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AN EXAMINATION OF THE *MITOURA* (LYCAENIDAE) IN THE SOUTHEASTERN UNITED STATES: WITH THE DESCRIPTION OF A NEW SUBSPECIES OF *MITOURA HESSELI*.

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ABSTRACT. Four subspecies of *Mitoura grynea* occur in the United States east of the Mississippi River. The nominate subspecies occupies this entire area except for Florida and the coastal regions of South Carolina and Georgia. *M. g. grynea* is usually associated with *Juniperus virginiana*. A neotype is designated for *Lycus gryneus* from Aiken County, South Carolina. *M. grynea smilacis* is endemic to the southeastern coastal islands and coastal mainland from about Brunswick Georgia north to the Santee River delta of South Carolina. *Smilacis*' range corresponds to that of *Juniperus silicicola* in that area. A neotype is designated for *M. grynea smilacis* from Chatham County, Georgia. *M. grynea sweadneri* is endemic to eastern Florida (especially along the coast) from about Jacksonville southward. *M. g. sweadneri* rarely has any fulvous scaling above. *Sweadneri*'s range corresponds to that of *Juniperus silicicola* in that area. A fourth subspecies is discussed but not described. This entity inhabits west central Florida. This subspecies tends to have yellowish red fulvous above and yellowish green ground below. *Mitoura hesseli* is represented in the eastern and southern United States by two subspecies. *Mitoura hesseli hesseli* ranges from Maine south through Virginia to northern North Carolina. *Mitoura hesseli angulata* Gatrelle is described from Aiken County, South Carolina. It is larger, ventrally darker, has a more angulate ventral median band and longer tails than nominate *hesseli*. *M. h. angulata* ranges from the southern sandhills of South Carolina southward into northern Florida. The populations in southeastern North Carolina are intermediate. The neotypes of *grynea* and *smilacis* and the holotype of *angulata* are currently deposited in the Museum of the Hemispheres, Goose Creek, South Carolina.

Additional key words. Genitalia, host associations, isolation.

MITOURA GRYNEA

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With *Mitoura grynea* (Hübner, 1819) we again come to a taxon which was likely discovered by John Abbot in eastern Georgia. This is somewhat problematic as *Mitoura grynea smilacis* (Boisduval and Le Conte, 1833) is also an Abbot species from this same region (Forbes, 1960). There are no type specimens for either of these taxa. In order to insure the continued prevailing usage of these names, neotypes are designated herein for both of these taxa.

The first name applied to this hairstreak was *Papilio damon* Stoll, 1782 (Figs. 19-20). This name, however, was preoccupied by a European Blue of the same name. Both Hübner's *Lycus gryneus* and *Polyommatus damastus* Godart, 1824 were new names proposed for the preoccupied *damon* (Forbes, 1960). The type specimen of *damastus* is extant in the National Museum of Natural History, Paris. This specimen however, is a *Calycopis cecrops* (Fabricius, 1793) and not a *grynea* (see Johnson, 1991).

The original description of *Papilio damon* by Stoll is typical of the very brief descriptions of that day. It is given in both Dutch and French. Here is the Dutch version followed by the English translation.

Fig. C. *D. Damon*. Behoort onder het Gezin der Schildrups – Pagies (*Pap. Pleb. Rural.*) en heft de groene kleur op de onderzyde der vleugelen satynagtig glanzig. Men vindtze in *Virginien*.

Figs. C and D *Damon*. ... of the shield larvae - Belongs to the family *Pap. Pleb. Rural* and has a green color on the underside of the wings that shines like satin. It occurs in Virginia.

As can be seen from the reproduction of the original figures, Stoll's insect is what we are familiar with today as *Mitoura grynea*. Stoll's figures were based on specimens from Virginia.

Lycus gryneus Hübner, was introduced in 1819 without description by the following simple caption which simply references Hübner's name *gryneus* to Stoll's description and figures. I have not been able to locate a Hübner figure of this and am not sure if there is one or not. This however, is of little consequence and I have thus not pursued that aspect at length.

732. L. *Gryneus*. Damon Cram. 390. C. D.

To this point in time, all of the southern U.S. Hübner names I have investigated over the years have been based on material collected by John Abbot in Georgia. Abbot collected many species near his home in what is today's Burke and Screven counties, Georgia. He also collected at least a few of his new species only in the coastal area of Georgia. We know this because the species he painted either do not occur in Burke or Screven counties at all, or if they do, not in the subspecies he depicted. The most certain exclusively coastal Abbot taxa are: *Problema bulenta* (Boisduval and Le Conte, 1834), *Euphyes arpa* (Boisduval and Le Conte, 1834), *Anthocharis midea midea* (Hübner, 1809), *Satyrium calanus calanus* (Hübner, 1809), *Fixsenia favonius favonius* (J.E. Smith, 1797), *Hemiargus ceraunus antibubastus* (Hübner, 1818) and *Mitoura grynea smilacis* (Boisduval and Le Conte, 1833).

The lepidopteran fauna changes greatly over the 60 miles from the Georgia coast to Screven and Burke counties. This is a result of the differing geologic and ecological development of these areas. Several species occur as one subspecies along the coast and another inland with less than 40 miles between them. One such subspecies pair is *Mitoura grynea grynea* and *Mitoura grynea smilacis*.

The *grynea* in Burke County are part of the subspecific entity that has long been referred to as nominate *grynea* over most of eastern North America. I have not yet found *grynea* in Screven County though it is likely there. The *grynea* that occurs along the immediate coast of Georgia and its coastal islands is subspecies *smilacis*. The Abbot painting of *smilacis* in its original description is clearly the coastal segregate. Thus, this name is not a problem (we shall deal with this later). Stoll's *grynea*, depicted under the name *damon*, is clearly the northern/inland subspecies.

The problem is that it is possible that Hübner's name *grynea* may have actually been based on Georgia's coastal population too. This is a real possibility as species *grynea* is much more common along the coast than inland. If this were to be the case, and because coastal *smilacis* is a very good subspecies, this would mean that, 1) *smilacis* would be a junior synonym of *grynea*, 2) the name *grynea* would then be restricted to the subspecies along the coast of Georgia and South Carolina, and 3) would require that the *grynea* populations in the rest of eastern and Midwestern North America be given another epithet. This would cause serious instability in the longstanding usage, and understanding, of the name *grynea*.

Regardless of whether or not there is a Hübner depiction of *grynea*, and regardless of what it may look like if there is one, the proper course of action is to focus on Hübner's equating of his name *grynea* with Stoll's name *damon* and therefore maintain Hübner's application of the name *grynea* to the inland/northern traditional subspecies. This situation requires the designation of neotypes for both *grynea* and *smilacis* to maintain nomenclatorial stability. I herein do this which maintains stability without sacrificing the integrity of the two biological subspecies concerned.

The primary consideration was where to affix the type locality. I have various specimens from Virginia which would accommodate the Stoll location (Figs. 22-24). However, the name was Hübner's and based on Abbot material. It was thus appropriate to align the type locality with the work of Hübner and Abbot and use a southern location. I have observed just a few *grynea* in Burke County (I have not been at

the right place at the right time) and collected only one. Unfortunately, it is in poor condition and not suitable for a neotype. It is definitely the nominate *grynea* phenotype however. A small series of *grynea* which I have collected in neighboring Aiken County, South Carolina are of the same biogeographic population as those in adjoining Burke County. I have therefore chosen to designate a specimen from Aiken County, South Carolina as the neotype. The neotype of *Lycus gryneus* Hübner, 1819 is a male (Figs. 29-30) with the following labels and data. A red label with the hand printed words: NEOTYPE. *Lycus gryneus* Hübner, 1819 designated by R. Gatrelle in TTR 3:4 August 2001. A white label with the hand printed words: March 29, 1988, Aiken State Park, Aiken County, SC. A small white label machine printed with: collector, Ronald R. Gatrelle; and hand printed: ♂ *M. grynea*. This specimen is currently deposited in the International Lepidoptera Survey's Museum of the Hemispheres, Goose Creek, South Carolina.

This same action was taken by H. A. Freeman (1952) in designating a neotype for *Megathymus yuccae* (Boisduval and Le Conte, 1834) from Aiken County. This name was based originally on Burke/Screven County specimens collected by Abbot. Therefore this action is not without precedent.

INTERMEDIATE POPULATIONS

I have discussed the geological formation of the Sandhill region and coastal area of Georgia and South Carolina in other papers on the taxa in this area (Gatrelle, 1998, 1999, 2001). Before the arrival of Europeans in this area, much of the butterfly fauna of the Sandhill region was isolated from the fauna of the coastal marshes and pine-hardwood islands along the coastal plain of Georgia and South Carolina by a dense jungle of swamp forests that lay between these two areas. Over the last 400 years this barrier has effectively been removed by the activities of man. This alteration has allowed several sister subspecies to extend their ranges toward each other in this area. This will eventually culminate in the contact of these taxa and ultimately the genetic mixing of both. This in turn will result in the eventual extinction (by absorption) of the coastal subspecies and the likely morphological altering of the inland ones.

M. grynea grynea (inland) and *M. grynea smilacis* (coastal) are subspecies of differing evolutionary lineages which are extending their ranges closer to each other due to the above ecological alteration. Any area where they meet is thus a tension zone rather than a blend zone. The tension zone between *grynea* and *smilacis* is very narrow. The populations I have experience with that pertain to this geographic change from *smilacis* to *grynea* are in Bryan County, Georgia and Barnwell, Berkeley and Dorchester counties South Carolina. This change in subspecies correlates with the range of their host trees in this same area: *Juniperus silicicola* for *smilacis* and *Juniperus virginiana* for *grynea* (Radford et. al. 1968).

Bryan County, Georgia is a narrow and long county that runs from the Georgia coast inland to Bulloch County. On its eastern side it borders Chatham and Effingham counties. There is a sizable colony of *M. grynea smilacis* in the northeast corner of Fort Stewart Army base just inside Bryan County near the junction of Bryan, Effingham and Chatham counties. Both *J. virginiana* and *J. silicicola* were present in this area when I collected there in 1977. Dr. R. T. Arbogast directed me to this site. Dr. Arbogast was a long time resident of Savannah and collected in that area of Bryan County often. This colony is the furthest known inland colony of *smilacis* in northeast coastal Georgia. This area is only 60 miles south of where I observed nominate *grynea* in Burke County. This indicates that intermediate populations may well occur in Screven County which is only 30 miles from this colony.

Dorchester County, South Carolina is to the northwest of Charleston County. Givhans Ferry State Park straddles Dorchester and Colleton counties and is 30 miles inland. In 1976 I located a small *smilacis* colony in the Dorchester portion of the park about three *Juniperus* trees on a bluff overlooking the Edisto River. The trees were quite old and I was not sure if they were *virginiana* or *silicicola*. My opinion is that they were *virginiana*. I say were, as they were victims of Hurricane Hugo in 1989. The bulk of the specimens from this colony were typical *smilacis* but some specimens I examined exhibited phenotypic

characters that leaned toward *grynea*. I consider this colony still taxonomically referable to as *smilacis* (Fig. 39). The importance of the presence of specimens with some intermediate characters here (Fig. 40) serves to demonstrate that true *smilacis* does not extend inland far from the coast.

Smilacis extends up the Cooper River into Berkeley County to Moncks Corner. There was once a very large *J. silicicola* forest on the west bank of the Cooper River just south of Moncks Corner. This site is now largely gone as it was destroyed in the construction of an upscale waterfront subdivision without regard for the site's unique native flora and fauna. As this colony was not far from my home I was able to study it frequently. It had two full broods with the first peaking in late April (numbering in the thousands by conservative estimates) and the second emerging from July to September. Dorsally red individuals were very frequent. About 10% of the specimens at this site have the ventral median line tending toward subspecies *grynea* (Fig. 42). I reared specimens from this colony twice on a *Chamaecyparis thyoides* L. I have planted in my yard. I do not know how far north *smilacis*' range extends along the coast.¹

In 1977 and 1988 I collected and/or examined specimens of *grynea* (Figs. 35-36) in and around Barnwell State Park in Barnwell County, South Carolina. The colony in this area is subspecies *grynea*. However, some of the specimens there exhibit ventral characters that lean toward *smilacis* – smaller basal hindwing spots and a straighter median band. Barnwell County is just across the Savannah River from Burke County, Georgia and approximately 75 miles from the coast. The area is 24 miles south of the *grynea* type locality at Aiken State Park in adjoining Aiken County.

As can be seen, I have not located a colony that is intermediate to subspecies *grynea* and *smilacis*. What I have noted is that a small number of *smilacis* specimens in the Berkeley and Dorchester County populations lean to *grynea* and that a few specimens of *grynea* in the Barnwell population lean toward *smilacis*. The Dorchester County colony showed the most variation.

MITOURA GRYNEA SMILACIS.

Thecla smilacis Boisduval & Le Conte, 1833. Here translated from the original French into English.

It has the carriage and size of *Thecla Acaciae* of Europe. The top of the wings is the same brown-blackish, with a small whitish matte [flat finish] near the middle of the superior [upper] part; the lower wings have toward the end [tip] two small pitted tails at the crest white as in similar species.

The lower part of the wings is of a less brilliant green than in the *rubi*, often washed with a little reddish, marked beyond the middle of a transverse white stripe, winding and wavy on the upper wings, winding on the lowers, bordered in front by a rust-colored faded imperceptibility with a green color. Between this stripe and the base of the lower wings have another short transversal stripe, sinuate, of the same color. The borders of these two wings is marked by two or three ashy crescents of which the intermediary is black in front, and the third aligned with two or three small rust-colored spots, more or less distinct. The anal area is black, and near the fringe there is a small white marginal line, almost nothing on the uppers.

The caterpillar is green, with blackish head and feet. It is marked with four rows of red spots, of which the two dorsals are formed with similar spots, and one on each side formed with spots a little larger.

The chrysalis [pupa] is a grayish-brown, with the abdomen more light and reddish.

It is found in Georgia on the *smilax*. It is at present very rare in collections.

This species forms a small group with the *Thecla chlorion* and *simaethis*.

A most interesting aspect of this description is that the larval host is given as *smilax* and that it is named after this plant. The genus *Smilax* is a modest sized assemblage of dioecious, herbaceous or woody vines. While vines of this genus are frequently found growing in Red Cedar trees, *grynea* larvae do not feed

¹ In editing this manuscript, Harry Pavulaan relayed that in 1999 he collected a female *Mitoura* in a stand of *J. silicicola* at the inland edge of a salt marsh near Ocean Isle Beach in Brunswick County, North Carolina. He stated that the individual tended more in overall phenotypic characters toward *smilacis* than nominate *grynea*. He also confined the individual on both male and female branches of *J. virginiana* for a period of 14 days where she refused to oviposit.

upon it. The genus was described by Linnaeus so the name was known to be associated with these vines well before the *smilacis* description in 1833.

The distinguishing subspecific taxonomic markings of *smilacis* are found on the ventral hindwings and the dorsal forewings. The two markings at the base of the ventral hindwings of *smilacis* may be absent (infrequent), dots (frequent) or aligned straight bars (frequent). They are never as in typical eastern *grynea* where this lower marking is usually offset marginally in the shape of a V (Fig. 24). In the description above, these two markings are described by the words: short, stripe and sinuate. In the copy of Abbot's painting they are two dots and in line (Fig. 21). Those *smilacis* specimens that have these markings present as dots or absent are in this respect marked like subspecies *M. grynea sweadneri* F. H. Chermock, 1940.

Smilacis also resembles *sweadneri* in that the hindwing median line is straight or only slightly wavy. This is very different than in *grynea* where this line is very crooked (Figs. 30 & 36). This difference between *grynea* and both *smilacis* and *sweadneri* is produced by the alignment of the intercellular median mark between veins M1 and M3. In *grynea* this line tends to lay horizontal along M3 and then bend upward at its mesial end to veins M2 and M1. In both *smilacis* and *sweadneri* the line in this interspace is vertical (Figs. 26 & 28). These differences between *smilacis* and *grynea* and similarities between *smilacis* and *sweadneri* point to *smilacis*' evolutionary closeness to *sweadneri* and distance from *grynea*.

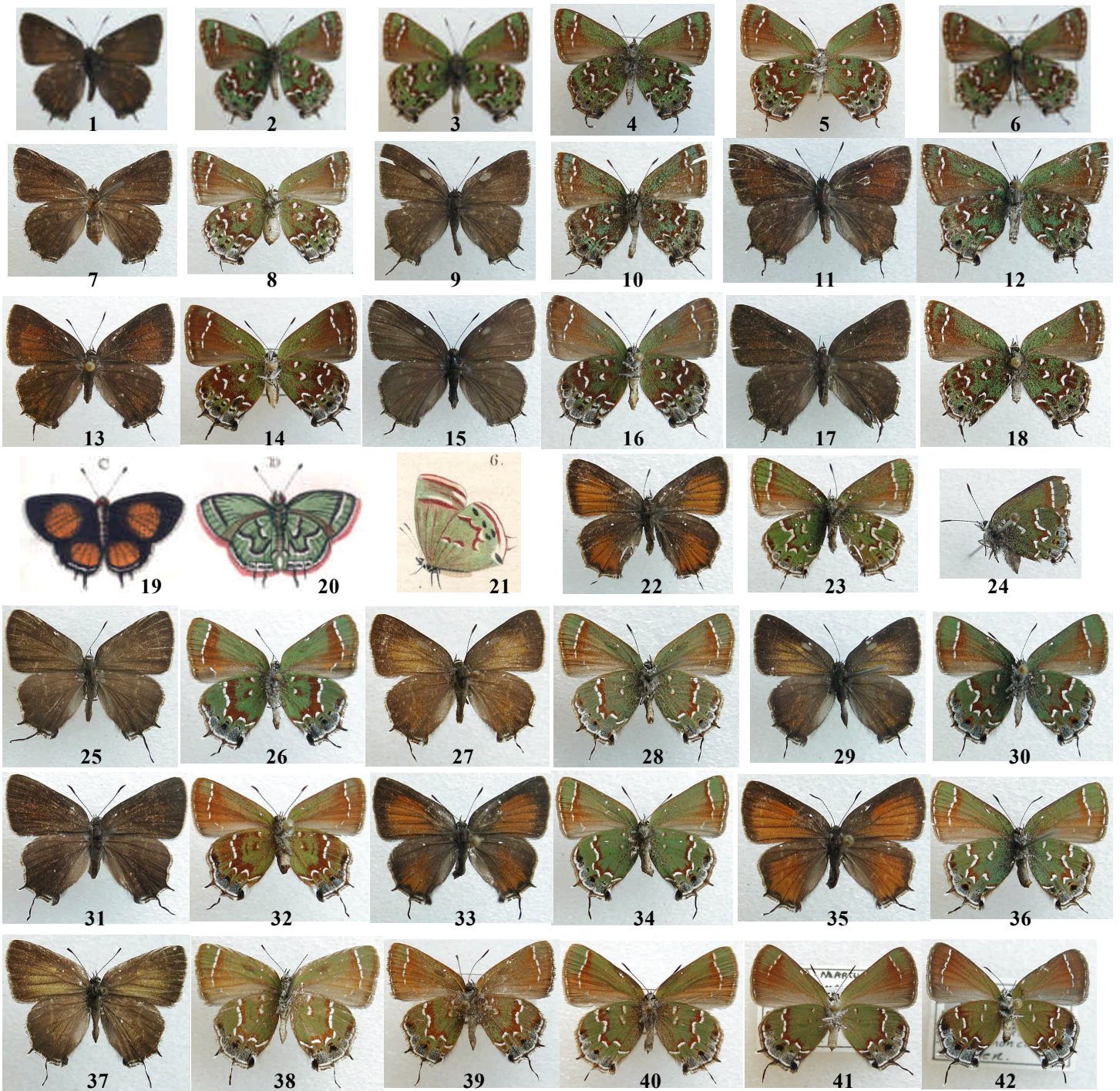
Smilacis is virtually unknown in collections. To many workers, it was only known from the original description and figures. It was therefore assumed by most of the older workers that *smilacis* lacked fulvous above. This also led a number of the older taxonomists to simply consider *smilacis* a "form" of *grynea* that lacked fulvous above. In actuality *smilacis* frequently has a good amount of red fulvous scaling on the dorsal forewings, especially in females (Fig. 33). I have collected scores and observed hundreds of *smilacis* along the north coast of Georgia and south coast of South Carolina. Fulvous specimens are more numerous than all dark specimens in the spring brood, and in the summer and fall broods about a third of the specimens are very fulvous above. The name *smilacis* is absolutely not based on a form.

While many *smilacis* look very much like *sweadneri* ventrally, their dorsal forewings are most often marked like subspecies *grynea*. Individuals of subspecies *sweadneri* rarely have any fulvous above and if so it is limited to a very faint patch of a few scales. This phenotypic feature points to *smilacis*' evolutionary distance from *sweadneri* and toward *grynea*. What we have then is a taxon that is morphologically as unique as any of the many other North American subspecies now considered as part of species *grynea*.

Mitoura grynea smilacis is endemic to a very narrow and unique semi subtropical coastal life zone that extends from the Santee River delta of South Carolina in the north then south to Jacksonville, Florida. That area is composed of hundreds of barrier islands and salt marsh where *smilacis* and its larval host, *Juniperus silicicola*, are both common. This does not mean that this unique subspecies is without peril. On Edisto Island, Colleton County, South Carolina, there was once a thriving abundant population. It is now scarce there due to beach area housing development. This type of expensive development is a plague to flora and fauna along the entire southeastern seaboard. Further, in this zone, *smilacis* probably does not range south of Brunswick, Georgia as it blends to subspecies *sweadneri* southward.

As discussed under *grynea grynea*, *smilacis* does not range far inland from the coast. While it is clear that for thousands of years *smilacis* and *grynea* were isolated from each other by the forest swamps between the Sandhills and coastal islands, there was no such barrier between *smilacis* and *sweadneri*. Thus, *smilacis* and *grynea* are meeting in a tension zone while *smilacis* and *sweadneri* meet in a blend zone.

I am here designating a male from Chatham County, Georgia as neotype of this neglected and unique subspecies (Figs. 27-28). The neotype of *Thecla smilacis* has the following labels and data attached to it. A red label with the hand printed words: NEOTYPE. *Thecla smilacis* Boisduval & Le Conte, 1833 designated by R. Gatrell in TTR 3:4 August 2001. A white label with the hand printed words: March 20, 1976, nr. Fort Pulaski, Chatham County, GA. A small white label machine printed with: collector, Ronald R. Gatrell; and hand printed: ♂ *M. g. smilacis*. This specimen is currently deposited in the International Lepidoptera Survey's Museum of the Hemispheres, Goose Creek, South Carolina.



Figs. 1- 42. Eastern *Mitoura*. **1-2:** ♂ *hesseli*, 10 May 1987, Lebanon St. For., Burlington Co., NJ (leg. unknown). **3:** ♂ *hesseli*, 13 May 1984, Blue Hills Res., Norfolk Co., MA (leg. unknown). **4:** ♂ *hesseli*, 20 April 1974, nr. Raeford, Hoke Co., NC. **5:** ♀ *hesseli*, ex pupa 12 June 1976, nr. Raeford, Hoke Co., NC. **6:** ♂ nr. *angulata*, 29 April 1988, St. Rd. 211, Brunswick Co., NC (leg. Zeligs). **7-8:** ♀ *hesseli*, 20 July 1972, Chatsworth, NJ (leg. Douglas). **9-10:** ♂ *angulata*, 1 April 1978, 10 mi. E. Sumatra, Liberty Co., FL (leg. Roman). **11-12:** ♀ *angulata*, 30 March 1979, 8 mi. E. Sumatra, Liberty Co., FL (leg. Baggett). **13:** paratype ♀ *angulata*, 21 April 1984, nr Aiken St. Pk., Aiken Co., SC. **14:** paratype ♀ *angulata*, ex ova 3 May - pupa 15 June 91, same data as 13. **15-16:** HOLOTYPE ♂ *M. h. angulata*, ex ova 4 May - pupa 19 June 1990, same data as 13. **17-18:** allotype ♀ *M. h. angulata*, 20 April 1990, same data as 13. **19-20:** Stoll's *damon* in Cramer 1782. **21:** B & LCt's *smilacis*, 1833. **22-23:** ♀ *grynea*, 6 May 1976, Fairfax Co., VA (leg. Hartgroves). **24:** ♂ *grynea*, same data as 22. **25-26:** ♂ *sweadneri*, 6 March 1976, New Smyrna Beach, Volusia Co., FL. **27-28:** NEOTYPE ♂ *M. g. smilacis*, 20 March 1976, nr. Ft. Pulaski, Chatham Co., GA. **29-30:** NEOTYPE ♂ *M. grynea*, 29 March 1988, same data as 13. **31-32:** ♀ *sweadneri*, 8 March 1975, St. Augustine, St. Johns Co., FL. **33-34:** ♀ *smilacis*, 19 March 1977, Hwy 204 nr. Ogeechee R., Bryan Co., GA. **35-36:** ♀ *grynea*, 26 March 1977, nr. Barnwell St. Rk., Barnwell Co., SC. **37-38:** ♂ *grynea* undescribed, 5 May 1974, Istachatta, Hernando Co., FL. **39:** ♂ *smilacis*, 13 March 1976, Givhans Ferry St. Pk., Dorchester Co., SC. **40:** ♀ *smilacis* nr. *grynea*, same data as 39. **41:** ♀ *smilacis*, ex ova 30 March - pupa 19 May 1991, on Cooper R. nr. Moncks Corner, Berkeley Co., SC. **42:** ♀ *smilacis*, ex ova 27 March - pupa 25 May 1991, same data as 41. Specimens are 1.15 actual size. All specimens leg. R. Gatrell unless otherwise noted. Photos by Joe Mueller.

MITOURA GRYNEA SWEADNERI

In the early and mid 1970's, while *Mitoura grynea sweadneri* was still rather plentiful along the east coast of Florida from Jacksonville south to Brevard County, I encountered this species several times. The most abundant colony was encountered at New Smyrna Beach, Volusia County. It was also widespread in the St. Augustine area including the type locality. I have not been to any of these sites for many years and thus can not personally speak to its abundance or scarcity now. It is reportedly still fairly common in some areas, but I know of no detailed published accounts in recent years.

This subspecies is fairly well known. Some workers had postulated that this might actually be a full species. This is not the case as it blends to *smilacis* in the north and to the west to a slightly different phenotype (which I shall discuss below), and then to the northwest to nominate *grynea*. Further, it is now known that the genitalia of the *Mitoura* blend from subspecies to subspecies in this group along with their morphology and phenotypes (e.g. Robbins, 1990). The *sweadneri* populations in the vicinity of Jacksonville begin to show blend zone characters toward *smilacis* (increased dorsal fulvous and basal bars on the ventral hindwings). Thus, I do not consider true *sweadneri* to range much further than the Florida – Georgia state line on the Atlantic coast. As stated by Calhoun (1997), it is a Florida endemic.

While the *smilacis* figures presented herein are the first ever photos of that subspecies, *sweadneri* is illustrated in several publications. *Sweadneri* is defined by the following characters (Figs. 31-32). Ventrally, the hindwing's two basal marks are either two dots or absent; the median line is fairly straight as in most *smilacis*, however, the inward part of the white median line often has a wide brown border; the black marginal spot in cell CU1 is not very large. Dorsally, the wings are usually a dark brown and rarely have reddish fulvous scaling, which when present, is faint and restricted.

The species *grynea* is recorded from 20 counties across northern and central Florida. Nineteen of these have been attributed to subspecies *sweadneri* (Calhoun, 1997). My taxonomic analysis is that this attribution is only partially correct, as the populations in western Florida differ significantly from typical *sweadneri*. However, the correct taxonomic placement of this west coastal Florida non-*grynea*/non-*sweadneri* entity is uncertain at this time and needs further study.

I have had a fair amount of experience with species *grynea* in Florida over the years. I have encountered *sweadneri* at 5 locations on the east coast, and the non (or near) *sweadneri* populations at 5 other locations in Hernando, Citrus, and Levy counties. In total, this amounts to a few hundred specimens of both entities. I have also viewed numerous Florida specimens in various personal collections and the Florida State Collection of Arthropods, Gainesville.

On the ventral hindwings, the population in west Florida seems allied to both *smilacis* and *sweadneri*. The basal markings are almost always dots (or absent), but I have seen a few specimens where these begin to become bars. The black marginal spot is also usually smaller than in east coast specimens. To my eye, the green ground color tends to a yellowish hue in some individuals, while in *sweadneri* the green is very dark and even brownish in some specimens. The big difference however, is on the dorsal surface where the west Florida population often has very noticeable fulvous areas (Fig. 37). Further, this fulvous tends to be yellowish, and while never real strong, it is reminiscent in shade to that of the western subspecies *M. grynea castalis* (W. H. Edwards, 1871). I had, at one point, decided to describe this entity as a new subspecies herein. However, I have decided this needs more study. This does not mean though, that these should be referred to as *sweadneri*. For now, they should be referred to as either near *sweadneri* or, perhaps more properly, as near *smilacis*.

The main question is, by what evolutionary path did this west Florida entity come into being? Is it a descendant from a *grynea* that might have inhabited western Florida at a glacial maxima when the west coast of Florida and areas of the Gulf coast extended many miles into the gulf of Mexico from where it is today? Or, did it move down into its present location from an ancestor to the north? How is it related evolutionally to *sweadneri*? These issues call for further research.

MITOURA HESSELI

Mitoura hesseli Rawson and Ziegler, 1950 was described from Lakehurst, Ocean County, New Jersey. There are two subspecies of *hesseli* in the eastern United States. This has been known for some time. Northern (nominate) *hesseli* ranges from southern Maine south to north coastal North Carolina. The populations in south central North Carolina are intermediate between nominate *hesseli* and the southern subspecies described below. The few specimens I have seen from the coastal population in Brunswick County, North Carolina also appear intermediate but lean toward the southern subspecies (Fig. 6).

I first became familiar with *hesseli* and its habitat in Hoke and Cumberland counties, North Carolina beginning in July 1973. I have collected/observed scores of specimens from that area on several occasions. I have also reared the Hoke County population twice (Fig. 5). On 23 April 1977 I discovered an undocumented stand of its larval host, *Chamaecyparis thyoides* L, near Aiken State Park in Aiken County, South Carolina. On 21 May 1977 I subsequently collected a female at this new site for a South Carolina state record. This was also one of the first known specimens of the southern subspecies. Previous searches between 23 April and 21 May found nothing (this species is not expected to be flying in that area in late May and my capture of this specimen that day was the result of an actual miracle – which I would be glad to tell anyone about privately). I have collected and observed this population several times between 1977 and 1991. I have also reared specimens of the Aiken colony twice (Figs. 13-16) verifying the unique characters of this population. Today, the site remains as it was when I first located it. .

The first person to consider describing this subspecies was Steve Roman who lived in the Orlando, Florida area at the time and who, along with Rick Gillmore, had the most experience with, and was thus the most knowledgeable of, this taxon in Florida. Roman subsequently gave up studying Lepidoptera (he later became interested in certain Coleoptera). About that same time I began working on this present paper dealing with all the southern *Mitoura* and had a rough manuscript completed by the fall of 1979. This was to be part of a series of papers on several southeastern hairstreaks. Business and personal matters put all this on hold. Next, Dave Baggett began to investigate this taxon and moved close to producing a paper. At one point we talked of doing this together. Several factors eventually came into play in his life that kept him from moving forward. Thus it is that I have been sitting on this description, in various stages of completion, for about 20 years.

The only real decision has been in determining the ranges of the two subspecies. Baggett felt the populations in Florida and south Georgia (discovered by Irving Finkelstein) were the definitive subspecific entity. I strongly disagreed. The new subspecies is only slightly more phenotypically developed and averages a little larger in Florida but as an evolutionary entity the subspecies clearly includes the population in extreme southwestern South Carolina. Subspecies *angulata* exhibits far less variation from southern South Carolina to north Florida than nominate *hesseli* exhibits from Maine to Virginia. *Angulata* may be present in Sumter County, South Carolina as there is a large stand of *C. thyoides* there. Unfortunately, it lies in the bombing range of the Shaw Air Base and can not be accessed – even though in a State Forest.

Mitoura hesseli angulata Gatrell, new subspecies

Description and diagnosis. (Figs. 9-18). The primary distinguishing features between the northern (nominate) and southern subspecies (*angulata*) are the markings on, and the ground color of, the ventral hindwings. Secondly, *angulata* is distinguished by its longer tails, larger size and tendency to have more fulvous scaling on the dorsal forewings. Other than the sex patch of the males, the sexes of each respective subspecies are marked and colored alike with the respective females being somewhat larger and with longer tails than their males. In nominate *hesseli* (Figs. 1-8) the ventral ground color is typically a vivid olive green, in subspecies *angulata* it is dark green to dark brown. In nominate *hesseli* the ventral white marginal line is often wide from M1 to the anal angle and blends into the submarginal area peppering it with many white scales; in subspecies *angulata* this line is thin and the submarginal area much less invaded with white scaling. The ventral hindwing median line in *angulata* is much more undulate than in nominate *hesseli*; the spots in this line on *angulata* are very angulate also while in northern *hesseli* they are more curved and give a softer appearance. The last two spots in this line in cell CU2 and A2 are diagnostic of *angulata* and form, what Baggett aptly called, a sickle shape; in northern *hesseli* these

lines usually tend to form a soft **m** shape. In *angulata* the lower of the two ventral hindwing basal spots is usually in the form of a sharp arrow-head pointed outward, this is mirrored by an inward pointing arrowhead in the median line in cells M1, M2; nominate *hesseli* lacks this feature. In cells M3 and CU1 the spots in the median band on *angulata* are often very reduced in size – almost absent; in nominate *hesseli* they may be only slightly reduced. On the dorsal surface, *angulata* has red fulvous scaling in some specimens, becoming more frequent the farther south the subspecies is encountered, there is red scaling on 6 of the paratypes (20%) but strongly in only two.

Types. All: SOUTH CAROLINA, Aiken County, nr Aiken State Park (leg. R. Gatrell). *Holotype* ♂ (Figs. 15-16): ex ova 4 May 1990, ex pupa 19 June 1990. *Allotype* ♀ (Figs. 17-18): 20 April 1990. *Paratypes*: 14 ♂♂, 16 ♀♀: 1 ♀, 21 May 1977; 4 ♂♂, 1 ♀, 21 April 1983; 4 ♂♂, 1 ♀, 21 April 1984; 1 ♀, 25 July 1988; 1 ♀, ex ova 27 April - ex pupa 9 June, 1 ♀, ex ova 2 May – ex pupa 24 June 1989; 3 ♂♂, 20 April 1990; 1 ♀, 29 April, 3 ♂♂, 9 ♀♀, ex ova 2 May – ex pupa 12 to 18 June 1991. All type specimens are currently housed in the TILS Museum of the Hemispheres, Goose Creek, South Carolina. It is planned that some of the paratypes will be deposited in another Museum to be determined later.

Type locality. Aiken County, South Carolina.

Etymology. This subspecies derives its name from the angular nature of the median bands on the ventral hindwings.

Remarks. It is significant that in the southern subspecies of *grynea* the ventral median line becomes straighter and the basal markings bars, dots or obsolete, while in the southern subspecies of *hesseli* these same characters become more angular and undulate. Opposite patterns like this, especially in closely related species, indicate that they are strictly genetic in origin. In contrast, it is usual for southern hairstreak subspecies in the eastern U.S. to exhibit more dorsal fulvous and longer tails than their northern counterparts – typical of environmentally induced morphological characters. The second brood of *M. hesseli angulata* is darker below than the spring brood with most specimens being a deep brownish green in ground color. I have seen many specimens from Florida in the private collections of Steve Roman, Rick Gillmore and Jeff Slotten.

It is very significant that I have reared both the Aiken (South Carolina) colony of *angulata* (Fig. 14) and the Hoke (North Carolina) colony of *hesseli* (Fig. 5) twice each. These were reared under the same conditions (indoors) at the same location (Goose Creek, SC) with each producing 100% distinctly different subspecific phenotypes demonstrating that the populations are two genetically distinct morphological subspecies.

Baggett (personal communication) was interested in the fact that he had found evidence in the plant literature that the larval host of *angulata* in Florida was considered by some as a distinct variety of *Chamaecyparis thyooides* and that this might indicate that *angulata* evolved in concert with this variety of *C. thyooides*. This is worthy of future study. I have noted several other stands of White Cedar in Aiken County (via binoculars) but have not been able to access these sites as they are well into private property. *Mitoura hesseli angulata* is quite uncommon in nature and very under-represented in collections. It should be considered a taxon of special concern. The population in Aiken County is the only known colony in South Carolina. This colony is located on a utility easement on private property. While *angulata* may well occur at other locations within South Carolina, this should not be assumed from a wildlife management standpoint. I have found that *hesseli* colonies are most numerous where the old trees have been logged and young trees are in thick stands of 5 to 30 feet tall saplings.

There were five other specimens I had photographed and originally intended to include in this paper but there was not enough room for them on the plate and they have been omitted. These were two unique wild caught aberrant individuals of *smilacis* and specimens of *grynea* from Mississippi and Iowa. The latter are examples of *grynea* to the west of this study area. All the Mississippi material I have seen from mid to up state is typical *grynea*. I have not seen any from the coastal region of that state. Being from Iowa, I have collected *grynea* at several locations there. These are transitional to more western phenotypes. They tend to have bars at the base of the VHW and lean toward subspecies *M. g. castalis* (W.H. Edwards, 1871).

In recent years various long established *Eumaeini* genera have come to be lumped as subgenera under *Callophrys* Billberg, 1820. This includes the genus *Mitoura*. This does not seem warranted to me. In fact, we are now in a phase where much lepidopteran lumping seems to be going on at all levels – and at times with very little or no published research. For those who have followed this trend, the name *angulata* would be spelled “angulatus” if placed under *Callophrys*.

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