

First record of the genus *Hadrocryptus* Cameron, 1903 (Ichneumonidae: Cryptinae) from Vietnam, with descriptions of two new species and notes on biology

Nhi Thi Pham^{1*}, Hoa Thi Dang^{1,2} & Duong Dinh Tran¹

Abstract. The ichneumonid wasp genus *Hadrocryptus* Cameron, 1903 is recorded for the first time from Vietnam. *Hadrocryptus ditissimus* (Tosquinet, 1903), previously known from Bhutan, India, Indonesia, and Malaysia, as well as *H. perforator* Broad & Barthélémy, 2012, formerly known only from China (Hong Kong), are newly recorded from Vietnam. In addition, two new species are described from Vietnam, namely *H. caobangensis*, new species and *H. ferrugineus*, new species. *H. caobangensis* was reared from the nest of *Allorhynchium lugubrinum* (Cameron, 1900) (Hymenoptera: Vespidae). A key to species of *Hadrocryptus* is included.

Key words. Darwin wasps, parasitoid, host, new records, taxonomy

INTRODUCTION

Hadrocryptus Cameron, 1903 is a poorly-known genus in the subfamily Cryptinae (Hymenoptera: Ichneumonidae) with seven recognised species from the Oriental and Australasian regions (Gupta & Gupta, 1983; Barthélémy & Broad, 2012).

Morphologically, *Hadrocryptus* belongs to Townes' subtribe Gabuniina, separated from other cryptines by having body shape approximately cylindrical, fore tibia of female dilated, the lower tooth of the mandible longer than the upper tooth, the tip of female flagellomeres cylindric and truncate, the first tergite usually stout, its spiracles at or near middle of tergite, the ovipositor tip without a distinct nodus, the tip of lower valve with vertical teeth, and its dorsal lobe partly or completely enclosing the upper valve (Townes, 1970). Santos (2017) and Santos & Perrard (2018) demonstrated that most of the former Gabuniina and the genus *Echthrus* Gravenhorst, 1829 form a large clade, which they termed the 'Gabunia group'. These authors also noted several morphological features that enable cryptine wasps to attack deeply concealed hosts, such as a modified antennal tip, large mandibular muscles, swollen fore tibia, enlarged oviposition

muscles, stout ovipositor and ovipositor lobe, traits shared by species in the *Gabunia* group. Adults of some species in the group are known as parasitoids of xylophagous Coleoptera and Lepidoptera (Townes, 1970; Santos, 2017), but the hosts of *H. perforator* Broad & Barthélémy, 2012 are aculeate Hymenoptera (Specidae and Vespidae) (Barthélémy & Broad, 2012).

Here, we report the genus *Hadrocryptus* for the first time from Vietnam, with descriptions of two new species and two other newly recorded species. As a result of collecting nests and rearing the host in the laboratory, we also record an additional host of this genus. The identification key to species of *Hadrocryptus* found in Gupta & Gupta (1983) is modified to include the two new species from Vietnam and *H. perforator*.

MATERIAL AND METHODS

Ichneumonid wasps were collected using Malaise traps and hand nets between 2005 and 2025 in Vietnam, in addition to collecting wasp nests. All specimens are deposited at the Institute of Biology (IB) (formerly known as Institute of Ecology and Biological Resources), Vietnam Academy of Science and Technology, Hanoi, Vietnam. Other collections referred to in this paper are the Natural History Museum, London, UK (NHMUK) and the Royal Belgian Institute of Natural Sciences, Brussels, Belgium (RBINS).

Morphological terminology follows Broad et al. (2018). The following abbreviations are used: F1, F2, F3, etc. = 1st, 2nd, 3rd flagellomere, etc., T1, T2, T3, T4 = metasomal tergite 1, 2, 3, 4, respectively, and S1 = metasomal sternite 1. Digital images of specimens were taken with a Nikon SMZ800N M80 stereomicroscope and a Canon 700D camera.

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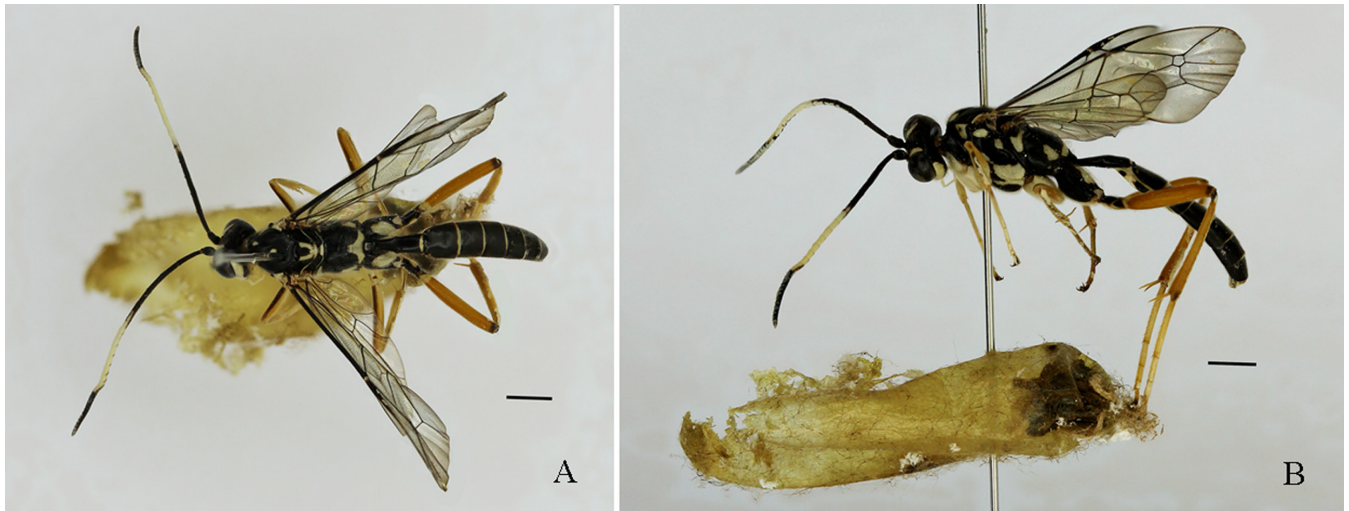


Fig. 1. *Hadrocryptus caobangensis*, holotype male with cocoon. A, habitus, dorsal view; B, habitus, lateral view (scale bar = 2 mm).

Photographs were stacked with Combine ZP, Helicon Focus and subsequently edited with Photoshop CS2.

TAXONOMY

Order Hymenoptera Linnaeus, 1758

Family Ichneumonidae Latreille, 1802

Subfamily Cryptinae Kirby, 1837

Genus *Hadrocryptus* Cameron, 1903

Hadrocryptus nasutus Cameron, 1903 (= *Echthrus ditissimus* Tosquinet, 1903), monobasic.

Hoplonopsis Szépligeti, 1916: 239.

Hadrocryptus is distinguished from other genera of the *Gabunia* group by the combination of the following characters: face with horn just below and between antennal sockets, clypeus with median tooth, propodeum lacking pleural carina between anterior transverse carina and base of hind coxa, first tergite with pronounced anterior, lateral teeth (weaker in male), fore wing with moderately large areolet, broadly subpentagonal, vein 1cu-a of fore wing distinctly antefurcal to vein M&RS.

Hadrocryptus caobangensis, new species (Figs. 1–3)

Diagnosis. Body black with yellow/ivory markings; face with moderately low horn; clypeus low nose-shaped (“nasute”) subapically; pronotum with narrow ivory mark centrally on pronotal collar and with largely triangular ivory mark at posterior corner; mesopleuron with ivory marks on speculum and below sternaulus; mesosternum with triangular ivory mark; scutellum ivory, anteriorly and medially black; tergites with very narrow posterior ivory bands.

Material examined. Holotype: male (IB), Cao Bang Province, Phia Oac-Phia Den National Park, 22°35'33"N,

105°51'7"E, 1,025 m a.s.l, 22 August 2024, emerged on 26 August 2024 from collected nest, coll. Dang T.H. Paratype: 1 male (IB), same data as holotype, except emerged on 7 May 2025.

Description of holotype male. Head 0.7× as high as wide, weakly constricted behind eye in dorsal view (Fig. 2B). Face 0.8× as high as wide, with two short longitudinal impressions, with fine punctures laterally and rugose punctures medially (Fig. 2A). Facial horn below and between antennal sockets, moderately low, pointed oval in dorsal view, protruding by distance slightly greater than inter-antennal distance, laterally with ridge connecting to antennal socket (Figs 2A, 2B, 2C). Clypeus rugose punctate, 0.5× as high as wide, lateral margin thin, up-curved, low nasute protrusion medially, sub-apically, apical margin thin, with obtuse, small median tooth (Fig. 2A). Malar space granulate, 0.5× as long as mandible basal width. Gena polished, with moderately dense punctures (Fig. 2C). Frons concave, with dense wrinkles medially, laterally with punctures. Vertex punctate. Postero-ocellar distance 0.9× ocular-ocellar distance, 1.4× median ocellus diameter (Fig. 2B). Antenna with 28 flagellomeres, F1 5.0× as long as wide, 1.4× as long as F2. Occipital carina complete, ventrally meeting hypostomal carina at base of mandible.

Mesosoma. Pronotum sub-polished, with dense punctures dorsally, ventrally with sparse punctures, medially impunctate, with short transverse striate (Fig. 2E). Mesoscutum 1.1× as long as wide, sub-polished, with dense punctures. Notaulus strong to level of posterior edge of tegula. Scutellum densely punctate, except smooth posteriorly, lateral carina present anteriorly (Fig. 2D). Mesopleuron sub-polished, punctate, dorsal end of epicnemial carina and lateral of speculum with transverse striae. Epicnemial carina present on ventral 0.8. Subalar prominence punctate. Speculum polished. Sternaulus well-developed, extending towards mid coxa, ventrad of lower posterior corner of mesopleuron (Fig. 2E). Metapleuron with large punctures, pleural carina extending from base to anterior transverse carina of propodeum. Submetapleural carina complete. Juxtacoxal carina strong (Fig. 2E). Propodeum with anterior transverse carina strong, complete,

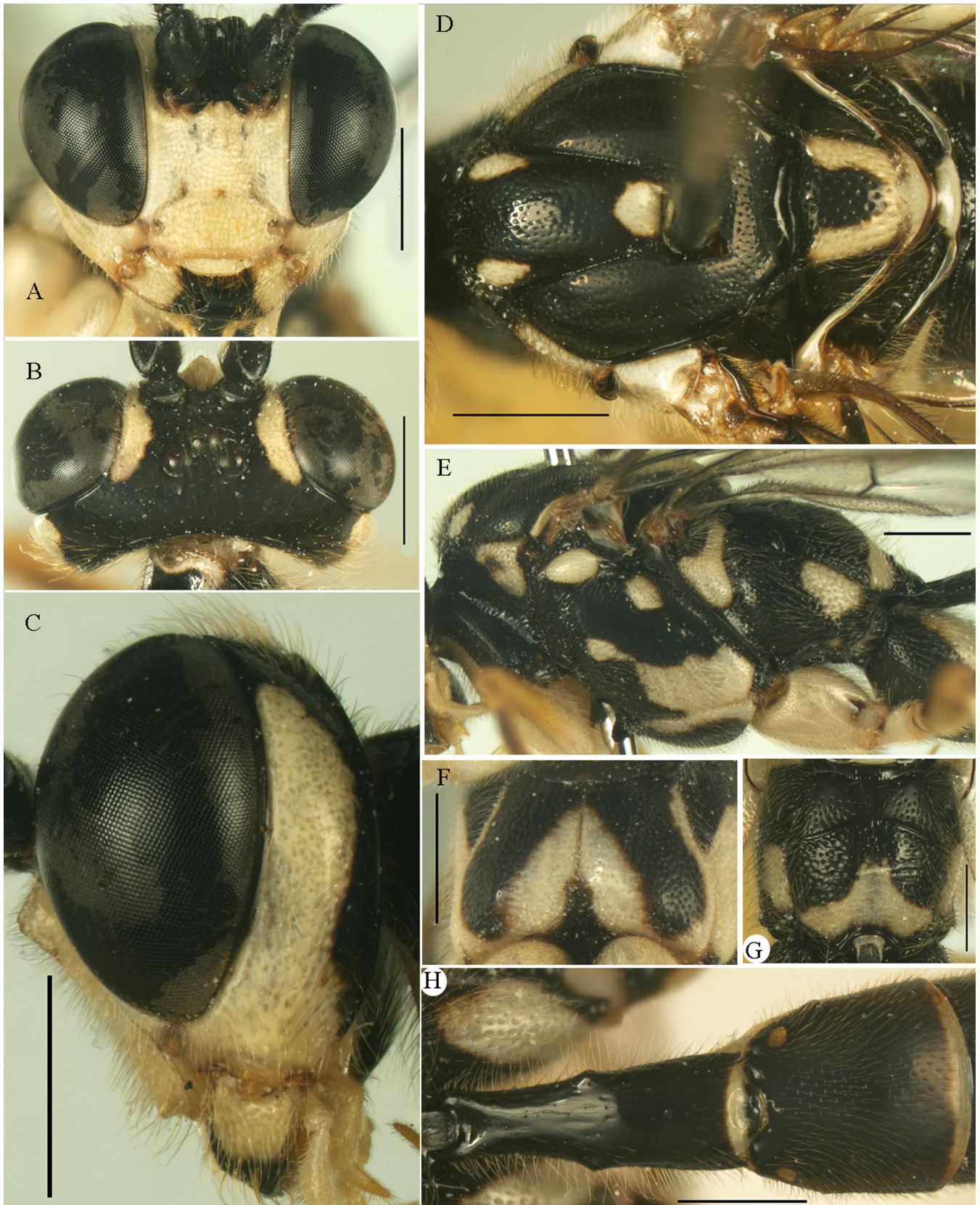


Fig. 2. *Hadrocryptus caobangensis*, new species, holotype male. A, head, front view; B, head, dorsal view; C, head, lateral view; D, mesonotum; E, mesosoma, lateral view; F, mesosternum; G, propodeum; H, tergites 1–2 (scale bar = 1 mm).

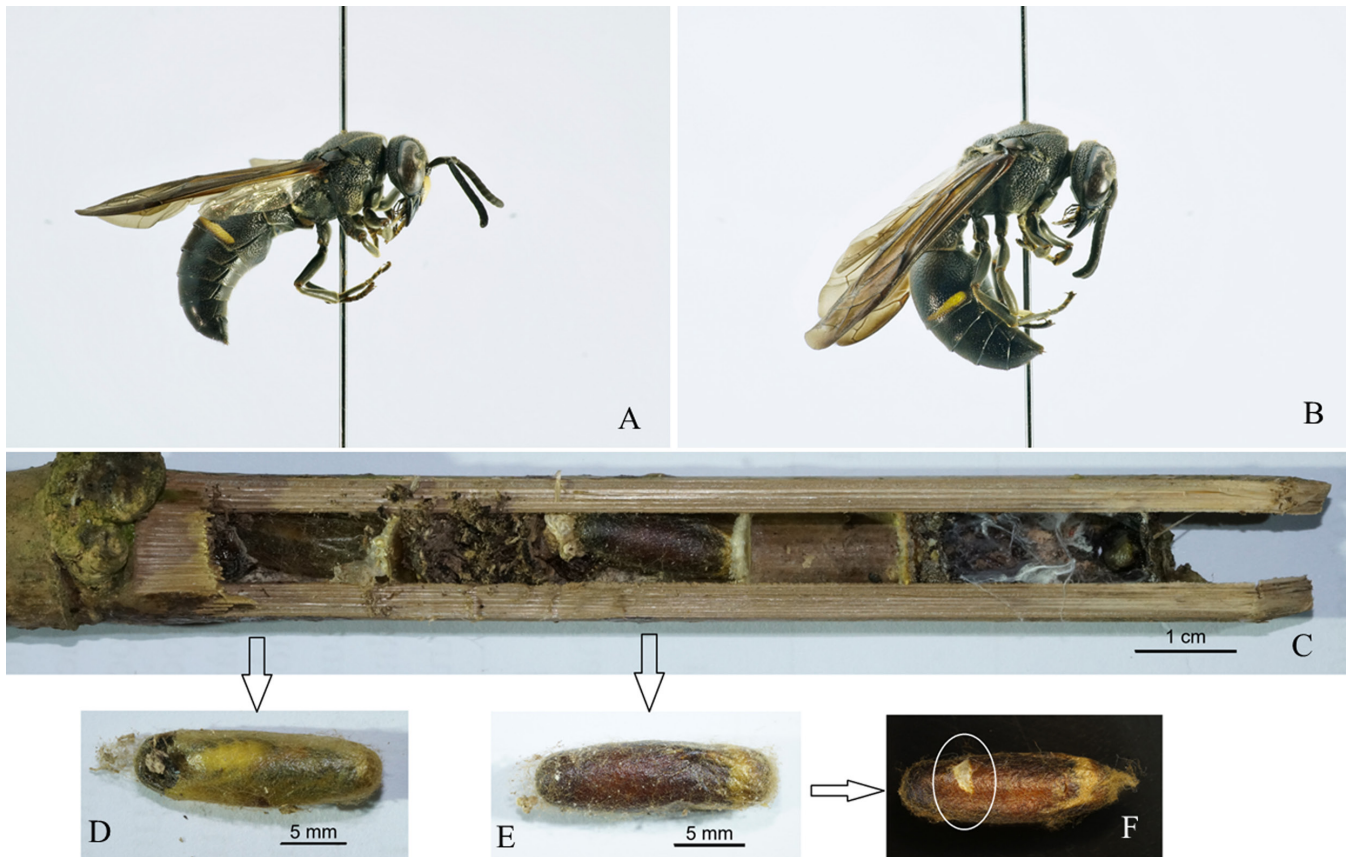


Fig. 3. Host and cocoons of *Hadrocryptus caobangensis*. A, B, *Allorhynchium lugubrinum*, host of *H. caobangensis* (A. male; B. female); C, nest of *A. lugubrinum* with cocoons of *H. caobangensis*; D, first cocoon of *H. caobangensis*; E, F, second cocoon of *H. caobangensis*.

posterior transverse carina indistinct. Area anterior of anterior transverse carina sub-polished, with dense punctures. Area posterior to anterior transverse carina rugulose (Fig 2G).

Wings. Fore wing length 12.1 mm, vein 1cu-a antefurcal to M&RS by about $0.4\times$ length of vein 1cu-a, subvertical, vein 2rs-m $1.1\times$ as long as 3rs-m, slightly convergent anteriorly, length of CU between 1m-cu&M and 2cu-a $1.1\times$ length of 2cu-a. Hind wing with distal abscissa of CU present, length of CU between M and cu-a $1.5\times$ length of cu-a.

Legs. Tibiae and ventral side of tarsi with bristles. Hind coxa densely punctate. Hind femur $6.2\times$ as long as wide, $0.8\times$ as long as hind tibia. Hind basitarsus $0.5\times$ as long as hind tarsus.

Metasoma. T1 $2.4\times$ as long as posterior width, sub-polished, with sparse punctures. S1 extending beyond level of spiracle. T2 onwards sub-polished, with dense punctures. T2 about $0.8\times$ as long as T1 (Fig. 2H).

Colour. Black with yellow/ivory markings. Antenna with dorsal part of F5 to F15 ivory. Face, clypeus, basal half of mandible, inner orbit to vertex, outer orbit to dorsal 0.85 of eye, posterior corner of pronotum and central pronotal collar narrowly, propleuron, lateral corner of median lobe of mesoscutum, central area on mesoscutum, tegula, lateral and posterior of scutellum, postscutellum, subalar prominence, dorsal half of speculum, oblique subventral stripe on mesopleuron, transverse stripe below sternaulus,

medio-posterior of mesosternum, dorso-posterior corner of metapleuron, transverse T-shape stripe below hind wing base, posterior patch on propodeum, narrow posterior bands on metasomal tergites ivory. Fore and mid coxae ivory with small black spot postero-dorsally. Fore and mid trochanters to trochantelli ivory with some small black markings. Fore tibia to tarsus yellowish white with black stripes on femur, tibia and tarsus 5. Mid tibia to tarsus reddish brown with black stripes dorsally. Hind coxa black with ivory markings on dorsal and inner sides. Hind trochanter and trochantellus black dorsally, whitish yellow ventrally. Hind femur to tarsus reddish, narrowly black on posterior of femur, base of tibia and posterior of tarsus 5. Wings hyaline, transparent, wing veins black.

Variation. The male paratype has 29 flagellomeres, F1 about $5.3\times$ as long as wide, postero-ocellar distance $0.7\times$ ocular-ocellar distance, $1.1\times$ median ocellus diameter, face $0.8\times$ as high as wide, clypeus $0.6\times$ as high as wide, fore wing length from 10.5 mm, vein 2rs-m slightly shorter than vein 3rs-m, length of CU between 1m-cu&M and 2cu-a slightly shorter than length of 2cu-a, T1 $2.5\times$ as long as posterior width.

Female. Unknown.

Comparative notes. The new species resembles *Hadrocryptus toliensis* Gupta & Gupta, 1983, *H. trimaculatus* Gupta & Gupta, 1983, *H. ditissimus* (Tosquet, 1903), and *H. perforator* Broad and Barthélémy, 2012 in general colour pattern. It can be differentiated from the other species by



Fig. 4. *Hadrocryptus ditissimus* (Tosquinet), female from Vietnam. A, head, front view; B, head, dorsal view; C, propodeum; D, head, lateral view; E, mesonotum; F, mesosoma, lateral view; G, metasomal tergites (scale bar = 1 mm).

having a lower facial horn, a lowly nasute clypeus and the colour of the pronotum, scutellum and mesosternum.

Etymology. The specific name refers to the type locality, Cao Bang Province, northeastern Vietnam.

Distribution. Currently known only from Cao Bang Province, northeastern Vietnam.

Biological notes. Three nests of *Allorhynchium lugubrinum* (Cameron, 1900) were collected in the secondary forest of Phia Oac-Phia Den National Park, Cao Bang Province. The nests were built in reed stem segments used as fences. At opening on 22 August 2024, one of the three nests referenced as Nest-24-293 contained two cocoons of *Hadrocryptus caobangensis*. This nest was 135 mm long and 10 mm in inner diameter (Fig. 3C). The first cocoon was at the pupal stage and it was positioned head toward the nest entrance

(Fig. 3D). The parasitoid cocoon was 19 mm in length and 5.5 mm in diameter (Fig. 3D). It was composed of a thin layer of finely spun silk, shiny and brownish transparent in colour, the outside was covered with numerous silk strands. The meconium was discharged by the pupating larva internally at the anal end of the cocoon along with the shed integument. The male holotype emerged from this cocoon on 26 August 2024. The second cocoon was a diapausing prepupa of *H. caobangensis*. This cocoon was 18 mm in length and 5 mm in diameter (Fig. 3E). Its structure was similar to the first cocoon, but it was thicker and the inside was not observable (Fig. 3E). The overwintering larva not only built a stronger cocoon, but also had the habit of repairing the cocoon when it was broken. As evidence, on 15 April 2025, we made a small hole in the cocoon when the parasitoid was still in the pre-pupal stage which was sealed by the prepupa (Fig. 3F). The prepupa became a pupa on 30 April 2025 and the pupal stage lasted seven days. The male paratype emerged

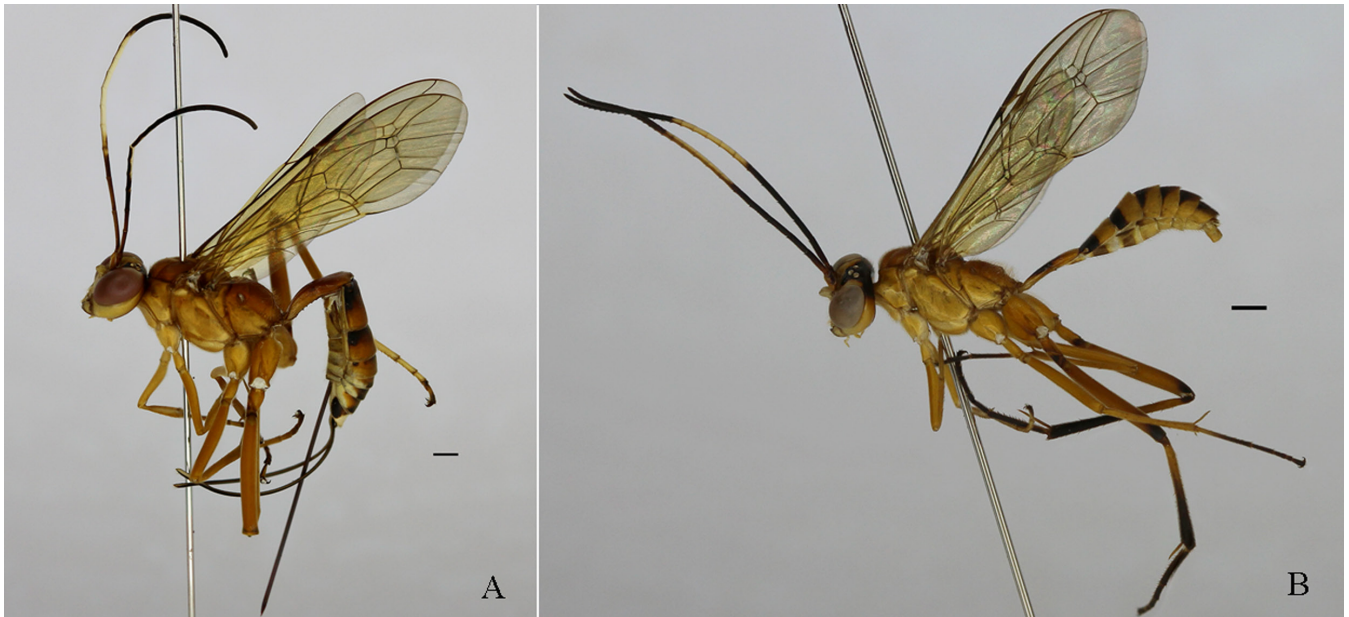


Fig. 5. *Hadrocryptus ferrugineus*, new species. A, habitus of holotype female, lateral view; B, habitus of paratype male, lateral view (scale bar = 1 mm).

on 7 May 2025. It is the first time that *Allorhynchium lugubrinum* has been recorded as a host of *Hadrocryptus*. Up to now, only *Xenorhynchium* sp., *Zethus* sp. (Vespidae: Eumeninae), and *Isodontia diodon* (Sphecidae) were known as hosts (Barthélémy & Broad, 2012).

***Hadrocryptus ditissimus* (Tosquinet, 1903)**
(Fig. 4)

Echthrus ditissimus Tosquinet, 1903: 252. Holotype: female, Java: Mt. Gedeh (RBINS).

Hadrocryptus ditissimus: Townes et al., 1961: 193.

Hadrocryptus nasutus Cameron, 1903: 12. Synonymised with *H. ditissimus* by Gupta & Gupta (1983).

Hadrocryptus tuberculatus Cameron, 1907: 5. Synonymised with *H. ditissimus* by Gupta & Gupta (1983).

Hadrocryptus dentatus Cameron, 1907: 21. Synonymised with *H. ditissimus* by Gupta & Gupta (1983).

Diagnosis. Body black with yellow markings; face with large, high horn; pronotal collar yellow with black mark laterally; mesopleuron and metapleuron punctate-striate to wrinkled; propodeum entirely black anteriorly in dorsal view; ovipositor sheath 1.1–1.3× as long as hind tibia.

Material examined. 1 female (IB), Nghe An Province, Pu Huong Nature Reserved, 9 August 2005, hand net, coll. Nguyen T.T.H.; 1 female (IB), Bac Kan Province, Kim Hy Nature Reserved, 22°12'31"N 106°5'2"E, 600–700 m a.s.l., 3 June 2014, hand net, coll. Nguyen T.P.L., Nguyen D.D. & Tran D.D.

Distribution. Previously known from Bhutan, India, Indonesia, and Malaysia (Gupta & Gupta, 1983). These are the first records of this species from Vietnam.

Notes. Vietnamese specimens have the pronotal collar yellow with a black mark laterally, instead of two yellow marks laterally as described by Gupta & Gupta (1983).

***Hadrocryptus ferrugineus*, new species**
(Figs. 5–6)

Diagnosis. Body ferruginous with black markings on head and metasomal tergites; face with large, extremely high horn, basally forming an obtuse angle opposite antennal socket; wings transparent, pale reddish yellow; ovipositor sheath 1.4× as long as hind tibia.

Material examined. Holotype: female (IB), Lang Son Province, Trang Dinh, Chi Minh, 22°21'34"N 106°24'47"E, 350 m a.s.l., 29 April–5 May 2025, Malaise trap, coll. Pham T.N., Cao, T.Q.N., Cao T.K.T., Dang T.H. & Nguyen D.H. Paratypes: 1 female, 3 males (IB), same data as holotype; 1 male (IB), Vinh Phuc Province, Me Linh Center for Biodiversity, 21°23'03"N 105°42'40"E, 70 m a.s.l., 1–10 June 2020, Malaise trap, coll. Tran D.D. coll.; 1 female (IB), same data and collector as preceding specimen, 21°23'22"N 105°42'48"E, 65 m a.s.l., 20–30 April 2021.

Description of holotype female. Head 0.8× as high as wide, constricted behind eye in dorsal view (Fig. 6B). Face 0.9× as high as wide, with two longitudinal grooves, with fine punctures laterally and rugose punctures medially (Fig. 6A). Facial horn below and between antennal sockets, large, very high, pointed oval in dorsal view, protruding by distance distinctly greater than inter-antennal distance, basally forming obtuse angle opposite antennal socket, laterally with ridge connecting to antennal socket (Figs 6A, 6B, 6C). Clypeus rugose punctate, 0.5× as high as wide, lateral margin thin, up-curved, apical margin thin, concave, with obtuse, low median tooth (Fig. 6A). Malar space granulate, 0.5× as long



Fig. 6. *Hadrocryptus ferrugineus*, new species, holotype female. A, head, front view; B, head, dorsal view (red arrow indicating obtuse angle at base of facial horn); C, head, lateral view; D, mesonotum; E, mesosoma, lateral view; F, propodeum; G, first tergite; H, tergites 2–8; K, ovipositor tip (scale bar = 1 mm, except scale bar for K = 0.5 mm).

as mandibular basal width. Gena polished, with scattered fine punctures. Frons concave, with punctures laterally and short striae medially. Vertex punctate. Postero-ocellar distance $0.5\times$ ocellar-ocellar distance, $0.8\times$ median ocellus diameter (Fig. 6B). Antenna with 25 flagellomeres, F1 $7.7\times$ as long as wide, $1.2\times$ as long as F2. Occipital carina complete, ventrally meeting hypostomal carina at base of mandible.

Mesosoma. Pronotum sub-polished, with dense punctures, lateromedially and along posterior edge with short transverse striate (Fig. 6E). Mesoscutum $1.1\times$ as long as wide, densely punctate, with setae. Notauli strong to level of posterior edge of tegula. Scutellum densely punctate, except smooth posteriorly, lateral carina present on anterior 0.3 (Fig. 6D). Mesopleuron densely punctate or punctate-striate, along

epicnemial carina to dorsal part, along speculum and at level of sternaulus with transverse striae. Epicnemial carina present on ventral 0.8. Subalar prominence punctate. Speculum polished. Sternaulus well-developed, extending towards mid coxa, ventrad of lower posterior corner of mesopleuron (Fig. 6E). Metapleuron rugose punctate, except anteroventral corner impunctate, pleural carina extending from base to anterior transverse carina of propodeum. Submetapleural carina complete. Juxtacoxal carina strong (Fig. 6E). Propodeum with anterior transverse carina strong, complete, posterior transverse carina strong, partly incomplete medially. Area anterior of anterior transverse carina sub-polished, with dense punctures. Area between anterior and posterior transverse carinae reticulate-rugose. Area below posterior transverse carina rugose punctate to rugulose (Fig. 6F).

Wings. Fore wing length 13.2 mm, vein 1cu-a antefurcal to M&RS by about $0.6\times$ length of vein 1cu-a, subvertical, vein 2rs-m $1.2\times$ as long as 3rs-m, slightly convergent anteriorly, length of CU between 1m-cu&M and 2cu-a $1.1\times$ length of 2cu-a. Hind wing with distal abscissa of CU present, length of CU between M and cu-a $1.8\times$ length of cu-a.

Legs. Tibiae and ventral side of tarsi with bristles. Hind coxa densely punctate. Hind femur $6.4\times$ as long as wide, $0.8\times$ as long as hind tibia. Hind basitarsus $0.5\times$ as long as hind tarsus.

Metasoma. T1 $2.2\times$ as long as posterior width, sub-polished, with dense punctures on posterior half (Fig. 6G). S1 extending beyond level of spiracle, with strong teeth, separated by more than their width. T2 onwards matt, with dense punctures. T2 about $0.65\times$ as long as T1, anteriorly with sub-triangle weakly raised medially (Fig. 6H). Ovipositor $1.4\times$ as long as hind tibia length.

Colour. Ferruginous with yellow and black markings. Antenna black with scape, pedicel, ventral part of F1 and F2 reddish, dorsal parts of F3 and F11, basal and posterior parts of F4 and whole of F5–F10 ivory. Median part of frons extending to stemmaticum and vertex black. Anterior parts of T2–T4, basal and posterior part of T5 and most of T6–T7 and lateral part of T8 black. Lateral part of T2–T7 and T8 medially yellow. Wings transparent, pale reddish yellow, wing veins black. Legs with dorsal part of tarsus 4–5 of fore leg, dorsal part of tarsus 3–5 of mid leg and dorsal part of tarsus 4 and posterior part of tarsus 5 of hind leg black.

Variation. Female paratypes have F1 $7.1\times$ as long as wide, postero-ocular distance $0.6\times$ ocular-ocular distance, $0.9\text{--}1.0\times$ median ocellus diameter, fore wing length $11\text{--}11.3$ mm, vein 2rs-m $1.2\text{--}1.4\times$ as long as 3rs-m, length of CU between 1m-cu&M and 2cu-a $1.0\text{--}1.2\times$ length of 2cu-a, hind wing vein CU between M and cu-a $2.2\text{--}2.6\times$ length of cu-a, T1 with black mark medially, S1 with weaker teeth, anterior transverse carina of propodeum almost complete. Male. Male paratypes with less sculptured bodies, antenna with 25–29 flagellomeres, dorsal side of F6 to F11 (or to F12) ivory, F1 $5.1\text{--}6.3\times$ as long as wide, $1.3\times$ as long as F2, postero-ocular distance $0.6\text{--}0.7\times$ ocular-ocular distance,

equal to median ocellus diameter, face $0.8\text{--}0.9\times$ as high as wide, fore wing length $6.1\text{--}10.3$ mm, vein 1cu-a antefurcal to M&RS by $0.3\text{--}0.5\times$ length of vein 1cu-a, vein 2rs-m $1.1\text{--}1.3\times$ as long as 3rs-m, length of CU between 1m-cu&M and 2cu-a $0.9\text{--}1.0\times$ length of 2cu-a, hind wing vein CU between M and cu-a $1.6\text{--}2.5\times$ length of cu-a, T1 $2.9\text{--}3.6\times$ as long as posterior width, T2 $0.7\text{--}0.8\times$ as long as T1, S1 without teeth, each tergites with black band, hind leg with posterior half of tibia to tarsus black.

Comparative notes. This new species is similar to *Hadrocryptus naranjis* Gupta & Gupta, 1983 in general colour pattern. It can be recognized from the latter by its facial horn with an obtuse angle opposite antennal socket and by an entirely ferruginous mesosoma (vs. with black markings).

Etymology. The specific name refers to the dominant colour of its body.

Distribution. Currently known only from secondary forest in Lang Son and Vinh Phuc provinces, northeastern Vietnam.

Hadrocryptus perforator Broad & Barthélémy, 2012
(Fig. 7)

Hadrocryptus perforator Broad & Barthélémy, 2012: 49. Holotype: female, China: Hong Kong (NHMUK).

Diagnosis. Black with yellow/ivory markings; face with black marking, facial horn large and high; mesopleuron and metapleuron striate or punctate-striate; pronotal collar ivory centrally; propodeum with yellow mark medio-anteriorly in dorsal view; ovipositor sheath about $1.4\times$ as long as hind tibia.

Material examined. 1 female (IB), Vinh Phuc Province, Me Linh Center for Biodiversity, $21^{\circ}23'03''\text{N}$ $105^{\circ}42'40''\text{E}$, 70 m a.s.l., 10–20 September 2021, Malaise trap, coll. Tran D.D.; 1 male (IB), same locality and collector except date, from 1–10 May 2021.

Distribution. Previously known from China (Hong Kong) (Broad & Barthélémy, 2012). These are the first records of this species from Vietnam.

Key to species of the genus *Hadrocryptus* Cameron (modified from Gupta & Gupta (1983))

1. Mesosoma entirely ferruginous, without any black markings (Figs 6D, 6E); [face with large, extremely high horn, base of horn forming obtuse angle opposite antennal socket (Fig. 6B)]; Vietnam *H. ferrugineus*, new species
- Mesosoma orange yellow with black markings or black with yellow/ivory markings.....2
2. Side of mesosoma (pronotum, mesopleuron and metapleuron), scutellum and legs wholly orange-yellow. Pronotum smooth and shiny, without any striations in middle groove. Mesopleuron and metapleuron sparsely and shallowly punctate; [only male known]; Indonesia (Sumatra)..... *H. naranjis* Gupta & Gupta, 1983
- Side of mesosoma black with/without black markings. Legs black marked. Middle groove of pronotum striate. Mesopleuron

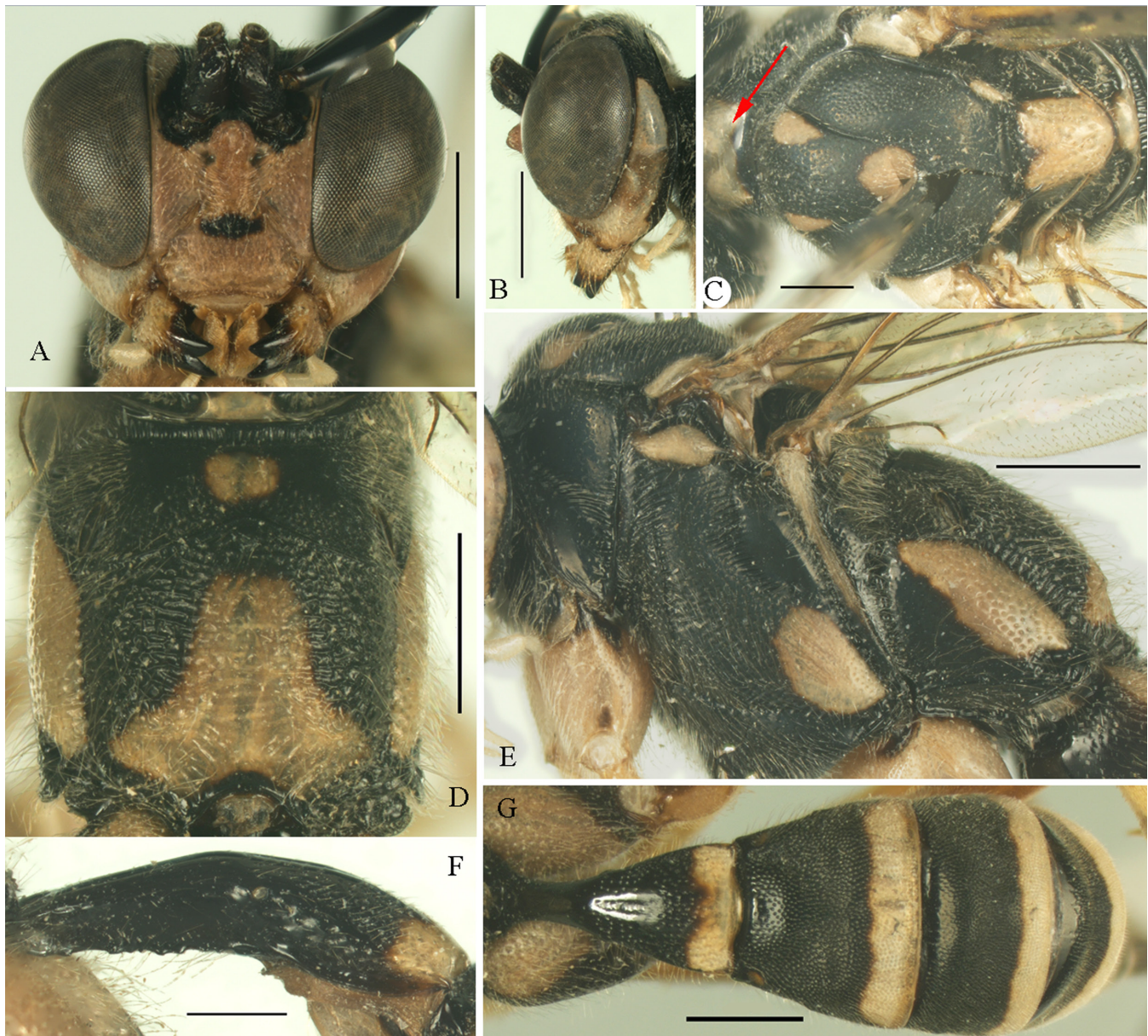


Fig. 7. *Hadrocryptus perforator* Broad & Barthélémy, female from Vietnam. A, head, front view; B, head, lateral view; C, mesonotum (red arrow indicating yellow mark on pronotal collar centrally); D, propodeum; E, mesosoma, lateral view; F, first tergite, lateral view; G, metasomal tergites (scale bar = 1 mm, except scale bar for C & F = 0.5 mm).

- and metapleuron with a few striations combined with punctures.....3
3. Mesopleuron wholly black. All coxae yellowish brown. Hind coxa with a dorsal black mark. Hind femur wholly black. Mesopleuron striate-punctate. Metapleuron and propodeum punctate-reticulate; [only female known]; Indonesia (Java)....
..... *H. cingulatus* (Szépligeti, 1919)
- Mesopleuron with yellow/ivory markings. Hind coxa wholly to largely black. Hind femur yellow medially. Sculpture different from above.....4
4. Face with small and knob-like horn. Scape and speculum yellow marked. Pronotal collar wholly yellow; [only female known]; Philippines *H. multimaculatus* Gupta & Gupta, 1983
- Face with large, conical or ridge-like horn. Scape and speculum black. Pronotal collar with an interrupted yellow or black with centrally yellow/ivory.....5
5. Facial horn moderately low (Figs 2A, 2B, 2C). Clypeus lowly nasute (Fig. 2C). Posterior corner of pronotum ivory (Fig. 2E). Scutellum black medially (Fig. 2D); [only male known];

- Vietnam
..... *H. caobangensis* Pham, Dang & Tran, new species
- Facial horn high. Clypeus weakly convex. Posterior corner of pronotum black. Scutellum narrowly black anteriorly (Figs 4E, 7C)6
6. Mesopleuron and metapleuron shiny, with shallow punctures. Face yellow, without any black markings. [Facial horn ridge-like, spread out and reaching to clypeus]; [only female known]; Indonesia (Sulawesi) *H. toliensis* Gupta & Gupta, 1983
- Mesopleuron and metapleuron striate or striate-punctate. Face yellow, with black marking7
7. Base of propodeum with three yellow marks. Anterior transverse carina of propodeum broken medially. Orbital ring wholly yellow; [only female known]; India
..... *H. trimaculatus* Gupta & Gupta, 1983
- Base of propodeum entirely black or with a median yellow mark. Anterior transverse carina of propodeum complete. Yellow orbital ring incomplete (Figs 4D, 7B).....8

8. Pronotal collar largely yellow (Fig. 4F). Propodeum entirely black anteriorly in dorsal view (Fig. 4C); Bhutan, India, Indonesia and Malaysia.....*H. ditissimus* (Tosquinet, 1903)
- Pronotal collar yellow centrally (Fig. 7C). Propodeum with yellow mark medio-anteriorly in dorsal view (Fig. 7D); China, Vietnam *H. perforator* Broad & Barthélémy, 2012

DISCUSSION

Although the shape and size of the facial horn, the sculpture of the head and mesosoma and the ventral teeth on the first sternite are important diagnostic characteristics of *Hadrocryptus* species, some variation was observed among individuals of each species. For example, the facial horn of *H. ditissimus* is conical, however some specimens from India examined by Gupta & Gupta (1983) have a round facial horn. Ventral teeth on the first sternite are weak to strong among specimens of *H. ditissimus*, which occurs also in *H. ferrugineus* from Vietnam. Sculptures of the head and mesosoma are relatively stable, except in *H. ditissimus*, where the mesopleural sculpture can vary between males and females. Six species are currently known only from one sex (two by males and four others by females), with both sexes known only for *H. ditissimus*, *H. perforator*, and *H. ferrugineus*. The modified identification key has been updated for all recognised species of *Hadrocryptus*, encompassing the variation found in voucher specimens of both sexes.

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