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THREE NEW HESPERIOIDAE (HESPERIINAE) FROM SOUTH CAROLINA: NEW SUBSPECIES OF *EUPHYES BIMACULA, POANES AARONI,* AND *HESPERIA ATTALUS*

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ABSTRACT. *Euphyes bimacula arbogasti* is described as a new subspecies from Berkeley County, South Carolina. It is known from only a few widely scattered colonies in the coastal swamp forests of the southeastern United States from Georgia to southeastern North Carolina. It is darker then *E. b. bimacula* and *E. b. illinois. Poanes aaroni minimus* is described as a new subspecies from Bull Swamp, Orangeburg County, South Carolina. This unique inland subspecies is presently known only from the type locality. It is darker then *P. a. aaroni* and *P. a. howardi*. *Hesperia attalus nigrescens* is described as a new subspecies from the relict dunes of Sandy Island National Wildlife Sanctuary, Horry County, South Carolina. This isolated subspecies is much darker than *H. a. attalus* and *H. a. slossonae*. The Sandy Island colony of *H. a. nigrescens* is believed to be the only remaining colony of this subspecies. All three subspecies are similarly melanic.

Additional key words: Threatened species, original descriptions.

INTRODUCTION

At least 33 species/subspecies of butterflies were originally described from populations inhabiting east coastal Georgia or south coastal South Carolina by the earliest workers on American Lepidoptera in the 1700's and early 1800's. Since then however, very little taxonomic attention has been given to the Lepidopterian fauna of the mid-Atlantic area of the United States between Florida and New Jersey. This has been especially true for the last half of the 1900's when very few lepidopterists, and even fewer butterfly taxonomists, have been residents of the mid-Atlantic area.

A result of this long term scarcity of collectors is that few specimens from this region are available for study. This informational void has given rise to taxonomic oversimplification and misrepresentation in the popular literature of the taxa occupying the area between Florida and New York and from the Atlantic coast to the Mississippi River. Most modern butterfly books recognize few species as occurring in more than one subspecies throughout this vast area of the United States.

This is in stark contrast with the west coastal region of the United States with its abundance of lepidopterists and subspecies. In this western area it is generally *expected* that each mountain range and valley system will harbor different subspecies – and indeed they often do. In California, for example, some (supposed) subspecies are separated by only a few hundred yards. Yet, the consistent impression given in the popular literature is that the species of South Carolina (from its coast to its mountains) are *not expected* to differ subspecifically from those of New Jersey, Missouri, or Louisiana.

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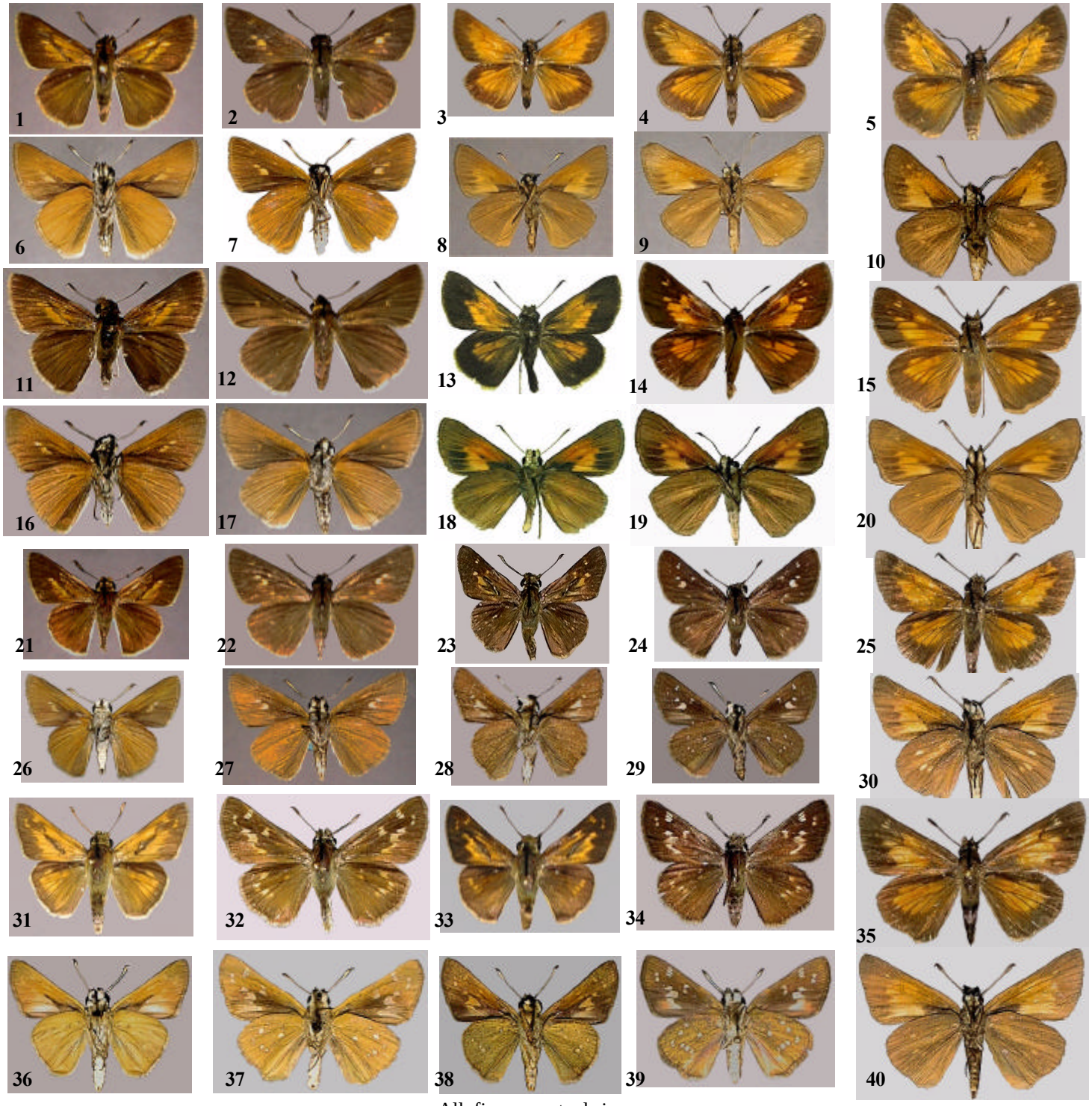

All figures actual size.

Figs. 1-40. 1/6 (d/v), ♂ *E. b. bimacula,* 29 June 1986, Passadumkeag, Penobscot Co., ME, leg. Grey. **2/7 (d/v),** ♀ *E. b. bimacula,* 29 June 1986, and same as 1. **3/8 (d/v),** ♂ *P. a. aaroni,* 20 August 1976, nr. New Gretna, Burlington Co., NJ, leg. Adelberg. **4/9 (d/v),** ♀ *P. a. aaroni,* same data as 3. **5/10 (d/v),** ♂ *P. a. howardi,* 24 April 1971, 10 mi. w. Daytona, Volusia Co., FL, leg. Roman. **11/16 (d/v),** ♂ **neotype** *E. b. illinois,* 22 June 1968, Denine Crossing, Grundy Co., IL, leg. N.G. Seaborg. **12/17 (d/v),** ♀ *E. b. illinois,* 28 June 1975, William's Prairie, Johnson Co., IA, leg. Gatrelle. **13/18 (d/v),** ♂ **holotype** *P. a. minimus,* 1 June 1992, Bull Swamp, Orangeburg Co., SC, leg. Gatrelle. **14/19 (d/v),** ♀ **allotype** *P. a. minimus,* 6 June 1992, and same as 13. **15/20 (d/v),** ♀ *P. a. howardi,* 25 July 1976, 5 mi. w. of I-95 on Hwy. 92, Volusia Co., FL, leg. Gatrelle. **21/26 (d/v),** ♂ **holotype** *E. b. arbogasti,* 12 July 1970, nr. jct. of I-26 and 17-A, Berkeley Co., SC, leg. Gatrelle. **22/27 (d/v),** ♀ **allotype** *E. b. arbogasti,* 21 May 1962, nr. Blichton, Bryan Co., GA. **23/28 (d/v),** ♂ **holotype** *H. a. nigrescens*, 10 October 1995, Horry Co., SC, leg. Gatrelle. **24/29 (d/v),** ♀ **allotype** *H. a. nigrescens,* 3 October 1995, and same as 23. **25/30 (d/v),** ♂ *P. aaroni ssp.,* 27 May 1995, Sabine Pass, Jefferson Co., TX, leg. Slotten. **31/36 (d/v),** ♂ *H. a. attalus,* 2 June 1974, 8 mi. west of Medicine Lodge on 160, Barber Co., KS, leg. Heitzman. **32/37 (d/v),** ♀ *H. a. attalus*, 28 May 1974, and same as 31. **33/38 (d/v),** ♂ *H. a. slossonae,* 21 June 1994, Chesterfield Co., SC, leg. Gatrelle. **34/39 (d/v),** ♀ *H. a. slossonae*, 5 September 1994, Hwy. 19, Marion Co., FL, leg. Gatrelle. **35/40 (d/v),** ♀ *P. aaroni ssp.,* same data as 25

The states of Georgia, South Carolina, and North Carolina compose the most ecologically diverse area in the eastern United States. This diversity occurs in all points of the compass, but is delineated most notably from the coastline to the mountains. South Carolina, being in the heart of this area, has five very definitive life zones: 1) semi-subtropical south coastal islands, 2) maritime swamp forests, 3) arid sandhills, 4) piedmont, and 5) the edge of the Appalachian Mountains. As one traverses these zones, from the south-east to the northwest, South Carolina's species changes greatly. On a given fall morning one could observe/collect such locally common tropical taxa as *Heliconius charitonius tuckeri* W. P. Comstock and F. M. Brown, 1950; *Danaus gilippus berenice* (Cramer, [1775]); *Hemiargus ceranus* a*ntibubastus* Hübner, [1818]; *Pterourus palamedes* (Drury, [1773]); *Urbanus dorantes* (Stoll, [1790]); and *Calpodes ethlius* (Stoll, [1782]) on Hunting Island in Beaufort County, then drive just five hours to Oconee County and in the afternoon observe/collect such locally common temperate species as *Boloria bellona* (Fabricius, 1775); *Speyeria cybele* (Fabricius, 1775); *Lycaena phlaeas americana* Harris, 1862; *Polites peckius* (W. Kirby, 1837); and *Enodia anthedon* A. H. Clark, 1936.

As with its species, South Carolina's subspecific diversity is more pronounced from east to west (southeast to northwest) than from south to north. In this respect, South Carolina is similar to southern California where the basic life zones and their accompanying subspecies are encountered east/west as they correspond to the mountain ranges and valleys. This similar geographical subspecific pattern should be *expected* because the subspecific distribution of the taxa in both South Carolina and California arose in concert with the geological evolution of these states coastal areas, mountains, valleys, and arid regions.

Some of South Carolina's species are represented in the state by one subspecies which is endemic to the coastal area and another which is endemic from the midlands to the mountains: *Anthocharis midea midea* (Hübner, 1809) (coastal islands) and *A. m. annickae* dos Passos and Klots, 1969 (remainder of state); *Asterocampa celtis reinthali* Friedlander, 1988 (south coast) and *A. c. celtis* (Boisduval and Leconte, [1834]) (remainder of state). Some do not occur in the coastal area but are represented by one subspecies in the sandhills and another in the mountains: *Satyrium edwardsii edwardsii* (Grote and Robinson, 1867) (mountains) and *S. edwardsii* undescribed (southern sandhills); *Chlosyne gorgone gorgone* (Hübner, 1810) (sandhills) and *C. g. carlota* (Reakirt, 1866) (upper piedmont and mountain foothills). Occasionally a species may have three subspecies within the state: *Satyrium calanus calanus* (Hübner, 1809) (south coastal), *S. c. falacer* (Godart, 1824) (mountains), and *S. calanus* undescribed (sandhills).

There are at least three undescribed butterfly species in South Carolina and several undescribed subspecies. Three of these heretofore undescribed subspecies are described as new Hesperiinae in this paper. Two of these are apparently geographically unique and are thus limited to single populations (one is in the Sandhills region and the other in a coastal dune area). The third is widely distributed from Georgia to North Carolina, but is rare within this range. Each of these subspecies should be considered as a taxon in need of special environmental protection. One, *Hesperia attalus nigrescens* Gatrelle, 1999 n. ssp., is already protected because most of its population is expected to be found within the Sandy Island National Wildlife Sanctuary in Horry County, SC.

A NEW SUBSPECIES OF *EUPHYES BIMACULA*

Review of *bimacula* subspecies.

***Euphyes bimacula bimacula* (Grote and Robinson, 1867)** was described from the female – the male being unknown at the time. There was no figure. The original description makes no mention of how many specimens were involved. I believe it is most probable that this species was described from a single specimen. Miller and Brown (1981) were unaware of the location of the type, but suggested that it might be in the AMHN or NY State Museum. I have not tried to locate the type. (Any Information regarding the

existence of the female holotype would be greatly appreciated.) It is possible that the type is no longer extant. Further, if *bimacula* was described from a single specimen, then there are no syntypes. In which case, a neotype should be designated from the vicinity of Philadelphia, Pennsylvania.

The *Annals of the Lyceum of the New York Natural History Society* is a rather rare work. It was only published in 10 volumes from 1860 to 1869. Because the original description is so rare, and also very detailed and accurate, I think it a good idea to reproduce it here:

> **Hesperia bimacula, n. s.** *Female*. Head, above, and prothorax, covered with dark brassy yellow scales; the tips of the palpi are stained with the same shade. Thorax and abdomen, above, blackish, clothed with lateral, longer, mixed olivaceous and aeneous hair. Beneath, the palpi are white; the eyes are also margined narrowly with white. Thoracic parts, beneath, clothed with longer, mixed griseous and whitish hair. Abdomen, beneath, whitish, with longitudinal darker streaks, laterally clothed with mixed griseous scales. Legs, obscure aeneous; femora with white scales inwardly. Antennae, rather short and stout; above, sub-annulate; "club," blackish; beneath, more plainly annulate with yellowish white, the apices tinged with dark fulvous.
>
> Wings, broad, somewhat longitudinally wrinkled; above, lustrous olivaceous brown, with dark olivaceous longer scales. Anterior wings, above, without markings, except two, unequal, pale yellowish, obliquely placed maculations at the base of the interspaces between the upper median nervules. Of these, the upper is much the smaller, and is brought nearer the external margin than the lower; beneath this latter there are faint indications of a third, paler spot, above the internal nervure. Base of the wing costal region, sparsely clothed with obscure aeneous-yellow scales; fringes, prominent, *whitish*, with a faint darker basal shade. Posterior wings, immaculate, with longer, aeneous olivaceous and yellowish hairs spreading over the disc and along internal margin, this latter as long as the abdomen, anal angle slightly and rather broadly exserted; fringes as on anterior wings. Beneath, the anterior wings are evenly covered with obscure aenrous or golden yellow scales, which are very prominent along costa, leaving the lower portion of the wings, above internal margin, free; the two yellow maculations of the upper surface are here repeated. The posterior wings are immaculate, concolorous with anterior pair, being almost everywhere evenly covered with golden yellow scales, least prominently so before internal margin.
>
> *Expanse*, 1.50 inches. *Length of body*, 0.70 inches.
>
> Habitat. – Atlantic District. (Philadelphia!)
>
> A little larger than Hesperia pocohontas, *Scudder*, and resembling this species in the shape of the wings. It will be readily recognized by the whitish fringes and the simplicity of its markings.

Because we are dealing with *bimacula* subspecies in this paper, the primary character to be noted in the original description is the repeated reference to "yellow" or "golden yellow" scaling (or hairs) on both the fore and hind wings (both dorsally and ventrally). Nominotypical *bimacula* is bright Dijon mustard orange (with slightly lighter veins) on the ventral hind wings (Figs. 6 & 7). The dorsal forewings of male *E. b. bimacula* are broadly fulvous in the cell and distal of the stigma (Fig. 1).

This subspecies ranges from the Atlantic coast (between Virginia and New Brunswick, Canada) west to Ontario, in Canada and to Indiana in the US where it transitions to *E. b. illinois* (Dodge).

I have examined 102 examples of this subspecies. The following is a summary listing of sites (by county) from which I have seen specimens. PENNSYLVANIA: Clinton, Huntingdon, Centre, Tioga, Montgomery; MAINE: Penobscot; MASSACHUSETTS: Middlesex; NEW JERSEY: Burlington, Ocean; WEST VIRGINIA: Hampshire; MICHIGAN: Crawford, Newaygo, Jackson (this southeastern Mich. population is near *illinois*).

Euphyes bimacula illinois **(Dodge, 1872)** was described from Bureau Co., Illinois where Dodge recorded it as being "…quite abundant upon grassy slopes on the high rolling prairie that forms the divide between the Illinois and Rock Rivers." He took a series of over forty specimens, nine of which were females. None of these were designated as types. In fact, he offered them in exchange to anyone who could provide him with specimens of "…North American butterflies not of common occurrence in Northern Illinois." He gave no illustration of his new skipper.

Ray Stanford (in Ferris and Brown, 1981) recognized *illinois* as a valid subspecies. I concur with this position based on my personal experience with this subspecies during the 1960's and 70's in my home state of Iowa. It differs from nominate *bimacula* in that it is larger, more fulvous on the dorsal forewings (especially in females), and most significantly, grayish (or olive) orange rather than yellowish orange on the ventral hind wings (Figs. 16 & 17).

This prairie subspecies was once abundant from Colorado to Indiana. Today it is found only in a few remnant prairies of that region. I encountered it in such prairies in Iowa. Its range is very similar to that of *Boloria selene nebraskensis* (Holland, 1928). *Nebraskensis* and *Oarisma powesheik* (Parker, 1870) are often found with it.

I have examined 63 specimens of *E. b. illinois* from the following states (by county). ILLINOIS: Cook, Grundy; IOWA: Johnson, Howard, Guthrie; MINNESOTA: Pine; WISCONSIN: Jackson; COLORADO: Yuma.

I have not been able to locate any of Dodge's syntypes. The best lead I had was that some of these specimens may have been deposited in the Field Museum in Chicago and from there to the Allyn Museum. I received no reply from my inquiry to the Allyn Museum about the possibility of any of Dodge's specimens being there. In the apparent absence of a type, I herein designate a male (Figs. 11 & 16) taken 22 June 1968, Denine Crossing, Grundy County, Illinois, leg. N. G. Seaborg as NEOTYPE of *Hesperia illinois* Dodge, 1872. This location is only 45 km east of Bureau County. This specimen in deposited in the Florida State Collection of Arthropods, Gainesville, Florida. If any syntypes are found, I withdraw this specimen as neotype only on condition that such syntype is designated as lectotype. I here redefine the type locality more scientifically as a geoecological type locality as follows: high prairies of north-central Illinois.

E. bimacula bimacula is a descendant of *E. b. illinois* and not the southeastern population. This is evidenced by the continuous range and similar size and phenotype of these two subspecies. If we had to recognize only two subspecies, they would be the smaller and much darker southeastern subspecies I describe below and a northern one, *bimacula*, which would range from New England to Colorado.

One of the most erroneous assumptions that persists among many taxonomists is the general idea that the primary line of evolution for the taxa in the northeastern US ascends from the Florida refugium. The fact is that nearly all the northeastern taxa which now inhabit the formerly glaciated areas of the northeast are derived from western sources. This is especially true for species whose larvae feed on grasses and sedges.

Undescribed Southeastern *bimacula* subspecies. I have seldom encountered *Euphyes bimacula* here in the Southeast, and when I have, it has never been in any numbers. I have collected it in Chatham County, Georgia with Dr. R. T. Arbogast and in Berkeley County, South Carolina near Summerville. I believe it to be extinct at the Summerville location. It appears this extinction was caused by drainage of the area by Westvaco (lumber/paper) for the purpose of municipal/industrial development and pine tree farming. Hopefully, this taxon is still extant in as yet undiscovered populations in Berkeley County.

It has long been the general opinion of skipper collectors that the small, dark southeastern populations of *E. bimacula* from the Green Swamp of southeastern North Carolina southward represent an undescribed subspecies (Figs. 21,22,26 & 27). Throughout this region, specimens are markedly darker above and below in comparison to the two northern subspecies and average smaller. Evolutionally, it has long been separated from the northern/western subspecies.

The most probable reason for this taxon having remained undescribed for so long is that few people have very many of them and usually from only one location. Its scarcity is evidenced by the *bimacula* distribution map on page 254 in Opler and Krizek (1984). I know of no one familiar with it who has ever questioned its subspecific distinctness. Mr. Harry Pavulaan was also interested in describing this taxon, but has graciously deferred to me because I have been working on it longer. I appreciate his input and encouragement to proceed.

Euphyes bimacula arbogasti Gatrelle, new subspecies.

Diagnosis. Males. Both *E. b. bimacula* and *E. b. illinois* are broadly fulvous on the dorsal forewings from the costal margin to distad of the stigma, and have the discal area of the dorsal hindwings lightly (but noticeably) dusted with fulvous scales and overlaid with long fulvous hairs. Males of *E. b. arbogasti* have the fulvous of the dorsal wings greatly reduced: on the forewings, the fulvous in the cell is usually confined to a small streak next to the upper segment of the stigma, there is rarely any fulvous in the FW costal area, and the fulvous distad of the stigma is significantly narrowed. Ventrally: *arbogasti* males are rusty brownish orange with prominent veining on the VHW; *bimacula* males are bright concolorous yellow-orange with only slightly lighter veins; *illinois* males are gray to olive-gray orange with very prominent VHW veining. The hairs on the head and prothoracic area of male *bimacula* and *illinois* are distinctly fulvous, while in *arbogasti* they are only slightly fulvous. **Females.** Females of *illinois* often have only one (and occasionally no) cream spots on their dorsal forewings while the females of both *arbogasti* and *bimacula* usually have both FW spots. Female *E. b. bimacula* often have orange fulvous scaling along the costa of the FW as delineated in the original description; *E. b. illinois* usually have little to some costal fulvous; *E. b. arbogasti* females usually have none to slight costal fulvous scaling. Ventrally: the hindwings of the females are like their males except that the light veining is correspondingly more pronounced. **Size.** *Illinois* is the largest and *arbogasti* the smallest subspecies. Average right FW radius from thorax to tip of apex (millimeters): ♂ *illinois* (16.3), ♀ *illinois* (17.5); ♂ *bimacula* (15), ♀ *bimacula* (16); ♂ *arbogasti* (14), ♀ *arbogasti* (15).

Description. ***Male*** (Figs. 21/26): *Head, thorax, abdomen* and *legs* as in *bimacula* except the hairs on top of the head and patagium are brown to slightly fulvous (these are distinctly fulvous on the other subspecies). *Forewings*: dorsally, dark brown with fulvous primarily restricted to one tiny spot at the apical tip of the stigma, two narrow spots distad of the stigma, and a small streak in the cell adjacent to the upper segment of the stigma; ventrally, with yellow fulvous prominent only along the costal margin, brown along the inner margin intruding up along the outer margin toward the apex (in the other subspecies the fulvous dusting in the apical area intrudes down along the margin into the inner marginal area). *Hindwings*: dorsally, dark brown with white fringe on the outer and inner margins, very little to no fulvous dusting in the discal area; ventrally, rusty brownish orange often with prominent light veins. ***Female*** (Figs. 22/27): *Head, thorax, abdomen* and *legs* as in male. *Forewings*: dorsally, unmarked dark brown except for two cream spots distad of the cell; ventrally, as in the male but darker. *Hindwings*: dorsally, as in male; ventrally, as in male except darker and the veins more contrasting.

Types. *Holotype* ♂ (Figs. 21/26): SOUTH CAROLINA: Berkeley County, nr. jct. of I-26 and hwy. 17-A, 12 July 1970, R. Gatrelle collector. *Allotype* ♀ (Figs. 22/27): GEORGIA: Bryan County, Blichton, 21 May 1962, collector unknown. *Paratypes*: 13♂♂, 4♀♀ (collector: R. Gatrelle unless otherwise noted): SOUTH CAROLINA: Berkeley County, nr. jct. of Interstate 26 & hwy. 17-A, 1♂, 11 July, 1♀, 14 July, 1♂, 1♀, 17 July, 1♂, 24 July, 1♀, 31 July 1971; 1♂, 21 July (leg. R.T. Arbogast), 1♂, 23 July, 1♂, 5 August 1973; NORTH CAROLINA: Brunswick County, Green Swamp, 1♂, 29 July 1983 (leg. Kral); GEORGIA: Bryan County, Blichton, 1♂, 12 July 1962 (leg. Unknown); Chatham County, Pine Barrens Rd. (all leg. R.T. & T.S. Arbogast), 1♂, 1♀, 2 May, 1♂, 10 May 1976; 3 ♂♂, 14 May 1978. The holotype, allotype, and 2 paratypes are deposited in the FSCA collection, Gainesville, FL. The remainder of the paratypes are distributed as follows: Dr. Jeff Slotten, Gainesville, FL (1), R. Gatrelle, Goose Creek, SC (6), R. T. Arbogast, Gainesville, FL (8).

Geoecological type locality. Sedge wetlands nr. Summerville, Berkeley County, South Carolina.

Etymology. It is my privilege to name this new subspecies after my long time friend Dr. Richard (Terry) Arbogast. Its common name should be Arbogast's skipper.

Remarks. The type locality was once a classic location as evidenced by its former biodiversity. The following are just a few of the many, and often rare, lepidopterian species that no longer occur at this site. *Euphyes berryi* (Bell), *E. bimacula arbogasti, Atrytonopsis loammi* (Whitney), *Satyrium kingi* (Klots and Clench), *Deciduphagus irus arsace* (Boisduval and LeConte), *Heraclides cresphontes* (Cramer), and *Callosamia securifera* (Maassen). While there are a couple of amateur butterfly collectors/watchers associated with the South Carolina Dept. of Natural Resources, that department has no real knowledge as to the condition of South Carolina's Lepidoptera or what to do about or with them. I moved to South Carolina 30 years ago. I have watched, and continue to watch, the destruction of vital lepidopterian habitat – nearly always by various state and local government agencies, including state and county parks. Eco-tourism is becoming big business everywhere, and the South Carolina "Low Country" is no exception. The building of paved roads (which function as dams in that they affect both the surface and subsurface hydromatrixes), park offices, campsites, and other facilities (which are built on the same higher ground most utilized by many Lepidoptera) are planned and implemented with no real knowledge of their effect upon the area's Lepidoptera. New industrial parks are coming into being on Daniel Island and inland from Charleston in Berkeley and Dorchester counties faster than any Lepidoptera related environmental studies could be adequately made. Why this fuss? As South Carolina's only butterfly expert, if I don't sound the alarm who will and when? If the known lepidopterian species/subspecies of South Carolina are not receiving adequate attention in the area of habitat preservation, there is absolutely no future for the rare undescribed taxa of this state! Lastly, in defense of the SC DNR, it all comes down to funding and personnel. Thus, I hope the US Dept. of Interior will budget much more funding to help the invertebrates of South Carolina. Remember: We cannot protect that which we do not know.

Review of *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. However, Holland (1931) gives a figure of a male "paratype" on PL. XLVI, fig.37. This specimen is in the Carnegie Museum NH, Pittsburgh and is probably actually the type. It is a typical *aaroni* male.

P. a. aaroni is the smallest and most brightly colored (especially females) of the *aaroni* subspecies (Figs. 3,4,8 & 9). Unfortunately, some researchers continue to follow Clark and Clark (1951) who introduced the idea that all populations from New Jersey to Miami, Florida are but one subspecies. The Clark's clearly acknowledged that the populations in New Jersey were recognizable, then offhandedly dismissed this by attributing the differences of *aaroni* to "nothing more than a depauperate light and somewhat undersized variety of the species." New Jersey *aaroni* are not undernourished faded dwarfs. They are an easily recognizable, valid subspecific taxon.

Both *P. a. aaroni* and *P. a. howardi* (Skinner, 1896) are broadly fulvous dorsally. However, the fulvous is more extensive and lighter in nominotypical *aaroni* – especially in females. When atypically large dark males of *aaroni* and atypically small light males of *howardi* are encountered they indeed look very much alike dorsally. However, New Jersey *aaroni* and Floridian *howardi* are quite different ventrally (as attested to by Holland, page 391). On the ventral hindwing, the vast majority of *howardi* are marked like *Poanes viator zizianae* Shapiro (1971) – with a long light central dash and three to four small light spots (see the description of *howardi* below). The ventral hindwings of nearly all *aaroni* are marked more like those of *Euphyes dion* (W.H. Edwards, 1867) with a faint central light streak and no spots.

I consider true *P. a. aaroni* to be confined to New Jersey and Delaware. However, it is possible that it ranges westward to the eastern and western shores of the upper Chesapeake Bay in Maryland (Fales, 1974). It is not found in Virginia by the Clark's own determination. (They state that many VA specimens are noticeably darker then either Floridian or New Jersey specimens. We will examine this more later.)

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. All but two of these were simply labeled as being from Florida. The two with site specific labels are stated as being from Georgiana on the Indian River. This is the eastern coastal area of Florida. The taxon was not figured and no specific specimen was designated as the type. However, Holland (1931) figures the male type on Pl. XLVI, fig.38. This specimen is absolutely typical of this subspecies and thus represents it well. The original description is as follows (key elements differentiating *aaroni, howardi,* and *minimus* are in bold):

> ***Pamphila howardi*, n. sp.** Male. – Expands 1.50 inches. *Upper side:* Superiors tawny with a fuscous **border a little more than one-eighth inch** in width; there are from **one to four small subapical tawny spots in the fuscous border;** at end of cell a dark spot which may or may not be connected with the stigma; stigma rather more than an eighth inch in length, very narrow and **unbroken,** and extending to inner margin. Inferiors have the same fuscous border and tawny central area. *Under side:* Superiors with tawny central area and border **same as upper side;** there is a large triangular spot extending into the wing from the base. The tawny colour above this spot is of a darker hue than that below and outside of it. Inferiors very light brown, generally with **four or five very faint tawny spots** in the central area.
>
> The females are larger, without the stigma and have the underside of the inferiors immaculate. Described from eight specimens in my own collection and four in that of the U.S. National Museum, through the courtesy of Prof. L.O. Howard. They are all from Florida; two being from Georgiana, on the Indian River; exact locality of others unknown. This species belongs to the *arpa, palatka, Aaroni, viator* group. It is a **much larger species than *Aaroni;*** it has not the bright immaculate inferiors below like *arpa* and differs from *palatka* in the stigma, which in that species is in two short sections. The superiors in *viator* above are fuscous, covered with tawny spots.

I have examined over 300 spread *howardi* and observed hundreds more in the field over the last 30 years. The mounted specimens I have examined are from the following states (by county). FLORIDA: Baker, Dade, Duval, Levy, Putnam, Seminole, Volusia; GEORGIA: Bryan, Chatham, Glynn; SOUTH CAROLINA: Beaufort, Colleton, Charleston, Jasper; NORTH CAROLINA: Currituck; VIRGINIA: Princess Ann.

The populations from Miami, Florida to Beaufort, South Carolina are very similar in size and markings, dorsally and ventrally. The populations in this area are broadly fulvous above and the vast majority of specimens (especially males) have the *viator*-like streak and spots on the ventral hindwings (as highlighted in the original description).

From Beaufort, South Carolina through Virginia most specimens are still broadly fulvous above but many specimens are encountered without the *viator*-spotting of the ventral hindwings. In some areas the ventrally unspotted phenotype dominates. These are the darker specimens mentioned by the Clarks in the *Butterflies of Virginia* on page 170. Despite the somewhat atypical appearance of some of these mid-Atlantic populations, they are still part of subspecies *howardi* and should be referred to as such. I believe the tendency for specimens in this area to be darker and to lose the ventral HW spots is due to past genetic contact with the freshwater inland subspecies *P. aaroni minimus* described below.

Undescribed Texas *P. aaroni* subspecies. It is my opinion that the *aaroni* population in east coastal Texas is most likely an undescribed subspecies (Figs. 25,30,35 & 40). I only have four worn specimens of this in my collection but they are unlike anything I have seen from the eastern US. I would want to examine several more before describing it. They are very large and orange fulvous rather than yellow fulvous. Their wings are quite rectangularly elongate and pointed at the apex (the wings of the three eastern subspecies are more square). The *viator*-spotting on the ventral hindwings is also very prominent. I strongly encourage someone in Texas who has a good series of these to describe it.

Undescribed inland South Carolina *P. aaroni* subspecies. On 17 May 1991 I was amazed to discover an inland fresh water population of *Poanes aaroni* at Bull Swamp in Orangeburg County, South Carolina. I found it common and by far, the dominant skipper at this site in May, June and September of 1991, 1992, and 1993. (I have not visited the site since.)

North of Florida, *aaroni* is only known from coastal salt or brackish marshes. According to Opler and Krizek (1984), this skipper is "…restricted to coastal salt marshes, usually in association with smooth cordgrass (*Spartina alternifolia*)." Gochfeld and Burger (1997) state that *P. aaroni aaroni* is restricted to salt marshes on both coasts of southern New Jersey. The fresh water South Carolina colony is surrounded by dry sandhill habitat and is located 120 km. inland and at least 100 km. from the nearest populations in Charleston and Colleton counties, South Carolina.

I know of only one other fresh water record from this region. This is found in Harris (1972) and is by H. W. Eustis for Richmond County, Georgia in the late 1940's. Harris figures a male from that population on plate 10. This specimen looks like a good *P. aaroni howardi* as it is brightly colored and quite unlike the dark Bull Swamp population. It is likely that Eustis' specimens were transients from the sizable *howardi* population that inhabits the vast swamps along the Savannah River from the coast inland into at least Screven County.

The Bull Swamp population is distinctive in several aspects. First, its sandhills location, fresh water ecology, and dark phenotype indicates that it is evolutionally distant from all coastal populations from Florida to New Jersey, and as such, has long been isolated from the other subspecies in time and space. Second, its phenotype is consistently distinct from both *aaroni* and *howardi*.

Therefore, I describe this population as a new subspecies, *Poanes aaroni minimus*.

Poanes aaroni minimus Gatrelle, new subspecies.

Diagnosis. Phenotypically, *Poanes aaroni minimus* differs from *aaroni* and *howardi* in having all dorsal fulvous markings reduced, or minimized. This is especially noticeable between the females. The ventral markings of *minimus* are similar to *aaroni* in that both lack prominent *viator*-spots and have all markings softened. It differs ventrally from *aaroni* only in being much darker. In *howardi* the ventral is often boldly marked with prominent *viator*-spots and central streak. Ecologically, it differs from all other populations from New Jersey to northern Florida in that it is endemic to fresh water marshes whereas the populations in those states are endemic to coastal salt and brackish marshlands (there are freshwater populations in peninsular Florida). Further, as a component of the Sandhills region, its biogeographical evolutionary origins are very different from those on the Atlantic coast. It is very possible that what we have here is the only remaining population of an *aaroni* that inhabited this area thousands of years ago when the region was the shoreline. Its life history is unknown.

Description. ***Male*** (Figs. 13/18). *Head*: the coloration of the hair and palpi is the same as in *howardi* and slightly darker than in *aaroni*; the antennal shaft and club are often so dark dorsally that the shaft is dorsally unringed, in *aaroni* and *howardi* the rings go all the way around the antennal shaft. *Thorax* (inc. legs) and *abdomen*: colored as in *howardi* and slightly darker than in *aaroni*. *Forewings*: dorsally, with wide blackish brown border occupying the outer 35-38% of the wing (measured from wing base to margin at vein CU_2) (medium brown at 23-27% in *aaroni*, brown at 27-32% in *howardi* and undescribed Texas) and extending from the apex to the distal end of the cell, about 25% of males will have one or two apical spots but in most specimens the apex is solid blackish brown (in *aaroni* the fulvous usually extends well beyond the cell into the subapical area; in *howardi* there are often two to five fulvous spots in the apical area – as I highlighted in the *howardi* original description), the inner fulvous area is sharply defined and not sinuate where it meets the dark outer border (the junction of the inner fulvous patch and outer border is usually sinuate at the veins and blended in the other subspecies), the lower part of the stigma is slightly shorter than in *howardi* and has less overall microandroconial mass making it appear smaller, darker, and more broken in many males; ventrally, with contrasting black (postmedian) and yellow (median) areas, no subapical light spotting. *Hindwings*: dorsally, dark border, broad and well defined as on the primaries, this affects the size of the fulvous spots in cells Rs, M_3, and CU_1 making them smaller and less elongate, from vein CU_2 to the anal margin the fulvous scaling is much diminished with many specimens having no spot in cell CU_2, this is a significant distinguishing character as I have never seen a *howardi* or *aaroni* specimen that lacked a spot in CU_2; ventrally, nearly concolorous subdued medium brown, usually with a faint tawny streak in cell and occasionally with two faint median *viator*-spots (one above and one beneath the streak) (*howardi* males usually have several, occasionally prominent, *viator*-spots – as highlighted in the *howardi* original description). ***Female*** (Figs. 14/19). *Head, thorax,* and *abdomen*: as in male; *Forewings*: without stigma, dark border as in male except for usually having two or three light apical spots, the basal half of the cell is usually brown and not fulvous, though this is variable; *Hindwings*: dorsally and ventrally, as in male.

Types. *Holotype* ♂ (Figs. 13/18): SOUTH CAROLINA: Orangeburg County, Bull Swamp, 1 June 1992, R. Gatrelle collector. *Allotype* ♀ (Figs. 14/19): SOUTH CAROLINA: Orangeburg County, Bull Swamp, 6 June 1992, R. Gatrelle collector. *Paratypes*: 27♂♂, 17♀♀: all SOUTH CAROLINA: Orangeburg County, Bull Swamp, R. Gatrelle collector; specimens and dates: 1♂, 17 May, 1♂, 1♀, 25 May, 1♀, 9 September 1991; 10♂♂, 5♀♀, 1 June, 4♀♀, 6 June, 5♂♂, 4♀♀, 1 September 1992; 3♂♂, 1♀, 1 June, 7♂♂, 1♀, 3 June 1993. (I also netted, examined, and released 45 additional specimens in 1993.) The holotype, allotype and two paratypes are deposited in the Carnegie Museum NH, Pittsburgh, PA because the types of *aaroni* and *howardi* are there also. The remainder of the paratypes are in the MOTH, Goose Creek, SC.

Geoecological type locality. Bull Swamp (freshwater), Orangeburg County, South Carolina

Etymology. *Minimus*, refers to the reduced fulvous area of this taxon as compared to the other subspecies.

Remarks. Many specimens I have seen from coastal South Carolina, North Carolina, and Virginia are atypical of Floridian *howardi* (as noted in the discussion under *howardi*). In fact, in a long series of coastal SC specimens, individuals occur which are phenotypically very close to *minimus* (except for the lack of a DHW spot in CU_2). This can be taken as possible evidence of genetic contact, at some time in the distant past in the mid-Atlantic area, between *howardi* and *minimus*. Further, because *minimus* is marked on the venter more like *aaroni* (though darker) and has the same color fulvous on the dorsum as *howardi* (though reduced in size), I think this is indicative of *minimus* being older, and thus a link to or is, the ancestor of both. It must be remembered however, that these similarly looking individuals are from very different ecological and biological populations. The phenotypic exceptions expressed in certain individual specimens that turn up in populations of *aaroni, howardi,* or *minimus* do not disprove the rule – evolutionary subspecificity.

P. a. minimus becomes the third known relict taxon endemic to the Sandhills region of Georgia, South Carolina, and North Carolina. The other two are *Chlosyne gorgone gorgone* (Hübner, 1810) and *Neonympha mitchellii francisi* Parshall and Kral, 1989. The geologic development, and correlating subspecific evolution of the biota, of the southeastern United States is old and "stable." As pointed out by Remington (1968), in recent millennia the evolutionary norm in this area has been one of convergence. Therefore it is always surprising to find a new taxon in this region, but expected that such taxa be found in only mono or widely scattered colonies. The Sandhills region is the most logical area to harbor such taxa and indeed that is the case. All of the taxa described in this paper are examples of old relict entities.

Review of *attalus* subspecies.

***Hesperia attalus attalus* (W.H. Edwards, 1871)** was described from two females collected by G.W. Belfrage near Waco, Texas. One of these specimens was figured (ventral aspect) by Holland (1931), Pl. LII, fig. 24. This same specimen was designated as lectotype by F.M Brown and L.D. Miller (1977).

H. a. attalus is a bright, colorful *Hesperia* as can be seen from figs. 31,32,36 & 37. This western prairie subspecies averages slightly larger than the Eastern US populations. This western subspecies has been widely isolated from its eastern counterparts for thousands of years. There are no blend zone populations between western and eastern *attalus*.

I have no personal experience with this subspecies. However I have examined 47 specimens from the following states (by county). OKLAHOMA: Cleveland; KANSAS: Barber; TEXAS: Smith. The majority of these are from the J.R. Heitzman collection which is now housed in the FSCA, Gainesville.

***Hesperia attalus slossonae* (Skinner, 1890)** was described from one male and one female collected by Mrs. A.T. Slosson. The origin of the specimens is simply given as Florida. The original description is as follows (I have highlighted key phrases in bold):

> **Pamphila slossonae** n. sp. – In size and markings this species comes nearest to *P. leonardus* Harris. The male expands rather less than an inch and a half. Ground color of inferior [superior] wings dark brown, with **basal half of wing thickly covered with tawny** scales which, beyond the stigma, form three spots, and just above these are two small square ones. The three subcostal spots are represented as in *leonardus*. Stigma narrow, black, and concave posteriorly. Inferior wings same color as superior, with **tawny scales scattered over the basal half.** There are four small, square, tawny spots close together, with a fifth elongated one at right angles with the four, on outer half of wing running nearly parallel with the outer margin, only the angle made by the spots is more acute. **Fringes of all wings dingy white.** The maculation on underside of superiors is nearly the same as in *leonardus*, but in color very different, the ground color in this species being made up of **yellowish and greenish scales;** underside of inferiors **olive-green,** with the spots of the upperside repeated, except there is a sixth one near the centre of the wing, and all are dingy white. Fringes on underside same as above. Head and thorax above covered with **greenish hair,** beneath grayish yellow. Palpi almost white.
>
> The female expands a little more than an inch and a half. Superior wings very dark brown, with a broken band of **yellow** consisting of five spots commencing at the first nerve above the interior margin and extending to within one-eighth inch of apex. The subcostal spots are present, as in the male, with spots fainter; **underside of wings also same as in male,** but white spots on inferiors smaller. Fringes in female dark on superiors, but gradually getting lighter on inferiors as the anal angle is approached.

Over the last 30 years, I have encountered this subspecies at several locations throughout the southeast. My personal records are from (by county): FLORIDA: Escambia, Levy, Marion; GEORGIA: Burke; SOUTH CAROLINA: Aiken, Orangeburg, Chesterfield; NORTH CAROLINA: Hoke. The great majority of the several hundred individuals I have observed or collected from these widely separated areas are of the same well marked phenotype described in the original description (Figs. 33,34,38 & 39). In females there is moderate ventral variation toward brownish, non-greenish-yellow individuals.

I have also examined 73 *slossonae* in institutional and private collections from the following states (by county): FLORIDA: Levy, St. Johns, Bradford, Putnam; NEW JERSEY: Ocean; GEORGIA: Crawford.

Throughout their range, all *slossonae* males, and most females, exhibit at least some golden tawny scaling on the ventral hindwings. The ventral hindwings of most males have a great deal of golden over-scaling (unless they are worn) and a prominent row of cream spots in the upper postmedian area. The ventral hindwing varies quite a bit in female *slossonae*, but possesses at least some cream spotting in the postmedian area – with many females having a well developed contrasting row of creamy white spots. The dorsal forewings of males are usually brightly tawny immediately distad of the stigma with conspicuous tawny scaling in the upper part of the cell and prominent apical spots. On their dorsal hindwings, male

slossonae usually have a conspicuous amount of golden fulvous hairs, especially near the inner angle, and a well developed row of upper postmedian spots. The dorsal forewings of female *slossonae* are variable. Some have a well developed row of postmedian spots, including the apical area, while others only have a few spots in the postmedian area. The dorsal hindwings of females are also variable with the postmedian spotting ranging from prominent to faint. However, almost all females have some dorsal hindwing spotting. All of these key traits are mentioned in the original description.

MacNeill (1964), in his classic work on the western American *Hesperia*, briefly delves into the origins of the eastern species of this genus. His position is that the eastern species, and particularly the southeastern taxa, represent the oldest and thus most phylogenetically stable assemblage of species in the genus (which originated in the Nearctic). In other words, the southeastern taxa are all very old and highly evolved. On page 10 he states: "In [the] eastern United States, and particularly the southeast, a small group of relatively unrelated species occurs, none of which shows close relationships to any other known species. Apparently little geographic diversity is expressed by any of these."

I concur with MacNeill. This is evidenced by the great stability of the *slossonae* phenotype from central Florida to New Jersey – where the only difference is that individuals become smaller northward. This homogony is the backdrop that manifests the evolutionary importance of a newly discovered, isolated, phenotypically unique population of *Hesperia attalus*.

Undescribed coastal South Carolina *H. attalus* subspecies. On 3 October 1995 I discovered a population of *Hesperia attalus* near the South Carolina Coast at the southern tip of Horry County. This site is on private property near the newly designated Sandy Island National Wildlife Sanctuary. The elevation at the site is about 100 ft and is part of the Sandy Island remnant dune uplift. Prior to the advent of Europeans and deforestation, this population was separated and isolated from the inland sandhill populations of *slossonae* (Figs. 33 & 36) by approximately 50 to 80 km of (often swampy) forest. Even today, it remains separated from the inland subspecies by at least 35 km.

This population is distinctive on two levels.

First, MacNeill's determination that **all** southeastern *Hesperia* are evolutionarily old, phenotypically stable taxa, requires that this uniquely distinct and isolated segregate has 1) been in existence a very long time, and 2) is evolutionarily distant (subspecifically distinct) from *slossonae.* Second, it is just as distinct phenotypically from *H. attalus slossonae* as *H. attalus slossonae* is from *H. attalus attalus*. It is very dark and melanistic, especially in the male.

Its geographic location dictates that it most likely came into being in only one of two ways. It most likely is a relict of an *attalus* that once inhabited the coastal area when ocean levels were much lower. Its range then extending out, many miles in some areas onto what is now the Continental Shelf, up and down the mid-Atlantic coast in semi-barren sandy habitats (Emery et. al., 1967; Remington, 1968). Thousands of years of shore line compression have pinned this taxon between the Atlantic Ocean and the Maritime Forests of the eastern seaboard. If this is so, it is an isolated taxon in the process of geologically induced extinction. This may be the only population still extant.

The only other plausible course of evolution is that it is a descendent of inland ancestors whose range was once connected to the coastal area. When this connection was severed by increased forestation, this subspecies evolved *in situ.* This scenario, on the surface, seems supported by the presence of other species at this site which are also natural parts of the inland sandhill community – most notably *Hesperia meskei straton* (W.H. Edwards). However, this course is not the most likely because the other members of the biota at this site, which are common to the sandhills, remain subspecifically the same. The uniqueness of the *attalus* at this site indicates that it had already evolved to its present taxonomic state before it arrived (from an area now offshore). MacNeill concluded that the evolution of **all** southeastern *Hesperia* was settled millennia ago. For these reasons, I now describe this population as a new subspecies.

Hesperia attalus nigrescens Gatrelle, new subspecies.

Diagnosis. In every aspect, much darker than *H. a. slossonae*, especially in the male. Never with extensive, or even moderate, golden-olive tawny ventral over-scaling in either sex. The ventral hindwings are dark brown and may occasionally be lightly peppered with some tawny. The ventral hindwings of females are very variable in the degree of white spotting, but are frequently concolorous unspotted dark brown. When these females also possess only one or two light dorsal spots, they can be easily mistaken for *Euphyes vestris metacomet* (Harris, 1862) in the field.

Description. ***Male*** (Figs. 23/28). *Head:* dark brown above, palpi dingy grayish white, antennae brown except for lower surface being slightly grayish white (in *slossonae,* the light areas are more extensive and definite creamy white); *Thorax* and *abdomen*: dark brown above, ventrally (inc. legs.) mottled brown and dingy gray (in *slossonae,* the sides and underside are heavily dusted with golden tawny and white). Simply put, *nigrescens* looks dingy and *slossonae* bright. *Forewings*: dorsally, ground color solidly dark brown with black line along the outer margin at base of fringe which is a gray brown, none of the 10 males in the type series have any tawny at the base of their forewings and all but one has the tawny in the cell limited to a tiny patch at the distal end, in the one exception the tawny is in the form of two streaks in the upper half of the cell, there are two to three tiny tawny apical spots and there may be one or two tiny submarginal spots near the apices, distad of the stigma the three usual greenish tawny spots are much reduced; ventrally, ground color black at base, elsewhere dark brown, very little to no orange fulvous along costa or in cell, light spots more restricted than above. *Hindwings*: dorsally, ground color dark brown, the macular band composed of two to four faint spots, basal hairs medium brown not tawny; ventrally, dark brown ground with macular band absent to complete, and then small and subdued, never bold as in *slossonae*, some individuals may be peppered with medium tawny scales. ***Female*** (Figs. 24/29). *Head, thorax* and *abdomen*: as in male but darker; *Forewings*: dorsally, ground blackish brown, spotting varies from only two to all spots present, these spots whitish never yellowish as in many *slossonae* (*slossonae* also vary greatly, but heavily spotted *slossonae* far exceed heavily spotted *nigrescens* and the darkest *slossonae* are far less dark than the darkest *nigrescens);* ventrally, dark brown with spotting restricted as above; *Hindwings*: dorsally, unmarked dark blackish brown to all spots present in same relation to *slossonae* as on dorsal forewing; ventrally, varying from solidly dark brown to all spots present in same relation to *slossonae* as on the dorsal hindwing.

Types. *Holotype* ♂ (Figs. 23/28): SOUTH CAROLINA: Horry County (specific site withheld), 10 October 1995, R. Gatrelle collector. *Allotype* ♀ (Figs. 24/29): Same data as male except 3 October 1995. *Paratypes*: 9♂♂, 9♀♀: all SOUTH CAROLINA: Horry County (specific site withheld); specimens and dates: 5♂♂, 8♀♀, 3 October 1995; 4♂♂, 1♀, 10 October 1995. The holotype and allotype are deposited in the Carnegie Museum NH, Pittsburgh, PA where the types of *attalus* and *slossonae* are also located. Paratypes are all in the MOTH, Goose Creek, South Carolina. (I saw approximately 20 more specimens in the field in addition to the few I collected. They were all dark.)

Geoecological type locality. Coastal dune grasslands in southern Horry County, South Carolina.

Etymology. *Hesperia attalus nigrescens* is so named to emphasize its dark melanistic coloration.

Remarks. The known range of *slossonae* as figured by Opler and Krizek (1984) on page 230 is very interesting. The gap between Peninsular Florida and Georgia only reflects a lack of collecting and is thus artificial. The range connection from southern North Carolina to the sandhills may also be artificial, if it is assumed. Though there may be records from near the coast, it does not follow that there is a continuous *subspecific* population in-between these areas.

I expect this subspecies' range to be limited to the vicinity of the Sandy Island National Wildlife Refuge. However, it is possible that this subspecies may extend south into Georgetown County in suitable habitat areas along the narrow strip of land between the intracoastal waterway and the Atlantic south to North Island – but this should not be assumed. The Green Swamp in southeastern coastal North Carolina would seem to limit its range into that area. However, if an *attalus* is in coastal North Carolina, it should not be assumed as this subspecies – though it may be.

Hesperia attalus nigrescens should be listed as at least threatened. The Department of Interior's Fish and Wildlife Service should immediately require that any environmental alteration (current or proposed) along the Atlantic Coast east of the intracoastal waterway between Georgetown and Myrtle Beach be subject to a survey for the presence of this new subspecies before any further alteration is permitted.

Is more research needed on the range of this subspecies and its relation to *slossonae*? Absolutely. A primary goal of *The International Lepidoptera Survey*, in light of the rapid destruction of the world's living things and environment, is to affix names to valid scientific taxa and afford them legal status before it is too late! There is no longer time to dot every **i** and cross every **t**. Lepidopterists no longer have the luxury of taking 10 to 30 years to decide to publish on a species/subspecies and then take another 1 to 3 years from article submission to publication. Taxonomists need to get out of the laid-back, typewriter-slow 19th century and into the computerized speed of the 21st – the Bulldozer certainly has. Environmental regress seeks no wisdom and waits for no one.

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Artikel/Article: THREE NEW HESPERIOIDAE (HESPERIINAE) FROM SOUTH CAROLINA: NEW SUBSPECIES OF EUPHYES BIMACULA, POANES AARONI, AND HESPERIA ATTALUS 1-13