



A NEW NORTH AMERICAN SWALLOWTAIL BUTTERFLY: DESCRIPTION OF A RELICT SUBSPECIES OF *PTEROURUS TROILUS* (PAPILIONIDAE) FROM THE SOUTHERN TIP OF FLORIDA.

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ABSTRACT. A neotype is designated for *Papilio troilus* Linnaeus, 1758 from Middleton Place Plantation, Charleston County, South Carolina. A neotype is designated for *Papilio ilioneus* J.E. Smith, 1797 from Burke County, Georgia. Abbot's *ilioneus* figures in Smith are the first published representations of nominotypical *Pterourus troilus troilus*. *Papilio troilus* variation *texanus* Ehrmann, 1900 was described from Houston, Texas. The *texanus* type is in the Carnegie Museum, Pittsburgh. The name *texanus* was restricted (by original description) to a gray male form and is not subspecifically available under ICZN article 45.5 or 45.6. This name has occasionally been misapplied subspecifically to populations of *troilus* from Texas eastward along the Gulf coast to the Atlantic coast of north Florida and southeast Georgia. All populations in these areas are *Pterourus troilus troilus*. Rothschild & Jordan (1906), Seitz (1924), and Tyler (1994) are examined. *Pterourus troilus fakahatcheensis* Gatrelle is described from the vicinity of the Fakahatchee Strand, Collier County, Florida. Its range is restricted to the Everglades ecosystem south of Florida Hwy. 80 at the southern tip of Florida. *Pterourus troilus fakahatcheensis* is hypothesized to be a peri-Pleistocene relict of the central Florida island or Caribbean faunas. The *fakahatcheensis* holotype and both neotypes are currently in the Museum of the Hemispheres (MOTH), Goose Creek, South Carolina.

Additional key words: *Papilio ilioneus* Cramer.

THE DELINEATION AND APPLICATION OF NAMES

Sometimes even the commonest of butterflies are found to be in need of taxonomic clarification. Such is the case with *Pterourus troilus* (Linnaeus, 1758). About ten years ago I became interested in the insect named *Papilio ilioneus* by Smith in Abbot, 1797. This eventually led to an examination of all of the names associated with *Pterourus troilus* in the southern United States. This paper gives the results of that investigation and taxonomic study. The names and taxa I researched are: *Papilio troilus* Linnaeus, 1758, *Papilio ilioneus* J.E. Smith, 1797, and *Papilio troilus* var. *texanus* Ehrmann, 1900.

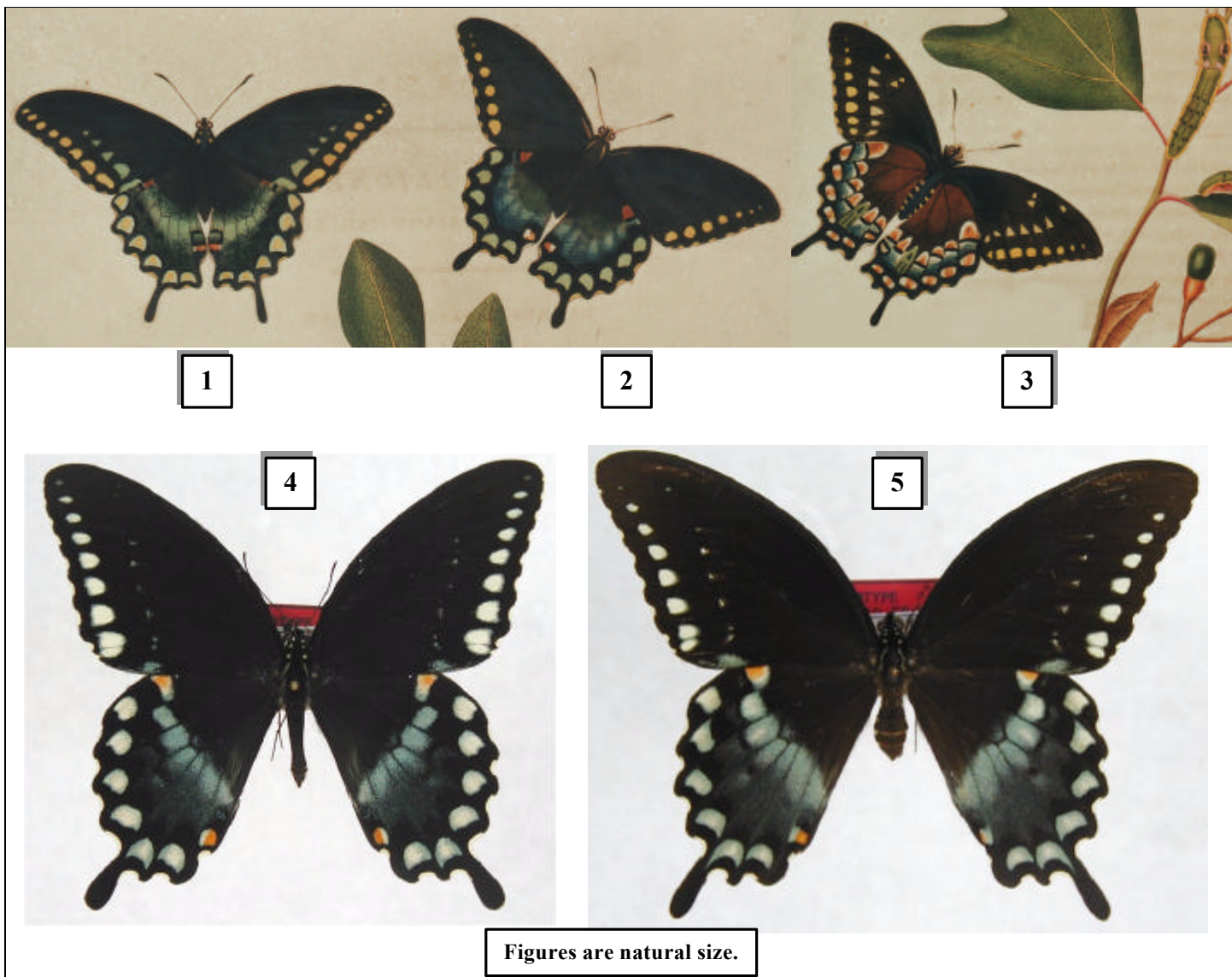
ILIONEUS

I began with *ilioneus*. The area of Screven and Burke counties, Georgia is the region from which John Abbot depicted his examples of *ilioneus* (Figs. 1-3). Thus, in 1989 I began making expeditions into that part of Georgia to observe and collect topotypical specimens for taxonomic examination. I soon found that two primary forms of male *troilus* were prevalent in Screven and Burke counties. This was not surprising as I had found this same variation in *troilus* males in south coastal South Carolina – which is what triggered my interest in this taxon in the first place.

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The two forms in this area are: 1) individuals with bluish-white submarginal spots on the dorsal hindwing margins (predominant February through April), and 2) individuals with greenish-blue spots along the dorsal hindwings (predominant May through July). Both forms are found fairly equally from mid-August to end of season. All green individuals occasionally occur (Fig 7.) The bluish-white spotted specimens are Smith's *ilioneus*. Beginning in August, the *ilioneus* form males are usually fresher and smaller than those of the greenish-blue form which are becoming worn. I attribute the smaller size of *ilioneus* at that time of year to heat stressed larvae/pupae in this hot arid region.

In Smith's 1797 Volume One, the first species he presents are *Papilio troilus* and *Papilio ilioneus*. However, the species Smith depicted as *troilus* is actually *Papilio polyxenes asterius* Stoll, 1782. It was this misidentification and misapplication of Linnaeus' name *troilus* to *asterius* that led Smith to describe Abbot's fine figures of typical *troilus* as an entirely different and new species – *ilioneus*. Smith's textual presentation of *troilus* (= *asterius*) contains information that helps us understand why he then introduced *ilioneus* as a new species. Smith's *troilus* text is as follows (my comments in brackets for clarity).



Figs. 1-3. Abbot's *Papilio ilioneus* in Smith, 1797. **Fig. 1.** Male dorsal. **Fig. 2.** Female dorsal. **Fig. 3.** Male ventral, larvae and pupae on Sassaparilla. **Fig. 4.** Neotype ♂ *Papilio ilioneus* Smith, 1797: 3 August 2000, River Road, Burke County, GA. **Fig. 5.** Neotype ♂ *Papilio troilus* Linnaeus, 1758: 19 July 1970, visc. Middleton Place Plantation, Charleston County, SC.

Papilio Troilus [= asterius]
Yellow Spotted Black Swallowtail

This *Papilio*, and that of the following plate [*ilioneus*], have given us more trouble than any other insect in the work. Unfortunately the Linnaean cabinet possesses neither;² and the specific characters and descriptions in the publications of our great master, as well as those of his worthy disciple Fabricius, are by no means sufficient to remove all doubt. In the present case, however, the Banksian Museum, revised by Fabricius, with the synonyms of Drury and Cramer, enable us with tolerable confidence, to offer this insect as the *Papilio Troilus*, nothing contradictory occurring in the two principal systematic authors above mentioned. We beg leave only to remark that *P. Asterias Fabr.* p. 6. seems not to be different from this. Our uppermost figure [Smith's *troilus*, but actually a male *asterius*] is precisely the No. 2 of Drury; and, according to his opinion, and the observations of Mr. Abbot, is only a variety (perhaps a sexual difference) to the other...

The original description of *ilioneus* (= *troilus*) in Smith 1797 is as follows (my comments in brackets for clarity). Smith's confusion of *troilus* with *asterius*, and failure to recognize that *ilioneus* was *troilus* is self evident in these two textual presentations and their accompanying figures (of which I only reproduce *ilioneus*).

Papilio Ilioneus
Sassafras Swallowtail Butterfly

P.E.T. alis caudatis nigris: posticis limbo caerule seentibus angulo ani fulvo; subtus maculis bisariis subocellaribus.

[Another black, tailed, species: the background of the hindwings' border is dark blue in the limbal area and the angle with a fulvous spot; the lower [hindwing] maculation in two rows of underside eyespots.]

Papilio Glaucus Fab. Entom. Emend. V.4. 4 ?

Its food is the Sassafras, the caterpillar folding a leaf together for an habitation, and removing to a new one, as its sustenance around is exhausted. These caterpillars exhale a remarkable sent, whence they are sometimes called Mellow-worms. Having changed in the beginning of October, they remained in the chrysalis state till the 10th of March. One of them in Virginia changed October 13th and the fly did not come out till April 5th. This butterfly is frequent about blossoms in the spring; and as the weather grows hotter, resorts to wet places in court-yards.

After much study and consultation we have not been able to refer this insect to any Linnaean or Fabrician species. Whether it may be the *Glaucus* of Fabricius in his work (that of his Mantissa is now named *Laodocus*), it surely cannot be the original *Glaucus* of Linnaeus, figured by Clerck, t. 24 s. 1. and by Cramer, t. 139. s. A.B. which is clearly distinguished by the remarkable brown line on the underside of its hind wings, as well as by its general colouring and marking. Mr. Jones whose opinion is of the first authority, supposed our right-hand figure, No. 2 [*ilioneus* female, dorsal] to be *troilus* [female] of Linnaeus, which it certainly much resembles, and the other [*ilioneus* male] to be a different species. For this we must rely on the accuracy of Mr. Abbot. If No. 2 be a variety of *troilus* [by this they mean *asterius*], the caterpillar, so different from that in our last plate [*asterius* larvae which they called *troilus*] must belong to No. 1 [male *ilioneus*, dorsal], of which No. 3 [male *ilioneus* ventral] seems indubitably the underside, and which we here describe as new by the name *Ilioneus*.

The entanglement of two species here, under three names, is obvious. It is also self evident that Abbot had taken the same species in Virginia as well as Georgia and considered these as one population. Abbot's figures of this species, though artistically exaggerated, are accurate paintings of spring *troilus* with creamy submarginal spots in the male. The fact that Abbot specifically mentioned rearing specimens from October larva to spring adults is strong evidence that the light spring form is precisely what he painted. It is of taxonomic import to note that Smith applied the name *ilioneus* with certainty only to Abbot's male and left open the possibility that Abbot's female might be another species *vide* Jones' assessment.

I have yet to find a valid type specimen (holotype or syntype) for any of Abbot's Georgian taxa, including *ilioneus*. In regard to Smith 1797, I refer the reader to Lucian Harris' comments on Abbot's dealings with Smith in *The Butterflies of Georgia* (1972) page 7. We can be absolutely certain that a type specimen for *ilioneus* never existed and that the name was based solely on Abbot's figures and notes.

I have designated a male from Burke County with the following label data as a neotype of *Papilio ilioneus* (Fig. 4). Small label with RONALD R. GATRELLE, COLLECTOR offset printed. Red label with hand

² This statement reveals that Smith consulted Linnaeus' type material and did not find Linnaeus' *troilus* types therein in 1797. In others words, Linnaeus' 1758 *troilus* types were already lost (or sold) by 1797. Linnaeus died in 1778.

written inscription: NEOTYPE ♂, *Papilio ilioneus* Smith, 1797, designated by R. Gatrell 2000 in TTR 2:4. White label with hand written inscription: 3 August 2000, River Road, Burke County, GA. The specimen is currently in the *Museum of the Hemispheres* (MOTH) collection, Goose Creek, South Carolina.

Although described as a species, *ilioneus* must be placed in the synonymy of *Pterourus troilus troilus* because these two names are based on the same southeastern subspecific population. Because the *ilioneus* form is as frequent as the greenish-blue spotted form in the region of *troilus*' type locality, either could be considered as the "normal" male form.

TROILUS

Pterourus troilus was described by Linnaeus in a brief Latin statement without figures. The original description is as follows – in Latin and then as translated into English. (My emphasis in **bold**.)

Troilus. 5. P.E. alis caudatis nigris: primoribus punctis marginalibus **pallidis**; posticis subtus maculis fulvis.

M.L.U. Habitat in Indiis.

Troilus. 5. Another black, tailed, species: the margins of the upper wings with prominent **pallid spots**; the maculation of the underside of the hindwings is yellowish-brown.

Habitat in [The] Indies [= the New World = southeastern America Colonies].

It is significant that the individual who translated this into English for me rendered *Indiis* as The Indies – as in the West Indies. In other species' descriptions Linnaeus uses India (as well as *Indiis*). It is held here that Linnaeus' India always means the country of India while his *Indiis* (in regard to *troilus*) is a reference (albeit unclear today) to the New World.³ But where in the 1758 New World? Obviously, the specimens came from the eastern seaboard of Colonial America. But where in primitive Colonial America?

I am not an expert on Linnaeus' work or by what channels he may have received specimens and information. However, having lived for 30 years in Charleston, South Carolina, has given me an appreciation of this cities' Colonial history. Founded in 1670, it is one of the nations oldest cities. But more importantly, Charleston soon became one of the most, if not the most, powerful economic and cultural center in Colonial America. The College of Charleston (1770), is the oldest municipal college in the nation. The Charleston Museum is the nation's oldest Museum and the Charleston Library Society (1748) is the 3rd oldest library in the country. The gardens at Middleton Place plantation are America's oldest landscaped gardens (1741).

Given Charleston's prominence in the early 1700's, it should be expected that not a few of the new species of Lepidoptera being described by the educated and cultured European taxonomists would have come from the vicinity of this preeminent Colonial city. In fact, it would be strange if this were not so. And indeed, we find that Hübner, Godart, Fabricius, Cramer, and Linnaeus all described taxa from Charleston area material. It was from Charleston that Linnaeus described *Papilio* (= *Phoebis*) *sennae eubule* in 1767.

We thus establish three key points. First, Linnaeus' statement that *troilus* was resident to the Indies (in the broad 1758 sense), necessitates that his description was based on coastal southeastern U.S. *Pterourus troilus*. Second, in stressing pallid marginal spots as *troilus*' primary dorsal feature, he confirms that his *troilus* was based on a phenotype found primarily in the Southeast. (The *ibus* suffix in *primoribus* pluralizes the word to mean both the fore and hind wings.) Third, Linnaeus' description of *troilus* precisely fits Abbot's (Georgian) *ilioneus* figure in Smith – which makes these two the exact same thing.

³ Linnaeus was a scientist who **wrote** technical papers in Latin. But like all of us, he **thought** in his common vernacular. At times these two meet in verbal expression. At the time of Linnaeus, the New World, from the southeastern U.S. to upper South America, was often referred to in the common language as "The Indies." The proof. Under *Proteus* (#163 in this same book), Linnaeus unequivocally lists its type locality as: "*Habitat in Gramine Americas.*" That is: "It lives in grassy America." Then, in the next line he states: "Varietas hujus numerosae sunt in Indiis..." That is: "This variety is numerous [widespread] in the Indies [New World – not India]..." Linnaeus was not stupid. He would not say in one line it was from "America," and in the next say it was found all over "India." In some cases the old authors did incorrectly associate location and species. In other instances [e.g. *troilus*] they were only Latinizing their common vernacular. There are Indians, then there are Indians.

Mr. M.J. Scoble of the Linnaean Society, London, has informed me that there is no type for *Papilio troilus* there. He further states (in press; 2001) that the species was described from the collection of Queen Ludovica Ulrika, which is now housed in the Zoological Museum at Uppsala, and that he and Martin Honey have searched that collection and no type exists there or anywhere else. According to Smith's 1797 remarks under *troilus*, he could not locate a type specimen for *troilus* even then. Smith, in trying to accurately determine what true *troilus* looked like, made a search of Linnaeus' type specimens and found no *troilus* stating: "Unfortunately the Linnaean cabinet possesses neither [*troilus* or *ilioneus*]." Remember that to Smith *asterius* was *troilus* and *troilus* was *ilioneus*.

I do not think it inappropriate to designate a specimen from near Middleton Place, Charleston, South Carolina as neotype of this species. In fact, it is well within the realm of possibility that the type of *troilus* was actually collected at the already famous gardens at Middleton Place in the 1750's. Accordingly, I have designated a male from that location and bearing the following label data as neotype of *Papilio troilus* (Fig. 5). Small label with RONALD R. GATRELLE, COLLECTOR offset printed. Larger red label with hand written inscription NEOTYPE ♂, *Papilio troilus* Linnaeus 1758, designated by R. Gatrell 2000 in TTR 2:4. Second larger label, white with hand written inscription: July 19, 1970, Charleston Co., SC, visc. Middleton Place Plantation. The specimen is currently deposited in the MOTH collection, Goose Creek, SC.

I chose an *ilioneus* form male as the *troilus* neotype because: 1) this phenotype best fits Linnaeus' original description of a taxon with "prominent **pallid** [sallow] marginal spots," and 2) because the *ilioneus* phenotype is so frequent, throughout the entire flight season, in south coastal South Carolina that it can accurately be referred to as the normal topotypical male *troilus* form.

Unfortunately, taxonomists in general have long misunderstood, and therefore disassociated, the names *troilus* and *ilioneus*. To be blunt, the primary reason for this is that workers not based in the Southeastern U.S. (which is almost everyone) have historically defined *troilus* by what was in their "back yard" and not on the scientific record. Thus, for decades *troilus troilus* has been defined in their minds (and published works) by atypical Northeastern or Midwestern populations dominated by blue-spotted (dark) HW males – populations in which pale spotted males are nonexistent or rare. Therefore, when these lepidopterists encountered light spotted *troilus* individuals in northern, eastern, or central Florida they determined that they were **subspecies** *ilioneus*. However, they are actually nominotypical *troilus* in its typical **form** – *ilioneus*. These workers should have noticed that Linnaeus' chief dorsal feature was prominent pallid (creamy) spots. They should have understood what Linnaeus **meant** by *Indiis*.

I believe that being familiar with a taxon as it occurs in the field is one of the taxonomists greatest assets. Museum specimens can only reveal so much. In fact, sometimes they can even be misleading. This is because many collectors often "target" only certain forms, or specimens of a certain size. This in turn results in giving a false impression of the phenotypic percentages or average proportions in a wild population. But mostly, there are many environmental and biological facts that can only be obtained by observing living specimens in their natural environs. I believe I am as aquatinted with *troilus* in nature as anyone.

I first became familiar with *Pterourus troilus troilus* in 1966 while living in St. Louis, Missouri. We often saw specimens of *troilus* in our back yard in urban St. Louis. I also observed scores of *troilus* in south-central Missouri on our visits to my wife's grandparents homestead on the banks of the Jacks Fork River. I only encountered the greenish-blue spotted male phenotype in Missouri.

Since moving to Charleston in 1970 I have studied butterflies in all areas of the state. The only subspecies in South Carolina is *P. t. troilus*, with form *ilioneus* being most frequent in the south coastal area of the state. Since 1970 I have also often collected Lepidoptera in several counties in northern and eastern Georgia. Only subspecies *P. t. troilus* is in Georgia with both male forms. (I have also collected *P. t. troilus* in western and central North Carolina, central and eastern Kentucky, eastern Tennessee, northern Mississippi, and eastern Arkansas.)

While serving in the US Navy, I was stationed in Pensacola, Florida from the early spring of 1968 to the spring of 1970. During that time I collected Lepidoptera extensively in the area between Fort Walton

Beach, Florida and the Mobile Bay in Alabama. *Pterourus troilus* was a common and widespread species in that region. Over those two seasons I collected numerous *troilus* individuals and observed hundreds more. The only subspecies I observed in that part of the Gulf coast was *troilus troilus* with greenish-blue spotted males being dominant. I found only *P. t. troilus* in the following Gulf coast counties: Alabama: Baldwin; Florida: Liberty, Bay, Walton, Okaloosa, Santa Rosa, and Escambia.

Over the last 30 years I have made many trips to sites in all of Florida. My experience with the populations in Nassua, Duval, St. Johns, Clay, Putnam, Marion, Volusia, Levy, Citrus, and Hernando counties reveals that these are also all referable to subspecies *P. troilus troilus*, with both male forms being present in this area (*ilioneus* dominant). Nominat *troilus* in this area are larger and have larger spots but they are typical *troilus* in their coloration – especially the females. Male specimens begin to occur regularly in the southern part of this area in transition toward the southern subspecies.

The tension zone⁴ between the two subspecies in Florida becomes pronounced in Orange, Brevard, Polk, Manatee, and Sarasota counties. I have collected/observed individuals from these areas which are identical to toptypical *troilus* (Fig. 6) and others (at the same sites) which strongly lean toward the new subspecies. In Manatee and Sarasota counties, most male specimens are closer to the new subspecies than *troilus*, but are not the new subspecies. The females in these two counties remain close to normal *troilus*.

From at least 1951 (Klots) to 1994 (Tyler et al) all of the populations in Florida were referred to in the literature as subspecies *ilioneus*. This is now know to have been incorrect for two reasons. First, *ilioneus* is a synonym of *troilus*. Second, there are three distinct entities in Florida: *P. t. troilus* in northern Florida, intermediates in middle and upper-southern Florida, and *fakahatcheensis*, Gatrell nssp. (described herein) in the southern tip of Florida. In 1994 Tyler (et al) erroneously applied the name *texanus* Ehrmann, 1900 to all populations from southeast Georgia throughout Florida (less the panhandle).

TEXANUS

In 1900 George A. Ehrmann of Pittsburgh, Pennsylvania published an article in *The Canadian Entomologist* titled *Variations in Some Common Species of Butterflies*. The clear intent of this article was to give names to variant individual forms of established taxa and not to name any new species or subspecies. In addition to several other taxa, Ehrmann dealt with three swallowtails in his paper: *Papilio polyxenes asterius* Stoll, 1782, *Battus philenor* (Linnaeus, 1771), and *Pterourus troilus* (Linnaeus, 1758). He named a variant male form for each of these swallowtails as follows.

Papilio asterias, Fabr. Var. *semi-alba*, ♂, nov. var.

On July 31st, 1899, I captured a very interesting form which is out of the ordinary run of the variation which prevails in this species. The size and markings are the same as the normal form, but all the maculations on the primaries are pure white, while the markings on the secondaries are of a deep golden yellow. The underside is the same, but not so conspicuous. Two males in my collection.

Hab.—S. W. Penn'a

Papilio philenor, Linn. Var. *obsoleta*, ♂, nov. var.

This form has no submarginal spots either on the fore or hind wings on the upper side; the underside of all the wings is the same as the normal form. Two males in my collection.

Hab.—S. W. Penn'a

Papilio troilus, Linn. Var. *Texanus*, ♂, nov. var.

In this form the light suffusion on the hind wings between the submarginal lunules and the discoidal cell is replaced by a well-decided band of ashen gray; the band is half an inch wide throughout; the submarginal spots, both on the fore and hind wings, are much larger than the general form. Expands 4 ½ inches. Male in my collection.

Hab.—Houston, Texas.

⁴ A “blend zone” is where two subspecies, one having arisen from the other, blend (a phenomenon of divergent evolution). A “tension zone” is where two subspecies, of different refugia ancestors, meet and clash (a phenomenon of convergent evolution).

All three swallowtail descriptions are worded similarly. The names given to these individual male specimens are clearly based on aberrant, gender specific, forms within otherwise normal populations of nominate subspecies. Under the rules of the ICZN, all of these names are infrasubspecific and unavailable. To become subspecifically available, an infrasubspecific name would need to meet the condition of either article 10.2 or article 45.6.4.1. I do not see the name *texanus* as having ever met one of these conditions.

Rothschild and Jordan (1906), and Seitz (1924) are the only works that come near to satisfying 45.6.4.1, which had to be met before 1985, but they fall short. In examining these works we should remember that there is both an extant type specimen (which defines/limits the phenotype) and a type locality (which defines/limits the possible subspecific genotype). Thus, the name *texanus* Ehrmann should not be arbitrarily moved about either geographically (to some other North America genotype – which is what species and subspecies are all about) or morphologically (to some other distant phenotype).

Rothschild and Jordan (pg. 597) apply the name *texanus* so broadly as to generally fit all *troilus* populations from coastal South Carolina southward. They place all Florida *troilus* under this name. They thus include three phenotypes and two subspecies under *texanus* – *troilus troilus* in north and upper-central Florida; intermediates in lower-central and upper-southern Florida; and undescribed subspecies in extreme southern Florida. Their application of *texanus* is **subspecifically indeterminate** relative to Floridian *troilus*.

They state that Texas specimens are nominate *troilus*, but raise the preposterous idea that Ehrmann's Houston, Texas locality "is perhaps erroneous." (Ehrmann surely knew where he caught the specimen!) However, they fail to ask, or answer, the essential question. Is there a Houston, Florida? There is one Houston in Suwannee County northern Florida. If this is the "Houston" type locality, it is nominate *troilus*.

To satisfy 45.6.4.1 they would have had to have definitively applied Ehrmann's name to a single subspecific population, which they did not do. In fact, they did just the opposite by associating the name on too broad of a regional and phenotypic basis. Rothschild and Jordan associated the name *texanus* with three taxonomically different Floridian entities – and (perhaps) a Texan one too. Article 45.6.4.1 requires adoption (harmony) not ambiguity (discord).

Had 45.6.4.1 been met by Rothschild and Jordan, then *Papilio troilus texanus* Ehrmann, 1900 would stand as a subspecific name. But for what geographic subspecies – the one in east Texas (which is *P. t. troilus*), the populations in north-central Florida which are also nominate *troilus* but containing intermediate individuals between *P. t. troilus* and the subspecies in extreme southern Florida, or the undescribed southern Florida subspecies? These populations are far from the same. The vast majority of the populations Rothschild and Jordan associated this name with fall under the nominate subspecies or intermediates. By original description, the type specimen limits the name to a gray male form.

If someone would propose that Rothschild and Jordan did meet (by adoption) article 45.6.4.1, then we would be in the untenable ICZN position of having a type specimen for one taxon (a Florida "*texanus*") whose aberrant type is representative of another taxon (Texas *troilus*)! A taxon is defined first by its extant biological representative(s), not a name. Also, if we eliminate the Ehrmann type from the equation, then we would have a subspecies (Florida "*texanus*") with no delimiting description, deposited types, type locality, or published figures.

The *Papilio* section in Seitz was written by Dr. Jordan. In this, Jordan simply repeats his 1906 theme. He establishes no type specimen or type locality. His key phrase is "[individual] specimens **also** occur." He thus again applies the name *texanus* in an uncertain manner. That is, if specimens "also occur" in one form then they have to "also occur" in **another form** within his "Florida" population. His statement is actually accurate as there are **three forms**, two *troilus* subspecies and an intermediate, in Florida. But while it is accurate, it is not subspecifically correct. In actuality, he is only noting that **within the populations** in Florida, and perhaps Texas, specimens (**individuals**) occur that have lighter spotting. His textual application is nebulous and so out of sink with what occurs in nature that it renders his taxon without phenotypic definition or geographic limitation ("Texas?"). This presents only more taxonomic confusion not clarification. Article 45.6.4.1 is not met here.

From at least 1931 (Holland) to 1994 the taxonomy of *troilus* was fairly stable as virtually all of the published works followed Ehrmann's explicit intent and deposited *texanus* into nominate *troilus* synonymy. Unfortunately, after 63 years of taxonomic stability relative to the non-subspecific use of *texanus*, Tyler et al (1994) again incorrectly applied the name to all Florida and southern Georgia *troilus*. A few others have now followed this (i.e. Mather, 1994 and Calhoun, 1997). None of these can meet article 45.6.4.1 as they were published after 1985. I hold that the name *texanus* is subspecifically unavailable because it was clearly introduced by Ehrmann as infrasubspecific and has never met article 45.6.4.1 or 10.2.

However, for the sake of taxonomic clarity, I here state that because the name *Papilio troilus* variation *texanus* Ehrmann, 1900 (type locality Houston, Texas) was specifically applied, by all the above authors (including Tyler et al), to *Pterourus troilus troilus* populations in either eastern Texas, southern Mississippi, southern Georgia, and/or northern and central Florida, I here affix and confine this name, as a subspecies (of authors), to the synonymy of nominotypical *Papilio troilus* Linnaeus, 1758 as this is the only subspecies in the above mentioned regions. I further state that *Papilio troilus* variation *texanus* Ehrmann, 1900, as either a form or a subspecies (of authors) must, by this regional limitation and the ICZN rules of priority (see below), also be placed in the synonymy of *Papilio ilioneus* Smith 1797. My position is not new. This was the accepted (and correct) taxonomic position from 1931 to 1994.

FLORIDIAN *TROIILUS*

The Florida populations of *troilus* have never been presented correctly in the literature. I believe this is because many taxonomic workers (especially in the northeastern U.S.) have long misunderstood nominate *troilus* as originally described by Linnaeus and Smith (as *ilioneus*). This is evidenced by the fact that the nominotypical subspecies has rarely been attributed to the state except in the area of the panhandle (e.g. Kimball (1965), Gerberg and Arnett (1989), Calhoun (1997)).

The populations in the northern half of Florida are the nominotypical subspecies, *troilus*. In the lower half of Florida (except the southern tip) the populations are intermediate to the new subspecies described herein. Those few workers who have seen specimens from the southern tip of the state have usually viewed them as only aberrant forms, ecotypes, or extremes at the end of a cline. In the course of this study I was surprised at how few people have actually collected this undescribed taxon.

The last major taxonomic presentation of Floridian *troilus* was by Tyler et al (1994). This work in particular needs to be addressed here due to the serious errors in its presentation of Southeastern *troilus*.

First, they state (pp. 33, 208, & Pl. 93) that they used the name *texanus* rather than *P. ilioneus* Smith because they believed *P. ilioneus* Smith to be preoccupied by "ilioneus" Cramer (1776) making *ilioneus* Smith a homonym. However, Cramer's *illioneus* is spelled with two L's not one as is *ilioneus* Smith. Under the ICZN one-letter rule these names are not homonyms. Next, they are also not homonyms under 58.7 because article 58 applies only, "when the nominal taxa they denote are [currently] included in the same genus or collective group." Lastly, even if these names were identical, article 23.9.5 requires that *ilioneus* Smith be retained because: 1) *illioneus* Cramer was used in conjunction with *Caligo* Hübner, 1816 long before the required date of 1899, and 2) from 1899 to date **all** workers have employed these names as *P. ilioneus* (Papilionidae) and *C. illioneus* (Nymphalidae). Thus, *ilioneus* Smith cannot be a disallowed primary homonym under *Caligo illioneus* (Cramer) because 23.9.5 forbids it.

Second, the *troilus* on Plate 93 are replete with errors. Of the thirteen *troilus* specimens figured six are in some type of error as follows. Fig. K: Actually a male – cited as a female (1 error). Fig. L: Actually a dorsal female – cited as both a male and a female ventral (2 errors). Fig. N: Actually a female – cited as a male on plate but female in appendix (2 errors). Fig. O: Actually a typical *troilus* form *ilioneus* with slightly larger than normal spots, it is part of the Sarasota County tension zone population – presented as Florida subspecies (1 error). Fig. P: Actually a male – cited as a female. The appendix lists this specimen as from Texas. If this is so, it is a good example of a specimen of one subspecies (*troilus*) which looks like (but can

not be) another subspecies – which they say it is (2 errors) (it also demonstrates that Ehrmann’s type is Texan). Fig. Q: Actually a very typical *troilus troilus* female from Jacksonville, Florida – cited as south Florida subspecies (compare to J and R) (1 error).

Only figures 10, 12, and R are specimens of the new south Florida subspecies described herein. The rest are either *troilus troilus* dark form, intermediates (K & O), or atypical specimens compared to the norm in the populations from which they were taken (N & P). I also strongly suspect that female specimen N is mislabeled. I have spent a lot of time in the area of New Smyrna Beach over the years and have never seen a *troilus* in that area which even remotely resembled this specimen.

Tyler et al does not meet 10.2 in regard to the name *texanus* for several reasons, not the least of which, is the fact that they apply the name, without type locality (except possibly Texas) to all Floridian forms and subspecies (except in the panhandle).

A NEW SUBSPECIES OF *PTEROURUS TROILUS*

The preceding sections of this paper have been put forth to bring about the proper delineation and application of those names which have already been published. However, even if the names *troilus*, *ilioneus* and *texanus* were to remain in place in their prior (incorrect) usage, it would have no effect on the validity of the new subspecies about to be described in this section. This is because all of the above names have been specifically applied to all of Florida. This paper is not the “renaming” of an already described taxon because the Everglades ecosystem segregate has never before been recognized as subspecifically distinct from the rest of Floridian *troilus* – nor has a name ever been proposed for this segregate before.

Yet, it is evident that for some time it has been known that the population of *Pterourus troilus* in extreme southern Florida is at least phenotypically unique (e.g. Clark and Clark, 1951). Why someone has not taken the time (and trouble) to fully research this is odd to me. Instead workers have either relied on the opinions of others or sought to take the path of least resistance by haphazardly and broadly overlaying the existent, but non-applicable, names *ilioneus* or *texanus* to specimens from this area of Florida.

This paper is the first evolutionary taxonomic investigation of the *troilus* populations in the extreme southern tip of Florida. As such, the first focus is not the beauty of this taxon or its unusual phenotype. As with all subspecies, the first inquire should be one of evolutionary origin. Where did this taxon come from?

The occurrence of intermediate forms in central Florida could indicate that the south Florida phenotype is simply the extreme end of a long blend zone with no real definitive evolutionary origin. Or, the presence of seasonally similar forms in other parts of the South (from Texas to Florida to South Carolina) could indicate that this is simply an extreme expression of an ecotype. That is, a phenotype produced by climate or environment and not evolution. Neither of these are the case.

Dr. Richard Boscoe of Lafayette Hill, Pennsylvania has reared this subspecies from Collier County females. Boscoe’s females oviposited on *Persea borbonia* (L.) (Red Bay), which is the primary host of this subspecies. He then reared the larvae on *Sassafras albidum* (Nuttall) (Sassafras) in the northeastern U.S. Eleven of these reared specimens are in the FSCA collection, Gainesville. They are all typical males of new subspecies *fakahatcheensis*. This is firm evidence that *fakahatcheensis* is not an ecotype because its normal phenotype was produced in specimens reared in the northern subspecies environment and on its host.

Dr. Jeff Slotten of Gainesville, Florida has a great deal of field experience, over several years, with this segregate in the Fakahatchee Strand area of Collier County. (I have only three days experience with this taxon in Collier County.) He has made a very important field observation relative to the timing of this taxon’s adult flights. This subspecies acts much like *Heraclides aristodemus ponceanus* (Schaus, 1911) in that its adult emergence is evidently tied to the advent of periods of rain. I have not found this phenomenon to exist in any other part of *troilus* range. This is an evolutionarily unique event that gives evidence as to the origin of this subspecies.

A precipitation related emergence pattern is common among tropical and subtropical Lepidoptera as they have made the evolutionary adjustment to wet and dry seasons. The hypothesis here is that this survival mechanism arose in a peri-Pleistocene Caribbean or Island Florida ancestor when this type of acclimation was essential for species survival due to extended periods of dry weather. I lean toward a Caribbean ancestor that arrived in Florida about the same time as *ponceanus*' ancestor. Museum specimens indicate that *ponceanus* and *fakahatcheensis* were once sympatric on the mainland south of Miami.

This is reinforced by records of this subspecies from the Florida Keys and Cuba. Opler & Krizek (1984) pg. 51 and Scott (1986) pg. 183 regarded the Cuban specimens as strays. However, they could also be vestiges of a still extant population there, or the last specimens of a now extinct population. (The nominate subspecies of the otherwise temperate *Papilio polyxenes* Fabricius, 1775 is a Cuban endemic.) King in Kimball (1965) recorded this *troilus* as ranging into the Keys. In any case, *fakahatcheensis* was once isolated from the northern (mainland) subspecies for at least a few thousand years.

Therefore, the intermediate forms in central Florida have come into being in only one of two ways. If *fakahatcheensis*' origin was the central Florida island, then (beginning at the time of its contact with mainland *troilus*) the northern *troilus* genes are diluting the *fakahatcheensis* gene pool and pushing it out (further south). Or, if *fakahatcheensis*' origin was the Caribbean (which I believe is the case), then its genes are incorporating into the *troilus* gene pool and moving the boundary of *troilus* further north. Either way, *fakahatcheensis* is not an ecotype (as is *ilioneus*) or the end of a cline. Central Florida is a tension zone where gene pools are struggling for dominance, stability, and subspecific identity.

There are several phenotypic characters in *fakahatcheensis* that manifest both its evolutionary distance from nominate *troilus* and closeness to *Pterourus palamedes* (Drury, [1773]). All *fakahatcheensis* males and females have the lower five VFW postmedian spots well developed with the great majority of males having these five spots clearly defined on the DFW also. (There are two specimens in the type series with eight DFW spots in this band.) In this they resemble *palamedes* more than nominate *troilus* whose males only occasionally have two to four (rarely more) of these spots vaguely present. In *troilus* these spots are bluish and rarely whitish, while in *fakahatcheensis* they are whitish and rarely bluish.

In the great majority of *fakahatcheensis* males the yellow line at the base of the VFW costal margin is just as prominent as it is in *palamedes*. In *troilus* this feature is usually absent or lightly present. The VHW yellow line in SM₂ of *palamedes* is occasionally represented in *fakahatcheensis* males by a diffuse streak in the same area. If this occurs in *troilus*, I have not seen it.

The DHW submarginal row of spots in female *fakahatcheensis* is often yellow and thus exactly as in the male. Thus, the *fakahatcheensis* sexes are much more alike than the *troilus* sexes are. In this they also lean to *palamedes* whose sexes are similar. It is worth noting that the sexes of Cuban *Papilio polyxenes* are much alike also. There is no mimicry of *Battus philenor* (Linnaeus, 1771) by *fakahatcheensis* females which in flight look most like the dark females of *Pterourus glaucus* (Linnaeus, 1758).

These characters manifest *fakahatcheensis* as evolving between *palamedes* and nominate *troilus*. *Fakahatcheensis* is not an ecotype or something at the "end of a cline." It is a relict subspecies struggling against the northern *troilus* gene pool for its subspecific integrity.

***Pterourus troilus fakahatcheensis* Gatrelle, new subspecies.**

Diagnosis and Description. Female (Fig. 11). Subspecies *fakahatcheensis* and *troilus* are delineated most clearly in the female – phenotypically and geographically. The regional shift in Florida from subspecies *troilus* to *fakahatcheensis* is much more abrupt in females than in males. The males of these two integrate widely from Orlando to Lake Okeechobee. In this same area, the great majority of females are typical *troilus* with yellow spotted females being virtually unknown. In subspecies *troilus*, males are dimorphic while the females have only one form. In subspecies *fakahatcheensis*, the opposite is found with *fakahatcheensis* males being relatively homogenous and the females variable. About 10% of *fakahatcheensis* females have bluish-green DHW submarginal spots, another 25% have these spots intermediate, with the remaining 65% having pale yellow DHW submarginal spots. These spots in *troilus* females are bluish. There are three primary differentiating characters between the females of *P. t. troilus* and *P. t. fakahatcheensis*. First, in *fakahatcheensis* the submarginal spots are

greatly expanded in size and lighter color (usually light yellow). Second, the broad field basad of these spots is dark blue in *troilus* whereas in *fakahatcheensis* it is distinctly greenish or greenish yellow. Third, the amount of yellow on the abdomen, ventral thorax, and legs is much greater in *fakahatcheensis*. The female figured by Harris in *Butterflies of Georgia* (plate 2:4 as *ilioneus*) is the best picture of *fakahatcheensis* in the popular literature. (Note that this specimen is from Miami.) It is also contrasted nicely with the *troilus* female (no. 2) just above it. Harris' male *troilus* (no. 1) is form *ilioneus*.

Male (Figs. 8 & 10). Most workers have focused on male *fakahatcheensis*' larger, creamy or greenish-yellow, submarginal DHW spots as its main character. However, its most significant evolutionary character is the prominence of the postmedian row of spots on the dorsal forewings. In most *troilus* males the postmedian spots are absent, while in male *fakahatcheensis* this row of spots is usually present to some degree (two of the *fakahatcheensis* paratypes have eight spots in this band). This postmedian spotting in male *fakahatcheensis* is usually yellowish. When individuals of *troilus* (inc. form *ilioneus*) are encountered with postmedian FW spotting it is almost always greenish or bluish. The prominence of this character is a link to *Pterourus palamedes* (Drury, 1773). The strength of this character tells us that *fakahatcheensis* is the *troilus* closest to *palamedes*. The fact that *ilioneus* tends to have larger lighter spots is coincidental and not indicative of an evolutionary relation with *fakahatcheensis*. We know this because the *ilioneus* phenotype is clearly an environmentally (dominate in spring or late fall) produced **ecotype**. The *fakahatcheensis* large, creamy, double spot band is produced by a **genotype** closer to *palamedes*. This ancestry is also revealed in the markings on the ventral hindwings of *fakahatcheensis* where the yellow line in SM₂ of *palamedes* is often partially present in *fakahatcheensis* (Fig. 10). All this points to a subtropical ancestry in *fakahatcheensis*. In all the *fakahatcheensis* males I have seen the DHW submarginal spots are light yellowish to some degree, and usually boldly yellow. The broad field basad of these yellow spots is never bluish as in *troilus* males, rather it ranges from greenish-yellow to green. On the venter both sexes of *fakahatcheensis* are marked alike. They differ on this surface from *troilus* in having a prominent yellow line at the base of the FW costa, larger more triangular postmedian VFW spots, and the VHW spots less red and often with yellow halos.

Types. *Holotype* ♂ (Fig. 8): FLORIDA: Collier County, visc. Copeland, 2 September 2000 (leg. R. Gatrell). *Allotype* ♀ (Fig. 11): FLORIDA: Collier County, Everglades Blvd. at 78th, 1 September 2000 (leg. R. Gatrell). *Paratypes*: 57 ♂♂, 16 ♀♀: all FLORIDA: DADE COUNTY: 40 mile Bend, 3 ♂♂, 10 August 1958 (leg. BWB); Miami, 1 ♂, 1 June 1946 (leg. H.L. King); 1 ♂, 3 June 1939; 1 ♂, 28 May 1936; 1 ♂, 30 June 1935; 1 ♀, September (all leg. Grimshawe); MONROE COUNTY: Rood Rd., 3 ♂♂, 20 March 1958 (leg. Reinthal); COLLIER COUNTY: Hwy. 29, 1 ♂, 7 April 1978 (leg. Fee); Seminole State Park, 1 ♂, 19 March 1958 (leg. Reinthal); Fakahatchee Strand, 1 ♂, 21 July 1973; 1 ♂, 3 September 1975; 3 ♂♂, 2 September 1976; 2 ♂♂, 6 August 1977; 4 ♂♂, 20 March 1978; 1 ♂, 20 March, 1 ♀, 23 March, 3 ♂♂, 25 March, 2 ♂♂, 10 June 1979; 1 ♀, 6 September 1988 (all leg. Finkelstein); 1 ♂, 13 August 1986 (leg. A. Towers); Everglades Blvd. at Canal Road, 15 ♂♂, 10 ♀♀, 30 August - 2 September 2000 (leg. R. Gatrell); Copeland, 1 ♂, 25 March 1970 (leg. H. Flashka); visc. of Fakahatchee Strand, 1 ♂, 2 ♀♀, 10 September 1989; 1 ♂, 24 August; 2 ♂, 1 ♀, 3 September 1990; 1 ♂, 27 March 1993; 2 ♂♂, 27 March, 4 ♂♂, 21 August 1999; 4 ♂♂, 1 ♀, 2 September 2000 (all leg. J. Slotten). The holotype and allotype are currently deposited in the Museum of the Hemispheres, Goose Creek, South Carolina. Paratypes are deposited in the following collections. Florida State Collection of Arthropods, Gainesville, Florida: 33 (30 ♂♂, 3 ♀♀), Jeff Slotten, Gainesville, Florida: 9 (6 ♂♂, 3 ♀♀), Museum of the Hemispheres, Goose Creek, South Carolina: 36 (25 ♂♂, 11 ♀♀).

Geocological type locality. Pine/hardwood areas in and around the Fakahatchee Strand, Collier County, Florida.

Status. This species is very common in Collier and Monroe counties. Much of its range lies within the National and State wildlife refuges and parks at the southern tip of Florida. It is therefore not in need of any special attention other than continued habitat preservation within these wildlife areas.

Range. *Pterourus troilus fakahatcheensis* ranges from coast to coast across the southern tip of Florida, although it is apparently rare today in the area south of Miami. Some modern writers state that this butterfly is absent in the Miami area (i.e. Gerberg and Arnett, 1989) while the older writers list it as "common" there (i.e. Rothschild and Jordan, 1906). It does not seem to range far to the north, though there is some indication that its range may extend further to the north on the east coast of Florida than on the west coast. I do not consider it to range, as a true subspecies, north of the general area of Florida Highway 80. This is an extremely arbitrary boundary. I give it only as a reference for future research. However, do note that my first inclination was to give I-75 (Naples to Ft. Lauderdale) as the northern "limit." Thus, in noting the vicinity of Hwy. 80 as the delimiting area, I am being liberal rather than conservative. Slotten states that specimens observed by other lepidopterists further south in the Everglades National Park are more subspecifically pronounced. Specimens in the FSCA collection from Highlands County northwest of Lake Okeechobee are intermediates and not referable to *fakahatcheensis*.

Comments. 80 specimens compose the type series. There are two other specimens in the FSCA collection collected by Mrs. Grimshawe that were not included in the type series because I was dubious of their authenticity. Mrs. Grimshawe sold specimens and was not above mislabeling them. *Fakahatcheensis* is pronounced fak-a-hatch-e-en-sis. The purpose of this paper is the delineation of southern *troilus* and the description of a new subspecies. Non-southeastern *troilus* have not been addressed herein. Northern and western *troilus* (though probably not subspecifically distinct) should be reassessed in a technical manner and the results published. The VHW spots of northern specimens tend to be much smaller and a darker red.

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Fig. 6. *Pterourus troilus* ♂ (*ilioneus*): 7 Mar. 1991, old Hwy. 37, S. of Mulberry, Polk Co., FL. **Fig. 7.** *P. troilus* ♂ (green): 3 Aug. 2000, Brigham Landing., Burke Co., GA. **Fig. 8.** Holotype ♂ *P. t. fakahatcheensis*: data in text. **Fig. 9.** *P. troilus* ♀: 8 May 2000, Goose Creek, Berkeley Co., SC. **Fig. 10.** Paratype ♂ (ventral) *P. t. fakahatcheensis*: 27 March 1999, Collier Co., FL. (leg. Slotten). **Fig. 11.** Allotype ♀ *P. t. fakahatcheensis*: data in text. (All leg. R. Gatrell, except 10.) All figures X-1.

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