

# A REVIEW OF THE *PHANUS VITREUS* GROUP (LEPIDOPTERA: HESPERIIDAE: PYRGINAE)

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**ABSTRACT.**— The "*vitreus*" group of *Phanus* was reexamined. Four new species are described: *Phanus albiapicalis* n. sp., *Phanus confusis* n. sp., *Phanus ecitonorum* n. sp., and *Phanus grandis* n. sp. Two were previously recognized as different but insufficient material existed. The seven included species appear as two subgroups.

**KEY WORDS:** Argentina, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, El Salvador, French Guiana, Guatemala, Guyana, HesperIIDae, Honduras, Mexico, Neotropical, Nicaragua, Panama, Paraguay, *Phanus*, *Phanus albiapicalis* n. sp., *Phanus confusis* n. sp., *Phanus ecitonorum* n. sp., *Phanus grandis* n. sp., Suriname, taxonomy, Trinidad, Venezuela.

The genus *Phanus* Hübner [1819] (HesperIIDae: Pyrginae), occurring from Mexico south through much of the Neotropics to northern Argentina, was revised by Evans (1952) and again by Miller (1965). The current concept is of five species in three groups: the "*obscurior*" group, including *Phanus obscurior* Kaye, 1924, with two subspecies; the "*marshallii*" group, including the monotypic *Phanus marshallii* Kirby, 1880; and the "*vitreus*" group, including three monotypic species, *Phanus vitreus* (Stoll, 1781), *Phanus rilma* Evans, 1952, and *Phanus australis* Miller, 1965. Miller (1965) examined two specimens of the "*vitreus*" group that could not be placed suggesting that these were still more diverse. The discovery of a new species of this group among a collection from Rondônia in western Brazil prompted me to reexamine the complex. Herein, I describe four new species.

The species of *Phanus* are very similar with their dark brown ground color and extensive hyaline streaks and macules on both wings. The male genitalia have a distinct lobe or tooth at the caudal end of the ampulla, this more-or-less parallel to a dorsal tooth on the harpe. The female genitalia have a rather wide lamella postvaginalis which is deeply indented on the caudal margin. The "*vitreus*" group was characterized by the short distal arms (shorter than the undivided portion) of the bifurcated hyaline streak in forewing cell  $CuA_1-CuA_2$  and the short uncus of the male genitalia (Evans, 1952; Miller, 1965). The streak in forewing cell  $CuA_1-CuA_2$  has long distal arms and the uncus is longer on both *P. obscurior* and *P. marshallii*.

Forewing length is from base to apex. Reference is made to the relative sizes of the macules towards the apex of the forewing of which there are five. The anterior three are considered subapical macules; the posterior two are considered submarginal. Terminology for the structures of the genitalia is after Steinhauser (1981, 1986). Two characters of the male genitalia useful in distinguishing species require additional definition. The uncus in dorsal (or ventral) view is nearly square (unflanged) or with the

lateral edges noticeably flared laterally and posteriorly forming distinct lobes (flanged). The costa of the valva has a point on its dorsal edge representing the uppermost point of attachment to the vinculum. The relative position of that point varies between species. Distribution records are for those specimens seen plus additional records from Miller (1965) of unambiguous taxa. Superficial and genitalia characters of the "*vitreus*" group species are summarized in Tables 1 and 2.

### *Phanus vitreus* (Stoll)

Figs. 1-7 (adults), 20 (♂ genitalia), 27 (♀ genitalia)

*Papilio vitreus* Stoll, 1781; figs. 7, 15, 21 in Miller (1965)

*Papilio momus* Fabricius, 1787

*Phanus godmani* Williams and Bell, 1931

**DESCRIPTION.**— Forewing length of male = 21.1mm (20.2-22.0, N = 10) and female = 21.3mm (19.9-22.0, N = 5, both samples from Rondônia, Brazil). This species is distinguished from other members of the "*vitreus*" group by a combination of small subapical spots on the forewing, the hyaline streak in the hindwing discal cell continuous with the discal spot in cell  $M_1-M_3$ , usually a pale streak at the base of  $CuA-2A$  on the hindwing, and a small submarginal macule in the same cell. The male genitalia have an unflanged posterior end to the uncus (in dorsal view), the valva is moderately broad, the lobe of the ampulla is dorsally directed, and there is a relatively broad space between it and the short dorsal process of the harpe. The female genitalia are not strongly sclerotized, the papillae anales are narrow, the lamella postvaginalis is short, the antrum is nearly square, and the lamella antevaginalis does not extend laterally beyond the width of the lamella postvaginalis.

**DISTRIBUTION AND PHENOLOGY.**— This species occurs from southern Mexico south to southern Brazil; records are for every month of the year.

*Specific records:* MEXICO.— *Oaxaca:* Candelaria Loxicha (Jan, Jul, Aug, Sep, Dec). *Chiapas:* Santa Rosa Comitán (Jul). GUATEMALA.— *Izabal Chichipate,* Mpio. El Estor, 125m (Aug). EL SALVADOR.— Santa Tecla, 900m (Jul), Tamanique, 1000m (Aug). HONDURAS.— no location (no date). COSTA RICA.— no location (no date). *Cartago:*

Turrialba (May). *Heredia*: Sarapique District, vic. Puerto Viejo (Mar). *Limon*: Paraiso (Sep). *Puntarenas*: vic. Villa Neilly, 60m (Jul), Osa Peninsula, 1.8mi. W Rincon (Feb). PANAMA.— *Canal Zone*: Culebra (Oct), Barro Colorado Island (Jan, Feb, Mar). FRENCH GUIANA.— no location (no date). Cayenne (no date). St. Laurent (no date). St. Laurent du Manoni (no date). Mana River (May). SURINAME (Surinam).— no location (no date). GUYANA (British Guiana).— no location (Feb). Warani (no date). Bartica (Dec). VENEZUELA.— no location (no date). Porto Cabello (no date). *Bolivar*: 17km S El Dorado (Jun). COLOMBIA.— La Burrascosa, 500-1200m, N of Tunja Bouaca (Nov). Muzo (no date). *Tolima*: Rio Chili, 7-800m (Feb); Rio Chili, 900m (Dec). ECUADOR.— no location (no date). *Napo*: Rio Coca, 300m (Jul). Rio Shingupino (Nov). PERU - no location (no date). *San Martin*: San Martin (May). *Loreto*: Iquitos (Jan, Jun, Sep). *Ucayali*: Middle Rio Ucayali (Mar). Putumayo (Nov, Dec). Achinamiza (Jan, Oct). BOLIVIA.— no location (Aug). *El Beni*: Rio Songo (no date). Rio Surutu, 350m (Apr). Coroico (no date). Rio Japacani (Aug). Prov. del Sara, 400m (Jun). *Santa Cruz*: Buenavista, 75km NW Santa Cruz, 450m (no date). BRAZIL.— no location (no date). *Amazonas*: Arima, Rio Purus (Nov). Manicore (Aug, Oct, Nov). Manicore, Rio Madeira (Nov). Manacapuru (Mar). *Mato Grosso*: Chapada (no date). *Minas Gerais*: Pilar (no date). *Pará*: no location (no date). Fazenda Velha, nr. Belem (Nov). Obidos (no date). Benevides (Oct, Nov). *Rio de Janeiro*: Rio (Aug). Petropolis, Independencia, 900m (Dec). *Rondônia*: Fazenda Rancho Grande, vic. Cacaullandia (Apr, May, Jul, Sep, Oct, Nov, Dec). Jaru (Aug). *Santa Catarina*: Sta. Catarina (Mar). COUNTRY UNKNOWN.— Panore (no date).

Miller (1965) listed many additional localities for *P. vitreus* including the following additional countries: Nicaragua, Trinidad. Some of those he gave referred to unrecognized species (see below). Specimens of these and other records (e.g., de Jong, 1983; Brown and Mielke, 1967) need to be reexamined before the distributional details of the various taxa are resolved.

**DISCUSSION.**— The species was named from Suriname and the type is apparently lost (fide L. D. Miller); it is not at Leiden or London (fide O. Mielke). Unfortunately, there are two very similar species in northeastern South America. One phenotype in the region, and apparently the most widespread, is that with a hyaline streak in the base of cell CuA-2A on the hindwing and the usual presence of a submarginal hyaline macule in the same cell. The genitalia are as described above. This phenotype has been associated with the name *P. vitreus* by Godman and Salvin (1879-1901), Evans (1952), and Miller (1965). I thus identify this as Stoll's (1781) concept and designate a male (Fig. 3) at the Carnegie Museum of Natural History as the neotype of *Papilio vitreus* Stoll (1781). This specimen has the following labels: white, printed - Suri- / nam; white, handprinted - PHANUS / VITREUS / SURINAM; white, printed and handprinted - Genitalia Vial / GTA - 2334. I have added the following label: red, printed - NEOTYPE / *Papilio vitreus* Stoll / designated by / G. T. Austin 1992.

The type of *Papilio momus*, described from French Guiana (Cayenne), is also apparently lost (fide L. D. Miller, Zimsen 1964; it is not at Copenhagen, fide O. Mielke) and, for stability, is considered a synonym of *P. vitreus*. I designate a male (Fig. 4) at the American Museum of Natural History as the neotype of *Papilio momus* Fabricius (1787). This specimen has the following labels: white, handprinted - St / Laurent / du / Maroni; white, handprinted - French / Guiana; white, printed and handprinted - *Phanus vitreus* / (Stoll) / Det. Lee D. Miller, 1985; white, printed

and handprinted - Genitalia Vial / GTA - 2219. I have added the following label: red, printed - NEOTYPE / *Papilio momus* Fabricius / designated by / G. T. Austin 1992.

*Phanus godmani* was applied to material from Costa Rica (not Nicaragua as stated by Evans, 1952). Williams and Bell (1931) mistook *P. marshallii* for *P. vitreus* as their illustration of the genitalia indicates. They thus proposed *P. godmani* for the phenotype of *P. vitreus* and illustrated the type and its genitalia. That male specimen (Fig. 5) and a paratype female are now at the Carnegie Museum of Natural History (the genitalia are not with the male type and may still be at the Academy of Natural Sciences, Philadelphia [under "Type Series 7578"] from where the specimen was transferred in the early 1960's, fide J. Rawlins). The [holo]type bears the following labels: white, printed - Costa Rica; white, printed and handprinted - Genitalia Slide / No. 479; white, printed - 852; red, printed and handprinted - TYPE / *Phanus* / *godmani* / R. C. Williams, Jr. P. [sic] Bell / [printed sideways on right edge] 7578. I have added the following label: red, printed - HOLOTYPE / *Phanus godmani* / Williams & Bell / identified by / G. T. Austin 1992. This is obviously of the Central American phenotype of *P. vitreus* (Figs. 6, 7) which is marginally different from South American populations. Differences include a shorter upper arm of the bifurcate streak in forewing cell CuA<sub>1</sub>-CuA<sub>2</sub>, a somewhat broader lower arm of this same streak, an often absent basal streak in hindwing cell CuA-2A, and an often absent submarginal macule in the same cell (although both basal and submarginal macules are present on the holotype of *P. godmani*). The latter two characters seem clinal from Brazil northward to Mexico. I do not choose to recognize these northern populations as a different subspecies, yet a name is available if this is desired at a later time.

#### *Phanus ecitonorum* Austin, new sp.

Figs. 8, 9, 34 (adults), 26 (♂ genitalia), 33 (♀ genitalia)

**DESCRIPTION.**— MALE. Forewing length = 21.1mm (20.4-22.1, N = 10, types, holotype = 21.6). Forewing with costal fold; wings dark brown with extensive white hyaline spots and streaks as typical for genus; bifurcate portion of streak in forewing cell CuA<sub>1</sub>-CuA<sub>2</sub> shorter than undivided portion; streak in hindwing discal cell conjoined with discal spot in M<sub>1</sub>-M<sub>3</sub>; nearly identical to *P. vitreus*, differs at type locality as follows: lower arm of bifurcate streak of forewing discal cell nearly always in two parts, outer third well separated from basal portion (this usually entire or with little separation on *P. vitreus*); lower spot in CuA<sub>2</sub>-2A of forewing well basad of upper spot (these usually close or slightly overlapping on *P. vitreus*); short streak in base of hindwing cell CuA-2A absent or, on some specimens, a few pale scales in this position on venter (usually a well defined macule or streak on *P. vitreus*); submarginal spot in same cell usually absent or represented by a few white scales (usually a well defined macule on *P. vitreus*); many specimens with gray scaling at forewing apex (this normally entirely dark on *P. vitreus*); ventral forewing with pale gray along anal margin often extending to outer margin (usually only as far as lower spot in CuA<sub>2</sub>-2A on *P. vitreus*); both wings with less olivish overscaling than on *P. vitreus*.

*Genitalia*: general form of "vitreus" group with short uncus; similar to *P. vitreus* but differing as follows: valvae with costa having dorsal projecting point nearly at anterior end (this more caudad on *P. vitreus*), slightly humped posterior to this, sloping gradually to a dorsally pointed or rounded tooth-like process on anterior ampulla (hump more pro-

nounced and process less so on *P. vitreus*), ampulla with dorso-caudally directed lobe at caudal end, slightly serrated anteriorly, well separated from tooth of ampulla (lobe of ampulla more dorsal in orientation and nearer tooth on *P. vitreus*), harpe with thin dorsal point approximating lobe of ampulla and nearly as long (dorsal point of harpe blunt, further separated from and shorter than lobe of ampulla on *P. vitreus*), caudal end of harpe short (generally longer on *P. vitreus*); uncus in ventral view flanged, lateral portions extending noticeably caudad of midline (caudal end of uncus nearly square or only slightly indented often with central point on *P. vitreus*).

**FEMALE.** Forewing length = 21.4mm (20.8-22.2, N = 6, types). Virtually identical with male; no costal fold, similarly different from female *P. vitreus* at type locality; macules in forewing cell CuA<sub>2</sub>-2A overlapping or contiguous; forewing apex without gray scaling.

**Genitalia:** similar to those of *P. vitreus* but differing in several respects as follows: overall more robust; papillae anales broader (in ventral view), especially anteriorly; lamella postvaginalis broad, anterior edge concave on either side of the center (thinner and anterior edge smoothly convex or relatively straight on *P. vitreus*); antrum broad and somewhat flared on caudal margin; posterior edge of lamella antevaginalis extending laterally beyond lamella postvaginalis (antrum narrow and lamella antevaginalis extending laterally to about outer edge of lamella postvaginalis on *P. vitreus*).

**TYPES.**— Holotype ♂: with the following labels: white, printed - BRASIL: Rondonia / 62 km S Ariquemes / linea C-20, 7 km E / B-65, Fazenda / Rancho Grande / 5 December 1991 / leg. G. T. Austin / (associated with / *Eciton burchelli*); white, printed and handprinted - Genitalic Vial / GTA - 1827; red, printed - HOLOTYPE / *Phanus ecitonorum* / Austin.

**Paratypes** (33 ♂, 13 ♀, same location and collector as holotype unless indicated otherwise) - 11 Aug 1991, leg. G. Bongioiolo (1 ♀), 25 Aug 1992, leg. G. Bongioiolo (1 ♀), 29 Aug 1992, leg. G. Bongioiolo (1 ♂), 9 Nov 1991 (1 ♂), 13 Nov 1991 (1 ♀), 17 Nov 1990, leg. J. Brock (1 ♀), 18 Nov 1991 (1 ♂), 20 Nov 1991 (1 ♂), 22 Nov 1991 (3 ♂, 1 ♀), 26 Nov 1991 (4 ♂), 27 Nov 1991 (2 ♂, 1 ♀), 28 Nov 1991 (1 ♀), 29 Nov 1991 (2 ♂), 30 Nov 1991 (1 ♂), 2 Dec 1991 (3 ♂, 1 ♀), 3 Dec 1991 (5 ♂), 5 Dec 1991 (5 ♂, 1 ♀), 6 Dec 1991 (1 ♀), 16 Apr 1992 (1 ♂), 18 Apr 1992 (1 ♀), 20 Apr 1992 (1 ♀), 22 Apr 1992 (1 ♀), ca 70km S Ariquemes, B-80, between lineas C-10 & 15, 1 Dec 1991 (3 ♂).

**DEPOSITION OF TYPES.**— The holotype and a female paratype will be deposited at the Universidade Federal do Paraná, Curitiba, Brazil. The remaining paratypes will be deposited in other collections.

**TYPE LOCALITY.**— BRAZIL: Rondônia; 62km south of Ariquemes, linea C-20, 7km (by road) east of route B-65, Fazenda Rancho Grande, 180m elev. This is approximately 5km northeast of Cacaullandia in typical tropical lowland rainforest. Many (21) of the types were collected in association with army ants, principally with *Eciton burchelli* but also with *Labidus praedator* (see Austin *et al.*, 1993). Twelve others were taken in traps baited with putrid fish. The absence of records (except one) prior to 1991 reflects, in part, no work at ant swarms nor the use of traps before that time.

**ETYMOLOGY.**— The species is named after its habit (along with other *Phanus* species) of associating with swarms of *Eciton burchellii* where it feeds on droppings left by ant associated birds.

**DISTRIBUTION AND PHENOLOGY.**— This species is known from Costa Rica to southern Brazil; specimens have been taken throughout the year.

**Specific records:** COSTA RICA.— Carillo (Oct). Cartago: Turrialba (May, Jun). Limon: Hdas La Suerte/Tapezco, 29 air km W Tortuguero, 40m (Aug). Puntarenas: vic. Villa Neilly, 60m (Jul). PANAMA.—

*Chiriqui* (no date). Canal Zone: Gatun (Aug). Barro Colorado Island (Mar). Cerro Campana (May). FRENCH GUIANA.— Port Laurent (no date). SURINAME (Surinam).— no location (no date). VENEZUELA.— Monagas: Carilzito Managas (May). COLOMBIA.— Magdalena: Bonda, 250ft (Jul). Don Diego (May). ECUADOR.— Palmar, Manabi, 200m (Apr). Santo Domingo (Feb, May). Maca (no date). Touchique (no date). PERU.— Loreto: Iquitos (Mar, Sep). Upper Rio Tapiche (Jan). San Martin: Rio Huallaga (Nov). BOLIVIA.— Santa Cruz: Quatro Ojas, 250m (Nov). El Beni: Upper Mamore R. (Dec). Rio Songo (no date). BRAZIL.— no location (no date); no location (Jul). Maranhão (no date). Amazonas: no location (no date). Barcellos, Rio Negro (Jul). Pará: no location (Aug). Obidos (no date). Benevides (Oct). Rio de Janeiro: Angra dos Reis (Dec). Rondônia: [types]. Santa Catarina: no location (Apr).

**DIAGNOSIS AND DISCUSSION.**— As noted, *P. ecitonorum* is a member of the "vitreus" group of *Phanus*, most similar to *P. vitreus* with which it was compared above. This is especially true in the northern portion of the distribution of *P. ecitonorum* from where a majority of specimens need to be dissected for positive identification. The two species are broadly sympatric (Table 3); *P. ecitonorum* has been universally included in series of *P. vitreus*; the female illustrated in Lewis (1987, pl. 85, no. 10) as *P. vitreus* is a *P. ecitonorum*. It is also similar superficially to *P. australis* in lacking the basal and submarginal spots in cell CuA<sub>2</sub>-2A on the hindwing, but most of the spots and streaks are less extensive on *P. ecitonorum*, especially the forewing subapical macules which are three times as broad as the two following submarginal macules on *P. australis*. The male valva is different: that of *P. australis* has a narrower, often tooth-like projection on the caudal end of the ampulla instead of the broad lobe on *P. ecitonorum* and the caudal end of the harpe is more triangular-shaped (short and more rounded on *P. ecitonorum*).

*Phanus rilma*, the other described member of the "vitreus" group, is also similar but is usually larger in size and the hindwing discal cell streak is separated from the discal spot in M<sub>1</sub>-M<sub>3</sub>. The male valva of *P. rilma* is narrower than that of *P. ecitonorum*, the anterior point on the costa is situated further caudad (as on *P. vitreus*), and the dorsal tooth of the ampulla is often distinctly serrated. The uncus of *P. rilma* in ventral view is flanged, much as on *P. ecitonorum*. The female genitalia of *P. ecitonorum* are also similar to those of *P. rilma*, more similar than those of *P. vitreus*. On *P. rilma*, the papillae anales are broad and somewhat quadrate; the lamella postvaginalis is even more robust than on *P. ecitonorum*, its anterior edge is often somewhat concave centrally.

#### ***Phanus confusus* Austin, new sp.**

Figs. 10, 11 (adults), 23 (♂ genitalia), 30 (♀ genitalia)

**DESCRIPTION.**— MALE. Forewing length = 22.6mm (22.2-23.0, N = 3, types and others, holotype = 22.6). Forewing with costal fold; wings dark brown with extensive white hyaline spots and streaks as typical for genus; bifurcate portion of streak in forewing cell CuA<sub>1</sub>-CuA<sub>2</sub> shorter than undivided portion; streak in hindwing discal cell conjoined with discal spot in M<sub>1</sub>-M<sub>3</sub>; forewing apex with or without slight grayish scaling; nearly identical to *P. ecitonorum*, differs as follows: wings somewhat longer and broader, hyaline markings average broader; upper arm of bifurcate streak in forewing cell CuA<sub>1</sub>-CuA<sub>2</sub> usually shorter. **Genitalia:** variable on the few males examined; most similar to those of *P. rilma*; valvae long and slender; tooth of ampulla distinctly serrated or

not; lobe of ampulla long as on *P. rilma*, its orientation like *P. rilma* or *P. ecitonorum*.

**FEMALE.** Forewing length 23.2mm (22.6-23.8, N = 10). As male; no costal fold. *Genitalia*: most similar to *P. rilma* with papillae anales relatively short and somewhat pointed; lamella postvaginalis relatively narrow cephalad (broader on *P. ecitonorum*); lamella antevaginalis relatively smoothly curved (not irregular as usual on *P. ecitonorum*).

**TYPES.**— Holotype ♂: with the following labels: white, hand-printed - Catemaco. Ver. / Mex. VIII-58 / T. Escalante; white, printed and handprinted - *Genitalia* Vial / GTA - 2233; red, printed - HOLOTYPE / *Phanus confusus* / Austin.

*Paratypes* (4 ♀): MEXICO.— *Veracruz*: Presidio, Apr 1940, leg. C. C. Hoffmann (1 ♀), Aug 1939, leg. C. C. Hoffmann (1 ♀), Aug 1948, leg. T. Escalante (1 ♀), Serrania de Motorango, leg. Toro (1 ♀).

**DEPOSITION OF TYPES.**— The holotype and three paratypes are at the American Museum of Natural History and one paratype is at the Allyn Museum of Entomology.

**TYPE LOCALITY.**— MEXICO: Veracruz; Catemaco.

**ETYMOLOGY.**— The species is named after its confusion with other members of the *Phanus vitreus* complex.

**DISTRIBUTION AND PHENOLOGY.**— This species is known from eastern Mexico to El Salvador. Collection dates are for March, April, and June through December.

*Specific records*: MEXICO.— no location (no date). *Veracruz*: [types]. *Oaxaca*: Candelaria Loxicha (Mar, Jun, Jul, Aug, Sept, Oct, Nov). Soyolapanel Bajo, Mpio. Comaltepec, 200m (Jul). Chiltepec, Mpio. Chiltepec, 20m (Oct). Valle Nacional (Apr). *Chiapas*: Muste (Sep). Puerto Cate, Bochil, 1500m (Aug). Sta. Rosa Comitán (Jul). GUATEMALA.— Moca. Such., 3000', (Jun). Santa Rosa Guazacapan (Dec). EL SALVADOR.— Sta. Tecla, 900m (Jul, Aug).

**DIAGNOSIS AND DISCUSSION.**— Superficially, *P. confusus* is very similar to other taxa of the "vitreus" group. They were considered as *P. vitreus* by Miller (1965). I initially thought this was possibly a subspecies of *P. rilma* based upon the the long and broad wings and the genitalia but with the hindwing discal streak and discal macule conjoined. Sympatry with *P. rilma*, however, quickly dispatched that idea. I also considered that *P. confusus* may be a northern subspecies of *P. ecitonorum*. Superficial differences (larger size, broader hyaline markings) and somewhat different genitalia led me to consider this as a full species. Additional material may prove otherwise.

The species differs from *P. vitreus* by its larger size, broader markings and different male and female genitalia (see keys). The smaller subapical markings differentiates it at once from *P. australis* which has a very different distribution.

#### *Phanus albiapicalis* Austin, new sp.

Figs. 12, 13 (adults), 22 (♂ genitalia), 29 (♀ genitalia)

Unclassified specimen No. 1, figs. 10, 16 in Miller (1965)

**DESCRIPTION.**— MALE. Forewing length = 21.0mm (20.0-21.9, N = 5, types, holotype = 21.9). Forewing with costal fold; wings dark brown with extensive white hyaline spots and streaks as typical for genus; bifurcate portion of streak in forewing cell  $CuA_1-CuA_2$  shorter than undivided portion; streak in hindwing discal cell conjoined with discal spot in  $M_1-M_3$ ; nearly identical to *P. vitreus*, differs as follows: forewing narrow, noticeably produced (forewing broader with more rounded apex on *P. vitreus*), upper arm of bifurcated streak in forewing cell  $CuA_1-CuA_3$  very short, usually less than 1/4 length of lower arm

(longer, usually 1/3 or more of lower arm on *P. vitreus*); forewing with distinct white apex (dark brown or slightly shaded with gray on *P. vitreus*); macules in forewing cell  $CuA_2-2A$  usually slightly overlapping; hindwing submarginal macules relatively narrow and square (usually broader with more concave distal and convex proximal margins on *P. vitreus*); hindwing discal macule in cell  $Rs-M_1$  overlaps submarginal macule in  $M_1-M_3$  (these usually distinctly separated on *P. vitreus* or at most contiguous); hindwing narrow and more distinctly produced at vein 2A into a more-or-less distinct tail (hindwing broader, less produced, and blunter at 2A on *P. vitreus*).

*Genitalia*: general form of "vitreus" group with short uncus; similar to *P. vitreus* but differs as follows: valva broader, anterior edge broad before curving rather abruptly caudad (anterior edge narrower and sloping gradually caudad on *P. vitreus*), costa relatively short and deeply curved to ampulla (costa longer with a shallower curve on *P. vitreus*), division between well-developed tooth and lobe of ampulla deep and "V"-shaped (division less deep and often shallowly "U"-shaped on *P. vitreus*), division between lobe of ampulla and dorsal process of harpe narrow and deep (broader and less deep on *P. vitreus*), dorsal tooth of harpe rather long (shorter on *P. vitreus*), caudal portion of harpe as on *P. vitreus* or slightly longer.

**FEMALE.** Forewing length = 21.0, 21.3, 22.2mm. Similar to male; no costal fold; forewing lacks white apex. *Genitalia*: very similar to *P. vitreus*, lamella postvaginalis broader, caudal margin square with deep indentation; antrum often trifurcate caudally (more-or-less straight on *P. vitreus*).

**TYPES.**— Holotype ♂: with the following labels: white, printed and handprinted - Fortin de las Flores, / Ver., Mex. VIII-15-1967 / H. A. Freeman; white, printed and handprinted - *Genitalia* Vial / GTA - 2232; red, printed - HOLOTYPE / *Phanus albiapicalis* / Austin.

*Paratypes* (4 ♂, 5 ♀): MEXICO.— *Veracruz*: Presidio, Aug 1950, leg. T. Escalante (1 ♂), 1 May 43, leg. T. Escalante (1 ♀). Catemaco, Jan 53, leg. T. Escalante (1 ♂, 1 ♀), Jan 51, leg. T. Escalante (1 ♀). Jalapa, no other data (1 ♂, 1 ♀). Atoyac, May, leg. H.H.S (1 ♂). 1-2mi W Nanchital, sea level, savanna, 1 Feb 1969, leg. L. D. & J. Y. Miller (1 ♀).

**DEPOSITION OF TYPES.**— The holotype and six paratypes are deposited at the American Museum of Natural History, one paratype is at the Carnegie Museum of Natural History and two paratypes are at the Allyn Museum of Entomology.

**TYPE LOCALITY.**— MEXICO: Veracruz: Fortin de las Flores.

**ETYMOLOGY.**— The species is named after the white-tipped forewing of the male.

**DISTRIBUTION AND PHENOLOGY.**— To date, this apparently rare species is known from eastern and southern Mexico, Guatemala, El Salvador, Panama, and Peru. Collection dates are January through March, May, June, August, and November.

*Specific records*: MEXICO.— *Veracruz*: [types]. *Chiapas*: Arroyo Miranda, Rio Jacetun, 120m (May). EL SALVADOR.— Santa Tecla (June). San Salvador, Cerro San Jacinto (Nov). PANAMA.— *Canal Zone*: Barro Colorado Island (Feb, Mar). PERU.— *Loreto*: Iquitos (no date). There is also a male at the Carnegie Museum of Natural History from BOLIVIA.— *Santa Cruz*: Buenavista, 75km NW Santa Cruz, that appears to be of this species but the genitalia (slide #2194) were not available for examination.

Miller (1965) illustrated one: GUATEMALA.— Moca (Aug). Brown and Mielke (1967) noted a male from Cavalcante, 900m, Goias, Brazil, as having identical genitalia to those of Miller's (1965) "unclassified specimen No. 1" indicating that this species may also occur in Brazil.

**DIAGNOSIS AND DISCUSSION.**— Miller (1965) illustrated a

specimen and the genitalia of a *Phanus* (unclassified specimen No. 1) from Guatemala which he considered as "probably an aberrant *vitreus*." Steinhäuser (1975) said that among *P. vitreus* from El Salvador "some males have white scaling at apex of upper forewing." Additional material from Mexico and Central and South America indicates that these were of an unnamed species here described as *P. albiapicalis*. It is very similar to *P. vitreus* to which it was compared above. *Phanus albiapicalis* and *P. confusus* are the only members of the "*vitreus*" group known from eastern Mexico where populations were previously referred to *P. vitreus* (e.g., Miller 1965).

This species is also very similar to *P. ecitonorum* from which it differs by the distinctly white-tipped forewing of the male, the narrower and more produced wings, the male genitalia which differ from *P. ecitonorum* in much the same manner as do those of *P. vitreus* (unflanged uncus, more caudad anterior point on the costa of the valva, a more erect ampulla lobe, blunt dorsal process of the harpe), and the female genitalia which again differ from *P. ecitonorum* in much the same way as do those of *P. vitreus*.

Other members of the "*vitreus*" group, *P. confusus*, *P. rilma*, and *P. australis*, all lack the white-tipped forewing and have broader wings. *Phanus rilma* is larger than *P. albiapicalis* and has the streak in the hindwing discal cell not connected to the discal macule in  $M_1$ - $M_3$ . *Phanus confusus* is also larger. On both *P. rilma* and *P. confusus*, the male uncus is flanged and the lobe of the ampulla is less erect and the female genitalia are more robust and heavily sclerotized. Both sexes of *P. australis* are distinguished from *P. albiapicalis* by the very broad subapical macules and they have different distributions.

#### *Phanus rilma* Evans

Figs. 14, 15 (adults), 25 (♂ genitalia), 32 (♀ genitalia)

*Phanus rilma* Evans, 1952; figs. 6, 18, 23 in Miller (1965)

**DESCRIPTION.**— MALE. Forewing length of male = 22.9mm (22.1-23.9, N = 10) and female = 23.9mm (23.2-24.7, N = 8, both samples from Oaxaca, Mexico). This species is large with long and broad wings. The hyaline streak in the hindwing discal cell does not extend distally to the discal macule in cell  $M_1$ - $M_3$ , distinguishing it from the sympatric *P. vitreus* and *P. confusus*. Note that some specimens of other taxa of the "*vitreus*" group have the vein at the end of the hindwing discal cell narrowly dark-scaled and occasionally the hyaline streak is constricted slightly at this vein. On *P. rilma*, there is a distinct, relatively broad separation between the discal cell streak (which ends proximal to the end of the discal cell) and the discal macule, the proximal end of which actually is within the discal cell (and the vein is sometimes dark scaled). On the forewing, the upper arm of the bifurcate streak in cell  $CuA_1$ - $CuA_2$  is about 1/3 the length of the lower arm and on males, the apex is dusted with white (but not a sharply defined patch as on *P. albiapicalis*) and the hyaline streaks are relatively narrow. The hyaline macules on the hindwing, especially in the submargin of males are small, giving the impression of a dark insect. The discal macule in cell  $Rs-M_1$  is small or absent and there is no submarginal macule in  $CuA_2$ -2A.

**Genitalia:** The male valva is narrow (especially caudally), the tooth of the ampulla is usually distinctly serrated, the lobe of the ampulla is long and caudally directed (more so than on *P. ecitonorum*), and the harpe is very short caudally and has a sharply pointed dorsal projection.

The caudal end of the uncus is flanged as on *P. ecitonorum*.

**FEMALE.** The female genitalia are robust and rather heavily sclerotized as on *P. ecitonorum*, the papillae anales are broad and somewhat pointed caudally, the lamella antevaginalis extends laterally beyond the margins of the lamella postvaginalis, and the antrum is flared caudally and its sides are bowed outward at about the middle.

**DISTRIBUTION AND PHENOLOGY.**— This species is known from the Pacific slope of southwestern Mexico and adjacent Guatemala with dates of capture from July to December.

**Specific records:** MEXICO.— Guerrero: Agua del Obispo (Jul). Oaxaca: Candelaria Loxicha (Jul, Aug, Sep, Oct, Nov, Dec). GUATEMALA.— no location (no date). Miller (1965) listed additional material: MEXICO.— Guerrero: no location (no date).

**DISCUSSION.**— This species, described from Guerrero, Mexico (Evans, 1952), is known from a small area in western Mexico and Guatemala (Miller, 1965). The holotype is at The Natural History Museum, London (Evans, 1952; Miller, 1965). Additional material indicates this same distribution with no geographic variation. The separation of the hindwing discal macule from the discal cell streak will distinguish this species from all other "*vitreus*" group *Phanus* except for a new species from southern Central America and northern South America named and described below.

#### *Phanus grandis* Austin, new sp.

Figs. 16, 17 (adults), 24 (♂ genitalia), 31 (♀ genitalia)

Unclassified specimen No. 2, figs. 11, 24 in Miller (1965)

**DESCRIPTION.**— MALE. Forewing length = 23.5mm (N = 1, Costa Rica), 23.2mm (N = 1, Panama), 22.4mm (N = 1, Colombia). Forewing with costal fold, wings dark brown with extensive white hyaline spots and streaks as typical for genus; bifurcate portion of streak in forewing cell  $CuA_1$ - $CuA_2$  shorter than undivided portion; similar to *P. rilma*, differs as follows: upper arm of bifurcate streak in forewing cell  $CuA_1$ - $CuA_2$  shorter, 1/4 or less length of lower arm; hyaline streaks broader and macules much larger; submarginal macule present in cell  $CuA_2$ -2A on hindwing; streak in hindwing discal cell fully connected to discal macule in cell  $M_1$ - $M_3$ .

**Genitalia:** valva similar to *P. rilma* with serrated tooth on ampulla; lobe of ampulla shorter, more erect (more like *P. ecitonorum*); valva broader than on *P. rilma* especially at caudal end; caudal end of uncus widely and deeply flanged.

**FEMALE.** Forewing length = 25.6mm (24.8-26.2, N = 3, types, holotype = 26.2). Similar to male; no costal fold; streak in hindwing discal cell separate from or narrowly conjoined with discal spot in  $M_1$ - $M_3$ .

**Genitalia:** very different from those of *P. rilma*; lamella antevaginalis lobate and not extending cephalad as those of other *Phanus*.

**TYPES.**— Holotype ♀: with the following labels: white, black border, handprinted - Venezuela / Rancho IV. 29 / Grande 1973 / R. L. Zusi; white, printed and handprinted - Allyn Museum / Acc. 1978-26; white, printed and handprinted - Genit. Prep. / SRS - 1232; red, printed - HOLOTYPE / *Phanus grandis* / Austin.

**Paratypes** (2 ♀): PANAMA.— Panama: Cerro Campana, 23 May 1972, leg. H. L. King (1 ♀). COLOMBIA.— Valle del Cauca. Rio Calima, below dam, 1300m, 24 Jan 1976, leg. S. R. and L. M. Steinhäuser (1 ♀).

**DEPOSITION OF TYPES.**— The holotype and paratypes are at the Allyn Museum of Entomology.

**TYPE LOCALITY.**— VENEZUELA.— *Aragua*: Rancho Grande. I do not like to include specimens away from the type locality in

the type series. This was done here because of the paucity of material and the relative constancy in phenotype of the three examined females. Rancho Grande, Venezuela was chosen as the type locality since there is apparently another specimen from the same location, supposedly at the American Museum of Natural History (Miller, 1965) which I have not examined.

**ETYMOLOGY.**— This is the largest of the known *Phanus*; thus the name meaning large.

**DISTRIBUTION AND PHENOLOGY.**— This very rare species is known only from the three female type specimens, an additional female (not examined) illustrated by Miller (1965), and three males tentatively assigned to this species. These are from Costa Rica, Panama, Colombia, and Venezuela taken in January, April, May, and July.

Specific records: COSTA RICA.— *Heredia*: Selva Verde Lodge, near Chilamate (May). PANAMA.— [type]. *Chiriqui*: Chiriqui (no date). VENEZUELA.— [type]. COLOMBIA.— [type]. Muzo (no date). Miller (1965) illustrated a female: VENEZUELA.— *Aragua*: Rancho Grande (Jul).

**DIAGNOSIS AND DISCUSSION.**— Miller (1965) examined a female *P. grandis* from Venezuela which he considered a possibly unnamed taxon of *P. rilma*. I have seen three additional females (and three males probably of this species) and concur that this was unnamed. The superficial appearance of *P. grandis* (large size, separation on females of the hyaline streak in the hindwing discal cell from the discal macule in cell  $M_1$ - $M_3$ ) initially associate this phenotype with *P. rilma*. The configuration of the female genitalia, however, indicates that *P. grandis* is a species in itself.

Two nearly identical males at the Carnegie Museum of Natural History labeled "Chiriqui" [Panama] and "Muzo, Colombia" are tentatively associated with *P. grandis*. Another, from Costa Rica, is at the Milwaukee Public Museum. They are large and agree with the phenotype of the females except the discal cell streak on the hindwing is not separated from the discal macule. Their genitalia are different from any other *Phanus* yet seen. Until additional males are examined, particularly from localities with females, this relationship is tentative and the males were not included in the type series.

The broad hyaline markings and genitalia distinguish *P. grandis* from the remaining *Phanus* except *P. australis*. The latter is smaller, has the subapical hyaline macules about three times as broad as the submarginal macules, and the hyaline streak in the hindwing discal cell is connected with the discal macule. The female genitalia of *P. australis* are less robust and sclerotized than those of *P. grandis*.

#### *Phanus australis* L. D. Miller

Figs. 18, 19 (adults), 21 (♂ genitalia), 28 (♀ genitalia)

*Phanus australis* L. D. Miller, 1965; figs. 8, 9, 17, 22 in Miller (1965)

**DESCRIPTION.**— MALE. Forewing length of male = 20.8mm (19.7-21.8, N = 10) and female = 21.8mm (19.8-22.7, N = 10, both samples from Santa Catarina, Brazil). This species, described from Nova Teutonia, Sta. Catarina, Brazil. It differs from all *Phanus* by the subapical macules on the forewing; these are three times as broad as the two submarginal macules following. It is most similar to *P. vitreus* and *P. ecitonorum*. It further differs from *P. vitreus* and *P. ecitonorum* by

the considerable overlap on most individuals of the two macules in  $CuA_2$ -2A on the forewing. The basal streak and, often, the submarginal macule in hindwing cell  $CuA_2$ -2A present on *P. vitreus* are absent on *P. australis*. The male genitalia are very similar to those of *P. vitreus* except the lobe of the ampulla is generally narrower and not terminally bulbous and the caudal portion of the harpe is longer and triangular-shaped.

**FEMALE.** The female genitalia are nearly identical to those of *P. vitreus*; the papillae anales of *P. australis* appear slightly shorter. The male and female genitalia of *P. ecitonorum* differ from *P. australis* in the same manner as they do from *P. vitreus*. *Phanus grandis* has broad subapical macules but these are not quite as broad as on *P. australis* and the genitalia are different (Tables 1 and 2).

**DISTRIBUTION AND PHENOLOGY.**— This species occurs from Brazil and Bolivia south to northern Argentina with records scattered throughout the year.

Specific records: BOLIVIA.— *Santa Cruz*: Buenavista, 75km NW of Santa Cruz, 450m (no date). Prov. del Sara (Mar, May, Jun). *El Beni*: Rio Songo (no date). Coroico (no date). BRAZIL.— Annaburg (no date). *Paraná*: Fenix, 300m (Oct.). *Santa Catarina*: Massaranduba-Blumenau (no date). Hansa Humboldt (no date). New Breman (no date). S Bento do Sul, Rio Vermelho, 850m (Feb, Dec). Nova Teutonia, 300-500m (Jan, May, Jun, Dec). PARAGUAY.— Sapucay (no date). Miller (1965) gave the following additional records: BRAZIL.— *Espirito Santo*: no location (no date). *Paraná*: Castro (no date). Tibagy, 2400' (Mar). Guarapuava (Feb). *Paraíba*: Joao Pessoa (Jun, Oct). *São Paulo*: São Paulo (no date). PARAGUAY.— Sapucay (Dec). Caaguzu (Apr). ARGENTINA.— *Misiones*: Dos de Mayo, 300m (Mar). Brown and Mielke (1967) gave records for BRAZIL.— *Distrito Federal*: Sebradinho Woods, 1050-1150m (Feb). *Goiás*: Cavalcante, 900m (no date). Vianópolis, 1000m (Nov).

**DISCUSSION.**— The holotype male of *P. australis* is at the Carnegie Museum of Natural History and bears the following labels: white, printed and handprinted - June 3 / 1940; white with black margin, printed - Brazilien / Nova Teutonia / 27° 11' S. 52° 23' L. / Fritz Plaumann / [sideways along left margin] \_\_\_\_\_ 194\_ ; white, printed and handprinted - Carn. Mus. / Acc. 12432; red, handprinted - HOLOTYPE / *Phanus* / *australis* / Lee D. Miller; yellow, printed and handprinted - Slide No. M373 / gen. / Carn. Mus. Ent.

#### DISCUSSION

The review by Miller (1965) indicated that the "vitreus" group of *Phanus* was more diverse than the three species of which he was able to see sufficient material. His two "unclassified specimens" do represent new species and there were two additional species hidden among series of *Phanus vitreus*. This brings to seven the known "vitreus" group species and a total of nine are now known within the genus.

There appear to be two subgroups within the "vitreus" group (Tables, 1, 2). The first, including *P. vitreus*, *P. albiapicalis*, and *P. australis* is characterized by the square caudal end of the uncus, the rather erect lobe of the ampulla, medium to long caudal end of the harpe, blunt dorsal tooth to the harpe, narrow papillae anales, and a narrow lamella postvaginalis. One species (*P. vitreus*) is widespread over much of the Neotropics. Another (*P. albiapicalis*) overlaps the distribution of *P. vitreus* in Central America (and possibly further south if the Peru and Bolivia specimens are correct) and occurs northward into eastern Mexico. The third species (*P. australis*) is sympatric with *P. vitreus* in

TABLE 1. Summary of superficial characters of the *Phanus vitreus* group.

	<i>P. vitreus</i>	<i>P. albiapicalis</i>	<i>P. australis</i>	<i>P. ecitonorum</i>	<i>P. rilma</i>	<i>P. grandis</i>	<i>P. confusus</i>
<b>FOREWING</b>							
wing shape	short, broad	short, narrow	short, broad	short, broad	long, broad	long, broad	long, broad
male forewing apex	brown to indistinctly grayish	distinctly white	indistinctly grayish	often distinctly grayish	gray to whitish	gray	indistinctly grayish or not
upper arm streak in CuA <sub>1</sub> -CuA <sub>2</sub>	medium to long	very short	medium to long	medium	short	short	short
macules in CuA <sub>2</sub> -2A	separate to slight overlap	usually overlap	usually broad overlap	separate on male, contiguous to slight overlap on female	separate, rarely contiguous	separate to contiguous	separate
subapical macules	narrow	narrow	broad	narrow	narrow	narrow	narrow
<b>HINDWING</b>							
relation of discal macule in Rs-M <sub>1</sub> and submarginal macule in M <sub>1</sub> -M <sub>3</sub>	separate to slight overlap	usually overlap	separate to contiguous	separate to contiguous	widely separate	contiguous to slight overlap	separate to slight overlap
discal cell streak and discal macule in M <sub>1</sub> -M <sub>3</sub>	conjoined	conjoined	conjoined	conjoined	separate	conjoined on male, mostly separate on female	conjoined
basal macule in CuA-2A	usually present	absent	absent	absent	absent	absent	absent
size anterior submarginal macules	large	large	large	large	small	medium to large	large
submarginal macule in CuA <sub>2</sub> -2A	small to medium	absent to minute	absent to minute	absent to minute	absent to medium	absent to minute	absent to
<b>DISTRIBUTION</b>	S Mexico to S Brazil	E Mexico to Panama, Peru(?), Brazil (?), Bolivia (?)	Bolivia to Argentina	Costa Rica to S Brazil	SW Mexico, Guatemala	Costa Rica, Panama, Colombia, Venezuela	E Mexico to El Salvador

TABLE 2. Summary of characters of the male and female genitalia of the *Phanus vitreus* group.

	<i>P. vitreus</i> (figs. 20, 27)	<i>P. albiapicalis</i> (figs. 22, 29)	<i>P. australis</i> (figs. (21, 28)	<i>P. ecitonorum</i> (figs. 26, 33)	<i>P. rilma</i> (figs. 25, 32)	<i>P. grandis</i> (figs. 24, 31)	<i>P. confusus</i> (figs. 23, 30)
<b>MALE</b>							
caudal end of uncus	square	square	square	flanged	flanged	flanged	flanged
costal point	caudad	caudad	caudad	cephalad	caudad	cephalad	cephalad
ampulla tooth	weakly to moderately developed, weakly serrate	well developed, weakly serrate	weakly developed, weakly serrate	well developed, weakly serrate	well developed, moderately serrate	moderately developed, moderately serrate	moderately developed, weakly to moderately serrate
ampulla lobe orientation	dorsad	dorsad	dorsad	dorso-caudad	dorso-caudad	dorso-caudad	dorso-caudad
ampulla lobe shape	moderately bulbous	moderately bulbous	tooth-like to narrowly bulbous	broadly bulbous	broadly bulbous	broadly bulbous	broadly bulbous
ampulla lobe length	short	short	short	short	long	short	long
harpe length	medium to long	medium to long	long	short	short	short	very short
harpe breadth	broad	broad	broad	broad	narrow	broad	narrow
harpe tooth	blunt	blunt	blunt	pointed	pointed	pointed	pointed
<b>FEMALE</b>							
sclerotization	moderate	moderate	moderate	strong	strong	strong	strong
papillae anales	long, narrow	long, narrow	short, narrow	long, broad	long, broad	long, broad	short, broad
lamella postvaginalis	narrow	narrow	narrow	broad	broad	broad	broad
lamella antevaginalis	narrow	narrow	narrow	broad	broad	broad	broad



TABLE 3. Known sympatries of species of the *Phanus vitreus* group.

LOCALITY	SPECIES
MEXICO: Veracruz; Presidio	<i>P. albiapicalis</i> , <i>P. confusus</i>
MEXICO: Veracruz; Catemaco	<i>P. albiapicalis</i> , <i>P. confusus</i>
MEXICO: Oaxaca; Candelaria	<i>P. vitreus</i> , <i>P. rilma</i> , <i>P. confusus</i>
MEXICO: Chiapas; Santa Rosa Comitán	<i>P. vitreus</i> , <i>P. confusus</i>
EL SALVADOR: Sta. Tecla	<i>P. vitreus</i> , <i>P. albiapicalis</i> , <i>P. confusus</i>
COSTA RICA: Cartago; Turrialba	<i>P. vitreus</i> , <i>P. ecitonorum</i>
COSTA RICA: Puntarenas; Villa Neilly	<i>P. vitreus</i> , <i>P. ecitonorum</i>
PANAMA: Chiriqui	<i>P. ecitonorum</i> , <i>P. grandis</i>
PANAMA: Cerro Campana	<i>P. ecitonorum</i> , <i>P. grandis</i>
PANAMA: Canal Zone; Barro Colorado Is.	<i>P. vitreus</i> , <i>P. albiapicalis</i> , <i>P. ecitonorum</i>
FRENCH GUIANA: St. (Port) Laurent	<i>P. vitreus</i> , <i>P. ecitonorum</i>
COLOMBIA: Muzo	<i>P. vitreus</i> , <i>P. grandis</i>
PERU: Iquitos	<i>P. vitreus</i> , <i>P. albiapicalis</i> , <i>P. ecitonorum</i>
BOLIVIA: Province del Sara	<i>P. vitreus</i> , <i>P. australis</i>
BOLIVIA: Rio Songo	<i>P. vitreus</i> , <i>P. ecitonorum</i> , <i>P. australis</i>
BOLIVIA: Coroico	<i>P. vitreus</i> , <i>P. australis</i>
BOLIVIA: Buenavista	<i>P. vitreus</i> , <i>P. australis</i> , <i>P. albiapicalis</i> (?)
BRAZIL: Distrito Federal; Sobradinho Woods	<i>P. "vitreus"</i> , <i>P. australis</i> <sup>1</sup>
BRAZIL: Espirito Santo	<i>P. "vitreus"</i> , <i>P. australis</i> <sup>2</sup>
BRAZIL: Goias; Cavalcante	<i>P. "vitreus"</i> ( <i>P. albiapicalis</i> ?), <i>P. australis</i> <sup>1</sup>
BRAZIL: Para; Obidos	<i>P. vitreus</i> , <i>P. ecitonorum</i>
BRAZIL: Para; Benevides	<i>P. vitreus</i> , <i>P. ecitonorum</i>
BRAZIL: Rondônia; Cacaullandia	<i>P. vitreus</i> , <i>P. ecitonorum</i>

1. from Brown and Mielke (1967)

2. from Miller (1965)

Bolivia and probably southern Brazil and occurs still further south to Argentina.

The second subgroup includes *P. ecitonorum*, *P. rilma*, *P. grandis*, and *P. confusus*. These are characterized by the flanged caudal end of the uncus, more caudal orientation of the lobe of the ampulla, a shorter caudal end of the harpe, a more pointed dorsal tooth on the harpe, broad papillae anales, and a broad lamella postvaginalis. Three of the species (except *P. ecitonorum*) have long and broad wings. The most widespread, *P. ecitonorum*, appears to be sympatric with *P. vitreus* over most of its distribution; the latter species occurs further north into northern Central America and southern Mexico. *Phanus ecitonorum* is also sympatric with *P. albiapicalis*, *P. australis*, and *P. grandis*; these latter have small known distributions. One (*P. rilma*) occurs on the west slope of southern Mexico and in adjacent Guatemala. The second (*P. confusus*) occurs in southern and eastern Mexico south to El Salvador and is sympatric in places with *P. albiapicalis*, *P. vitreus*, and/or *P. rilma*. The last species (*P. grandis*) is found in a small area from Costa Rica to Colombia and Venezuela where it is sympatric with *P. vitreus* and *P. ecitonorum* and potentially sympatric with *P. albiapicalis*.

Thus, sympatries between species of the "vitreus" group are extensive and as many as three are known to occur together (Tables 1, 3). Each of the first subgroup species are sympatric

with another member of the group in at least one location (all three appear to be present at Buenavista, Bolivia); *P. vitreus* occurs with each of the six species of the "vitreus" group at one or more locations (Table 3). Three of the four species of the second subgroup have small known distributions and the sympatries among its taxa are correspondingly fewer. The only known sympatries are of *P. ecitonorum* and *P. grandis* in Panama and of *P. rilma* and *P. confusus* in Oaxaca, Mexico. This begs the question of conspecificity among the remaining combinations. Differences in genitalia and superficial characters indicate that *P. rilma* is specifically distinct from *P. ecitonorum* and *P. grandis* and that *P. grandis* is distinct from *P. confusus*. Differences in genitalia also suggest the specific distinctness of *P. ecitonorum* and *P. confusus* although it was suggested in the discussion of the latter that *P. confusus* may prove to be a northern subspecies of *P. ecitonorum*. Over much of tropical America, there are usually two species at any locality, *P. vitreus* and *P. ecitonorum*. These also occur in many of the places within the distributions of more restricted taxa. Often it is necessary to dissect genitalia for definite determination. Female genitalia are often very similar and some specimens need to be compared in series and associated with appropriate males by subtle superficial characters. The following keys, along with Tables 1 and 2 and the figures, will allow identification.

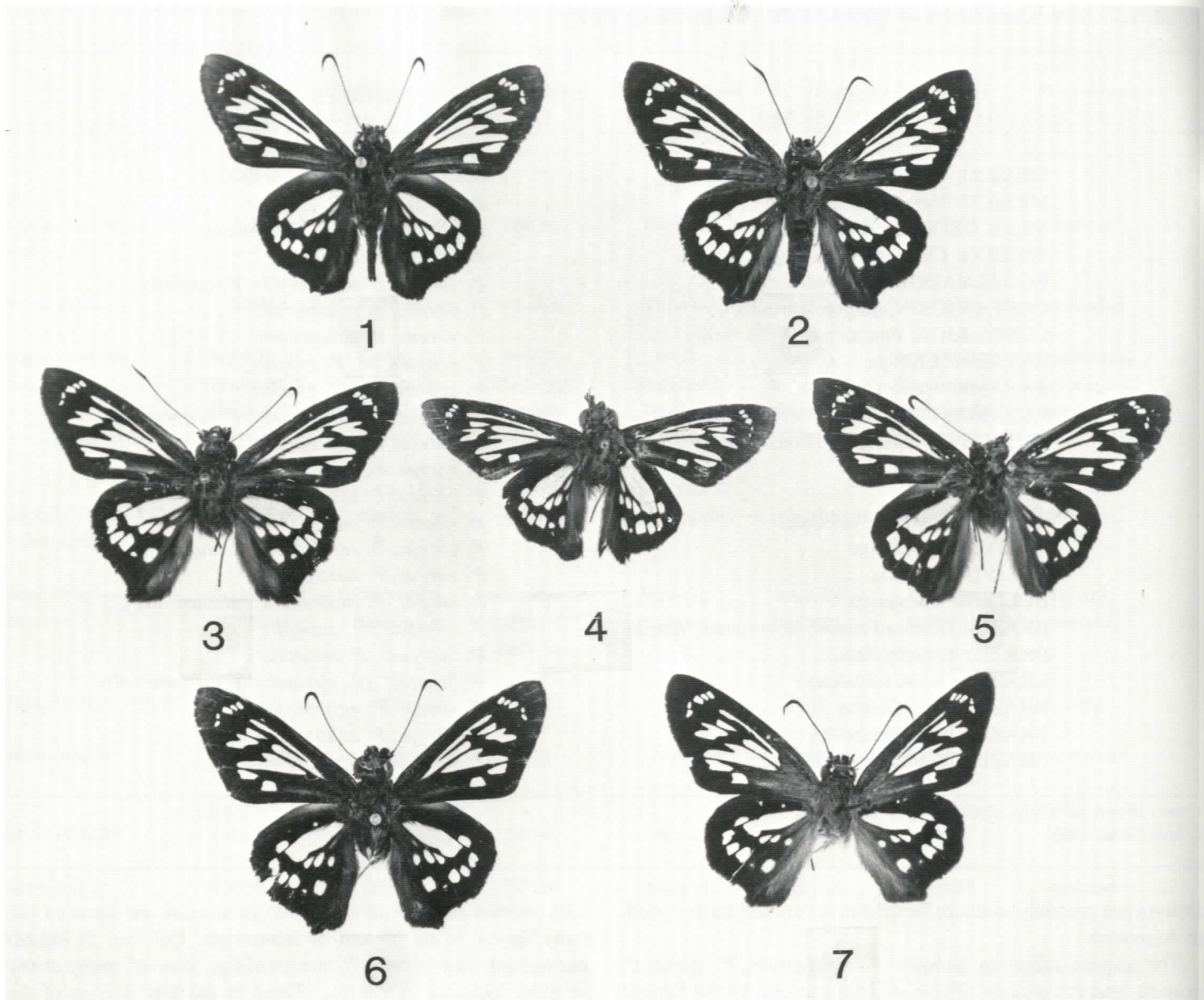
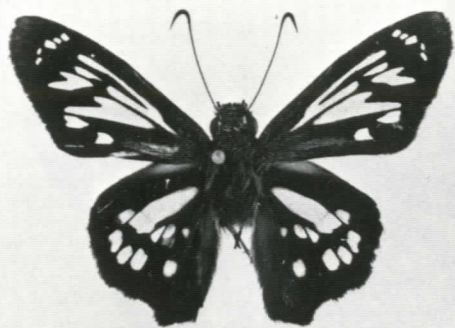


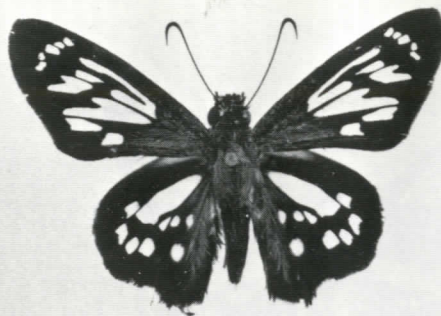
Fig. 1-7.— 1. *Phanus vitreus* - ♂, dorsal surface, BRAZIL: Rondônia. 2. Same, ♀. 3. Neotype ♂, *Papilio vitreus* - dorsal surface, data in text. 4. Neotype ♂, *Papilio momus* - dorsal surface, data in text. 5. Holotype ♂, *Phanus godmani* - dorsal surface, data in text. 6. *Phanus vitreus* - Central America phenotype, ♂, dorsal surface, COSTA RICA: Limon. 7. *Phanus vitreus* - Central America phenotype, ♀, dorsal surface, PANAMA: Barro Colorado.

Fig. 8-11.— 8. Holotype ♂, *Phanus ecitonorum* - dorsal surface, data in text. 9. Same, ♀, dorsal surface, BRAZIL: Rondônia. 10. Holotype ♂, *Phanus confusis* - dorsal surface, data in text. 11. Same, ♀, dorsal surface, MEXICO: Veracruz.

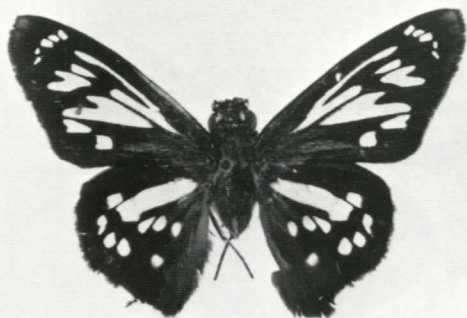
Fig. 12-15.— 12. Holotype ♂, *Phanus albiapicalis* - dorsal surface, data in text. 13. Same, ♀, dorsal surface, MEXICO: Veracruz. 14. *Phanus rilma* - ♂, dorsal surface, MEXICO: Oaxaca. 15. Same, ♀, dorsal surface, MEXICO: Oaxaca.



8



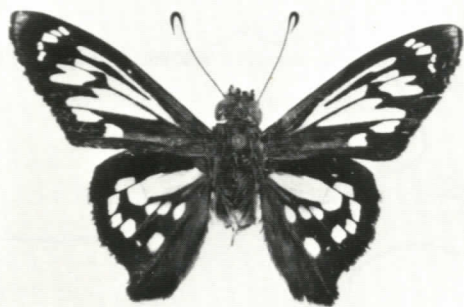
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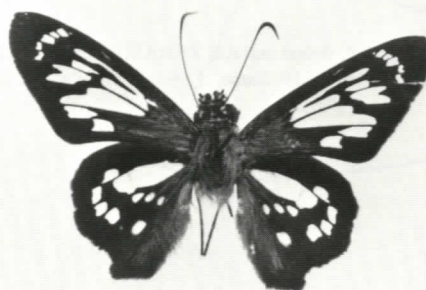
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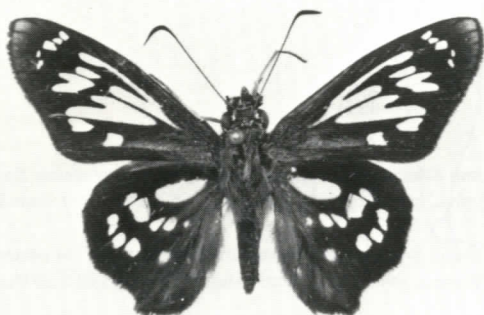
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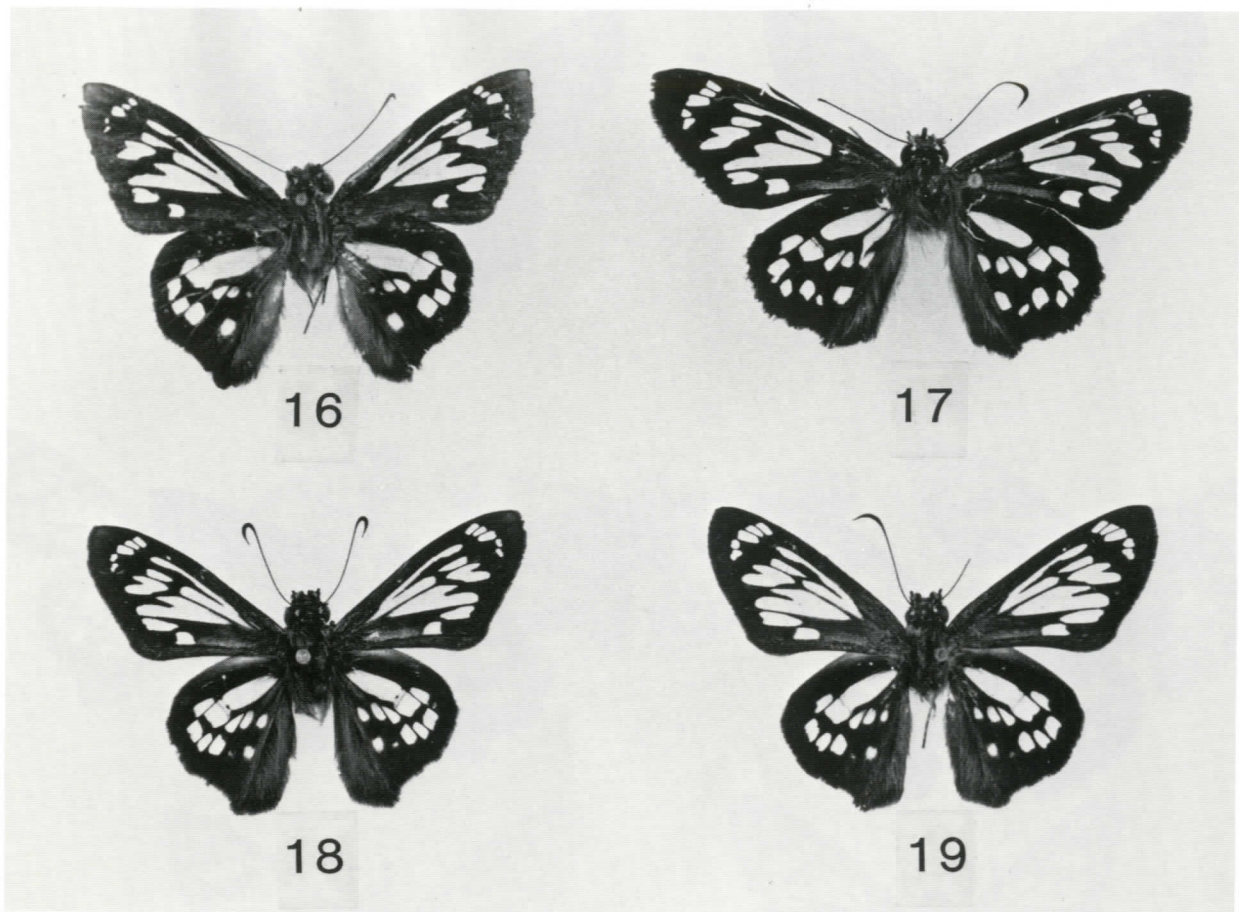
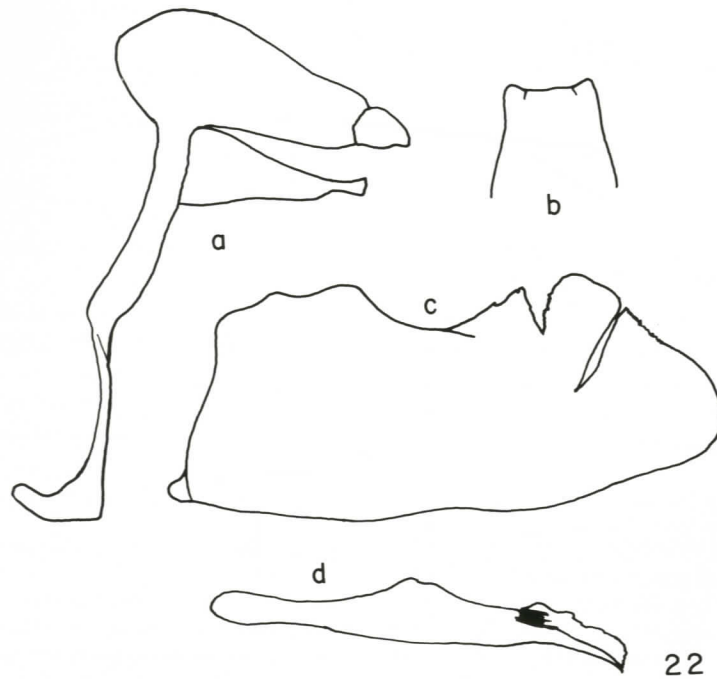
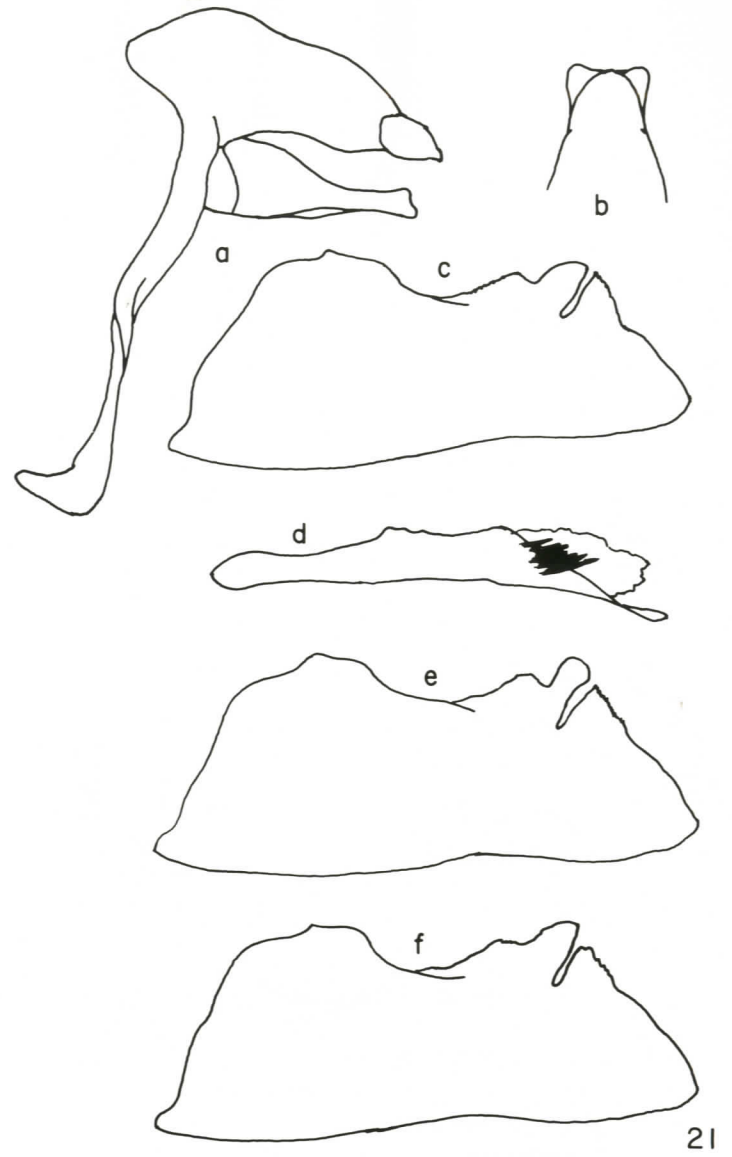
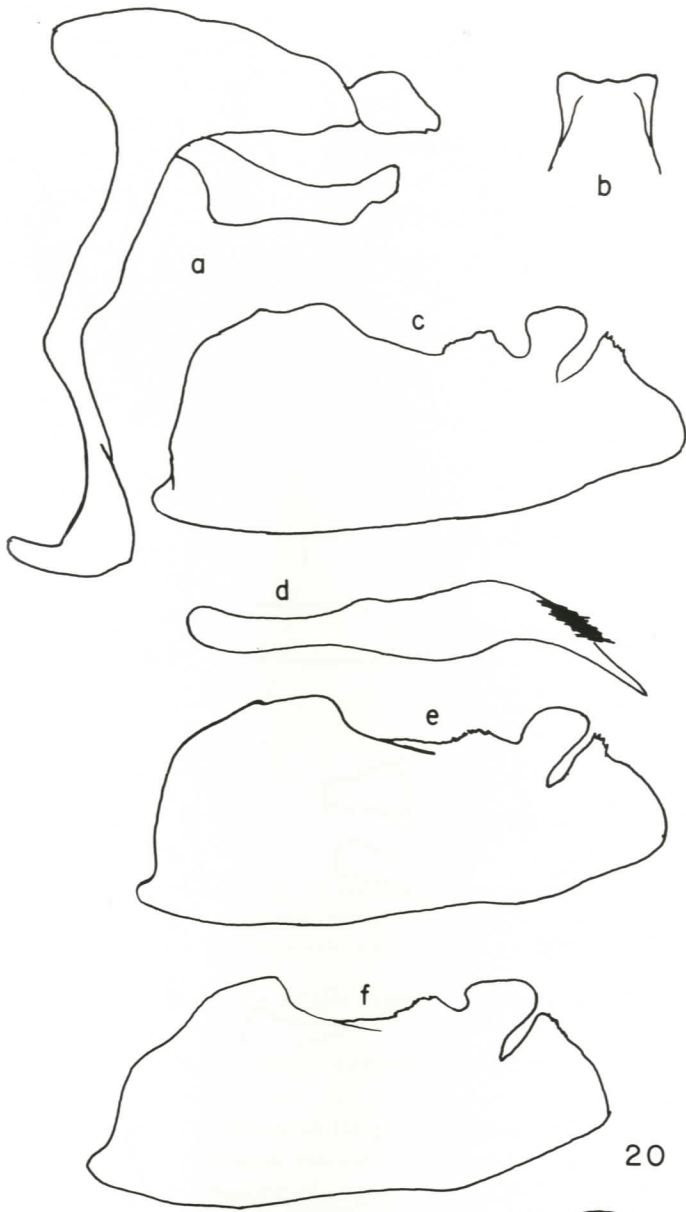


Fig. 16-19.— 16. *Phanus grandis* - ♂, dorsal surface, PANAMA: Chiriqui. 17. Holotype ♀, *Phanus grandis* - dorsal surface, data in text. 18. *Phanus australis* - ♂, dorsal surface, BRAZIL: Santa Catarina. 19. Same, ♀, dorsal surface, BRAZIL: Santa Catarina.

Fig. 20. *Phanus vitreus* - ♂ genitalia, (a-d) BRAZIL: Rondônia. (a) tegumen, gnathos, uncus, and associated structures, lateral view; (b) posterior tip of uncus, dorsal view; (c) left valva, lateral-exterior view; (d) penis, lateral view; (e) BRAZIL: Rondônia, left valva, lateral-exterior view; (f) COSTA RICA: Limon Prov., left valva, lateral-exterior view.

Fig. 21. *Phanus australis* - ♂ genitalia, (a-d) BRAZIL: Santa Catarina. (a) tegumen, gnathos, uncus, and associated structures, lateral view; (b) posterior tip of uncus, dorsal view; (c) left valva, lateral-exterior view; (d) penis, lateral view; (e) BRAZIL: Santa Catarina, left valva, lateral-exterior view; (f) BOLIVIA: Buenavista, left valva, lateral-exterior view.

Fig. 22. *Phanus albiapicalis* - ♂ genitalia, MEXICO: Veracruz. (a) tegumen, gnathos, uncus, and associated structures, lateral view; (b) posterior tip of uncus, dorsal view; (c) left valva, lateral-exterior view; (d) penis, lateral view.



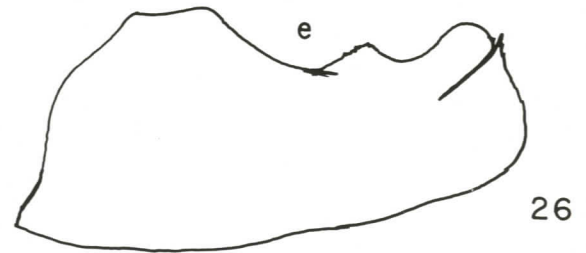
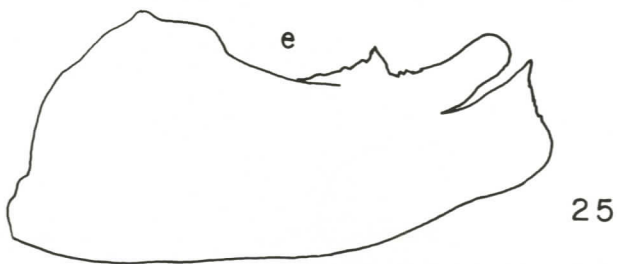
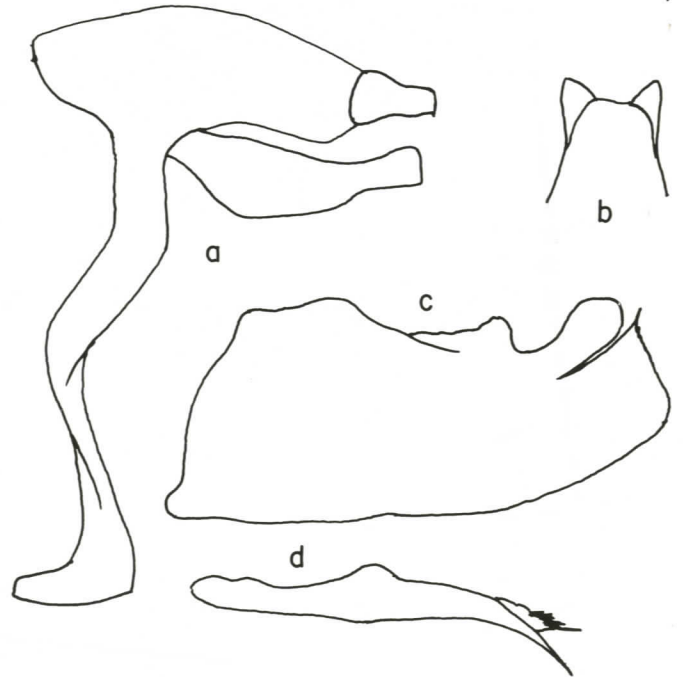
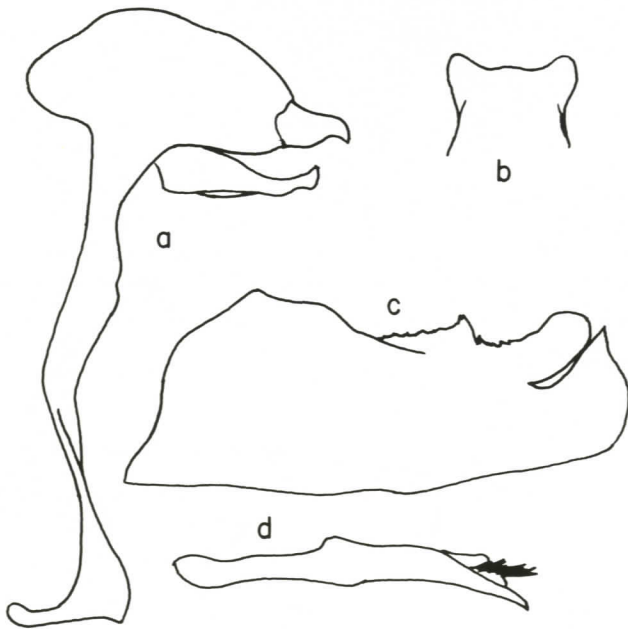
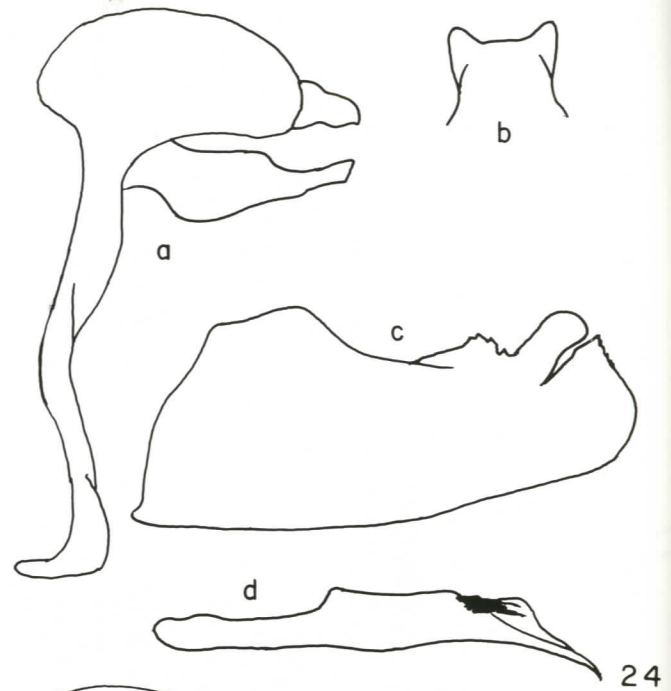
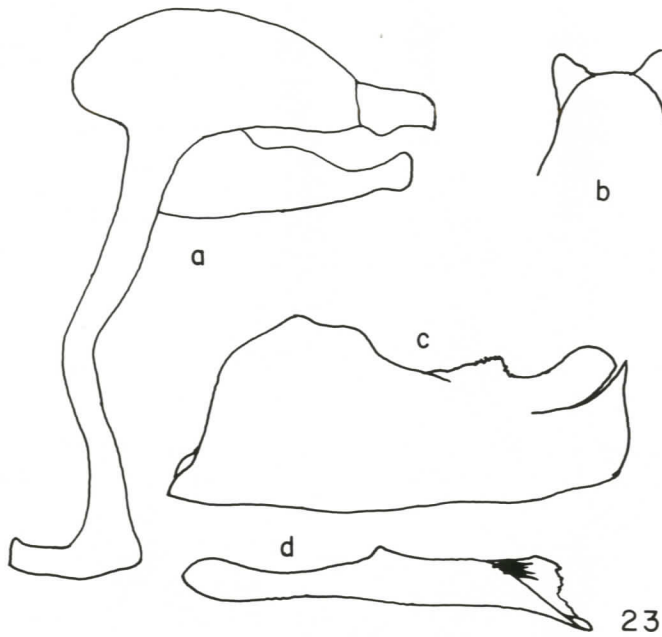


Fig. 23. *Phanus confusus* - ♂ genitalia, MEXICO: Oaxaca. (a) tegumen, gnathos, uncus, and associated structures, lateral view; (b) posterior tip of uncus, dorsal view; (c) left valva, lateral-exterior view; (d) penis, lateral view.

Fig. 24. *Phanus grandis* - ♂ genitalia, PANAMA: Chiriqui. (a) tegumen, gnathos, uncus, and associated structures, lateral view; (b) posterior tip of uncus, dorsal view; (c) left valva, lateral-exterior view; (d) penis, lateral view.

Fig. 25. *Phanus rilma* - ♂ genitalia, (a-d) MEXICO: Oaxaca. (a) tegumen, gnathos, uncus, and associated structures, lateral view; (b) posterior tip of uncus, dorsal view; (c) left valva, lateral-exterior view; (d) penis, lateral view; (e) MEXICO: Oaxaca, left valva, lateral-exterior view.

Fig. 26. *Phanus ecitonorum* - ♂ genitalia, (a-d) BRAZIL: Rondônia. (a) tegumen, gnathos, uncus, and associated structures, lateral view; (b) posterior tip of uncus, dorsal view; (c) left valva, lateral-exterior view; (d) penis, lateral view; (e) BRAZIL: Rondônia, left valva, lateral-exterior view.

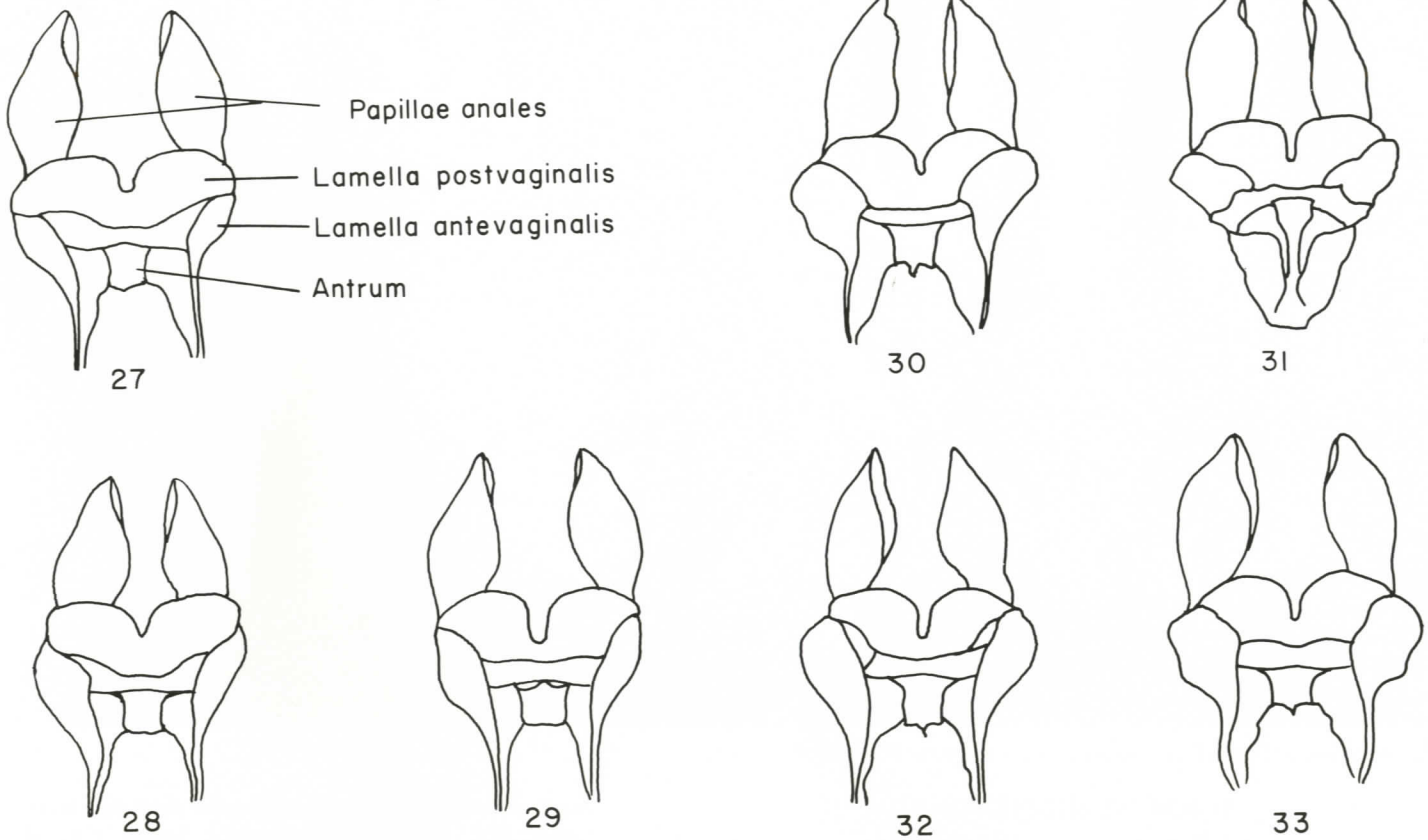


Fig. 27-33.— 27. *Phanus vitreus* - ♀ genitalia, BRAZIL: Rondônia. 28. *Phanus australis* - ♀ genitalia, BRAZIL: Santa Catarina. 29. *Phanus albiapicalis* - ♀ genitalia, MEXICO: Veracruz. 30. *Phanus confusus* - ♀ genitalia, MEXICO: Chiapas. 31. *Phanus grandis* - ♀ genitalia, holotype, data in text. 32. *Phanus rilma* - ♀ genitalia, MEXICO: Oaxaca. 33. *Phanus ecitonorum* - ♀ genitalia, BRAZIL: Rondônia.

**Key to the males of the "vitreus" group of *Phanus*<sup>1</sup>**

1. Posterior end of uncus more-or-less square in dorsal view ..... 2  
 Posterior end of uncus flanged in dorsal view ..... 4
2. Subapical forewing macules three times as broad as submarginal macules, lobe of ampulla narrow and often tooth-like; southern Brazil and Bolivia to Argentina ... *P. australis*  
 Subapical macules much narrower, lobe of ampulla broad and bulbous; widespread ..... 3
3. Wings narrow, forewing apex distinctly white ..... *P. albiapicalis*  
 Wings broader, forewing apex dark ..... *P. vitreus*
4. Hyaline streak in hindwing discal cell separate from discal macule in cell M<sub>1</sub>-M<sub>3</sub>, submarginal macules of hindwing usually small ..... *P. rilma*  
 Hyaline streak in hindwing discal cell conjoined with discal macule in cell M<sub>1</sub>-M<sub>3</sub>, submarginal macules of hindwing large ..... 5
5. Eastern Mexico and northern Central America *P. confusus*  
 Southern Central America and South America ..... 6
6. Smaller, tooth of ampulla not strongly serrated; southern Central America and South America ..... *P. ecitonorum*  
 Larger, tooth of ampulla strongly serrated; Costa Rica to northern South America ..... *P. grandis*

**Key to the females of the "vitreus" group of *Phanus***

1. Genitalia not heavily sclerotized, lamella antevaginalis narrow, papillae anales narrow ..... 2  
 Genitalia heavily sclerotized, lamella antevaginalis broad, papillae anales broad ..... 4
2. Subapical forewing macules three times as broad as submarginal macules; southern Brazil and Bolivia to Argentina ..... *P. australis*  
 Subapical macules much narrower; widespread ..... 3
3. Wings broad, posterior margin of antrum relatively straight ..... *P. vitreus*  
 Wings narrower, posterior margin of antrum often trifurcate ..... *P. albiapicalis*
4. Hyaline streak in hindwing discal cell completely conjoined with discal macule in cell M<sub>1</sub>-M<sub>3</sub> ..... 5  
 Hyaline streak in hindwing discal cell separate from or narrowly connected to discal macule in cell M<sub>1</sub>-M<sub>3</sub> ... 6
5. Larger; eastern Mexico and northern Central America ... *P. confusus*  
 Smaller; southern Central America and South America ... *P. ecitonorum*
6. Submarginal macules on hindwing usually small; southwestern Mexico and western Guatemala ..... *P. rilma*  
 Submarginal macules on hindwing large; Costa Rica to northern South America ..... *P. grandis*

1. The characters separating *P. grandis* from *P. ecitonorum* and *P. rilma* are tentative pending the examination of additional males of *P. grandis*.



Fig. 34. *Phanus ecitonorum* - ♂ at paper lure at type locality (Photo by R. J. Borth).

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