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TWO NEW NYMPHALIDAE FROM WESTERN NORTH CAROLINA: NEW SUBSPECIES OF *SPEYERIA APHRODITE* AND *PHYCIODES BATESII.*

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ABSTRACT. Two new subspecies are described from Macon County, North Carolina. *Speyeria aphrodite cullasaja* is characterized by dorsal melanism, especially in females, by usually lacking the dorsal FW basal spots in cell Cu_1 and Cu_2, and by a narrowed buff marginal band on the ventral HW (sometimes absent in females). *Phyciodes batesii maconensis* males are characterized by wholly yellow ventral hind wings devoid of any dark marginal dusting or whitish crescents; and females occasionally possessing, lightly dusted, brown margins and rarely having a silvered marginal ventral HW spot. *P. batesii maconensis* larvae are gregarious *Aster* feeders. Females are known to oviposit only on *Aster undulatus*. Both subspecies are presently known only from the drainage of the Little Tennessee River in western North Carolina and northern Georgia at altitudes above 4,000 feet. Both are common in this area.

Additional key words: *batesii* syntypes, *Speyeria atlantis,* high altitude, Great Smoky Mountains National Park

A new subspecies of *Speyeria aphrodite* Fabricius

L. Paul Grey was North America's expert on *Speyeria*. In our correspondence over the years he had expressed his belief that the southernmost populations of both *Speyeria aphrodite* in north Georgia and western North Carolina (Figs. 1, 2) and *Speyeria atlantis* Edwards in West Virginia (Figs. 9, 10) were undescribed subspecies. Unfortunately, I never found the *aphrodite* he wanted from that area until after his health failed.

On 8 July 1988, I located a population of *S. aphrodite* in the area of Jones Knob, Macon County, North Carolina. This population was visited in 1988 through 1994 and in 1998 with *aphrodite* present all years. In 1990, another population was located in the vicinity of nearby Scaly Mountain, Macon County; and in 1994 *aphrodite* was discovered in the area of Rabun Bald in adjacent Rabun County, Georgia. All known colonies are resident at elevations above 4,000 feet.

A total of about 100 specimens have been collected from these sites. They confirm Dr. Grey's speculation and represent a new subspecies.

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Speyeria aphrodite cullasaja Gatrelle, new subspecies

Diagnosis. *Speyeria aphrodite cullasaja* is the largest of the nine known *aphrodite* subspecies. The average FW radius being 37 mm (expanse 66 mm) in males, and 44 mm (expanse 78 mm) in females. In appearance, *cullasaja* ♂♂ look like large ♂♂ of *Speyeria cybele novascotiae* (McDunnough) (Fig. 5); while *cullasaja* ♀♀ closely resemble ♀♀ of *S. atlantis capitanensis* R. Holland (Fig. 6), only larger. Two features distinguish *cullasaja* from all other *aphrodite.* First, the basal half of the dorsal surface in both sexes, but especially the female, is heavily suffused with dark brown scales. So much so, that this area in some females appears almost black. In flight, these dark females can be mistaken for slow flying males of *Speyeria diana* (Cramer). Secondly, 75 – 80% of specimens (both sexes) have the basal spots in cell Cu_1 and/or Cu_2 either absent or greatly reduced. The largest males, with broader than average ventral buff margins, are easily mistaken in flight, or at nectar, for males of *S. cybele* (Fabricius) with which it flies.

Description. *Male* (Fig. 1): *Head*: dark brown dorsally, light brown palpi ventrally, antennae with shaft dark brown, club black. *Thorax* and *abdomen*: concolorous dark brown dorsally, concolorous light brown ventrally. *Forewings:* black spots at base of cell Cu_1 and Cu_2 just below discal cell usually missing or greatly diminished; dorsally, with basal dark brown scaling usually extending to postmedian black spots in Cu_1 and Cu_2, frequently into base of cell M_3, and to second black bastad bar in discal cell; ventrally, as in nominate *aphrodite* but all colors bolder, especially reddish brown at base, and brown markings at apex. *Hindwings:* dorsally, with brown scaling as in nominate *aphrodite,* but much darker; ventrally, with narrowed light buff marginal band usually 2 mm or less, ground color dark brown. *Female* (Fig. 2): *Head*: as in male. *Thorax* and *abdomen*: as in male. *Forewings:* black spots at base of cell Cu_1 and Cu_2 just below discal cell usually missing or greatly diminished; dorsally, with heavy dark brown to black basal scaling extending through discal cell and to postmedian black spots in Cu_1, Cu_2 and M_3; ventrally, strong brownish red flush to area bastad of postmedian black spots, tornus pale brownish yellow, apex dark brown with silver spots. *Hindwings:* dorsally, with heavy dark brown scaling extending to the postmedian black spots, except in cell M_2; ventrally, with narrowed light buff marginal band 2 mm or less, frequently obliterated by dark purplish brown as in subspecies *alcestis* (W. H. Edwards).

Types. *Holotype* ♂ (Fig. 1): trail to Scaly Mountain, 4200', Macon Co., North Carolina, 5 July 1990, Coll. Ronald R. Gatrelle. *Allotype* ♀ (Fig. 2): meadow near Jones Knob, 4150', Macon Co., North Carolina, 15 July 1994, Coll. Ronald R. Gatrelle. *Paratypes:* 58♂♂, 25♀♀: all MACON COUNTY, North Carolina: JONES KNOB: 1♂, 2 ♀♀, 8 July, 2♂♂, 4♀♀, 9 July 1988; 4♂♂, 7 July, 2♂♂, 1♀, 8 July 1989; 1♂, 1♀, 4 July 1990; 1♂, 5 July 1991; 1♂, 2♀♀, 6 July 1993; 2♂, 10 June, 10♂♂, 17 June, 2♂♂, 26 June, 4♂♂, 2♀♀, 2 July, 1♂, 9♀♀, 15 July 1994; 3♀♀, 12 July, 1♀, 13 July 1998. DENNY ORCHARD RD (below Jones Knob): 3♂♂, 17 June, 1♂, 26 June 1994. SCALY MOUNTAIN: 2♂♂, 5 July, 2♂♂, 6 July 1990; 1♂, 7 July 1993. HALE RIDGE ROAD (below Scaly Mt.): 2♂♂, 10 June, 10♂♂, 17 June, 1♂, 26 June 1994. All collected by Ronald R. Gatrelle. The holotype, allotype, and 6 paratypes are deposited in the collection of the American Museum of Natural History, New York. Paratypes are deposited in: the Allyn Museum of Entomology, Sarasota, Florida (4), Florida State Collection of Arthropods, Gainesville, Florida (4), Dr. Jeff Slotten collection, Gainesville, Florida (2), Dr. George T. Austin collection, Las Vegas, Nevada (4), remainder in collection of Rev. Ronald R. Gatrelle, Goose Creek, South Carolina.

Etymology. Cullasaja is Cherokee for "laughing water." The subspecies is named for the Cullasaja River Gorge, which is the outstanding geological feature of the area and is threatened by proposed hydroelectric development.

Remarks. An additional 12 males have been taken in Rabun County, Georgia, along Sky Valley Road (this becomes Hale Ridge Road where it crosses into North Carolina). Males wander away from breeding areas below 4000'. Females seem to stay in the higher elevation, in meadows and thinly wooded areas near balds. Peak flight is mid-June for males, and mid-to late-July for females. The range of *cullasaja* is difficult to predict. However, it is not great. From Virginia south, *aphrodite* is clinal in appearance, with specimens becoming larger and females darker. Clark and Clark (1951) give a good presentation of *aphrodite* variation in the Appalachian region. I have examined numerous specimens from all states throughout this area. *Cullasaja* has not been found in any other location. Some of the more pertinent locations and specimens are as follows: 3♂♂ and 8♀♀ in the FSCA Gainesville, Florida from Great Smoky Mountains National Park, Cades Cove, Blout County, Tennessee: while larger and more heavily dusted than topotypical *aphrodite* (TL New York City, Figs. 3, 4), all specimens have the typical basal spots in Cu_1 & Cu_2, and none of the females approach *cullasaja* in degree of basal darkness. They are not *cullasaja*. At the state line on Hwy. 23 Unicoi County, Tennessee / Madison County, North Carolina: I took a few in 1978 (the meadow is now gone due to road construction), none of which are *cullasaja.* Big Black Mountain, Harlan County, Kentucky: occasional specimens lack the spots in Cu_1 and Cu_2, but are otherwise typical of the variation described by Clark and Clark. For now, *Speyeria aphrodite cullasaja* is known only from the Nantahala Mtns. and

acts as an island isolate in a cluster of peaks and connecting ridges above 4000 feet in the southern end of the Blue Ridge. I expect it to inhabit other Blue Ridge mountains between Highlands and Asheville, North Carolina. Since it has not been found in the western Appalachian Mtns., it may be a southern Blue Ridge endemic.

A new subspecies of *Phyciodes batesii* (Reakirt)

Scott (1994) presented a thorough study of the biology and taxonomy of the genus *Phyciodes*. In that work, he described three new subspecies of *Phyciodes batesii* (Reakirt), of which *P. b. lakota* Scott, TL Pine Ridge, Sioux County, Nebraska is one. Scott lumped *lakota* into his clinal concept of "eastern" *batesii* – which he sees extending from Alberta, Canada, across southern Canada and the northern United States to the Atlantic Ocean, and then down the Appalachian Mountains terminating in northern Georgia. A vast area overlapping many life zones, habitats, elevations, etcetera.

In this clinal concept, he correctly sees two phenotypic "extremes" (his term) and a variable intermediate. He correctly extends the range of his western extreme, *lakota* (Fig. 16), eastward into Michigan and **central Ontario.** He accurately limits his other extreme phenotype to the high mountains of the southern Appalachians in northeast Georgia and western North Carolina. He then incorrectly associated this second extreme with the intermediate variable phenotype, northeastern US nominate *batesii* (Figs. 17, 18, 19), which he extended into **eastern Ontario.**

His taxonomic verdict should have been based foremost on any existent type specimens and an accurate understanding of the type locality (location, habitat, altitude etc.). Then without prejudice, allow the facts to dictate the conclusions. He did not. His treatment of *P. batesii* in the eastern and southern US is prejudicially incorrect. His statements reveal his *lakota* taxonomy is based heavily on in his own predisposed personal agenda. "Because I wish to use only two names in this cline, I want to have the TLs [type localities] as near as possible to the ends of the cline." "I have used taxonomic license to force the [his] concept."

Type specimens

In his *batesii* research, he refers, directly or indirectly, to information supplied to him by myself no less than 7 times. His taking "taxonomic license" included not mentioning photos of the syntypes (one from Winchester, VA and one from Colorado) in the FMNH that I informed him of in a 17 Nov. 1993 letter. (photos provided by the Allyn Museum of Entomology.) The Winchester syntype clearly shows a *P. batesii batesii* **type specimen** (Fig. 14) with dark shading along the outer margin of the ventral HW. In his study, he did mention that I had informed him (in the same letter) that no Gloucester, New Jersey (type locality) specimens could be found. However, he neglected to mention that I had located and obtained the loan of Shipiro's Philadelphia, County, PA, *batesii* taken VI-23-65, Wissahickom. A specimen taken only 15 miles from Gloucester (and thus a virtual **topotype)** with quite a bit of shading along the ventral margin of the HW. (Specimen now housed in the Bohart Museum, University of California Davis.)

Since both the existent syntype and topotype possess brown scaling (and of equal importance, crescent spots) in their margins, Scott's attempt to present nominate *batesii* as a taxon that doesn't posses dark scaling along the ventral margin of the HW is false (Figs. 17, 19). Scott states, "My separation of ssp. *batesii* and *lakota* is based on this [brown] patch…" But, this patch in *lakota* isn't consistently prominent (Fig. 16). Scott, on page 51, mentions "families" (colonies? adults from larval groups?) of *lakota* that "in wing pattern resembles N Appalachians [= *batesii batesii*] adults."

In actuality, Scott's *lakota* is either an east-west clinal subspecies of *batesii* or should be considered a synonym of nominate *batesii*. The three major characters on the ventral HW mentioned by Scott (silver crescent, brown dusting, heavier marking) are shared by *lakota* and eastern *batesii* in classical clinal gradation. Further, there is no barrier or break (isolation) in his east-west cline. He has both subspecies in Ontario (*lakota* central and *batesii* eastern). The syntypes themselves connect the western (*lakota*) and eastern (*batesii*) population, as one is from Colorado (Fig. 15) and the other Virginia!

Conversely, none of those three characters, by Scott's own research, are found in northern Georgia and western North Carolina *batesii*. Furthermore, *batesii* in north Georgia and western North Carolina are isolated on elevational Islands above 4,000 feet in the southern section of the Appalachians. They are isolated broadly from northern populations by valleys at about 2,000 feet (followed by the routes of I-81 and I-75) in southwestern Virginia. They may be more narrowly isolated by elevation, as is *Speyeria aphrodite cullasaja* (described above), which occupies the same ecological niche.

Type locality

Scott continually refers to his restricted *P. b. batesii* type locality of Winchester, VA as being in the northern Appalachian "mountains." The elevation of Winchester is 714 feet – basically the same as Charlotte, North Carolina, and 100 feet lower than Spartanburg, South Carolina. Winchester is on the edge of the Virginia piedmont (see Clark and Clark, 1951). Winchester is only 38 miles south of Pennsylvania and 145 miles southwest from Gloucester, NJ.

Scott (1986) shows Winchester, VA, Gloucester, NJ, and Sioux County, Nebraska, to be in the Upper Austral faunal zone. Both *batesii* and *lakota* are inhabitants of primarily once glaciated and/or Upper Austral faunal areas. His same 1986 map shows his unique *batesii* extreme in North Carolina to be in the Canadian zone. In nature, *P. batesii batesii,* and *lakota,* are non-isolated, non-montane. The heretofore undescribed western North Carolina *batesii* is an isolated, high altitude, montane subspecies.

I see no reason to "restrict" the type locality to the immediate vicinity of either city mentioned in the original description (as did Klots (1951, Gloucester), or Scott (1994, Winchester)). Though to do so, in my opinion, would have no effect on the systematic taxonomy of *P. batesii batesii.* Thus, I consider the type locality to be the relatively small 145 mile Upper Austral geographical area from sea level (coastal plain) to 714 feet (piedmont) as stated in the original description. (State lines are artificial boundaries that have nothing to do with taxonomy.)

Phyciodes batesii maconensis Gatrelle, new subspecies

Diagnosis. As described in Scott (1994), "In southern Appalachians the unh of males **always** lack a marginal brown patch **and** pale crescent, and the unh of females generally lacks a marginal brown patch (or it is very weak) and **usually** lacks the crescent." (Emphasis mine.) When a crescent is found on females, it is rarely silvered (I have seen only 2 silvered ♀♀ out of 90 examined). Nominate *batesii* from northeastern Virginia (TL) and the northeastern US differs from *maconensis* as per Scott (1994), "The brown unh marginal patch and pale unh marginal crescent **vary** esp. in males (females **often** have **both** patch and crescent)." (Emphasis mine.) Further, the crescent is often silvered in both males and females of *batesii* (Fig. 18). The theme throughout the literature is that *P. batesii batesii* may be distinguished by its diminished or absent VHW brown patch. Distinguished from what? From *P. tharos* (Drury). Regarding the brown patch, *maconensis* is to *batesii* as *batesii* is to *tharos*. In comparison to *maconensis*, many *batesii* may be said to have a prominent brown patch. These same *batesii* in comparison to *tharos* may be said to have a light patch. The average FW radius of male *maconensis* is 18 mm (expanse 35 mm), in females it is 21 mm (expanse 38.5 mm). My largest female has an expanse of 41 mm. In four pair of NY *batesii* I examined, the male FW radius averaged 16.5 mm (expanse 33.5), the female FW radius averaged 18 mm

(expanse 35 mm). The ventral FW black markings on *maconensis* are reduced in comparison to *batesii*, especially the apical black patch along the costal margin. Male and female *maconensis* look about the same, except for size; though the tendency is for *maconensis* females to be more lightly marked than males on the VFW and more heavily marked on the VHW. I have several *maconensis* females which are nearly devoid of any black on the VFW (Fig. 13). *Batesii* females are usually more heavily marked beneath than males on both the FW and HW. The ventral FW of *batesii* is redder and much more patterned.

Description. *Male* (Fig. 11): *Head,* appearance and appendages as in nominate *batesii. Thorax* and *abdomen:* as in nominate *batesii*. *Forewings:* dorsally, orange spotting of the postmedian and median bands and in discal cell more extensive than on *batesii,* with the median band usually a paler orange than the postmedian band and not as yellowish as in ♂ *batesii;* ventrally, yellowish orange ground with black markings crisp, and more restricted than on *batesii*, apical black patch along costal margin much smaller than on *batesii* and median black bar along costal margin often reduced to oval spots. No bold median light banding as often occurs on *batesii*. *Hindwings:* dorsally, broadly orange with postmedian spots usually at least partially fused to median orange patch, much as in *P. cocyta* (Cramer); ventrally, ground yellow with yellowish brown striations faint to very faint, no black markings except occasionally along costal margin and then not extending below vein $SC+R_1$, submarginal row of spots absent to light brown, never being prominent black dots as is frequently the case with *batesii*, rarely a faint light yellowish crescent along hindwing margin, but never prominent or white or silvered. *Female* (Fig. 12): as male, but larger and with following differences: contrast of median and postmedian bands on dorsal forewings more pronounced, ventral forewing with less black then ♂♂ (*batesii* ♀♀ usually have more black than their ♂♂), ventral hindwings with more brown striations and often a faint cream crescent (rarely whitish or silvered), occasionally some brown marginal dusting but never approaching a patch as is frequent in many *batesii* ♀♀.

Types. *Holotype* ♂ (Fig. 11): Jones Knob, 4100', Macon County, North Carolina, 4 June 1993, Coll. Ronald R. Gatrelle. *Allotype* ♀ (Fig. 12): same data as male. *Paratypes*: 47♂♂, 45♀♀: all MACON COUNTY, North Carolina, area of Jones Knob; all Coll. Ronald R. Gatrelle unless otherwise noted: 4♀♀ (2 leg. Jeff Slotten), 27 June, 1♀ (leg. Jeff Slotten), 28 June 1992; 17♂♂, 7♀♀, 4 June, 8♂♂, 9 June, 5♂♂, 7♀♀, 10 June 1993; 14♂♂ (3 leg. Scott Massey), 10♀♀ (5 leg. Scott Massey), 30 May, 3♂♂, 15♀♀, 10 June, 1♀, 17 June 1994. The holotype, allotype and 12 paratypes are deposited in the Florida State Collection of Arthropods, Gainesville, Florida. Paratypes are deposited as follows: private collection of Dr. Jeff Slotten, Gainesville, Florida (3), private collection of Dr. James Scott, Lakewood, Colorado (2), British Museum of Natural History, London, England (10), Allyn Museum of Entomology, Sarasota, Florida (14), University of California Davis, Davis, California (2), remainder of paratypes (49) in collection of Rev. Ronald R. Gatrelle.

Etymology. *Maconensis* is named after Macon County, North Carolina.

Remarks. In addition to the type series, I have found *maconensis* on the trail to Scaly Mountain, Macon County, and have observed it in the area of Rabun Bald, Rabun County, Georgia. 1♂, 4♀♀ taken 30 May 1967 and 2♀♀ taken 2 June 1963 from Great Smoky Mountains National Park, Indian Creek area, Swain County, North Carolina, in the FSCA, Gainesville, appear to be *maconensis* also. I have found this new subspecies to be common. It inhabits the floor of open virgin hardwood forests around the tops of granite balds or ridges above 4000'. Specimens are often found along roads to these balds, which is as far as most collectors will go. However, if one will leave the road and traverse a hiking trail or forge one's way up to ridge crests (watch out for rattlesnakes), *maconensis* will be found flitting about the forest floor. This habitat differs markedly from the types of habitat described in Scott for *batesii* (fields, barrens, etc.) *P. batesii maconensis* is far from endangered; there are hundreds of high, inaccessible ridges and balds where *maconensis* surely thrives. I have found *maconensis* ova only on *Aster undulatus* L., and have only been able to get ♀♀ to oviposit on *A. undulatus* in captivity. In rearing *maconensis*, I have found the larvae to be gregarious *Aster* feeders. I think it has been so uncollected in the southern Appalachians because its flight period is in-between the flights of species that most collectors/watchers seek. Thus, the butterfly is out, but the collector is in. My own discovery of it was by "accident." The year 1992 was a very late season in the mountains. Jeff Slotten and I had gone to Jones Knob the end of June that year to look for *Speyeria aphrodite cullasaja*. We were too early for *cullasaja,* but found 4 worn (3 weeks out of season) females of *maconensis*. Returning 4 June 1993, it was fresh and common.

CONCLUSION

Speyeria aphrodite cullasaja and *Phyciodes batesii maconensis* occupy what seems to have been a relatively uncollected niche in the southern Blue Ridge and Appalachian Mountains. Both of these species have, until now, been considered rare in north Georgia and western North Carolina. They are actually

rather common. It is not surprising therefore, that other species which are generally considered uncommon or rare in that region (Harris 1972) also inhabit this same niche – with annual regularity. The following are resident at Scaly Mountain (S), Jones Knob (J), Rabun Bald (R): *Autochton cellus* (Boisduval and LeConte) (J); *Polites coras* (Cramer) (S,J,R); *Poanes hobomok* (Harris) (S,J,R); *Artogeia virginiensis* (below J); *Lycaena p. americana* Harris (J,R); *Parrhasius m-album* (Boisduval and Leconte) (S,J,R); *Erora laeta* (W. H. Edwards) (S,J); *Polygonia faunus smythi* A. H. Clark (R,J); *Clossiana bellona* (Fabricius) (R,S); *Ceryconis pegala carolina* (F. & R. Chermock) (status per Gatrelle 1985) (S,J). Of these, *coras, hobomok* and *americana* are common; *laeta, smythi, bellona* and *carolina* generally present in small numbers; and *virginiensis, m-album* and *cellus*, infrequent.

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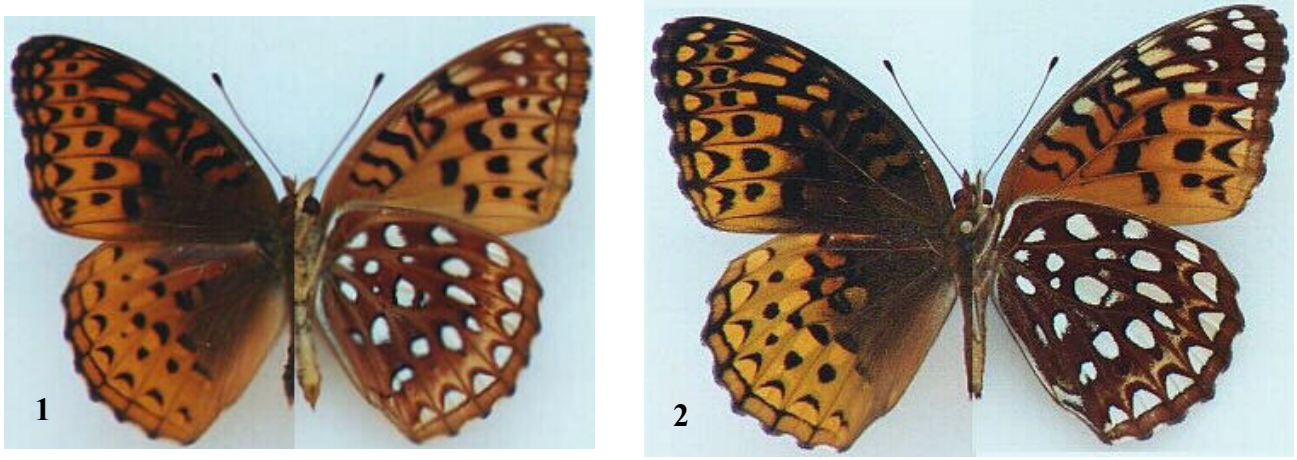
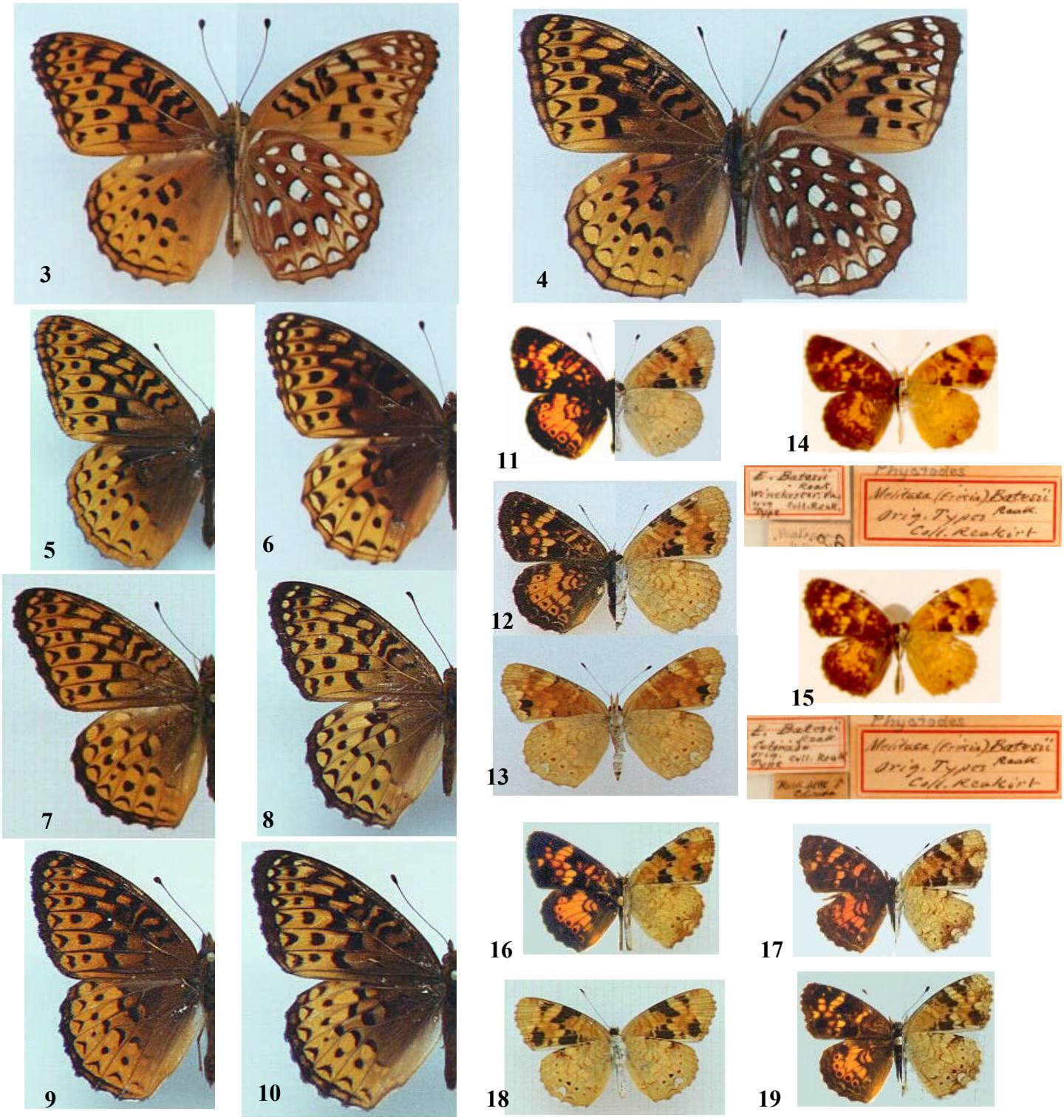


FIGS. 1-2. Type specimens of ***Speyeria aphrodite cullasaja*. 1, ♂ holotype,** dorsal and ventral surfaces. **2, ♀ Allotype,** dorsal and ventral surfaces. Data in text.



FIGS. 3-19. **3,** Topotype ♂ *Speyeria aphrodite,* 3 July 1983 Long Island, NY, dorsal and ventral surfaces. **4,** ♀ *S. aphrodite,* 3 July 1981 Ulster Co., NY, dorsal and ventral surfaces. **5,** ♂ *S. cybele novascotiae*, 28 July 1990, Halifax Co., N.S. Canada, dorsal surface. **6,** Topotype ♀ *S. atlantis capitanensis,* 1 July 1989, 8000', Lincoln Co., NM, dorsal surface. **7,** ♂ *S. atlantis,* 16 July 1983 Vilas Co., WI, dorsal surface. **8,** ♀ *S. atlantis,* 15 July 1983 Florence Co., WI, dorsal surface. **9,** ♂ *S. atlantis* ssp., 3 July 1987, 4200', Randolph Co., WV, dorsal surface. **10,** ♀ *S. atlantis* ssp., 28 June 1987, 4200', Randolph Co., WV, dorsal surface. **11,** ♂ **holotype** *Phyciodes batesii maconensis,* dorsal and ventral surfaces, data in text. **12,** ♀ **allotype** *Phycoides batesii maconensis,* dorsal and ventral surfaces, data in text. **13,** ♀ **paratype** 077 *P. b. maconensis,* 10 June 1994 Macon Co., NC, ventral surface. **14,** VA ♂ **syntype** of *P. batesii.* **15,** CO ♂ **syntype** of *P. batesii.* **16,** ♂ **paratype** *P. b. lakota,* ex pupa 10 August 1994, Sowbelly Cyn., Sioux Co., NE. **17-18,** ♂♂ *P. batesii.* **19,** ♀ *P. batesii.* **17-19,** 10 June 1974 Jamesville, Onondaga Co., NY.

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