

TWO NEW *CHELONOCORIS* SPECIES  
FROM BORNEO AND SUMATRA  
(HEMIPTERA, HETEROPTERA, ARADIDAE)

TAMÁS VÁSÁRHELYI

*Hungarian Natural History Museum, 1088 Budapest, Baross u. 13., Hungary,  
E-mail: [tvasarhelyi@gmail.com](mailto:tvasarhelyi@gmail.com), <https://orcid.org/0000-0002-1103-0454>*

*Chelonocoris bakonyii* sp. n. from Borneo (East Malaya) and *Ch. heissi* sp. n. from Sumatra (Indonesia) (Hemiptera, Heteroptera, Aradidae, Mezirinae) are described on the basis of male specimens. The female holotype of *C. usingeri* Kormilev, 1956 from Borneo is illustrated for the first time.

Keywords: flat bugs, Indomalaya, taxonomy, habitus photo, new species, sexual dimorphism.

INTRODUCTION

The apterous genus *Chelonocoris* Miller, 1938 (Hemiptera, Heteroptera, Aradidae, Mezirinae) (the first genus of the family containing apterous members) was described by MILLER (1938), with 7 species from Malaya, Borneo and India, and placed into a new subfamily, Chelonocorinae (now a junior synonym of Mezirinae). USINGER (1943) added further 6 species from Java and Sumatra, gave a key to known species, and prognosed the discovery of several further species. Essentially this publication was the basis of the chapter on the genus in the fundamental work of USINGER and MATSUDA (1959). KORMILEV (1956, 1983) described two additional species, without broadening the distribution of the genus. As a result, the genus currently contains 16 described species (KORMILEV & FROESCHNER 1987).

In the course of revision of the Aradidae material of the Hungarian Natural History Museum, Budapest, I came across three specimens of *Chelonocoris*. One is the holotype female of *Ch. usingeri* Kormilev, 1956 (Borneo), the second is a male from Sumatra (Indonesia), identified and published by Kormilev (1956) as *Ch. bloetei* Usinger, 1954, the third is a recently collected, unidentified male from Borneo (East Malaysia). The specimen from Sumatra is considered to be not *Ch. bloetei*, but a new species, while the male from Borneo is considered, in spite of similarities, to be not the unknown male of *Ch. bufo* Miller, 1938, or *Ch. usingeri*, but another yet undescribed species. The new species are described in the present paper. Drawings and a photo of the holotype of *Ch. usingeri* is also given, because the original description (KORMILEV 1956) contained but the tip of the abdomen of the female from below.

## MATERIAL AND METHODS

Specimens studied are deposited in the Hemiptera Collection of the Hungarian Natural History Museum, Budapest (HNHM). The holotype female of *Ch. usingeri* and the holotype male of *Ch. heissi* sp. n. are pinned, the holotype male of *Ch. bakonyii* sp. n. is tightly card-mounted.

Exoskeletal structures were studied and drawings were made using an Opton 47 50 52 – 9901 microscope supported by a drawing apparatus. Photographs of the specimens at hand were made in the HNHM using a NIKON D7200 digital camera mounted with AF-S Micro Nikkor 105 mm 1:2.8 ED objective (operating software: Helicon Remote v. 4.4.4), stacked photos were rendered using Helicon Focus v. 8.2.2 software.

Collecting and identification data are cited so that rows on the same label are separated by /, while different labels on the same pin are separated by // in the text.

Explanatory note to illustrations: Earlier specialists of this genus published spectacular and informative habitus drawings of *Chelonocoris* specimens, though depicting the sculpture of the dorsal side as if the surfaces were shiny and clearly visible. In fact, the specimens – as usual in the genus – are covered with pubescence and individual hairs, and some wax-like material. It results in a matted or dirt-like appearance, so that sometimes it was very difficult to find even the glabrous areas, or the borders on segments or sclerites, or visualise finer sculpture like e.g. borders of areas around medial glabrous areas. Glabrous areas were drawn when found among/under the pubescence and the dirt-like layer. This experience puts one on guard about using the published excellent drawings, the specific identification was considered, however, clearly possible.

In the formula of relative lengths of antennal joints 20 scale units = 1.0 mm.

Abbreviations for morphological terms: deltg = dorsal external laterotergite (connexivum); PE = posterior-exterior.

## TAXONOMY

Family: Aradidae Spinola, 1837  
Subfamily: Mezirinae Oshanin, 1908  
Genus: *Chelonocoris* Miller, 1938

*Chelonocoris* MILLER, 1938: 500.

Type species: *Chelonocoris truncatus* Miller, 1938, by subsequent designation (USINGER & MATSUDA 1959: 253).

*Chelonocoris usingeri* Kormilev, 1956  
(Figs 1, 4–8, 19)

*Chelonocoris usingeri* KORMILEV, 1956: 287.

Material studied: Holotype, female (HNHM): “Borneo / Xántus // Holotype // *Chelonocoris usingeri* / N. Kormilev 1955”.

Notes: In the original description the female holotype was described, and only the tip of abdomen was figured. Now habitus drawings from two dif-

ferent directions, and a photo of the holotype and its antenna is given. Some features of this specimen are compared to those of *Ch. bakonyii* sp. n. under the latter species.

KORMILEV (1956) gave the proportions of the antennal joints erroneously as 20:11:22:8, (obvious misspelling for joint I), they are as 70:22:40:16 in my measurements.

Note on type locality: János Xántus, an early Hungarian explorer, hunter, ethnographer and geographer performed a collecting trip from January to May 1870 in the northern territories of Borneo, debarking in Sarawak (SÁNDOR 1970). Thus, the approximate time and locality of collecting can be added.

### *Chelonocoris bakonyii* sp. n.

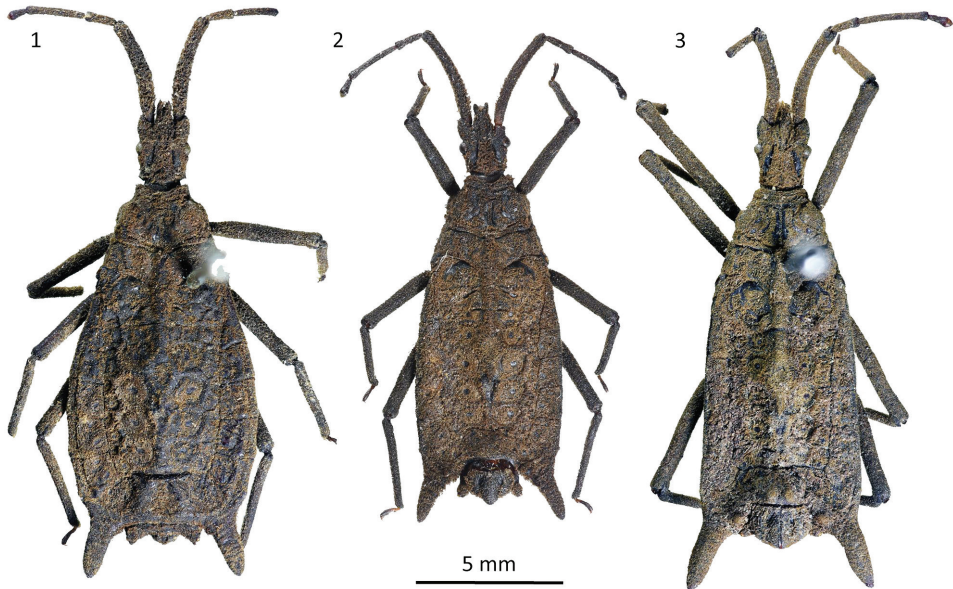
<http://zoobank.org/B6AFE5AC-E5C7-4D95-942C-FC90EABE5FF4>

(Figs 2, 9–12, 18)

Type material: Holotype (HNHM), male: "MY, Borneo, Sarawak / state, Muara Tebas / Peninsula / 1° 42'56" N, 110° 26'48" E / 3. I. 2016. / leg M. Lukátsi".

Description: Male. Apterous, large, body elongate subtriangular, with tomentum and wax-like dirt. Pubescence formed by tufts and evenly distributed hairs. Edge of body and femora with erect hairs, also present on antennal joints II–III.

Colouration: Body black with rusty brown tomentum, wax-like dirt yellowish-brown. Pubescence rusty brown or black.



**Figs 1–3.** 1 = *Chelonocoris usingeri* Kormilev, 1957, female holotype; 2 = *Ch. bakonyii* sp. n., male holotype; 3 = *Ch. heissi* sp. n., male holotype

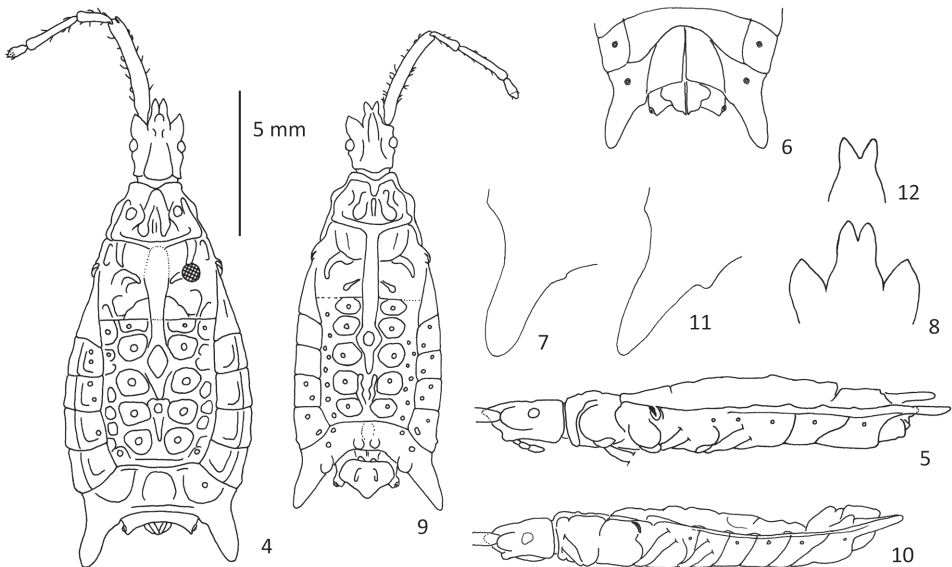
Head longer than wide across eyes, genae surpassing clypeus, diverging, forming a V, reaching 1/5 of antennal joint I. Antenniferous tubercle on left side stout, laterally convex, pointed, as characteristic for the genus; on right side tubercle missing beyond base of antenna. This may be consequence of an injury. Vertex with M-shaped median tomentose area, laterad to this naked up to eyes. Hairs and wax-like dirt forming an edge on hind margin of head.

Antenna (Figs 9, 18) relatively slender, subcylindrical joint I densely (especially basomedially), joint II–III sporadically with long erect hairs. Relative length of antennal joints I to IV as 72:20:40:14.

Pronotum wider than long, anterior margin sinuate in almost whole width, lateral borders convex, posterior border shallowly V-shaped. Laterad to median longitudinal sulcus a pair of subcontiguous ridges, converging and fused anteriorly, laterad to these a crescent-shaped narrow ridge and a blunt tubercle.

Mesonotum with scutellum-like elevation, medially fused with median longitudinal inflation. Laterad to this a pair of converging, wide, flat, arched tubercles. Metanotum with crescent-shaped bare area. Orificium oriented dorsolaterally.

Abdomen with median ridge evenly elevated until rhomboid depression, elevation lower than the thickness of abdomen (as seen in lateral view). Lateral border slightly convex, PE angles of dltgs not protruding, dltg VI with small projection before posterior corner. Median glabrous areas clearly visible, borders covered by dense pubescence. Inner margin of dltgs clearly visible. Tergite VII medially elevated, with two flat tubercles, terminal lobes (Figs 9, 11) triangular, long, outer margin slightly convex, inner border straight. Mesad to the lobe a rounded, prominent tubercle. Paratergites of segment VIII not reaching tip of pygophore, spiracle latero-terminal.



**Figs 4–12.** *Chelonocoris usingeri* Kormilev, 1957 female holotype (4–8) and *Ch. bakonyii* sp. n. male holotype (7–12): 4, 9 = body in dorsal view, only visible parts depicted; 5, 10 = lateral view of body; 6 = tip of abdomen, ventral view; 7, 11 = terminal lobes; 8, 12 = genae. Figs 7–8 and 11–12 are out of scale

Measurements: Holotype, male: length of head 2.24 mm, width of head 1.68 mm, length of pronotum 1.84 mm, width of pronotum 2.96 mm, combined length of meso- and metanotum 2.40 mm, maximum width of abdomen 4.96 mm across segment V, width at tip of PE angles VII 4.96, total length of body in median line 13.28 mm, total length of body including terminal lobes 13.84 mm.

Etymology: It is a great pleasure to dedicate this species to the eminent Hungarian zoologist Prof. Dr. Gábor Bakonyi, a fellow hemipterist and co-author in *Nepomorpha*, contributing also to various fields of ecology, later eco-toxicology, and a lifetime best friend of author. He also served as selfless Editor-in-Chief of *Acta Zoologica Academiae Scientiarum Hungaricae* from 2006 to 2022.

Notes on habitat and ecology: The collecting locality is in Bako National Park, in primary rain forest, with bulk supply of dead wood and a dense leaf litter layer. The collecting happened in the night, from logs but not from below bark (Márk Lukátsi pers. comm.). This is in accordance with earlier published data in the literature (e.g. KORMILEV & FROESCHNER 1987), concerning usual habitat of apterous Aradidae.

Discussion: The species level identification of the examined male specimen was first based on a survey of differences and similarities of male and female specimens of described species using published descriptions and illustrations (MILLER 1938: *Ch. malayensis* Miller, 1938 and *Ch. dyak* Miller, 1938; USINGER 1954: *Ch. kormilevi* Usinger, 1954, *Ch. mancinii* Usinger, 1954 and *Ch. bloetei*). In species of *Chelonocoris* females are generally larger, their abdomen is more rounded, abdominal inflation is higher, the abdominal sculpture in dorsal view is different to various degree from that of males, dltgs are provided with definite longitudinal carinae, and PE lobes of tergite VII (terminal lobes) tend to bend inwards in contrast with the condition found in males. Insignificant sexual dimorphism was found in the antenna, pronotum, meso-metanotum, the development of the scutellar area (except in *Ch. mancinii*), the outline of the body from lateral view, and the shape and size of the terminal lobe (although the latter is usually somewhat longer in males). The sexual dimorphism is apparently more expressed in *Ch. dyak* and especially *Ch. peregrinus* Miller, 1938, than in other species of the genus.

Diagnosis: The male holotype of the new species matches into the Malayan and Borneo group of species of *Chelonocoris* (USINGER 1953). It is definitely not conspecific with *Ch. dyak*, and using the key of USINGER and MATSUDA (1959) runs to *Ch. bufo*, but it is different from the latter species in the following diagnostic characters (provided in key format):

A(B) (Female) Head strongly narrowing posteriorly, with straight hind border. Antennal joint I thickening in apical part. In lateral view pronotum unevenly bulging, abdominal inflation strongly elevated on segments

III–IV. Terminal lobe narrowing posteriorly, but sides subparallel behind segment VIII. Malay Peninsula. *Ch. bufo*

B(A) (Male) Head strongly narrowing behind eyes, then sinuate, with medially convex hind border. Antennal joint I thickest in its basal third. In lateral view pronotum flat; abdominal inflation unevenly convex, but no portion more strongly elevated. Terminal lobe continuously narrowing. Borneo. *Ch. bakonyii* sp. n.

Body length of the female *Ch. bufo*, as given by MILLER (1938), is 1.27 times that of this male of *Ch. bakonyii* sp. n., which may also result from individual variation. This ratio is between 0.98–1.10 in those species where both sexes are described, and, as given by MILLER (1938), could be calculated 1.15 in *Ch. peregrinus* which later proved to represent two species. These data also support the species separation.

The male holotype of *Ch. bakonyii* sp. n. is also similar to the female holotype of *Ch. usingeri*. Their differences are listed below. For each character, first the female *Ch. usingeri*, then the male *Ch. bakonyii* sp. n. is referred

Body less covered by pubescence, e.g. dorsal median ridge is naked, vs more covered, the ridge bearing hairs. Slit between genae is of a narrow V shape vs of wider V shape. Vertex slightly convex towards genae, vs vertex frontally bent downwards. Antennal joint I is thickest at basal third, vs subcylindrical. Median longitudinal, inflated carina or ridge is flattened and widened anteriorly vs evenly emerged and narrow in whole length. Lobe on PE angles VII first narrowing, then evenly wide, tip more rounded vs continuously narrowing, with sharper tip. Edge of body, including the terminal lobes naked, with very few, scattered hairs only, vs densely haired. Femora with few, scattered erect hairs (0–10 in dorsal view) vs femora with more, 20–30 erect hairs, especially on hind femur. On the basis of hairs on the femora the female holotype of *Ch. usingeri* runs in the key of USINGER and MATSUDA (1959) to *Ch. dyak*, the male holotype of *Ch. bakonyii* sp. n. to *Ch. bufo*. This feature is not satisfyingly depicted in the referred work, but the text seems to be unambiguous. Hairs on femora alone is considered as of specific importance by USINGER (1954).

### *Chelonocoris heissi* sp. n.

<http://zoobank.org/4CD1B046-ABEB-46DF-BB79-046AD5774981>  
(Figs 3, 13–17)

Type material: Holotype (HNHM), male “Padang Padjang / West Sumatra / H. Rolle, Berlin W // *Chelonocoris bloetei* Usinger / N. Kormilev 55”.

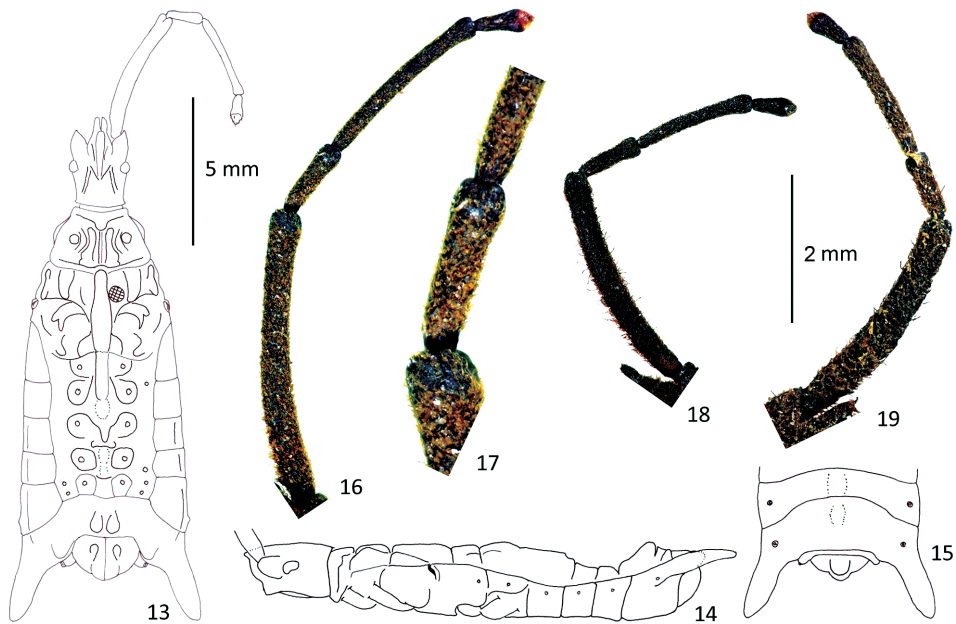
Description: Male. Apterous, large, body elongate subtriangular, covered by tufts and evenly distributed hairs (tomentum) and a wax-like or dirt-like material.

Colouration: Body blackish-brown, tufts and evenly distributed hairs as well as wax-like or dirt-like material rusty brown.

Head longer than wide, genae longer than clypeus, reaching about 1/7 of antennal joint I, with a narrow slit between them. Antenniferous tubercles short, laterally convex, apex blunt. Eyes small, flattened semiglobose. Postocular borders concave, narrowing posteriorly, then subparallel. Hairs and wax forming an edge posterolaterally. Vertex, clypeus and genae slightly convex until tip of genae in lateral view. Rostrum not reaching hind border of head, in a moderately wide labial groove, bordered by straight, flat ridges on both sides.

Antennae (Figs 3, 13, 16) long, first joint slightly curved, widest in basal fourth, with long, dense pubescence medially, and erect or curled hairs along the entire length. Joint II slightly, evenly widening toward apex, III very slightly curved, subcylindrical, suddenly thickening at apex, IV pyriform. Relative length of antennal joints I to IV as 89:25:58:19.

Pronotum shorter than wide, strongly widening posteriorly, hind border slightly S-shaped on both sides, collar with shallow sinuation medially. Disc medially with a narrow, slit-like furrow, bordered by almost straight longitudinal tubercle on both sides, laterad to these oncurved edge (mostly of hairs and dirt) and one rounded, inflated tubercle. Mesometanotum and abdominal terga are separated by a longitudinal inflated area, finely interrupted anteriorly between meso- and metanota and at anterior border of tergal plate, and terminating at a bowl between terga III and IV. Mesonotum medially formed scutellum-like, with 3 sublongitudinal, flat tubercles laterally on both sides. Metanotum with a pair of distorted crescent-shaped shiny area and two longitudinal tubercles laterad to these. Up-



**Figs 13–19.** *Chelonocoris heissi* sp. n. male holotype (13–17), *Ch. bakonyii* sp. n. male holotype (18) and *Ch. usingeri* Kormilev, 1957 female holotype (19): 13 = dorsal habitus; 14 = body in lateral view; 15 = tip of abdomen, ventral view; 16–19 antennae, dorsal view. The 5 mm scale bar refers to drawings, the 2 mm scale bar to entire antennae, Fig 17 is out of scale

per end of metathoracic scent gland openings are seen anterolaterally, with widening operculum at dorsal end. Abdomen with straight lateral borders, slightly widening posteriorly until segment VI. Lateral border of dltg VI with small projection at about 2/3 of its length.

Abdomen with dltgs well separated from central dorsal plate consisting of segments II–VI. Dorsal plate moderately elevated, with inflated median portion. Median glabrous areas relatively distinct. Dltgs flat, PE angles not protruding, with fine sublateral carina-like elevations on posterior segments. Median part of tergum VII elevated, with a pair of longitudinal, low tubercles, and with another, definite and elevated tubercles on both sides of large pygophore. Paratergites VIII short, bent outwards, spiracle apical. Terminal lobes long, pointing posterolaterally, narrowing posteriorly except for a short section lateral to the tip of pygophore.

Measurements: Holotype male: length of head 3.04 mm, width of head 2.04 mm, length of pronotum 2.16 mm, width of pronotum 3.28 mm, combined length of meso-metanotum 2.64 mm, maximum width of abdomen 5.60 mm across segment VI, width at tip of PE angles VII 6.56, total length of body in median line 15.44 mm, total length of body with terminal lobes 16.80 mm.

Etymology: It is a great pleasure to dedicate this outstanding species to Prof. Dr. Ernst Heiss, acknowledging his outstanding contribution to our knowledge on flat bugs (and other hemipteran groups) of the Earth on one side, and his continuous, collegial help across decades on the other.

Discussion: The new species matches to the Sumatra species, and runs in the key of USINGER and MATSUDA (1959) to either *Ch. bloetei* or *Ch. depressus* Usinger, 1954, if we consider the statement “second and third antennal segments practically naked with only the finest appressed pubescence” to be true, but rather to *Ch. ferrugineus* Usinger, 1954 or *Ch. mancinii*, if we consider the statement “second and third antennal segments with fine but distinct erect or curved hairs” to be true. The diagnostic value of this feature is doubtful, since it is apparently difficult to separate “finest appressed pubescence” from “variously developed fine hairs”. MILLER’s (1938) drawings, with short lines on the antennae, marking the presence rather than the nature of hairs, do not really help in the present case. The antennae of the three species at hand suggest that the first statement matches the condition found in *Ch. heissi* sp. n., since the two species from Borneo definitely bear distinct, erect or curved hairs. The holotype of *Ch. heissi* sp. n. is, however, clearly distinguishable from all four above named species by a set of characters.

Diagnosis: The males of the abovementioned species are mostly known except *Ch. ferrugineus*, and the features on the tip of abdomen are clearly different (c.f. USINGER 1954, figs 6C, 6E, 6H). The postero-exterior lobes of all of them are either shorter and/or continuously narrowing, while they are longer, first narrowing, then parallel-sided, then narrowing again in *Ch. heissi* sp. n. The abdomen of *Ch. bloetei* has slightly convex sides, this species and *Ch. mancinii* both have straight inner margin of the terminal lobe, while *Ch. heissi* sp. n. and *Ch. depressus* have inner margin strongly bent inwards basally. *Ch. depres-*



*sus* has a definite tubercle on the PE corner of dltg VI, which is lacking in the new species, and parallel sides of the abdomen, which is widening posteriorly in *Ch. heissi* sp. n. The general character of the abdominal inflation is different in the female of *Ch. ferrugineus* from that in the male of *Ch. heissi* sp. n. in greater extent than observed in the species mentioned in the discussion of *Ch. bakonyii* sp. n. Antennal joint I is 2.2 times longer than the width of head in *Ch. heissi* sp. n., this value is 2.0 in *Ch. ferrugineus*; in the latter species, the head is more strongly narrowing posteriorly than in the new species.

Construction of a new key would require an examination of all other species concerned.

\*

Acknowledgement – Author is grateful to Ms Anna Á. Somogyi (Curator of Hemiptera, HNHM) for her assistance while preparing photographs of the specimens, as well as to the referees for their valuable comments on the manuscript.

## REFERENCES

- KORMILEV, N. A. (1956): Notes on Aradidae from the Eastern Hemisphere, X (Hemiptera), On some apterous Mezirinae from India and Indonesia. – *Philippine Journal of Science* 85[1957]: 283–294.
- KORMILEV, N. A. (1983): New Oriental aradid bugs in the collection of the British Museum (Natural History) (Insecta: Hemiptera). – *Journal of Natural History* 17: 437–469. <https://doi.org/10.1080/00222938300770291>
- KORMILEV, N. A. & FROESCHNER, R. C. (1987): *Flat bugs of the world: A synonymic list (Heteroptera: Aradidae)*. (Entomography, vol. 5). – Entomography Publications, Sacramento, 246 pp.
- MILLER, N. C. E. (1938): A new subfamily of Malaysian Dysodiidae (Rhynchota). – *Annals and Magazine of Natural History, Series 11*, 1: 498–510. <https://doi.org/10.1080/00222933808526796>
- OSHANIN, B. F. (1908): *Verzeichnis der paläarktischen Hemiptern mit besonderer Berücksichtigung ihrer Verteilung im Russischen Reiche*, 1(2): 395–586 – Buchdr. der K. Akademie der wissenschaften, St. Petersburg, Supplement to volume 13.
- SÁNDOR, I. (1970): *Xántus János*. – Magvető Könyvkiadó, Budapest, 407 pp. [in Hungarian]
- SPINOLA, M. (1837): *Essai sur les genres d'insectes appartenants a l'ordre des Hemiptères, Lin., ou Rhyngotes, Fab., et à la section des Heteroptères, Dufour*. – Yves Gravier, Geneva, 383 pp. <https://doi.org/10.5962/bhl.title.65481>
- USINGER, R. L. (1954): Revision of the genus *Chelonocoris* Miller (Hemiptera, Aradidae). – *Zoologische Mededelingen* 32: 259–278.
- USINGER, R. L. & MATSUDA, R. (1959): *Classification of the Aradidae (Hemiptera-Heteroptera)*. – British Museum (Natural History), London, 410 pp.

Submitted September 19, 2023; accepted December 11, 2023; published December 20, 2023

Academic editor: Péter Kóbor

