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NOTES ON THE APHELOCHEIRIDAE (HETEROPTERA) FROM INDOCHINA, WITH REDESCRIPTIONS OF *APHELOCHEIRUS INOPS* AND *A. GULARIS* AND THE DESCRIPTION OF A NEW SPECIES FROM VIETNAM

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Males and females *Aphelocheirus* (s.str.) *inops* HORVÁTH, 1918 and *A.* (s.str.) *gularis* HORVÁTH, 1918 are described and illustrated, mainly from the type material in the Hungarian Natural History Museum. A lectotype was selected from the syntype series of *Aphelocheirus inops* HORVÁTH, 1918, which consists of eleven specimens belonging to four species. *Aphelocheirus* (s.str.) *tuberculipes* sp. n. from Cao Bang Province in northern Vietnam is described and compared with the closely related *A.* (s.str.) *femoratus* POLHEMUS et POLHEMUS, 1989 from West Malaysia and Thailand. New records from Vietnam are presented of *Aphelocheirus gularis*, *A. inops*, and *A.* (s.str.) *similaris* POLHEMUS et POLHEMUS, 1989.

Key words: *Aphelocheirus*, taxonomy, new record, Laos, Vietnam

INTRODUCTION

Aphelocheirus WESTWOOD, 1833, has its greatest species diversity on the Southeast Asian mainland, especially in Indochina. Indochina is herein defined to include northern and central Thailand, Laos, Vietnam, and Cambodia, and is known to harbour an extremely high level of diversity. It lies within the Indo-Burma biodiversity hotspot, one of only 34 such internationally recognised regions with high diversity coupled with a high rate of habitat loss and extinctions (MITTERMEIER *et al*. 2005). In addition, the Indochina hotspot is adjacent to the Southwest China biodiversity hotspot (MITTERMEIER *et al*. 2005). Numerous species of Aphelocheiridae have been described from Indochina during the last 20 years (e.g., POLHEMUS & POLHEMUS 1989, ZETTEL 1998, SITES & ZETTEL 2005, SITES 2006) and a good number of species remain still undescribed (unpubl. data). Thus, correct interpretation of early described taxa is a critically important foundation for continued systematic studies on the family. In the times of ARNOLD LUCIEN MONTANDON, GÉZA HORVÁTH, and MAURICE ROYER very little was known about the high diversity of *Aphelocheirus* and about the correct evaluation of species-specific characteristics. Their original descriptions referred mostly to size, colour and

a few structural characters, that are usually insufficient for modern taxonomy. Therefore, studies of the type material are required to re-elucidate species identities.

Careful examination of the type specimens of *Aphelocheirus gularis* HORVÁTH, 1918 and *A. inops* HORVÁTH, 1918 – both described from "Annam Laos" without further information on the locality or the collector – yielded surprising results. When HORVÁTH (1918) described these two species, he based *A. gularis* on a single winged male and *A. inops* on a series of brachypterous males and females, of which nine syntypes (two males and seven females) are still present in the Hungarian Natural History Museum; two further syntypes (one male and one female) have been given to the JOHN T. POLHEMUS Collection in Colorado (POLHEMUS & POLHEMUS 1989) on an exchange basis. Although GÉZA HORVÁTH was fully aware that species of *Aphelocheirus* occur in two wing morphs (see HORVÁTH 1899), he sorted the Indochinese material in the Budapest Museum according to the wing morph in two species, defined the macropterous *A. gularis* mainly by characteristics of a winged specimen (HORVÁTH 1918), and overlooked that his brachypterous syntype series of *A. inops* was not conspecific, but consisted of four species.

In their revision of *Aphelocheirus* in tropical Asia, POLHEMUS & POLHEMUS (1989) redescribed the male of *A. gularis* (based on the holotype) and both sexes of *A. inops* (chiefly based on the two syntypes in the JOHN T. POLHEMUS Collection).

The present study illustrates the genitalia of the male holotype of *A. gularis* in detail by following modern standards and describes the female of *A. gularis* for the first time. Further, a lectotype designation for *A. inops* has become necessary because of a mixed syntype series consisting of four species, including one female of *A. gularis*, which was previously undescribed. The genitalia of the male lectotype and the subgenital plate of a conspecific female paralectotype are illustrated herein. Five female *A. inops* paralectotypes belong to two unidentified species; also these specimens are discussed and illustrated.

In addition, we present the description of one new species from Vietnam, which is closely related with *A. femoratus* POLHEMUS et POLHEMUS, 1989, and new records of *A. gularis*, *A. inops*, and *A. similaris* POLHEMUS et POLHEMUS, 1989 from Vietnam.

MATERIAL AND METHODS

Material studied consists of mostly dry-mounted and a few alcohol preserved specimens deposited in the following collections: HNHM – Hungarian Natural History Museum, Budapest, Hungary; NHMW – Natural History Museum, Vienna, Austria; ZMHU – Zoological Museum, Hanoi University of Science, Vietnam; ZRCS – Zoological Reference Collection, National University of Singapore.

Terminology and methods follow previous taxonomic works on *Aphelocheirus* by the first author. Binocular microscopes with a camera lucida were used to prepare descriptions and line draw-

ings (Figs 3–25, 30–35). The digital colour photographs of specimens (Figs 1, 2, 26) were taken with a Leica DFC490 camera attached to a Leica MZ16 binocular microscope with the help of Image Manager IM50 and processed with Auto-Montage Pro and Adobe Photoshop 7.0 software. Specimen labels were photographed with a Sony Cybershot DSC-T5 digital camera. Digital pictures of leg structures (Figs 27–29) were photographed by the BK Lab System (Visionary Digital) in the Raffles Museum of Biodiversity Research, Singapore.

Aphelocheirus (s.str.) *inops* HORVÁTH, 1918
(Figs 1, 3, 6, 11, 15–19)

Aphelochirus inops HORVÁTH, 1918: 140.
Aphelocheirus (*Aphelocheirus*) *inops* (HORVÁTH): POLHEMUS & POLHEMUS 1989: 220–222.

Material examined. Lectotype (by present designation; brachypterous male): "Annam\ Laos", "inops Horv.\ det. Horváth", "TYPUS", "Aphelochirus\ inops Horv.", "LECTOTYPUS\ Aphelochirus\ inops Horváth, 1918\ des. Zettel & Tran 2008" (HNHM). Paralectotypes: 1 male, 1 female (brachypterous) "Annam\ Laos", "inops Horv.\ det.Horváth", "TYPUS", "PARALECTOTYPUS\ Aphelochirus\ inops Horváth, 1918\ labelled Zettel & Tran 2008", "Aphelocheirus\ inops Horváth\ det. Zettel & Tran 2008" (HNHM). Additional material: 1 male (brachypterous) Vietnam: Ha Giang Prov., Vi Xuyen, Viet Lam stream, 11.XII.2000, Coll. V.V. Nguyen & X.N. Ngo, # VNHG0001 (ZRCS).

Lectotype designation. The type series in the Hungarian Natural History Museum consists of the following brachypterous specimens: (1) two males (including lectotype) and one female of *A. inops*; (2) one female of *A. gularis*; (3) four females sp. "A"; one female sp. "B". Two further paralectotypes in the J.T. POLHEMUS Collection (POLHEMUS & POLHEMUS 1989) were not examined during the current study.

HORVÁTH (1918) did not designate a holotype or "type". The fact that the syntype series consists of four species requires a lectotype designation. POLHEMUS and POLHEMUS (1989) listed in the paragraph of examined material a brachypterous male "holotype" in the Hungarian Natural History Museum and two "paratypes" in the JOHN T. POLHEMUS Collection. Normally, this would meet the requirements of a lectotype designation. However, these authors failed to label a specimen in the Hungarian Natural History Museum accordingly. Moreover, important parts of their redescription, if not the whole, is based on the syntypes (= "paratypes") in the JOHN T. POLHEMUS Collection, which is obvious, because the male syntypes in the Hungarian Natural History Museum have not been dissected (before the present study) and no material from this institution has been loaned, but only one pair was taken on exchange. However, the lectotype designation carried out in this paper is in full accordance with the interpretation of this taxon by POLHEMUS and POLHEMUS (1989).

Description of brachypterous male (if no variation is given, measurements refer to the lectotype). Size. Body length 6.9–7.9 mm (lectotype: 6.9 mm). Body width 4.6–5.2 mm (lectotype: 4.6 mm). Pronotum width 3.5–4.0 mm (lectotype: 3.5 mm).

Colour. Dorsal colour of lectotype (Fig. 1) almost uniformly medium brown, except head yellow. Specimen from Ha Giang with dark brown dorsum, except head yellow and narrowly infuscated anterolaterally. Ventral side, including appendages yellowish, partly brownish infuscated.

Head (Fig. 1) short, length 0.9 times head width; dorsal surface coarsely punctured, except a few large punctures near anterior margin, all punctures confluent. Anterior section of head (anterior of anterior eye margin) moderately short, 0.65 times eye length (eye length measured parallel with median line of head). Rostrum 1.8 times as long as profemur, tip reaching mesotrochanter.

Thorax: Pronotum (Fig. 1) with distinctly convex disk, coarsely granulate. Median pronotum length 0.7 times median head length. Maximum width at posterior corners, 3.8 times median length. Lateral margins of pronotum strongly convex and convergent anteriorly; width at anterior corners 0.47 times maximum width. Prosternum anteromedially produced into small lobe. Propleuron (Fig. 3) medially with stout, triangular process, its anterior tip slightly acute. Mesosternum with high medial hump (Fig. 6), its anterior, steeply sloping face approximately as long as its ventral outline. Mesoscutellum coarsely granulate; anterior width 3.0 times median length, its centre only slightly convex.

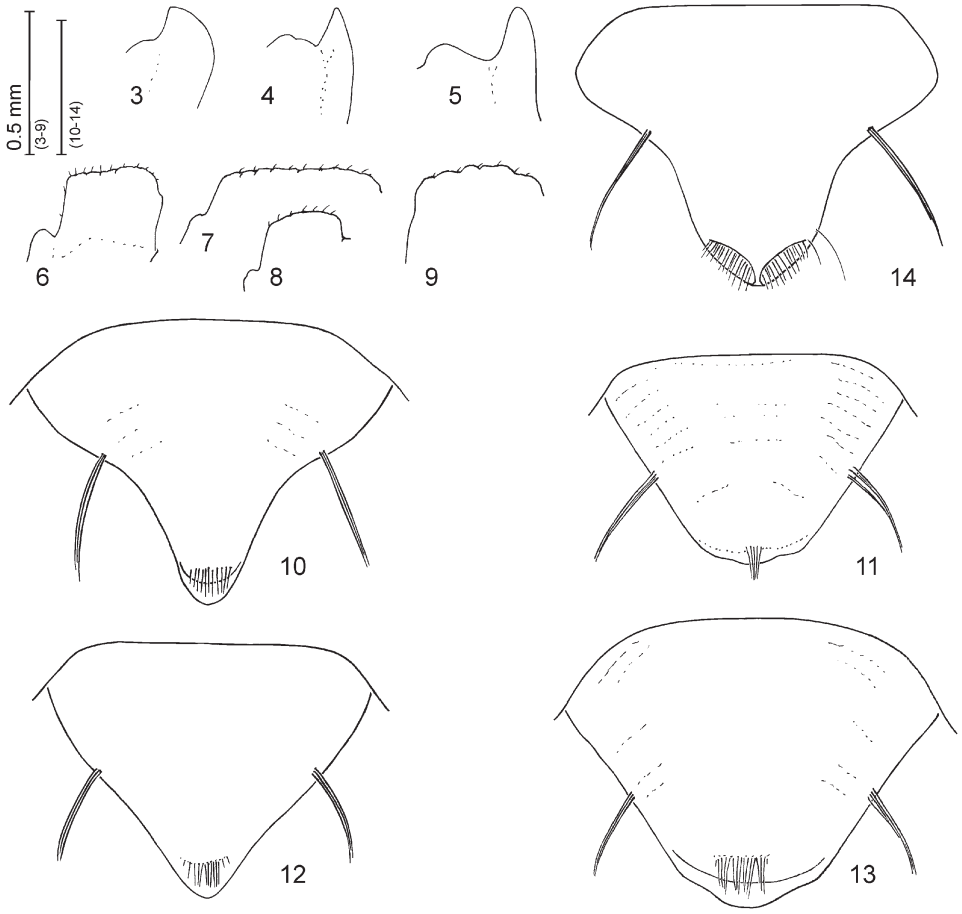
Hemielytra (Fig. 1) coarsely granulate, large, not reaching posterior margin of tergite 2, medially without gap (note that in Fig. 1 the lectotype's left hemielytron is not in natural position). Each hemielytron much wider than long (ca. 1.5 times) and laterally with small triangular embolar process (process width ca. 0.1 times total hemielytron width).

Figs 1–2. Habitus, dorsal aspect: 1 = brachypterous male of *A. inops* (lectotype by present designation; body length 6.9 mm), 2 = macropterous male of *A. gularis* (holotype; body length 6.8 mm). Labels not on scale. © NHMW Hemiptera Image Collection, published with permission

Legs relatively short and stout, femora scarcely exceeding lateral margin of body. Profemur 2.9 times as long as wide; shorter than both meso- and metafemur; those without special modifications.

Abdomen (Fig. 1). Tergites 2–7 with acute posterior corners, but corners of tergites 2 and 3 less pronounced. Sternite 3 medioposteriorly with small tubercle. Sternites only slightly asymmetrical, sternite 4 with 2, sternite 5 with 4 peg-like setae.

Genitalia. Pygophore with left parandrium distinctly longer than right one (Fig. 15); left parandrium of narrow, subtriangular shape, with apex slightly recurved; right parandrium forming a

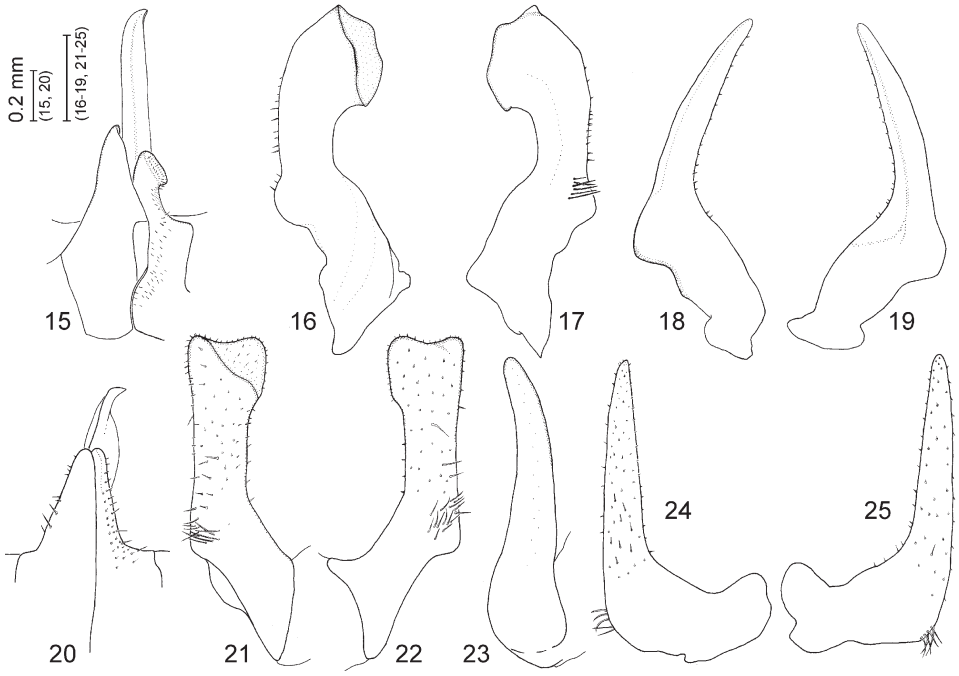


Figs 3–14. 3–5 = Medial process of propleura ventrolateral aspect: 3 = *A. inops*, 4 = *A. gularis*, 5 = *A. tuberculipes* sp. n., 6–9 = Medial carina of mesosternum, lateral aspect: 6 = *A. inops* (brachypterous morph), 7 = *A. gularis* (holotype, macropterous morph), 8 = *A. gularis* (brachypterous morph), 9 = *A. tuberculipes* sp. n. (brachypterous morph). 10 = Subgenital plates of female paratype of *A. tuberculipes* sp. n.: 11–14 = Subgenital plates of female syntypes of *A. inops*, ventral aspect. 11 = *A. inops*, 12 = *A. gularis*, 13 = *A.* sp. "A", 14 = *A.* sp. "B"

wide, apically truncate hook. Main body of aedeagus (Fig. 15) almost straight, with weakly curved apex. Left paramere (Figs 16, 17) stout, with bend near mid-length, distal part curved and slightly widened towards subtruncate apex; at bend with a group of slightly longer setae, otherwise bare or with very short setae. Right paramere (Figs 18, 19) with enlarged bend at proximal two fifths, distal part slender, weakly curved, and steadily narrowed towards acute apex, only with short setiferation.

Description of brachypterous female. Size. Body length 8.2 mm. Body width 5.5 mm. Pronotum width 4.2 mm. Similar to brachypterous male. Abdomen symmetrical, sternite 4 with 4, sternite 5 with 4, and sternite 6 with 7 peg-like setae. Subgenital plate (Fig. 11) with broad base and small, narrow, tongue-shaped distal part, its sides S-curved, its apex narrowly rounded, with paired tufts of long setae laterally and one tuft of short seate subapically.

Discussion. *Aphelocheirus inops* is closely related to *A. jendeki* ZETTEL, 1998 which is known from China (Yunnan), northern Vietnam (ZETTEL 1998, 2001) and northern Thailand (SITES 2006), but this species differs in larger body size, in very short, obtuse posterolateral angle of the hemielytron of brachypterous specimens, in wider bases of both parameres, and in the extremely narrow, almost spine-shaped distal part of the right paramere (see ZETTEL 1998: figs 15, 17–20).



Figs 15–25. Genitalia of males: 15–19 = *A. inops* (lectotype), 20–25 = *A. gularis* (holotype). 15, 20 = Parandria and aedeagus. 16, 17, 21, 22 = Left parameres, two aspects. 18, 19, 23–25 = Right parameres, two or three aspects, respectively

The female of *A. jendeki* has a similar subgenital plate as *A. inops*, but the distal part is more triangular and less strongly narrowed.

Distribution. The type locality of this taxon is uncertain. The specimens' locality labels bear only the information "Annam-Laos" which covers a large area in today's Laos and central Vietnam. There is also no information about the collector or expedition. The only exact locality data of *A. inops* are available from a recently collected specimen in Ha Giang Province in northern Vietnam.

Aphelocheirus (s.str.) *gularis* HORVÁTH, 1918
(Figs 2, 4, 7, 8, 12, 20–25)

Aphelochirus gularis HORVÁTH, 1918: 141.
Aphelocheirus (Aphelocheirus) gularis (HORVÁTH): POLHEMUS & POLHEMUS 1989: 222–224.

Material examined. Holotype (macropterous male): "Annam\ Laos", "gularis H.\ det.Horváth", "Aphelochirus\ gularis Horv.", "Coll. Mus.\ Nat.Hung.", "TYPUS", "Loan\ from\ Budapest", "HOLOTYPUS\ Aphelochirus\ gularis Horváth, 1918\. labelled Zettel & Tran 2008" (HNHM). **A**dditional material: 1 female (brachypterous; paralectotype of *A. inops*) "Annam\ Laos", "inops H.\ det.Horváth", "TYPUS", "PARALECTOTYPUS\ Aphelochirus\ inops Horváth, 1918\ labelled Zettel & Tran 2008", "Aphelocheirus\ gularis Horváth, 1918\ det. Zettel & Tran 2008" (MTMB); 1 male, 4 females (brachypterous), Vietnam: Cao Bang Prov., Ha Quang, Soc Ha, 16.XII.2000, Coll. V.V. Nguyen & X.N. Ngo, # VNCB0001 (ZRCS, NHMW); 8 males, 4 females (brachypterous) Vietnam: Ha Giang Prov., Vi Xuyen, Viet Lam stream, 11.XII.2000, Coll. V.V. Nguyen & X.N. Ngo, # VNHG0001 (ZMHU, ZRCS, NHMW); 1 male, 1 female (brachypterous) Vietnam: Quang Binh Prov., Phong Nha, Vuc Tro stream, 14.VII.2004, 34 m a.s.l., pH 8.3, 17°38.188'N 106°12.810'E, Coll. D.C.J. Yeo, A.D. Tran & al. DY0404 (ZMHU).

Description of macropterous male (holotype). Size. Body length 6.8 mm. Body width 4.5 mm. Pronotum width 3.2 mm.

Note that macropterous specimens of *Aphelocheirus* usually differ from brachypterous individuals by the following characteristics: colour slightly darker; sculpturing of head, pronotum and mesoscutellum slightly coarser; eyes slightly larger; pronotum of very different shape; mesoscutellum strongly enlarged; forewings reaching approximately to abdominal tip.

Colour. Dorsal colour pattern as in Figure 2. Ventral side, including appendages, yellowish, partly brownish infuscated.

Head (Fig. 2) moderately short, length 0.9 times head width; irregularly punctured, large and small punctures mixed; anterior section of head short, 0.5 times eye length. Pronotum (Fig. 2) slightly convex, with sinuate hind margin; median length of pronotum 0.75 times median head length; maximum width near posterior corners 3.4 times median length; width at anterior corners 0.45 times maximum width. Propleuron with medial process as in brachypterous morph (comp. Fig. 4). Mesosternum (Fig. 7) with similar median carina as in brachypterous morph, but less highly raised above the more swollen mesosoma. Embolar margin of hemielytron strongly expanded laterally, forming a sharp, wing-shaped process (Fig. 2). Abdomen including genitalia as in brachypterous morph.

Description of brachypterous male. Size. Body length 6.7–7.0 mm. Body width 4.7–5.0 mm. Pronotum width 3.6–3.8 mm.

Colour. Head yellow, anterior margin usually more or less infuscated. Pronotum, mesoscutellum, hemielytra, and tergites either uniformly dark brown or with vague pattern of yellowish brown marks: paired dots near middle of pronotal disk, sides of mesoscutellum, transverse fasciae on posterior half of hemielytra, and 1–2 paired dots on tergites. Ventral side including appendages yellowish, few parts brownish infuscated.

Head short, length 0.95 times head width; dorsal surface with densely set, mixed large and small punctures, posteriorly confluent, anteriorly with shiny interspaces. Anterior section of head (anterior of anterior eye margin) short, 0.5 times eye length (eye length measured parallel with median line of head). Rostrum short, 1.4 times as long as profemur, hardly surpassing mesosternum.

Thorax: Pronotum with distinctly convex disk, coarsely granulate, except on two small areas close to middle rugose with shiny interspaces. Median pronotum length 0.65 times median head length. Maximum width at posterolateral corners, 3.7 times median length. Lateral margins of pronotum strongly convex and convergent anteriorly; width at anterolateral corners 0.45 times maximum width. Prosternum anteromedially with small lobe. Propleuron (Fig. 4) medially with narrow, triangular process, demarcated by almost rectangular incision; apex acute. Mesosternum (Fig. 8) with high, anteriorly rounded median hump. Mesoscutellum coarsely granulate; anterior width 2.8 times median length, its centre slightly convex.

Hemielytra coarsely granulate, posteriorly not reaching posterior margin of tergite 2, medially without or with small gap measuring up to one eighth of hemielytron width. Each hemielytron much wider than long (ca. 1.6 times), laterally with short triangular embolar process (process width 0.07 times total hemielytron width).

Legs relatively short and stout, femora scarcely exceeding lateral margin of body. Profemur 2.8 times as long as wide, slightly shorter than both, meso- and metafemur; those without modifications.

Abdomen. Tergites 2–7 with acute posterolateral corners, but corners of tergites 2 and 3 almost rectangular, those on tergites 4 and 5 with triangular teeth. Sternites asymmetrical, sternite 3 medioposteriorly with small tubercle, sternite 4 with 2–4, sternite 5 with 3–5, sternite 6 with 0–4 peg-like setae.

Genitalia. Pygophore with both parandria of subequal length and similar shape (Fig. 20), long and almost steadily narrowed towards apex, but left parandrium much broader and partly covering right in caudal aspect. Main body of aedeagus (Fig. 20) with sharp apex curved to right. Left paramere (Figs 21, 22) stout, subparallel except slightly broadened in apical part, with strong bend in basal third, with only short setiferation. Right paramere (Figs 23–25) strongly curved at base, distal part slender, almost straight, and steadily narrowed towards acute apex, only with short setiferation.

Description of brachypterous female. Size (smallest specimen is paralectotype of *A. inops*). Body length 6.6–7.5 mm. Body width 4.6–5.2 mm. Pronotum width 3.5–3.8 mm. Similar to brachypterous male. Abdomen symmetrical, sternite 4 with 2–4, sternite 5 with 3–4, sternite 6 with 3–5 peg-like setae (in some specimens all setae broken off). Subgenital plate (Fig. 12) very broad, subtriangular, with broadly rounded apex, but usually with distinct minute, triangular or lobe-shaped, medial tip; sides convex, with narrow tufts of long, curved setae at about mid-length; subapical, medial tuft of setae directed straight caudad.

Discussion. *Aphelocheirus gularis*, *A. dudgeoni* POLHEMUS et POLHEMUS, 1989 from Hong Kong and Guangxi, *A. hainanensis* ZETTEL, 1998 and *A. ellipsoideus* LIU et DING, 2005 both from Hainan Island form a complex of similar and probably closely related species. *Aphelocheirus dudgeoni* and *A. ellipsoideus* differ from the other two species in separated forewings of the brachypterous morph

(in *A. ellipsoideus* more than in *A. dudgeoni*), the shape of both parameres of the male (see ZETTEL 1998: figs 54–57, LIU & DING 2005: figs 2–5), and a slightly incised apical margin of the female's subgenital plate (in *A. dudgeoni*; female of *A. ellipsoideus* unknown). Whereas specimens of *A. dudgeoni* from Hong Kong are nearly uniformly yellowish brown, specimens from Guangxi have a discrete pattern of brownish dots on the dorsal surface (ZETTEL 1998). *Aphelocheirus gularis* and *A. hainanensis* are most similar. ZETTEL (1998) compared *A. hainanensis* with the description of *A. gularis* by POLHEMUS and POLHEMUS (1989), because the type was not available for study at that time. However, the differences stated by ZETTEL (1998) must be corrected or re-evaluated after examination of the type and the non-type material: The colour of the head depends on the wing morph (yellow in brachypterous specimens, brown in macropterous specimens of *A. gularis*), but is not consistently different in the two species. Variations of the medial structures of the mesosternum also are dependent on the wing morph. The labrum is punctate in both species, not smooth and shiny as described by POLHEMUS and POLHEMUS (1989) for the holotype of *A. gularis*. The ratio of head width and head length seems to be slightly larger in *A. hainanensis* than in *A. gularis*; however, measurements of the median head length can vary due to the degree of deflexion of the head. Thus, in general, small differences of reported ratios are inappropriate for species separation. The concavity of the apical margin of the left paramere (ZETTEL 1998: p. 88 referred erroneously to the right paramere) of *A. gularis* is less concave (compare Figs 21, 22) than in the illustration by POLHEMUS and POLHEMUS (1989: fig. 89) and more similar (but not identical) with the same structure in *A. hainanensis*. In addition to this small difference in the left paramere, the colour pattern of the brachypterous morph of the two populations is different: *A. hainanensis* has numerous bright yellowish to orange marks on pronotum, hemielytra, and tergites, whereas *A. gularis* is usually uniformly dark brown or has, rarely, indistinct orange-brown spots. The differences between *A. gularis* and *A. hainanensis* are so small that the two taxa might actually represent only subspecies of a single species, but at present this cannot be confirmed by morphology. The situation is further complicated by the existence of a female described below.

Distribution. For explanation of the type locality see the Distribution section for *A. inops*. Exact locality data (all based on males) are available from the provinces Cao Bang, Ha Giang, and Quang Binh in Vietnam.

Aphelocheirus (s.str.) aff. *hainanensis* ZETTEL, 1998

Material examined. 1 female (brachypterous), Vietnam: Lang Son Prov., Huu Lien Nature Reserve, Lan Ram stream, 10.X.2001, Coll. A.D. Tran VNLS0102 (ZRCS).

Notes on morphology. This female is larger than the examined females of *A. gularis* and has a vivid colour pattern as described for *A. hainanensis*, especially with pairs of distinct marks on tergites 4–6. Body length 7.7 mm. Body width 5.3 mm. Pronotum width 3.9 mm. Length of head equal to its width; so the head is slightly longer than that of the types of *A. gularis* and *A. hainanensis*. Subgenital plate similar as in *A. gularis* and *A. hainanensis*, but its median tip obsolete.

Aphelocheirus (s.str.) sp. "A"
(Fig. 13)

Material examined. 4 females (brachypterous; paralectotypes of *A. inops*): "Annam\ Laos", "inops H.\ det.Horváth", "TYPUS", "PARALECTOTYPUS\ Aphelochirus\ inops Horváth, 1918\ labelled Zettel & Tran 2008", "Aphelocheirus\ sp. A\ det. Zettel & Tran 2008" (HNHM).

Notes on morphology. Body length 7.5–7.7 mm. Body width 4.7–5.0 mm. Pronotum width 3.6–3.8 mm. Colour of dorsum medium to dark brown, but head yellow or light brown. Dorsum coarsely sculptured, especially on hemielytra. Head shorter than long (0.9 times). Rostrum reaching mesocoxa. Medial propleural process with acute apex. Mesosternum with highly raised median carina. Hemielytra coarsely granulate, posteriorly not reaching posterior margin of tergite 2, medially without gap. Each hemielytron much wider than long (ca. 1.5 times), laterally with very short triangular embolar process (process width 0.05 times total hemielytron width). Sternites 4 and 5 each with 1–4 peg-like setae (partly broken off). Subgenital plate (Fig. 13) subtriangular, with only slightly sinuate sides and narrow apex; sides with narrow tufts of long, curved setae at about two-thirds of length; subapical tuft of setae directed straight caudad.

Discussion. These four females are not *A. inops*, but cannot be related to any described species at present. The structures of the subgenital plate (Fig. 13), especially its subtriangular shape, are very diagnostic. Another important characteristic is the sparsely, but coarsely, tuberculate surface of hemielytra and sides of tergites. The authors refrain to describe this material as new, because males are unknown and the type locality is not clear.

Aphelocheirus (s.str.) sp. "B"
(Fig. 14)

Material examined. 1 female (brachypterous; paralectotypes of *A. inops*): "Annam\ Laos", "inops H.\ det.Horváth", "TYPUS", "PARALECTOTYPUS\ Aphelochirus\ inops Horváth, 1918\ labelled Zettel & Tran 2008", "Aphelocheirus\ sp. B\ det. Zettel & Tran 2008" (HNHM).

Notes on morphology. Size. Body length 7.9 mm. Body width 5.1 mm. Pronotum width 3.9 mm. Colour of dorsum dark brown, but head yellow with black triangle at base and mesoscutellum yellowish. Head much shorter than long (0.85 times). Rostrum reaching mesocoxa. Medial propleural process with rounded apex. Mesosternum with raised, rounded medial hump. Hemielytra coarsely granulate, posteriorly almost reaching posterior margin of tergite 2, medially with narrow gap (ca. 0.1 times hemielytron width). Each hemielytron wider than long (ca. 1.3 times), laterally with very short triangular embolar process (process width 0.07 times total hemielytron width). Sternites without recognizable peg-like setae. Subgenital plate (Fig. 14) almost trapezoidal with small apical lobe; sides weakly concave and with narrow tufts of comparatively short, curved setae at about mid-length; with subapical transverse row of setae directed straight caudad.

Discussion. This single female has some similarities to *A. gularis*, but it is longer and has an elongate subgenital plate with relatively shorter lateral setae (comp. Figs 12 and 14). The absence of peg-like setae on abdominal sternites would place it in the *A. minor* species group (ZETTEL *et al*. 2008), but the venter is almost polished, so it seems possible that all setae (and their insertions) are abraded. The female is very different from that of *A. lahu* POLHEMUS & POLHEMUS, 1989, the only species of the *A. minor* group described from Southeast Asia; and it cannot be assigned to any described species so far.

Aphelocheirus (s.str.) **tuberculipes** sp. n.
(Figs 5, 9, 10, 26–35)

Type material. Holotype (brachypterous male; ZMHU) and paratypes (2 brachypterous males, 6 brachypterous females; ZMHU, NHMW, ZRCS), Vietnam: Cao Bang Prov., Ha Quang, Phu Ngoc, stream near District Headquarter, 17.XII.2000, Coll. V.V. Nguyen & X.N. Ngo, # VNCB0002.

Type locality. Northern Vietnam, Cao Bang Province, Ha Quang, Phu Ngoc, stream near administrative District Headquarters.

Description of brachypterous male (if no variation is given, measurements refer to the holotype). Size. Body length 7.8–8.0 mm (holotype: 7.8 mm). Body width 4.7–5.1 mm (holotype: 4.7 mm). Pronotum width 4.0–4.1 mm (holotype: 4.0 mm).

Colour. Dorsal colour pattern (Fig. 26, female): most of dorsum yellowish to light brown, pronotum with dark transverse stripes, base of mesoscutellum weakly infuscated, hemielytron mainly brown, tergites with some obscure darker areas, especially on tergite 5. Ventral side, including appendages, yellowish, hardly infuscated.

Head (Fig. 26, female) short, length 0.95 times head width; dorsal surface with densely set, mixed large and small punctures, not confluent except on most posterior part; interspaces shiny. Anterior section of head (anterior of anterior eye margin) moderately short, 0.6 times eye length (eye length measured parallel with median line of head). Rostrum 1.9 times as long as profemur, tip reaching mesotrochanter.

Thorax: Pronotum (Fig. 26, female) with distinctly convex, very densely punctured disk, sides coarsely granulate. Median pronotum length 0.7 times median head length. Maximum width at posterolateral corners, 3.5 times median length. Lateral margins of pronotum strongly convex and convergent anteriorly; width at anterolateral corners 0.45 times maximum width. Prosternum anteromedially produced into small lobe. Propleuron (Fig. 5) medially with narrow, triangular process demarcated by rectangular incision, with tip acute. Mesosternum (Fig. 9) with high medial hump, its anterior, steeply sloping face slightly shorter than its ventral outline. Mesoscutellum coarsely granulate; anterior width 2.8 times median length, its centre only slightly convex.

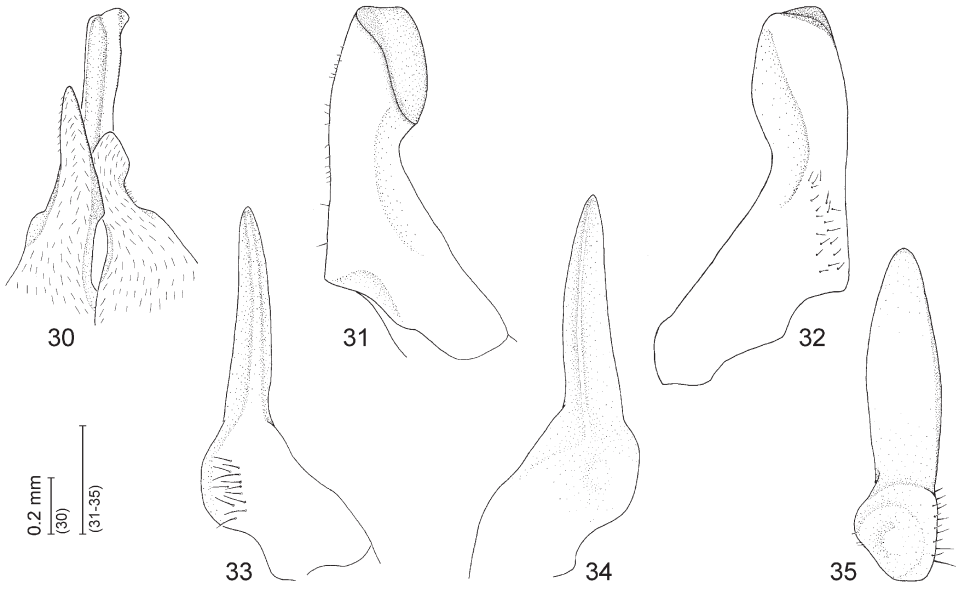
Fig. 26. Habitus, dorsal aspect, of *A. tuberculipes* sp. n. (brachypterous female paratype; body length 7.5 mm), labels not on scale. © NHMW Hemiptera Image Collection, published with permission

Hemielytra (Fig. 26, female) coarsely granulate, large, posteriorly not reaching posterior margin of tergite 2, medially without or with very narrow gap (up to one tenth of hemielytron width). Each hemielytron much wider than long (1.5 times) and laterally with small, triangular embolar process (process width 0.07 times total hemielytron width).

Legs short and stout, femora scarcely exceeding lateral margin of body. Profemur enlarged, 2.6 times as long as wide; shorter than both, meso- and metafemur. Meso- and metatrochanter (Figs 27–29) each with raised, narrow, ovate, brown swelling. Metafemur (Fig. 29) with brown patch located on distinct dilatation of femur. These patches composed of densely packed, very short, modified setae. Mesofemur (Fig. 28) with large, ill-defined, brownish patch consisting of less strongly modified setae.

Abdomen. Tergites 2–7 with acute posterolateral corners, but corners of tergites 2 and 3 almost rectangular, those on tergites 4 and 5 forming slender spines. Sternites strongly asymmetrical, especially sternites 5–6; sternite 3

Figs 27–29. Brachypterous male (paratype) of *A. tuberculipes* sp. n.: 27 = overview on structures on middle and hind leg, and peg-like setae on sternites 4 and 5, 28 = structures on mesotrochanter and mesofemur, 29 = structures on metatrochanter and metafemur



Figs 30–35. Genitalia of holotype male of *A. tuberculipes* sp. n.: 30 = parandria and aedeagus, 31–32 = left parameres, two aspects, 33–35 = right parameres, three aspects

medioposteriorly with small and low tubercle, sternite 4 with 4, sternite 5 with 5–6, sternite 6 with 1–2 peg-like setae.

Genitalia. Pygophore (Fig. 30) with left parandrium distinctly longer than right; left parandrium of narrow, blade-like shape, with apex very acute; right parandrium distally dilated and slightly curved laterad. Main body of aedeagus (Fig. 30) almost straight, with subparallel sides and apex weakly curved to the right; "dorsal" face (as situated in pygophore) with distinct medial impression. Left paramere (Figs 31, 32) with bend near midlength, subapically widened, but apically narrowed toward narrowly truncate apex; at bend with group of slightly longer setae, otherwise bare or only with very short setiferation. Right paramere (Figs 33–35) with bend at proximal two fifths, distal part slender, blade-shaped, almost straight; apex narrowly rounded; only with short setiferation.

Description of brachypterous female. Size. Body length 7.4–7.9 mm. Body width 5.0–5.3 mm. Pronotum width 3.9–4.1 mm. Similar to brachypterous male. In some specimens dorsum darker: Head laterally brownish, pronotum, mesoscutellum, hemielytra, and tergites mainly brown. Profemur not as enlarged as in male. Abdomen symmetrical, sternite 4 with 4–5, sternite 5 with 6–7, sternite 6 with 0–2 peg-like setae. Subgenital plate (Fig. 10) of subtriangular shape, side sinuate, convex at base, concave distally, apical margin broadly triangular, with small, but distinct medial apex; lateral margins at about basal third with narrow tufts of very long setae and subapically with occasional relatively long setae (see Fig. 10, left side); near apical margin with paired oblique ridges separated by narrow median furrow, ridges densely set with short yellowish setae.

Discussion. This is the second known Oriental species of the genus which has strong modifications on the middle and hind legs of the male, but POLHEMUS and POLHEMUS (1989) noted similar characteristics in some endemic species from Madagascar. Males of *A. femoratus* POLHEMUS et POLHEMUS, 1989 have distinct, raised, ovate brown swellings on the meso- and metatrochanters and on the bases of the metafemora; this species is recorded from peninsular Malaysia, southern and northern Thailand, and southwestern China (POLHEMUS & POLHEMUS 1989, SITES *et al*. 1997, LIU & DING 2005). Voucher specimens of *A. femoratus* from southern Thailand (Songkhla Province) were used for comparison and illustrations. Males of the new species have brown patches of modified setae similar to those of *A. femoratus*, but those on the trochanters are narrow and those on the metafemora are situated on distinct dilatations (Figs 27–29). The head of *A. tuberculipes* sp. n. is shorter than that of *A. femoratus*, and the lateral process of the hemielytron (brachypterous morph) is more projecting. The left paramere is apically wider in *A. tuberculipes* sp. n. than in *A. femoratus*, and the right paramere is distally narrower (Figs 31–35). The subgenital plates of the females are of similar shape and setiferation, but the apex is wider in the new species (Fig. 10).

Aphelocheirus (s.str.) *similaris* POLHEMUS et POLHEMUS, 1989

Aphelocheirus (Aphelocheirus) similaris POLHEMUS et POLHEMUS, 1989: 242–243.
Aphelocheirus (s.str.) *similaris* POLHEMUS et POLHEMUS, 1988: ZETTEL 1998: 93–94.

Material examined. 1 male (macropterous-dealate) labelled "VIETNAM.Prov.Lao Cai.\ Dist. Sa Pa. Cat-Cat-FVBC.\ 1250m. 8. 04–2. 06.1998.\ leg. Frontier, Vietnam" (HNHM).

Notes. This species is known only from northern Vietnam, and only in five specimens of the macropterous morph (POLHEMUS & POLHEMUS 1989, ZETTEL 1998, and this study). The parameres of the newly examined specimen match well with the illustrations presented by ZETTEL (1998: figs 50–53); the structure of the left paramere is unmistakable for any other Southeast Asian species.

Distribution. Recorded from Hanoi (POLHEMUS & POLHEMUS 1989) and Lao Cai Province (ZETTEL 1998, and this study) in Vietnam.

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