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ERESIA CARLOTA REAKIRT (NYMPHALIDAE): THE DESIGNATION OF A LECTOTYPE AND THE RETURN OF THE TYPE LOCALITY TO COLORADO

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ABSTRACT. The description of *Eresia carlota* Reakirt, 1866 (currently recognized as *Chlosyne gorgone carlota*) was based on specimens collected in 1864 in the foothills of the Front Range, west of Denver, Colorado. A subsequent neotype designation established the type locality as Cedar Hill, Missouri. The neotype, however, is inconsistent with the phenotype of this taxon as understood by Reakirt. More important, the neotype designation was based on an erroneous interpretation of the Code and is nomenclaturally invalid. A lectotype of *Eresia carlota* is designated, which restores this nominal taxon to its original concept and returns the type locality to Colorado.

Additional key words: *Chlosyne gorgone*, *Chlosyne nycteis*, Herman Strecker, James Ridings, lectotype, Tryon Reakirt

Around the year 1865, the Philadelphia lepidopterist Tryon Reakirt (1844–ca.1873) received specimens of a supposed new species of butterfly from James Ridings (1803–1880), an English entomologist who also lived in Philadelphia. The specimens were collected by Ridings in Colorado during June of 1864. Reakirt (1866) named this taxon *Eresia carlota* and attributed it to “Rocky Mountains, Colorado Territory.” A century later, Brown (1974) decided that a neotype was necessary to properly define the name *E. carlota*. He selected a male specimen from Missouri and also figured a female from the same population, both of which were collected on 18 May 1947 by Pardon S. Remington.

Although Brown (1974) indicated that the neotype of *carlota* and its associated female were deposited in the Allyn Museum of Entomology (Sarasota, Florida), they were not found subsequent to the 2004 transfer of specimens from the Allyn Museum to the McGuire Center for Lepidoptera and Biodiversity (MGCL, Florida Museum of Natural History, Gainesville). In June of 2010, Lawrence F. Gall unexpectedly located these specimens in the collection of the Peabody Museum of Natural History (PMNH, Yale University, New Haven, Connecticut) (catalog no. YPM ENT 413267; the male lacks the neotype label mentioned by Brown). This discrepancy is explained in a letter from F. Martin Brown to Charles L. Remington of PMNH, dated 28 March 1975; “There is one specimen among the butterflies that technically belongs to the Allyn Museum of Entomology. That is the neotype for Reakirt’s *carlota*. It makes no difference to me where it is preserved but it is stated in the designation that it is at Allyn. I thought that I had retained it but found that I had returned the specimens some years back” (archives, PMNH Div. Entomol.). The collection of P. S. Remington, father of C. L. Remington, is deposited at PMNH. In keeping with Brown’s (1974) statement of

disposition, these specimens will be transferred from PMNH to MGCL (L. F. Gall pers comm.).

The rediscovery of the neotype prompted me to re-examine its status. I concluded that Brown’s (1974) designation does not satisfy the Code (ICZN 1999) and is nomenclaturally invalid. This is fortunate, as the neotype from Missouri is inconsistent with Reakirt’s concept of this taxon, which was based on higher elevation specimens from Colorado.

METHODS

The original description of *Eresia carlota* by Reakirt (1866) and the subsequent neotype designation by Brown (1974) were reviewed. The relevant provisions of the Code (ICZN 1964, 1999) were consulted to determine the validity of the neotype. Images were obtained of the neotype and its associated female. Also obtained were images of the Colorado specimens for which the name *E. carlota* was originally proposed. Microfilm printouts of the manuscripts of William H. Edwards (1822–1909) (MGCL archives) were examined for references to relevant taxa.

RESULTS

Reakirt (1866) included no written description or figure of *Eresia carlota*, but cited an earlier description by Edwards (1861), who had misidentified specimens of this species from Illinois and Missouri as *Melitaea nycteis* Doubleday (now recognized as *Chlosyne nycteis*). Reakirt (1866) criticized William H. Edwards for his earlier mistake; “I cannot imagine how Mr. Edwards could have regarded this very distinct species as identical with Mr. Doubleday’s figure [of *nycteis*]; it no more resembles it, than does *Tharos* [*Phyciodes tharos* (Drury)]”. No written description accompanied the original figure of *M. nycteis* in Doubleday ([1847]), and only the dorsal surface of this species was portrayed.

Consequently, the identity of *Melitaea nycteis* was very poorly understood throughout much of the 19th century and very few specimens were known. Scudder (1862) was aware of several specimens, which he described as a new species, *Melitaea oenone*. Only after examining types of *M. nycteis*, “received directly from Doubleday,” did Scudder realize his mistake (Scudder 1868).

Edwards’ own confusion about these butterflies was more persistent. In 1864, *C. nycteis* was common near Edwards’ home in West Virginia, but he identified the species as *Melitaea ismeria* Harris (nec Boisduval & Le Conte) (Edwards’ journal “A”), which is synonymous with *Melitaea harrisii*, a butterfly described that same year by S. H. Scudder. Edwards (1870) later attempted to correct this mistake by identifying specimens of *C. nycteis* as *M. harrisii*. Probably in response to Reakirt’s (1866) admonition, and supported by the capture (by a “Mr. Eaton”) of a single specimen of “*carlota*” near his home in July of 1867 (Edwards’ journal “B”; Edwards 1894), Edwards (1871) concluded that his earlier interpretation of *M. nycteis* was synonymous with *E. carlota*. By the mid-1870s, Edwards acknowledged that he had previously misapplied the name *M. harrisii* (Edwards 1875), and he accurately remarked that *carlota* “abounds in Colorado” (letter to H. Edwards, 23 Dec. 1874). The latter statement was partially based on his receipt of specimens from his future son-in-law, Theodore L. Mead, who had collected them in Colorado in June of 1871 (see Mead 1875) (at least two such specimens from Mead are preserved in the Carnegie Museum of Natural History, Pittsburgh, Pennsylvania, where the collections of Mead and Edwards are deposited). Having finally sorted out the names, Edwards (1877) listed *carlota*, *harrisii*, and *nycteis* as separate species within the genus *Phyciodes*.

Around that same time, Scudder (1875) determined that *E. carlota* was synonymous with the nominal taxon *Dryas gorgone* Hübner. After decades of confusion surrounding the application of these two names, *carlota* is now recognized as the subspecies *Chlosyne gorgone carlota*. The name *Melitaea ismeria* Boisduval & Le Conte also was applied to *C. gorgone*, but irrevocable confusion about its identity warranted its suppression (Calhoun 2003; Calhoun et al. 2005; ITZN 2006).

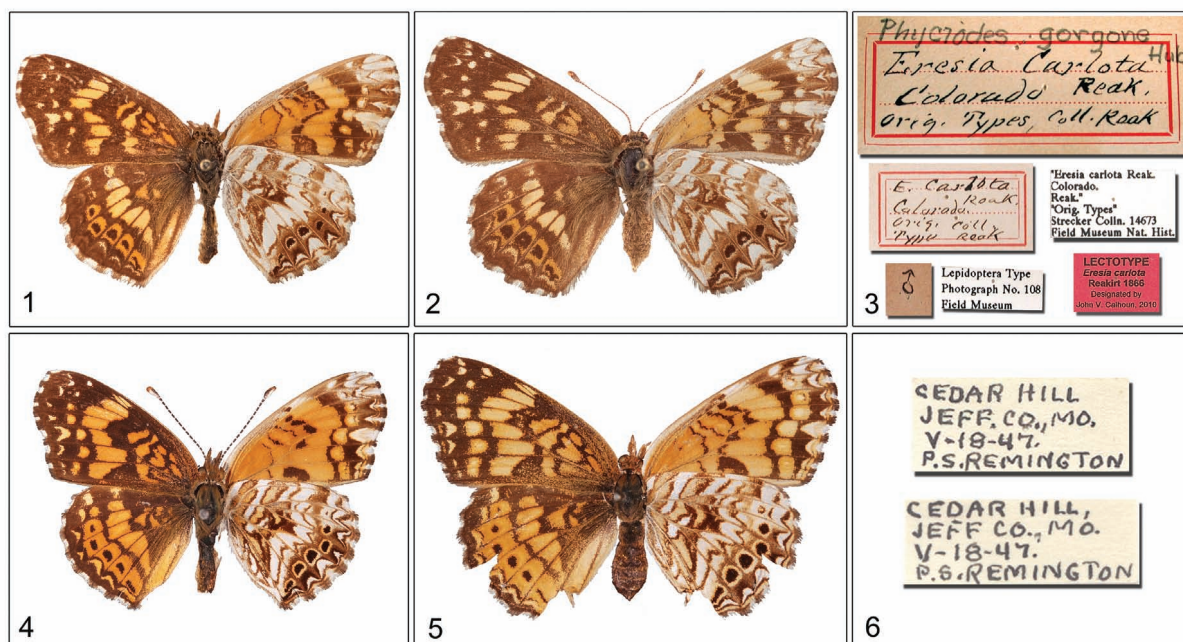
Despite its broad distribution in North America, only two subspecies of *C. gorgone* are currently recognized. The nominotypical subspecies is purported to occur within a restricted area of the upper coastal plain of Georgia and adjacent South Carolina (Gatrell 1998), while all other populations are tentatively regarded as *C. g. carlota*. If we must define the original concept of the nominal taxon *Dryas gorgone*, then perceived differences in western montane populations (see below)

emphasize the need to properly recognize the original concept of *Eresia carlota* Reakirt.

Reakirt’s collection was acquired in 1868 by the lepidopterist F. H. Herman Strecker (1836–1901) of Reading, Pennsylvania (Brown 1964). In a catalog of supposed types in his collection, Strecker (1900) listed a pair (male and female) of *carlota* that he received from Reakirt. Eight years later, Strecker’s collection of over 50,000 specimens was purchased for \$20,000 by the Field Museum of Natural History (FMNH, Chicago, Illinois) (Anonymous 1908; Skiff 1909). Strecker’s collection at FMNH still contains the two specimens of *carlota* that he listed in 1900 (Figs. 1, 2). Labels, most likely prepared by Strecker (or under his supervision), identify them as *Eresia carlota* and attribute them to Reakirt (Fig. 3).

The two specimens of *C. gorgone* in the Strecker collection were long considered to represent syntypes of *E. carlota* and labels identify them as “types” (Fig. 3). However, Higgins (1960) argued that because Reakirt did not provide a written description or figure of *Eresia carlota*, but merely cited the earlier description by Edwards (1861), *Eresia carlota* therefore represents a replacement name (*nomen novum*) for *Melitaea nycteis* Edwards (nec Doubleday). As such, these names would be objective homonyms and the nominal taxa they denote would share a name-bearing type. Consequently, only those specimens from Illinois and Missouri on which Edwards based his description of “*nycteis*” would represent syntypes of *E. carlota*. Brown (1974) agreed with this analysis and took it one step further. Following an unsuccessful search for Edwards’ specimens, Brown designated a neotype of *E. carlota* using a male *C. gorgone* that was collected in Cedar Hill, Missouri (Fig. 4). He also figured a female from the same population (Fig. 5). The type locality of *E. carlota* was thereby relocated over 1200 km (746 mi) east of its original location in Colorado. This treatment is still recognized (Pelham 2008).

Although *C. gorgone* is highly variable throughout its range, Reakirt’s (1866) concept of *carlota* is not analogous to that of Edwards (1861), nor the neotype of Brown (1974). Reakirt (1866) noted that J. Ridings obtained his specimens of *carlota* “among the mountains” of Colorado. While in Colorado, Ridings explored westward to Empire City (now Empire) in Clear Creek County, and northward to Burlington (now Longmont) in Boulder County (Brown 1966). Comments by Reakirt (1866) suggest that in June of 1864 Ridings most likely was traveling through Jefferson County, Colorado on his way to Empire City. Jefferson County is one of the 17 original Colorado counties that were established in 1861. Ridings probably followed one



FIGS. 1-6. Specimens related to *Eresia carlota*; dorsal (left) and ventral aspects. **1**, male *C. gorgone* (Strecker coll., FMNH), herein designated as the lectotype of *E. carlota*. **2**, female *C. gorgone* (Strecker coll., FMNH), herein considered a paralectotype of *E. carlota*. **3**, Strecker's large cabinet label (top) and five smaller labels from the lectotype specimen. **4**, invalid male neotype of *E. carlota*. **5**, female *C. gorgone* from the same population as the invalid neotype. **6**, labels from the invalid neotype (top) and associated female.

of the existing wagon trails that connected Denver to destinations in the mountains (Scott 1999).

Although Kons (2000) did not perceive any geographic variation in *C. gorgone*, many adults from higher elevations in Colorado possess expanded dark maculation (especially pronounced in females) and the white ground color of the ventral hindwing tends to be more silvered. The dorsal orange coloration also tends to be paler and more uneven in tone. This is the prevailing phenotype of the first brood, when adults fly in May and June. Fisher (2006) discussed such differences between populations in eastern Colorado. Observations of *C. gorgone* in Colorado by Andrew D. Warren (pers. comm.) suggest that these distinctions are likely the result of both geographic and generational variation. Higgins (1960), who considered typical *carlota* to be represented by populations of *C. gorgone* from Illinois and Missouri, was still unsure about the widespread application of the name; "I cannot say whether it will be correct to accept *carlota* for the high level form of Colorado, or whether, in fact, the name should be used for a different subspecies." Populations of *C. gorgone* along the western slope of the Colorado Rockies also reportedly exhibit subtle differences from those found east of the continental divide (Ferris 1981).

The two specimens of *C. gorgone* from Reakirt's collection are very dark and consistent with the first brood phenotype found in the foothills west of Denver, where this species remains locally common (Figs. 1, 2). Although the neotype designated by Brown (1974) is also from the first brood, it originated from a region where the species is not known to normally produce the phenotype found in the higher elevations to the west.

Brown's (1974) action dissociated the type of *carlota* from the higher elevation populations of *C. gorgone* in Colorado, which represent Reakirt's true concept of this nominal taxon. There is no evidence that Reakirt previously examined specimens of this species from any other locality. Fortunately, I discovered a nomenclatural error by Brown (1974) that permits the reinstatement of the original type specimens and type locality of *carlota*. Similar errors may affect other taxa that are currently recognized using alleged replacement names.

The current International Code of Zoological Nomenclature (ICZN 1999) invalidates the neotype of *Eresia carlota*. Although Brown (1974) was governed by the second edition of the Code (ICZN 1964), it too included provisions that invalidated his action. The neotype of *E. carlota* is untenable for the following reasons. Applicable definitions and articles from the

second edition of the Code (ICZN 1964) are given in brackets.

- 1) The Code defines a replacement name (*nomen novum*) as “a name established expressly to replace an already established name” [a new name adopted “to replace an earlier name, and valid only if the latter is preoccupied”]. Such names are typically proposed for junior objective homonyms. Reakirt (1866) did not expressly indicate that *carlota* was a replacement name and criticized Edwards (1861) for misidentifying the species. Reakirt proposed *carlota* as a “nov. sp.” (new species). Conversely, Edwards (1861) did not identify his “*Melitaea nycteis*” as a new species and credited this name to Doubleday. Edwards (1862) published similar written descriptions of taxa that were figured, but not described, by Doubleday & Westwood (1846–1852). Considering his general confusion about these butterflies, it is obvious that Edwards (1861) merely attempted to define *M. nycteis* as figured by Doubleday (in Doubleday & Westwood 1846–1852; Pl. 23 fig. 3), but did so using specimens of the wrong species.
- 2) Article 49 of the Code states, “A previously established specific or subspecific name wrongly applied to denote a species-group taxon because of misidentification cannot be used as an available name for that taxon” [“A specific name used in an erroneous species identification cannot be retained for the species to which the name was wrongly applied”]. As argued in no. 1 (above), the name *Melitaea nycteis* as used by Edwards (1861) constitutes a misidentification, thus it cannot be accepted as an established name for the taxon subsequently described as *Eresia carlota*, and therefore is unavailable for replacement.
- 3) Reakirt (1866) did not provide his own description, yet his reference to Edwards (1861) represents an acceptable indication as permitted for new names proposed before 1931 per Art. 12.2.1 [Art. 12] of the Code.
- 4) Two specimens that Reakirt (1866) evidently consulted for his description of *E. carlota* are extant and represent syntypes. Because Reakirt partially based *carlota* on Edward’s misidentification, the specimens from Illinois and Missouri that were examined by Edwards constitute part of the type series per Art. 72.4.2 of the Code. The latter specimens are apparently lost or unrecognizable (Brown 1974), thus the only available syntypes known to exist are the Colorado specimens in the Strecker collection (ex Reakirt, ex Ridings) now deposited in FMNH.

In accordance with Art. 74.1 of the Code (ICZN 1999), the male syntype in the Strecker collection at FMNH (Fig. 1) is hereby designated as the **lectotype** of *Eresia carlota* Reakirt, 1866. This action invalidates the neotype of Brown (1974) per Art. 75.8 of the Code. The lectotype bears four labels (Fig. 3): a red-bordered label, probably prepared by Strecker [*E. carlota* / Reak. / Colorado. / Orig. Type / Coll. Reak.]; a small handwritten label with a male symbol; and two printed FMNH labels [*Eresia carlota* Reak. / Colorado. / Reak.” / “Orig. Types” / Strecker Colln. 14673 / Field Museum Nat. Hist.] [Lepidoptera Type / Photograph No. 108 / Field Museum]. There also is a large, red-bordered label associated with these specimens, probably used by Strecker as a cabinet label, which was placed at the head or foot of these specimens [*Eresia carlota* / Reak. / Colorado / orig. Types, Coll. Reak.] (across the top is the penciled name, “*Phyciodes gorgone* Hub,” probably written during the 20th century). A red lectotype label has been affixed to this specimen [LECTOTYPE / *Eresia carlota* / Reakirt 1866 / Designated by / John V. Calhoun 2010] (Fig. 3). The accompanying female in the Strecker collection (no. 14674) is a paralectotype and is labeled accordingly. The type locality is suggested to be the Front Range foothills of Jefferson County, Colorado, west of Denver.

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