangataloo, Ophir-Sum. [= Mt. Ophir], 1915, A. de Kock' (RMNH).



**Fig. 8:** Distribution map of *Nerthra asiatica* (HORVÁTH, 1892) (circles), *N. spissa* (DISTANT, 1911) (rhombs), and *N. unguistyla* TODD, 1957 (squares).



**Fig. 9:** Distribution map of *Nerthra indica* (ATKINSON, 1889) (circles), *N. eximia* TODD, 1957 (asterisk), *N. lobata* (MONTANDON, 1897) (squares), *N. nieuwenhuisi* TODD, 1957 (crosses), and *N. serrata* (MONTANDON, 1897) (rhombs).

*Nerthra eximia*: TODD (1961a): 468 (catalogue, distribution); CHEN et al. (2005): 414 (catalogue: Malesia, distribution).

**Ecology.** Unknown.

**Distribution** (Fig. 9). Indonesia (West Sumatra) (TODD 1957).

**Discussion.** This species is only known from the female holotype. TODD (1957) wrote: 'It is very closely related to the preceding species [i.e. *N. nieuwenhuisi*] and may subsequently prove to be but a form of that species, but for the present I prefer to describe it as a separate species. This species agrees with *N. nieuwenhuisi* n. sp. and differs from *N. lobata* (MONTANDON), the only species previously reported from Sumatra, by the absence of lateral tumescences of the last visible abdominal sternite, by the strongly elevated scutellum, and by the greatest width of the pronotum being at the level of the transverse furrow. It differs from *N. nieuwenhuisi* n. sp. by its smaller size, differently shaped lateral margins of the pronotum, and differently shaped lateral margin of the embolium. It should be pointed-out, however, that the two sides of the pronotum of this specimen are not alike, and therefore differences of the shapes of the lateral margins of the pronota of the two species may not be significant in this instance. The facts that these are insular species and from different islands was another factor in my decision to treat this specimen as a separate species'. Further material is needed to improve our knowledge of *N. eximia* and to confirm its species status.

### *Nerthra indica* (ATKINSON, 1889)

(Figs 2, 6–7, 9–14, 17–20)

*Mononyx indicus* ATKINSON, 1889: 345. LECTOTYPE: male, India, Sikkim (OXUM). Designated by LANSBURY (1988).

*Mononyx indicus*: MONTANDON (1899a): 394, 397 (key, redescription, faunistics); DISTANT (1906): 15 (redescription, distribution); MAXWELL-LEFROY (1909): 709 (ecology); PAIVA (1919): 372 (ecology, faunistics).

*Nerthra indica*: TODD (1955): 350, 405–406, 466–467 (redescription, figure, taxonomy, key, catalogue, distribution, faunistics); TODD (1957): 152 (variability, faunistics); TODD (1961a): 469 (catalogue, distribution); TODD (1961b): 93–94 (taxonomy, figure, faunistics); NIESER (1977): 298 (faunistics); TODD (1977): 216 (faunistics); LANSBURY (1988): 248–250 (lecto-type designation, redescription); NIESER & CHEN (1992): 5–6, 10 (comparative note, figure, faunistics); POLHEMUS (1995): 24 (catalogue, distribution); THIRUMALAI (1998): 189–190, 192 (key, faunistics); HUA (2000): 214 (check-list: China); BAL & BASU (2003): 542–544 (key, diagnosis, distribution, faunistics).

*Mononyx projectus* DISTANT, 1911: 310–311 (description, figure, type locality). SYNTYPES(?): India, 'Assam, Sibsagar (Coll. Distant)' (BMNH).

*Mononyx projectus*: TODD (1955): 405–406 (taxonomy, synonymy).

*Mononyx turgidulus* DISTANT, 1911: 311–312 (description, figure, type locality). SYNTYPES(?): 'Nepal, Gowchar (Coll. Distant)' (BMNH).

*Nerthra turgidula*: TODD (1955): 406–407 (original description repeated); TODD (1961a): 474 (catalogue, distribution); TODD (1961b): 93–94 (taxonomy, synonymy); BAL & BASU (2003): 542–544 (key, diagnosis, distribution, faunistics).

*Nerthra arunachalensis* THIRUMALAI, 1998: 190–192 (description, key, figures, type locality), **nov. syn.** HOLOTYPE: male, India, Arunchal Pradesh, Julli village, Near Ganga, Itanagar, 6.viii.1991, D. B. Bastawade coll. ('The type material is deposited at Arunchal Pradesh Field Station, Zoological Survey of India, Itanagar and will be transferred to National Collections of Zoological Survey of India, Calcutta' [= NZSI] (THIRUMALAI 1998)). We did not examine the type.

**Material examined.** CHINA: NW FUJIAN, Wuyi Shan Mts., Kuatun, 27°40'N 117°40'E, 2300 m a.s.l., 19.iv.1938, 1 larva (instar 3), and 4.vi.1938, 1 male, J. Klapperich lgt. (NMPC); Kuatun, 18.vi.1946, 1 female; 24.vi.1946, 1 male; 25.vi.1946, 1 female; 27.vi.1946, 1 female; 28.vi.1946, 1 larva (instar 5); 2.vii.1946, 1 male; 15.vii.1946, 2 females, Tschung Sen lgt. (NMPC). S YUNNAN, '30 km SW Tszin'pina [= Pingbian], 370 m a.s.l., 13.vi.1956, 1 male, D. Panfilov lgt. (NMPC); 'okr. Cheli' [= Yunjinghong env.], 700 m a.s.l., 20.iv.1957, 1 male, 1 female, D. Panfilov lgt. (NMPC); YUNNAN, 'okr. Binbyanya' [= Pingbian env.], 700 m a.s.l., 29.vi.1956, 1 male, D. PANFILOV lgt. (NMPC); 'Daveyshan', okr. Binbyanya' [= Pingbian env., Daweishan Nature Reserve], 1350 m a.s.l., 23.vi.1956, 1 male, and 1500 m a.s.l., 22.vi.1956, 1 male, D. Panfilov lgt. (NMPC); Maguan [= Anping], 23°04'N 104°25'E, 1500–1600 m a.s.l., 25.–26.vi.1994, 2 males, 1 larva (instar 3), V. Kubáň lgt. (NMPC). INDIA: MEGHALAYA, Nokrek NP, 3 km S of Daribookgiri, 25°27'N 90°19'E, 1400 m a.s.l., 26.iv.1999, 1 female, Z. Košťál lgt. (ZJPC); 3 km E of Tura, 25°30'N 90°14'E, 500–1150 m a.s.l., 15.–22.v.1999, 1 female, Z. Košťál lgt. (ZJPC). SIKKIM, Phodong village env., 3000 m a.s.l., 28.v.2002, 1 female, P. Benda lgt. (PBPC); Tankhola, Tista R[iver], 19.ii.1920, 1 female, H. Stevens lgt., E. L. Todd det. (BMNH); E SIKKIM, Gantok [= Gangtok], 5000 ft, 6.v.1924, 1 female, R.W.G. Hingston lgt. (BMNH); Gangtok, 1.–4.v.1984, 1 male, A. Hamet lgt. (ZJPC); Gangtok env., Fambong-Lho forest, 2000–2500 m a.s.l., 8.–15.vii.1997, 1 female, J. Schneider lgt. (ZJPC); W SIKKIM, Peeling env., 2100 m a.s.l., 18.–20.vii.1997, 1 female, J. Schneider lgt. (ZJPC). WEST BENGAL, Darjeeling env., 2000–2400 m a.s.l., 4.–7.vii.1997, 1 male, J. Schneider lgt. (ZJPC); Kurseong [= Karsiyang], N.E. Himalayas, 5000 ft, 21.–29.v.[19]06, 1 male, N. Annandale lgt. (BMNH). LAOS: La Casade, 30 km from Xieng Khouang [= Xiangkhoang], 5.i.1918, 1 female, R.V. de Salvaza lgt. (BMNH); HUA PHAN province, Phu Phan Mt., 20°12'N 104°01'E, 1500–1800 m a.s.l., 20.–31.v.2007, 1 male, local collector lgt. (NMPC); LOUANGNAMTHA province, Namtha → Muang Sing, 21°09'N 101°19'E, 900–1200 m a.s.l., 5.–31.v.1997, 1 male, 1 female, V. Kubáň lgt. (MMBC). NEPAL: Kimpti Kola, 2000 m a.s.l., 31.x.1961, 1 female, Gruber lgt. (NMPC). NARAYANI province, Chitwan district, Sauraha, 20.–25.v.1992, 1 male, I. Jeniš lgt. (ZJPC); Royal Chitwan National Park, 7.5 km of NW Sauraha, Rapti river-side, 27°34'N 84°24'E, 180 m a.s.l., 19.vi.2005, 1 female, M. Hartmann lgt. (NMEG); Sauraha SW, Rapti river, bank, 27°34'80"N 84°29'49"E, 18.iv.2000, 1 larva (instar 5), A. Weigel lgt. (NMEG). VIETNAM: TONKIN, Huong By, May 1916, 1 male, R.V. de

Salvaza lgt. (BMNH). VINH PHUC province, Tam Dao, 3.–11.vi.1985, 1 male, 1 female, and 27.v.–2.vi.1986, 1 male, 1 larva (instar 4), V. Švihla lgt. (NMPC); Tam Dao, 890 m a.s.l., 18.v.2007, 1 male, 2 females, V. Socha lgt. (NMPC, VSPC).

**Variability of adults.** Males ( $n = 20$ ): For measurements see Table 1. In 17 males the pronotum was wider than maximal abdomen width (ratios (mm): 7.1 : 6.7, 7.0 : 6.6, 6.8 : 6.3, 6.7 : 6.3, 6.6 : 6.4, 6.6 : 6.3 (3x), 6.5 : 6.2, 6.5 : 6.1, 6.4 : 6.3, 6.4 : 6.2 (2x), 6.3 : 6.0, 6.3 : 5.9, 6.0 : 5.9, 5.8 : 5.6), while in three remaining males the ratio was equal (6.6 : 6.6, 6.3 : 6.3, 6.1 : 6.1). Females ( $n = 20$ ): For measurements see Table 1. In eight females the pronotum was wider than maximal abdomen width (ratios 7.6 : 7.4, 7.5 : 7.4, 7.5 : 7.1, 7.4 : 7.3, 7.4 : 7.1, 7.2 : 7.1, 6.9 : 6.6, 6.8 : 6.7), in four females the ratio was equal (7.8 : 7.8, 7.6 : 7.6, 6.8 : 6.8, 6.7 : 6.7), and in eight females the pronotum was narrower than abdomen (ratios 7.5 : 7.6, 7.1 : 7.6, 7.0 : 7.1 (2x), 6.6 : 6.8, 6.6 : 6.7, 6.4 : 6.7, 6.4 : 6.6).

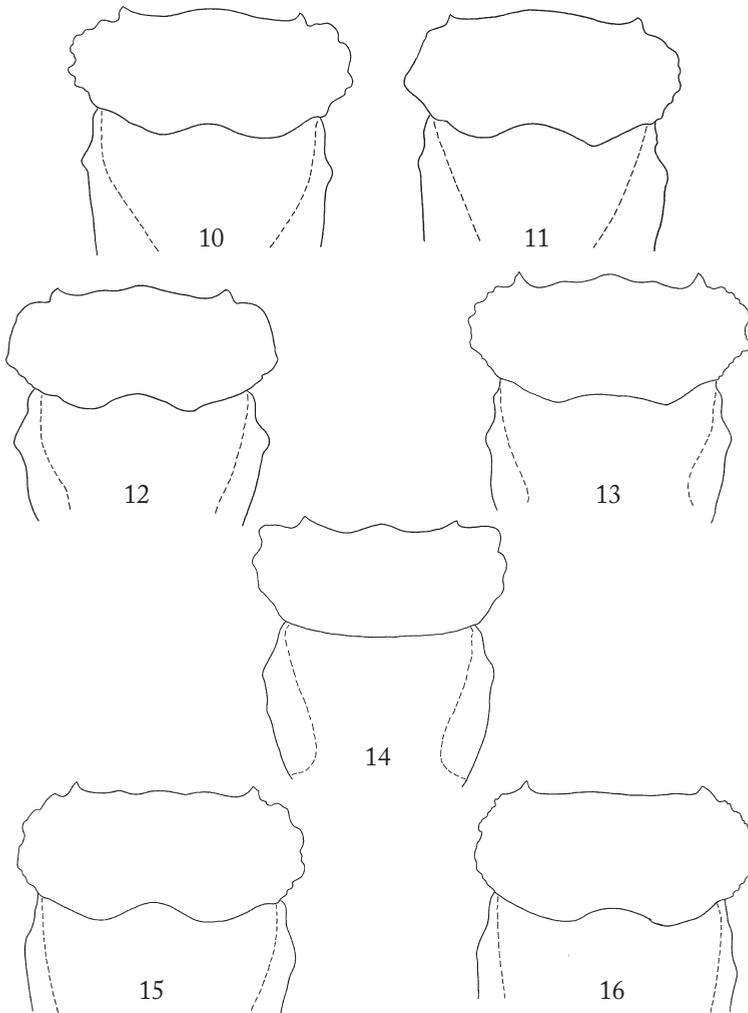
Body brown, with variable yellowish, grayish or reddish colouring, often obscured by muddy crust. We found extreme morphological variability in *N. indica*, especially body sculpture, and outlines of the pronotum, hemelytra, and abdomen. In particular, we did not find two specimens with exactly the same shape of pronotum. Moreover, in 23 of 40 examined specimens the lateral margins of the pronotum were markedly asymmetrical (see Figs 2, 10–13). On the other hand, all males shared the same paramere shape (Figs 17–19). In all investigated females the outline of the ovipositor was the same and the ventral submarginal tumescences on the last visible abdominal sternite were absent.

**Description of 5<sup>th</sup> instar larva** (Fig. 6). Body brown, thorax laterally and legs pale brown; body covered with sparse pale clavate setae; upper surface partly covered with muddy crust. Head with three tubercles in front of eyes (one high, conical on each side, one smaller, conical to flat medially); two low elevations on vertex between eyes. Pronotum flattened laterally, strongly elevated medially; lateral margins rounded and expanded laterally, deeply incised before anterior angles, bearing sparse clavate setae; posterior margin bisinuous (slightly convex laterally and medially, slightly concave submedially).

**Table 1.** *Nerthra asiatica* (HORVÁTH, 1892), *N. indica* (ATKINSON, 1889), and *N. nieuwenhuisi* TODD, 1957 – measurements of adults.

	Total body length (mm)	Head width (mm)	Inter-ocular width (mm)	Pronotum length (medially) (mm)	Maximal pronotum width (mm)	Abdomen width (across connexivum) (mm)
<i>N. asiatica</i>						
female ( $n = 2$ )	11.3–11.6	4.3–4.6	2.5–2.6	3.1–3.2	7.3–8.0	8.2–8.5
<i>N. indica</i>						
male ( $n = 20$ )	8.5–9.4	3.7–4.3	1.8–2.1	2.5–2.9	5.8–7.1	5.6–6.7
female ( $n = 20$ )	9.2–10.7	3.9–4.4	1.8–2.2	2.6–3.3	6.4–7.8	6.6–7.8
<i>N. nieuwenhuisi</i>						
male ( $n = 2$ )	10.2–10.5	4.2–4.3	1.9–2.0	2.7–3.0	7.0–7.2	6.6–6.7

Mesonotum laterally flattened, medially elevated and projected posteriorly, bearing three distinct tubercles (one apically, two subapically) and shallow depression among them. Mesonotal wing pads large, flattened, expanded laterally, reaching anterior margin of abdominal tergite III, bearing sparse row of pale clavate setae on lateral margin. Metanotum anteriorly covered by mesonotum, posterior margin straight, metanotal wing pads completely covered by mesonotal ones. Abdominal tergites convex, decreasing towards connexivum; connexivum with lateral margins slightly turned upwards, forming shallow



**Figs 10–16:** Variability of pronotum and hemelytra outline. 10–13. *Nertbra indica* (ATKINSON, 1889): 10–11 – males from China, Maguan; 12 – female from India, Fambong Lho forest; 13 – female from India, 3 km E of Tura. 14 – *N. arunachalensis* THIRUMALAI, 1998, male, holotype (according to THIRUMALAI 1998). 15–16 – *N. nieuwenhuisi* TODD, 1957, males from Malaysia, Mt. Malang.

groove between tergites and connexivum; lateral margin of connexival segments rounded medially, bearing long clavate setae; connexival outline thus undulating. Tergite I medially projected posteriorly and elevated, bearing dense group of stout, black clavate setae on each side of the projection (in one specimen missing, probably rubbed off); however, dorso-abdominal scent gland (DAG) ostioles not apparent. No trace of DAG ostioles observed on remaining tergites. Measurements: see Table 2.

**Description of 4<sup>th</sup> instar larva.** Generally similar to instar 5, if not stated otherwise. Pronotum: posterior margin only slightly bisinuous. Mesonotum laterally flattened, medially slightly elevated and projected posteriorly, without tubercles, but with shallow depression subapically; posterior margins slightly bisinuous; mesonotal wing pads not developed, however, lateral margins flattened and expanded laterally. Metanotum narrower than mesonotum, laterally flattened but not expanded, wing pads not developed. Tergite I medially projected posteriorly and elevated, dense group of stout, black clavate setae on each side of the projection not present (possibly damaged). Measurements: see Table 2.

**Description of 3<sup>rd</sup> instar larva** (Fig. 7). Generally similar to instar 5, if not stated otherwise. Head with three small tubercles in front of eyes (one laterally on each side, one medially; the lateral ones not much higher than median one). Pronotum: posterior margin slightly convex. Mesonotum depressed laterally, lateral margins expanded and rounded; posterior margin almost straight, slightly convex medially. Metanotum narrower than mesonotum, laterally narrowly flattened, not expanded. Tergite I medially projected

**Table 2.** *Nerthra asiatica* (HORVÁTH, 1892) and *N. indica* (ATKINSON, 1889) – measurements of larvae.

	Total body length (mm)	Head width (mm)	Inter-ocular width (mm)	Head height (mm)	Thorax length (mm)	Pronotum length (mm)	Pronotum width (mm)	Mesonotum width (mm)	Abdomen length (mm)	Abdomen width (mm)	Metatibia length (mm)
<b><i>N. ASIATICA</i></b>											
<b>4th instar</b>											
Sichuan: Jiulonggou	7.1	3.3	1.6	1.6	3.3	1.8	5.2	5.5	3.2	5.3	2.5
<b><i>N. INDICA</i></b>											
<b>3rd instar</b>											
Yunnan: Maguan	4.5	2.4	1.1	1.2	2.0	1.3	3.7	3.8	2.1	3.2	1.7
Fujian: Kuatun	4.7	2.5	1.1	1.2	2.2	1.4	3.8	4.0	2.2	3.7	1.3
<b>4th instar</b>											
Vietnam: Tam Dao	6.1	3.1	1.4	1.6	2.9	1.9	5.0	5.2	2.6	4.8	2.4
<b>5th instar</b>											
Fujian: Kuatun	7.4	3.4	1.6	1.7	3.5	2.1	5.6	5.9	3.1	5.7	3.1
Nepal: Sauraha	8.1	3.6	1.8	2.1	3.6	2.3	6.1	6.4	3.5	6.2	3.3

posteriorly and elevated, dense group of stout, black clavate setae on each side of the projection not present (possibly damaged). Measurements: see Table 2.

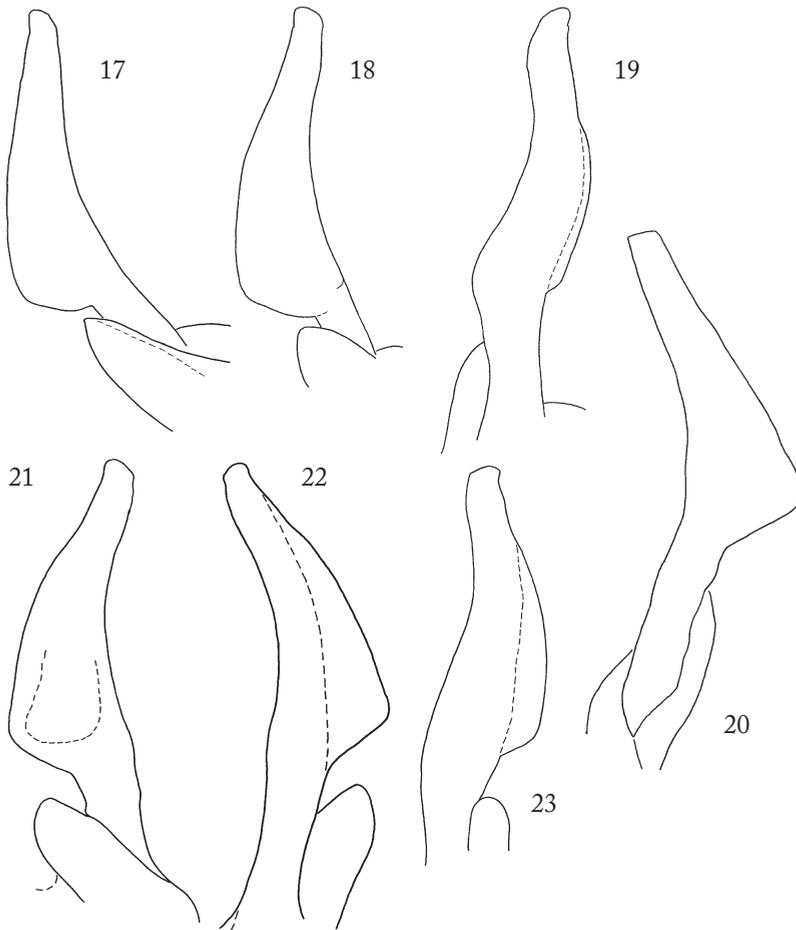
**Differential diagnosis of larva.** The studied larvae were found in association with adults of *N. indica*. They differs from larvae of *N. asiatica* in the following characters: head with three tubercles in front of eyes (one laterally on each side, one medially); pronotum strongly elevated medially, lateral margins expanded laterally, rounded, deeply incised before anterior angles; metanotum laterally expanded and rounded; lateral margins of connexival segments rounded medially, connexival outline undulating.

**Ecology.** MAXWELL-LEFROY (1909) characterized *N. indica* as follows: 'it is found on grass paths, on the soil and under stones, as well as on hard roads; it is not aquatic and is possibly predaceous on small insects'.

According to TODD (1961b) it was collected between 600–5000 ft [= 183–1524 m a.s.l.] in Darjiling. Our records from Sikkim and West Bengal extends its altitudinal limit to 3000 m a.s.l.

**Distribution.** Bangladesh (Sylket [= Sylhet] – TODD (1955)). Burma (LANSBURY 1988 – no exact record). China: Fujian (this paper), Guangdong (NIESER 1977; TODD 1977), Guangxi (NIESER & CHEN 1992), Guizhou (NIESER & CHEN 1992), Sichuan (NIESER & CHEN 1992), ?Tibet (NIESER & CHEN 1992), Yunnan (NIESER & CHEN 1992). India: Arunachal Pradesh (THIRUMALAI 1998), Assam (TODD 1955, 1957; NIESER 1977; LANSBURY 1988), Meghalaya (PAIVA 1919; BAL & BASU 2003), Sikkim (MONTANDON 1899a; TODD 1957; LANSBURY 1988; BAL & BASU 2003), Tamilnadu (THIRUMALAI 1998, this outlying record needs confirmation), West Bengal (MONTANDON 1899a; TODD 1961b). Laos (new record). Nepal (DISTANT 1906). Vietnam (TODD 1957 – Tonkin, no exact locality; here confirmed).

**Discussion.** *Nerthra indica* is a highly variable species. TODD (1957) wrote: 'The specimens from Tonkin differ slightly in the shape of the lateral margin of the pronotum which appears more like the margin of the pronotum of *N. lobata* (MONTANDON), but the absence of lateral tumescences on the last visible abdominal sternite of the female and shape of the clasper of the male reveal their relation to *N. indica* (ATKINSON)'. TODD (1961b) gave the following size ranges: 'Male: Length, 8.2 to 9.1 mm; width of pronotum, 5.5 to 6.7 mm; width of abdomen, 5.7 to 6.4 mm. Female: Length, 8.5 to 10.2 mm; width of pronotum, 6.4 to 7.8 mm; width of abdomen, 6.4 to 8.4 mm'. Further he stated: 'The specimens under consideration verify the fact that both sexes are extremely variable in the relative widths of the pronotum and abdomen. In some instances the pronotum is wider, in others the abdomen is the wider. Correspondingly, the width of the connexivum is also variable. The species is laso variable in the shape of the lateral margin of the pronotum, but those presently studied have that part less irregular in shape than in those specimens previously studied and in a few instances the specimens from the Darjiling area agree with the illustration of *Mononyx turgidulus* DISTANT in the shape of the margin. Therefore, I have placed that name in the synonymy of *indica*' (TODD 1961b). LANSBURY (1988), redescribing the syntype series, presented the following measurements: 'Males: 9–9.6 mm long; pronotal width 6.5 mm; abdominal



**Figs 17–23:** Parameres in different views. 17–19. *Nerthra indica* (ATKINSON, 1889), male from Laos, Namtha → Muang Sing. 20 – *N. arunachalensis* THIRUMALAI, 1998, male, holotype (according to THIRUMALAI 1998). 21–23 – *N. nieuwenhuisi* TODD, 1957, male from Malaysia, Mt. Malang.

width 6.3–6.4 mm; head width 4–4.1 mm; width between eyes 2 mm. Females: 9.4–10 mm long; pronotal width 6.9–7.1 mm; abdominal width 6.8–7.0 mm; head width 4–4.1 mm; width between eyes 2–2.1 mm.’ THIRUMALAI (1998) gave measurements of one female from southern India, Tamilnadu: ‘Length 10.0 mm; width of pronotum 7.7 mm; width of abdomen 8.2 mm’. These above mentioned characters well correspond with the observations we made on our material.

THIRUMALAI (1998) described a new species, *N. arunachalensis*, based on one male (holotype) and one female (paratype) from Arunachal Pradesh, northern India. In his key he distinguished *N. arunachalensis* and *N. indica* from *N. asiatica* and *N. spissa* by having the ‘lateral margin of pronotum broadly sinuous’. Both species differ in ‘lateral margin of pronotum projecting beyond the base of embolium’ in *N. arunachalensis*, and ‘lateral

margin of pronotum projecting not beyond the base of embolium' in *N. indica*. Further he wrote: '*N. arunachalensis* is close to *N. indica* (ATKINSON) and *N. serrata* (MONTANDON) in general appearance, but differs distinctly in the nature of pronotum [Fig. 14], ventral abdominal segments, and male paramere [Fig. 20], and other characters mentioned in the text'. He gave the following measurements of *N. arunachalensis*: 'Male: Length, 8.3 mm., width of the pronotum, 6.2 mm., width of abdomen, 5.9 mm., Female: 9.4 mm., width of the pronotum, 7.1mm., width of abdomen, 6.9 mm. [sic!]' THIRUMALAI (1998) listed only following references – ATKINSON (1889), DISTANT (1906, 1911), and TODD (1955), being completely unaware of all papers pointing-out the variability of *N. indica* (TODD 1957, 1961b; LANSBURY 1988; NIESER & CHEN 1992), as well as the existence of another endemic Indian species *N. unguistyla*.

We have compared the description, figures and measurements of *N. arunachalensis* given by THIRUMALAI (1998) with available series of *N. indica* and other published data on its variability (see above). This revealed, that *N. arunachalensis* fits in all aspects (including geographical distribution) within the range of variation of *N. indica*. On this basis we regard *N. arunachalensis* to be a junior subjective synonym of *N. indica*.

The shape of male paramere has been represented in previous works as being variable, but we regard this as an artefact of the rendering of the illustrations (TODD 1959, 1961b; LANSBURY 1988; NIESER & CHEN 1992; THIRUMALAI 1998). However, we found that by rotating the extracted pygophore with the left paramere exposed, we reconcile our observations with those of the above mentioned authors (see also Figs 17–20).

### *Nerthra lobata* (MONTANDON, 1899)

(Figs 3, 9)

*Mononyx lobatus* MONTANDON, 1899a: 394, 397–398. SYNTYPES: Indonesia, 'Sumatra, Panghe-rang Pisang (E. Modigliani)' (MCSN, coll. Montandon (currently in BMNH)) & 'Java' (NHMW).

*Nerthra lobata*: TODD (1955): 350, 407–409, 466–467 (redescription, figures, key, catalogue, distribution, faunistics); TODD (1957): 153–154 (figure, distribution, faunistics); TODD (1961a): 469 (catalogue, distribution); NIESER (1977): 298 (faunistics); CHEN et al. (2005): 414 (catalogue: Malesia, distribution); BUZZETTI et al. (2006): 32 (distribution, faunistics).

**Material examined. INDONESIA:** WEST SUMATRA, Gugul, 12 km W from Padangpanjang, iv.–v.1992, 3 females, local collector lgt. (NMPC, ZJPC). **MALAYSIA:** PAHANG, Sungai Taban, 24.iv.1922, 1 female, H.M. Pendelbury lgt., coll. F.M.S. Museum, E.L. Todd det. (BMNH).

**Ecology.** Unknown.

**Distribution** (Fig. 9). Indonesia: Java (MONTANDON 1899a), Sumatra (MONTANDON 1899a; TODD 1955; NIESER 1977; BUZZETTI et al. 2006). Malaysia: Pahang (TODD 1957).

*Nerthra macrothorax* (MONTROUZIER, 1855)

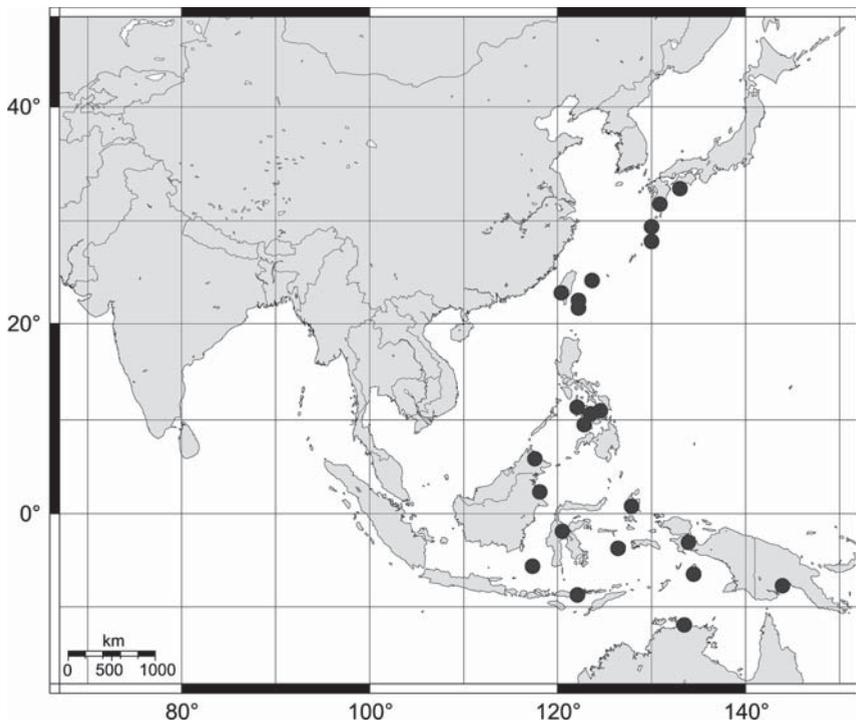
(Fig. 24)

*Galgulus macrothorax* MONTROUZIER, 1855: 110–111 (description, type locality). HOLOTYPE (probable): Papua New Guinea, Woodlark Is. (MNHN) (see ANDERSEN & WEIR 2004; POLHEMUS (1995) gave the type material as syntype(s)).

*Scyllaeus macrothorax*: STÅL (1861): 201 (generic placement); STÅL (1876): 139 (catalogue, distribution).

*Peltopterus macrothorax*: STÅL (1863): 408 (catalogue, distribution); STÅL (1865): 173 (comparative note); STÅL (1871): 610, 706 (check-list: Philippines); MONTANDON (1899b): 779–780 (redescription, faunistics); KIRKALDY (1906): 150 (catalogue of genera); ESAKI (1928): 75 (faunistics); OHSHIMA (1933): 410 (faunistics); SONAN (1934): 21–22 (faunistics); ESAKI (1936): 43 (faunistics); HOFFMANN (1941): 44–45 (catalogue, distribution); MIYAMOTO (1953): 35 (faunistics); MIYAMOTO (1954): 28 (faunistics).

*Nerthra macrothorax*: TODD (1955): 348, 414–416, 468–473 (redescription, figures, key, catalogue, distribution, faunistics); TODD (1957): 157 (faunistics); TODD (1959): 63–64, 67, 69–71 (figures, key, comparative note, synonymy, catalogue, ecology, distribution, faunistics); TODD (1960a): 172, 176–177, 192 (figures, key, comparative note, synonymy, catalogue, distribution, faunistic); TODD (1960b): 116 (ecology, faunistics); TODD (1961a): 470 (cata-



**Fig. 24:** Distribution map of *Nerthra macrothorax* (MONTROUZIER, 1855) in south-east Asia and adjacent parts of Malesia and Australia.

logue, distribution); POPOV (1971): 70 (figure); POLHEMUS (1976): 240 (ecology); NIESER (1977): 299 (faunistics); TODD (1977): 216 (faunistics); MIYAMOTO & YASUNAGA (1989): 156 (check-list: Japan); CASSIS & GROSS (1995): 86–87 (catalogue: Australia, distribution, faunistics); POLHEMUS (1995): 24 (catalogue, distribution); NIESER & CHEN (1999): 94 (key, distribution); HUA (2000): 214 (check-list: Taiwan); ANDERSEN & WEIR (2004): 273, 275, 279–280, 336 (key, figures, distribution); CHEN et al. (2005): 414 (catalogue: Malesia, distribution); NIESER & CHEN (2005): 308 (diagnosis, ecology, distribution, faunistics); CASSIS & SILVEIRA (2006): 145 (distribution, zoogeography); EVENHUIS & POLHEMUS (2006): 4 (check-list: Fiji).

**Ecology.** According to TODD (1959) it ‘has been found burrowing in rotten *Pandanus* logs. This activity may be important in the distribution of the species as such debris could easily drift from one island to another through the action of storms and ocean currents’. TODD (1960b) reported additional findings of this species ‘under *Pandanus* and decaying leaves of *Erythrina indica* near the sea shore’ on Philippine Islands of Cebu and Negros. NIESER & CHEN (2005) observed these toad bugs burrowing in the sand on a beach in the south of Taiwan. The possible transmarine transport with plant debris is a reasonable explanation for its wide distribution throughout the Indo-Pacific region (e.g., POLHEMUS 1976).

**Distribution** (Fig. 24). Widely distributed across Indian and Pacific Oceans. South-east Asia: China: Taiwan (ESAKI 1928; SONAN 1934; HUA 2000; NIESER & CHEN 2005), Lu Dao Island (= Green Island, Kasho To Island) (TODD 1957), Lan Yu Island (= Orchid Island, Koto Sho Island) (TODD 1957). Indonesia: East Kalimantan: Maratua Island (TODD 1957). Japan: Ryukyu Islands: Yaeyama Island, Kikai-Shima Island, Tokara Group (Takajimi Island); Kyushu: Osumi; Shikoku: Satano Misaki [= Ashizuri-misaki] (ESAKI 1928, 1933, 1936; OHSHIMA 1933; MIYAMOTO 1953, 1954). ?Malaysia: Sabah (North Borneo – MONTANDON 1899b). Further distribution: Comoro Islands: Mayotte Island; ?Tanzania; Indonesia: Aru Island, Buru, Flores, Halmahera, Irian Jaya, Kei Islands [= Kepulauan Kai], Postiljon [= Sablana] Islands, Sulawesi; Philippines: Biliran, Cebu, Leyte, Negros, Panay; Mariana Islands; Caroline Islands; Australia: Northern Territory; Papua New Guinea: incl. New Britain and other adjacent islands; Solomon Islands; Fiji; Tonga; Samoa (e.g., MONTANDON 1899b; ESAKI 1928; TODD 1955, 1957, 1959, 1960a, 1960b, 1961a; NIESER 1977; CASSIS & GROSS 1995).

### *Nerthra nieuwenhuisi* TODD, 1957

(Figs 4, 9, 15–16, 21–23)

*Nerthra nieuwenhuisi* TODD, 1957: 153–155. HOLOTYPE: female, Indonesia, ‘Borneo, Boven, (upper) Mahakkam River, 1894, Borneo Exped., Dr. Nieuwenhuis’ (RMNH).

*Nerthra nieuwenhuisi*: TODD (1961a): 471 (catalogue, distribution); CHEN et al. (2005): 414 (catalogue: Malesia, distribution).

**Material examined. MALAYSIA:** Sarawak, Mt. Malang, 2500 ft, 1 male, B. Mjoberg lgt., Ex F.M.S. Museum, B.M. 1955–354 (BMNH); Malang, April 1904, 1 male, Ex F.M.S. Museum, B.M. 1955–354 (BMNH).

**Description of male** (Fig. 4). Colouration: Ground colour orange-brown, scutellum, median elevation on anterior part of pronotum and head between eyes with blackish spots, abdominal sternites (except their orange-brown outer margins), apices of femora, entire tibiae and tarsi blackish; membrane of the same colour as rest of hemelytra, or slightly darker. The structure of the two examined males fits well to description of female by TODD (1957). We found the following structural differences: lateral margins of pronotum variable, from almost regularly rounded (Fig. 15) to median and posterior portions nearly straight (Fig. 16); lateral margin of embolium only slightly expanded laterally, regularly rounded (Figs 4, 15–16); and connexivum less prominent than in female, only five abdominal segments visible. Paramere as in Figs 21–23. Measurements ( $n = 2$ ): Body length 10.2 / 10.5 mm; head width 4.2 / 4.3 mm; inter-ocular width 1.9 / 2.0 mm; head height 2.4 / 2.5 mm; pronotum length (medially) 2.7 / 3.0 mm; (maximal) pronotum width 7.2 / 7.0 mm; (maximal) abdomen width (across connexivum) 6.7 / 6.6 mm, respectively (see also Table 1). Pronotum slightly wider than abdomen (ratios 7.2 : 6.7 and 7.0 : 6.6).

**Differential diagnosis.** This species was previously known only from the female holotype (TODD 1957).

TODD (1957: 155) wrote: 'It is slightly larger than *N. asiatica* (HORVÁTH), from which it may be easily separated by the dilated margin of the embolium, distinctive lateral margin of the pronotum, and proportionally longer hind legs. The size, shape of the lateral dilation of the embolium, and the shape of the lateral margin of the pronotum will separate this species from the other species of the *grandicollis* group.' According to TODD (1957: 156) *N. nieuwenhuisi* is 'very closely related' to *N. eximia* 'and may subsequently prove to be but a form of that species'. This species is differentiated from other south-eastern Asian species of the *N. grandicollis*-group, as follows: i) from *N. asiatica* it differs in the shape of pronotum, outer margin of embolium laterally expanded, and the number and shape of tubercles on the head; ii) from *N. spissa* and *N. unguistyla* it mainly differs in the shape of the left paramere, and iii) from *N. unguistyla* in its well-developed hemelytral membrane. According to external characters and the shape of the paramere (if known), *N. nieuwenhuisi* is most similar to *N. indica*, *N. lobata*, *N. serrata*, and *N. eximia*. From these species it differs in the combination of the following characters: body orange-brown, apices of femora, entire tibiae and tarsi blackish; a combination not observed in any other studied *Nerthra* species from south-eastern Asia. Furthermore, *N. nieuwenhuisi* is similar to *N. eximia* in that the scutellum is strongly elevated, distinguished from *N. indica* in which the scutellum is moderately elevated, and from *N. lobata*, where the scutellum is distinctly depressed basally. *Nerthra nieuwenhuisi* can be separated from the other species by the less expanded lateral margin of embolium, the shape of lateral margin of pronotum, and absence of lateral submarginal tumescences ventrally on the last visible abdominal sternite of female. The latter, are well developed in *N. lobata*, and

are also absent in *N. indica* and *N. eximia*, and by the shape of the left paramere. The left paramere (Figs 21–23) is very similar to that of *N. indica* (Figs 17–19) and *N. lobata* (see TODD (1955): 467), but differs from them being slightly shorter and wider basally. The female of *N. nieuwenhuisi* should be distinguishable also by its large size (holotype: body length 12.5 mm, pronotum width 8.5 mm, abdomen width 8.3 mm) (see TODD 1957).

**Ecology.** Unknown.

**Distribution** (Fig. 9). Indonesia: Kalimantan Timur (TODD 1957). Malaysia: Sarawak (new record).

### *Nerthra serrata* (MONTANDON, 1897)

(Fig. 9)

*Mononyx serratus* MONTANDON, 1897: 365–366 (description, type locality). SYNTYPES (both sexes): Burma, ‘Carin Chebà, Carin Ghecù’ [‘Type localities Carin Ghecù and Carin Cheba are now known to be in that section of Burma between the Salwin and Sittang rivers, east and northeast of Toungoo.’ (TODD 1957)] (MCSN, ZMUH, coll. Montandon (? currently in BMNH)).

*Mononyx serratus*: MONTANDON (1899a): 394, 396 (key); DISTANT (1906): 15 (redescription, figure, faunistics).

*Nerthra serrata*: TODD (1955): 408–410 (original description repeated, comparative note); TODD (1957): 152 (note on type localities); TODD (1961a): 473 (catalogue, distribution); THIRU-MALAI (1998): 192 (comparative note).

**Ecology.** Unknown.

**Distribution** (Fig. 9). Burma (MONTANDON 1897; DISTANT 1906; TODD 1957).

**Discussion.** MONTANDON (1899a) gave an extensive description of the species; however, he did not compare it with any other species, stating only: ‘La forme très dilatée du pronotum, le lobe de la marge élytrale et les sinuosités du connexivum permettront de reconnaître facilement cette espèce.’ [= Very enlarged shape of pronotum, lobe of the elytral margin, and the sinuosity of connexivum enable an easy identification of this species]. DISTANT (1906) diagnosed the species and provided a habitus figure of a syntype (probably male). TODD (1955) repeated the original description in verbatim with statement: ‘The writer has not seen this species or at least has not been able to recognize it’. Nevertheless, TODD (1955: 408–409) discussed the status of *N. serrata* as follows: ‘It may be that *N. serrata* (MONTANDON) will prove to be this species [= *N. lobata*] in which case *Nerthra lobata* (MONTANDON) would fall as a synonym since it was described two years after the former species. Doctor R.L. USINGER examined the clasper of the type of *N. serrata* (MONTANDON) and is of the opinion that it is the same as my drawing of the clasper of *N. lobata* (MONTANDON). MONTANDON’s description of *N. serrata* states that the pronotum laterally is very dilated and that the segments of the connexivum are concave. None of the specimens I have examined are of this nature. For that reason and because both species were described by MONTANDON, this writer prefers to retain both species

until more specimens can be examined.' (TODD 1955). So far, the types of *N. serrata* have never been reexamined and redescribed, and identity of the species is unclear.

***Nerthra spissa* (DISTANT, 1911)**

(Fig. 8)

*Mononyx spissus* DISTANT, 1911: 312–313 (description, figure, type locality). LECTOTYPE: male, India, Assam, 'Sibs. [= Sibsagar] 6257', 'Distant coll 1911–383' (BMNH). Designated by NIESER & CHEN (1992).

*Mononyx spissus*: CHAKRABARTY et al. (1994): 2, 24–25 (diagnosis, faunistics).

*Nerthra spissa*: TODD (1955): 350, 411–412, 466–467 (redescription, figure, key, catalogue, distribution, faunistics); TODD (1961a): 473 (catalogue, distribution); NIESER & CHEN (1992): 6 (lectotype designation, figure); THIRUMALAI (1998): 190, 192 (key, faunistics).

**Ecology.** Unknown.

**Distribution** (Fig. 8). India: Arunachal Pradesh (CHAKRABARTY et al. 1994; THIRUMALAI 1998), Assam (TODD 1955; NIESER & CHEN 1992).

**Discussion.** This species is so far known from the males only. For further comments on its status see Discussion under *N. asiatica*.

***Nerthra unguistyla* TODD, 1957**

(Figs 8, 25)

*Nerthra unguistyla* TODD, 1957: 152–154. HOLOTYPE: male, South India, Mayavaram, 8.x.1945, P.S. NATHAN lgt. (J.C. LUTZ collection, currently in USNM).

*Nerthra unguistyla*: TODD (1961a): 474 (catalogue, distribution); TODD (1977): 217 (faunistics).

**Material examined. INDIA:** TAMILNADU, Coimbatore, ii.1950, 1 male, 1 female; 1.iv.1950, 1 female; iv.1950, 1 female, P.S. Nathan lgt. (NMPC).

**Ecology.** Unknown.

**Distribution** (Fig. 8). India: Pondicherry (TODD 1977), Tamilnadu (TODD 1957).

**Discussion.** This species differs substantially from all remaining species of *N. grandicollis* species-group lacking the hemelytral membranes (TODD 1957).



**Fig. 25:** Habitus of *Nerthra unguistyla* TODD, 1957, female from India, Coimbatore (10.4 mm length) (Photo: Jan Macek).

[*Nerthra grandicollis* (GERMAR, 1837)]

*Mononyx grandicollis* [sic!]: HUA (2000): 214 (checklist: China – Hongkong).

**Discussion.** Afrotropical species (e.g., TODD 1959, 1961a). The record from Hongkong (HUA 2000) is apparently erroneous.

## DISCUSSION

At present, nine species of *Nerthra* are known from south-eastern Asia west of Wallace's line. TODD (1955) synonymized all previously described genera of Nerthrinae with *Nerthra*, establishing eight informal species-groups. To this, CASSIS & SILVEIRA (2004) add a ninth species-group to accommodate the endemic Western Australian species *N. tuberculata* MONTANDON 1899. Two of these species-groups occur also in south-eastern Asia, the *N. rugosa* (DESJARDINS, 1837) species-group and the *N. grandicollis* species-group.

The *N. rugosa* species-group, comprised of four species, is distributed in coastal areas of tropical and subtropical regions (especially in eastern Pacific) (see TODD 1955; CASSIS & SILVEIRA 2006), is represented by single species – *N. macrothorax*.

The remaining eight species belong to the *N. grandicollis* species-group, including nine species: *N. grandicollis* (widely distributed in Afrotropical region and Madagascar), *N. asiatica* (south-eastern China, northern India), *N. eximia* (Sumatra), *N. indica* (widely distributed from south-eastern China to southern India, Laos, and Vietnam), *N. lobata* (Java, Sumatra, Malayan Peninsula), *N. nieuwenhuisi* (Borneo), *N. serrata* (Burma), *N. spissa* (northern India), and *N. unguistyla* (southern India).

Most families of Nepomorpha and Gerromorpha are species rich in south-eastern Asia, with many newly described species every year (see e.g. CHEN et al. 2005). In contrast, the diversity of Gelastocoridae in this region is apparently low. Taking the possible synonymies of *N. spissa* with *N. asiatica* and *N. serrata* with either *N. lobata* or *N. indica* into account, the number of described species from south-eastern Asia is less diverse, and we have found no evidence of new species. However collections of toad bugs from southeast Asia are limited, and additional survey, especially from Burma, Thailand, Cambodia, Malayan Peninsula, Borneo, Sumatra, and southern India, are needed to determine this hypothesis.

The larval morphology of Gelastocoridae is poorly studied and the identity of the larvae of most species remains unknown. So far, all five instars of only two species were described in detail and illustrated – Nearctic *Gelastocoris oculus oculus* (FABRICIUS, 1798) (HUNGERFORD 1919, 1922; BROWN & MCPHERSON 1994) and Neotropical *Nerthra ranina* (HERRICH-SCHAEFFER, 1853) (ESTÉVEZ & SCHNACK 1978). Further, only MELIN (1929) shortly described and illustrated larvae of two species of *Gelastocoris* and four species of *Nerthra* from South America, and CASSIS & SILVEIRA (2001) gave descriptions of larvae of five Australian species belonging to the *N. alaticollis* (STÅL, 1854) species-group.

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## РЕЗЮМЕ

Направена е ревизия на 9 вида от род *Nerthra* SAY, 1832 (Hemiptera: Heteroptera: Gelastocoridae: Nerthrinae), срещащи се в Югоизточна Азия, западно от Уолесовата линия. Описани са мъжките на *N. niuewenhuisi* TODD, 1957, четвърта възраст ларва на *N. asiatica* (HORVÁTH 1892), трета, четвърта и пета възраст ларви на *N. indica* (ATKINSON, 1889), и са илюстрирани за първи път. Предложена е нова синонимия на *Nerthra indica* (ATKINSON, 1889) = *N. arunachalensis* THIRUMALAI, 1998 и накратко е обсъдена изменчивостта на *N. indica*. За първи път са съобщени с точни находки на *N. niuewenhuisi* от Сарабак (Малайзия), и *N. indica* от Фугзян (Кумаї), Лаос и Виетнам.

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