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SUNDRY ARGYNNINE CONCEPTS REVISITED (NYMPHALIDAE)

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ABSTRACT. Suggestions for revisions in the Argynninae section of the 1981 Miller and Brown checklist are presented, the taxa principally discussed being *Semnopsyche, Boloria, Proclossiana,* and the *Speyeria* species *nokomis, zerene, adiaste, callippe, hydaspe, atlantis,* and *mormonia.* For the genera, hitherto undescribed characters are noted as reasons for retaining *Boloria* while synonymizing *Proclossiana* and *Semnopsyche.* Within the *Speyeria* species, several type locality changes are recommended and new synonymies proposed. While most *Speyeria* "subspecies" intergrade extensively, the category has appealed to many as a useful one, providing convenient tags for geographically localized color forms. Despite lack of definitives, suggesting need for further studies, no immediate drastic curtailing of subspecific listings is recommended.

Additional key words: *Speyeria, Semnopsyche, Boloria, Proclossiana,* North America.

Comments, corrections, and suggested emendations to the Argynninae section in the Miller and Brown (1981) checklist are detailed under the following headings. References for taxa mentioned herein are available in that checklist if not found in the literature citations appended.

Speyeria versus *Semnopsyche*

Miller and Brown (1981) correctly place *Semnopsyche* as a synonym of *Speyeria* although giving no reason for doing so. I recently made dissections that settle this matter unambiguously. To my embarrassment I find that the species *idalia* (Drury) has a "secondary" bursal sac in female genitalia. This was the character used by dos Passos and Grey (1945) in delimiting *Semnopsyche.* But since *idalia* is the generotype of *Speyeria, Semnopsyche* perforce becomes a junior synonym thereof. Perhaps, then, some future splitter will want to categorize separately those speyerians which have a simple, long ovate bursa, as described by dos Passos and Grey (1945), a refinement which would seem un-

desirable since that type of bursa is usual in argynnines worldwide. Thus, it is an exception worth noting that a bursa almost exactly like that of *idalia* may be seen in the Eurasiatic *Mesoacidalia charlotta* (Haworth) (described by Haworth 1803). The latter's bursa is longer and pointing more dorsad than usual in argynnines, terminating in a definite constriction, followed by enlargement to a small round sac. Comparison of the *Speyeria* generotype with *charlotta* should be of incidental interest since it adds hitherto unpublished evidence supporting the idea that Nearctic argynnines placed in *Speyeria* are closest in phylogeny to *Mesoacidalia*, as various students have speculated when judging by wing facies and as Warren (1944) deduced from features of male genitalia.

Boloria and *Proclossiana*

Studies of bolorian genitalia have lead me to conclude (reluctantly) that generic restriction of *Boloria* Moore to *pales* (Denis & Schiffermüller) and the other species placed in that genus by Warren (1944) probably should stand. This, however, is only because Miller and Brown do not use subgenera. It is fairly certain that many, given the opportunity to study the surprisingly little-varied genitalia of females, plus the invariably bifid uncus of males, would want to place all of the world bolorians in a single category. Nevertheless, in the *pales* group as defined by Warren (1944), the generic diagnosis fails to mention a heavily spiculate uncus, and this, so far as I have seen, is a unique feature in the bolorians, an extreme divergence of probable phylogenetic significance further supporting Warren's categorical treatment.

There is less chance for divided opinions when reviewing *Proclossiana* Reuss. The variety of characters in male genitalia of bolorians may be seen in dos Passos and Grey (1945:figs. 1–21). It would seem to be in violation of consistency and parsimony to accord the single species *eunomia* (Esper) a separate category when the male genitalia appear no more distinctive than in the group now lumped in *Clossiana*. Genitalia of *eunomia*, accredited to the then-prevailing taxon *aphirape* Hübner, are illustrated by dos Passos and Grey (1945:fig. 10). Additionally, when reviewing female genitalia of world bolorians (unpubl. studies), I found only slight distinctions in *eunomia*, nothing to suggest any degree of phylogenetic divergence above the species level. Therefore, I recommend placing *Proclossiana* in synonymy under *Clossiana*.

Neotype and Type Locality of *Speyeria nokomis nokomis* (W. H. Edwards)

A neotype for *S. n. nokomis* was fixed by dos Passos and Grey (1947). It was a specimen purportedly collected by Oslar in the Mt. Sneffels

area of Ouray Co., Colorado. That action was criticized both in Miller and Brown (1981) and in Brown's (1965) monumental work on W. H. Edwards types. The historical improbability of Mt. Sneffels as the exact type locality of *nokomis* may be granted, but one source of doubt has been removed: the butterfly does occur there, as has been verified by Richard L. Klopshinske, of Olathe, Colorado. Vouchers, five pairs taken at Mt. Sneffels *leg.* Klopshinske, are in the American Museum of Natural History. I think our neotype designation meets even the rigid Code requirements of today, since the very muddled history of this taxon, as related by Brown (1965), has to be taken into account. The true type locality promises to remain forever obscure, and, therefore, objections could be raised against any other fixation whatsoever. As it stands, the name is tied satisfactorily to all essential requirements of the original description, namely, the neotype is from the "Rocky Mountains" and it has a "cinnamon brown" disk. I therefore reaffirm the earlier (1947) designation of neotype and type locality as having been an acceptable solution to an admittedly murky problem.

Revisions Required in *Speyeria zerene* (Boisduval)

The "Yosemite" type locality chosen for *S. z. zerene* by dos Passos and Grey (1947) is invalid in view of Lorquin's itinerary as traced by Masters (1979). Masters designated a type locality to conform thereto, namely, Agua Fria, which is just west of Mariposa and about 56 km from Yosemite. Evidently Masters concluded that the regional variation was such that taxonomic concepts would remain unchanged.

The taxon *gunderi* (Comstock) is incorrectly placed as a subspecies under *S. coronis* (Behr). Field evidence was discussed by Grey (1975) to this effect: Intensive collecting in the Warner Mountains of California reveals a massive regional phenotypic fluctuation in the species *zerene* because of a collision between a yellow and a red subspecies in a "Basin-Sierran" tension zone. Some resulting individuals have yellow disks, others have pallid greenish disks, yielding very close matches with the type material of *gunderi*, which was beautifully depicted by Comstock (1927:plate 27). In contrast, the species *coronis*, although here strictly sympatric, is relatively little-varied and never appears to verge toward the facies of *gunderi*. This appears to be sufficient proof for the combination *S. zerene gunderi*.

Removal of *gunderi* from *coronis* to *zerene* necessitates putting *cynna* dos Passos & Grey as a junior synonym of *gunderi*. Both taxa apply to the same concept, that is, to a pallid yellow-disk subspeciation of *zerene*.

Speyeria z. pfoutsi (Gunder) is a junior synonym of *S. z. platina* (Skinner), and should be so listed. The reasons why Gunder became confused in this instance are detailed by Grey (1969).

Specific Recognition for *Speyeria adiaste* (W. H. Edwards)

Contemporary students, including the Emmels (1973) and Howe (1975), recognize *adiaste* as a distinct species. This change should be made in the Miller and Brown checklist. Evidence for the subspecific association was circumstantial, and is now outweighed by other considerations, particularly the electrophoretic study by Brittnacher et al. (1978). Students will have to continue to marvel at the narrow distribution of the *adiaste* subspeciation in southern California, which is a huge anomaly in Nearctic argynnine speciations, and something of a world wonder in Argynninae.

Subspeciation of *Speyeria callippe* (Boisduval) in the Sierra Nevada

Reexamination of the lectotype of *S. c. juba* (Boisduval), and comparison with the holotype of *S. c. sierra* dos Passos & Grey suggests treating *sierra* as a junior synonym of *juba*. Variation of *callippe* in the California mountains near Lake Tahoe has bewildered many collectors; the name *sierra* was advanced to be descriptive of the yellowish and greenish-disk variants, associating them with the proper species, *callippe*. The lectotype of *juba* appears to be within bounds assignable to the diversity in the region from whence *sierra* derived. With the apparent need to cut back on subspecific nomenclature, as discussed later on, this would be a good place to start. Variation usually assigned to *S. c. inornata*, centering more southerly in the Sierra, now appears to me to be very distinct from *juba*. Perhaps *inornata* (W. H. Edwards) should be resurrected from synonymy. Despite recent work by Arnold (1983, 1985), the whole Sierran *callippe* subspeciation badly needs further study. Earliness of its flight season can be allowed for, and it appears that colonies are far more numerous than might appear from available records.

Type Locality of *Speyeria hydaspe rhodope* (W. H. Edwards)

Brown (1965) asserted that the type locality of *rhodope* should be restricted to the "Fraser River Lowlands", rejecting the dos Passos and Grey (1947) restriction to the Cariboo District of British Columbia. Three of the four recognized syntypes bear "Cariboo" labels. But Brown found a letter to Edwards from Crotch, the original collector, stating that ". . . the small Argynnis with purple beneath . . ." was taken in an area that Brown interprets to have been in a westerly direction from 100-Mile House, whereas the Cariboo District lies easterly from there.

Based on my visits in 1973 and 1975 to the approximate region

suggested by Brown, the habitat appears unsuitable to support any *hydaspe* subspecies. Remaining undisturbed areas are mostly in dry lodgepole pine forest. Going easterly, however, the foothill spruce-fir forests of the Cariboo District present suitable habitat, and specimens of *rhodope* were collected. To my knowledge there are no records of this insect from the Frazer River lowlands, and very few from the Cariboo area, suggesting that it is quite locally restricted.

Discrepancies between Brown's conclusions and my findings could be eliminated by postulating that the reference in Crotch's letter was not to *rhodope* but to *Clossiana titania* (Esper). In the terminology of that day this bolorian would have been called a "small Argynnis" and it also displays "purple beneath". The habitat preferences of *titania* vs. *rhodope* would support that alternative, *titania* being locally abundant in the region where Brown would place *rhodope*. A return to the "Cariboo" type locality for *rhodope* would make syntype labeling consistent with field evidence.

Type Locality and Status of *Speyeria mormonia mormonia* (Boisduval)

The lectotype of *mormonia* is from the Boisduval Collection *leg.* Lorquin, and bears a "Lac Sal" notation on a label. This, conjoined with the name, plus the impression from facies that the specimen might have derived from Utah, led dos Passos and Grey (1947) to designate Salt Lake City as type locality.

A key bit of data, then unpublicized but now well known, is that Lorquin did cross the Sierra from somewhere in northern California, and probably collected as far east as extreme western Nevada.

My recent reinspection of the *mormonia* lectotype suggests that this specimen originated in or closely adjacent to the Sierra Nevada of California. That conclusion would be hard to prove because, as is so often the case in *Speyeria*, it comes down to subtle nuances in color and pattern. But aside from the *ipse dixit*, others whose opinions I value, such as John Emmel and Paul Hammond, apparently have concurred that the specimen obviously is "sierran".

Placement of the original *mormonia* in Utah resulted in *S. m. arge* Strecker being applied to the California subspeciation. To accord with the revised status of *S. m. mormonia*, *arge* becomes a junior synonym thereof.

Miller and Brown (1981) recognized both *m. arge* and *m. mormonia* as valid subspecies, and for the latter, proposed a type locality restriction to Pyramid Lake, Nevada. Some historical justification was adduced for that action, and undoubtedly it is close to the mark in a geographical sense. Since I have never seen *mormonia* material from Pyramid Lake,

I would be curious, as others might be, to learn what is available and where it is deposited, and especially how well it matches the lectotype.

Status of *Speyeria mormonia opis* (W. H. Edwards)

This taxon is known from three syntypes, two described by Brown (1965:322), and another in the Smithsonian which, like the first two, appears derived from "Bald Mt." *leg.* Crotch. These specimens support the concept of *opis* as a subspecies of *mormonia*, and all three are similarly characterized by small size and dorsal melanic pattern, being ventrally sordid yellowish and unsilvered.

The Bald Mountain upland is in the Cariboo District of British Columbia, south of Barkerville (in the same area where I think *rhodope* probably originated). In 1981, Edward Peters collected the first contemporary series of topotypical *opis*, 40 specimens, which he kindly allowed me to examine and select 23 examples for deposit in the American Museum of Natural History. Variation in this sample is far greater than in the above-noted syntypes, proving that in the Bald Mountain population there are individuals which, compared to the syntypes, are larger, smaller, lighter, darker, are silvered and unsilvered in about equal proportions, and thus encompass the whole range of *mormonia* variation in British Columbia.

This extensive variation at the type locality necessitates broadening the concept of *opis*, and one result must be to synonymize *jesmondensis*, described by McDunnough (1940), and considered in Miller and Brown (1981) as validated by and attributable to dos Passos and Grey (1947). The population represented by *jesmondensis* overlaps *opis* extensively in variation, and also yields brown-disk forms reminiscent of the Oregon subspecies *m. erinna* (W. H. Edwards). In addition, occasional specimens are like *m. washingtonia* (Barnes & McDunnough), less melanic and light yellowish to pale greenish discally, this being a form dominant in the Okanagan region of British Columbia as well as in Washington.

It was a welcome surprise to find that the legendary *opis* is similar to *jesmondensis* in being a hodgepodge of color forms, thus further justifying suspicions that expanding nomenclature is not likely to promote better understanding of northwestern *mormonia*, which, in itself, is a sharply discrete entity.

Type Locality of *Speyeria mormonia bischoffii* (W. H. Edwards)

The involved history of the taxon *bischoffii* was exhaustively summarized by Brown (1965:316–321), who recommended that Sitka, Alaska, be regarded as type locality. Nothing in the original description supports that conclusion, and a dissenting criticism by dos Passos and Grey (1965) has been reinforced by subsequent events. A colony of *mormonia* has been discovered at Anchorage, far north of records extant

in 1965, at a logical spot for a mainland landfall by a sailing vessel operating in the vicinity of Kodiak Island, that is, substantially where dos Passos and Grey had conjectured. Even more persuasive, the Anchorage melanics match the Edwards Kodiak neotype better than any other Alaskan material I have seen. I therefore propose that the Sitka type locality restriction be withdrawn in favor of Anchorage. This will bring the original description, the neotype, and extant material into better agreement. Vouchers, taken in the "Ski Bowl" near Anchorage, *leg.* Bond Whitmore, are presently in the collection of Donald Eff, Boulder, Colorado.

Subspecies in *Speyeria*

In earlier days it was easier to define subspecies of *Speyeria*. For the most part they were distinctive in facies and well separated geographically. Advent of the automobile changed all that: road networks expanded, collectors travelled more, and geographic coverage burgeoned. Consequently, gaps between named subspecies have been partly or wholly bridged by intermediates, giving rise to much name-shuffling and even to questions about the validity of subspecies as a category.

Speyerian populations are notoriously varied in single localities, including type localities. From this it follows that judgments made as to what is "typical" of particular taxa, if based on samplings from type localities, are subjective in presuming a local norm, or are inadequate if based on a single holotype specimen. Still worse, most speyerian subspecies are insufficiently isolated to prevent occasional straying. The variety of local color forms in topotype populations can thus disperse, mingle, and blend with others similarly afflicted. Where then, and how, should subspecific lines be drawn?

A comment by Rindge (1987) gives one answer, and it carries the weight of having resulted from surveying 37,500 specimens of *Speyeria* during geographical rearrangement of series in the American Museum of Natural History. He says: ". . . it quickly became apparent to me that the majority of subspecific names proposed in this genus are, at best, but random points on or at the end of clines, and hence are of little or no scientific value. There appear to be very few completely allopatric populations to which legitimate names might be attached."

In a similar vein, Arnold (1983, 1985) recognized only 3 *callippe* subspecies of 16 accepted in Miller and Brown (1981). I heartily subscribe to the idea that the majority of subspecific names in *Speyeria* could be dropped; they are essentially undefinable. However, I have one major question concerning Arnold's methodologies: As one well acquainted with *callippe* variation in all the geographical regions Arnold sampled, I can only wonder how through any mathematical legerdemain the large brown-disk *callippe callippe* of the San Francisco

Peninsula can be directly associated with, say, the smaller, often yellow-disk "sierra" of Plumas Co.? Or the red-disk silvered *elaine* of southern Oregon with the sordid yellowish and unsilvered *laurina* of the Greenhorns? Also, retention of *semivirida* as one of the three recognized subspecies invites the criticism that *semivirida* in itself is a catchall, beginning in the Tahoe region with creeping intrusion of brown into the green-disk series, and culminating in British Columbia (for example near Jesmond) with individuals nearly black discally. So why is *semivirida* singled out, except in a vague regional sense, from the other intergrading forms that were synonymized?

These are relatively minor quibbles. A measure of how far I agree in principle with Arnold is that I think ambiguities will persist until all trinomials are discarded, and *callippe* is allowed to stand alone as a distinct, nonoverlapping entity. But even the "rigidly definable species" is by no means easily attained, as confirmed in a paper by Ferris (1983) mentioned below. Before ending discussion of Arnold's *callippe* study, however, a serious objection must be stated, namely, that his methodology would seem destined to fail where most needed, namely in determining what are to be accepted as valid *Speyeria* species. The problem here would be with the many local parallels that blur superficial distinctions among species. In many places the differences in facies between species widely agreed to be valid, can be, and often are, fewer and more subtle than among the *callippe* subspecies Arnold synonymized.

This allied and more vital problem of delimiting species amid the welter of subspecific variations is exemplified in Ferris (1983). No better statement of the often confusing impressions conveyed by field-collected series can be found in the literature; this reference should be consulted by everyone interested in sympatry as a means of defining species. It would be hard to dispute Ferris's tentative hypothesis that two sibling species may be involved in the Colorado "*atlantis*" material; this would apply even more certainly to some of the Canadian series. On the whole, however, it probably would require a hand-pairing breakthrough such as Ferris envisions to decide among alternatives. The moral of Ferris's work perhaps is not to worry unduly about subspecies until we can say more precisely what species to recognize. A recent paper by Scott (1988) suggests a fairly objective and practicable way to assess conflicting data in sympatrisms. He studied the situations in *atlantis* described by Ferris. By rearing broods from areas where *hesperis* predominated over *atlantis* and vice versa, Scott obtained enough intermediates to incline him toward the single polytypic entity theory.

The one thing certain from all this is that speciation and subspeciation in *Speyeria* will continue to fuel debate and taxonomic disagreements. Revising this section of Miller and Brown will be an unenviable chore.

So far as I would venture recommendations, I think the species, aside from the elevation of *adiaste*, are standing the test of time.

The status of presently listed subspecies in Miller and Brown (1981) is problematical. While I would retain most of the subspecific taxa, it seems to me a distinction should be made between the utility of these names versus their reality in nature as definable biological units. Lafontaine (1987) retained certain *Euxoa* "subgenera" by the device of a distinct typeface; strictly speaking they are synonyms but practically speaking they are helpful in classifying that difficult genus. The situation in *Speyeria* is analogous: variation is huge and not well understood, sure to be further exploited since furnishing so many exciting possibilities for geneticists and other students of evolution. It would be convenient, then, to have discriminant tags available, and indeed there is something to be said for their "reality"—they enable succinct reference to color forms which students can see actually do prevail in certain geographical areas. For that reason, if for no other, I suspect they will refuse to die even if formally synonymized.

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