



# The Taxonomic Report

OF THE INTERNATIONAL LEPIDOPTERA SURVEY



## A SUBSPECIFIC ASSESSMENT OF THE GENUS *HESPERIA* (HESPERIINAE) IN EASTERN NORTH AMERICA (PART I: THE SOUTH)

### New Subspecies of *Hesperia metea*, *Hesperia sassacus* and *Hesperia meskei*

RONALD R. GATRELLE <sup>1</sup>

126 Wells road, Goose Creek, South Carolina 29445

with sections by

MARC C. MINNO

600 NW 35<sup>th</sup> Terrace, Gainesville, Florida 32607

ALEX GRKOVICH <sup>1</sup>

4 Valley Circle, Peabody, Massachusetts, 01960

**ABSTRACT.** *Hesperia meskei pinocayo* Gatrelle and Minno is described from Big Pine Key, Monroe Co., Florida. This subspecies is thought to be nearly extinct. Its mainland status is uncertain. It is characterized by bi-colored ventral hindwings with more prominent ventral hindwing spots. *Hesperia metea intermedia* Gatrelle is described from Pickens Co., South Carolina. Its range is from northwestern South Carolina west through Mississippi and probably into Missouri. Males have the least dorsal fulvous of the *metea* subspecies; ventrally they are well marked. Females are similar to subspecies *licinus*. *Hesperia sassacus nantahala* Gatrelle and Grkovich is described from Clay Co., North Carolina. It is often boldly spotted on the ventral hind wing especially in females. The ventral ground color is often dark mottled brown in both sexes rather than yellowish as in the nominate subspecies. Its known range is the southern Appalachian mountains of western North Carolina, but likely extends from northern Georgia to West Virginia.

## INTRODUCTION

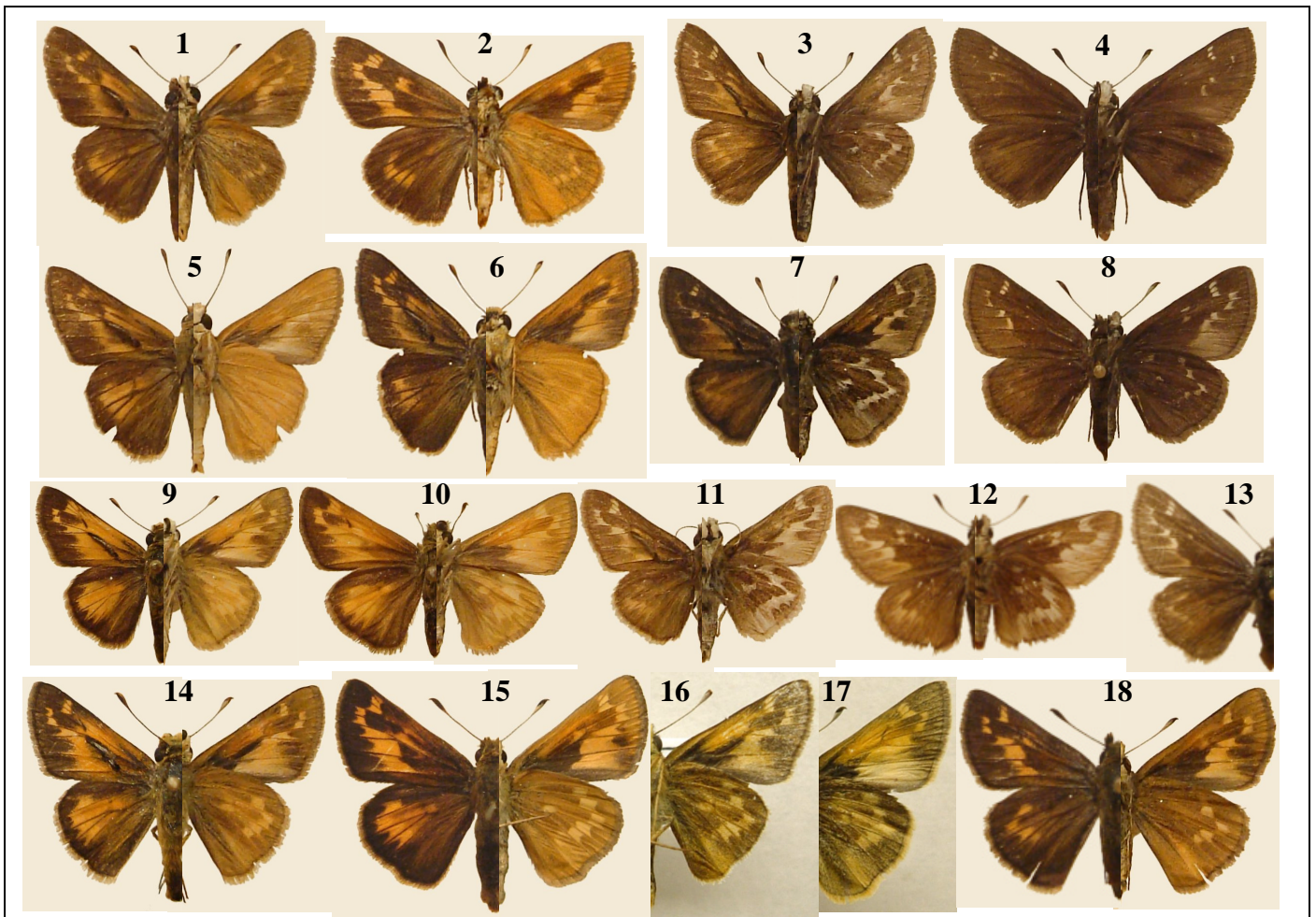
The southern United States is an historically under studied region of the country relative to its butterflies and skippers. Only Florida has received adequate attention from colonial times to the present. Yet, even in Florida, there are still a few taxa in need of further research. One such species is *Hesperia meskei* (W.H. Edwards, 1877). The populations of this skipper on the lower Florida Keys, Monroe County, have long been suggested by various writers and researchers as a likely undescribed subspecies. Yet, it has remained undescribed until this publication.

North of Florida, the deep South from Louisiana to North Carolina has had few resident lepidopterists. The few who have lived in this area and built notable collections have not been working butterfly taxonomists. Further, only a limited number of areas within this region have been well collected and much of the region is still unsurveyed. Even in some well collected areas, little taxonomic scrutiny has been locally applied. One well collected but under studied region is the area around Clemson University in northwestern South Carolina. For decades it has been known that *Hesperia metea* Scudder, 1864 is an inhabitant of this area. This taxon is examined in this paper and determined to be an undescribed subspecies ranging from South Carolina through Mississippi and probably into Missouri.

<sup>1</sup> Staff Researcher, The International Lepidoptera Survey, Goose Creek, South Carolina.

Perhaps the least studied area in the South is western North Carolina. This seems unusual as much historical collecting was done in the Smoky Mountains National Park and also in the vicinity of the Biological Station, Highlands, North Carolina. In the 1990s, the senior author began to survey the butterflies and skippers of western North Carolina in a wider and thorough manner via contract work he performed for the US Forest Service and The International Lepidoptera Survey (TILS). Gatrell has previously described two taxa new to science from this region. A third is now added as *Hesperia sassacus* Harris, 1862 has been found to occur widely in this region and to constitute an undescribed subspecies.

The description herein of three new *Hesperia* subspecies brings the total number of known *Hesperia* taxa in the southern United States to eight. Four of these have been described just in the last decade, and thus, the number of described *Hesperia* taxa in this region doubled at the turn of the twenty first century. This serves to illustrate how taxonomically understudied the South has been. Other undescribed taxa are presently known from the southern United States at both the subspecies and species level in various families. Historically, the South seems to have been viewed as faunally ubiquitous – especially by those in other regions. But the region is composed of many varied faunal zones and specialized niches produced by its rich geologic and climatic history.



**All:** left side, dorsal; right side, ventral. **Figs. 1-2:** ♂ holotype & ♀ allotype, *Hesperia meskei pinocayo* (data in text). **Figs. 3-4:** ♂ & ♀, *H. metea licinus*, 29 March 1962, Tyler S.P., Smith Co., TX. **Fig. 5:** ♂, *H. m. meskei*, 1 June 1975, Freestone Co., TX. **Fig. 6:** ♂, *H. m. straton*, 3 October 1995, Horry Co., SC. **Figs. 7-8:** ♂ holotype & ♀ allotype, *H. metea intermedia* (data in text). **Figs. 9-10:** ♂ & ♀ topotypes, *H. sassacus sassacus*, 6 June 1975, Sherborn, MA. **Figs. 11-12:** ♂ & ♀ topotypes, *H. m. metea*, 17 May 1955, Willimantic, CT. **Fig. 13:** ♀, *H. m. metea*, 29 April 2003, Harnett Co., NC. **Figs. 14-15:** ♂ holotype & ♀ allotype, *H. sassacus nantahala* (data in text). **Figs. 16 & 18:** ♂ & ♀ paratypes, *H. s. nantahala*, 27 May 2003, Clay Co., NC. **Fig. 17:** ♂, *Atalopedes campestris huron* (Same data as 16). Scale: 1.3 actual size. Photos: Joe Mueller.

## *Hesperia sassacus*

Gatrelle and Grkovich

Until the 1990s, *Hesperia sassacus* was considered a rarity south of Virginia (Harris 1972, Howe 1975, Pyle 1981, Opler & Krizek 1984). But with the recent advent and boom in butterfly watching, several colonies of this skipper have now been found in western North Carolina in Ashe, Watauga, Avery, Mitchell, Burke, Yancey, Madison, Haywood, Macon, and Clay counties (Harry LeGrand pers. comm.) Thus, it is now considered a not uncommon taxon in western North Carolina.

*Sassacus* has yet to be recorded from Georgia, but it is surely there as North Carolina specimens have been collected within one mile of the Georgia line (Scaly area in Macon, Co. by James Adams). The northeastern Georgia counties should be examined closely for the presence of this species. The only historical Georgia record is attributed to the coastal region (Harris 1972), but this is certainly an identification error. Gatrelle has located two highly probable sites but has not been able to survey these at the proper time of year. They are the Popcorn Overlook serpentine barrens on Hwy. 76 east of Clayton and the area around Sky Valley off Hwy. 246, both in Rabun County.

It has been known since the early 1940s that individuals of the then southernmost populations in Virginia were often quite dark and similar to the Canadian “form *manitoboides*” (A.W. Lindsey 1942, Clark & Clark 1951, Forbes 1960). Forbes even referred to the populations in the mountains of western Virginia as, “a richly colored race, approaching *manitoboides*.” Forbes used the term race for subspecies. Thus, our current presentation of the southernmost populations as a dark new subspecies can not be called a “new discovery.” We are merely certifying that which has previously been suggested by others – that the southern mountain populations of *sassacus* are phenotypically and subspecifically distinct from nominate *sassacus* of the New England region.

The authors are uniquely experienced with this species in the field and are thus positioned to make an accurate subspecific assessment of this taxon. Gatrelle is familiar with the populations at the extreme southern end of its range and has collected the type series. Grkovich resides in the type locality of nominate *sassacus* and is thus familiar with the variation of the nominate taxon. He is also familiar with the Appalachian subspecies via his observations and collecting of it in southeastern West Virginia.

### *Hesperia sassacus nantahala* Gatrelle and Grkovich, New Subspecies

**Diagnosis and description.** The *nantahala* photos (Figs. 14-16 & 18) well illustrate the distinctiveness of this new subspecies from nominate *sassacus* (Figs. 9-10). **Dorsally:** males of the two subspecies are patterned much alike but *nantahala* is a slightly deeper orange and has the fulvous areas slightly more restricted; in females, the fulvous is much more restricted in *nantahala* with 23% of the paratypes being form *pocahontas* (Fig. 18), 46% form *alfaratta* and only 31% moderately to fully fulvous as is usual in nominate *sassacus* females. **Ventrally:** topotypical *sassacus* males are almost always light yellow fulvous on the hind wing with the hesperia spot band only slightly or moderately different from the ground color, few specimens have well defined spots on a darker ground; in *nantahala* males, the ventral hind wing ground is quite variable, often dark brown (Fig. 16) and usually medium brown but occasionally light orange yellow (but not as light as in typical *sassacus*), against this dark ground the hesperia spot band is broad and more defined than in *sassacus*; in *nantahala* females, 95% of females have medium to rich brown hind wing ground with the cream colored hesperia spot band pronounced, so much so that some female *nantahala* can easily be mistaken for the species *Hesperia leonardus* Harris, 1862.

**Types.** *Holotype* ♂ (Fig. 14): NORTH CAROLINA: Clay County, Hwy. 64 at Buck Creek, 3400 ft., 27 May 2003. *Allotype* ♀ (Fig. 15): NORTH CAROLINA: Clay County, Buck Creek, For. Rd. 6269, 27 May 2003. *Paratypes*: 23 ♂♂, 13 ♀♀; All NORTH CAROLINA: Clay County: various sites in and around Buck Creek: 1 ♂, 16 May 2002; 4 ♂♂, 1 ♀, 24 May 2002; 1 ♂, 1 ♀, 25 May 2002; 1 ♂, 10 May 2003; 13 ♂♂, 9 ♀♀, 27 May 2003; 2 ♂♂, 1 ♀, 2 June 2003. Macon County: Jones Knob area, 4000 ft.: 1 ♀, 25 May 2002; 1 ♂, 27 May 2003. All leg. R. Gatrelle. The holotype and all paratypes are currently in the TILS Museum of the Hemispheres' collection, Goose Creek, South Carolina. Some paratypes will eventually be deposited in other institutions. (Dark paratypes, 27 May 03, Clay Co., figures 16 & 18.)

**Etymology.** *Nantahala* is taken directly from Nantahala National Forest, western NC and is used as a noun.

**Remarks.** Based on specimens Grkovich has observed and collected in Greenbrier Co., West Virginia, we consider the range of *nantahala* to extend north into southern West Virginia. The region and range of intermediate populations north and east of southern West Virginia needs to be determined. The colonies of *nantahala* in the southern Appalachians are numerous but generally isolated from each other. As with all southeastern *Hesperia* (MacNeill 1964), this is an old taxon and thus its phenotype is genetically stable within these micro colonies which have doubtless been isolated from each other for hundreds to thousands of years. This taxon is found in open meadows, even highway right-of-ways (type locality). But it is also resident deep in open hardwood forest along trails in the same environs as *Poanes hobomok monofacies* Gattelle, 2002 and *Phyciodes batesii maconensis* Gattelle, 1998. *Nantahala* is a fairly large *Hesperia* with an average expanse from outer forewing margin to margin in spread males of 30mm and in females 34mm (type series). In Massachusetts *sassacus*, the average was 26mm in males and 30mm in females (n=10 each). We have not observed oviposition. Many specimens of both sexes of *nantahala* strongly resemble *Atalopedes campestris* (Boisduval, 1852) (Sachem Skipper) on the ventral surface (Fig. 17). This resemblance is to such a degree in many individuals that a positive sight determination between the two from this surface alone is not possible. A series of eleven *sassacus* from Grand Isle, Vermont were dark beneath as in *nantahala*, but above they were typical *sassacus*. These types of individuals should be referred to as form *manitoboides* and may be frequently encountered in eastern Canada and the adjacent areas of the United States.

## *Hesperia metea*

Gattelle

The known southern colonies of *Hesperia metea* Scudder, 1864 are moderate in number. Most southern specimens have been collected in Mississippi and Georgia. In North Carolina, it has now been documented in widely scattered colonies in 17 counties by the many butterfly watchers in that state with most records centered in the south central Sandhills region. Unfortunately, vouchers are lacking for most of these sites. I am aware of only one regional site for this skipper in South Carolina even though it is recorded for five counties. The records for Pickens and Oconee counties are confirmed. There are several scattered colonies in that region in and around Clemson.

There is very little taxonomic information in the literature concerning the deep South populations of *metea*. Even in Harris' *Butterflies of Georgia*, most of his text is devoted to accounts of the species in Pennsylvania and New Jersey. Opler & Krizek 1984 only state, "Populations in Arkansas and Texas (subspecies *licinus*) are almost immaculate above and below, and some individuals elsewhere in the Deep South are nearly so." C. Don MacNeill in Howe 1975 provides the most, and most pertinent, information on southern *metea*. Re the subspecies *licinus* (Edwards, 1871) he states, "This subspecies is known only from Texas and Arkansas. Specimens from Georgia and Mississippi, however, show tendencies toward this subspecies and a careful analysis might well demonstrate a large zone of intergradation between the two east and north of Texas."

Until two years ago, I considered the southern populations of *metea* to be subspecies *licinus* and ranging from Texas to South Carolina. There is no doubt that the southern populations, as alluded to by the above authors, are not the nominate subspecies and that in many ways they most resemble subspecies *licinus*. However, the phenotype of the populations from Missouri to South Carolina does not indicate a "blend zone". Rather, the populations over this broad area are homogenous in appearance and intra-region variation. I now hold that this is a unique subspecies and here propose it as such. I have chosen the name *intermedia* not because it blends into the other subspecies, but because its characters fall between them.

Evolutionally, I consider this "new" subspecies to be the taxon closest to the parent of both *metea metea* and *metea licinus*. As the southeastern segregate, it is certainly older than *metea metea* as much of that subspecies' range lies in areas that were glaciated a mere 20,000 years ago. At some time, *intermedia*-like parents are hypothesized to have been isolated in Texas or Mexico giving rise to *licinus*. In modern times, the ranges of these three subspecies have expanded and moved closer to each other, but I hypothesize that they have been isolated evolutionally from each other for some time. There is evidence of this at the east and west ends of the range of *intermedia*.

In the east, nominate *metea*'s range extends south into the southern Sandhills of North Carolina (Fig. 13) and perhaps into the northern part of that region in South Carolina. It is a relatively short distance to upstate South Carolina where *intermedia* occurs. There are no known "blend zone" (actually, post glacial suture zone) colonies between North Carolina *metea* and South Carolina *intermedia*. In the west, the same situation exists with a relatively short distance between Missouri *intermedia* and Arkansas *licinus* with no known "blend zone" colonies between the two. The area to check in the west would be Remington's (1968) Louisiana-East Texas Suture Zone F.

While *metea metea* extends south into the midlands of North Carolina, *intermedia* extends north into the Mountains of North Carolina and perhaps, West Virginia (Allen 1997, figures) and southern Ohio (Iftner et al 1992, figures). *metea metea* has a narrow east west range from New England into Wisconsin. True *metea* is a light colored taxon with bold VHW spots and veins. In describing this new subspecies, the range of *metea* is much reduced by defining its phenotype more specifically. I have not seen Kentucky or Tennessee specimens, but I expect them to all fall within the newly recognized subspecies.

MacNeill (1964) states that the genus *Hesperia* is oldest in the southeastern US. It would seem odd indeed for the oldest taxon within *metea* to not be recognized as a distinct subspecies.

### *Hesperia metea intermedia* Gatrelle, New Subspecies

**Diagnosis and description.** The *intermedia* photos (Figs. 7-8) well illustrate this new subspecies. **Dorsally:** males of *intermedia* are darker than males of either *metea* or *licinus* with males of the latter two being much alike. Females of *intermedia* are dark blackish brown as in *licinus* but with (restricted) light forewing spots; females of *metea* are usually bright fulvous brown with bold white spotting. **Ventrally:** males of toptypical *metea* have the hind wing hesperia spot band well developed and often with white "cobweb" veining; in *licinus* the veins are not white and the spots greatly reduced; in *intermedia* males the spots are usually well developed but very little white veining. Females of *intermedia* have a small but bright hesperia spot band and no white veining while in *licinus* the spots are often absent; in *metea* females they are very well developed and often with extensive white veining.

**Types.** *Holotype* ♂ (Fig. 7): SOUTH CAROLINA: Pickens County, visc. Lake Issaqueena, 20 May 1993. *Allotype* ♀ (Fig. 8): SOUTH CAROLINA: Pickens County, visc Lake Issaqueena, 21 April 1993. *Paratypes:* 33 ♂♂, 6 ♀♀: SOUTH CAROLINA: Pickens County: three sites vicinity Lake Issaqueena: 9 ♂♂, 1 ♀, 20 April 1993; 3 ♂♂, 1 ♀, 21 April 1993: 3 ♂♂, 2 ♀♀, 21 April 1994; 3 ♂♂, 15 April 2003. (All leg R. Gatrelle). MISSISSIPPI: Lee County: Tombigbee State Park: 1 ♂, 13 April 1975; 2 ♂♂, 7 April 1977; Tishomingo County: 1 ♀, Mt. Woodall; 1 ♀, 5 mi. w. Belmont; 1 ♂, Burnsville, all 16 April 1994; 11 ♂♂, 2 mi. sw Bloody Springs, 18 April 2002. (All leg. R. Patterson). The holotype and all South Carolina paratypes are currently in the TILS Museum of the Hemispheres' collection, Goose Creek, South Carolina. All Mississippi paratypes in personal collection of R. Patterson. Some paratypes will be deposited in other institutions.

**Etymology.** *Intermedia* indicates that this taxon is phenotypically between.

**Remarks.** In this study, specimens of *H. metea licinus* were examined from: ARKANSAS: Carroll Co. (7 ♂♂, 1 ♀); OKLAHOMA: Cleveland Co. (1 ♂, 6 ♀♀) (det. McGuire & Freeman); TEXAS: Leon Co. (1 ♂, 1 ♀); Smith Co. (3 ♂♂, 2 ♀♀); Tarrant Co. (1 ♂); Wise Co. (1 ♂, 2 ♀♀). 4 pair were examined from Benton Co., MISSOURI and determined to be *intermedia*. This area is on the Ozark Plateau which has faunal affinity with the southern Appalachian region. Only 16 specimens of *intermedia* were examined from GEORGIA, but these were from a wide area and provided a good sample. GA locations were: Greene Co., Cobb Co., Bartow Co., McDuffie Co., Douglas Co., and DeKalb area. The Georgia material was more variable than the South Carolina or Mississippi series but all individuals fell within the concept of *intermedia*. 52 specimens of nominate *metea* were examined from MASSACHUSETTS, CONNECTICUT, NEW JERSEY, RHODE ISLAND, PENNSYLVANIA, and MICHIGAN. All specimens examined were in the Florida State Collection of Arthropods, Gainesville, Florida or the private collection of the author. The holotype and allotype specimens of *intermedia* were selected because they were "average". There are individuals of both sexes that are both lighter and darker.

A major question was the southeastern limit of *metea metea*'s range. No North Carolina Sandhills specimens were located for loan, and while photos are available, they are risky for taxonomic assessment as they can be skewed by camera settings, lighting, or electronically "enhanced" on internet web sites. Thus, I made a late trip in 2003 to the North Carolina southern midlands to locate and examine individuals in the field and collect any as necessary. I located two males and got a good look at them before they eluded me. Two females were collected (Fig.13). This sample was tiny, but nonetheless revealed that they are best referred to subspecies *metea*. Their phenotype differed from New England individuals (and are larger,) but I do not feel they can be called "transitional" to *intermedia*. I certainly do not include them in *intermedia*.

# *Hesperia meskei*

Gatrelle and Minno

The populations of *Hesperia meskei* on the lower Florida Keys already have a common name, the Rockland Grass Skipper. This attests to its having been well known for many years as a unique entity. One of the most recent treatments of this segregate was by Minno and Emmel (1993) in *Butterflies of the Florida Keys*. In the species account, they state that the Keys population seems to represent an unnamed subspecies. Why this segregate has never been described is not fully known, however, one reason is that various lepidopterists have talked of doing so over the last 40 years and others held off from describing it out of professional courtesy. But none have done so. Now, not only have the decades passed by, but this taxon has nearly passed into extinction. The authors believe it is imperative that this unique and now very rare insect receive formal status as a taxonomic taxon to better assure that it is afforded any and all protection that it may require. This official status can also help in promoting searches for it on the mainland and reintroduction efforts if needed.

The Keys subspecies is very different in all characters from nominate *meskei* which is endemic to Texas. True *meskei* is a very light and bright taxon (Fig. 5). The Rockland Grass Skipper is closest to subspecies *straton* (W.H. Edwards, 1881) (Fig. 6) which is the subspecies of the southeastern United States including mainland Florida where its type locality is Indian River, Florida. All of the specimens of *straton* we have examined exhibit a fairly consistent phenotype over its rather large range. Clearly, *pinocayo* has evolved a unique phenotype. But more significantly, this subspecies is biologically unique as it does not diapause but is continually brooded. It has not been recorded in February, July or August but this reflects larval development (broods) not true diapause (which is usually induced by day length).

## *Hesperia meskei pinocayo* Gatrelle and Minno, New Subspecies

**Diagnosis and description.** Figures 1-2 well illustrate this new subspecies. **Dorsally:** males of *pinocayo* vary from fulvous as in males of *straton* and *meskei* to much less fulvous. Females of *pinocayo*, *straton* and *meskei* are much alike dorsally. **Ventrally:** males and females of *pinocayo* are unique in the color and pattern of the ground and hesperia spot band of the hind wings; from CU<sub>2</sub> to the inner margin the ground is dark ocher to rust brown and from CU<sub>2</sub> to the anal margin (vanal area) light rusty yellow; the hesperia spots are more prominent than in *straton* and *meskei meskei*, which in the latter are usually not visible being the same color as the bright ground; *meskei meskei* is unique in that the VFW is usually heavily light fulvous (Fig. 5) while in *straton* (Fig.6) and *pinocayo* it is dark to varying degrees.

**Types.** *Holotype* ♂ (Fig. 1): FLORIDA: Monroe County, Big Pine Key, 22 November 1979, leg. W.L. Adair. *Allotype* ♀ (Fig. 2): FLORIDA: Big Pine Key, 22 April 1973, leg. R.A. Anderson. *Paratypes:* 20♂♂, 14♀♀: All FLORIDA: Dade Co.: 1♂, 1♀, Navy Wells Preserve, 26 August 1980, leg L.C. Koehn. Monroe Co., Big Pine Key: 1♂, 26 November 1978, 1♂, 15 May 1979, leg C.M. Stevens; 1♀, 11 March 1984, leg. M.C. Minno; 6♂♂, 1♀, 20 March 1979, 1♀, 6 November 1981, leg. R.W. Boscoe; 3♀♀, 10 December 1972; 1♂, 28 January, 2♂♂, 11 March, 1♀, 15 March, 3♂♂, 1♀, 18 March, 1♂, 2♀♀, 25 March, 1♀, 5 April, 1♂, 22 April, 1♂, 13 May, 1♂, 16 September, all 1973, all leg. R.A. Anderson; 1♂, 1♀, 24 November 1979, leg. Jeff Slotten; 1♀, 24 May 1981, leg. M.G. Douglas. The holotype and 10 paratypes are in the FSCA, Gainesville, Florida. The allotype and 7 paratypes are in the TILS collection, Goose Creek, South Carolina. Remaining paratypes as follows: Minno collection: 1; Koehn collection: 2; Slotten collection: 2; Anderson collection: 12.

**Etymology.** *Pinocayo* is derived from Spanish and is used by us as a noun meaning Pine Key.

**Remarks.** More research is needed to determine the biogeographic evolution of *pinocayo*. We do not expect this taxon to be found to be a species, but acknowledge this possibility. DNA and breeding studies may reveal sufficient distance and/or incompatibility of a degree that such a status is warranted. Minno has examined the genitalia and found it very similar, if not the same as, subspecies *straton*. Our greatest question is the presence and range of this species on the mainland. The specimens collected by Koehn in Dade County at Navy Wells means it may be (or once was) found in the Miami area. Gatrelle has often wondered why “*meskei*” has not been found in southwestern Florida in the area just west of the Fakahatchee Strand as the habitat looks perfect. Conservation is of immediate concern. The taxon is within the Key Deer Refuge on Big Pine Key and is therefore already afforded habitat and disturbance protection. However, the number of individuals have now declined so greatly that some type of breeding program seems called for soon if not immediately.

## ACKNOWLEDGEMENTS

We thank those who loaned us essential specimens of the various taxa in these studies: Andy Anderson (FL), Jeff Sloten (FL), Leroy Koehn (KY), David Hoag (Vermont), Dale Clark (Texas). We thank the DPI/FSCA Gainesville, FL and TILS/MOTH Goose Creek, SC for access to their diverse collections. We thank Joe Mueller for his fine photography of specimens.

## LITERATURE CITED

- ALLEN, T.J. 1997. *The Butterflies of West Virginia and Their Caterpillars*. Pittsburgh, PA: University of Pittsburgh Press xii + 388 pp.
- CLARK, A.H., and L.F. CLARK. 1951. *The Butterflies of Virginia*. Smithsonian Misc. Coll. 116 (7): vii + 239 pp.
- FORBES, W.T.M. 1960. *Lepidoptera of New York and Neighboring States, part 4*. Cornell Univ. Agr. Exp. Sta. Memoir 371, 188 pp.
- HARRIS, L., Jr. 1972. *Butterflies of Georgia*. Univ. of Okla. press, Norman OK. 326 pp.
- HOWE, W.H. 1975. *The Butterflies of North America*. Doubleday & Co., Inc. New York, NY. 633 pp.
- IFTNER, D.C., J.H. SHUEY & J.V. CALHOUN. 1992. *Butterflies and Skippers of Ohio*. Ohio St. Univ. (in co-op with) Ohio Dept. of Nat. Res. Div. of Wildlife and Ohio Lepid. Columbus, Oh. 214 pp.
- LINDSEY, A.W. 1942. A Preliminary Revision of *Hesperia*. Denison Univ. Bull. Jour. Sci. Laboratories, Vol. 37, pp. 1-50, 6 pls.
- MacNEILL, C.D. 1964. *The Skippers of the Genus Hesperia in Western North America, With Special Reference to California*. Univ. of Cal. Press, Berkeley/Los Angeles, CA. 230 pp.
- \_\_\_\_\_. 1975 in: HOWE, W.H. *The Butterflies of North America*. Doubleday & Co., Inc. New York, NY. pg. 475.
- MINNO, M.C. & T.C. EMMEL. 1993. *Butterflies of the Florida Keys*. Dept. of Zoology, Univ. of FL, Mariposa Press. Gainesville, FL. 168 pp.
- OPLER, P.A. & G.O. KRIZEK. 1984. *Butterflies East of the Great Plains, An Illustrated Natural History*. Johns Hopkins Univ. Press, Baltimore, MD. 294 pp.
- PYLE, R.M. 1981 (1992). *The Audubon Society Field Guide to North American Butterflies*. Alfred A. Knopf, NY. pp. 924.
- REMINGTON, C.L. 1968. Suture-zones of Hybrid Interaction Between Recently Joined Biotas. *Evol. Biology*, Vol. 2 (8), 325- 413.
- 

### *The Taxonomic Report*

is a publication of *The International Lepidoptera Survey (TILS)*.

(A Tax Exempt Non-Profit Scientific Organization )

**Donations are needed to support and further our efforts to discover and protect butterflies worldwide. All donations are US tax deductible. Please help generously.**

Donations should be mailed to: **Treasurer, 126 Wells Rd., Goose Creek, SC 29445.**

Checks should be made payable to: **TILS**. Please indicate if you need an individual receipt.

Catch us on the web at: [www.tils-ttr.org](http://www.tils-ttr.org)