



# The Taxonomic Report

OF THE INTERNATIONAL LEPIDOPTERA SURVEY



## DESCRIPTION OF A NEW SUBSPECIES OF *POANES AARONI* (HESPERIOIDAE: HESPERIINAE) FROM THE WEST CENTRAL GULF COAST OF THE SOUTHERN UNITED STATES

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**ABSTRACT.** *Poanes aaroni bordeloni* is described from Jefferson County, Texas. This taxon is part of a lepidopteran community endemic to the west central area of the US Gulf Coast between Mobile Bay, Alabama and Galveston Bay, Texas. As such, *bordeloni* is defined taxonomically by its evolutionary development as much as by its facies. *Bordeloni* is the largest *aaroni* subspecies. *Bordeloni* males are marked much like those of *P. a. howardi* both dorsally and ventrally. *Bordeloni* females usually have the fulvous spotting on the dorsal forewings reduced as in *P. a. minimus* females while the fulvous on their upper hindwings is more extensive than *P. a. howardi* females. Morphologically, the forewing outer margin in both sexes of *bordeloni* is distinctly straighter and much less rounded than in the other *aaroni* subspecies. The *bordeloni* holotype is deposited at Texas A & M University. Lectotypes are designated for *Pamphila aaroni* Skinner 1890 and *Pamphila howardi* Skinner 1896 from specimens in the collection of the Carnegie Museum (NH), Pittsburgh.

**Additional key words.** Phenosyncronic subspeciation.

### SOME MECHANICS OF LEPIDOPTERAN TAXONOMY

#### Species and Subspecies are Evaluated Differently

Lepidoptera populations are determined to be individual species when they meet certain objective **criteria** – reproductive isolation, genetics, genitalia, mate location dynamics, host parameters, etc. Evolutionary theory is not a factor in determining speciation because species (with or without subspecific components) are the product of an evolutionary process past – a definitive plateau in the process. Thus, when properly done, the taxonomic placement of populations at the species level is self evident and unarguable because it is based solely on observable facts.

Conversely, the taxonomic placement of populations of Lepidoptera at the subspecific level must deal with the past, present, and future of the organism's evolution because subspecies are only subjectively defined components of a species. Where phenetically (morphologically, biologically, ecologically, etc.) is a subspecific population going relative to where it has been in its association with the other components of the species. Evolutionary theory is a major factor in determining subspeciation because sub-species (as sub-components) are the most observable manifestation of a species active evolutionary process – a semi-definitive step (toward stagnation/extinction or adaptation/speciation) in the plateau process.

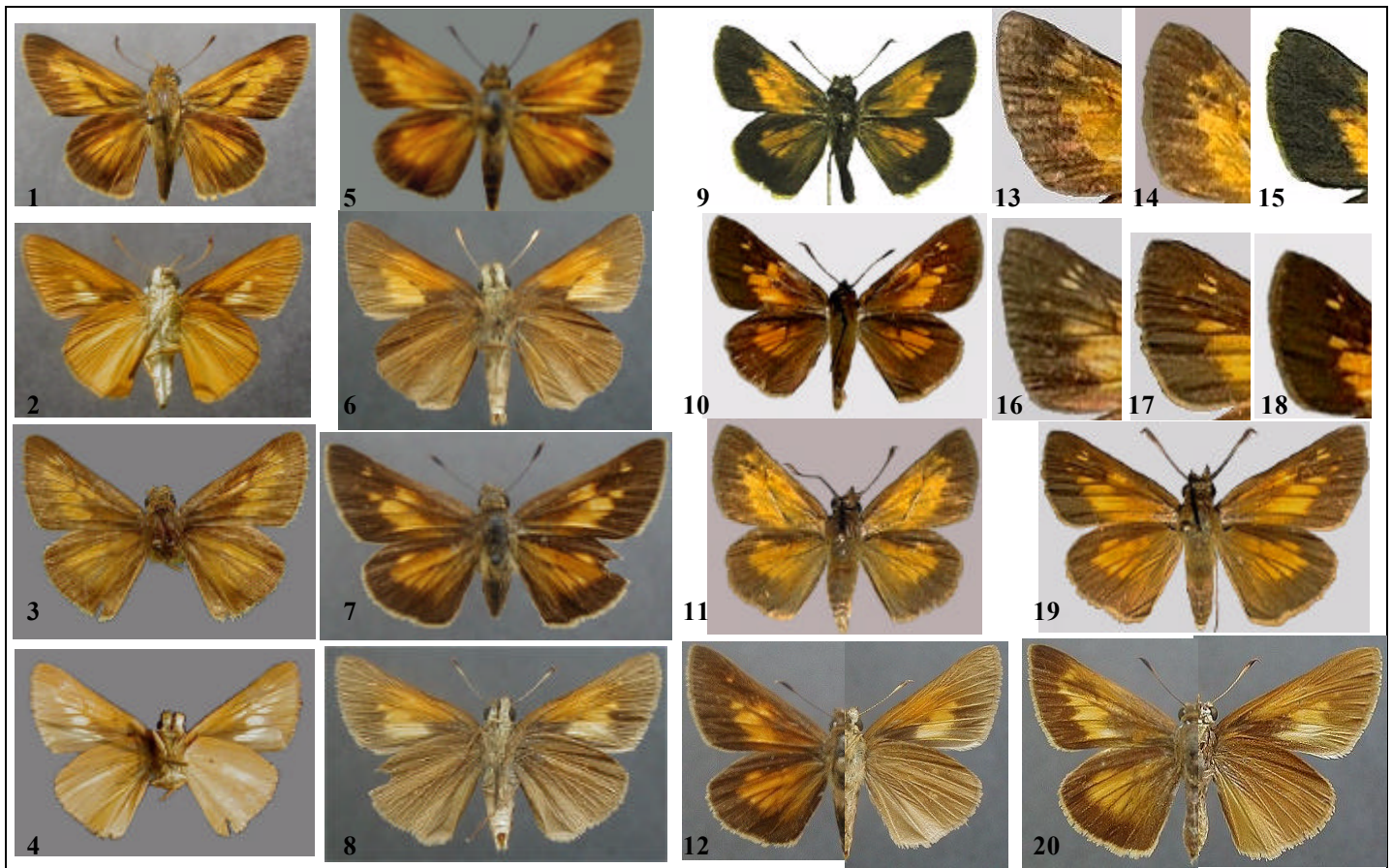
Thus, at the subspecific level, the taxonomic classification of Lepidoptera is based largely on a researcher's assessment (hypothesis) of a population's evolution. Therefore, the subjective analytical **process** by which the researcher's assessment was made is the primary element that must be weighed in determining the validity of the proposed subspecific taxonomic conclusion – not some group of preset criteria. The

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exception is non-clinal subspeciation where the set criteria of isolation is usually factored in. However, this isolation can be established through either seasonality or geography.<sup>2</sup> Subspecific classification is therefore often arguable because it is always subjective to some degree.

Mechanically, species level taxonomy can be accomplished without any evolutionary theory by **objectively** weighing an organism against certain generally accepted criteria, while subspecific taxonomy can not be properly accomplished without a **subjective** understanding (theory) of an organism's evolutionary past, present, and future. Species and subspecies are evaluated differently.

Thus, a taxonomist who utilizes the same system of analysis (either objective preset criteria or subjective process and assessment) for both the specific and subspecific levels will inherently be in error at one. This manifests itself in one of two ways: 1) A taxonomist will describe a population as a new species but without sufficient proof because the research is too interpretive. This occurs when subspecific level



**Figs. 1-4. *Euphyes bayensis*.** 1/2 (d/v) ♂: Texas, Jefferson Co., Sabine Pass, 13 Sept. 1994, leg. Bordelon [Bordelon]. 3/4 (d/v) ♀ paratype: Mississippi, Hancock Co., Bay St. Louis, 10 Oct. 1970, leg. Kergosien [MOTH]. **Figs. 5-8 & 12. *P. a. bordeloni*.** 5/6 (d/v) ♂ holotype: Texas, Jefferson Co., Sabine Pass, 12 May 1994, leg. Bordelon [TX A & M]. 7/8 (d/v) ♀ allotype: 21 May 1994, then same data as 5. 12 (d/v) ♀ paratype: Texas, Jefferson Co., Sabine Pass, 25 May 1995, leg. Slotten [Slotten]. **Figs. 9 & 10. *P. a. minimus*.** 9 (d) ♂ holotype: South Carolina, Orangeburg Co., Bull Swamp, 1 June 1992, leg. Gatrell [CM]. 10 (d) ♀ allotype: 6 June 1992, then same as 9. **Figs. 11 & 19. *P. a. howardi*.** 11 (d) ♂: Florida, Volusia Co., 10 mi. w. Daytona, 24 April 1971, leg. Roman [FSCA]. 19 (d) ♀: Florida, Volusia Co., Daytona, 25 July 1976, leg. Gatrell [MOTH]. **Fig. 20 (d/v) ♀ *E. pilatka*:** Mississippi, Hancock Co., Bay St. Louis, 27 Sept. 1970, leg. Kergosien [MOTH]. **Figs. 13-18. *P. aaroni* subspecies (left FW margin).** **Fig. 13. ♂ *P. a. bordeloni*.** **Fig. 14. ♂ *P. a. howardi*.** **Fig. 15. ♂ *P. a. minimus*.** **Fig. 16. ♀ *P. a. bordeloni*.** **Fig. 17. ♀ *P. a. howardi*.** **Fig. 18. ♀ *P. a. minimus*.** (d = dorsal, v = ventral) [collection in which specimen is housed]

<sup>2</sup> Subspecies can exist at the same time but not at the same location (i.e., both in March, but one in Texas and one in California). Or, if absolutely univoltine, they can exist at the same location but not at the same season (i.e., both at the same site, but one in the spring and one in the fall). When seasonal subspeciation also involves a shift in host specificity, the organism is well on its way to full speciation (Pratt & Emmel, 1998).

process and assessment are misapplied to the species level. 2) A taxonomist will not describe (or not recognize) a population as a subspecies because it does not meet certain objective criteria. This occurs when specific level criteria are misapplied to the subspecies level. The result: species are weakly described and valid subspecies go undescribed. The effect: subspecies are going unrecognized and therefore unprotected from modern environmental pressures which in turn are causing their unnatural extinction.

An individual who frowns on subspecies (lumper) recently wrote me, “There is no objective way of drawing a line between the degrees of variation in populational segregates.” Interestingly, that is exactly my point! While species are objective and therefore largely unarguable, subspecies are subjective and often arguable. While species are an end product (definitive plateau) of evolution, subspecies are the visible components of a species continuing evolution (irregular steps between plateaus). In the sense that species are easier to delineate, species level taxonomy is easier to do – and thus less controversial. The solution is not to ignore subspecies or avoid subspecific taxonomy, but to find and define the variable taxonomic lines that delimit various living organisms subspecifically.

### **Evolutionary Function of Subspeciation (Variation)**

There are three factors by which the long term evolutionary vitality of a lepidopteran organism is promoted: by its **host acceptability** – the more polyphagous a species larvae are the less apt it is to become extinct; by its **climatic adaptability** – the more tolerant a species is of varying environments the less apt it is to become extinct; and by its **subspecific alterability** – the more subspecific components within a species the less apt it is to become extinct. The third factor is what I want to address here.

The world’s biota is composed of many more subspecies (animals), varieties (plants), and strains (microbes) than species. Since the arrival of winged insects in the mid to late Paleozoic Era (270 to 350 million years ago) and modern insects in the Cretaceous period (70 to 135 million years ago), evolution has insured the existence (by diversification) of Lepidoptera through time by means of subspeciation (that which is **adapting** to new hosts, at different locations, in diverse climates, for a future time) rather than speciation (that which has **adapted** to one host, at one location, in one climate, for a present time). Without variations there will be no future evolution of tomorrow’s new organisms. Therefore, from the future evolutionary perspective, a species with multiple subspecies (more variation) is more important (viable) than those species with no subspeciation.

I therefore find two things very disconcerting about the current climate of American lepidopteran taxonomy. First, in reading the scientific literature, it is truly amazing how often subspecies have been described without any accompanying evolutionary theory. Populations are deemed as subspecies just because they “look different.” No wonder some taxonomists are paying so little attention to subspecies. Second, I am disturbed by the increased number of taxonomists who have no interest in (see no value in) recognizing or describing subspecies. How have some taxonomist’s apparently lost sight of the living, evolutionary, theoretical, and future elements of taxonomic study?

### **Phenosyncronic Subspeciation**

The word “color” is a term we often use in our day to day speech. However, color is composed of several very different technical aspects such as shade, hue, value, and intensity. Thus, when one person is talking to another about the “color” of a flower, the speaker may actually be focused on the hue while the listener may be focused on the value. In which case, communication went forth but was not accomplished.

The word “morphology” is much like the word color. It is a broad term that includes all aspects of an organism’s form and structure – wing and body contour, coloration, and variation. Thus, the words morph and morphology often mean different things to different people. I always employ the term morphology only to that aspect which deals with physical contour or shape (square, round, long, short, hairy, smooth, etc.). When I deal with a population’s coloration pattern I use the word phenotype.

I do this because the root words morph and pheno are very different. Morph is primarily indicative of that type of form which is physical in shape and structure. This is why butterfly larvae, pupae, and adults are often spoken of as morphs. Conversely, pheno is from the Greek *paino* or *phanínein* which means to shine reflectively – to appear via reflected light. Having conveyed my definition of terms, we can move on in our current communication.

In subspecific development it is usual for sister subspecies to evolve distinctly different phenotypes (which are produced by the interaction of the genotype with the environment). This is called phenotypic subspeciation. In describing subspecies, lepidopteran taxonomists have historically focused primarily on a taxon's phenotypic evolution and secondarily on its biological, ecological, or morphological evolution. In fact, many of our described subspecies, while looking very different, actually differ very little biologically or ecologically (e.g., *Limenitis arthemis arthemis* (Dury, [1773]) and *L. a. astyanax* (Fabricius, 1775)).

In some cases however, while a sister subspecies is evolving in a divergent manner morphologically, biologically, or ecologically, its phenotypic evolution is parallel – synchronous. I call this phenosyncronic subspeciation. Thus, phenosyncronic subspeciation exists when the facies of one subspecies differ very little from a sister subspecies (e.g., *Glaucopsyche lygdamus xerces* (Boisduval, 1852) and *G. l. pseudoxerces* Emmel & Emmel, 1998; *Anthocharis midea annickae* (dos Passos & Klots, 1969) and *A. m. texana* Gatrell, 1998; *Cercyonis sthenele sthenele* (Boisduval, 1852) and *C. s. hypoleuca* Hawks & Emmel, 1998).

The subspecific validity of a phenosyncronic subspecies is therefore based primarily on its unseen evolutionary (present and future) genetic potential – as evidenced by its observable biological (inc. larval host), environmental (inc. seasonal), or regional (inc. refugium) distinctives. Phenosyncronic subspecies are a very important segment in the lepidopteran evolutionary chain. Yet, they seem largely overlooked. I believe this is primarily because modern taxonomists have gravitated more and more into the error of applying various species level criteria into the process of subspecific definition.

A phenosyncronic subspecies, by virtue of its divergent evolutionary course, is more evolutionarily significant than a sister subspecies that differs only in its facies. For example, two subspecies which look very different but occupy the same ecological niche, feed on the same host, and fly at the same time are not nearly as evolutionarily important as a third sister subspecies which looks very similar to one of the first two but occupies a different ecological niche, feeds on a unique host, or flies at a different time of year. For example, the genus *Euphilotes* Mattoni, is rich in phenosyncronic subspecies<sup>3</sup> (Pratt & Emmel, 1998).

When a phenosyncronic subspecies evolves to the degree that it warrants recognition as a species, the result is a sibling species pair (e.g., *Euphyes dion* (W. H. Edwards, 1879) and *E. bayensis* Shuey, 1989). Many northern specimens of *E. dion* are indistinguishable in coloration, male genitalia, and stigma from *E. bayensis*. However, they usually differ in male stigma, greatly in habitat preference, and do not interbreed when sympatric.

This paper employs the principles of subspecific taxonomic analysis (process, assessment, and conclusion) as applied to the west central US Gulf Coast segregate of *Poanes aaroni*. The process, in this case, is the examination of a skipper butterfly's biogeographical history, integral biotic community, and phenotype. The evolutionary assessment is that a phenosyncronic subspecies is determined. The conclusion is the description of a new subspecies.

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<sup>3</sup> While these authors do not use the term phenosyncronic subspecies, the taxa they delineate primarily on the basis of seasonal occurrence and host associations fall essentially into this type of subspeciation. In correctly emphasizing that these taxa represent a higher degree of evolution than simple geographic subspecies, they referred to them as semi-species, which is fine for the purpose of conceptual understanding but unacceptable within the Code of the ICZN (the Code only recognizes organisms below the genus level as either species or subspecies). Therefore, Pratt and Emmel elevated several of these taxa to species level – which may or may not be correct. Nonetheless, subspecies, whether biological, morphological, seasonal, host specific, phenotypic, geographic, clinal, or convergent are still only SUBSPECIES. And all species, no matter how marginal or complexly interrelated in groups, are still only SPECIES. The ICZN Code is wisely structured to accommodate both scientific definition (by uniform restriction of technical terms) and evolutionary theory (by non-regulation of authors textual presentation of organic interrelation).

## ***POANES AARONI BORDELONI* GATRELLE, NEW SUBSPECIES**

### **Discovery**

On 27 September 1992 Dr. Jeff Sloten of Gainesville, Florida discovered a population of *Poanes aaroni* (Skinner, 1890) on the Gulf Coast at Bay Saint Louis, Hancock County, Mississippi. This record was not only the first for Mississippi but extended the known range of *aaroni* about 600 km westward (Opler & Krizek, 1984). This site is the type locality of *Euphyes bayensis* Shuey, 1989, and as such, had been previously well sampled. We now know that this Gulf Coast segregate is an undescribed subspecies.

A year later on 30 September 1993 Mr. Charles Bordelon of Beaumont, Texas discovered a colony of this segregate at Sabine Pass, Jefferson County, Texas. This location is near the Texas and Louisiana state line, about 450 km to the west of Bay Saint Louis, and 1000 km from the nearest population of *P. aaroni howardi* (Skinner, 1896). This skipper is now known to occur in Texas westward in Jefferson County to McFaddin National Wildlife Refuge. Bordelon expects it to eventually be found along the coast in neighboring Chambers County to Smith Point and, perhaps, into Harris County. The taxon is well established in this region and is sometimes common.

*E. bayensis* (Figs. 1-4) is sympatric with this *aaroni* subspecies at all known locations. *Euphyes pilatka* (W.H. Edwards, 1867) is also present with this *aaroni* subspecies at the Bay Saint Louis site.

In issue 1:10 of *The Taxonomic Report* (24 December 1999), I described a new subspecies, *Poanes aaroni minimus* Gatrell, from inland South Carolina. In the process of this description, I figured a pair of this Texas *aaroni* and stated that I believed they represented an undescribed subspecies. I also suggested that someone from Texas consider describing it. Shortly after the publication of *TTR* 1:10, I received a phone call from Mr. Bordelon in which he offered to send me his specimens of this segregate and also encouraged me to undertake the description of it. I have. This paper makes public the results of that study. This subspecies is named for Mr. Bordelon in recognition of his many years of work with Lepidoptera and his discovery of this taxon in Texas.

### **Overview of *Poanes aaroni* Subspecies**

*Poanes aaroni aaroni* (Skinner, 1890) was described from seven males and one female collected by Mr. Samuel Aaron at Cape May, New Jersey. The species was not figured and no type was designated. Holland (1931) figures a male “paratype” on PL. XLVI, Fig. 37. It is typical of this subspecies and thus represents it well. This specimen was assumed to be the type and located in the Carnegie Museum NH, Pittsburgh. However, upon my correspondence with Dr. John Rawlins of the CMNH no such specimen could be found. Dr. Rawlins relayed the following (emphasis his).

There is a single male specimen in the CMNH bearing a label stating it to be the specimen figured in Plate LXVI, Fig. 37, but **there is no question that it is NOT the specimen illustrated**. A pin label states that the specimen was obtained by Holland from Skinner in exchange for a pair of *Papilio brevicauda* in 1890. The specimen bears a classic triangular “TYPE” label, but no further data on locality or collector. It is probable but not certain that this is a syntype.

In my subsequent efforts to find a specific specimen specifically designated in the literature to be the type of *P. aaroni*, Dr. Fred Rindge of the AMNH offered the following.

For *P. aaroni*: See both Skinner & Williams, 1924, *Trans. Amer. Ent. Soc.*, 50:60, where they state that the type is in the ANSP. And Gillham and Ehrlich, 1954, *op. Cit.*, 80:112, where they list the type as no. 7093 ANSP.



Dr. Rawlins has informed me that there is one other Skinner specimen at the CMNH. This specimen is the one mentioned above as ANSP (Academy of Natural Science) type no. 7093. I assume here that this is also the specimen that Miller and Brown (1981 page 43) took as the “holotype” in their checklist. Concerning this specimen and situation Dr. Rawlins has relayed the following.

Verbatim label data (labels separated by / with external comments in square brackets): New Jersey [typeset in black ink] / Type 7093 *Pamphila aaroni* Henry Skinner [dark red label, typeset except for “*Pamphila aaroni*” handwritten in black ink]... There is no reason to doubt that the above male is a valid syntype. It is appropriate for lectotypification, if indeed this has not already been done in the literature (Rawlins did not research this aspect thoroughly) as it was marked as a Skinner type when the specimen was still at ANSP.

It seems to me that this specimen should have a lectotype label affixed to it if for no other reason than to tie up any loose ends that may technically still exist. The word “type” on its label just means that it is of the type series and not The Type – holotype. Thus, I here designate this specimen as lectotype of *Pamphila aaroni* Skinner 1890. I have sent a label that reads as follows to Dr. Rawlins to be placed on this specimen. Handwritten on red paper in black ink: LECTOTYPE ♂ *Pamphila aaroni* SKINNER, 1890 Designated July, 2000, R.R. Gatrelle, TTR 2:2.

*P. a. aaroni* is the smallest and most brightly colored (especially females) of the *aaroni* subspecies. I have examined 81 *P. a. aaroni* summarized as follows by state and county. DELAWARE: Kent; NEW JERSEY: Burlington, Ocean, Cape May.

***Poanes aaroni howardi* (Skinner, 1896)** was described from 12 specimens without mention of their sex. All but two of these were only labeled as being from Florida. The two with site specific labels are stated as being from Georgiana on the Indian River. Thus, a definitive type locality has never been established. Accordingly, I here restrict the type locality to: vicinity of Georgiana, Brevard County, Florida. This taxon was also not figured in the original description and no specimen was designated as holotype. Holland (1931) figures a male syntype on Pl. XLVI, fig. 38. It is typical of this subspecies and thus represents it well. This specimen was also assumed to be housed in the Carnegie Museum NH, Pittsburgh. Dr. John Rawlins has relayed the following concerning possible types of this taxon in the CMNH.

Verbatim label data (labels separated by / with external comments in square brackets): Florida [handwritten in black ink] / Collection Dept. Agr. [typeset in black ink] / TYPE [large bold typeset in black ink; a square label, but clearly the top third of the usual triangular Skinner label for “TYPE”, meaning syntype] / Collect. Skinner [typeset in black ink] / type 7092 *Pamphila howardi* Henry Skinner [dark red label, typeset except for “*Pamphila howardi*” handwritten in black ink]...

Described from 12 syntypes of unspecified sex (but including both sexes), 8 specimens in Skinner Collection and 4 from USNM via L.O. Howard. Two syntypes restricted to “Georgiana”, the others without restriction (just “Florida”). The type above is one of the unrestricted ones. there is no reason to doubt that this male is a valid syntype and it would be appropriate for lectotypification if indeed this has not already been done in the literature (Rawlins did not research this aspect thoroughly) as it was marked as a Skinner type when the specimen was still at ANSP...

Rawlins is aware of only one other syntype, at CMNH in June 2000. It is a female labeled verbatim as follows: Florida / Collection C.V. Riley / Collect. Skinner / ALLO-TPYE ♀ *Pamphila*

aaroni Henry Skinner. There is no reason to doubt that this is a valid syntype, and with the designation described above, it would become a paralectotype.

Holland (1898) in "The Butterfly Book" illustrates a male of this species on Plate 46, Figure 38, as *Phycanassa howardi*. As of 15 June 2000 Rawlins could not locate a specimen (male or female) in the CMNH bearing a label stating it to be the specimen figured in Plate LXVI, Fig. 38.

Because the type specimen situation is not absolutely clear in regard to this taxon, I here designate the above mentioned male as lectotype of *Pamphila howardi* Skinner 1896. I have sent a label that reads as follows to Dr. Rawlins to be placed on this specimen. Handwritten on red paper in black ink: LECTOTYPE ♂ *Pamphila aaroni howardi* SKINNER, 1896 Designated July, 2000, R.R. Gatrell, TTR 2:2.

I have examined over 300 *howardi* from the following states (by county). VIRGINIA: Princess Ann; NORTH CAROLINA: Currituck; SOUTH CAROLINA: Beaufort, Colleton, Charleston, Jasper; GEORGIA: Bryan, Chatham, Glynn; FLORIDA: Baker, Dade, Duval, Levy, Putnam, Seminole, Volusia.

***Poanes aaroni minimus* Gatrell, 1999** was described from 46 specimens from a fresh water swamp in Orangeburg County, South Carolina. This is the only known colony of this unusual subspecies. *Minimus* is the most phenetically distinct *aaroni* subspecies.

**The Gulf Coast segregate** of *P. aaroni*, described herein as *P. a. bordeloni*, is the largest *aaroni* subspecies. Dorsally, it is more orange fulvous than yellow fulvous. Its most striking feature is the apically elongate shape of its forewings. These have the outer margins fairly straight which makes the apex very pointed and almost falcate in some specimens. (The outer forewing margins of the three eastern subspecies are distinctly rounded). The viator-spotting on the ventral hindwings of this segregate varies greatly from prominent to absent. The ventral hindwing ground color is slightly darker than in *howardi* (both sexes).

I have examined 31 specimens of this subspecies from the following states (by county). TEXAS: Jefferson. MISSISSIPPI: Hancock. These specimens make up the type series.

### Process and Assessment

As I began to accumulate and study specimens, I first looked for reasons why this segregate should not be considered subspecifically distinct from Floridian *P. a. howardi*. When I placed a few specimens of Floridian *howardi* and the Texas segregate together and just took a glancing look at them they appeared about the same (especially the males). This ephemeral examination of specimens, if coupled with a conception that both populations are resident to a geologically ubiquitous southern United States, could easily lead someone to the conclusion that only one subspecies is involved. However, when I moved beyond a cursory examination of this skipper's facies and also considered the differing biogeographical development of the eastern and western area of the southern United States, a very different picture began to emerge.

Looking closer. The Gulf Coast segregate (*P. a. bordeloni*) shares several coloration and spot pattern characters with both *minimus* and *howardi*. Dorsally, *bordeloni* and *howardi* males are virtually identical in their fulvous spot pattern with *bordeloni* tending to be more orange fulvous and *howardi* more yellow fulvous. Ventrally, *bordeloni* males are more like those of *minimus* except in those males with strong viator-spotting. Dorsally, female *bordeloni* usually have a reduced forewing spot pattern like *minimus* females while the hindwing is more broadly fulvous than *howardi* females. They differ ventrally in the same manner as the males. Thus, the Gulf Coast segregate differs phenotypically from *howardi* primarily in the female and not the male. As stated above, the most noticeable visible difference between *bordeloni* and the other *aaroni* subspecies are the shape of their forewings.

If only these minimal phenotypic features and one strong morphological character were considered, the Gulf segregate might warrant description as a subspecies. However, these are not the only factors that must be considered.

The biogeographical evolution of the Gulf Coast segregate greatly distances it from Floridian *howardi*. Like many other butterflies in the Gulf area, *P. a. bordeloni* is surely ascended from a Texas or Mexican refugium while *howardi* is ascended from the Floridian refugium. As such, *bordeloni* belongs to the southwestern US fauna while *howardi* is part of the southeastern US fauna. If this is so, then these two southern taxa have been separated for thousands of years and are now moving toward each other. The likelihood is good that they will meet one day in the Florida panhandle (if they have not done so already in an undiscovered tension zone colony). Then again, they may never meet.

Evolutionally, we do not know the degree of variance contained in the future genetic potential of either *bordeloni* and *howardi*. However, we do know that it is different – as evidenced by the observably divergent shape of their forewings and minor phenotypic differences. This is regional genetic subspeciation.

According to Remington (1968) the lepidopteran subspecies of the southern United States are of very recent origin. Remington postulates that most of these probably came into being in just the last 30,000 years during periods of glacial retreats and advances in the Pleistocene (1 million to 10 thousand years ago which effected great climatic and geophysical changes in the Gulf Coast area). The last glacial maximum (Wisconsin) is generally placed about 11,500 B.P.

During periods of glacial maxima ocean levels were lowered which resulted in shorelines being extended. In the interglacial periods ocean levels rose which resulted in shoreline resorption. In the west central Gulf Coast area this ebb and rise in sea level moved the shore line in or out many miles from its present location. During the interglacial periods the plants and animals of the southern US became separated into disjunct eastern and western species segregates (Remington, 1968). For numerous species, this break in gene flow resulted in the evolution of eastern and western subspecies or sibling species.

As the land mass of the Southern United States increased toward its present day state, these organisms were dislocated and adapted in concert with the changes in the region's ecology and geography. This biogeographical evolutionary process has produced a unique community of biota that is presently endemic to the west central Gulf Coast of the southern United States.

Dr. Richard Brown, Mississippi State University, states (pers. com.) that this region's endemism is limited to the off shore islands and in dune areas. The hurricanes and many river outlets which have shaped the coastal area in modern times have fragmented these island, dune, and marsh habitats. This area of endemism, though further southeast, correlates evolutionarily to Remington's Louisiana-East Texas suture-zone F. The following Lepidoptera are unique to this coastal region.

*Automeris louisiana* Ferguson & Brou, 1981, *Asterocampa celtis alicia* (W.H. Edwards, 1868), *Limenitis archippus watsoni* (dos Passos, 1938), *Euphyes bayensis*, and *Poanes aaroni bordeloni*.

### ***Poanes aaroni bordeloni* Gatrell, new subspecies**

**Diagnosis.** In both sexes of *bordeloni* the dorsal fulvous areas are usually a deeper color of orange than in *howardi*. The dorsal facies of male *bordeloni* differ very little from *howardi*. However, the dorsal forewings of *bordeloni* females usually have the fulvous areas much reduced, as in *minus* females, while the fulvous on their hindwings is more developed than in *howardi* females. (About 20% of females have extensive fulvous on their forewings.) Ventrally, the viator-spots on the hindwings (in both sexes) of *bordeloni* are very variable. The ground color on this surface is also variable but usually darker than in *howardi*. Ecologically, *bordeloni* is endemic to salt and brackish marshes as are subspecies *a. aaroni* and *a. howardi*.

**Description. Male** (Figs. 5-6). *Head*: the coloration of the hair and palpi is the same as in *howardi*. *Thorax* (inc. legs) and *abdomen*: colored as in *howardi*. *Forewings*: dorsally and ventrally, fulvous pattern the same as in *howardi* but more orange, stigma less prominent than in *howardi* especially the upper segment. *Hindwings*: dorsally, the fulvous pattern the same as in *howardi* but more orange and slightly more extensive; ventrally, the light streak in the cell and the viator-spots may be very prominent or absent. **Female** (Figs. 7-8, 12). *Head*, *thorax*, and *abdomen*: as in male; *Forewings*: dorsally and ventrally, without stigma, dark marginal border much wider than in male, usually having two light apical spots, in 80% of



females the fulvous is limited to a postmedian band of spots which gives these females a remarkable resemblance to *Euphyes pilatka* females (Figs. 12 & 20). *Hindwings*: dorsally, broadly orange fulvous with the spot in cell CU<sub>2</sub> usually well developed; ventrally, as in male. **General.** The outer margins of the forewings of both sexes of *bordeloni* are only slightly curved from the outer angle to the apex (apex of marginal curve at vein M<sub>2</sub>). In the other three subspecies the outer forewing margins are rounded with the apical point of the curve being at about mid wing (vein M<sub>3</sub>). In some specimens the apical tip of the forewings is slightly, but noticeably, falcate.

**Types.** *Holotype* ♂ (Figs. 5-6 ): TEXAS: Jefferson County, Sabine Pass, 12 May 1994 (leg. Bordelon). *Allotype* ♀ (Figs. 7-8 ): TEXAS: Sabine Pass, 21 May 1994 (leg. Bordelon). *Paratypes*: 16 ♂♂ and 13 ♀♀: TEXAS: Jefferson County, Sabine Pass: 1 ♀, 30 September 1993 (leg. Bordelon); 5 ♂♂, 8 May (2 leg. Bordelon, 3 leg. Rickard), 1 ♀, 12 May, 2 ♂♂, 1 ♀, 21 May, 1 ♀, 23 May (leg. Bordelon), 1 ♂, 30 July (leg. Knudson) 1994; 1 ♂, 5 ♀♀, 25 May, 2 ♂♂, 2 ♀♀ 27 May 1995 (leg. Slotten); 2 ♂♂, 19 May (leg. Knudson), 1 ♂, 24 May (leg. Bordelon) 1996. MISSISSIPPI: Hancock County, Bay Saint Louis: 2 ♂♂, 2 ♀♀, 27 September 1992 (leg. Slotten). The holotype and allotype are deposited in the collection of Texas A & M University, College Station, Texas. Paratypes are in the collections of Charles Bordelon, Beaumont, Texas ( 3 ); Ed Knudson, Houston, Texas ( 4 ); Roy Kendall, San Antonio, Texas ( 7 ); Jeff Slotten, Gainesville, Florida ( 10 ); and the Museum of the Hemispheres (MOTH), Goose Creek, SC ( 5 ).

**Geocological type locality.** Coastal salt marshes of Jefferson County, Texas.

**Etymology.** *Bordeloni* is named for Mr. Charles Bordelon of Beaumont, Texas.

**Remarks.** Evolutionally, the reduced forewing and increased hindwing dorsal fulvous of female *bordeloni* connects it with both *minimus* and *howardi* respectively. The dorsal color and pattern of the fulvous on male *bordeloni* strongly connects it to *howardi* and *aaroni* and distances it from *minimus*. The highly variable ventral viator-spotting and dark ground color connects it with both *howardi* and *minimus* and distances it from *aaroni*. The shape of the forewing margins distances it from all other populations. I would interpret these character associations (or lack of association) to indicate that *bordeloni* and *minimus* are the oldest subspecies and *aaroni* the youngest.

## ACKNOWLEDGMENTS

I thank the following persons for their contributions without which the paper could not have been produced. For the loan of specimens: Charles Bordelon, Jeff Slotten, Ed Knudson, and Roy Kendall. For information of the syntypes of *aaroni* and *howardi*: Dr. John Rawlins, CMNH, Pittsburgh and Dr. Fred Rindge, AMNH, New York. For critical textual review (pro and con): Dr. Richard L. Brown, Mississippi State University. Manuscript review: Mr. Bryant Mather, Clinton, Mississippi. For photography of specimens: Mr. Joseph Mueller, my son-in-law.

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