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## Type locality of *Polyommatus lucia* (W. Kirby, 1837) (Lycaenidae: Polyomatinae) with an inspection of the species' phenotypic expression.

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**ABSTRACT.** The type locality of *Polyommatus lucia* was not clearly defined by W. Kirby (1837) and has been improperly interpreted as Cumberland House, Saskatchewan, Canada by several authors. The present paper examines the circumstances surrounding the collection of the specimen described and illustrated by William Kirby, and determines the type locality is Fort Carlton Provincial Park, Saskatchewan. The habitat, flora, and phenotypic expression of *Celastrina lucia* (W. Kirby) near the type locality are presented.

### INTRODUCTION

Since its portrayal in Fauna Boreali-Americana (W. Kirby, 1837), *lucia* has been inconsistently treated as: **SPECIES**. Opler & Warren, 2002; Scott, 2006; Pelham, 2008; Pohl *et al.*, 2010; Pavulaan, 2014; Ômura *et al.*, 2015. **SUBSPECIES of *Celastrina argiolus***. Brown, 1970; dos Passos, 1964; Hooper, 1973; Howe, 1975; Eliot & Kawazoé, 1983; Scott, 1986; Klassen *et al.*, 1989; Ferris, 1989. **SUBSPECIES of *Celastrina ladon***. Miller & Brown, 1981; Hodges, 1983; Bird *et al.*, 1995; Layberry *et al.*, 1998; Guppy & Shepard, 2001). Our current understanding of the continental range of *Celastrina lucia* is the forested areas from Alaska to Newfoundland & Labrador in extreme eastern Canada, south to Montana, North Dakota, Minnesota, Wisconsin, Michigan, parts of northeastern United States and coastal New Jersey, and eventually through the Appalachian Mountains to northern Virginia. It is absent from the vast tundra areas of northern Canada. The Washington state and Colorado populations appear to be disjunct. The name *lucia* was based on a single specimen in the original publication. Therefore, the published “one specimen” (Kirby, 1837) is the holotype in accordance with the ICZN Code Article 73. We do not know the current location of the holotype or even if it is extant. We use the historical name Carlton House in the following historical discussion, but note that both the historical place name Carlton House and the alternate historical place name Fort Carlton have been replaced by the modern geographical place name Fort Carlton Provincial Park.

### THE WRITTEN RECORD

The specimen utilized by William Kirby to erect *Polyommatus lucia* was collected on the *Second Overland Expedition to the Polar Sea* under the command of Captain Sir John Franklin of England. Franklin led two expeditions into the wilderness of northwest Canada to find a passage to the Polar Sea (Franklin, 1823; Franklin, 1828). These expeditions benefited from routes blazed by Hudson Bay Company fur traders. The First Overland Expedition (1819-1822) largely concentrated on Indians, plants, and geology. The *Second Expedition* (1825-1827) was better prepared for collecting natural history specimens and brought back

thousands of plants and large numbers of mammals, birds, fish, and insects. The chief naturalist on both expeditions was surgeon Dr. John Richardson. The assistant naturalist on the *Second Expedition* was Thomas Drummond, who was recommended by botanist William Jackson Hooker. Richardson wrote that “Drummond is the best disposed and most indefatigable collector of Natural History I have ever seen. [He] is my main stay in the botanical and entomological departments, my attention being much directed to other objects (Levere, 1993)”. Kirby (1837) and Hooker (1840) also praised Drummond as the primary collector of entomofauna and flora in their respective books.

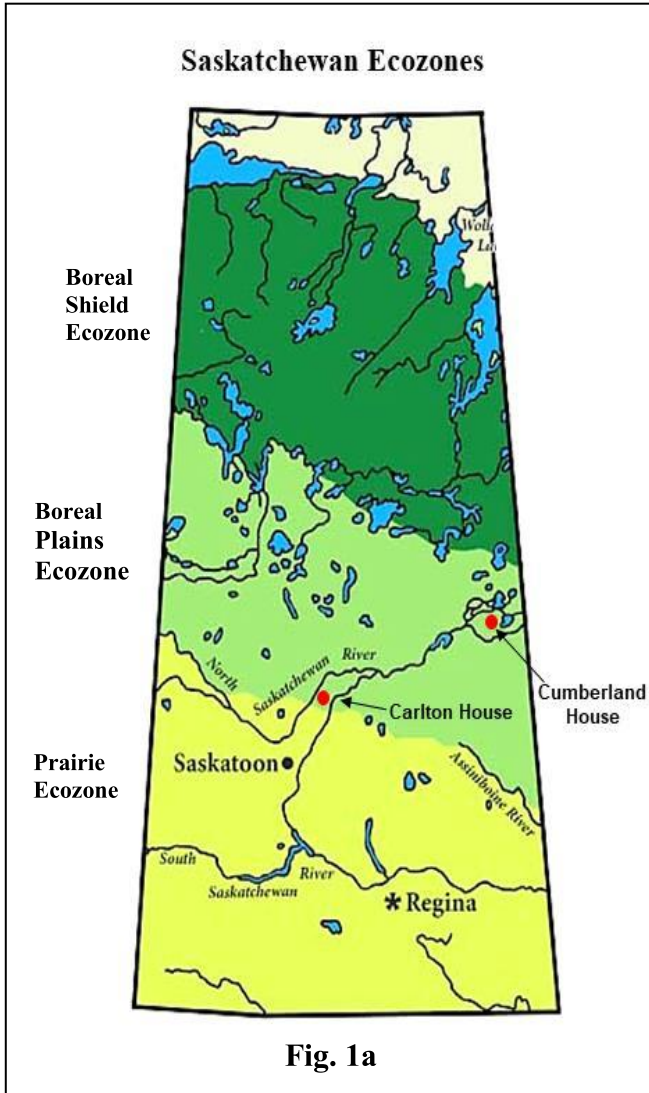


Fig. 1a

The *Second Expedition* reached Cumberland House (Fig. 1a-b) on the Saskatchewan River in late June of 1825. The assumption that the *lucia* specimen was collected at Cumberland House is likely mistaken. Narratives of Franklin (1828), Richardson (1829), and Drummond (1830) reveal a different picture. Cumberland House (Lat. 53.9583° N) was an outpost established by the Hudson Bay Company on the eastward-flowing Saskatchewan River near present-day Saskatchewan-Manitoba border. It served as a trading station for fur trappers and a resting place for explorers. After a brief one-night stay, the northern detachment commanded by Franklin and Richardson left on June 26<sup>th</sup> for winter quarters at Great Slave Lake. Drummond stayed at Cumberland House for 50 days during the summer of 1825 from June 28<sup>th</sup> to August 17<sup>th</sup>. He then traveled westward on the Saskatchewan River and North Saskatchewan River in a separate detachment to the Rocky Mountains. He returned to Carlton House (Lat. 52.8700° N) in today’s central Saskatchewan, in the spring of 1827, staying 97 days from April 5<sup>th</sup> to July 11<sup>th</sup>. This time period is critical to understanding when the specimen of *lucia* was collected.

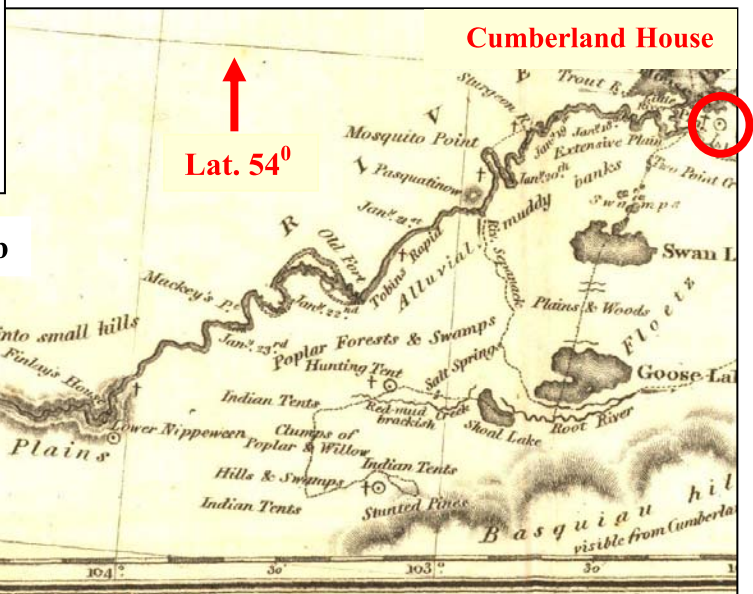
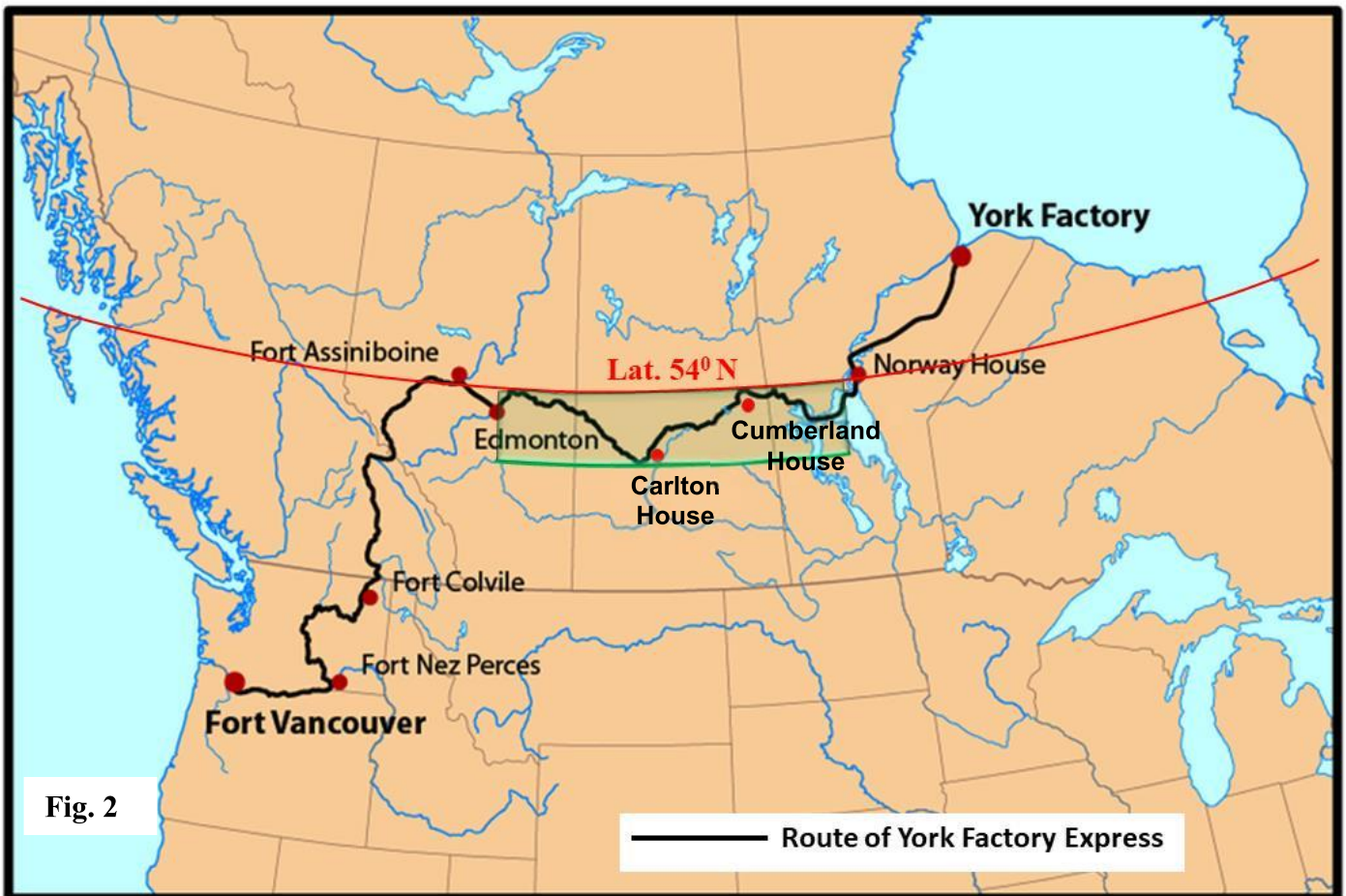


Fig. 1b

Kirby described *Polyommatus lucia* from “Lat. 54°” from a single specimen. It has been assumed by many that the *lucia* specimen was collected at Cumberland House. Both dos Passos (1943) and Klots (1951) adopted Kirby’s notation (“Cumberland-house, Lat. 54°”) as the type locality of *Callophrys augustus* and *Celastrina lucia*, though these species were in fact listed by Kirby as taken at “Lat. 54°”. Reference to this latitude by fur traders and explorers was essentially a term coupled to a broad latitudinal E-W travel route following the Saskatchewan River and North Saskatchewan River, rather than a precise latitudinal bearing. Lat. 54° N is a region that equates to the mid-section of the York Factory Express (Fig. 2). This band, usually called “the Express”, but also called the “Columbia Express”, or the “Communication”, was a fur brigade operated by the Hudson's Bay Company in the early 19th century connecting York Factory and Fort Vancouver. It was named “Express” because it was used not only to transport furs and supplies, but also to quickly move departmental reports and letters. It was the main overland connection between the Columbia Department and the Hudson's Bay Company's headquarters at York Factory. This route directly connected Fort Edmonton to Norway House. Drummond in his “Sketch” reveals he was at Cumberland



House in the summer of 1825 and briefly for a few days in the summer of 1827 near the end of the trip. These dates definitely do not fall within the univoltine flight period of *lucia* in this region. Drummond described only a couple of Cumberland House butterflies in his “Sketch”, specifically a *Polygonia* and an *Erebia* which appear in Kirby (1837). So where did Drummond collect *lucia*? He was charged by Franklin to explore the upper branches of the North Saskatchewan River to the Rocky Mountains, and, after scaling the mountains, head southward to the Columbia River. He left Cumberland House in late August of 1825, stopped briefly at Carlton House, and then headed westward to Fort Edmonton via the North Branch of the Saskatchewan River (now known as North Saskatchewan River). Drummond typically walked the shores of

the river collecting specimens, meeting up with his advanced team at encampments later in a day. Upon reaching the mountains, he organized a team of guides and horses, and headed south passing over the Rockies at Jasper. He did not return to the east side of the Rockies until the spring of 1827, arriving at Carlton House on April 5<sup>th</sup>. After a grand reunion with Richardson, the two immediately set about gathering specimens in the neighborhood of Carlton House. This concentrated activity continued until Richardson's departure in late May. Drummond finally departed Carlton House for Cumberland House on July 11<sup>th</sup>. His extended residence at Carlton House lasted 97 days. In his "Sketch" he expressed this about butterflies, "Several *Lepidopterae* occurred in these districts, which I did not meet with in any other situations; but as their names are unknown to me, I cannot particularize them." By aligning known flight periods within his 97-day residence at Carlton House, this is reasonably when he collected *lucia*, *augustus*, *dorcas* and others. There are modern records of these species in the Canadian National Collection from the district where Carlton House resides. Many plants and birds collected during the *Second Expedition* have a Carlton House type locality as well.

In Kirby (1837, p. 298-300), there are four butterfly species described in consecutive order that provide insight to the collection locality.

*Thecla Augustus* ("Taken in Lat. 54")  
*Lycaena Dorcas* ("Taken in Lat. 54")  
*Polyommatus Lucia* ("Taken with the preceding")  
*Hesperia Peckius* ("Taken with the preceding")

Prior to describing these four, Kirby described *Hipparchia Discoidalis*, p. 298, as "Several specimens taken at Cumberland-house, Lat. 54." For nearly two centuries many writers have assumed that "Lat. 54" meant Cumberland House, while overlooking the fact that butterfly species named by Kirby don't all fly together at the same time or in the same habitat. Drummond's presence at Cumberland House during the summer of 1825 would explain the supplement of a specific location ("Cumberland-house") to "Lat. 54". Drummond often added a specific location in Lat. 54 with his beetles. It indicates that "Lat. 54" meant one thing and "Cumberland House" meant something else more specific. There are interesting notes by Richardson from the *First Expedition*. He wrote, "The Cumberland House District, extending about one hundred and fifty miles from east to west along the banks of the Saskatchewan, and about as far from north to south, comprehends, on rough calculations, upwards of twenty thousand square miles." To this he added, "Geese appear at Cumberland House, in latitude 54, usually about the 12th of April." This infers the Cumberland House District was something much larger than Cumberland House. The Cumberland District was part of the E-W "express" known to many as Latitude 54. From Fauna Boreali-Americana, Vol. 2, Birds (Swainson & Richardson, 1831), we learn there were dozens of records of birds killed in Lat. 54. Most were taken during spring migration in spring of 1827 when Richardson and Drummond were working together at Carlton House. It is important to note that no butterfly described in Kirby (1837) was taken in "The Journey from New York to Cumberland House" in the early part of the *Second Expedition*.

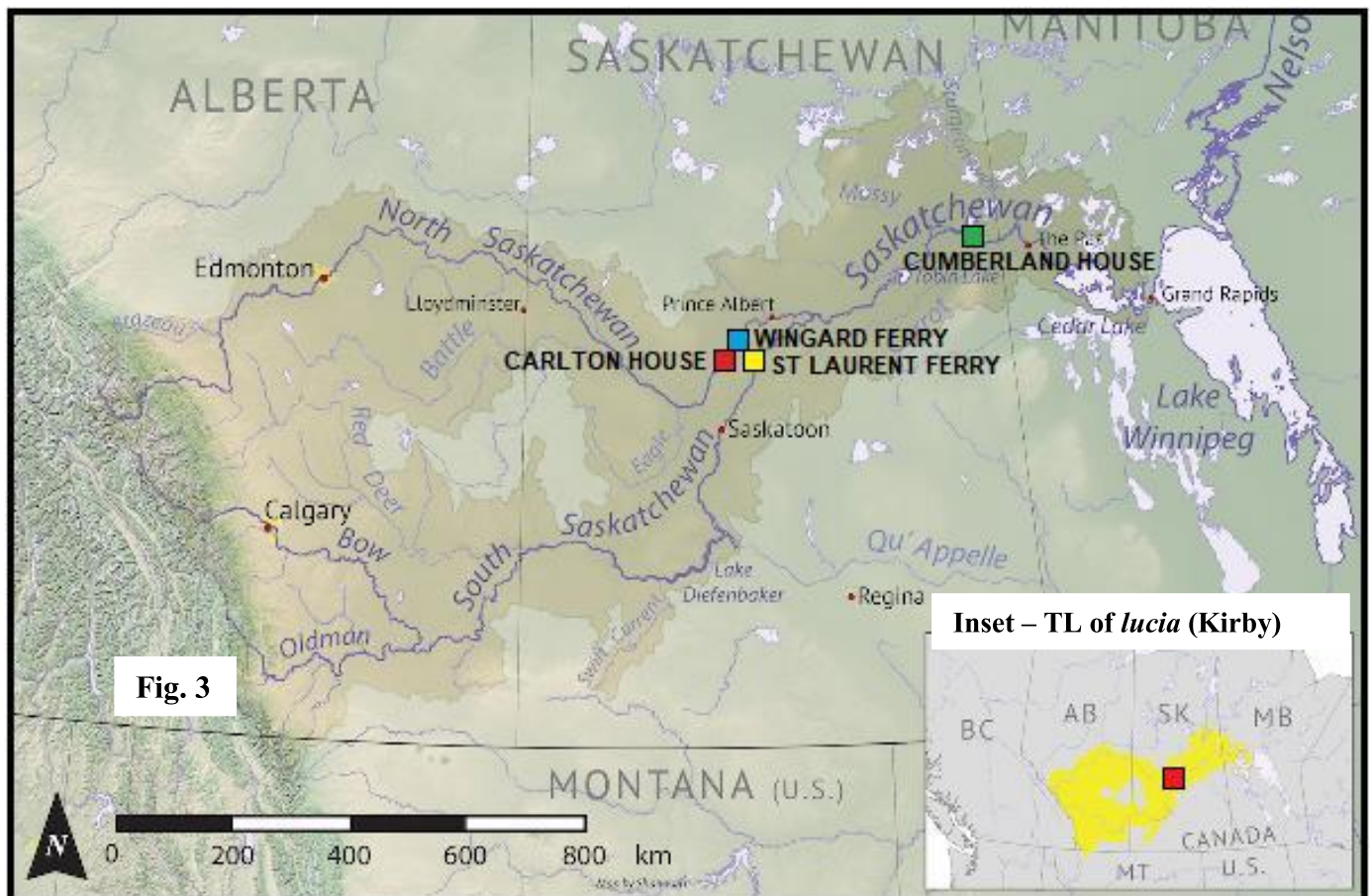
### HABITAT, HOSTS AND FLIGHT PERIOD

*Celastrina lucia* is wide-ranging and well-distributed throughout the Boreal Plains Ecozone. Kirby (1837) in a brief account of the habitat along the Saskatchewan River between Carlton House and Cumberland House described it as "well-wooded country" while the region around Cumberland House was primarily boreal wetland. Franklin (1823) described this same stretch of the river as bounded with poplar forests. One of us (NK) found *lucia* to be extremely common in the aspen-poplar forests in central Saskatchewan. One specimen was taken in Jack Pine (*Pinus banksiana*) habitat. Knowing the *lucia* type locality was likely

Carlton House, one of us (DW) made contact with two resident Saskatchewan lepidopterists (R. Hooper, J. Kozial). Their long-term observations have been very helpful. Carlton House is in the Boreal Plains Ecozone (Fig. 1a), which is the contact zone between the Canadian Shield forests to the north and the vast prairie to the south. The habitat has been purposely described as aspen parkland. (See APPENDIX for photos.) In low areas of this zone, Willows (*Salix*), Alder (*Alnus*) and Boxelder (*Acer negundo*) dominate. Higher areas have a more diverse mixture, including Trembling Aspen (*Populus tremuloides*), Balsam Poplar (*Populus balsamifera*), Birch (*Betula*) and White Spruce (*Picea glauca*). Higher sandy areas are dominated by Jack Pine (*Pinus banksiana*) with an understory of Canada Blueberry (*Vaccinium myrtilloides*) and Dwarf Bilberry (*Vaccinium caespitosum*). Various species of *Vaccinium* and *Prunus* bloom simultaneously in the spring. Chokecherry (*Prunus virginiana*) is wholly abundant throughout the Boreal Plains Ecozone. *Lucia* is closely associated with *P. virginiana*, though no ovipositions have actually been witnessed. Since various *Prunus* species (*P. serotina*, *P. virginiana*) broadly serve as larval hosts of *lucia* throughout eastern Canada and northeastern United States, *Prunus virginiana* is likely the primary host in the Boreal Plain Ecozone. Crispin Guppy (CG, pers. comm.) has observed *lucia* often associated with Red Osier Dogwood (*Cornus sericea* (= *stolonifera*) with many ovipositions observed. CG also informs us that Bearberry (*Arctostaphylos*) is the most common host in central British Columbia with several ovipositions observed. The flight period of *lucia* in the type locality region of central Saskatchewan occurs in May with extremes being April 20<sup>th</sup> and June 29<sup>th</sup>.

### PHENOTYPE OF CELASTRINA LUCIA AT TYPE LOCALITY

One of us (NK) visited the type locality of Fort Carlton Provincial Park and surrounding areas on 2015 May 20 (Fig. 3). One female was observed in the park; thus, confirming the species is still extant at the type locality.



A series of 11 specimens (10 ♂, 1 ♀) was collected at Wingard Ferry, along the North Saskatchewan River, 10.5 km (6.5 mi.) northeast of Fort Carlton Provincial Park. An additional (female) specimen was taken 4 km (2.5 mi.) east of Wingard. Another series of 20 (16 ♂, 4 ♀) was collected ca. 1 km N of the St. Laurent Ferry along the South Saskatchewan River, 29.0 km (18.0 mi.) east of Fort Carlton Provincial Park. An additional male was collected at the ferry. The riverside habitat at all sites corroborates Kirby's description of "well-wooded country" as was seen by travelers on the river. Phenotypic variation of *lucia* near the type locality is primarily expressed on the ventral hindwings, ranging widely from heavily-patterned forms with dark margins to lightly-spotted forms without dark patches or margins. Dorsal variation is fairly consistent in males (Fig. 4), with some slight variation in the females (Fig. 5).

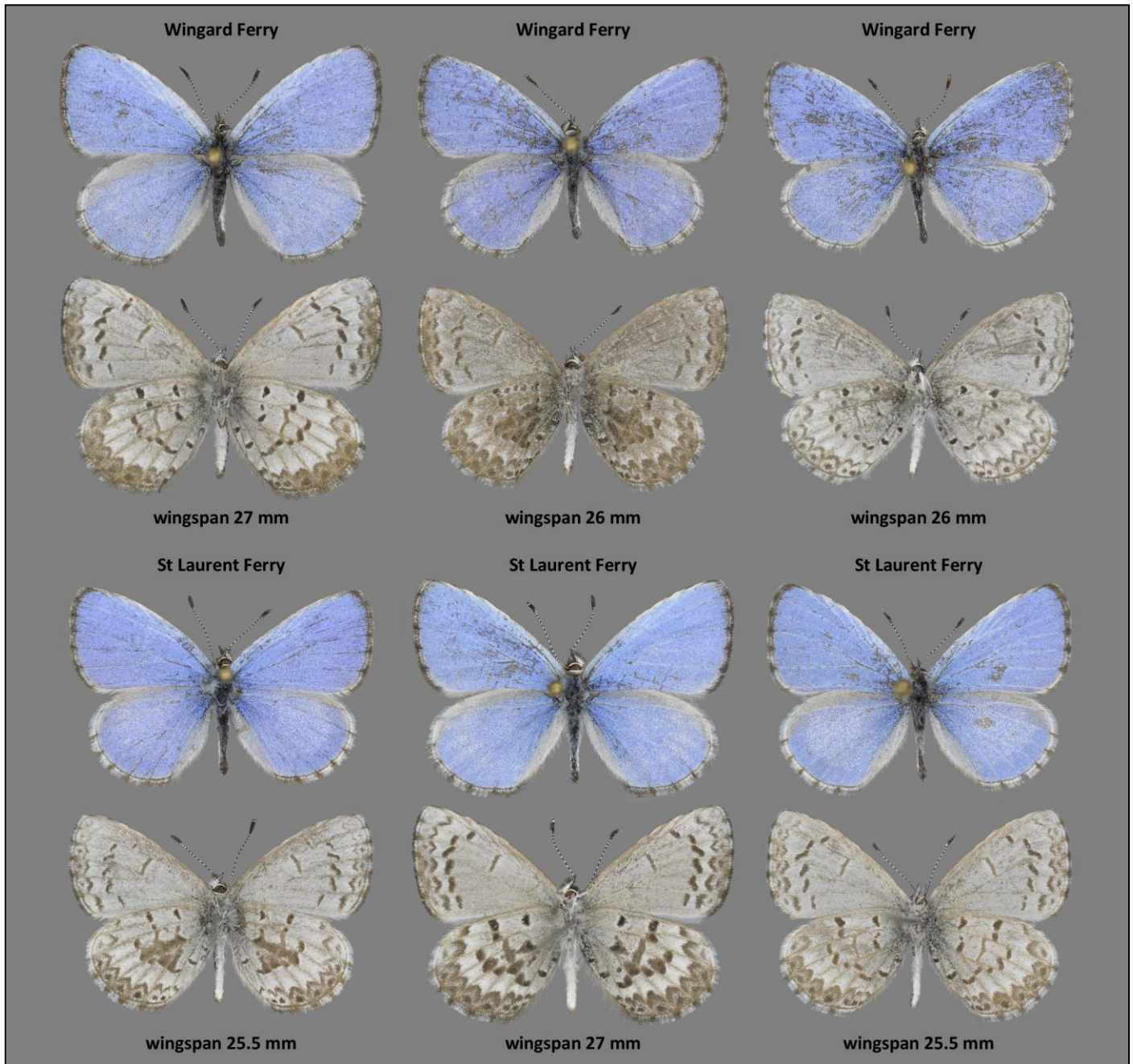


Fig. 4. Variation in *Celastrina lucia* males from near the type locality. N.G. Kondla, 2015-5-20.



Fig. 5. Variation in *Celastrina lucia* females from near the type locality. N.G. Kondla, 2015-5-20.

To demonstrate visible resemblance, a male and female pair of *Celastrina lucia* from near the type locality is shown with Kirby's *Polyommatus lucia* (1837) illustration on the next page (Fig. 6). Trained colorists from that era commonly hand-painted engraved plates made of cream-colored wove paper. Kirby's images in Fig. 6 were taken from a scan of his Plate III in *Fauna Boreali-Americana*, Part 4, *Insecta* (1837). The individual image orientation and colors in Plate III were maintained in making the combination image at the bottom of Fig. 6.





## CONCLUSIONS

After taking into account data accompanying the original material, the collector's notes, and itineraries, we conclude the currently accepted type locality of *Polyommatus lucia* (W. Kirby, 1837) is erroneous and is corrected to Fort Carlton Provincial Park, Saskatchewan, Canada. This location was historically known as Carlton House or Fort Carlton. A holotype was established in the original publication in accordance with ICZN Code Article 73. We reason there is no qualifying condition, exceptional need, or urgent necessity to designate a neotype.

## ACKNOWLEDGMENTS

We are indebted to Ron Hooper and John Kozial for providing important information on the habitat, potential hosts, and flight period of *lucia* in central Saskatchewan. We sincerely thank Crispin Guppy and John Calhoun for reviewing the paper and offering helpful assistance with text and figures. We thank Sheri Amsel of [www.exploringnature.org](http://www.exploringnature.org) for providing the Saskatchewan Ecozones map (Fig. 1a) and Suzanne Smiles, Thomas Library at Wittenberg University, Springfield, Ohio, for providing the image of Kirby's Plate III (Fig. 6 bottom). The map titled "Map of the Route of the York Factory Express, 1820s to 1840s" (Fig. 2) was created by Pfly and is available at [https://en.wikipedia.org/wiki/York\\_Factory\\_Express](https://en.wikipedia.org/wiki/York_Factory_Express). The map "Route of the Expedition from York Factory to Cumberland House and the Summer & Winter Tracks from thence to Isle A La Crosse in 1819 & 1820" comes from Franklin (1823).

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APPENDIX – HABITAT PHOTOS NEAR LUCIA TYPE LOCALITY



Fig. 7 & 8. – Wingard Ferry area showing aspen-poplar forest near North Saskatchewan River.  
N.G. Kondla, 2015-5-20.



Fig. 9 & 10. – St. Laurent Ferry area showing aspen-poplar forest near South Saskatchewan River.  
N.G. Kondla, 2015-5-20.

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