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SYSTEMATICS AND ZOOGEOGRAPHY OF THE GENUS *Phanus* (Hesperiidae)

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Examination of the Carnegie Museum series of *Phanus* and attempts to key them according to Evans (1952) showed that there was a new species and that another appeared to have two subspecies. Further, there were some interesting distributional patterns suggested, but, as is so often the case, more material was needed. Accordingly, I have gathered the bulk of the *Phanus* in collections for study, and all records are followed by initials representing these assemblages, as follows: AMNH (American Museum of Natural History), BM (British Museum (Natural History)), CAS (California Academy of Sciences), CDM (collection of C. Don MacNeill), CM (Carnegie Museum, including the collections formerly belonging to the Academy of Natural Sciences of Philadelphia and Lee D. Miller), and USNM (U. S. National Museum).

I would like to here express my appreciation to the following for their help and encouragement in this study: Mr. Harry K. lench and Dr. R. M. Fox, Carnegie Museum; Dr. F. H. Rindge, American Museum of Natural History; Messrs. N. D. Riley and T. G. Howarth, British Museum (Natural History); Dr. C. Don MacNeill, California Academy of Sciences; and Dr. W. D. Field, U. S. National Museum. Particular thanks go to Mr. Clench for his help in preparation of the maps. Without the help and cooperation of these people this project would have been impossible. This research was supported in part by National Science Foundation grant GB-2928.

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Genus **Phanus** Hubner, [1819]

Phanus Hübner, [1819]. Verz. bek. Schmett., (4): 114. Type species: *Papilio vitreaus* Stoll, by monotypy.

Papilio vitreus Stoll, by monotypy.

Phanus is a homogeneous assemblage of skippers containing five species, three of which occur generally throughout the Neotropics, one which seems to be restricted to Mexico and northern Central America and the fifth is confined to southern Brazil, Paraguay, northern Argentina and eastern Bolivia. The sexes are similar, so the key which follows later will serve to characterize both males and females.

Evans (1952: 6) places this genus in Group B (the *Augiades* group) which he characterizes (1952: 1) as, "Third segments of palpi divergent. Wings erect in repose." The first of these statements is true for nine of the eleven included genera, *Phocides* Hübner and *Hypocrypothrix* Watson having convergent palpi, but the second statement is not universally true, if at all. I have seen members of four genera of this group in the field, including *Phanus*, and all have invariably been perched with their wings held flat.

The palpi are typical of the group as defined by Evans (1952: 5). The antennae are about half as long as the forewing costa, the club occupying the terminal third. The club is gently thickened and arcuate about the middle, tapering to a long, slender apiculus. The cell of the forewing is very long, almost three-fourths the length of the wing, and the cell of the hindwing is about half as long as the wing. The mid-and hind-tabiae each bear one pair of terminal spines.

KEY TO THE SPECIES OF *PHANUS* HÜBNER

1. Distal arms of bifurcated streak in space C_1-Cu_2 of forewing longer than undivided proximal part ..... 2.
   Distal arms of bifurcated streak in space C_1-Cu_2 of forewing much shorter than undivided proximal part ..... 4.
2. Upper arm of bifurcated streak in space Cu_1-Cu_2 of forewing shorter than lower arm; hindwing cell streak completely separate (often widely) from discal spot in space M_1-M_3 (rarely slightly connected in some females); valva with long terminal spine projecting posteriad ..... *P. obscurior* ..... 3.
   Upper arm of bifurcated streak in space Cu_1-Cu_2 of forewing as long as lower arm; hindwing cell streak partially contiguous with, or only narrowly separated from, extradiscal spot in space M_1-M_3; valva with dorsal distal lobe, no spine *P. marshallii* (Kirby)
3. Hindwing cell streak widely separated from discal spot in M_1-M_3; submarginal spots in M_1-M_2 and M_2-M_3 are well sep-

arated ..... *P. o. obscurior* Kaye
Hindwing cell streak narrowly separated from discal spot in space M_1-M_3 (slightly connected in some females); submarginal spots in M_1-M_2 and M_2-M_3 contiguous .... *P. obscurior prestoni*, new subspecies.

4. Hindwing cell streak widely separated from discal spot in space M_1-M_3; valva with strongly toothed dorsal distal lobe and prominent distal spine diverted dorsad ..... *P. rilma* Evans
Hindwing cell streak contiguous with discal spot in space M_1-M_3; valva without terminal spine ..... 5.
5. Forewing subapical spots three times as long as submarginal spots in spaces M_1-M_2 and M_2-M_3; dorsal distal lobe of valva angular and strongly toothed basad ..... *P. australis*, new species
Forewing subapical spots not much larger than submarginal spots in spaces M_1-M_2 and M_2-M_3; dorsal distal lobe of valva rounded and not strongly toothed ..... *P. vitreus* Stollo

Phanus obscurior Kaye

This species, perhaps the most distinctive of the genus, is characterized by the following: the distal arms of the bifurcated streak in forewing space Cu_1-Cu_2 are longer than the proximal united part, but the upper arm is shorter than the lower one; the hindwing cell streak is separate from the discal spot in space M_1-M_3, except in some females of *o. prestoni*, whereas in all species but *rilma* these spots are more or less coalesced; and the genitalia of both sexes are distinctive. The male genitalia are characterized by the posteriad diversion of the dorsal distal tooth of the valva, and the uncus is greater than one-third the length of the tegumen, a characteristic shared with *marshallii*. The vaginal plate is stouter in this species than in others, as may be seen in the plate.

Two subspecies are recognized in this species; *obscurior* is the only *Phanus* that is considered to have geographic isolates.

Phanus obscurior obscurior Kaye, 1924

Figs. 1 ♂, 2 ♀, 13 valva

Phanus obscurior Kaye, 1924. Trans. Ent. Soc. London, 72: 416 (Trinidad).

The nominate subspecies occurs in Central America from at least Nicaragua south to Colombia and Venezuela and in Trinidad. It is characterized by the greater restriction of the hyaline spots, particularly those of the hindwing, as described in the discussion of the next subspecies.

Except in Trinidad nominate *obscurior* does not appear to be common. I have seen seventy specimens, forty-four males and twenty-six females, from the following localities:

NICARAGUA: "Nicaragua" (BM); Chontales (BM); San Ramon, R. Wanks (BM). COSTA RICA: "Costa Rica" (BM); San Jose (CM, USNM, BM); Cartago (CM). PANAMA: Chiriqui (BM); Veraguas (BM); Bugaba (CM); Barro Colorado Isl., ii-iii (CM, AMNH). COLOMBIA: "Interior of Colombia" (BM). VENEZUELA: "Venezuela" (BM); Puerto (Porto) Cabello (CM, BM); Las Quiguas, Esteban Valley, xi-iii (BM). TRINIDAD: "Trinidad" (BM, including type); Fondes-Amandes Road (AMNH); St. Ann's Valley (BM); Mamore, iii (BM); Maraval, i-ii, ix-xii (BM); Northern Mtns., i, xii (BM); St. George's, xi (BM); Port of Spain (BM); Broadway (BM); Caparo (BM). NO DATA: (USNM, BM).

Phanus obscurior prestoni, new supspecies

Figs. 4 ♂, 5 ♀, 12 ♂, 19 ♀ gen.

This subspecies differs from nominate *obscurior* in the more extensive hyaline markings on all wings of both sexes. The lower member of the bifurcate forewing cell streak, frequently broken in *o. obscurior,* is always entire in the present subspecies. The hindwing cell streak is elongated in *o. prestoni* toward the discal spot in M_1-M_3 and occasionally coalesced with it in some females. The submarginal spots in M_1-M_2 and M_3-M_2 of the hindwing, separate in the nominate subspecies, are coalesced in the present one, although they are definitely two spots, not a single one as in *vitreus.* As in *o. obscurior* the females have more extensive hyaline markings than do the males.

Length of forewing of holotype male 22.0 mm. ; the male paratypes have forewing length between 21.5 and 23.5 mm., averaging 22.5 mm. ; and the female paratypes range between 23.0 and 26.0 mm., averaging 24.1 mm.

The male genitalia of *prestoni* differ in one significant respect from those of the nominate subspecies: the dorsal distal tooth does not extend posteriad beyond the posterior margin of the valva, whereas in *o. obscurior* the tooth is quite long, extending well beyond the distal margin. The female genitalia are as those of the nominate subspecies.

Described from seventeen specimens, nine males and eight females, from the upper Amazon of Brazil.

Holotype male: Nova Olinda, Rio Purus, Brazil, June, 1922 (S. M. Klages); ♂ genitalic slide no. M-375 (Lee D. Miller).

Paratypes (eight males and eight females), as follows: 1 ♂ Manacapuru, Brazil; 3 ♂ Manicore, Rio Madeira, Brazil; 1 ♂ Manicore, Rio Madeira, Brazil, xi; 1 ♂ San Gabriel, Rio Negro, Brazil; 1 ♂ Rio Tapajos, Conceicaon, Brazil, ix-1931; 1 ♂ Benjamin Constant, Brazil, Borders of Peru-Colombia, 24-ii-[19]42 (F. M. Bailey); 2 ♀ Manaus, [Brazil]; 1 ♀ Solimoes, 420 mi. above Manaus, Brazil, 16-ix-1961 (F. W. Preston), ♀ genitalic slide no. M-390 (Lee D. Miller); 1 ♀ "Rio S., Brazil"; 3 ♀ Para, [Brazil] (A. Miles Moss); 1 ♀ Utinga, Belem de Para, Brazil, viii-12-[19]58.

The holotype male and four male and three female paratypes are deposited in Carnegie Museum (CM Ent. Type Series No. 508). Two male paratypes are deposited in the American Museum of Natural History. Two male and four female paratypes are deposited in the British Museum (Natural History). One female paratype is deposited in the collection of C. Don MacNeill.

It is with great pleasure that I name this subspecies in honor of Dr. F. W. Preston of Butler, Pa. who collected the illustrated female and whose gifts over the years have greatly enriched Carnegie Museum.

Fifty-six additional specimens, thirty-four males and twenty-two females, have been seen, but not included in the type series. These represent the following localities:

BRITISH GUIANA: Georgetown (CM); Warani (CM); Kartabo, Bartica dist. (AMNH); Rockstone, Essequebo (USNM); Mazaruni (BM). FRENCH GUIANA: Port Laurent (CM); St. Laurent (AMNH). SURINAM: "Surinam" or "Suriname" (BM). BRAZIL: "Brazil" (BM); Corcovado (BM); Petropolis (USNM); Rio (de) Janeiro USNM, BM; Espirito Santo (BM). COLOMBIA: E. Colombia (CM); Neiva (CM). PERU: Los Puento, ii (AMNH); Putamayo River, ix, xi (AMNH); Florida, Rio Putamayo, iv, x (BM); Pebas (BM); Iquitos, i-iv, vi-viii, xi (AMNH), BM). NO DATA: (CM, AMNH, BM).

The distribution of the subspecies of *obscurior* has interesting implications. The nominate subspecies is restricted to what might be termed "the extra-Amazonian" tropics and is replaced in the Guiana-Amazonian area by *o. prestoni.* The close affinities of these two subspecies indicates a possible recent isolation, a factor which will be discussed in greater detail later in the section on distribution.

Phanus marshallii (Kirby), 1880

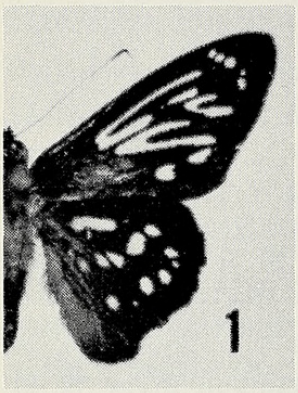
Figs. 3 ♂, 14 ♂ gen., 20 ♀ gen.

Entheus marshallii Kirby, 1880. Proc. Roy. Soc. Dublin, [1880]: 339 (Trinidad).

This species, which with *vitreus* is one of the most frequently met, is characterized as follows: the upper arm of the bifurcated streak in forewing space Cu_1-Cu_2 is as long as the lower one, the only species in which this is true; the hindwing cell streak is separate from the discal spot in space M_1-M_3, though in many females these spots are connected at their upper ends; the male genitalia are characterized by the uncus being over one-third the length of the tegumen (shared with *obscurior*) and the presence of a dorsal distal lobe on the valva, toother along the posterior margin, as shown in the figure; and the vaginal plate of the female genitalia is composed of two subquadrate lobes, not so robust as in *obscurior*, but heavier than those of the other species, as shown in the figure. The available records are from Mexico throughout South America to southeastern Brazil and Bolivia.

I have examined 209 specimens, 105 males and 104 females, representing the following localities:

MEXICO: Nayarit, ix (AMNH); Atoyac, Vera Cruz (BM); Jalapa, (Vera Cruz) (BM); Piste, Yucatan, ix (CDM); Xcan, Quintana Roo, vi, vii (CM, CDM); Chiltepec, Oaxaca, x (CM). GUATEMALA: "Guatemala" (AMNH); Palin, vii (CM); Cayuga, v (CM, USNM);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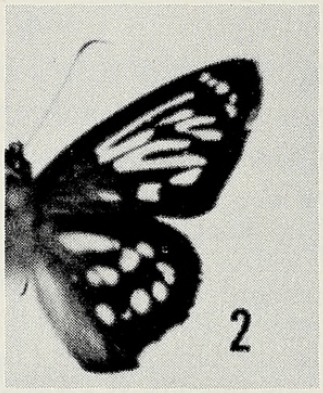
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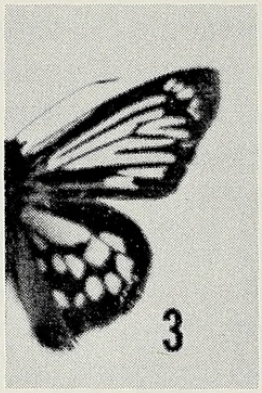
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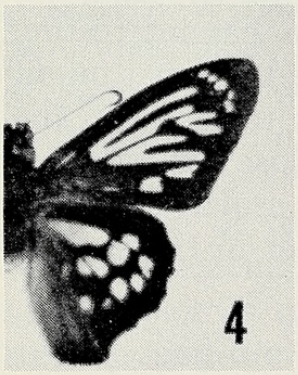
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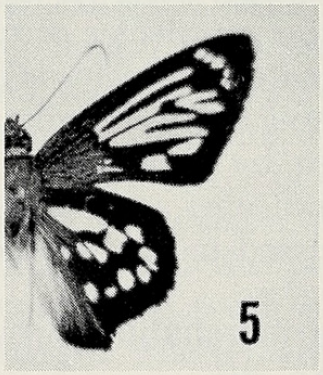
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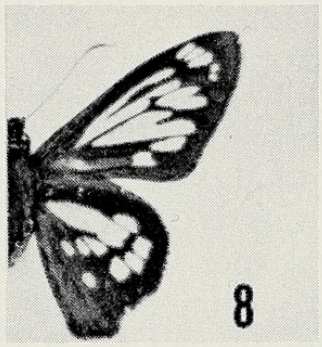
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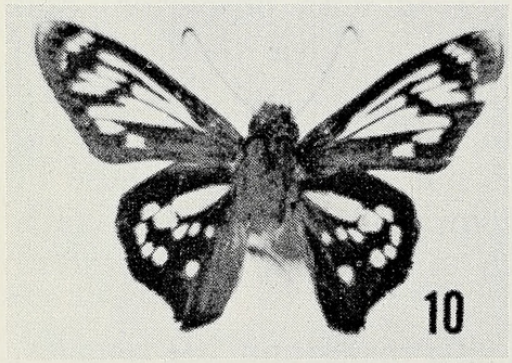
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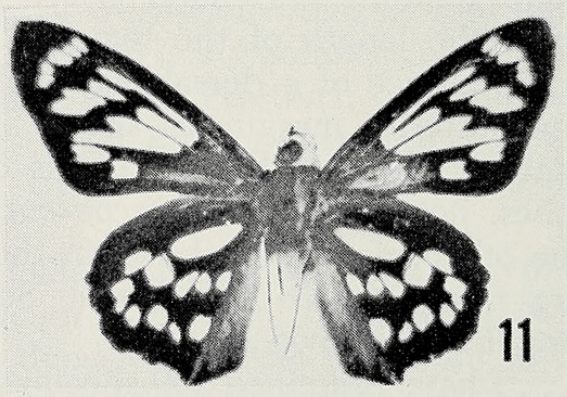
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Guazacapan (BM); Quirigua (BM); Senahu, Vera Paz (BM). BRITISH HONURAS: Corosal (BM). HONDURAS: Ruatan Island (BM); San Pedro Sula (BM). NICARAGUA: San Ramon, R. Wanks, vi (BM). COSTA RICA: "Costa Rica" (BM); Sixola R., iii (CM, BM); Guapiles, Prov. Limon, viii (S. P. Hubbell). PANAMA: Chiriqui (BM); Puerto Armuelles, ix (CM); Veragua(s) (BM); Corozal, ii (AMNH); Barro Colorado Island, iii (AMNH, CAS); Maddendam, C. Z. (CDM). VENEZUELA: "Venezuela" (BM); Puerto Cabello (CM, BM); Suapure, iii, iv (BM); San Esteban, v-vii (CM, BM); Las Quiguas, Esteban Valley (BM). TRINIDAD: "Trinidad" (CM, AMNH, BM); Heights of Aripo, viii (CM); Tabaquite, iii (AMNH); Port of Spain, iii (AMNH); Dabadie, iv (AMNH); Kumuto, iv (AMNH); Homomo Mt. Rd., St. Anne's, iv (AMNH); Carenage, viii (CM); St. George's (BM); Caparo (BM); St. Ann's Valley (BM); Maraval (BM); Mt. Tucuche, viii (BM); N. Mtns., xii-i (BM); Arima dist., xii-ii (BM). TOBAGO: "Tobago" (BM). BRITISH GUIANA: "British Guiana" (CM, BM); Warani (CM); Bartica, iii (AMNH, BM); Oronoque and New River heads (BM); New River (BM); Demerara R. (BM): Mazaruni (BM). SURINAM: "Surinam" (AMNH, BM); Zanderij Isl., Para dist., iv (CM, AMNH): Bronswea, iii (AMNH); Moengo, v (CM); Mana R., v (CM); St. Laurent, iii (AMNH); St. Jean, Maroni dist. (AMNH). FRENCH GUIANA: "French Guiana" (BM); Cayenne (BM). BRAZIL: "Brazil" (CM); "Brasilia" (USNM); Manicore, x (AMNH, BM); Manacapuru, iii, x (CM); Sao Paulo de Olivencia, v (CM); Santarem, viii (CM, BM); Potaro (CM); Porto Velho (USNM); Obidos, Para (or 'Obydos"), vi (BM, CDM); Pernambuco (BM); Chapada (BM); Para (*ex* pupa) (BM); Anna R. (BM); Rio Tapajos, Conceicaon (BM); Espirito Santo (BM); Uypiranga, 10 mi. from Manaus, xi, xii (BM). ECUADOR: Paramba, 3500', v (BM). PERU: Iquitos, iii (AMNH); Putamayo River ,xi (AMNH); Achinamiza, i (AMNH). BOLIVIA: Rio Japacani (Yapacani), iii, ix (CM); Prov. del Sara, v (CM, BM);; Coroico (CM); Buena Vista, 75 km. NW Sta. Cruz (CM, BM). NO DATA: (CM); "Amer. mer." (*ex* coll. Felder, BM).

Phanus vitreus (Stoll), 1781

Figs. 7 ♂, 15 ♂ gen., 21 ♀ gen.

Papilio vitreus Stoll, 1781. Pap. Exot., 4: 146 (Surinam).

Papilio momus Fabricius, 1787. Mant. Ins., 2: 86 (Cayenne).

Phanus godmani Williams and Bell, 1931. Trans. American Ent. Soc., 57: 286 (Costa Rica).

This species, along with *marshallii* the commonest of the genus, is at the center of a small group of closely related species to

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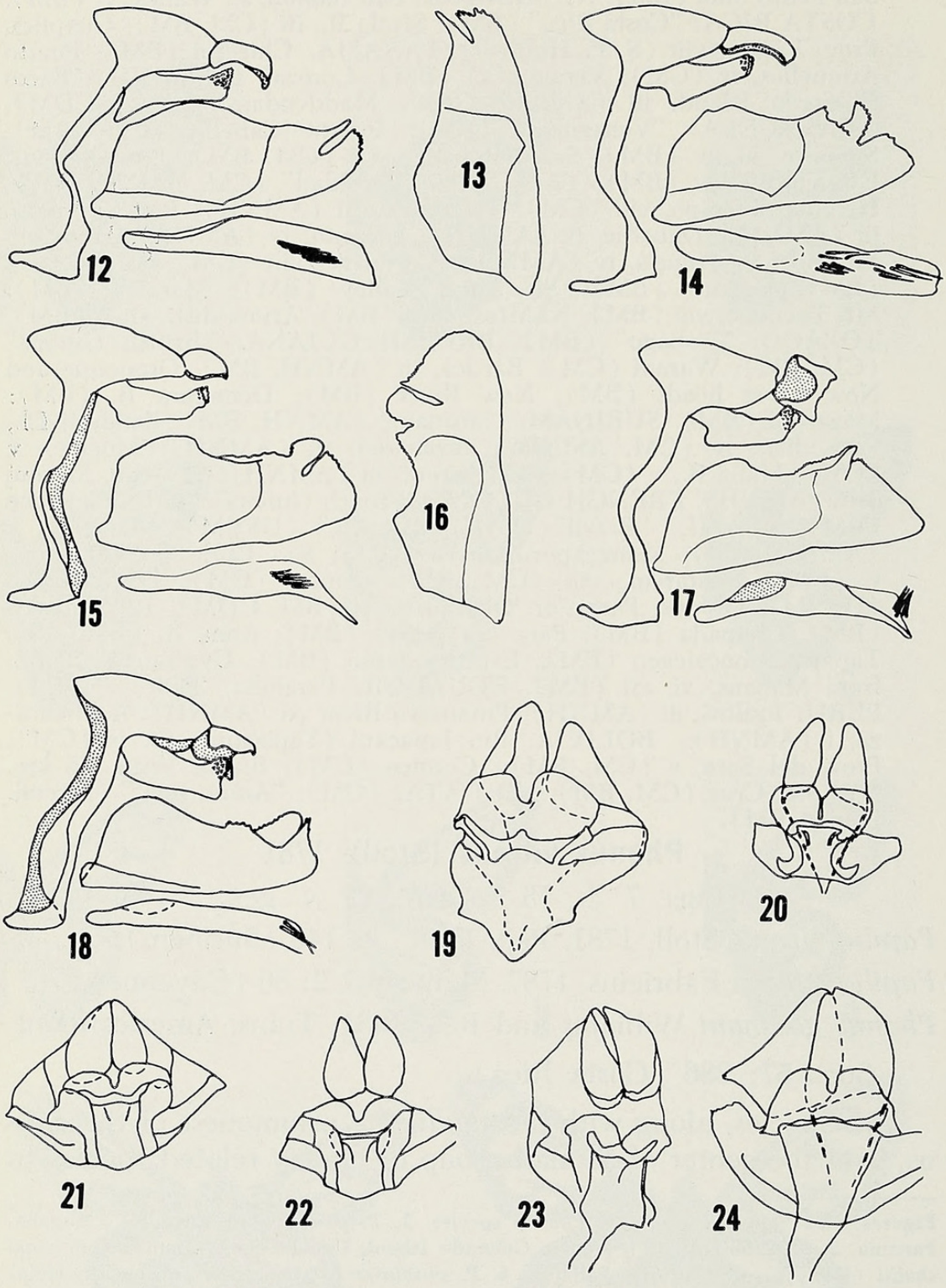
Figures 1-11: upper surfaces of *Phanus* species. 1. *P. o. obscurior* Kaye, ♂, Bugaba, Panama. 2. *P. o. obscurior*, ♀, Barro Colorado Island, Canal Zone, Panama. 3. *P. marshallii* (Kirby), ♂, Chiriqui, Panama. 4. *P. obscurior prestoni*, new subspecies, Holotype ♂, Nova Olinda, Rio Purus, Brazil. 5. *P. obscurior prestoni*, new subspeeies, Paratype ♀, Rio Solimoes, 420 mi. west of Manaus, Brazil. 6. *P. rilma* Evans, ♀, Agua del Obispo, Gro., Mexico (AMNH). 7. *P. vitreus* (Stoll), ♂, Manacapuru, Brazil. 8. *P. australis*, new species, Holotype ♂, Nova Teutonia, Sta. Catarina, Brazil. 9. *P. australis*, new subspecies, Paratype ♀, Nova Teutonia, Sta. Catarina, Brazil. 10. *Phanus* unclassified specimen No. 1, ♂, Moca, Guate. (AMNH). 11. *Phanus* unclassified specimen No. 2, ♀, Rancho Grande (Noracay), Venezuela (AMNH). Unless otherwise indicated all specimens are in the collection of Carnegie Museum.



Figures 12-24: genitalia of *Phanus* species. 12. *P. obscurior prestoni* ,new supspecies, Holotype ♂ genitalia. 13. *P. o. obscurior* Kaye, ♂ valva. 14. *P. marshallii* (Kirby), ♂ genitalia. 15. *P. vitreus* (Stoll), ♂ genitalia. 16. *Phanus* unclassified specimen No. 1, ♂ valva. 17. *P. australis, new species,* Holotype ♂ genitalia. 18. *P. rilma* Evans, ♂ genitalia. 19. *P. obscurior prestoni,* new subspecies, Paratype ♀ genitalia. 20. *P. marshallii,* ♀ genitalia. 21. *P. vitreus,* ♀ genitalia. 22. *P. australis,* new species, Paratype ♀ genitalia. 23. *P. rilma,* ♀ genitalia. 24. *Phanus* unclassified specimen No. 2, ♀ genitalia.

be discussed later. Along with the next two species *vitreus* is distinguished by the bifurcated streak in forewing space Cu_1-Cu^2 having a longer undivided proximal part than divided arms. The subapical spots on the forewing are only slightly larger than the submarginal spots in spaces M_1-M^2 and M_2-M_3, thereby setting the present species apart from *australis*, and the hindwing cell streak is contiguous with the discal spot in space M_1-M_3, setting *vitreus* apart from *rilma*. The rounded, virtually untoothed dorsal distal lobe of the valva is also distinctive. The lobes of the vaginal plate, as shown in the figure, are more finely drawn than those of *australis* and not so contorted as *rilma*.

Phanus vitreus is recorded from Mexico through Central and South America to southeastern Brazil and Bolivia. It also occurs commonly on Trinidad.

357 specimens, 166 males and 191 females, have been examined, representing the following localities:

MEXICO: "Mexico" (CM, AMNH); Atoyac, Vera Cruz, v (CM, BM); Jalapa, (Vera Cruz) (AMNH, USNM, BM); Serrania de Motorango, Vera Cruz (AMNH); Presidio, Vera Cruz, iv, viii (AMNH); Teapa, Tabasco, iv (BM). "CENTRAL AMERICA": (AMNH). GUATEMALA: Polochic Valley (BM); Forests of N. Vera Paz (BM); Guzacapan (BM). HONDURAS: "Honduras" (CM, USNM, BM): "Sp. Honduras" (USNM); San Pedro Sula (BM). NICARAGUA: "Nicaragua" (BM); Chontales (BM); San Ramon, 375' v (BM). COSTA RICA: "Costa Rica" (CM, BM, including types of *godmani*); San Jose (USNM); Guapiles (USNM, BM); Carillo (CM); Port Limon, iii (USNM); Zent dist., ii (USNM); vic. Villa Neilly, Prov. Puntarenas, vii (CM); Cachi, x (BM); Estrella Riv. (BM). PANAMA: "Panama" (BM); Chiriqui (CM, AMNH, BM); David (BM); Bugaba, 1-500' (BM); Cerro Campana, 10 km. SW Campana, xii (CDM); Barro Colorado Isl., i-iii (AMNH); Gatun, C. Z., viii (AMNH); New Culebra, C. Z., x (AMNH). COLOMBIA: "Colombia" (BM); Muzo (CM); Bonda, vii (CM); Don Diego, Dept. Magdalena, v (CM); (CM); Monbornscuza, xi (AMNH); Cauca (BM); nr. Bogta (BM); "Nouvelle Granade", Cundinamarca (BM); Cananche, Cundinamarca, vi (BM); Cachabé, i (BM). VENEZUELA: "Venezuela" (CM, BM); Puerto Cabello (CM, BM); Carripito, Monagas, v (AMNH); San Esteban, vii, viii (BM); Suapure, ii, iii (BM). TRINIDAD: "Trinidad" (BM); Marval, ix (BM); Tabaquite, Narieva dist. (BM); Maracas Valley, viii (BM); Port of Spain (BM); St. George's (BM). BRITISH GUIANA: "British Guiana", ii (CM, BM); Warani (CM); Bartica, xii (AMNH, BM); Carimang (BM); Demerara (BM); Omai (BM). FRENCH GUIANA: "French Guiana" (BM, AMNH); Cayenne (B , CM); St. Laurent du Maroni (BM, AMNH): St. Jean, Maroni R. (USNM); Port Laurent (CM); Maroni R. (USNM); Mana R., v (CM). SURINAM: "Surinam" (CM, BM); Berg-en-daal, v (BM); Saramacea R. (BM); Ephrata, ii (BM). ECUADOR: "Ecuador" (CM, BM, CAS): Palmar, Manabi, iv (AMNH); Santo Domingo, ii (AMNH); Macas (AMNH); La Chima (BM); Balzabampa, Prov. Bolivar, ii (BM); Sta. Inez (BM); Aguano (BM); Paramba, iv (BM). PERU: Colonia Perene, Rio Perene, 18 mi. NE La Merced, i (CAS); Iquitos, iv-vii, ix, xi (CM, AMNH, USNM, MB); Achinamiza, i, ix (CM, AMNH); Putamayo R., xi. xii (AMNH); Upper Rio Tapeche, i

(AMNH); Rio Hullaga, xi (AMNH); La Union, R. Huacamayo, Carabaya, 2000', xi (BM); Chanchamayo (BM); La Merced, v-viii (BM); Rio Pacaya, lower Ucayali, viii-ix (BM); "Amazones" (BM); Pebas (BM); Mayobamba (BM); Florida, Rio Putamayo, iv (BM). BRAZIL: "Brazil" (CM, AMNH, BM); "Brasilia" (USNM); Obidos (or "Obydos") (CM, AMNH, BM); Benevides, Para, x-xi (CM); Belem, Para, i, vii, ix (CDM); Para, viii (CM, AMNH, BM); Manicore, x xi (CM, AMNH); Manacapuru, iii (CM); Maranham (CM, BM); Barcellos, Rio Negro, vii (AMNH); Chapada (CM, BM); Panore, (CM); Arima, Rio Purus, xi (CM); "Amazons" (AMNH); Sao Paulo de Olivencia, vi-ix (BM, CDM); Teffe, Amazonas, vii-viii (BM); Maues, Amazonas (BM); Rio Ugayala (BM); Tarapote, Amazonas (BM); Cevallo-Cocho, Amazonas (BM); Bahia (BM, CDM); "Rio S." (BM); Itaparica, xii (BM); Corcovado (BM); Serra de Communaty, Pernambuco (BM); Pernambuco (BM); Ceara (BM); Porto Real (BM); Pilar, Minas Geraes, (CM); Rio de Janeiro (BM); Laguna de Sacuaresma, Rio de Janeiro, ix (BM); Espiritu Santo (BM); St. Catherine's (CM); Joinville, Sta. Caraina, iv (AMNH). BOLIVIA: Buenavista, 75 km. NW Sta. Cruz (CM, BM, AMNH); Rio Surutu, iv (CM); Cuarto Ojas, Dept. Sta. Cruz, xi (CM); Prov. del Sara, ii-iv, vi (CM, BM); Rio Songo (CM); oroico (CM); Upper Mamore R. (CM); Rio Japacani, viii (CM); Reyes, vii (BM).

Phanus rilma Evans, 1952

Figs. 6 ♀, 18 ♂ gen., 23 ♀ gen.

Phanus rilma Evans, 1952. Cat. American Hesperiidae, 2:21 (Guerrero, Mexico).

This is the rarest *Phanus*, apparently restricted to Mexico and Guatemala, although one female from Venezuela may represent an unnamed subspecies of it. *P. rilma* may be distinguished from other members of the *vitreus* group by having the hindwing cell streak widely separated from the discal spot in space M_1-M_3. The configuration of the bifurcate streak in forewing space Cu_1-Cu^2 definitely separates this species from both *marshallii* and *obscurior*. The male genitalia are of the *vitreus* type with the very short uncus, but the valvae are distinctive: there is a dorsal distal spine, diverted dorsad, and the dorsal lobe is toothed on its proximal margin. The contorted vaginal plate of the female genitalia is distinctive, as shown in the figure.

I have seen only six specimens, three males and three females, representing the following localities:

MEXICO: Guerrero (BM, including type); Agua de Obispo, Gro., vii (AMNH). GUATEMALA: "Guatemala" (AMNH).

Phanus australis, new species

Figs. 8 ♂, 9 ♀, 17 ♂ gen., 22 ♀ gen.

Sexes similar. This species is nearest *vitreus*, differing superfically in the following respects: the three forewing subapical spots are much larger, always three times the size of the submarginal spots in M_1-M_2 and M^2-M_3, whereas in *vitreus* the subapicals are rarely twice the size of the median submarginal spots; the proximal margin of the upper opaque white spot in forewing

space Cu_2-A overlaps the distal half of the lower spot in the present species, and in *vitreus* the proximal margin of the upper spot is generally distad of the entire lower spot; the upper arm of the bifurcated hyaline streak in forewing space Cu_1-Cu^2, never half as long as the lower arm in *vitreus*, is greater than half as long as the lower arm in *australis*, occasionally the arms are almost equal; and the genitalia are different, as outlined below.

Length of forewing of male holotype 21.0 mm., the male paratypes range between 19.0 and 21.0 mm., averaging 20.4 mm., and the female paratypes range from 19.5 to 22.0 mm., averaging 21.2 mm.

The male genitalia are of the *vitreus* type, differing from that species chiefly in the configuration of the valva. The dorsal lobate process at the distal end of the valva of *vitreus* is represented in *australis* by a long, tooth-like lobe. Just proximad of this lobe is a dorsal toothed ridge, much more pronounced than that of *vitreus*, with teeth basad of the lobe. The distal margin of the valva is more or less angular, in this respect approaching *marshallii*, whereas the valva of *vitreus* is more or less rounded distally.

The female genitalia are nearest those of *vitreus*, but the vaginal plate is heavier than that of the latter species, as shown in the figure.

Described from 116 specimens, sixty-one males and fifty-five females, from southeastern Brazil.

Holotype male: Nova Teutonia, 27° 11′ S., 52° 23′ W., [Sta. Catarina], Brazil, 3.vi.1940 (Fritz Plaumann), 300-500 m.; ♂ genitalic slide no. M-373 (Lee D. Miller).

Paratypes (sixty males and fifty-five females), as follows: Same locality and collector as holotype: 2 ♂ 1 ♀ vi-1939, 1 ♂ 1 ♀ xii-1939, 1 ♀ v-1940, 2 ♂ 1 ♀ vi-1940, 7 ♂ 4 ♀ xii-1957, 1 ♂ 2 ♀ i-1958, 2 ♂ 3 ♀ v-1961, 3 ♂ 7 ♀ vi-1961, 1 vii-1961, 1 xii-1 ♂ vii-1958, 1 ♂ 2 ♀ xii-1958, 3 ♂ 2 ♀ vi-1959, 1 ♀ xii-1959, 1 ♀ iii-1960, 7 ♂ 6 ♀ xii-1960, 17 ♂ 9 ♀ i-1961, 2 ♂ ii-1961, 2 ♀ iii-1961, 2 3 v-1961, 3 7 vi-1961, 1 ♀ vii-1961, 1 ♀ xii-2 ♀ iii-1961, 2 ♂ 3 ♀ v-1961, 3 ♂ 7 ♀ vi-1961, 1 ♀ vii-1961, 1 ♀ xii-1961; 2 ♂ 4 ♀ Massaranduba-Blumenau, Brazil; 3 ♂ 2 ♀ New Breman, Sta. Catarina, Brazil; 1 ♀ Annaburg, Brazil; 2 ♂ Castro, Parana, Brazil; 1 ♂ Tibagy, Parana, [Brazil], 2400′, 23-iii-1910 (E. D. Jones); 1 ♂ Guarapurya, Parana, Brazil, Feb., 1960 (J. Kesselring); 1 ♀ Espirito Santo, [Brazil] (*ex* coll. Fruhstorfer); 1 ♀ S. Paulo [Brazil].

The holotype male and twelve male and twelve female paratypes are deposited in Carnegie Museum (C.M. Ent. Type Series No. 509). Nine male and eight female paratypes are deposited

in the American Museum of Natural History. Two male and two female paratypes are deposited in the British Museum (Natural History). One male paratype is deposited in the U. S. National Museum. Thirty-six male and thirty-three female paratypes are deposited in the collection of C. Don MacNeill.

In addition to the type series nineteen specimens, ten males and nine females, were examined from the following localities:

BRAZIL: Joao Pessoa, Paraiba, vi, x (CDM). PARAGUAY: Sapucay, xii (CM, BM); Carguazu, iv (CDM). ARGENTINA: Dos de Mayo, Misiones, 300 m., iii (CDM). BOLIVIA: Buenavista, 75 km. NW of Sta. Cruz (CM, BM); Rio Songo (CM); Prov. del Sara, v-vi (CM).

This species has consistently passed in collections as *vitreus*, from which it is quite distinct. The two species are sympatric in many parts of the range of *australis* (Prov. Santa Catarina and Espirito Santo, Brazil and Buenavista, Rio Songo and Prov. del Sara, Bolivia), with *australis* being apparently the more abundant species in these areas. Specimens referred to *vitreus* from the range of *australis* should be checked carefully; many will prove to be the latter.

Unclassified specimen No. 1

Figs. 10 ♂, 16 valva

This male (Moca, Guate., Aug. 31, '47; ♂ genitalia slide no. M-512 [Lee D. Miller]) is probably an aberrant *vitreus*, but, as shown in the figure, the hindwing cell streak is partially separated from the discal spot in space M_1-M_3, the only "*vitreus*" to show this feature. This specimen is definitely not referable to *rilma*, the genitalia being much closer to those of typical *vitreus*. The specimen is in the collection of the American Museum of Natural History.

Unclassified specimen No. 2

Fig. 11 ♀, 24 ♀ gen.

This female (Rancho Grande (Noracay), Venezuela, vii-28-'46, Flemming; ♀ genitalic slide no. M-516 [Lee D. Miller]) is closest to *rilma*, as shown in the figure, but the hyaline markings are more extensive. The female genitalia, however, are quite different. It is difficult to ascertain whether this variation is within or without the normal range for *rilma*, since I have only had the opportunity to dissect one female of that species. While this specimen undoubtedly represents a nameable entity, whether it is a separate species or a subspecies of *rilma*, I hesitate to name it on the basis of a single female. This specimen, too, is in the collection of the American Museum of Natural History.

RELATIONSHIPS WITHIN THE GENUS *PHANUS*

There appear to be three fundamental groupings within the genus, two of which are monotypic. Of these the furthest removed from the others is *obscurior*. The male and female genitalia, as well as the pattern, of this species are less like those of the other species than between any pair of the other members of the genus. The long uncus of *obscurior* is more like that of *marshallii*, a species which seems to occupy a central position between *obscurior* and the *vitreus* group, than any other species. This leads to a possible explanation that the primitive *Phanus* may have been like *marshallii*, and it gave rise to both *obscurior* and the *vitreus* complex. If this is true *obscurior* probably arose first since it is less like *marshallii* than are any of the *vitreus* group. Within the *vitreus* group the most aberrant species is *rilma* which significantly approaches *marshallii* in several important respects, such as the separation of the hindwing cell streak and the discal spot in space M_1-M_3 and the configuration of the dorsal valva lobe. Therefore, *rilma* is considered more primitive than the other two species in the*vitreus* group, *vitreus* and *australis*, which are very close and probably arose rather late chronologically.

THE DISTRIBUTION OF *PHANUS*

The distribution of *marshallii* has not been mapped, but it is one of the most generally distributed species of the genus, found from Mexico to central Brazil and eastern Bolivia and in Trinidad. It is apparently absent from southeastern Brazil, Paraguay and northern Argentina, the metropolis of *australis*.

The locality records for the subspecies of *obscurior* are shown in Fig. 25, along with projected actual ranges. Nominate *obscurior* is found throughout Central America and at least coastal Venezuela and Trinidad, whereas *prestoni* has been recorded from the Guianas and the Amazon valley. The available records show only one country from which both subspecies have been taken, Colombia. The two records of *prestoni* are from eastern Colombia, and I feel that the ambiguous "Interior of Columbia" record of *o. obscurior* probably refers to a specimen taken west of the Cordillera. It seems likely, too, that nominate *obscurior* will be found in northwestern Ecuador. Just when the isolation of *o. obscurior* and *o. prestoni* took place is difficult to ascertain, but it seems well established that the latter arose in an area bounded on the north by the Guiana highlands and the Venezuelan savannah, and on the west by the Andean front, whereas the nominate subspecies may well have arisen in Central America.

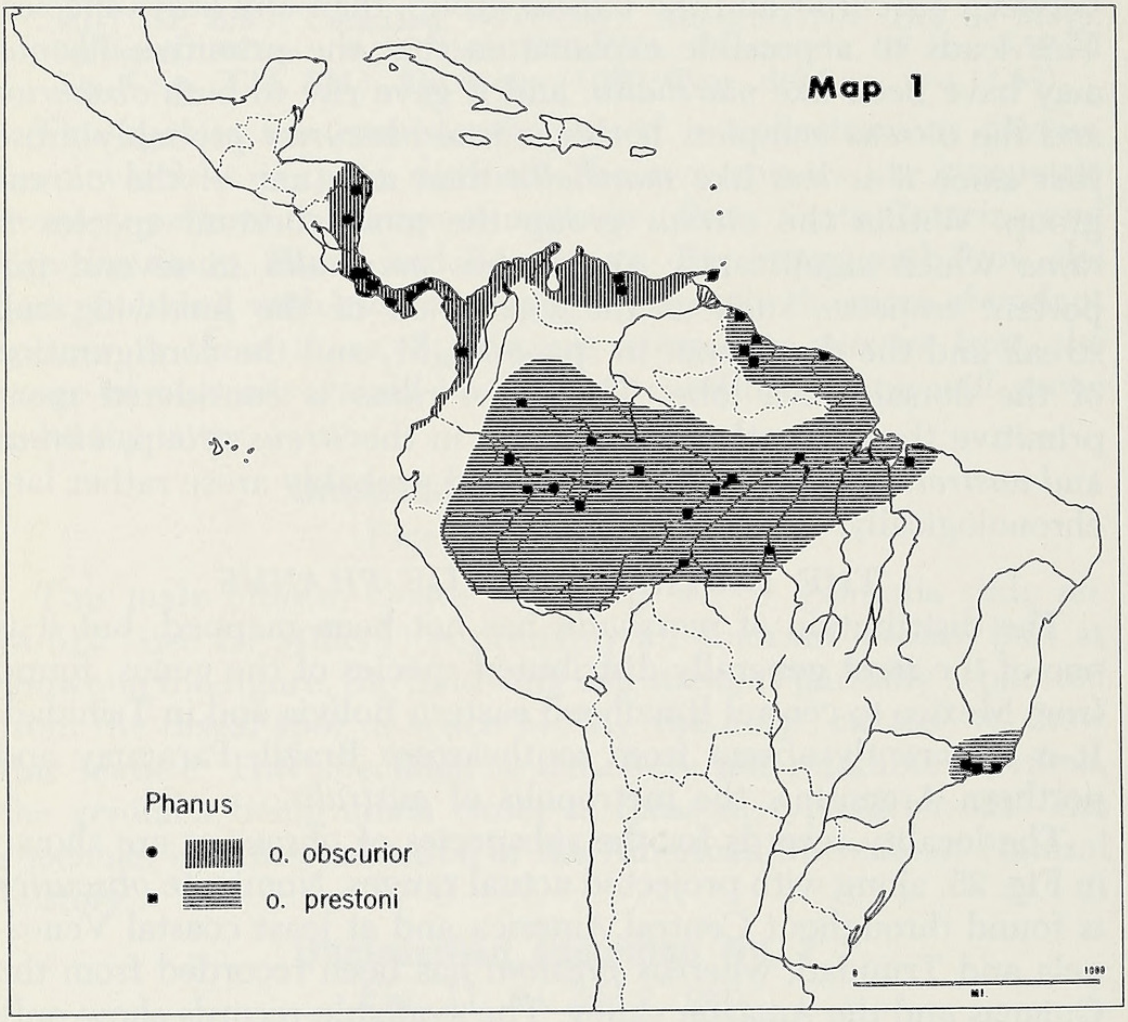


Fig. 25: The distribution of the subspecies of *Phanus obscurior* Kaye.

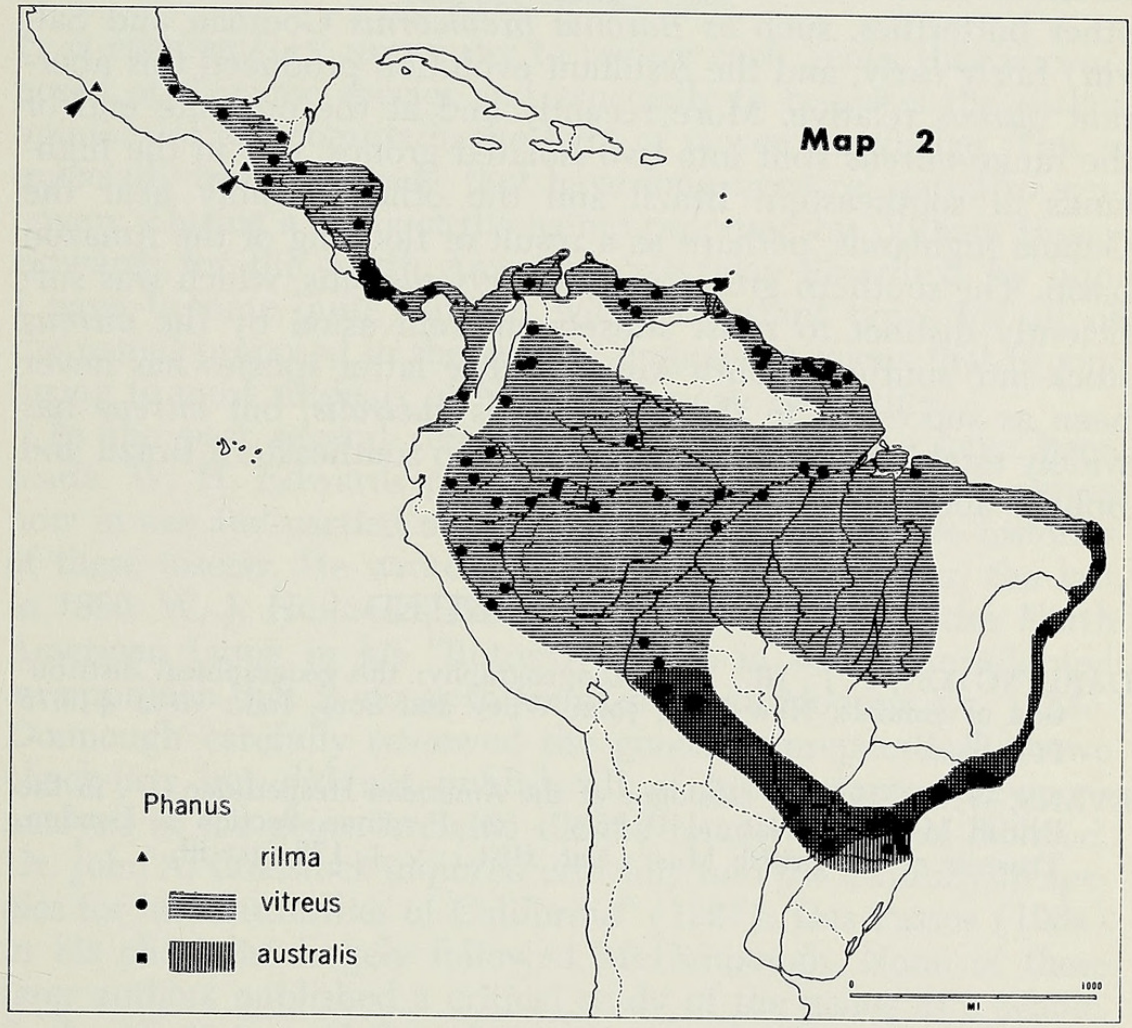


Fig. 26: The distribution of the *vitreus* complex of the genus *Phanus* (*vitreus* [Stoll], *rilma* Evans and *australis*, new species).

The disttribution of the *vitreus* complex is shown on Fig. 26. Here one sees a widely distributed species which quite possibly gave rise to two other species at the opposite ends of its range. It is significant that the most aberrant member of the *vitreus* group, *rilma,* is found in Mexico and Guatemala, an area more or less cut off from the rest of the Neotropics during the Tertiary (Darlington, 1957: 285). It seems likely that a relatively undifferentiated *vitreus*-like stock was isolated there (as were several other butterflies, such as *Baronia brevicornis* Godman and Salvin) fairly early, and the resultant evolution produced this aberrant *vitreus* relative. More recently and at the opposite end of the range *vitreus* split into two isolated groups, one in the highlands of southeastern Brazil and the other possibly near the Guiana highlands, perhaps as a result of flooding of the Amazon basin. The southern group evolved into *australis,* which was sufficiently distinct to resist subsequent reinvasion by the *vitreus* stock into southern South America. The latter species has never been as successful in this area as has *australis,* but *vitreus* has widely established itself—from Mexico to southeastern Brazil and Bolivia and in Trinidad.

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