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THE NEOTROPICAL GENUS *PAZIUS*  
(MECOPTERA: BITTACIDAE)BY GEORGE W. BYERS<sup>1</sup>

DISCOVERY of specimens of the unusual bittacid genus *Pazius* in the Mecoptera collection of the University of Michigan Museum of Zoology led to an examination of what little has been written about this genus. Apparently, only three specimens have hitherto been known to science. A single male, collected in Peru, was described by Navás in 1908 as *Bittacus gracilis*. Five years later Navás concluded that this remarkable insect represented a new genus, which he named *Pazius* in honor of Diego Alvarez de Paz, S.J. In the preparation of his 1921 monograph of the Mecoptera of the world, Esben-Petersen examined one male and one female of *Pazius* from Panama, in the collection of the British Museum. These he identified as *Pazius gracilis* Navás, at the same time presenting a sketch of the male genitalia and a photograph of the wings. For the past thirty-five years no further specimens of *Pazius* have been mentioned in entomological literature.

Illustrations of wings of *Pazius* in Navás' 1913 paper and Esben-Petersen's monograph indicate clearly that the Peru and Panama specimens are of one genus, for the venation and shape of wing are conspicuously different from those of all other bittacid genera. However, on comparing Navás' original description of *Bittacus gracilis* with my notes on the British Museum specimens so named, it is evident to me that there are two species involved. A female in the University of Michigan collection, taken in a light trap at Peña Blanca, Los Santos, Panama, about 175 miles from the locality from which the specimens in the British Museum came, appears to be conspecific with them. Four other specimens in the Michigan collection clearly represent a third species.

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Having searched for and inquired concerning additional material in other collections without success, and realizing that it may be many more years before further specimens are made available, I wish to present the following notes on the three species, represented by these eight specimens, in the hope that calling them to the attention of others will encourage additional collections. I wish also to thank Dr. T. H. Hubbell, of the University of Michigan Museum of Zoology, for the loan of specimens for study, and Dr. D. E. Kimmins for allowing me to examine the specimens in the British Museum (Natural History) and for later making detailed sketches of the male genital segments.

*Pazius* Navás

*Pazius* Navás, *Broteria, serie zoologica*, 11, fasc. 1 (1913): 45.

The original diagnosis of this genus, in Latin, is here translated: "Similar to *Bittacus* Latreille. Antennae filiform. Abdomen longer than posterior wing. Feet slender, elongate; posterior femora cylindrical, not incrassate; first segment of posterior tarsus nearly twice as long as the fourth. Wings narrow, subpetiolate; stigmal spot elongate, triangular, connected to the radial sector by two cross-veins; costal area very narrow, a cross-vein in its basal third; subcosta terminating long before the stigma; first axillary (anal) vein absent; thyridia very small or absent."

Although this is not a particularly good description of *Pazius*, it is repeated here because the journal in which it appeared is relatively uncommon in this country.

Two striking characteristics of *Pazius* render it immediately and easily separable from *Bittacus* and other bittacid genera. First, it is a conspicuously slender insect, frail in appearance, with wings extremely narrowed in the proximal third of their length (Fig. 1). Second, the eyes are unusually large and in both males and females meet beneath the bases of the antennae (Fig. 2). The vein 1A is not absent, as stated by Navás, but is very short and inconspicuous (Figs. 3 and 4). In the forewing it parallels  $Cu_2$  for somewhat less than one-fifth of the length of that vein, then turns abruptly to the posterior margin (Fig. 4). In the hindwing 1A is half again as long as it is in the forewing and is fused for almost its entire length with  $Cu_2$ , the combined vein closely paralleling the posterior edge of the wing and the short length of 1A crossing almost imperceptibly from  $Cu_2$  to the margin. The vein 2A in the hindwing is not straight as in the forewing (Fig. 4) but

broadly sinuate, coalescing basally with the wing margin. The vein referred to by Navás as the radial sector, connected by two cross-veins with the stigmal area, is actually the vein  $R_{2+3}$ .

TYPE OF GENUS.—*Bittacus gracilis* Navás.

*Pazius gracilis* (Navás)

*Bittacus gracilis* Navás, *Memorias, Real Academia de Ciencias y Artes de Barcelona*, 6 (1908): 413, Fig. 15

*Pazius gracilllis* (Navás), *Broteria, serie zoologica*, 11, fasc. 1 (1913): 45, Fig. 8a.

Although the holotype (and only known specimen) of this species is included in the part of the Navás collection which survived destruction during the Spanish Civil War, it is no longer sufficiently well preserved to make its redescription worthwhile. Dr. F. Español examined the type (in the Museo de Zoología de Barcelona) and in a letter described it in these discouraging words: "This specimen, unfortunately, is very much damaged, having lost the posterior part of the abdomen as well as the antennae and part of the legs and wings. Therefore I doubt if it could be of any use."

The original description of the species, translated from the Latin, reads as follows: "Male. Large, slender, dark, shiny. Head dark; antennae paler. Thorax dark, dull black above, dark orange below. Abdomen extremely slender and elongate, the terminalia expanded, pale with darker tip; cerci large, pale, leaflike, tridentate, acutely tipped, with margins thickened by 'veins.' Feet very slender, pale brick-red; apices of femora, tibiae, and tarsal segments dark. Wing membrane slightly tinted with gray, hyaline, elongate, narrow, apex elliptical; stigmal spot large, elongate, black, the color extending into the radial field, joined to the radial sector by two cross-veins; veins and cross-veins dark. Body length 23 mm., forewing 17 mm., hindwing 14.5 mm. Female unknown to me."

Two things about this description are important for purposes of comparison with the other known species. The first is that the "cerci" (actually posterolateral extensions of the ninth tergite, referred to as dorsal appendages or, together, as the epiandrium, by some authors) are tridentate and acutely tipped. This is rather sketchily but at the same time adequately illustrated in the figure accompanying the original description. My Figure 7 is an attempt at restoration of the appearance of the male genital segments of *Pazius gracilis* on the basis of the sketch by Navás and the structure of males of other species. The second

important aspect of the description is the absence of any reference to diagonal pale bands or stripes on the thoracic pleura. It is evident that Navás noted details of coloration of the insect, and therefore it is significant that he made no mention of such stripes, since one of the other species is conspicuously so marked.

Navás obtained the specimen from Dr. O. Staudinger, of Dresden, dealer in entomological materials. The type locality is given as "Chan-chamayo, Peru," the name probably referring to the Río Chanchamayo, in Junín Department ( $11^{\circ} 00' S$ ,  $75^{\circ} 20' W$ ), 50 miles east of Lago de Junín. This river flows 20 miles north from San Ramón to join the Río Perené and is in the Amazon drainage. Elevations along the river vary from 2300 to 3400 feet. The date of collection is not known.

### *Pazius obtusus*, new species

*Pazius gracilis*, Esben-Petersen [not Navás 1908], *Mecoptera, collections zoologiques du Baron Edm. de Selys Longchamps*, fasc. 5, Pt. 2 (1921): 161, Figs. 187, 188.

This name is proposed for the two specimens from Panama earlier identified by Esben-Petersen as *Pazius gracilis*, and for one additional female in the University of Michigan collection. The trivial name refers to the broadly rounded appearance of the dorsal appendages of the ninth tergite of the male, seen in lateral profile (Fig. 8; compare with Figs. 7 and 10).

Esben-Petersen's description of the species is paraphrased here: Head and rostrum brown; rostrum yellowish at the base. Antennae brown, the two basal segments thickened and yellowish. Thoracic dorsum castaneous; pleura castaneous with two conspicuous, diagonal, pale yellowish streaks on each side. Abdomen brown, the posterior margins of the segments narrowly darkened; the terminal segments darker. In the male the dorsal appendages, seen from the side, are very broad, their lower margins each with two broad, rounded indentations. Terminal abdominal segments of the female, especially the seventh, very incrassate. Femora cylindrical, brown, grading to brownish black in the apical third; the darker part divided by a broad, yellowish band. Tibiae brown, becoming brownish black distally, with a broad apical yellowish band. Fore tarsi yellowish brown; intermediate and hind tarsi blackish brown. Wings as described for the genus. Body length 23 mm., forewing 18 mm., hindwing 16 mm.

Only after examination of the next species did it seem that the inner or mesal projections of the dorsal appendages might show taxo-

nominally useful differences. Dr. Kimmins has kindly prepared a sketch of one of these appendages (Fig. 9), as well as of the genital segments of the male in lateral aspect. Comparison of Figures 9 and 11 reveals several differences in detailed structure of the appendage as well as some interesting similarities, notably the mesal process that terminates in two branches, the one unarmed and the other bearing two spines. Other than this, there is little to add to Esben-Petersen's description.

The male specimen in the British Museum collection is hereby designated as the holotype of *Pazius obtusus*, and the female specimen with it the allotype. Both were collected by Champion, at Bugaba village (two miles south of Concepción; 8° 30' N, 82° 36' W), Chiriquí Province, Panama, at an elevation between 800 and 1500 feet. The date of collection is unknown. One female paratype, preserved in alcohol in the University of Michigan collection, was taken in a light trap operated by F. S. Blanton at Peña Blanca (four miles south-southwest of Las Tablas), Los Santos Province, Panama (7° 40' N, 80° 20' W), at an elevation of approximately 150 feet, on 2 October 1952.

#### *Pazius furcatus*, new species

The following description is based on dried specimens.

Head (Figs. 2 and 6): Eyes dark brown or black; vertex blackish, grading into dark brown on occiput and brown on remainder of head; rostrum dark amber-colored, paler at its base; maxillary palps dark brown; antennal bases yellowish brown, the flagellar segments grayish brown.

Thorax (Fig. 6): Elevated parts of thoracic dorsum dark brown, except for yellowish postnotal areas, depressed parts paler brown; mesepisternum and basalare sclerite chestnut brown, the remainder of the pleural and sternal surfaces pale grayish brown; small blackened areas at ventral apex of mesepisternum and of mesothoracic meron and at the posterodorsal angle of the latter; spiracles narrowly elliptical; intersegmental membrane between pronotum and mesonotum conspicuous dorsally and slightly overlapping anterior margin of mesonotum. Wings (Figs. 3 and 4) as described for the genus. Femora grayish brown, narrowly tipped with blackish brown, with a poorly defined, subapical, yellowish brown band about half a millimeter in width; tibiae grayish brown, grading into yellowish brown apically; fore tarsi pale brown, middle and hind tarsi dark brown. First segment

of posterior tarsus more than twice the length of the fourth segment (Fig. 5).

Abdomen elongate and slender; tergites and sternites dark brown, the membranous parts paler brown to yellowish brown. Sixth and especially seventh abdominal segments of female expanded (Fig. 12); eighth sternite widely separated from the seventh and extending backward beneath ninth tergite, forming a clearly defined genital chamber; ninth tergite with a heavily sclerotized antecosta and one stout black spine (rarely two) on each side of the posterior margin. Eighth and ninth abdominal segments of male enlarged and darkened, except for the pale yellowish brown ninth tergite (or epiandrium, Fig. 10, 9*t*). Dorsal appendages of ninth tergite with acute tips slightly upturned and curved sharply mesad, and with incurved ventral projections. On the dorsal surface of each of the ventral projections, on the inner surface of the appendage, is a process directed anteromesad, terminating in two short black spines (Fig. 11).

The aedeagus bears a conspicuous forked projection (Fig. 10), probably homologous with penunci described in certain species of *Bittacus*. It is to this unusual forked structure (cf. Fig. 10 with 7 and 8) that the species' trivial name, *furcatus*, refers.

The holotype of *Pazius furcatus* is a male, collected at Táchira village, state of Táchira, Venezuela, 7 April 1920, by Jesse and E. B. Williamson. The allotype was collected at nearby La Fria village on 16 April, and two female paratypes were taken at La Fria on 16 and 17 April, all by the Williamson brothers during their 1920 expedition to South America. The type locality is approximately 8° 07' N, 72° 16' W, at an elevation of about 1000 feet, in the western foothills of the Cordillera Mérida. The La Fria locality is 8° 13' N, 72° 16' W, at approximately 400 feet above sea level, at the southern edge of the coastal plain. E. B. Williamson's field notes describe the two collecting areas as *quebradas* (ravines) through "tall tree forest" and mention a luxuriant undergrowth, especially along the streams in the bottoms of the ravines.

REMARKS.—That so few individuals of *Pazius* are found in collections may be a result of restricted flight periods (two per year are possibly indicated by the available collection data), local distribution, small population size and/or inaccessibility of appropriate habitats. It seems not unreasonable to expect that as additional specimens are obtained many more undescribed species will be represented, for the genus is probably widespread in northern South America and adjacent Central America.

It would be very desirable to have freshly collected specimens preserved in 70 per cent alcohol or other suitable preservative, so that the anatomy could be studied and characters thus found which would aid in better species recognition of females and perhaps indicate more clearly the relationship of *Pazius* to *Bittacus*.

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PLATE I

*Pazius furcatus*

- FIG. 1. Dorsal aspect of holotype male.
- FIG. 2. Head of paratype female, mouthparts (right maxilla, left labial palp, both mandibles) exposed.
- FIG. 3. Forewing of paratype female.
- FIG. 4. Detail of basal part of forewing of paratype female.
- FIG. 5. Posterior tarsus of paratype female.
- FIG. 6. Head and thorax of holotype male, left lateral aspect.



PLATE I

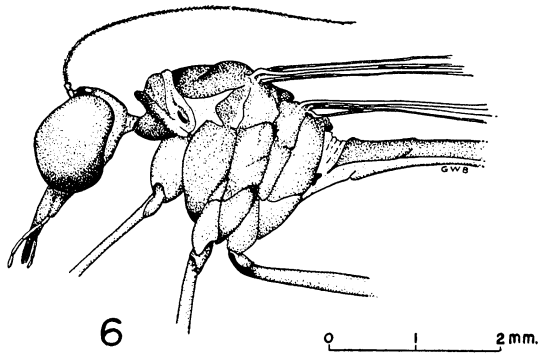
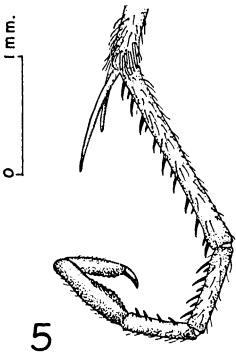
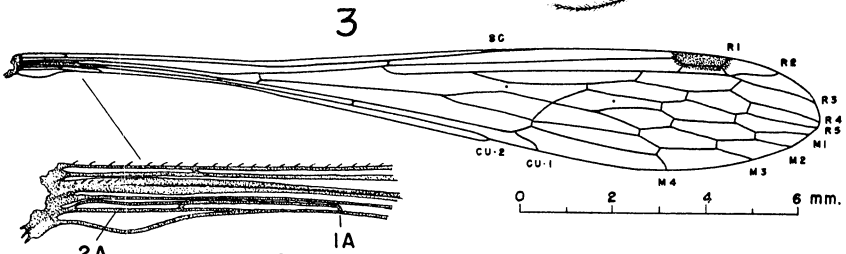
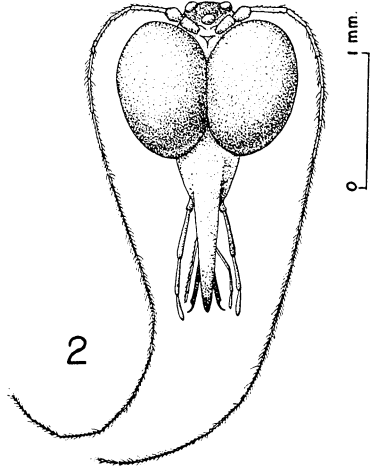
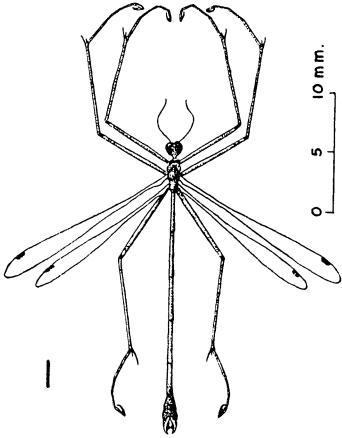
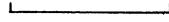
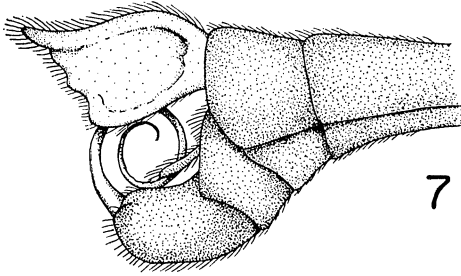


PLATE II

Genitalia of *Pazius* species

- FIG. 7. Genital segments of male *Pazius gracilis* Navás (holotype), right lateral aspect, from sketch by Navás.
- FIG. 8. Genital segments of male *P. obtusus* (holotype), right lateral aspect, from sketches by Kimmins and Esben-Petersen. Sclerites slightly separated by treatment with potassium hydroxide.
- FIG. 9. Dorsal aspect of right dorsal appendage of male *P. obtusus* (holotype), from sketch by Kimmins.
- FIG. 10. Genital segments of male *P. furcatus* (holotype), right lateral aspect; *9t*, ninth tergite (dorsal appendage); *9s*, ninth sternite; *bs*, basistyle.
- FIG. 11. Dorsal aspect of right dorsal appendage of male *P. furcatus* (holotype).
- FIG. 12. Terminal abdominal segments of female *P. furcatus* (allotype); *9t*, ninth tergite.

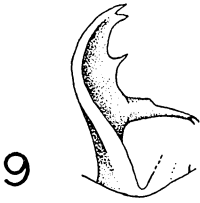
PLATE II



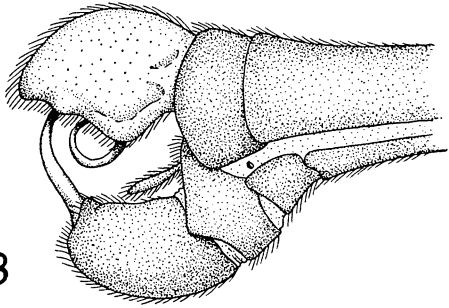
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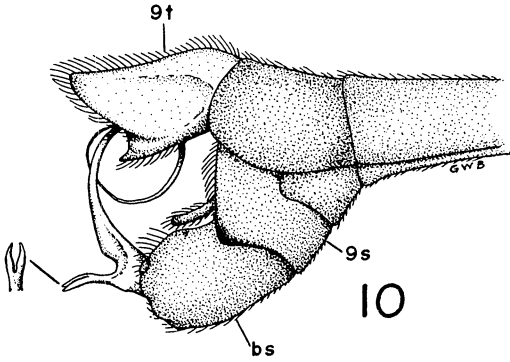
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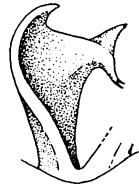
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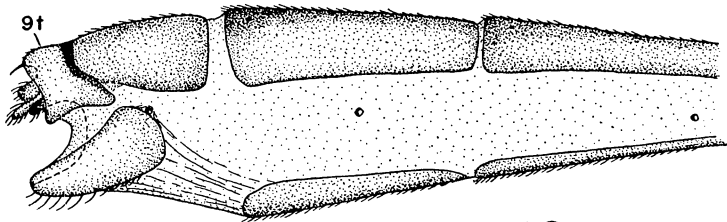
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