

***Hygropetrocoris guyana* Sites, 2015, in French Guiana: descriptions of the female and nymphal instars (Hemiptera, Heteroptera, Naucoridae)**

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Abstract. – Recently, an atypical saucer bug, *Hygropetrocoris guyana* Sites, 2015, was described based on two males from a wet rock in Guyana. Herein, we describe the female and third through fifth instars, and provide two new records of the species from French Guiana. The female has a subgenital plate that extends half the length of the abdominal midline and the third through fifth instars can be distinguished based on the relative lengths of the mesonotal wing pad compared with the exposed part of the metanotal lateral margin.

Résumé. – *Hygropetrocoris guyana* Sites, 2015, en Guyane : descriptions de la femelle et des stades juvéniles (Hemiptera, Heteroptera, Naucoridae). Récemment, une punaise aquatique atypique, *Hygropetrocoris guyana* Sites, 2015, a été décrite sur la base de deux mâles collectés au Guyana sur une roche humide. Nous décrivons ici la femelle et les troisième, quatrième et cinquième stades, et fournissons deux nouvelles mentions de l'espèce en Guyane française. La femelle a une plaque sous-génitale qui s'étend sur la moitié de l'abdomen et les troisième au cinquième stades se distinguent en fonction de la longueur relative du fourreau alaire mésonotal par rapport à la partie exposée de la marge latérale métonotale.

Keywords. – Nepomorpha, Cryphocricinae, Guiana Shield, nymph, immature, saucer bug.

The saucer bugs (Heteroptera, Naucoridae) have received recent taxonomic attention throughout much of the Neotropics. Of the five currently recognized subfamilies, the New World subfamily Cryphocricinae has been the subject of most of these recent studies. Treatments have included the rearrangement of generic associations (SITES *et al.*, 2017) while other papers have treated regional faunas (REYNOSO-VELASCO & SITES, 2018c; SITES *et al.*, 2018). Further, the genus *Ambrysus* in Mexico is currently being revised through a series of papers on individual species groups (e.g., SITES & REYNOSO-VELASCO, 2015; REYNOSO-VELASCO & SITES, 2016a, b, 2018a, b).

An atypical genus of Cryphocricinae, *Hygropetrocoris* Sites, 2015, resembles gelastocorids in superficial appearance and habitat association, and was described based on only two males from a wet rock surface in Guyana (SITES, 2015). To date, only those two adult males along with undescribed 3rd and 4th instars are known. Presented here are new records of *Hygropetrocoris guyana* Sites, 2015, from two localities in French Guiana and formal descriptions of the female and third through fifth instars.

MATERIALS AND METHODS

Specimens were collected by hand during two programs of surveys and inventories of macroinvertebrates carried out by Onikha and collaborators in French Guiana. An inventory of the macroinvertebrates of the La Trinité Nationale Reserve at the inselberg Roche Bénitier

was conducted in November 2018, and a survey of aquatic insects for the project RECOLT at Chutes Voltaire (Saint-Laurent-du-Maroni) was conducted in March 2019.

Length of the body is measured from the anterior margin of the head to the posterior margin of the abdomen, and width at the widest point, usually across the embolia (female) or meso- or metathoracic wingpads (nymphs). All measurements are reported in mm. Abdominal segment numbers are expressed as Roman numerals. Images of all insects were obtained with a Leica M205C stereo microscope coupled with the Leica Application Suite V4.10 Extended Depth of Focus module, followed by image preparation with Photoshop CS5 (Adobe Systems Inc., San Jose, California).

Specimens will be deposited in museums with the following abbreviations: Muséum national d'Histoire naturelle, Paris (MNHN) and University of Missouri, Columbia (UMC).

SYSTEMATICS

Hygropetrocoris guyana Sites, 2015 (fig. 1-7, table I)

Hygropetrocoris guyana Sites, 2015: 431.

Material examined. – **French Guiana:** Inselberg Roche Bénitier in La Trinité National Reserve, 4°37.163'N 53°24.457'W, 394 m, 7.XI.2018, *S. Clavier*, TRI18-01-01 (1♀, MNHN); Chutes de Cascades Voltaire, 5.03222°N, 54.08685°W, 32 m, 9.III.2019, coll: D. Post (1♂, UMC; 1-5th instar, MNHN). **Guyana:** Region 9, Kusad Mts., Mokoro Creek near rockslide area, 2°48' 31.86", -59°51' 54.0066", 170 m, 27.IX.2013, Short, Isaacs, Salisbury, hygropetric seepage with detritus, GY13-1027-03B (1-3rd instar, 3-4th instars, UMC).

Table I. – Descriptive measurements (mean mm ± SE^a) of female and nymphal instars of *Hygropetrocoris guyana* Sites, 2015.

| Character ^b | Female | Instar 5 | Instar 4 | Instar 3 |
|------------------------|-------------------|----------|-------------|----------|
| Body length | 8.16 | 6.88 | 5.27 ± 0.03 | 4.00 |
| Body width | 5.44 | 5.04 | 3.49 ± 0.04 | 2.72 |
| Head length | 1.58 | 1.40 | 1.16 ± 0.01 | 0.94 |
| Head width | 2.08 | 2.06 | 1.58 ± 0.01 | 1.28 |
| Synthlipsis | 0.72 | 0.70 | 0.53 ± 0.02 | 0.44 |
| Pronotal length | 1.44 | 0.94 | 0.69 ± 0.01 | 0.46 |
| Mesonotum length | 6.16 ^c | 1.44 | 0.93 ± 0.00 | 0.62 |
| Metanotum length | 1.64 ^c | 0.80 | 0.68 ± 0.01 | 0.52 |
| Leg lengths: | | | | |
| Profemur | 2.08 | 1.80 | 1.31 ± 0.01 | 0.94 |
| Protibia | 1.42 | 1.26 | 0.86 ± 0.01 | 0.58 |
| Protarsus | 0.44 | 0.43 | 0.34 ± 0.00 | 0.28 |
| Mesofemur | 2.04 | 1.82 | 1.31 ± 0.00 | 1.02 |
| Mesotibia | 1.68 | 1.50 | 1.09 ± 0.01 | 0.80 |
| Mesotarsomere 1 | 0.20 | 0.20 | 0.14 ± 0.01 | 0.12 |
| Mesotarsomere 2 | 0.28 | 0.58 | 0.37 ± 0.01 | 0.29 |
| Mesotarsomere 3 | 0.38 | - | - | - |
| Metafemur | 2.64 | 2.40 | 1.73 ± 0.01 | 1.28 |
| Metatibia | 2.48 | 2.30 | 1.60 ± 0.01 | 1.20 |
| Metatarsomere 1 | 0.26 | 0.34 | 0.19 ± 0.01 | 0.14 |
| Metatarsomere 2 | 0.52 | 0.94 | 0.64 ± 0.01 | 0.46 |
| Metatarsomere 3 | 0.58 | - | - | - |

^a SE values less than 0.005 are listed as 0.00. Number of specimens measured: female, 1; 5th, 1; 4th, 3; 3rd, 1.

^b Measurements of body, head, and notal lengths taken at midline.

^c Meso- and metanota lengths for female given for hemelytron and scutellum, respectively.

Descriptions. – In the description of the female, only differences from the description of the male (SITES, 2015) are given here. In the descriptions of nymphs, the fifth instar is described in detail because its structures are the most well-developed and evident, and only differences in earlier instars are described. Descriptive measurements of the female and nymphs are given in table I.

Female (fig. 2-4). Length, 8.16; width, 5.44. Hemelytra slightly exceeding abdominal apex. Abdominal sterna nearly symmetrical (fig. 3). Laterosternite VI with posteromedial corner rounded and slightly deflexed. Subgenital plate dorsoventrally convex; approximately half length of abdominal midline (fig. 3), $1.22\times$ longer than greatest width, 1.46 long, 1.20 wide; lateral margins convergent posteriorly; roundedly truncate at apex; posterior half coarsely punctate; lateral and posterior margins lined with elongate, light-colored hairs (fig. 4). Profemur anterior margin excavated in distal half and protibia with corresponding tooth (fig. 2-3) (both sexes).

Nymph. Fifth Instar (fig. 5). Length, 6.88; width, 5.04; $n=1$. Body elongate-oval, overall moderately flattened but with slight dorsal convexity, greatest width at wingpads; dorsally yellow-brown with

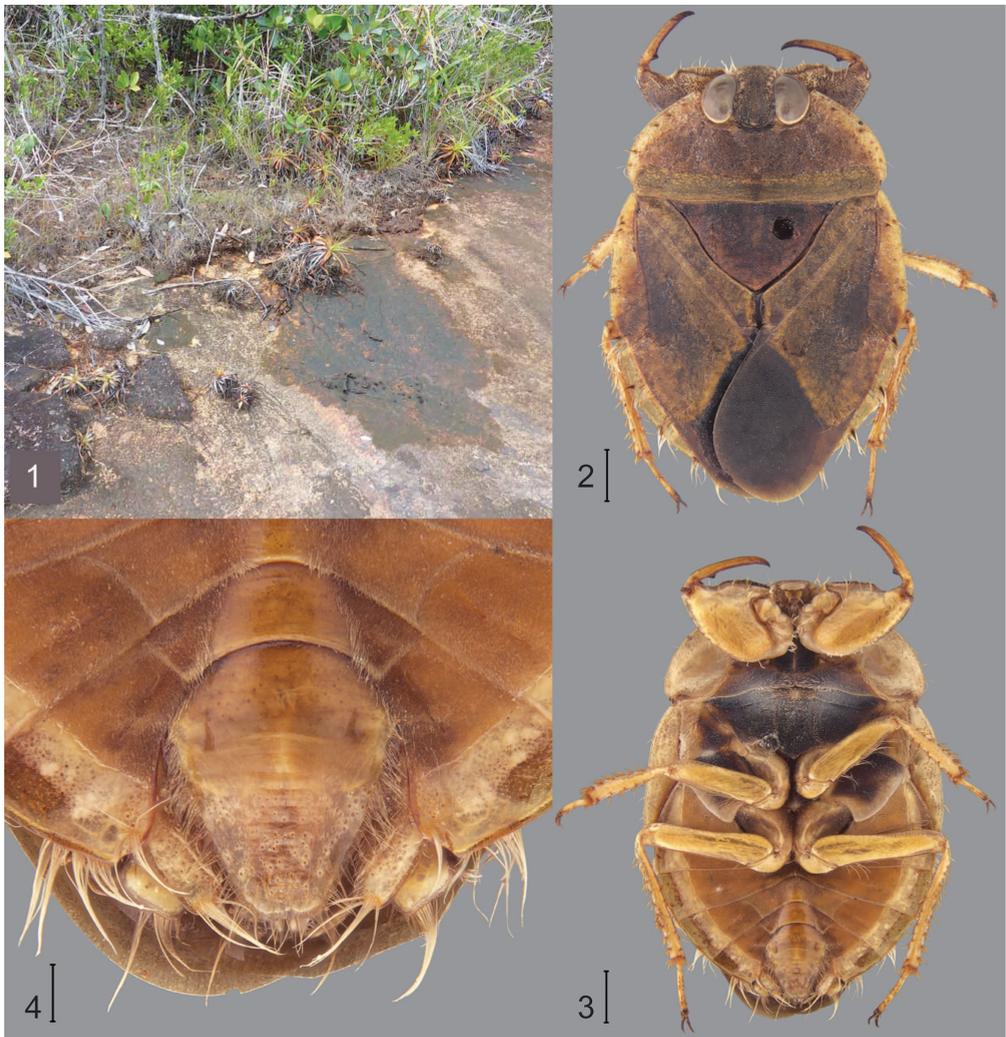


Fig. 1-4. – Features of *Hygropetrocoris guyana* Sites, 2015. – 1, Wet rock habitat of female at inselberg Roche Bénitier in La Trinité National Reserve. – 2, Dorsal habitus of female, size bar = 1.0 mm. – 3, Ventral habitus of female, size bar = 1.0 mm. – 4, Terminal abdominal sterna of female, including subgenital plate, size bar = 0.3 mm.

profuse dark brown punctation, ventrally pale yellow with brown suffused near midline. Ventrally with glabrous lateral band from abdominal sterna to prothorax widening anteriorly; fine hairs throughout medial area to glabrous lateral band; hairs becoming more dense and elongate near midline on terminal abdominal sterna. Prosternal midventral ridge becoming narrowly separated and open anteriorly.

Head. Head length 1.40, maximum width 2.06, synthlipsis (=minimum interocular distance) at middle 0.70, with four to five pairs of setal rosettes bordering inner margin of eyes, additional pairs laterad of frontal sutures. Head with profuse dark brown punctation; declivent ca. 70° with respect to long axis of body; not continuous with lateral margin of pronotum; compound eye bulging, elevated above level of vertex, inner margin convex when viewed from above and divergent when viewed from front; posterior margin of head slightly convex between eyes; labrum broad, rounded, nearly semi-circular; rostrum short, two visible segments, first segment partially concealed behind labrum, distal segment darker and approximately half width of first segment; antenna 3-segmented, proportions 2:7:15, length 0.48, segments one and two pale yellow, three brown.

Thorax. Not a yellow with extensive dark brown punctation except staggered areas at lateral margins. Dark coloration associated with punctation coalescing to form irregular markings anteriorly on meso- and metanota and extensively in submedian area of pronotum. Mid-dorsal longitudinal suture (ecdysial cleavage line) from anterior margin of pronotum to near posterior margin of metanotum. Pronotum broad, $4.7\times$ as wide as long; maximum width at posterolateral corners; posterolateral corners slightly produced posteriorly, narrowly rounded; with submarginal tufts of erect, light-colored setae; posterior margin overlapping 2–5% of mesonotum, anterior margin slightly concave between eyes, extending anteriorly laterad and ventrad of eyes. Mesonotum with posterior margin deeply convex medially, M-shaped. Metanotum shortest of nota, ca. $0.6\times$ that of mesonotum at midline; posterior margin nearly straight across middle $2/3$, produced posteriorly as wingpads laterally. Both pairs of wingpads extending to anterior margin of abdominal segment III. Metanotum overlapping most of abdominal tergum I and ca. 50% of tergum II at midline.

Legs. Mostly pale yellow with brown pretarsal claws. Prothoracic leg retentorial (see SITES & NICHOLS, 1990), coxa pale yellow. Procoxa ca. $1.4\times$ length of trochanter and ca. $0.6\times$ length of femur; mostly glabrous except ventral, subapical line of elongate, pale setae. Profemur with strong brush of dense setae along anterior edge, brush diverging into two rows proximally to accept tibia and tarsus when appressed; anterior margin with subtle excavation distally; four to five groups of trichobothria in anterior half of ventral surface. Protibia with subtle basal tubercle to engage distal excavation of profemur. Protarsus one-segmented with single immovable pretarsal claw.

Meso- and metathoracic tarsi with dark brown apices and pretarsal claws. Mesothoracic leg with all segments shorter than corresponding segments of metathoracic leg. Mesocoxa conical, ca. $1.8\times$ length



Fig. 5-7. – Nymphal instars of *Hygropetrocoris guyana* Sites, 2015. – 5, Fifth instar. – 6, Fourth instar. – 7, Third instar. Size bars = 0.5 mm.

of trochanter and $0.7\times$ length of femur; with brush of setae on mesal margin. Mesofemur with row of stout, peg-like setae along posterodorsal margin; elongate pale setae on posteroventral margin; several stout spines basally on anterodorsal margin. Mesotibia with scattered stout spines on lateral and mesal margins and an apical comb of eight spines ventrally. Mesotarsus two-segmented, segment one extending beneath segment two, segment two $3\times$ length of one. Pretarsal claws paired and equal, ca. $0.3\times$ length of tarsus. Metacoxa and trochanter resembling those of mesothoracic leg in shape; metacoxa $1.1\times$ length of trochanter, with brush of setae on mesal margin. Metafemur with rows of minute peg-like setae along posterodorsal and posteroventral margins; several stout spines basally on anterodorsal margin; scattered elongate pale setae on posterior margin. Metatibia with rows of stout spines on lateral and mesal margins and an apical comb of seven to eight spines ventrally. Mesotarsus two-segmented, segment one extending beneath segment two, segment two $3\times$ length of one. Pretarsal claws paired and equal, ca. $0.3\times$ length of tarsus. Natatorial hairs absent on mesothoracic and metathoracic legs.

Abdomen. Dorsally yellowish brown with dense dark brown markings associated with punctation which becomes coalescent in areas in middle half of II–VI; punctation gradually diminishes laterally. Paired ostioles of dorsal scent glands at posterior margin of III. Series of transverse brown markings interrupting dark brown punctures mid-laterally on each of terga III–VII. Lateral margin with prominent tufts of elongate light-colored setae directed dorsad near middle of segments III–VII, fringe of elongate light-colored setae directed laterad in posterior halves of III–VIII. Ventrally without punctation; lateral margins with wide glabrous band; middle $2/3$ finely hirsute; with longer setae near midline becoming denser and more elongate near abdominal apex; spiracles evident $1/3$ to $1/2$ distance from lateral margin to midline on segments II–VIII.

Fourth Instar (fig. 6). Length, 5.27 ± 0.03 ; width, 3.49 ± 0.04 ; $n=3$. Antennal proportions 2:5:10, length 0.34. Irregular dark markings formed by coalescent punctation on nota and abdominal terga less extensive. Pronotum with posterolateral corners less produced posteriorly. Mesonotal wingpad less developed; lateral margin of mesonotum, including wingpad, $2.2\times$ length of exposed part of lateral margin of metanotum. Metanotum overlapping ca. 50% of abdominal tergum I at midline. Mesonotum longest of nota at midline, $1.3\times$ length of pro- and metanota.

Third Instar (fig. 7). Length, 4.00; width, 2.72; $n=1$. Antennal proportions 1:4:9, length 0.28. Irregular dark markings formed by coalescent punctation on nota and abdominal terga less extensive than previous instar. Mesonotal wingpad less developed; lateral margin of mesonotum, including wingpad, $1.6\times$ length of exposed part of lateral margin of metanotum. Metanotum overlapping ca. 50% of abdominal tergum I and abdominal tergum I overlapping ca. 50% of abdominal tergum II at midline. Mesonotum longest of nota at midline, $1.3\times$ length of pronotum and $1.2\times$ length of metanotum.

Habitat description. – One female specimen was collected at La Trinité Nationale Reserve at the inselberg Roche Bénitier. Inselbergs are dome-shaped rocky outcrops rising above the surrounding plains (BORNHARDT, 1900). This inselberg is 460 m high and located in an undisturbed forest 100 km south of the Atlantic Coast. In French Guiana, inselbergs consist of Precambrian granites of the Guiana Shield craton. Dispersed patches of inselberg vegetation locally known as “rock savanna” grow on shallow (1–20 cm) acidic (pH 4.0–5.5) organic soils (SARTHOU & GRIMALDI, 1992). In contrast to the buffered conditions of the Guianese rainforests, inselbergs form ‘xeric islands’ and are characterized by extreme and changing microclimatic conditions with high day and night variations of temperature (20–45°C) and relative humidity (18–100%). Surface temperatures of the exposed rocks can reach as high as 65°C (SARTHOU, 1992). The female specimen was collected at the end of the dry season. At this time of year, the inselberg was almost totally dry and aquatic habitats virtually nonexistent. The female specimen was found near the last run-off of water under a humid layer of organic soil.

One male and one fifth instar specimen were collected in March 2019 during the project RECOLT at Chutes Voltaire (Saint-Laurent-du-Maroni). Chutes Voltaire are waterfalls on the stream Voltaire, locally known as Crique Voltaire, a preserved mid-order stream of the western part of French Guiana in the Maroni watershed. Chutes Voltaire is 35 m high and consists

of several steps of granitic outcrops. Inselbergs are located in the upstream drainage area of Crique Voltaire. These specimens were collected from dead leaves wedged in a crevice near a pool below one of several levels of a cascading waterfall with some of the leaves submerged.

Discussion. – In the original description of the male, SITES (2015) questioned whether or not modifications of the prothoracic legs with excavation in the femora and corresponding tooth in the tibia was a sexually dimorphic character and possibly restricted to only males because a similar condition exists in species of the Asian genera *Cheirochela* Hope, 1841, *Coptocatus* Montandon, 1909, and *Gestroiella* Montandon, 1897 (Cheirochelinae, Cheirochelini). However, the discovery of the female of *Hygropetrocoris* reveals that this feature is not sexually dimorphic and evidence of it can be seen developing in the nymphs.

Because *Hygropetrocoris* has been collected only three times and the waterfall habitat of the second collection in French Guiana reported here is not consistent with the other two collections, we are unable to confidently and completely characterize the habitat at this time. Nonetheless, it appears the insect can be found out of the water on wet rocks as has been the case with two of the collections. Supporting the wet rock, hygropetric habitat association is that the adults are not hydrodynamic in body shape (see SITES, 2015) and neither the immatures nor adults have natatorial setae on the meso- and/or metathoracic legs. These setae are used for swimming and are typical of other ‘aquatic’ saucer bugs. However, a confounding observation is that the male collected among leaves in the crevice at the waterfall at Chutes de Cascades Voltaire has substantial numbers of Peritrichia ciliates on all femora and the propleura, suggesting that it was living underwater or at least spent enough time wet or underwater to enable the Peritrichia to survive. More collections and focused observations are needed to fully characterize the habitat of *Hygropetrocoris*.

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