

**ON THE TRUE *HETAERINA CAPITALIS* SELYS, 1873 AND ITS
SIBLING SPECIES *HETAERINA SMARAGDALIS* SPEC. NOV.
(ZYGOPTERA: CALOPTERYGIDAE)**

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A thorough comparative study shows that "*Hetaerina capitalis*" actually consists of two good species, viz. *H. capitalis* Selys (designated lectotype ♀: Bogotá; Coll. Selys, Brussels) and *H. smaragdalis* sp. n. (holotype ♂: road Manrique-La Sierra, 425 m, Cojedes, Venezuela, 28-I-1983; Facultad de Agronomía, Maracay). Males and females of both species, and the larva of *H. capitalis* are described and figured. The most important characters for separating the adults are the shape of the superior anal appendages in the male and the colour of the thoracic stripes in the female. Several additional features, e.g. wing venation, length of the pterostigma, body size, colour of upper front and clypeus, and habitat preferences may also be useful to separate these two sibling species. A complete bibliography, distributional map, and some observations on the biology of *H. capitalis* are also provided.

INTRODUCTION

Already RACENIS (1954) noted that male specimens of "*Hetaerina capitalis*" captured in western Venezuela had only 2 or 3 cell rows in the anal field of their hind wings, while examples he had collected in the Coastal Cordillera, around Caracas, showed 3 to 4 rows. He did not, however, discover any further morphological differences between these two populations, hence considering both as being conspecific.

When I myself compared examples from the Coastal Cordillera with specimens from several parts of Venezuela, and from Colombia, Central America and Mexico, I eventually arrived at the conclusion that there were two good species involved. On the base of various morphological features I finally succeeded in disentangling the two taxa, not without committing a new mistake: I

did not check Selys' type series, one male and two females, from "Bogotá". Instead, all those specimens which corresponded well with the more detailed description given by CALVERT (1901) and by RIS (1918) of Central American and Colombian (Muzo) examples, were attributed to *H. capitalis* Sel., while those from the Venezuelan Coastal Cordillera and some places in the Venezuelan Andes were considered to represent an undescribed species. — On the occasion of the VII Venezuelan Congress of Entomology, Maturín, I exposed these findings proposing "*Hetaerina crassidens* sp. n." (nomen nudum) as the specific name for those aberrant Venezuelan populations (DE MARMELS, 1982). When I later had the opportunity to examine the type series of *H. capitalis* Sel., I found that only the two females were left, while the male was apparently lost. So, I had no choice but to designate lectotype one of the females, both of which, to my surprise, proved to be conspecific with those Venezuelan specimens named by me "*H. crassidens*" and not with the Central American and Muzo examples thought to be *H. capitalis* Sel. Now, females are per se quite cumbersome type specimens in the Calopterygidae. A stronger reason to deplore the loss of the original male is, however, my suspicion based on the original description by SELYS (1873a), that the male could have not been conspecific with the two females, but with specimens from Muzo (Colombia) and Central America. In this case, and choosing the male as the lectotype, I would have been saved from changing the name of almost all specimens mentioned in the literature under "*Hetaerina capitalis*".

SELYS (1873b) indicates "Bogotá" as the type locality of *H. capitalis*. It is probable that the true place of capture of the type females lies somewhere in the slopes of the eastern Cordillera rather than in the immediate vicinity of the city itself, whose elevation is 2640 m! ("... die näheren Umgebungen der Stadt sind jedenfalls für diese Insekten wenig wohnlich"; RIS, 1918, p. 3).

The specific identity of specimens from Colombia mentioned in the literature, but not seen by me, remains doubtful.

HETAERINA CAPITALIS SELYS

Figures 1, 3, 5-7, 11-16, 17-20, 21

Hetaerina capitalis SELYS, 1873a ("race de majuscula?"); — SELYS, 1873b ("patrie: Bogotá"); — HAGEN, 1875 (in part?: Colombia/N. Granada: Bogotá); — SELYS, 1879 (comparison with *H. majuscula*: in part?); — KIRBY, 1890 (referring to SELYS, 1873a and 1873b: in part); — CALVERT, 1901 (this species?: Bogotá); — RIS, 1918 (this species?: Colombia: "Sosomuco"; San Antonio/Magdalena); — WILLIAMSON, 1923 (this species?: Colombia: Cincinnati/Santa Marta); — RACENIS, 1953 (Venezuela); — RACENIS, 1954 (Venezuela: Cordillera de la Costa); — RACENIS, 1958 (Venezuela: Miranda, Aragua: in part); — RACENIS, 1968 (Venezuela: Caracas); — DE MARMELS, 1981 (Venezuela: El Avila); — *Hetaerina crassidens* DE MARMELS, 1982 (nomen nudum) (Venezuela: Táchira; Aragua eastwards).

Designation lectotype (female): "Bogotá"; Coll. Selys, Inst. Royal des Sciences Naturelles de Belgique, Brussels).

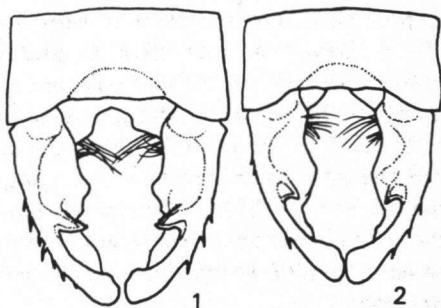
Material examined (adults: 59 ♂, 22 ♀, including lectotype, paralectotype and allotype; larvae: 2 ♂, ultimate instar; exuviae: 6 ♂, 7 ♀, ultimate instar). — COLOMBIA: "Bogotá"; — VENEZUELA: Táchira: Loma de Pío (San Cristóbal); Aragua: Rancho Grande (Maracay), Cumbre de Choroní, Cataurito (Villa de Cura), Tiara; Distrito Federal and Miranda: El Avila (Caracas); Miranda/Guárico: Guatopo; Anzoátegui: Cerro Tucusito (Valle de Guanape). — The larval material has been collected at the Quebrada Pasaquire, El Avila (Caracas) (2 specimens reared).

Female (lectotype). — Adult, with the following handwritten labels: "Bogotá"; "Het. capitalis Selys", and with a printed label "Collection E. de Sélys-Longchamps". The abdomen is broken off, attached to the specimen in an envelope.

Top of head, frons, labium and labrum black; clypeus brilliant black; base of mandible and first antennal segment pale brown, second segment black, remaining parts lost; a very minute brown spot between each lateral ocellus and the base of the corresponding antenna. — Prothorax dorsally black, lateral margin brown; pterothorax brown with black markings as in Figure 5. These black stripes have a somewhat oily aspect. A weak metallic green and coppery reflection is, however, discernible. — All legs are missing, except the left anterior one, which is black. — Wings tinged with brown, venation mostly brown, but vivid orange at the wing bases out to half way from quadrangle to nodus; pterostigma dark brown and short, covering roughly one and a half cells, in all wings. Anterior and postnodals of the first series, in fore and hind wings respectively: 29:26-27:31/28:23-25:28. There are 32(29) cells arranged in 2 rows in the anal field of the hind wings counted from the wing root out to the first continuous cell between 1A and the hind border, at the down curve of 1A. — Abdominal segments 1-4 mostly dark brown, segments 5-10 black; the ovipositor does not reach to the distal margin of segment 10.

Measurements. — Total length 45.5 mm; abdomen 36 mm; hind wing 32.5 mm; pterostigma 0.7-0.9 mm.

The paralectotype female is teneral and somewhat smaller than the lectotype, otherwise similar. Top of head and clypeus black; the dark thoracic stripes with a slight violet shining, which marginally changes to green; all stripes well-developed. Anterior and postnodals of the first series in front and rear wings,



Figs. 1-2. Male anal appendages: (1) *Hetaerina capitalis* Sel. (Venezuela, Miranda, El Avila, Quebrada Pasaquire, 1100 m); — (2) *H. smaragdalis* sp. n. (holotype).

respectively: 29:25-27:28/28:23-21:? (apex damaged); cells in the anal field of the hind wings 24(26), in mostly 2 rows.

Measurements. — Total length 41.5 mm; abdomen 31.5 mm; hind wing 29 mm; pterostigma 0.7-0.9 mm.

The Venezuelan females.

— They are overwhelmingly similar to the lectotype. All dark thoracic bands are black, with or without an opaque green or olivaceous reflection. The only constant difference observed concerns the dark metepisternal stripe, which is, in all Venezuelan females, reduced to the upper fourth, or at least broadly interrupted half way from the spiracle to the antealar ridge, whereas it is complete and continuous in both the lecto- and the paralectotype. In the

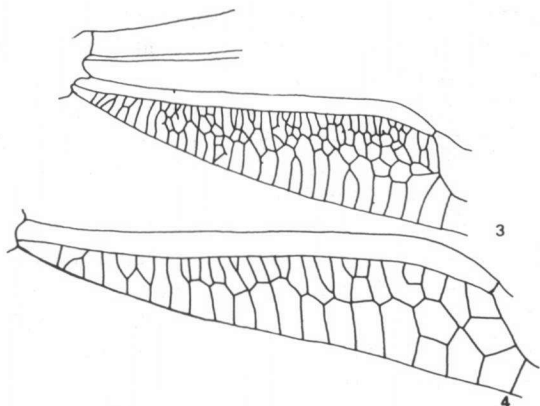
Venezuelan females the top of the head is black, rarely with a weak green shining on the frontal tubercles. 47% have an all-black clypeus, 53% show an opaque green or bluish shining. In 95% of the females the pterostigma is shorter than $1\frac{1}{2}$ cells.

Measurements. — Total length 43-49 mm; abdomen 33-37 mm; hind wing 30-34 mm.

Male (allotype). — Venezuela, Miranda: Quebrada Pasaquire, El Avila, 1100 m, I-VIII-1980, J. De Marmels leg.

It would have been most desirable to have at my disposal a male from the Colombian eastern Cordillera for the purpose of describing the allotype. However, the few males collected most closely to "Bogotá" are from the State of Táchira, in the Venezuelan Andes. They are somewhat teneral, and I preferred, therefore, to describe an adult specimen from the Venezuelan Coastal Cordillera (El Avila).

Labium, labrum, top of head and antennae, black; clypeus brilliant black, laterally with a weak and rather opaque bluish luster; bases of mandible and of first antennal segment brown; a small brown spot also between each lateral ocellus and the corresponding antenna. — Prothorax dorsally black, the lateral tubercles of the median lobe dark brown; pterothorax similar to Figure 6, reddish brown with black bands; the black metepisternal stripe broadly interrupted at half height. — Feet black. Wings hyaline, each with a red basal and apical spot;

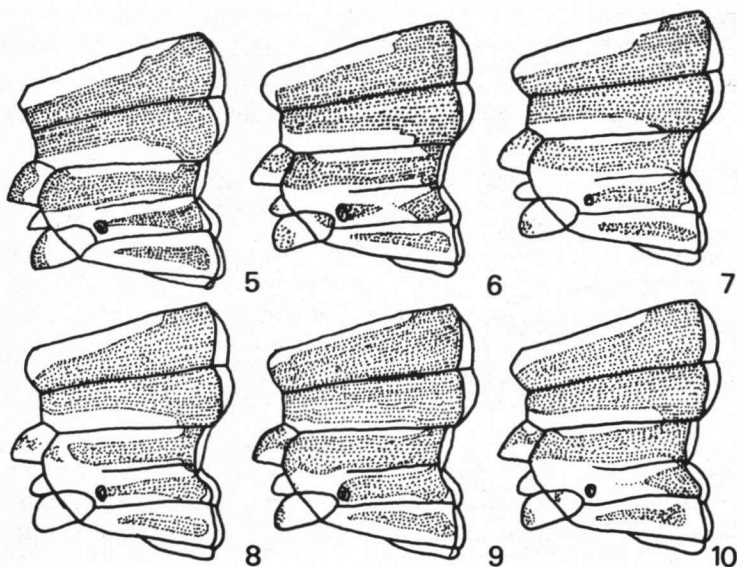


Figs 3-4. Anal field of left hind wing (transposed; not in scale): (3) *H. capitalis* (♂ allotype); — (4) *H. smaragdalis* sp. n. (♂ holotype).

pterostigma roughly as long as the underlying cell, and not high, R₁ not concave below the stigma. Ante- and postnodals of the first series in front and rear wings, respectively: 40:33-33:42/43:33-31:40. Anal field of the hind wings with 100(95) cells, arranged in 3 to 5 rows. — Abdomen basally mostly brown, darkening continuously to rearwards; segments 6-10 black. Superior anal appendages almost identical to those shown in Figure 1; the postmedian internal tooth strong, surpassing internally the ventro-internal margin of the appendages. Therefore, the tip of the tooth is visible in ventral view. Inferior appendages reduced to a short base bearing a pointed tubercle.

Measurements. — Total length (including appendages) 56 mm; abdomen (incl. app.) 44 mm; hind wing 33 mm; pterostigma 0.5 mm.

The other Venezuelan males. — The specimens from the State of Táchira are noteworthy because their metepisternal stripe is complete. Among all other males there are only 22% with a complete metepisternal stripe, while in the remaining 78% this stripe is interrupted or, at least, considerably constricted and paler at half height. Half of the males have a brilliant black clypeus, while in the remaining 50% a more or less opaque green, blue or violet reflection is visible. Only old individuals have their wings tinged with brown; the pterostigma is smaller than 1½ cells in 83% of the males, equal in 14%, and larger in 3%. The Venezuelan males are also characterized in having their head top black, sometimes with a



Figs 5-10. Diagram of the pterothorax of *H. capitalis* (Figs 5-7) and *H. smaragdalis* sp. n. (Figs 8-10): (5) ♀ (lectotype); — (6) ♂ (Venezuela, Aragua, Cumbre de Choroni, 1300 m); — (7) ♂ (Venezuela, Táchira, San Cristóbal); — (8) ♀ (allotype); — (9) ♂ (holotype); — (10) ♂ (Mexico, Nayarit, Tepic).

weak violet (rarely greenish) shining on the frontal tubercles, or between them and the frontal ocellus.

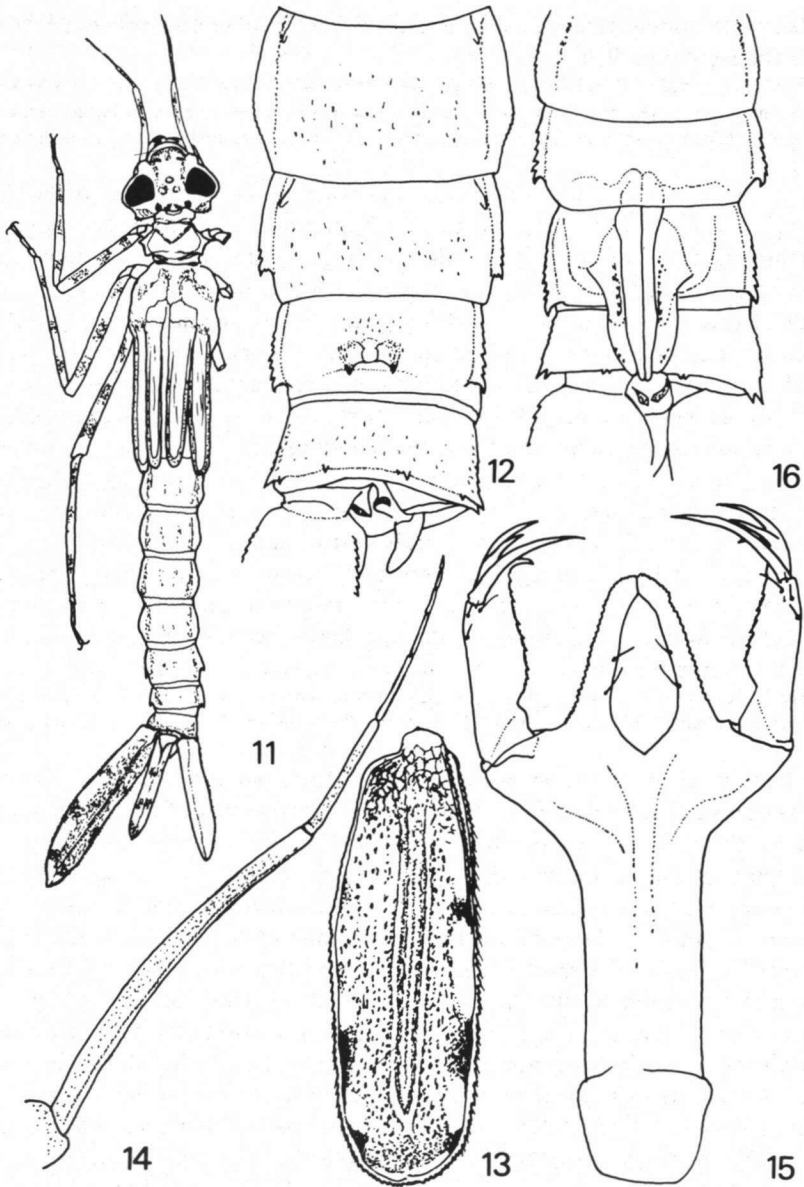
Measurements. — Total length (incl. app.) 48-57 mm; abdomen (incl. app.) 38-45 mm; hind wing 28-34 mm. — The specimens from the easternmost localities (Guatopo and Cerro Tucusito) are the smallest, while those from the Andes and from the Coastal Cordillera are larger (total length 51 mm or more).

Larva. — Antenna without conspicuous setae; the labium reaches to the hind margin of the second pair of coxae. Prothoracic apophyses two-pointed, resembling those of some Aeshnids; the larger posterior tubercle somewhat rearwards directed. Wing cases reaching to the middle or to the end of segment 4. Lateral carinae of segments 8 and 9 serrate, the last denticle being normally broader and hook-shaped; segment 10 without middorsal carina or tubercle. — Male gonapophyses not reaching to the posterior margin of segment 9. In the females the ovipositor may be from slightly shorter to as long as segment 10, or may be longer, depending on the actual condition of the exuviae. — Lateral caudal gills parallel-sided and pointed, triquetral in cross-section; median gill conspicuously shorter, roughly $\frac{1}{2}$ to $\frac{3}{5}$ the length of the lateral gills, and foliaceous, laterally compressed, parallel-sided and with the apex broadly rounded. — All gills are regularly and finely serrate on all carinae. Tracheae visible only in the exuviae, not in the larvae preserved in alcohol; up to 10 may branch off from the main stem in rather regular intervals, but without ramifying much towards the dorsal or ventral margin, respectively (median gill).

Measurements. — Total length, from clypeus to distal margin of segment 10. 23-24 mm (larvae preserved in alcohol), 15-19 mm (dry exuviae); lateral gill 7-9 mm; median gill 4-5 mm; hind femur 7-7.5 mm.

Distribution. — The species occurs from somewhere near Bogotá northwards along the Colombian eastern Cordillera up to the State of Táchira in Venezuela, where it passes the "Tachira Depression" and, following the Cordillera of Mérida, reaches the Coastal Cordillera. Here, *H. capitalis* inhabits the coastal chain as well as the interior chain. The easternmost locality known is Cerro Tucusito, on the border between the States of Miranda and Azoátegui, where the Central Coastal Cordillera ends abruptly, being separated from the Oriental Cordillera by the "Unare Depression". It does not seem altogether impossible that the species may have found its way also to the eastern Coastal Cordillera, in the States of Sucre and Monagas (*Cora cyane* Sel. did so, indeed), but I doubt it. HAGEN's (1875) record of "*H. capitalis*" from Surinam is, without question, erroneous. Dr J. Belle (pers. comm., August, 1984) did not collect either this species or *H. majuscula* Sel. in Surinam. Whether *H. capitalis* is present south of Bogotá, or in the Sierra de Perijá, or even in the Sierra de Santa Marta, is unknown.

Flight season. — Adults can be seen in all months of the year. A clear flight period is difficult to establish, while population size actually oscillates from year to year (after unpublished observations by the author).



Figs 11-16. Larva of *H. capitalis*: (11) ultimate instar (♂) (Venezuela, Miranda, El Avila, Qda. Pasaquire, 1100 m); — (12) abdominal segments 7-10, ventral view (same specimen); — (13) median gill, left lateral view (same specimen); — (14) right antenna (same specimen); — (15) labium of ultimate instar [exuviae] (♀), dorsal view (same locality); — (16) abdominal segments 7-10, ventral view (same ♀).

Habitat and habits. — All but one Venezuelan localities are situated at elevations between 1000 and 1300 m above sea level. Only the easternmost site (Cerro Tucusito) is at about 860 m. *H. capitalis* thrives along forested rocky quebradas from the lower subtropical life zone up to the lower boundary of the cloud forest. The actual presence of adults in these shaded habitats depends, nevertheless, strongly upon sunny weather. After copulation, the tandem flies to the river bank, where it normally walks backwards a few centimeters until the female reaches the water line. While the female submerges, the male releases it immediately and alights nearby on a stick or rock, apparently guarding from here the oviposition site. The female oviposits into roots down to 10 cm below water surface, and may stay there for 10, or up to 50 minutes (DE MARMELS, 1981).

At 2 out of 9 places, *H. capitalis* is the sole calopterygid present; at 3 places the species occurs together with *H. cruentata* (Ramb.) only; at 1 site it shares the same spot with *H. macropus occisa* Hagen, and at another place with *H. smaragdalis* sp. n. and *H. cruentata*. Only once has *H. capitalis* been observed together with all 3 species. At this site (Cataurito), however, the bulk of *H. smaragdalis* sp. n. and *H. macropus occisa* live at the main stream, which is rather plain and situated below 1000 m, while *H. capitalis* and *H. cruentata* inhabit a smaller, steep and rocky affluent above 1000 m, to which point the former species ascend only occasionally, while neither *H. cruentata* nor *H. capitalis* ever descend to the main stream less than a hundred meters lower down.

HETAERINA SMARAGDALIS SP. N.

Figures 2, 4, 8-10, 17-20, 21

Hetaerina capitalis SELYS, 1873b (Panama); — HAGEN, 1875 (in part?: Colombia/N. Granada: Bogotá); — SELYS, 1879 (in part?); — KIRBY, 1890 (referring to SELYS, 1873b: in part); — CALVERT, 1901 (Guatemala, Costa Rica, Panama); — CALVERT, 1907 (Guatemala, Honduras, Costa Rica, Panama); — CALVERT, 1908 (Mexico, Guatemala, Costa Rica); — CALVERT, 1909 (referring to CALVERT, 1907); — WILLIAMSON, 1915 (Guatemala); — CALVERT, 1917 (Costa Rica); — RIS, 1918 (Costa Rica; Panama; Colombia, in part: Muzo); — CALVERT, 1919 (Guatemala); — *Hetaerina capitalis* var. *colombiana* NAVAS, 1923 (Colombia: Muzo); — *Hetaerina capitalis* WILLIAMSON, 1923 (Guatemala, Honduras; Colombia: Bolívar/Santa Marta, in part? Cincinnati/Sta Marta, Cristalina/Puerto Berrio, Mariquita/Honda; Venezuela: Aroa, Bejuma, Nirgua, San Esteban/Carabobo, Táchira); — CALVERT, 1931 (Guatemala, Costa Rica); — RACENIS, 1953 (Venezuela, in part); — RACENIS, 1954 (Venezuela: Perijá); — RACENIS, 1958 (Venezuela: Aragua, in part); — DONNELLY, 1965 (Guatemala); — DE MARMELS, 1982 (Mexico, Central America, Venezuela: Aragua, in part).

Holotype male: Venezuela, Cojedes, road Manrique-La Sierra, 425 m, 28.I. 1983, author leg.

Material examined (107 ♂, 13 ♀, including holotype, allotype and paratypes). — MEXICO: Nayarit: Tepic, Vic. Compostela; Oaxaca: Valle Nacional; Veracruz: between Laguna Catemaco

and Volcán Santa Marta (Quetzalapan); Chiapas: Ocotlan. — GUATEMALA: Volcán Tajumulco; Escuintla; Guatemala: El Fiscal; Chiquimula: Padre Miguel; Zacapa: Río Las Cañas. — EL SALVADOR: La Libertad: Taminique. — HONDURAS: "Honduras". — NICARAGUA: Matagalpa. — COSTA RICA: Alajuela: San Mateo, Mina, Ojo de Agua, San Ramón, Quebrada de Salas (Atenas), Río Siquiara (Turrúcares); Cartago: Río Chitaria (Jabillos) Río Laiza (Cachí), Pavones; Limón: Guápiles. — PANAMA: "Panamá"; Chiriquí: Potrerillos. — COLOMBIA: Magdalena: Sierra de Santa Marta. — VENEZUELA: Zulia: Kunana; Táchira: Río Frío, Loma de Pio (San Cristóbal), Táchira; Trujillo: Trujillo; — Lara: Parque Nacional Yacambú (Sanare); Cojedes: La Sierra (Manrique); Yaracuy: Minas de Aroa; Carabobo: San Esteban; Aragua; Cataurito (Villa de Cura), El Limón, Rancho Grande (Maracay).

Male holotype). — Antennae, labium, labrum, vertex and occiput, black; clypeus bright blue green; top of head between antennae, middle ocellus and vertical part of front, vivid metallic green; base of mandible pale brown. — Prothorax black with a coppery reflection, lateral margin above coxa pale brown; pterothorax dorsally velvet black; the lateral black bands are complete and regular, with a bright violet shining; pale parts light reddish brown, or beige. — Feet black. Wings hyaline, each with a red basal and apical spot; pterostigma almost as long as 2 underlying cells, very dark brown, and comparatively high, forcing R_1 into a slightly concave curve below it; ante- and postnodals of the first series in front and rear wings, respectively: 33:29-27:35/33:31-28:35; anal field of the hind wings with 47(43) cells, arranged in 2-3 rows. — Abdomen basally mostly brown, darkening posteriorly; segments 6-10 black. Superior anal appendages as in Figure 2; the postmedian internal tooth small, not surpassing internally the ventro-internal margin of the appendage, and therefore, not visible in ventral view; inferior appendages reduced to a short base bearing a pointed tubercle.

Measurements. — Total length (incl. app.) 49 mm; abdomen (incl. app.) 39 mm; hind wing 28 mm; pterostigma 1 mm.

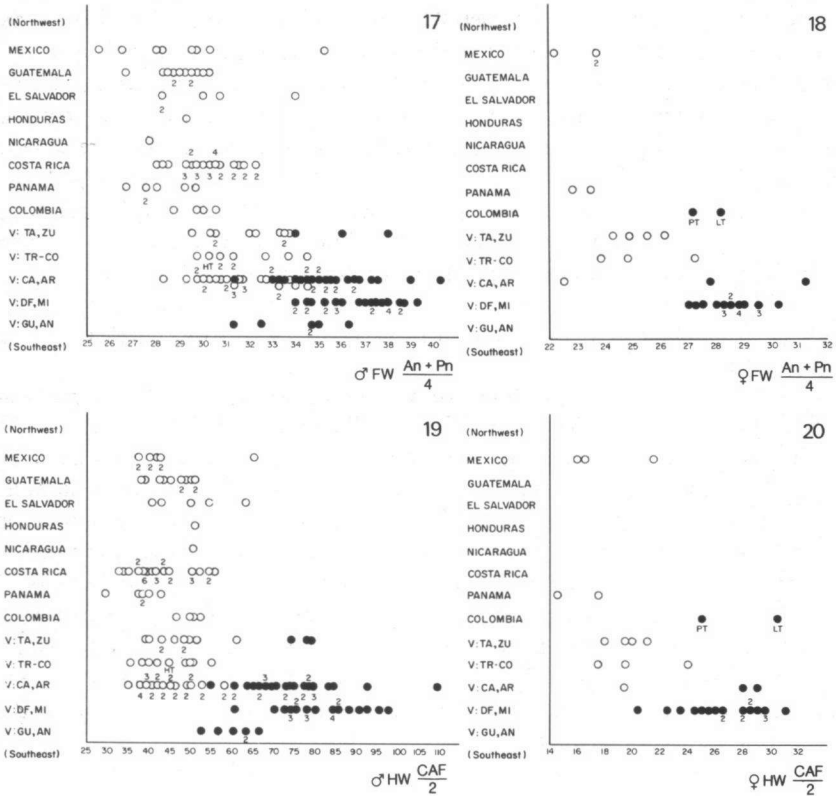
The paratype males from South America. — These are very similar to the holotype: metepisternal stripe complete in 100% of the specimens; all stripes are black with violet reflections; clypeus flashing metallic green, blue or (rarely) violet, in 91% rather opaque metallic green in 9%. Pterostigma shorter than $\frac{1}{2}$ cells in 10%, longer or at least equally long, in 90%.

Measurements. — Total length (incl. app.) 49-53 mm; abdomen (incl. app. 39-42 mm; hind wing 28-31 mm.

The paratype males from Mexico and Central America. — In all Mexican specimens the black thoracic markings, including those on the mesepisterna, show exclusively green reflections. Of 12 Guatemalan males only 2 had their thoracic stripes violet instead of green, while already 16 of the 34 Costa Rican and Panamanian males were characterized by coppery violet markings, resembling their South American conspecifics; metepisternal stripe of regular width, and complete, in only 10 of the 61 males, but considerably constricted, broadly interrupted at half-height, or altogether reduced to a dorsal spot, in the other 51 specimens. Clypeus bright metallic blue, green or violet in 100%, often with yellow

spots at the lateral angles; all males with bright green reflections on the top of the front. Pterostigma as long, or longer than $1\frac{1}{2}$ cells in 62%, shorter in 38%, the small series from Chiapas with very short to partly atrophied pterostigmata.

Measurements. — Total length (incl. app.) 46-56.5 mm; abdomen (incl. app.) 36-45.5 mm; hind wing 27-34 mm.



Figs 17-20. Venational features of *H. capitalis* and *H. smaragdalis* sp. n., plotted against a geographical gradient (Y-axis). Each dot/circle represents 1, or as many specimens as is indicated above or below it, by a cipher. — All males have been identified strictly on the base of the shape of the superior anal appendages, the females on the base of the colour of the dark thoracic bands: (17) males. Results of dividing by 4 the sum of the ante- and postnodals of both fore wings, for each specimen; — (18) same for the females; — (19) males. Results of dividing by 2 the sum of the cells in the anal field of both hind wings, for each specimen; — (20) same for the females. — [O: *H. smaragdalis* sp. n.; — ●: *H. capitalis* Sel.; — V: Venezuela; — TA: State of Táchira; — ZU: Zulia; — TR-CO : Trujillo, Lara, Yaracuy and Cojedes; — CA: Carabobo; — AR: Aragua; — DF: Distrito Federal; — MI: Miranda; — GU: Limits of Miranda/Guárico; — AN: Anzoátegui; — HT: holotype; — LT: lectotype; — PT: paralectotype; — FW: fore wing; — HW: hind wing; — An: antenodals of both wings, summarized; — Pn: postnodals of both wings, summarized; — CAF: cells within both anal fields, summarized].

The largest male is one from Veracruz; most other specimens do not exceed a total length of 50 mm.

Female (allotype). — Same data as holotype.

Labium, labrum, vertex, occiput and all but the first antennal segments, black; a small spot on each side of the labrum, base of mandible, and first antennal segment, beige; clypeus bright metallic blue and violet; top of head between middle ocellus, base of antennae and the vertical part of front, metallic green. — Prothorax dorsally black with green reflections, a brown spot on the lateral tubercle; ventral margin also brown. — Pterothorax pale reddish brown to beige; dark parts of mesepisternum flashing emerald green, as well as the three lateral dark bands, which are regular and complete. — Legs black. Wings tinged with brown; venation dark; pterostigma pale brown, and long, covering 2 underlying cells; R₁ slightly concave below the stigma. Ante- and postnodals of the first series, in front and rear wings, respectively: 22:24-23:26/22:24-24:23. Anal field of hind wings with 15(20) cells, in 1-2 rows. — Abdominal segments 1-4 laterally dark brown, 5-10 black; the ovipositor almost reaches to the distal margin of segment 10.

Measurements. — Total length 42 mm; abdomen 32 mm; hind wing 28 mm; pterostigma 1 mm.

The paratype females from Mexico, Panama and Venezuela. — All specimens have bright emerald green thoracic stripes, green reflections on the top of the front, and long pterostigmata. In the Mexican and Panamanian examples the metepisternal stripe is reduced to its dorsal fifth. Yellow areas are present on clypeus, labrum and front (Mexico). Venation at the wing bases more or less orange. — The females from Zulia and Táchira (Venezuela) show complete metepisternal stripes and lack any yellow spots on clypeus and frons. One female from Táchira has the mesepimeral (!) stripe reduced to a small dorsal and ventral spot. One specimen from Trujillo (Venezuela) shows a ventrally blurred metepisternal band, while the single female from Aragua has all stripes well-developed and sharply contrasting.

Measurements. — Total length 42-46 mm; abdomen 31-35 mm; hind wing 27-33 mm.

The larva is unknown.

Distribution. — From Mariquita and Muzo (north of Bogotá) northwards to the Sierra de Perijá and the Sierra de Santa Marta, but also along the Colombian Eastern Cordillera to Táchira, and following the Cordillera of Mérida to the Central Coastal Cordillera, both the coastal and interior chains. Up to now *H. smaragdalis* sp. n. has not been found east of Aragua State, but may be present further eastwards due to its adaptation to low altitudes. In the west, *H. smaragdalis* sp. n. is present in all Central American countries and reaches well into Mexico (Nayarit).

Flight season. — The species has been taken in all months of the year.

Habitat and habits. — *H. smaragdalis* sp. n. seems to prefer habitats at lower elevations than *H. capitalis*. The Venezuelan localities are situated between

425 m and 1100 m above sea level, but only 3 out of 10 with known elevation are higher than 900 m. Similarly, out of 14 places in Central America and Mexico with data concerning their elevation, 11 are situated between 300 and 900 m, and only 3 between 1000 and 1200 m. The highest place mentioned in the literature for "*H. capitalis*", which may concern *H. smaragdalis* sp. n., is Cincinnati, near Santa Marta (Colombia), at about 1370 m (WILLIAMSON, 1923).

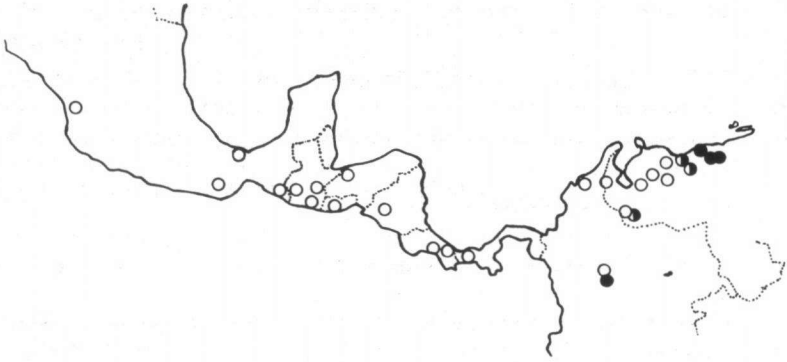


Fig. 21. Distribution of *Hetaerina smaragdalis* sp. n. and *H. capitalis* Sel. in Mexico, Central America and northwestern South America. — [○: *H. smaragdalis* sp. n., ●: *H. capitalis* Sel., ⊙: both species].

From 13 sites in Central America and Venezuela it is known, either by clear references in the literature or by own observations, that *H. smaragdalis* sp. n. occurs together with *H. macropus* alone at 7 of them, with *H. macropus* and *H. capitalis* at 1 place, with *H. macropus*, *H. capitalis* and *H. cruentata* at 1 place, with *H. cruentata* alone at 2 places, with *H. cruentata*, *H. macropus* and *H. majuscula* at 1 place, and with *H. cruentata* and *H. rudis* Calv. at 1 place. WILLIAMSON (1923) gives some additional references. These, however, often refer to one river, but not explicitly to the same spot on that river. WILLIAMSON, (1923, p. 14) quite correctly refers to *H. macropus* as to "the invariable associate" of "*H. capitalis*" (= *H. smaragdalis* sp. n.). — The general habitat of *H. smaragdalis* sp. n. are small, forested brooks, similar to those mentioned for *H. capitalis*. These rivulets are, however, often less precipitous due to their lower elevation, and may belong into the tropical rather than the subtropical zone.

SUMMARY OF DIAGNOSTIC CHARACTERS SEPARATING
H. CAPITALIS SEL. AND *H. SMARAGDALIS* SP. N.
IN SOUTH AMERICA

Males

H. capitalis

Larger; top of head black; clypeus all black or with an opaque green or blue shining; more ante- and postnodals; 3-5 rows of cells in the anal field of the hind wings, and a higher number of cells; a short pterostigma; rather narrow wing tips; the metepisternal black stripe normally constricted or interrupted at half-height; postmedian internal tooth of the superior anal appendage stronger and surpassing internally the ventro-internal margin of the appendage.

H. smaragdalis sp. n.

Smaller; top of head and clypeus bright metallic blue or green; fewer ante- and postnodals; 2-3 rows of cells in the anal field of the hind wings, including fewer cells; a longer pterostigma; rather broadly rounded wing tips; the metepisternal black stripe complete, regular, and with a violet luster; postmedian internal tooth of the superior anal appendage small, not reaching to the ventro-internal margin of the appendage.

Females

Larger; top of head and clypeus black, rarely with an opaque blue or green reflection; more ante- and postnodals; more cells in the anal field of the hind wings; a short pterostigma; all thoracic stripes black, violaceous, or opaque dark or olivaceous green; the metepisternal stripe reduced to a dorsal spot, or, at least, broadly interrupted at half-height.

Smaller; top of head and clypeus bright metallic green or blue; fewer ante- and postnodals; fewer cells in the anal field of the hind wings; a longer pterostigma; all thoracic stripes vivid emerald green; the metepisternal stripe normally complete.

Remarks. — Four males with "intermediate" characters were taken at El Limón and Rancho Grande (Aragua). In these cases it seems admissible to suppose the presence of hybrids. At Rancho Grande both *H. capitalis* and *H. smaragdalis* sp. n. occur along the same rivulets and actually meet at certain spots at about 900 m above sea level.

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