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ARGYNNIS (SPEYERIA) NOKOMIS NOKOMIS: GEOGRAPHIC VARIATION, METAPOPOPULATIONS, AND THE ORIGIN OF SPURIOUS SPECIMENS (NYMPHALIDAE)

by

James A. Scott & Michael S. Fisher

60 Estes Street, Lakewood, Colorado 80226-1254 USA, e-mail: JameScott@juno.com;

6521 South Logan Street, Centennial, Colorado 80121-2329 USA, e-mail:

butterfliesofcolorado@hotmail.com

Abstract. Geographic variation in wing pattern within ssp. *nokomis* is documented across its range from northern New Mexico to southern Colorado and southeastern Utah and northeastern Arizona. This variation allows one to pinpoint the origin of collected specimens within that range, and defines the maximum possible areas of metapopulations. All of the numerous specimens of ssp. *nokomis* labeled from Ernest Osler from southwestern and central Colorado, including the mislabeled neotype, are actually part of a hundred *nokomis* collected by Wilmatte and Theodore Cockerell from Beulah, New Mexico, so that is the true *nokomis* type locality. Ssp. *tularosa* is an invalid synonym because it is identical to Beulah ssp. *nokomis*, the provenance of all specimens is dubious as all were mislabeled from Sacramento Mts. but evidently actually collected at Beulah by the Cockerells or Henry Skinner, the purported altitude is too low, known collectors did not find it at the mislabeled Sacramento Mts. sites when it supposedly occurred there, numerous other mislabeled *nokomis* exist, and the only valid specimens from those mountains are another subspecies *coerulescens*.

Introduction. We have been studying *A. nokomis* W. H. Edwards for decades, and have accumulated enough series of specimens to construct an accurate picture of the geographic variation in this species, especially ssp. *nokomis*. The geographic clusters of similar phenotypes within ssp. *nokomis* even allow the determination of the maximum areal extent of metapopulations or sets of metapopulations. And the observed geographic variation now permits us to solve several vexing mysteries that have long puzzled lepidopterists. Problems with the types and type localities have plagued *Argynnis nokomis* W. H. Edwards for more than a hundred years (Brown 1965). The original type vanished. A neotype was designated by dos Passos & Grey (1947) but its origin and the validity of its collection data crediting Osler has been doubtful

ever since. The discovery of a population near several of Oslar's claimed localities lent credibility to Oslar but close examination of those specimens reveals significant differences that again bring Oslar's localities into question.

Holland (2008) discussed and then (2010) named a new subspecies, *A. nokomis tularosa*, from the Sacramento Mts. in southern New Mexico, adding more confusion to the situation, because there are numerous problems with localities of those types and their documentation.

We discuss all these problems here and examine the likelihood that all those specimens and many other mislabeled specimens were actually collected from Beulah New Mexico by Wilmatte Cockerell (sometimes by Theodore Cockerell; another batch was collected by Henry Skinner) and sold by her to Ernest Oslar who mislabeled them in many different ways and sold them to more than a dozen museums and collectors. Our analyses support that conclusion.

This paper first presents background information, on the locality Beulah New Mexico, on the key people Wilmatte Cockerell, T. D. A. Cockerell, Ernest Oslar and Paul Grey, on museum specimens from Beulah and Oslar, and on the neotype. Then we present our findings on geographic variation within ssp. *nokomis*, and finally we bring all those findings together to determine the origin and status of the neotype and the recently-named *tularosa*.

This case is of unusual interest because it involves so many of the troubles and triumphs of the human condition. The troubles include fraudulently mislabeling specimens to increase their sales price; personal greed (some collectors are willing to pay high prices for choice specimens, which subsidizes such mislabeling, and other collectors greedily collect specimens from tiny colonies that are apparently vulnerable to extinction) and commercial greed (a company profits from the extermination of an important colony of *nokomis* just so lazy people can ride electric carts on alien monocultures of chemical-drenched grass in order to whack tiny balls into small holes); financial troubles leading to questionable ways of supplementing poor teachers' and collectors' incomes; disappointment as some colonies are found to be pathetically small (barely the size of a small house) or go extinct by misguided removal of cattle; and the sad story of a person whose eager zeal allowed him to be irrationally deceived in order to satisfy a lifelong dream and who in turn unwittingly deceived two journals who published his findings. On the triumphant side, this case includes the joy of discovering new colonies, and the satisfaction of determining and publishing the variation and habits of *S. nokomis* and solving persistent problems after decades of effort. This case also carries lessons regarding proper entomological curation, as numerous people made sloppy mistakes by failing to attach and maintain proper labels on specimens.

Beulah New Mexico is a key *nokomis* location in this discussion. Beulah (later renamed Beulahcita) is a few houses in Sapello Canyon, San Miguel County, in the Sangre de Cristo Mts. of north-central New Mexico just northwest of the town of Las Vegas (W. Cockerell & T. Cockerell 1900, T. Cockerell 1909a, 1909b, 1910, Skinner 1902a, 1907). The *nokomis* colony habitat is a narrow mostly-wooded canyon centered on a tiny meadow-hay area in the canyon bottom and hillside. *A. nokomis* has a mate-locating system in which males fleek ("patrol", see Scott 2010) about the moist meadow/seep habitat to locate females, and if there is a desirable meadowy "eye" in the center of the colony they spend more time there to find females. Males circle about the open meadow "eye" of the colony and dip down to the grass (Skinner 1902a) to locate young females through vision and scent. Females oviposit near violets, some of which grow in thicker grass or on little bumps rising up from cattle-trampled parts of the meadow, but most violets grow in partial shade of riparian trees and shrubs nearby. Away from the "eye" of

colonies, males flock to seek females on flowers and in the riparian areas of the colony. This colony site has a very small meadowy “eye” in the narrow canyon bottom and up the slope a little, but it must have been larger when it was discovered by Wilmatte Porter Cockerell or Theodore Dru Alison Cockerell when he was a teacher at the local college in Las Vegas just southeast of the canyon. She (his wife) caught ~100 specimens here in 1900-1903 (he caught only ~10% of them, based on specimen labels), and Henry Skinner visited from Chicago in 1901 and collected another hundred. The colony was large at that time, when the habitat was evidently less wooded (in the 1970s a stone sawmill foundation and large antique sawmill table and two-foot diameter saw blade still stood there near the Beulacita sign and some houses, evidence of extensive tree cutting when the colony was discovered) but the population later plummeted as more houses were constructed and logging diminished.

Theodore Dru Alison Cockerell and **Wilmatte Porter Cockerell** have a central place in this story, so we detail here their history and residences and collections, based on the biography and bibliography of Weber (1965), and the biography of Ewan (1950). **T. D. A. Cockerell** (1866-1948) was born in London England. He became a world-renowned expert on bees and many other subjects, and named at least 9,045 taxa of bees (7,860 extant taxa and 1,185 extinct fossils) including 6,765 species of Hymenoptera and 11 butterflies (Zuparko ~2000). From the ages of 12 to 81 he published more than 3,904 papers (almost the world record for publications, most of which were small recipe-card-size notes that critics decry as superficial, but some were large good revisions of bees and good papers on fish scales and *Hymenoxys* and *Gaillardia* plants etc.) including about 60 or more papers on butterflies. His history in the west began in 1887 when he moved to Westcliffe in southern Colorado, where he lived until 1890. He briefly returned to England, then lived in Jamaica 1891-1893, then because of tuberculosis he moved to Mesilla Park in Las Cruces New Mexico 1893-1900, where he was a poorly-paid professor of entomology and zoology at New Mexico Agricultural College 1893-1896 and 1898-1900, and also served at that college’s New Mexico Agricultural Experiment Station 1893-1901. He met his 2nd wife **Wilmatte Porter** there, a high school biology teacher. He worked out the forms of *Chlosyne lacinia* larvae while he lived in Mesilla Park in Las Cruces. Some of his publications relate to entomological visits to the Sacramento Mts. (including #896 & #912 etc. concerning the Tularosa and Mescalero Agency there)(each paper is numbered in the list of his publications compiled by Weber 1965). (We note that if someone had collected *nokomis* in this area, T. Cockerell would have known about it, because he lived there from 1893-1900.)

In 1900 the couple moved north to the town of Las Vegas, just east of the Sangre de Cristo Mts. in northern New Mexico, where T. Cockerell was a teacher of biology at New Mexico Normal University in that town until 1903. The Cockerells collected butterflies in the Sangre de Cristo Mts. from mid 1900-1903, where they collected ~100 *nokomis* at Beulah New Mexico just NW of Las Vegas from Aug. 10-Sept. 4 1900, which Wilmatte Cockerell and T. Cockerell (1900) named “*Argynnis nitocris* var. *nigrocaerulea*”. T. Cockerell (1909b) later named an aberration *rufescens* of it from there, and Wilmatte discovered its egg in the meadow (described by T. Cockerell 1910). Wilmatte Cockerell actually collected most of those specimens, plus the specimens from another nearby colony (T. Cockerell 1909a), based on specimen labels and communication from T. Cockerell to F. H. Benjamin. (**Henry Skinner** learned of the discovery and visited there Aug. 9-26, 1901 [one label mistakenly says Aug. 17 1902] and collected “about one hundred specimens” [Skinner 1902a] and described the egg and first-stage larva [Skinner 1907]). T. Cockerell’s wife Wilmatte was a high school teacher and their income was small, so Wilmatte (and sometimes Theodore) Cockerell collected and she sold at least 89 specimens of

Beulah *nigrocaerulea* to Ernest Oslar and perhaps more specimens to others. T. Cockerell and other faculty were so poorly paid at New Mexico Normal University that he organized a revolt of the faculty, which closed the school for 12 years. So they moved to Colorado, where he was curator of the Colorado College museum 1903-1904 and then moved to Boulder and became professor at University of Colorado from 1906-1941. He worked at the Desert Museum in Palm Springs California from 1941-1945, then died in 1948 in San Diego.

Ernest J. Oslar (1858-1944) is a key part of this discussion also. Oslar was a professional collector all of his life (Brown Eff & Rotger 1957 p. 4). Ewan (1950) and Ewan and Ewan (1981) have a biography of Oslar: He was a professional collector from England who lived in north Denver, and collected in Colorado (occasionally Utah) from 1893 to at least 1920. Oslar placed ads in journals (such as *Psyche* 13[1]:3, Feb. 1906) requesting contracts to collect insects of any order from Colorado, New Mexico, and Arizona. Oslar “collected large series of diurnal Lepidoptera in the central Rocky Mountains for the Field Museum (Chicago Museum of Natural History) and for other institutions [including the Colorado Museum of Natural History], both alone and in the company of David Bruce, *q.v.*, and other collectors.” He supplied specimens for the John D. Rockefeller collection in Chicago, and exhibited at the 1893 Chicago World’s Fair. He kept no field books of his trips. Ewan also wrote “It is a tribute to his enterprise that he was able to support his wife and fourteen children by butterfly collecting!” The need for that much income must have motivated Oslar to dress up his specimens as attractively as possible, complete with phony localities, to stimulate sales and derail competitors. The best example that Oslar cared more about money than he did about precise localities, is *Oeneis alberta oslari*, which Henry Skinner named for Oslar. Oslar mislabeled the *oslari* types “Deer Creek Canyon, Colorado”, [Jefferson County, near Denver] “September 25, 1909”, and this deception fooled everyone for 30 years. Brown et al. (1957) even extended Oslar the benefit of the doubt in guessing that “It is probable that Oslar captured members of the small occasional second brood that emerges in September”, when actually no second flight of *O. alberta* has ever been found anywhere in the species’ range. The specimens actually must have been collected more than 3,000 feet higher in altitude 45-50 miles away in South Park (doubtfully Middle Park), in May or early June (Brown Eff & Rotger 1957 p. 23). A stage line and later a railroad (operated in succession by three railroad companies) ran between Denver and Fairplay in South Park until its closure in 1937 (G. Scott 1999) (remnants of the track bed still remain along U.S. Highway 285), offering Oslar easy transportation there. Oslar evidently hoped to keep the sales market for himself by tricking other collectors into going to erroneous localities at erroneous times, and by mislabeling specimens to create a new market for desirable species from new exciting locales. He mislabeled specimens as coming from Deer Creek and Mt. Sneffels and Hayden Peak and Hall Valley etc. Additionally, Oslar supplied one of the syntypes of *Chlosyne whitneyi damoetas* to Skinner (1902b) without any locality. The evidence presented here and below proves that Oslar bought Beulah *nokomis* specimens from Wilmatte Cockerell and sold them to many collectors (including William C. Wood, Mr. Marloff, Mr. Frederic Hova Wolley-Dod, Bob [Robert] Potts, Mr. Arthur J. Snyder, etc.) and museums throughout the U.S.

Lionel Paul Grey (1909-1994) worked on *Argynnis* (*Speyeria*) for five decades and published about 20 papers on them. Grey was the expert on *Argynnis* (*Speyeria*) who reduced the number of species from >100 to 13 and served as the specimen expert in all his *Argynnis* papers (such as dos Passos & Grey 1947), while dos Passos handled nomenclatural matters. In the 1950s and 1960s at least, Paul Grey offered free identifications of *Argynnis* that other people (including Scott) would loan to him. In one year alone he identified and returned 10,000

Argynnis to other lepidopterists, according to his letters to Scott, so in five decades Grey may have identified more than 100,000 specimens. As part of his studies he catalogued specimens in collections and museums and wrote the data on file cards listing locality/habitat/wing facies for each species at each locality. He loaned Scott his *nokomis* cards in the 1970s and Scott copied the information from them.

Museum specimens and labels of ssp. *nokomis* from Beulah and Ernest Oslar. Based mostly on Paul Grey's *nokomis* file cards (plus slight corrections for specimens actually present now in collections such as USNM), there are at least 47 specimens validly labeled Beulah in collections (figs. 1-4): Specimens labeled Beulah collected by Wilmatte P. Cockerell (most of them) or T. D. A. Cockerell are in the Colorado State Univ. Gillette Museum (1 male), the Univ. of Colorado Museum (4m2f including 1m1f from the Don Eff collection, fig. 3), USNM (fig. 4, 2m with no collector label but giant label has Cockerell handwriting, 1m *rufescens* holotype coll. by Cockerells, 1m1f from William Barnes collection with Cockerell handwriting and same large giant yellowed label as the two figured males), FMNH (1m, plus 1m1f from Strecker coll.), MCZ (3m3f), CNC (1m1f, plus 1m1f from the Wolley-Dod collection), AMNH (2f from the Grey coll. and 1f from Grey coll. from Bob Potts and John Thomas Mason colls.), the Cheyenne Mtn. Museum coll. in Colorado Springs Colo. (1m from the J. Mason coll. and Bob Potts coll.). Specimens labeled Beulah coll. by H. Skinner are in LACM (2m), San Diego Nat. Hist. Mus. (1m2f), the Grey coll. in AMNH (1m), and USNM (5m3f). Specimens labeled Sapello Canyon are in USNM (2m, fig. 1) and FMNH (1m1f ex [Arthur J.] Snyder coll., adding 7,200' per H. Skinner).

Oslar sold at least 83 specimens that he labeled Sneffels Mts. (fig. 11) or Hayden Mts. (fig. 12) or Hayden Peak or just Ouray Co., that are also labeled as from Oslar: 38 specimens are labeled Sneffels Mts. (most with Ouray Co. Colo., two with S.W. Colo., most with Aug. and Oslar, some with VIII, three with 10,000', one with 9,000') in USNM (20m11f), AMNH (1f from Grey coll. ex Cary coll., 1m1f ex Wm. C. Wood coll. [one of which is the neotype discussed below]), CNC (1m1f; the male bears a note from W. T. M. Forbes: "Original figure of *Nokomis* (based on the unique) was like this! W.T.M.F."), CAS (1m1f with ex Dodge, ex [Jean] Gunder colls.), and CMNH (1m2f ex Marloff coll.). 35 specimens are labeled Hayden Mts. or Hayden Peak (most labeled with Oslar, some variously with S.W. Colo. or San Juan Mts., Colo. or Ouray Co. Colo., Aug.) in USNM (9m4f), AMNH (6m6f, plus 2m1f Grey coll. ex Cary coll.), the Gillette Museum at Colorado State Univ. (2m2f [+6m no locality]). 4 specimens (2m2f) labeled Ouray Co. San Juan Mts. Aug. Oslar are in CNC.

Oslar obviously mislabeled 2 *nokomis* specimens in LACM "Hall Valley, Park Co. Colorado leg. E. J. Oslar", plus "July 29, 1928" (1 male), or "Aug. 2, 1928" (1 female). This is a ridiculous locality because Hall Valley is at and above timberline and 100 miles from the nearest suitable habitat for the species.

The number of specimens in museums suggests that Oslar never collected *nokomis*. If Oslar caught his own *nokomis* specimens in Ouray Co. and properly labeled them from Ouray Co., where did those Beulah specimens go that he purchased from Mrs. Cockerell? There are NO Oslar specimens in museums and collections labeled Beulah; the inventory above lists only Oslar Sneffels-Hayden-Ouray Co.-Hall Valley specimens, and Cockerell/Skinner Beulah specimens, and the numbers involved are consistent with the numbers collected by Mrs. Cockerell and T. Cockerell and H. Skinner. Noone would throw Oslar-Beulah specimens away. The numbers say that Oslar mislabeled ALL the Beulah specimens he bought from Wilmatte Cockerell.

It is important to note here that people in the 1800s and early 1900s did not care as much about having precise locality information as biologists do today. They often labeled them poorly or not at all. Part of the problem is due to bad old maps, so localities were vague. The oldest specimens in museums today very often have missing or erroneous data. Curators would often rewrite the labels and throw away the originals, or add labels stating localities and collectors they thought fit those specimens. William J. Holland would even place type labels on specimens he thought were typical specimens of species that had been named by Edwards. Beyond this, dealers especially had an incentive to not divulge exact localities. Oslar and other dealers deliberately mislabeled specimens of profitable species in order to keep the localities secret so they could sell valuable specimens from there without the competition of other people who might go there and collect them and ruin the market for that particular species or variety.

The lost original specimen, the need for a *nokomis* neotype, and Paul Grey's letters. A neotype was needed because the original *nokomis* specimen was lost and there was great confusion about the identity of the name *nokomis*: does the name refer to the brown-disc ssp., or the yellow-disc ssp.? The original specimen was described by William Henry Edwards in 1862 as having a brown disc, but it vanished and Edwards later mistakenly redescribed *nokomis* as having a yellow disc, based on specimens of *A. n. apacheana* Skinner from the Wheeler Survey probably collected from west of Camp Independence, California, then he mistakenly cited the TL as Bitter Root Mountains (Idaho-Montana), and finally he guessed it was from the Wind River Mts. of Wyoming. Brown (1965) details this comedy of errors. Brown (1965) noted that "Edwards' original 'Rocky Mountain' specimens could not have come from the Ouray region. That is an area where no white man penetrated the Colorado mountains until the early 1870s..." But the original specimen may have been caught in southwestern Colorado, perhaps the Rio Florida east of Durango (Brown 1965). Ferris & Fisher (1971) suggested the TL might be "east of Fort Apache, along the East Fork of the White River, Apache Co. Ariz." There is a male in AMNH labeled "lectotype designated 18 May 1970 by C. D. Ferris & M. Fisher, Unaweep Canyon, West Creek, Mesa Co. Colo. 6,000' 19 Aug. 1968 leg. M. Fisher", which is invalid because the lectotype designation was never published. Also, a lectotype must be designated from syntypes, and the specimen was collected 106 years after it could be a syntype.

Brown (1965) and Ferris & Fisher (1971) thought that "Ojo Verde" in SE Utah could have been the source of the original 1862 *nokomis* specimen. Scott used the Macomb/Newberry expedition map to find and visit the exact site, which is in the bottom of Hatch Wash (38°14'50"N lat., 109°26'40"W long., SW ¼ Sec. 30, T29S, R23E, 5,500') 5 mi. SSW La Sal, and has a USGS gauging station (#9-1855). Scott discovered it is just an intermittent flash-flood wash that could never have had a *nokomis* population (4,650 cubic feet per second of flood water roared through on Aug. 20, 1970). Additionally, populations from San Juan Co. Utah and nearby Montrose Co. Colo. have the disc varying from cinnamon-brown to brownish-yellow on males and most females have greenish on the unh disc, so are beginning the clinal transition to ssp. *apacheana* and most specimens do not resemble the neotype.

Scott possesses 40 letters written to him by Paul Grey from 1962 to 1988. Letters #7, 9, and 22 have relevant information; they were written in response to a manuscript by Scott and others cataloguing the ~130 known *nokomis* localities (which has now jumped to ~170+) along with the geology and hydrology of each site (this mss. was not published because most *nokomis* colonies are small in size and overcollecting is presumed to be harmful to small populations of colonial butterflies, and Scott becomes upset when he learns of groups of three people visiting a tiny colony for three days and collecting every specimen they find).

Letter #7 from Paul Grey writes “Before closing, some thoughts re the 1862 *nokomis*. I’m betting it was taken by an officer, a doctor or some official attached to a cavalry post in the southwest. The people at the Smithsonian then were aggressively cultivating such people who were going to these outposts, and the fact of it being in a glass jar on cotton shouts of a one-shot amateur. My hunches all favor a New Mexico T.L. [for *nokomis*] I thought Ft. Stanton would be a good place to prod the map, for a guess (if Brownie can guess, so can I).” (Actually there is no concrete record of *nokomis* from Fort Stanton, as no specimens are known to exist, and there is no record of specimens from there in Paul Grey’s cards of *nokomis* localities/habitat/facies that include specimens that other collectors loaned him and from all the museums; so Fort Stanton is just an unfounded guess or rumor carried down verbally from some unknown source.) But Grey ended up being correct about New Mexico being the TL, as demonstrated below.

Cyril F. dos Passos & L. Paul Grey (1947) designated a neotype of *nokomis*. This neotype has long been controversial because the specimen is from a questionable location and bears a label that proclaims it was collected by Ernest J. Oslar. This specimen in AMNH was figured by Brown (1965) and has labels “A. *Nokomis*”; “Oslar/Sneffels Mts./Ouray Co./Col. Aug/9000 ft.” printed, with the date and altitude handwritten; and “Ex Coll./Wm. C. Wood/Acc. 36915” printed. Article 76.3 of the ICZN Code states that the place of origin of the neotype becomes the type locality of that taxon, so in 1947 the origin of the original specimen became unimportant and the type locality became Sneffels Mountains. Brown questioned this locality and looked for *nokomis* in Ouray Co. without success, and wrote “As I have stated above, the locality data on this specimen is suspect.” Brown also noted a male and two females from Oslar in the Marloff Collection in the Carnegie Museum that have similar locality labels “Sneffels Mts./Ouray Co. Colo./August/alt. 10000 ft.”, “*Argynnis/ nokomis/*={*nitocris apacheana*”, and “Marloff Coll’n/Carn. Mus./Acc. 8992” (the 9,000-10,000 altitude listed for these specimens is mislabeled as it is much too high for the species there). Brown Eff & Rotger (1957 p. 48) lacked Colorado *nokomis* specimens to illustrate, so Brown figured male and female Oslar specimens (on p. 335) loaned to him by Paul Grey, from “Hayden Mountain” (an alpine peak 10 miles WNW of the other alpine peak Mt. Sneffels), so Oslar obviously mislabeled those specimens also. Both specimens show undersides, which are similar to ordinary *nokomis* from Beulah New Mex., and Brown wrote “I suspect that Oslar got these specimens elsewhere, possibly in the foothills of the San Luis Valley, or they may be some of the specimens Cockerell collected near Beulah, New Mexico, and sold to Oslar.” (Actually Mrs. Cockerell collected most of them, and she sold the specimens to Oslar.) Scott (1982) wrote “The neotype of *Argynnis (Speyeria) nokomis* was caught by Mrs. Cockerell at Beulah, New Mexico, and sold to E. Oslar, based on correspondence from T.D.A. Cockerell to F. Benjamin of the Smithsonian.”, which information came from Paul Grey’s letters to Scott. The “correspondence” refers to a specimen label and a letter. That label is still present in a Smithsonian drawer (fig. 12), which reads “Cockerell informs me that Oslar’s “Ouray Co. Colorado” specimens were collected by Mrs. Cockerell at Beulah, N. Mex. and sent to Oslar. 25 iv 25 F H Benj.” (Foster Hendrickson Benjamin was William Barnes’ curator from 1922-1927, then he worked at the Bureau of Entomology in USNM [later becoming the Smithsonian] from 1927-1936.) A letter from W. D. Field to Grey 20-iv-1953 repeated that label (as detailed on one of Paul Grey’s file cards of *nokomis* species/localities/wing facies).

When belief grew among lepidopterists that Oslar’s “Mt. Sneffels or Hayden Peak, Ouray Co.” specimens were collected at Beulah, because of the proof that they were collected by Mrs. Cockerell at Beulah and sold to Oslar, they considered discarding the dos Passos & Grey neotype and designating another. William D. Field wrote in an April 28, 1953 letter to Paul Grey that a

male from Beulah in USNM should be designated the neotype, which would shift the type locality to Beulah.

Grey's letter #9 to Scott wrote "I don't know what to think about the Beulah derivation; several things are not clear cut, some seem O.K. I think we may accept that Cockerell sent some specimens to Oslar because he told several people including Foster Benjamin and Don Eff that he did so. [Eff was a contributor to Brown et al.'s 1957 book 'Colorado Butterflies'] And at this late day I can't be very dogmatic about my impressions when I did study this material and I may be wrong on some of them. But in a vague way I seem to remember that I located and took careful heed of somewhere around 40-60 specimens BOTH of "Beulah-Cockerells" and "Colorado-Oslar". I knew at the time of the canard re Oslar falsifying the data so it was of keen interest to me (1) that Cockerell would send so many of a then very rare bug to a fellow he evidently had no love for, and (2) that the two series should look to my eye to be as different as might be expected if from two quite different populations. I still have a sneaking wonderment if Oslar didn't have his own "secret colony", maybe not where he said, but somewhere down that way? Anyone who wants to try to settle this as best it can be done at this late time certainly should bring all of these series together through loan, from the MCZ, AMNH, Smithsonian, etc. And I'll bet comparison won't support the Beulah derivation of all of this material." (Actually, Wilmatte Cockerell sold the specimens to Oslar.)

So we have a controversy here. Grey's recollection years later considered Oslar's specimens to be from a "secret colony", yet W. D. Field in an April 28 1953 letter to Paul Grey wrote that he could not see any difference between Beulah and Oslar's Ouray Co. specimens except some from Beulah looked darker on basal half of hw below.

Brown (1965) wrote that he had searched Ouray County for *nokomis* without success. But his searches must not have been thorough (perhaps he mistakenly searched at too-high altitude), because in 1982 Richard Klopshinske discovered *nokomis* in the same county as Mt. Sneffels (Ouray Co.) but at much lower altitude than Oslar's impossibly-high purported altitude of 9,000-10,000 feet. Mike Fisher and others have collected specimens there from 1983 onward. As a result, some people thought that the neotype could have been caught by Oslar from that colony in Ouray County and then mislabeled as from Mt. Sneffels or Hayden Peak/Mtn. at 9,000-10,000 feet or Hall Valley etc. This would fit Grey's letter #9 above in which he thinks that Oslar's 40-60 Ouray Co. Colorado specimens looked a bit different than the 40-60 Cockerell Beulah New Mex. specimens. The problem with this idea is that Grey's memory was nebulous on whether Oslar's Colorado specimens could be distinguished from Beulah ones, and these butterflies are all similar.

And as noted above, the specimens in museums today suggest that Oslar never collected *nokomis*, because there are NO specimens from Oslar labeled Beulah (the specimens that he purchased from Wilmatte Cockerell), simply because he mislabeled them all and sold them.

Grey's letters to Scott and to Fisher suggested that series of ssp. *nokomis* from different areas should be compared to determine whether subtle differences could be found that would specify their origin. We did exactly that.

Geographic variation within ssp. *nokomis* was studied by us for decades, and is here presented. As background information, we note that **ssp. *nokomis*** is defined by having a predominantly brown unh disc (darker-brown in females), whereas in **ssp. *apacheana*** the disc is pale yellow in males and green in females; those two ssp. intergrade clinally across NW Colorado to NE Utah to S Utah to Nevada/California (*carsonensis* Austin is a synonym). **Ssp. *nitocris*** (W. Edwards) also has a brown disc, and could be considered to be another very

distinctive variety of *ssp. nokomis*, but traditionally (Ferris & Fisher 1971) it has been separated because it is darker overall, as the unh disc is a little darker (dark to medium cinnamon-brown in males, dark cinnamon-brown often with black median area in females), the unh silver spots are ringed with more black scales, the unh submarginal area is usually somewhat suffused with brownish in males and some dark scales in females, and the ups of females is usually darker with the outer pale areas less whitish and a little more bluish. Southward, *ssp. coerulescens* W J. Holland in Mexico has melanic ups bases of males and females, the unh disc is often greenish-tinted, and females have more bluish on ups.

We now have series of *ssp. nokomis* from all areas within the range, and Brian Harris of the Smithsonian kindly provided photos of the numerous perfectly-preserved Oslar specimens there. We carefully examined series of specimens everywhere in the range of this *ssp.* in S Colo.-N New Mex.-NE Ariz. The traits of males and females that show significant geographic variation within *ssp. nokomis* can be called “metapopulation diagnostic traits” and are discussed below.

A “metapopulation” is a group of populations that shares enough emigration and immigration between populations to allow for the repopulation of included populations that might occasionally become extinct. *Argynnis nokomis* would seem to have such a metapopulation structure in much of its range, because its populations are known to sometimes become extinct and the many tiny populations are surely prone to extinction, and adults including females are known to occasionally disperse many kilometers (such as a female Scott Ellis captured with a baseball bat in the family orchard near Hotchkiss in Delta Co. that is far from any known colony, although a colony probably occurs in Paonia). Fleishman et al. (2002) studied metapopulation structure of *nokomis* at a small area in the Great Basin, and found a mean dispersal distance of 1 km and a maximum observed movement of 4.5 km. When the western U.S. was settled in the 1800s, farmers and ranchers greatly modified the water supply of streams and meadows by draining wetlands and diverting water into irrigation ditches and ponds and hayfields, and they introduced water-hogging cattle. These hydrologic changes must have resulted in the extirpation of a large proportion of the *nokomis* colonies, which are mostly found in moist valley bottoms prized for growing hay or livestock or crops. *S. nokomis* surely suffered more from human settlement than any other butterfly in the interior of western North America (and a golf course recently wiped out most of the Durango Colo. colony). The locations of uniform wing phenotype that we have found below seem to define probable metapopulations, or at least sets of similar-wing-pattern metapopulations.

Important traits of males include: 1) the darkness of the ups wing bases on forewing and hindwing; 2) the size of two tawny upf spots just basal to the median black marks in cells CuA₁ and CuA₂ (basal to these tawny spots is the darker upf wing base); 3) the thickness of the ups black wing marks; 4) the shape of the central postbasal uph black staple or horseshoe mark differs somewhat in one geographic region, though this mark shows similar variation in most areas so is of limited usefulness; 5) the unh disc in metapopulations A-F varies somewhat individually without geographic variation, whereas northward in metapopulations H-K the disc varies more and becomes paler as these populations start to intergrade toward *ssp. apacheana*.

Important traits of females include: 6) the thickness of upf wing veins that run through the creamy postmedian-submarginal upf areas (dark wing scales make these veins look thicker on some females, thinner on others); 7) the width of the pale yellowish submarginal area on unh; 8) the long postmedian pale yellow uph spot near costa in cell Sc+R₁ lacks orange in most females of all populations (some have a slight orangish tint, and some have the spot quite orangish), except most females in several metapopulations have the spot slightly to mostly orangish; 9) the

pale submarginal areas of upf vary from pale cream to pale yellow to orangish, and are mostly rather pale or pale yellow but are more often orangish-tinted in the east, and are a bit bluer in one western population; 10) the unh disc averages the same everywhere except it is a little darker in eastern area F, and becomes greener northward in metapopulations H-K.

Some traits vary too much to show significant geographic variation. And the size of the median-postmedian black marks on males seems to be enlarged in reared specimens (notable on series reared from Ouray Co. Colo. and Vernal Utah by S. Spomer), which S. Spomer (pers. comm.) surmises is due to greater humidity during rearing, so we did not use reared specimens for this trait.

Metapopulation locations A to F below represent the main variation of *ssp. nokomis*, and are carefully defined below because the original lost type and the neotype could have been collected from any of these areas, based only on information available prior to this paper (we pinpoint the true location below as location F). Location G represents specimens with dubious locality labels from Ernest Oslar. Metapopulation locations H to K below represent the beginning of the cline from *ssp. nokomis* to *ssp. apacheana*, and the *nokomis* types could not have come from there because the phenotypes mostly differ and historically white people did not go there early enough to collect the original *nokomis*.

A) Chuska Mts. (New Mex.-Ariz.) specimens (fig. 7) seem to average slightly larger silver spots. The unh submarginal brown cones capping the silver spots on females seem to average larger. The ups wing bases of males are fairly dark. The two tawny upf spots of males are fairly large like most populations. The uph staple mark of males is fairly large like most populations. Females have upf veins thick like most populations, and the pale unh submarginal band is fairly narrow like most populations. The postmedian uph pale spot near costa is much oranger than most populations (it is slightly to considerably orangish in about 80% of females). The pale outer part of upf of females usually lacks orangish tint and is orangish in few. The pale area on the unf tip of both males and females seems to average larger than in other populations.

B) In Ouray Co. Colo. (fig. 5) (collected by Fisher, plus some reared by Steve Spomer, and internet photos of another pair) males have a larger area of medium brown on wing bases of upf and especially on uph than all other populations, and as a result the two upf median tawny spots just basal to the postmedian black marks are smaller in cells CuA₁ (nearly gone) and CuA₂ than all other populations. On males the postbasal uph staple/horseshoe-shaped mark is average in size but on many specimens the outer and inner parts are very narrowly connected (this thin connection seems to be independent of any humidity-induced enlargement of the black marks). Nearly all females have narrower veins (less brown scaling along the veins) on outer part of upf than all other populations, and the unh submarginal yellowish area is definitely wider than all other populations (this is also wider in males). The postmedian uph pale spot near costa is oranger (slightly to considerably orangish in 13 of 14 females). The pale areas on outer part of upf of females seem to average slightly creamier than other populations but this area has a slight orangish tint.

The real Ouray Co. specimens differ considerably from E side Sangre de Cristo specimens in males (darkness of brown on basal areas of upf and uph, thinner connection on the uph postbasal mark, extent of brown on uph, and size of the two tawny spots on upf on males) and females (width of dark scaling along upf veins, and amount of orangish on upf and uph), and both sexes (width of unh submarginal yellowish area).

C) Colonies S of the San Juan Mts. in SW Colo. such as near Durango (fig. 6) are similar to those on W side of Sangre de Cristo Mts. (a disgusting golf course wiped out most of the

Durango colony), so the ups black marks of males are smaller than males from E side Sangre de Cristo Mts. The uph postbasal staple mark of males is usually normal in size but many are smaller so the average is slightly less than usual. The unh submarginal yellowish band on females is wide, about as wide as Ouray Co. females. The upf wing veins on females are fairly wide. The postmedian uph pale spot near costa is slightly to considerably orangish in about 2/3 of females. The pale outer part of upf is slightly-orangish tinted on some females.

D) San Luis Valley Colorado males (figs. 7-8) are similar to E) but the ups wing bases appear a little darker-brown but not as dark as E side of Sangre de Cristo Mts. males. Females are similar to E) in the thickness of upf wing veins and the width of the unh submarginal pale area. The postmedian uph pale spot near costa is creamy in nearly all females, and orangish in only 2 of 8. The pale outer part of upf is slightly orangish tinted on only about a fifth of females. These populations might be part of the metapopulation in E to the south but are very small so may be subject to inbreeding and extinction.

E) Adults from the W side of the Sangre de Cristo Mts. NM (fig. 9) have ordinary ups black marks (again smaller than males from E side Sangre de Cristo Mts.) and the uph staple mark on males is usually fairly large though small on many so averages a bit less than usual, the male ups bases are medium-brown similar in darkness to Ouray Co. (some are darker) but the area of brown is smaller esp. on uph and the two tawny upf spots are larger. The female ups veins are thicker than Ouray Co. The unh submarginal yellowish band on females is comparatively narrow (it is wide only in Ouray Co. and S of San Juan Mts.). The postmedian uph pale spot near costa has a slight amount or much orangish in ~55% of females. The pale outer part of upf is slightly orangish-tinted on nearly 50% of females. It is interesting that these adults are lighter in ups brown basal areas and have smaller black markings on ups than adults from the E side of these mts. Evidently there is one metapopulation on the W side, and a second metapopulation on the E side.

F) Males from the E side of the Sangre de Cristo Mts. in New Mexico (figs. 1-4, 10) are generally darker on upf (and uph) bases than males from all other areas, but the two tawny spots are larger than Ouray Co. (some males have these spots small and one has them absent)(only the Ouray Co. pops. have these spots averaging very small). Males seem to average slightly thicker black postmedian ups marks than other populations, and the postbasal uph staple/horseshoe mark on males has the distal part larger on average but the proximal part tends to be obscured by the dark uph base. The unh disc of females is darker (more black on the outer part of the disc) than all other populations. A few females are just as pale as Ouray Co females but nearly all females have wider dark upf veins. The unh submarginal yellowish band on females is comparatively narrow. The postmedian uph pale spot near costa is slightly to considerably orangish in about 60% of females. The pale outer part of upf is slightly orangish-tinted on about 50% of females. The dark ups bases and uns disc tends toward ssp. *nitocris*, so we can understand why *nigrocaerulea* from this area was named a variety of *nitocris*. Besides our specimens, Brian Harris of the Smithsonian sent us photos of 8m4f from Beulah New Mexico (fig. 4).

G) Oslar specimens. These are mostly labeled "Mt. Sneffels" or "Hayden Peak" or sometimes "Ouray Co." in SW Colo., or sometimes "Hall Valley" in central Colo., as detailed above. Brian Harris of the Smithsonian sent us photos of 20m11f labeled Mt Sneffels E. Oslar (fig. 11), and 9m4f labeled Hayden Mts. E. Oslar (fig. 12). Adults are exactly like E side Sangre de Cristo Mts. adults (metapopulation F), as they have darker ups bases on males, two larger tawny spots on upf of males in cells CuA₁₋₂, and thicker black ups marks on males (notably the outer part of the uph postbasal horse-shoe mark) than most other populations and especially

Ouray Co. males. Females match those from E side Sangre de Cristo Mts. also, with thicker upf veins, narrow unh submarginal pale area, more orangish on upf outer area and more orangish on uph postmedian spot near costa, and darker unh disc on females. Three Oslar “Ouray Co.” specimens have been figured: the pair fig. by Brown et al. [1957] showed only the undersides, but the neotype fig. by Brown [1965]) has larger tawny spots in upf cells CuA₁₋₂ and darker ups bases matching E side Sangre de Cristo Mts. specimens. (The two male “Bent” specimens fig. by Holland [2010] match them as well.)

This is conclusive proof that Oslar’s specimens were collected by the Cockerells at Beulah New Mexico and sold to Oslar who mislabeled them Mt. Sneffels and Hayden Mts. and Hall Valley etc. (several became mislabeled Bent New Mexico etc.). All the Oslar *nokomis* specimens obviously came from the E side of the Sangre de Cristo Mts., not from Ouray Co. Thus Paul Grey’s recollection--based on unsupported memory years later--was wrong that Oslar’s specimens differed from Beulah specimens, and William Field’s examination was correct that they do not differ. Unfortunately Grey never had any authentic specimens from Ouray Co. to compare.

Individual variation is greater than interpopulation variation within ssp. *nokomis*, so random sampling involved in small samples can produce visible differences, but our samples are large enough to show that these regional differences are real.

The unh disc from all the above areas is rather similar, light to darker orangish-brown in males, and darker brown (even blackish medially) in females, except it is a bit darker in F.

But the unh disc averages paler in the following geographic metapopulation localities H-K because they are starting to intergrade with ssp. *apacheana*, so the unh disc of males is usually light-brown to cinnamon-brown (sometimes nearly yellow) and the disc of females is usually greenish (sometimes brownish-green and seldom cinnamon-brown) whereas the disc on females at the above locations is generally cinnamon-brown on males and darker-cinnamon-brown on females. At all the following localities males have the ups wing bases averaging fairly dark, the two tawny upf spots just basal to the median black marks in cells CuA₁ and CuA₂ are large, the black postmedian ups marks are fairly large like most populations [and the distal part of the uph black staple is large], while females have the upf veins wide, the pale submarginal unh area is wide, the uph postmedian pale spot near costa of females generally lacks orangish, and the pale outer part of upf of females generally lacks orangish tint.

H) Montrose Co. Colo. and San Juan Co. Utah males look a little odd because the black postmedian upf spots are a bit thinner and connect together a bit less than other populations, except the distal part of the uph horseshoe seems to be large like at other localities. The unh disc averages cinnamon brown to brownish-yellow in males, mostly green (sometimes mostly cinnamon-brown) in females, because of intergradation toward *apacheana*.

I) The upper Unaweep Canyon Mesa Co. Colo. population has males with the ups wing bases darker brown and black ups markings fairly wide, but the bases were paler brown in the lower population more like Montrose Co. (removal of cattle from the lower site resulted in growth of *Phragmites* etc. that contributed to the extirpation of the lower population). The unh disc is light-to-fairly-dark cinnamon-brown in males and darker cinnamon-brown with greenish in females as the population is intergrading toward ssp. *apacheana*, but the disc is slightly darker in the upper population, where most females have greenish only near the abdomen.

J) The Grand Co. Utah population always has the unh disc light-cinnamon-brown in males and greenish in females, perhaps because it is a small population that has had some inbreeding.

The uppers black marks of males are rather thick like Mesa Co. males. The pale outer part of uppers of females lacks orangish tint but tends to have a little more bluish.

K) Populations S of the Uinta Mts. in NE Utah have the unh disc even lighter, from brownish-yellow to fairly-dark-orangish-brown in males, and green to cinnamon in females.

(As background information, the cline from ssp. *nokomis* to ssp. *apacheana* continues in S Utah, where the disc is mostly brownish-yellow in males and mostly green in females as adults become more similar to *apacheana*, and the male disc becomes mostly yellow westward in ssp. *apacheana*).

The neotype verdict. The obvious conclusion is that the neotype of *nokomis* selected by dos Passos and Grey (1947) labeled “Oslar/Mt. Sneffels...” was collected at Beulah New Mex., not in Ouray Co. Colo., in this scenario: Wilmatte Cockerell collected more than a hundred specimens of *nokomis*, mostly from Beulah, and sold most of them to Ernest Oslar to supplement the Cockerells’ poor teachers’ incomes, and then Oslar mislabeled them with three to six or more fictitious locations and sold them to the dozen or more museums and private collections listed above (a full survey of all Oslar specimens in every collection may reveal more fictitious locations and many more repositories). Oslar evidently realized that T. Cockerell was distributing Beulah *nokomis* and Henry Skinner had also caught a hundred Beulah *nokomis* (wrote Skinner 1902a) and distributed many of them, saturating the market for Beulah specimens, so in order to create a new market for *nokomis* from an exciting new locality Oslar mislabeled his Beulah specimens as Mt. Sneffels and Hayden Peak and Ouray Co. and Hall Valley etc. and sold them to help support his wife and 14 children. (Specimens noted below with dubious data from Rodeo New Mexico and Rincon New Mexico and Las Vegas New Mexico and Bent New Mexico and Mescalero New Mexico are likely also from Beulah.) *Oeneis alberta oslari* by itself is concrete proof that Oslar mislabeled specimens (he mislabeled those 50 miles away from the real locality, and four months later).

It isn’t much of a coincidence that Oslar’s Mt. Sneffels/ Hayden Mts. localities are near a real Ouray Co. Colo. *nokomis* colony. There are *nokomis* colonies all over W and S Colorado and N New Mex. and all over Utah and Ariz., so almost anyplace Oslar chose at random to mislabel specimens would be near a real colony, except east of the continental divide in central Colorado, and actually Oslar did mislabel the two Hall Valley specimens from there. David Bruce also collected high in the “Hayden Mts.” of Colorado in 1884 (Ewan & Ewan 1981), as well as in Hall Valley, and William Barnes collected in Hall Valley prior to 1913. So Oslar evidently chose some Bruce localities to use for his mislabeling, and they were friends and Oslar surely collected at Hall Valley also, and Oslar probably got specimens of various insects and butterflies from Bruce to sell.

Should a new neotype be designated? No. There was a good reason for dos Passos & Grey (1947) to designate the neotype. Letter #9 from Paul Grey wrote “The lost type was of the brown-disk persuasion and it was from the Rocky Mountains. At the time we put out our catalogue the Oslar specimens were the prominent and most unequivocal material known to us fulfilling these primary obligations. Thus the neotype--whether it is from Ouray Co. in SW Colorado or Beulah in N New Mexico—satisfies the objectives of the neotype in specifying which subspecies the name *nokomis* represents.” This statement is entirely correct, so there does not seem to be any necessity for us or anyone else to reject this neotype and designate another. The names used would not change. Catalogues should simply list the name *Argynnis (Speyeria) nokomis* and the publication date and citation etc. and then list the type locality as “Beulah, San Miguel Co. New Mexico; not Ouray Co. Colorado.”, because we have proven that the neotype

came from Beulah. (This problem is yet another example of the time and money expended on dealing with old names, caused by the Principle of Priority which automatically forces all taxonomists to waste considerable time and expense on researching all old names in the Old Name Sewer. The Principle of Priority should be overturned. And type localities should be based on biology/genetics, not on historical accidents of discovery of type specimens.)

Identity of *nigrocaerulea*. Article 76.3 of the ICZN Code states that the place of origin of the neotype becomes the type locality of a taxon, so the TL of *nokomis* is Beulah NM, the same TL as *nigrocaerulea*, therefore *nigrocaerulea* is an objective synonym of *nokomis*.

Ferris & Fisher (1971) treated *nigrocaerulea* as a synonym of *nitocris*, which is incorrect. They lacked specimens of *nigrocaerulea* to compare.

Holland (2010, key on bottom of p. 79) mistakenly treated *nigrocaerulea* as occurring in the Chuska Mountains in the Navajo Reservation (of NE Arizona-NW New Mexico) while he treated Sangre de Cristo populations as typical *nokomis*. This is a bad mistake because the TL of *nigrocaerulea* is Beulah on the E side of the Sangre de Cristo Mts., and all the butterflies from northern New Mexico, NE Arizona, and southern Colorado actually represent one taxon *A. nokomis nokomis=nigrocaerulea*.

STATUS OF *A. NOKOMIS TULAROSA*. Ssp. *tularosa* is an obvious synonym of ssp. *nokomis*. It was named from only four specimens (two males, two females) which is not good practice. We carefully studied the photos of all four specimens, all illustrated by Holland (2008, 2010), and consider them identical to the large number of specimens we have examined from the east side of the Sangre de Cristo Mts. in northern New Mex., including the numerous specimens we have examined from Beulah, which is the type locality of both *nokomis* and *nigrocaerulea* (Figs. 1-4, 11-12) and is the origin of all the Oslar specimens. The following traits of the four *tularosa* are exactly like east side Sangre de Cristo Mts. (including Beulah) specimens: the up wing bases of male *tularosa* are very dark; the black up markings of males are fairly wide and the horseshoe postbasal uph mark is fairly large; the two tawny spots in cells CuA₁₋₂ inside the black postmedian marks are large; the upf veins of females are wide; the unh disc of females is dark; the submarginal unh yellowish band of females is narrow; the pale upf outer area of some females seems to have a touch of orangish; and finally, the disc on ventral hindwing is the same color and shows variation completely within that of Sangre de Cristo Mts. specimens. The colors of males and females do not differ from Beulah specimens. The markings do not differ, except the dark chevrons capping the submarginal hindwing silver spots on the females seem to be longer than they are on most Sangre de Cristo females; however those chevrons vary and some are long on the latter (such as the last two females in Fig 3), and we note below that those chevrons look longer on Holland's 2008 photos than the 2010 photos because the former were photographed with less light. The female holotype has median unh silver spots rather small, but the other three have spots like most Sangre de Cristo Mts.-SW Colo. specimens, and the spots are also small on some Beulah specimens in Fig. 4. The traits noted in Holland (2010) do not in any way distinguish *tularosa* from east side Sangre de Cristo Mts. *nokomis*, and Holland did not mention the dark chevrons on ventral hindwing margin that is the only trait we notice that may be the slightest bit different. Holland (2010) claimed that "Two known female specimens lack the fulvous spot on DHW costa", which evidently refers to the long postmedian pale spot near costa in cell Sc+R₁, but this is a variable spot which lacks orangish in about half the females from the Sangre de Cristo Mts. (and lacks orangish in most females of all populations except the Chuska Mts. and Ouray Co. populations in which some orangish is present on most females).

Furthermore, we wonder if Holland actually examined this spot on the two females. These spots are not visible on the photos because the hindwings were moved forward beneath the forewing during mounting, and Holland (2010) wrote “My sincerest thanks to Jocelyn Gill of the Canadian National Museum (CNM) for the magnificent photo work that can protect an irreplaceable national asset from pointless handling.”, suggesting that Holland was working only from photos and doubtfully viewed the actual specimens. The uppermost male figured by Holland (2010) has a lighter-orangish-brown disc than the lower male, but such variation occurs in Sangre de Cristo Mts. and all other populations of ssp. *nokomis*, and such pale discs would seem to be too pale for southern New Mexico, where ssp. *nitocris* in SW New Mex. always has a dark disc, and the only specimens verified from the Sacramento Mts. are another very distinctive ssp. *coerulescens* that has a dark or even greenish-tinged dark disc (fig. 13).

Problems with the *tularosa* specimen labels. Two of the *A. n. tularosa* males (both in AMNH) were labeled “New Mexico, Otero Co., vic. Bent, ex Ehrlich Coll.” for one male and “Bent, Otero Co., New Mex. Aug. 12 Ex. Coll. Ehrlich” plus an additional label “Coll. of L. P. Grey” for the second male (Holland 2008). Holland noted that the labels were in Paul Grey’s handwriting, and noted that Paul Ehrlich told him that he has “no knowledge of the material”. Holland noted that Ehrlich would have been 15 years old in 1948 when Paul Grey’s collection was transferred to AMNH. Evidently Paul Grey wrote those labels, based on information of dubious labeling and origin. Paul Grey’s letters to Scott help elucidate these two specimens. In letter #7 Oct. 12 1977 Grey wrote “I have seen specimens from “vic. Bent” Otero Co. that do wonderfully well to match the concept of a very pallid brown-disk thing [as contrasted with *nitocris* Edwards]. Unfortunately they were from a dealer (ex Paul Ehrlich Coll.) with no other data. This possible lead hasn’t been run to earth yet; file it in case you can ever do anything with it.” Letter #9 March 25 1978 wrote “The two singleton males I had that came from Paul Ehrlich who got them from a dealer were labeled from “Bent”, quite far from the Rio Hondo area [Grey thought that Rio Hondo might be a good *nokomis* area merely because Richard Holland had found a willowy marsh near a lake there; no *nokomis* has ever been found there]. I still have one and think d.P. [dos Passos] may have the other; they were extremely pallid disk and yet of the brown-disk series.” Those specimens were sold, probably mislabeled, maybe even stolen? We will probably never know exactly what happened to them. They could have been collected at Beulah and had missing or inadequate labels, a possibility that becomes likely when we consider the large number of several hundred specimens collected from Beulah, and the giant labels that would easily fall off Cockerell specimens or be discarded due to fading (see fig. 4 top). Someone may have then mislabeled them Bent who thought T. Cockerell collected them and thought they were collected from the Sacramento Mountains when Cockerell lived nearby in Las Cruces New Mexico. Possibly someone who bought Beulah specimens from Wilmatte Cockerell misplaced the locality and wrote out labels giving them localities where they knew the Cockerells collected (in the Sacramento Mts.), localities gleaned from reading some of T. Cockerell’s numerous published papers. They could be specimens Ernest Osler received from Wilmatte Cockerell and just mislabeled them from Bent. The Rincon specimen noted below may have the same explanation of its mislabeling, or might have been a mixup by the Cockerells.

The two female specimens of *A. n. tularosa* reported by Holland (2008) are from the CMNH, one labeled “Mescalero, N. Mex., VIII 13, 1931, W. Huber” and “Exch. ANSP., C.M.Acc.20359”. The other female is labeled the same but has VII instead of VIII. Holland suggested the VII is mislabeled and should be VIII. Holland noted that according to the accession label, these specimens went to Pittsburgh in 1940, with invertebrates from the

Philadelphia museum going to the Pittsburgh museum in exchange for mammals sent to the Philadelphia museum. Holland stated that W. Huber was head mammalogist at the Philadelphia Academy of Sciences in 1931. We do not know of any mammalogists who collect butterflies (they never even have nets), so we doubt that Huber cared much about those butterflies (after all, he let them depart the museum).

Wharton Huber was born in Philadelphia in 1877 (biography with photo at www.dvoc.org/cassiniaOnLine/Cassinia32/C32_42_43.pdf), and married in 1918. He briefly collected in New Mexico for the MCZ, sponsored by Col. John E. Thayer. In 1920 he came to the Academy of Natural Sciences in Philadelphia and worked in ornithology under Dr. Stone, and became curator of mammals in 1923. He made many trips to collect birds and mammals: Nicaragua in 1921 or 1922, the Bear River in Utah for ducks, the southwest U.S. and Mexico in 1927, 1929, 1931, 1932, and 1933, two trips to the Mescalero Apache Reservation in New Mex. (evidently during those Mexico trips) with a trip to the Queen Charlotte Is. in between, California (date unknown), Louisiana in 1934, and Panama in 1938. In 1940 (when Holland 2008 notes the specimens were transferred to Pittsburgh) he was in ill health and moved to Cedarville, Chester Co., Pennsylvania, and died March 13, 1942. This biography offers clues: Huber was in ill health when the invertebrates were moved from Philadelphia to Pittsburgh and when he moved to Cedarville, so this must have been a difficult chaotic time when an ill Mr. Huber or some uncaring worker probably mixed up the labels during the sorting, labeling, assembling, compacting, and packing of the specimens for the move or the unpacking and resorting of them upon arrival in Pittsburgh. Then he died little more than a year later. Internet search produces no indication that he ever collected invertebrates, while he did accumulate a private collection of 4,000 North American birds and mammals.

Oslar's *nokomis* specimens ended up in most large museums of the time, and probably ended up in Philadelphia also, purchased by a collector whose specimens ended up there. Many Cockerell specimens have faded writing on large cheap yellowing paper labels (fig. 4) that could be discarded because of fading or fall off due to their weight. So the two females probably were Beulah specimens sitting somewhere in the Philadelphia museum without labels, and someone thought that Huber had collected them so put a Huber Mescalero label on them. Those labels may have just been placed on some of the invertebrates en masse—unlabeled or badly labeled Oslar specimens included--when they transferred to CMNH. When collections are transferred, dozens of temporary unskilled people are recruited to quickly pack and ship specimens they know or care little about, and they often find loose ends that have to be dealt with somehow (in this case with no help from ill Wharton Huber), so they have to make instant decisions amid the frenzy of activity, so if there are boxes of bugs in the process of labeling from an expedition and the labels were with them, the two large unlabeled *nokomis* nearby might have been placed in a nice vacant area of the box just to get them efficiently boxed for shipment, and then later those labels would be placed on all the bugs in the box. The accession label was attached in Pittsburg, so maybe the Mescalero labels were attached there while labeling a box of specimens.

If Huber had actually collected such nice specimens, surely he would have told people about them, and he would take steps to get them identified and he would want to keep them!

Mistakes happen in collections. Ancient lepidopterists were forced to write labels with pen and ink. When commercial printing improved, until the current era of small computerized printers, entomologists generally pinned their bugs in little Schmitt boxes with a handwritten large label pinned nearby or under one specimen, then they waited to label each specimen until they ordered little printed labels from a printing company and received them in the mail weeks

later; numerous specimens remained unlabeled until the end of the collecting season when labels from many localities would be ordered en masse. And during the mounting process most people do not label their specimens individually until they get printed labels; they separate the specimens from the data to relax them before mounting (Scott relaxes them in envelopes with data, and pins the data right next to the mounted specimen and never separates data from specimen), so sometimes the correct data does not make it back to the proper specimen when the specimens are removed from the mounting boards and boxed and the labels are prepared and placed on the specimen. Many collectors just give their specimens numbers/letters when collecting, and even store them with just those numbers/letters, and hopefully write explanations of those in notebooks; that system can easily produce mislabeling because numbers are more easily mixed up than written locality names. And labels sometimes become loose and fall off specimens that are moved, especially when the pin hole is enlarged by label removal and reinstallation (many museum labels have two or three holes made by careless persons who removed it for examination or photography), then someone can put a different label on it found in the new location, or maybe a new label is made from faulty memory...the possibilities for mistakes are endless. Specimens in public museums gradually get broken over the decades as they are handled (compare the photos of W. H. Edwards' type specimens illustrated by F. M. Brown with those same specimens pictured in W. J. Holland's first *Butterfly Book* 7-8 decades earlier in 1898), specimens are often reduced to dust by breakage and dermestids etc. Entropy (inevitable increase of disorganization) is at work in collections as well as in chemistry and physics. (Though we are amazed at the nice condition of 113-year-old *nokomis* in Smithsonian=USNM, figs. 1, 4, 11-12.)

One additional possible source should be mentioned. James Abram Garfield Rehn (1881-1965) did collect insects. He was an entomologist, mammalogist, and curator of insects at ANSP who "worked at several hundred localities within the Rocky Mtn. area both alone & with Morgan Hebard [another curator of insects at ANSP], between the years 1907 and 1928" according to Ewan (1950). It is possible he collected some *nokomis* that participated in the packing confusion as the invertebrates were transferred to Pittsburgh and became mislabeled. Rehn wrote a monograph of Orthoptera, and Hebard wrote treatises of Orthoptera of Colorado and on Blattidae, so both men wielded good nets to catch grasshoppers.

Interestingly, the two specimens that Ernest Osler mislabeled Hall Valley Colorado (noted above) are labeled 1928, close to the 1931 date for the Mescalero specimens. Was Osler mislabeling and selling his last few *nokomis* as late as 1928-1931?

Other collectors failed to find *tularosa*. Another puzzle: why did F. Martin Brown and Paul Grey and C. dos Passos and others not find those Mescalero specimens in the Carnegie Museum? They all thoroughly examined *nokomis* from all the museums, and Paul Grey kept file cards detailing *nokomis* from all the major museums, which he loaned to Scott who wrote down all those records. Specimens without labels would have been ignored.

Also, the Cockerells lived near the Sacramento Mts. from 1893-1900, and collected bees and butterflies there, right at the time Holland suggests that *tularosa* flew there and was collected from places along the major highway that runs in a beeline from the Cockerells' residence to the *tularosa* localities (Holland [2010] claims the butterfly flew there until 1931 at least). If this were true, why didn't the Cockerells collect it there? If someone had actually collected *tularosa* there, the Cockerells would have known about it, as it was a desirable species. On this point Holland (2010) wrote "it seems unlikely that anything this spectacular would have totally escaped his purview". It seems reasonable that the Cockerells did NOT collect it there and

didn't learn of anyone else collecting it there, simply because the butterfly never occurred in that area. Charles Henry Tyler Townsend (1863-1944) was professor at New Mexico Agricultural College and assistant entomologist at USDA 1891-1893, and never reported *nokomis* either, although he collected mostly Diptera. No one else is known to have collected butterflies in the Sacramento Mts. in the 1800s or early 1900s. Cary (2002) wrote that Winslow J. Howard, a mining assayer and early collector in New Mexico, was never known to be in the Sacramento Mts. or SE New Mexico because "Mining was not a big part of the frontier economy in the Sacramentos, making it difficult to imagine what would have attracted Howard to the area or how he could have supported himself as an assayer."

Impossible altitude. The altitudes of the supposed *tularosa* specimen localities are too low at that southern latitude to support viable colonies of *nokomis*. Bent is ~6,000' and Mescalero ~6,950', both too low in altitude. The lowest *nokomis*=*nigrocaerulea* colony in northern New Mexico-NE Ariz-S Colo. is 6,800' and the highest is 8,360' and the average is 7,500' (Scott et al. *nokomis* mss.), and the Sacramento Mts. in southern New Mexico are much farther south and hotter, so probably could not support colonies at 6,000-7,000' altitude. They could especially not support any colony on an alluvial fan beside the mountains; the Tularosa River and others run out into a closed basin where the water evaporates because the area is so hot and dry. Someone might think that the *nokomis* occurred at higher altitude in the mountains nearby, but maps show that all the creeks in the area are intermittent thus the whole area does not look very promising for *nokomis* which requires copious amounts of permanent flowing water (Holland [2008] notes that the stream was underground before it flowed out of the escarpment). Holland (2008) also claimed that *nokomis* must have occurred in the valley bottom between Tularosa (only 4,500 ft.) and Bent, which is too low to support *nokomis*. And maps also show only intermittent creeks at High Rolls to the south, a moth locality noted by Holland (2008). The valid specimen of *A. nokomis coerulescens* from the Sacramento Mts. noted below is from much higher altitude.

The actual locality of *tularosa*. Based on our diagnosis that wing pattern of the *tularosa* specimens is the same as that of specimens from Beulah on the E side of the Sangre de Cristo Mts., and based on the presence of ~200 Beulah specimens (nearly 100 of them mislabeled) in collections around North America, and based on mistakes on the labels and the dubious provenance of the specimens, we suggest that the *tularosa* specimens were also collected at Beulah, New Mexico by Wilmatte Cockerell or Henry Skinner, as some of many widely distributed by them and Ernest Osler to many other collectors and museums with labels that varied in locality information from correct to absent to deliberately mislabeled in multiple ways, and some of those specimens somehow received erroneous labels. (And note that other *nokomis* specimens in various museums lack locality information completely, but those specimens were not written down on Paul Grey's cards or by us.) The *tularosa* specimens are not from the Sacramento Mts. as Holland claimed. The name *tularosa* is a synonym of *nokomis*=*nigrocaerulea*.

More mislabeled *nokomis*. Obvious mislabeling of *nokomis* specimens is not uncommon. Several Osler specimens from Hall Valley Colorado were obviously mislabeled as that locality is in subalpine-alpine zones in the middle of high Rocky Mountains, far from suitable habitat. A female in AMNH identical to ssp. *nokomis*=*nigrocaerulea* labeled "Rincon, New Mex." is mislabeled also, as Rincon is in Doña Ana Co. southwest of Mescalero on the hot flats near the Rio Grande River (the word rincon in Spanish means corner or nook so other places in New Mex. are reported to have that name, but they are tiny and obscure as internet search produces

only the Doña Ana Co. town) (Mike Toliver once suggested it may have really been from Rociada in San Miguel Co., as T. Cockerell [1909a] wrote that “my wife and I first found it [*nokomis*] there [in Rociada] in quantity” [at least 6 Wilmatte Cockerell specimens from there coll. Aug. 8-11, 1902 are now in AMNH, LACM, MCZ, CAS {from Graham Heid coll.}, & Colo. State Univ. Gillette Museum {1 female coll. by Wilmatte Cockerell}], but no permanent colony occurs there now as irrigation has made the meadow a large too-wet sedge meadow], but the name Rincon does not look or sound like the name Rociada). Maybe there was just an inadvertent switch of labels from bee to butterfly on a Cockerell desk, because the Cockerells likely collected at Rincon which is not far from Las Cruces, or perhaps someone had a poorly-labeled or unlabeled specimen and thought Cockerell had caught it so he relabeled it with some locality he knew the Cockerells visited; who knows. The same kind of mistake may have happened to the two Bent *tularosa* specimens. “Rincon New Mexico” is the TL of *Papilio polyxenes* form *curvifascia* Skinner, and Skinner collected a hundred *nokomis* at Beulah, so maybe Skinner mislabeled this Rincon specimen?, which lacks a county location. And there is a ssp. *nokomis* specimen in the Gillette Museum in Fort Collins, Colorado, labeled “Rodeo New Mexico” (at the E edge of the Chiricahua Mts.), which is obviously mislabeled, and the altitude is way too low for it and no one will believe that any ssp. other than *coerulescens* would occur in the Chiricahua Mts. (it was doubtfully collected in the Chiricahua Mts. as that range has been thoroughly explored). It’s also hard to believe that someone collected it from Ruidoso in the Sacramento Mts. New Mexico and mistakenly wrote it Rodeo. A female from “Las Vegas New Mex. collected by H. Meeske” in USNM is also mislabeled, as that town is on the plains; it surely is from Beulah to the NW. The Hall Valley and Rincon and Rodeo and Las Vegas and Bent specimens all probably came from Beulah. A pair from “Thermal Springs New Mexico” and a pair from “Hot Springs, 7,000 ft., New Mexico” in AMNH also resemble Beulah specimens and there is a hot-water meadow bathing spot in Sapello Can. so they might be from Beulah; but they might actually be from Gallinas Can. NW of Las Vegas (a poor habitat now, a narrow mostly-too-dry canyon) where there is a tiny town of Hot Springs. Francis Huntington Snow (1840-1908) spent 9 weeks near Las Vegas Hot Springs New Mex. in 1882 and his colleagues spent 2 months in Gallinas Can. near Las Vegas Hot Springs in 1883 (Ewan 1950) and he spent time in 1884 in N New Mex., but he probably did not collect *nokomis* (if he had, someone probably would have published it). There is a female of *A. n. coerulescens* in USNM from “New Mexico” which is most likely poorly labeled or mislabeled somehow; someone could guess that it was caught in the Sacramento Mts. Two female *nokomis* were reportedly collected on the Lower Florida River E of Durango Colo. 6500-7000’ on Sept. 15, 1877 and figured by H. Strecker (Ferris & Fisher 1971), but that data is somewhat questionable because a *Boloria kriemhild* specimen has the same locality and date and is surely mislabeled because *kriemhild* only occurs from N Utah and Wyoming northward (not in Colorado) and does not fly in September. Three female ssp. *apacheana* in Allyn Museum (now in McGuire Center) are mislabeled from Sentinel Peak Inyo Co. Calif. Aug. 1921 (O. Poling) where there is no suitable habitat (John F. Emmel pers. comm.). And there is a *nokomis apacheana* in the Allyn Museum mislabeled Valle Redondo in Baja California Norte Aug. 1932 Tarsicio Escalante (Scott once ordered butterflies from Escalante, and when they arrived in envelopes they had no data whatsoever, so Scott returned them and asked for his money back, then in a letter Escalante was incensed and claimed that he would have sent the data. Separating specimens from data is definitely the way to end up with mislabeled specimens.) So, there are mislabeled *Argynnis nokomis* galore, and careful search in museums and collections would surely reveal more. (And

regrettably we must note that this is the kind of butterfly that some collectors steal. Colin Wyatt was once caught stealing specimens from BMNH, which he pinned into cork he glued into a large hat. The first step for sanitizing stolen specimens is to discard their incriminating labels.)

Coincidentally, New Mexico has a sordid history of mislabeled *Argynnis* (*Speyeria*). *A. (S.) hydaspe conquista* dos Passos & Grey was named from specimens from “Little Tesuque Canyon, near Santa Fe, Santa Fe Co. New Mexico”, which is in the Sangre de Cristo Mts. also. Specimens of *A. zerene* were also labeled as supposedly collected from the same locality, but those gained little attention because only the *hydaspe* was named a distinct subspecies. The specimens of both those species were collected by Alexander B. Klots, who collected in NW Wyoming also at that time. Finally after 40 years of futile searches it was recognized that all those specimens were simply NW Wyoming specimens accidentally mislabeled by Klots or an assistant (Scott 1982). Neither species has ever occurred in New Mexico. *A. (S.) hydaspe* has also been mislabeled from “San Juan Mts., viii. 29” of Colorado (specimens from the Cary collection cited by Brown et al. 1957). Of course these mixups are unrelated to the *nokomis* case, but we mention them only to note the unfortunate history of mislabeled New Mexico butterflies.

Undisclosed alteration of the *tularosa* photos and locality information. The photos in Holland (2008) show a male with antennae aimed forward and tornus missing on right hindwing, and a female (the *tularosa* holotype) with tornus missing on left hindwing. The same specimens in Holland (2010--male row 1, female row 3) show the left antenna of the male placed farther back, and the tornus of both male and female miraculously restored. Obviously photo-editing software was used to alter these photos, without disclosing the alteration, which could affect the appearance of the specimens (the Acknowledgements in Holland 2010 say Jocelyn Gill of CNC did “magnificent photo work”, so evidently she altered the photos). Disturbingly, the blackish-brown conical chevrons that basally edge the submarginal silver spots on the hindwing of the female appear smaller on the 2010 photo than the 2008 photo, because the 2008 photos were photographed with less light or printed darker. Also, Holland’s (2010) fig. 1 legend states that the antennae are intact only on the third row specimen, so someone has evidently photocopied an antenna from another specimen onto the fourth row female which has both antennae intact on the photo; apparently both antennae were photographed at an oblique angle by a camera aimed at the left antenna of the third row female. And why is the left labial palp missing on the underside of the 4th row female, present on the upperside? The Holland (2010) figure legend also deceptively altered the locality labels given in Holland (2008) by adding the words “Tularosa River, Otero County, ca. 7,000” to their locality, and changed the July time on one specimen to Aug. We jest that Holland should have included the word “restoration” along with his words “holy grail” in the title of his 2008 paper. Undisclosed manipulation of Holy Grail objects is expected of churches who manufacture images to attract monetary donations from gullible church folk, but is to be deplored in scientific publications. Holland’s (2010) opening statement indicated that he had searched for *nokomis* in the Sacramento Mts. for 44 years; unfortunately his zeal for discovery rose after all that time to such an extent that he ignored the facts in order to make his dream of the holy grail come true.

The ssp. in Sacramento Mts. New Mexico is actually *A. n. coerulescens*. Kilian Roever collected two male specimens of *coerulescens* on the east side of the Sacramento Mts., and in the 1970s he brought one of them to Scott to examine and photograph (fig. 13). It is an obvious *coerulescens* specimen like those now found in Mexico. Ssp. *coerulescens* once occurred in southern Arizona (the only confidently-located site was in the Santa Catalina Mts., where the

colony at Cascade Spring near the summit of Mt. Lemmon was exterminated by water diversion during federal construction of a radar station, which was never finished). The exact locality is given on the specimen, which is much higher in altitude (8,500') than the dubious *tularosa* localities (we do not disclose exact localities for *A. nokomis* because most are small and should not be collected, and we have heard of groups of three people collecting one small colony for three days). Both specimens are in the K. Roever collection although reportedly one was later consumed by dermestids. Also, there is a female *coerulescens* in USNM labeled just "New Mexico", though that inadequate label does not inspire confidence in its veracity.

Obviously two different subspecies of one butterfly species cannot coexist synchronically, so it is reasonable to conclude that the Sacramento Mts. has ssp. *coerulescens*, and the ssp. *nokomis*=*tularosa* specimens labeled from there are mislabeled specimens from Beulah, as we determined above. Further search for *nokomis* in the Sacramento Mts. might require searching at higher elevation and searching for different kinds of habitats than the usual wet-meadow seeps. *A. nokomis coerulescens* differs from other *nokomis* ssp. because it flies about pine forest where violets grow under the trees in moist duff that is kept moist by summer monsoons. It may differ from other *nokomis* ssp. in which males fleck in riparian areas and wet meadow "eyes" to seek females for mating while females oviposit in the meadows but more often oviposit in the semi-shade of trees or bushes (willows etc.), as the usual host *Viola sororia affinis* = *nephrophylla* = *papilionacea* grows mostly in moist semi-shade under bushes/trees/dense grass etc. 1st-stage larvae hibernate in most ssp. (Scott & Mattoon 1982) and probably also in *coerulescens* because it has an equally late flight period, while Sterling Mattoon noted that lab *coerulescens* larvae can also aestivate as 3rd-stage larvae, which in nature could get them through the drier spring months in Mexico.

Metapopulation dynamics. As noted above, a "metapopulation" is a collection of populations that are connected by migrants frequently enough to repopulate any little population in that area that temporarily goes extinct. Based on its geographic variation, it is clear that *S. nokomis* is able to disperse long distances along river courses and across dry areas often enough to create the broad cline of variation displayed as ssp. *apacheana* transitions into ssp. *nokomis* across Nevada and Utah and Colorado and into New Mexico. But dispersal is seldom successful across high mountain ranges (the Sangre de Cristo Mts. and the San Juan Mts.) so distinct differences develop and persist on the two sides of such ranges and it is clear that there are different metapopulations on each side of those ranges. So it is extremely doubtful that the Sacramento Mountains would have a metapopulation that would look the same as either of the two that exist in the Sangre de Cristo Mts. several mountain ranges to the north.

Conclusion. Two apparently separate problems—the *nokomis* neotype and the identity of *tularosa*—became one proven solution as we accumulated evidence. The proof came from historical testimony by T. Cockerell and F. Benjamin and Don Eff, and from geographic variation in wing pattern. Series of *A. nokomis* from every inhabited area known to us reveal that the neotype and all other Oslar specimens as well as the specimens named *tularosa* by Holland, were collected from Beulah on the east side of the Sangre de Cristo Mts., New Mexico. All the Oslar specimens and types of those two names resemble Beulah specimens, and do not resemble specimens later found in Ouray County, Colorado, the fictitious locality of the *nokomis* neotype. About 100 were collected from Beulah by the Cockerells (mostly by Wilmatte Cockerell, who sold most of hers to Oslar according to T. Cockerell), and another hundred by Henry Skinner, and those specimens were widely distributed to numerous collectors and

museums. The *tularosa* types came from some of those 200, the neotype from Wilmatte. The evidence reveals that Osler never collected *nokomis*, and he mislabeled the 89+ specimens he bought from Wilmatte as coming from four or more different localities including Mt. Sneffels to augment their sale price to other collectors and museums, apparently because he thought that Skinner's hundred would depress the price of specimens labeled Beulah, and Osler needed money to support his wife and 14 children (Osler also mislabeled *Oeneis alberta osleri* specimens to monopolize the sales market by keeping other people from collecting it). The *tularosa* specimens are among many *nokomis* that evidently became mislabeled through curatorial mistakes, some made during transfers between museums when a curator was ill. Thus both *nigrocaerulea* and *tularosa* are objective synonyms of *nokomis* because all three have the same Beulah type locality.

Holland was so emotionally involved in this matter—his lifelong dream—that his judgment was affected. He was deceived so completely that the *tularosa* specimens were holy grail antiques, that he had them restored (in his photos) and he convinced two prominent North American butterfly journals to publish them as valid without any supportive investigation. So it is our responsibility to evaluate *tularosa* using standard procedures of the antiques trade, including examination by experts. Our antique appraisal notes that the provenance of all the *tularosa* specimens is very bad: People listed on the labels disavow owning the specimens; their labels contain obvious mistakes; various letters and testimony provide a viable alternate source of the specimens from several hundred collected at Beulah which were distributed to numerous collectors and museums and frequently mislabeled; other similar *nokomis* specimens exist which are obviously mislabeled; the altitude of the supposed localities is too low; the Cockerells did not find *nokomis* in the Sacramento Mts. when they lived nearby; photos and photo legends of the specimens have been altered; the *tularosa* specimens are not a distinct subspecies and are well within the variation of specimens from Beulah and are different from specimens from other regions; finally, specimens with confident provenance exist from the Sacramento Mts.—the purported location of the *tularosa* specimens—that actually belong to subspecies *coerulescens*. Unfortunately, the four *tularosa* specimens are not “holy grail” antiques; they are wholly bogus fakes. (Note: Richard W. Holland passed away October 5, 2013, at his long-time home in Albuquerque, New Mexico, after suffering from Parkinson's Disease for a dozen years [Cary, 2014].)

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Fig. 1. Sapello Can.
[Beulah] New Mex.,
2 males, USNM.



Fig. 2. *A. nokomis nokomis* Beulah, New
Mex., 3 males 1 female.



Fig. 3. *A. nokomis nokomis* from Beulah, New Mexico, 4 males 2 females,
Univ. Colo. Museum, coll. by Cockerells.



Fig. 4. *A. nokomis* from Beulah New Mexico (top 2m coll. by Cockerells (based on handwriting), middle 5m3f coll. by Henry Skinner, bottom 1m1f from William Barnes collection coll. by Cockerells (based on handwriting), all USNM. (The ups wing bases are a bit too dark on the males in this fig.).



Fig. 5 (left) Ouray Co. Colo. (right column underside of same females), all M. Fisher coll.



Fig. 6. N Durango in SW Colo. (right, same females underside), all M. Fisher coll.



Fig. 7. col. 1, col. 2#1-2 San Luis Valley CO; col. 2#3-7, col. 3#1-5 Archuleta Co. CO; col. 3#6, col. 4, col. 5#1-3 N Durango CO; col. 5 #4-6, cols. 6-8 Chuska Mts. New Mex.; all J. Scott coll.



Fig. 8. San Luis Valley, Colo. (right two columns are other sides of same adults as col. 1-2) (males #1=7, 2=9, 4=6, females #3=10, 5=8), all M. Fisher coll.



Fig. 9. W side Sangre de Cristo Mts., New Mex., all J. Scott coll.



Fig. 10. E side Sangre de Cristo Mts., New Mex., all J. Scott coll.



Fig. 11. *A. nokomis* "Mt. Sneffels" [actually Beulah NM] Ernest Osler, all USNM.



Fig. 12. *A. nokomis* “Hayden Mts.” [actually Beulah NM] Ernest Oslar, all USNM.



Figs. 13 (left)-14 (right). *Argynnis nokomis coerulescens*. The orange male fig. 13 was collected in Sacramento Mts. New Mexico by Kilian Roever. Note the slightly-greenish brown ventral hindwing disc, and the very black basal areas on upperside. The female fig. 14 is from Santa Catalina Mts., Arizona, where a colony formerly occurred on Mt. Lemmon. Females are somewhat bluish. The disc varies from slightly-greenish-brown to reddish-brown in both sexes but averages much darker even blackish in females.

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