ALBERTA LEPIDOPTERISTS' GUILD NEWSLETTER

Spring 2022

Welcome to the ALG Newsletter, a compendium of news, reports, and items of interest related to lepidopterans and lepidopterists in Alberta. The newsletter is edited by John Acorn, and it is published twice a year, in spring and fall.

Northern Marble (*Euchloe ausonides*), photo by Robert Bercha

Contents:

A Closer Second Look at *Colias* Sulphurs of the lowland complex in Saskatchewan: Diagnostic dilemmas in Saskatchewan Sulphurs

Daniel Glaeske

Sulphurs in the genus *Colias* are some of the most familiar butterflies to people in the northern hemisphere. They are widespread, often common to abundant in their habitats, and several species adapt well to the disturbed habitats such as farms, roadsides, and urban environments. They also tend to congregate at mud-puddles., raising their visibility. Indeed, their predominant yellow colour may have prompted the name "butter-fly" itself in English and closely related languages. Despite being familiar and readily identifiable as a group, *Colias* sulphurs to a species are often ridiculously difficult to identify, even with modern DNA technology! A complicating factor is that species often have multiple forms, some of which resemble other species.

Across North America, for years now, it has been assumed that there have been two closely related species of *Colias* termed the "lowland complex" (most other species of *Colias* are alpine or boreal) that usually have a prominent submarginal dark spots on the wings beneath. These species are usually abundant, widespread, and especially abundant in human disturbed habitats. One is a yellow butterfly (*Colias philodice* Godart, 1819, the Clouded Sulphur) ranging across the northern half continent except for the extreme southeast and southwest; the other an orange butterfly (*Colias eurytheme* Boisduval, 1852, the Alfalfa Butterfly or Orange Sulphur) very common in the southwest extending into the southern Midwest and southeastern US. Formerly occupying largely separate ranges (allopatric), the advent of agriculture and roads allowed both species to expand their ranges tremendously, creating superabundant swarms in agricultural areas. In the last century, as this happened, numerous intermediate forms were discovered in these swarms that were presumed to be hybrids. Indeed, they are closely related enough that some (Strecker, 1878; Hovanitz, 1943; Hooper, 1973) have subsumed them under one species.

I was first stimulated to look at this group of butterflies in 2020, when for reasons of work I only had very limited opportunities to collect in natural areas and instead roamed the ditches and fields in the immediate vicinity of Assiniboia, Saskatchewan. In these areas, yellow butterflies of the genus *Colias* are usually abundant, and fly with less abundant, but still common, very similar butterflies that are orange. Previously, I had paid little attention to these common butterflies, assuming they simply represented the common Clouded Sulphur, and its more southern close relative, the Orange Sulphur or Alfalfa Butterfly, and their hybrids. A

few observations, though, piqued my interest. Under more scrutiny, trying to identify these butterflies became far more interesting than I initially believed.

The observations that so sparked my interest were as follows. First, the putative small spring form of the Clouded Sulphur was nonetheless present throughout the summer and fall as well. Furthermore, mating pairs appeared to be largely assorted to either the spring forms or the typical forms; very few mixed pairs were seen. Second, specimens with a largely central orange patch were often seen in areas where the Alfalfa Butterfly was rare or absent (early spring, boreal forest, virgin prairie well away from ditches and alfalfa fields). Third, even in alfalfa fields and ditches where alfalfa was abundant, very few mixed mating pairs of Clouded Sulphurs and Alfalfa Butterflies were seen. Finally, in central Saskatchewan, there appeared to be only one brood of Clouded Sulphurs; similar to the spring form, and with predominantly white females.

Now both the Alfalfa Butterfly and the Clouded Sulphur have common variants that complicate diagnosis. Both have a spring form that is smaller, more greenish, and has narrower marginal bands (the Alfalfa Butterfly small spring form, "ariadne," also has reduced orange). Both also have white females that are often very difficult to distinguish. Furthermore, the Alfalfa Butterfly, normally with at least some orange, has a completely yellow form! Finally, where both species are abundant, hybrids may be common, up to 10% of the population. These forms may exhibit a variety of intermediate characteristics.

But wait! I discovered that the situation, to paraphrase Carl Sagan, was not only stranger than I supposed, but stranger than I could suppose! It seems that there is a butterfly described from central British Columbia (Lake La Hache), *Colias eriphyle* W. H. Edwards, 1876 (now generally treated as a subspecies, *C. philodice eriphyle*). This has been thought to occur in the intermontane and Rocky Mountain regions. It is distinguished from the eastern Clouded Sulphur by wider darker margins in the male, the presence of an orange patch on the ventral forewing of the females, and a general tendency for reduction of the submarginal spots.

Further complicating identification is the discovery that what were formerly considered hybrids in western North America, are probably a colour morph of *C. p. eriphyle* (hybrids apparently were most similar to one of the parents and identified as either *C. p. eriphyle* or *C. eurytheme*; phenotypic "hybrids" proved genetically to be *C. p. eriphyle* (Dwyer et al., 2014). What is not known, however, is where *C. p. eriphyle* ends and the eastern *C. p. philodice* begins. Edwards described an insect as *C. hagenii* which he later synonymized with *C. eriphyle*. *C. hagenii* was described from specimens from Colorado, Montana, Wyoming, and "Dacotah" (Bismarck).

On the other hand, Klassen et al. (1989), describe Clouded Sulphurs from Manitoba as belonging to "subspecies *philodice*." Guppy & Shepherd (2001) also speculate that eastern *C. p. philodice* may be making inroads into British Columbia

in agricultural areas. *C. p. eriphyle* usually has been described as a subspecies of *C. philodice*, but sometimes as a subspecies of *C. eurytheme*. Gerould (1943) observed reduced fertility between the Western Clouded Sulphur and the eastern Clouded Sulphur as well as the Alfalfa Butterfly. Watt & Wheat (2008) found, based on mitochondrial DNA, that *C. p. eriphyle* was separate from both *C. p. philodice* and *C. eurytheme*. Pelham et al., (2022) therefore raised *C. eriphyle* (and *C. vitabunda* Hovanitz, 1943) to species status; the Western Clouded Sulphur and the Lively Clouded Sulphur.

Watt & Wheat's research also demonstrated that what was considered a northwestern form or subspecies of the Clouded Sulphur, *C. p. vitabunda*, is genetically distinct as well. This subspecies was characterized by being single-brooded and having narrow black margins, a tendency for reduction of the submarginal spots, and a preponderance of white females. Specimens of *C. p. vitabunda*, especially males, are virtually impossible to distinguish from spring specimens of Clouded Sulphurs from southern Saskatchewan, and from summer specimens in the boreal forest (where there also appears to be an increased proportion of white females). As in the situation between *C. p. eriphyle* and *C. p. philodice*, it is not known where the range of *C. p. vitabunda* begins and *C. p. eriphyle* begins. *C. p. vitabunda* is certainly found into northeastern British Columbia and appears to overlap there with *C. p. eriphyle*.

So where do the Saskatchewan sulphurs of the lowland complex fit in? The spring specimens in southern Saskatchewan are small, more greenish, and have narrower dark marginal bands, and are almost indistinguishable from *C. p. vitabunda*. The females have the diagnostic ventral forewing orange patch of *C. p. eriphyle*, and occasional orange specimens are also known that are attributed as forms of *C. p. eriphyle* (orange forms are apparently unknown in *C. p. vitabunda*). Summer specimens are larger and may be distinguished from *C. p. philodice* by wider black marginal borders in the males (narrower in the females), a tendency for reduction of the submarginal spots, and the ventral forewing orange patch. All specimens from southern Saskatchewan examined so far appear to be referable to *C. p. eriphyle*. Unfortunately, specimens resembling the spring form may be found throughout the summer as well. Although *C. p. vitabunda* and *C. p. eriphyle* have been raised to species status by Pelham (2022), other explanations are possible.

The Clouded Sulphur may have been split into three populations during the peak of the last glaciation: a northern population in Beringia, an eastern population pushed down to the southeastern USA and eastern Mexico, and a western population that was pushed southward into the southern Great Basin and mountain valleys. The Alfalfa Butterfly may have been pushed further south into western Mexico though it likely overlapped significantly with the southwestern population of Clouded Sulphurs.

After recession of the glaciers, the formerly separate populations of the Clouded Sulphur expanded to contact each other again but there has not been enough time for all phenotypes to percolate equally throughout the entire population. So instead of a balanced polymorphism within the entire population, we have an imbalanced, geographically (or possibly ecologically) skewed, polymorphic population.

The northwestern population in Beringia was isolated from other populations of Clouded Sulphurs by the Cordilleran and Laurentide ice sheets. The phenotype expressing univoltinism, increased proportion of white females, and later emergence had obvious advantage in the far north and became fixed. The narrower dark margins and tendency for reduction of the submarginal spots are probably just coincidentally linked. This population eventually became *C. p. vitabunda*.

Conversely, the southwestern population, having much more prolonged contact with the Alfalfa Butterfly, introgressed genes for orange colouration, resulting in the orange patch on the ventral forewing of females and the regular appearance of orange morphs in the population even without hybridization with the Alfalfa Butterfly. The ancestral reduction of submarginal spots, shared with *C. p. vitabunda*, was retained. This became today's *C. p. eriphyle*.

The eastern population was characteristically bright yellow without any orange shading, and probably inhabited the gulf coast areas, perhaps slightly further north. It was split into two by the establishment of the moist southern Austral hardwood forests inimical to the Clouded Sulphur following the retreat of the glaciers. One portion retreated to the southern Mexican and Guatemalan highlands to become subspecies *C. p. guatemalana* Röber, and the other retreated northward in the USA away from the southeastern coastal areas. This eastern population became the common Clouded Sulphur of the east. It retained the narrower borders like the northwestern population but had much more prominent submarginal spots. As the populations expanded, the eastern population also interacted with the western population on the Great Plains. Some of the genes from this western population may have introgressed into midwestern populations of *C. philodice*, explaining Gerould's observation that Kansas and Nebraska *C. philodice* showed many characteristics of *C. p. eriphyle*, but were completely interfertile with more eastern *C. philodice* whereas montane *C. p. eriphyle* showed reduced fertility with eastern *C. p. philodice*. It has perhaps no coincidence that the rare orange morph of nominate *C. p. philodice*, "luteitincta," was described from the western edge of *C. p. philodice*'s range (Illinois and Michigan).

More recently, the expansion of ranges has also brought *C. philodice* into widespread contact with this formerly southwestern Alfalfa Butterfly. Whereas the western population (*C. p. eriphyle*) has had much more prolonged contact with *C. eurytheme*, the eastern population has had only very recent extensive contact. This

has produced a situation where most of the orange forms in eastern North America are probably true hybrids, and orange forms of the eastern population are very rare.

Following deglaciation, the expansion of ranges of members of the lowland complex of sulphurs has brought most of the formerly segregated populations into contact again. The Beringian population extended southeastward along the ice-free corridor as the cordilleran and Laurentide ice sheets separated, eventually contacting the north- and eastward expanding *C. p. eriphyle* populations. Similarly, the western and eastern populations, formerly separated from the midwestern US by a north-south band of extremely arid cold desert (Owen Davis, unpublished, and others), expanded to meet in a broad front in the Great Plains. The southeastern population probably was found in the coastal lowlands around the gulf of Mexico. As the ice retreated, the southern temperate hardwood forests invaded the coastal lowlands and split this population into a southern group, which retreated into the southern Mexican and Guatemalan highlands, producing the subspecies *C. p. guatemalana*, and a northeastern group that became *C. p. philodice*.

The Clouded Sulphur therefore may represent a continent-wide species with phenotypic polymorphism where the differing phenotypes show geographic variation in relative abundance. There is a west to east gradient in the prominence of the submarginal row of spots on the ventral surface, ranging from mostly or commonly reduced (*C. p. eriphyle* and *C. p. vitabunda*) to usually very prominent (*C. p. philodice* and *C. p. guatemalana*). There is also a southwest to northeast gradient of orange forms from common in the southwest and west (*C. p. eriphyle*) to increasingly uncommon northeast and eastward (Great Plains *C. p. philodice*), and apparently absent in the far north (*C. p. vitabunda*) and rare in the east. Finally, wide black marginal borders are a feature of the western (*C. p. eriphyle*) and extreme southern (*C. p. guatemalana*) populations and narrower margins in the far north and eastern populations (*C. p. philodice* and *C. p. vitabunda*).

Early spring orange specimens in Saskatchewan are probably morphs of the Clouded Sulphur. The brightly orange and large butterflies of the summer, especially in alfalfa fields and ditches are almost certainly *C. eurytheme*. Specimens with intermediate characteristics may be hybrids, or morphs of *C. p. eriphyle*. White females of *C. eurytheme* are virtually impossible to distinguish from *C. p. eriphyle* or *C. p. philodice*, but are usually larger. *Colias p. philodice* usually has narrower bands, and milder yellow dorsal hindwing spots, but this is not a reliable characteristic in Saskatchewan as *C. p. eriphyle* has wider bands and stronger orange discal spots normally.

UV reflectance holds some hope to distinguish specimens. Males of *C. p. philodice* and *C. p. eriphyle* (and probably *C. p. vitabunda* as well) do not reflect UV, whereas *C. eurytheme* reflect UV broadly (Stella et al, 2018); Unfortunately, F1 hybrids between *C. eurytheme* and *C. philodice* do not reflect UV; yellow *C.*

eurytheme males reflect UV similarly to orange males (Silberglied & Taylor, 1977). Unfortunately, females do not reflect UV.

In summary, the so-called lowland complex of sulphurs in Saskatchewan is represented by at least two entities with a moderate amount of variability: the Clouded Sulphur, *Colias philodice*, and the Alfalfa Butterfly, *Colias eurytheme*. It is probable that the variations in the Clouded Sulphurs in Saskatchewan represent incompletely balanced polymorphisms, but it is possible that there may be two or even three species hiding under the term Clouded Sulphur. Saskatchewan Clouded Sulphurs may be referable to subspecies (or species) *eriphyle* but also may simply be representative of a blend zone between *C. p. eriphyle* and *C. p. philodice*. Northern specimens that resemble *C. p. vitabunda* are also likely simply phenotypes of the Clouded Sulphur but may represent a blend zone between *C. p. eriphyle* and *C. p. vitabunda*. Brightly orange specimens are undoubtedly the Alfalfa Butterfly whereas incompletely orange specimens may be hybrids, forms of the Alfalfa Butterfly, or forms of the Clouded Sulphur.

Some avenues of future investigation would be to analyze mitochondrial DNA to see if Wheat & Watts' observations hold up and to determine to which species Saskatchewan clouded sulphur belong. UV reflectance may provide some insights into determination of species as not all populations of Clouded Sulphurs have been surveyed for this property. More collecting and observations of central, northern, and eastern Clouded Sulphurs may help illuminate the boundaries between *C. p. vitabunda*, *C. p. eriphyle*, and *C. p. philodice*, whether there are sharp boundaries between the populations or broad blend zones. Finally, breeding experiments may help determine the frequency and characteristics of the orange forms of the Clouded Sulphurs, and what proportion of intermediate specimens are truly hybrids.

The Butterflies

1**. Western Clouded Sulphur (*Colias philodice eriphyle* W. H. Edwards, 1876)**

The Western Clouded Sulphur was described from specimens from Lake La Hache, in central British Columbia. These specimens were weakly distinguished from the eastern Clouded Sulphur by having slightly broader black borders, an tendency for reduction of the submarginal spots, slightly more orange colouration to the ventral HW, and a definite orange tint to the ventral FW of typically coloured (that is, not white) females. Spring and fall specimens (forms "kootenai" and "autumnalis") are smaller, have narrower black borders above, and a more marked tendency for reduction of the submarginal spots. These forms may be seen throughout the summer, though they form the minority of midsummer specimens.

Colias hagenii Edwards, 1883 was described from specimens from Pueblo, Colorado, but Edwards noted similar specimens from Bismarck, North Dakota, Montana, and Wyoming. Edwards later synonymized *hagenii* with *eriphyle*.

Colias philodice eriphyle: top row, spring female dorsal and ventral; second row, summer male dorsal and ventral; third row, orange form male dorsal and ventral; bottom row, orange form female, dorsa and ventral.

Colias philodice eriphyle: top row, spring male dorsal and ventral; second row, summer female dorsal and ventral.

2. Alfalfa Butterfly (*Colias eurytheme* Boisduval, 1852)

The Alfalfa Butterfly was described from California and historically was most common in the Southwest, extending into the southeastern US and migrating northward regularly. In the last century, it expanded its range northeastward becoming common in the upper Midwest and the Northeast as well. It has been assumed that the Alfalfa Butterfly was able to exploit agricultural lands with fields of alfalfa and clover to allow the population explosion. However, it is not felt to be able to overwinter farther north, particularly in the central part of the continent.

Analogous to the Clouded Sulphur, the Alfalfa Butterfly has a spring/fall form, "ariadne" that is smaller, often shows a reduction in the submarginal spots, narrower black margins above, and a reduction in the intensity and the extent of the orange above. Form "keewaydin" has a reduction in the intensity of the orange but is otherwise similar to the typical summer form. There is also a rare yellow form, "unicitrina" that has no orange above. It may be distinguished from the Clouded Sulphur by wider black margins above, and from both the Clouded Sulphur and the Western Clouded Sulphur by the less intensely orange discal spot on the dorsal hindwing, because the orange is largely replaced by yellow (it continues to look slightly orange due to the ventral pink halo showing through enough to blend with the dorsal yellow scales a bit of an orange look.

The Alfalfa Butterfly in Saskatchewan is found generally in ditches and alfalfa fields from July into October. It becomes much rarer further from these areas. It also becomes progressively rare further north in Saskatchewan, virtually absent from the boreal forest.

Colias eurytheme. Top row: typical male (19 Aug 1997, St. Victor, SK), form keewaydin male (28 Aug 2021, St. Victor, SK), form ariadne male (23 Aug 2012, Rear Judique, Cape Breton Island, Nova Scotia). Note the narrower black borders and smaller size of ariadne. Second row: typical female, (28 Aug 2012, Willow Bunch, SK), form keewaydin female (15 Aug 2020, St. Victor, SK), form unicitrina male (4 Aug, 2021, Willow Bunch, SK). Note the obscure discal spot with the orange scales lacking, pink scales from beneath showing through, and wide black borders. Third row: white female (27 Aug 2011, Big Beaver, SK), white female (1 July 2015, Willow Bunch, SK), putative hybrid male (12 July 2013, St. Victor, SK). Note the smaller size and slightly narrower black margins of the hybrid male. Note the wide black borders of the white females. Bottom row: white *Colias philodice eriphyle* females. Left, boreal forest (13 July 2020, Montreal Lake, SK).Note slightly smaller size and narrower black marginal borders. Right, praire (9 June 1998, St. Victor, SK).

Colias eurytheme: top row, male "ariadne" form dorsal and ventral; second row, white female dorsal and ventral; third row, typical male dorsal and ventral; bottom row, *C. eurytheme* X *philodice* male hybrid, dorsal and ventral (note the orange flush in central areas of dorsal wings, and the narrower dark borders above)

3. Clouded Sulphur (*Colias philodice philodice* Godart, 1819)

The Clouded Sulphur was described from specimens from Virginia. Over the years, this species was assumed to include virtually all specimens from eastern and northern North America that were yellow above, with a submarginal row of spots beneath, and a pearlescent discal spot with a pink halo on the hindwing ventrally. The spring form, smaller, darker, and more greenish was called "anthyale." Another form with some orange colouration to the dorsal forewing was termed "luteitincta."

A population in the highlands of Guatemala and southern Mexico, *Colias philodice guatemalana* Röber, 1909, the Guatemalan Clouded Sulphur, shows both stronger submarginal spots beneath and wider marginal bands above. There does not appear to be any orange forms. This population is currently the only one in the lowland complex that is geographically isolated from the others.

4. Lively Clouded Sulphur (*Colias philodice vitabunda* Hovanitz, 1943)

The Lively Clouded Sulphur was described from specimens in Alaska and noted to occur in the Yukon and northern BC as well. Hovanitz described it as closely related to philodice, but subsumed both under the Old World species, *Colias chrysotheme* (Esper, 1781). It is thought to occur at least to western Northwest Territories and northwestern Alberta (*Colias eurytheme alberta* ab. pallidissima Bowman from Fort Vermilion is considered a synonym). Its distinguishing features were listed as univoltinism, narrow marginal bands, smaller size, reduction or absence of submarginal spots, marked reduction of marginal bands of females, and a preponderance of white females.

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Colias eurytheme: top row, male form “unicitrina” dorsal and ventral; note wide black margins above, nearly complete row of sumbarinal spots, and much paler orange discal spot. UV reflectance as in typical *C. eurytheme*. Second row, form “keewaydin” male. Note the wider dark margins above and heavy submarginal row of spots beneath. *Colias p. philodice*. Third & fourth row: summer male, summer female, dorsal and ventral.

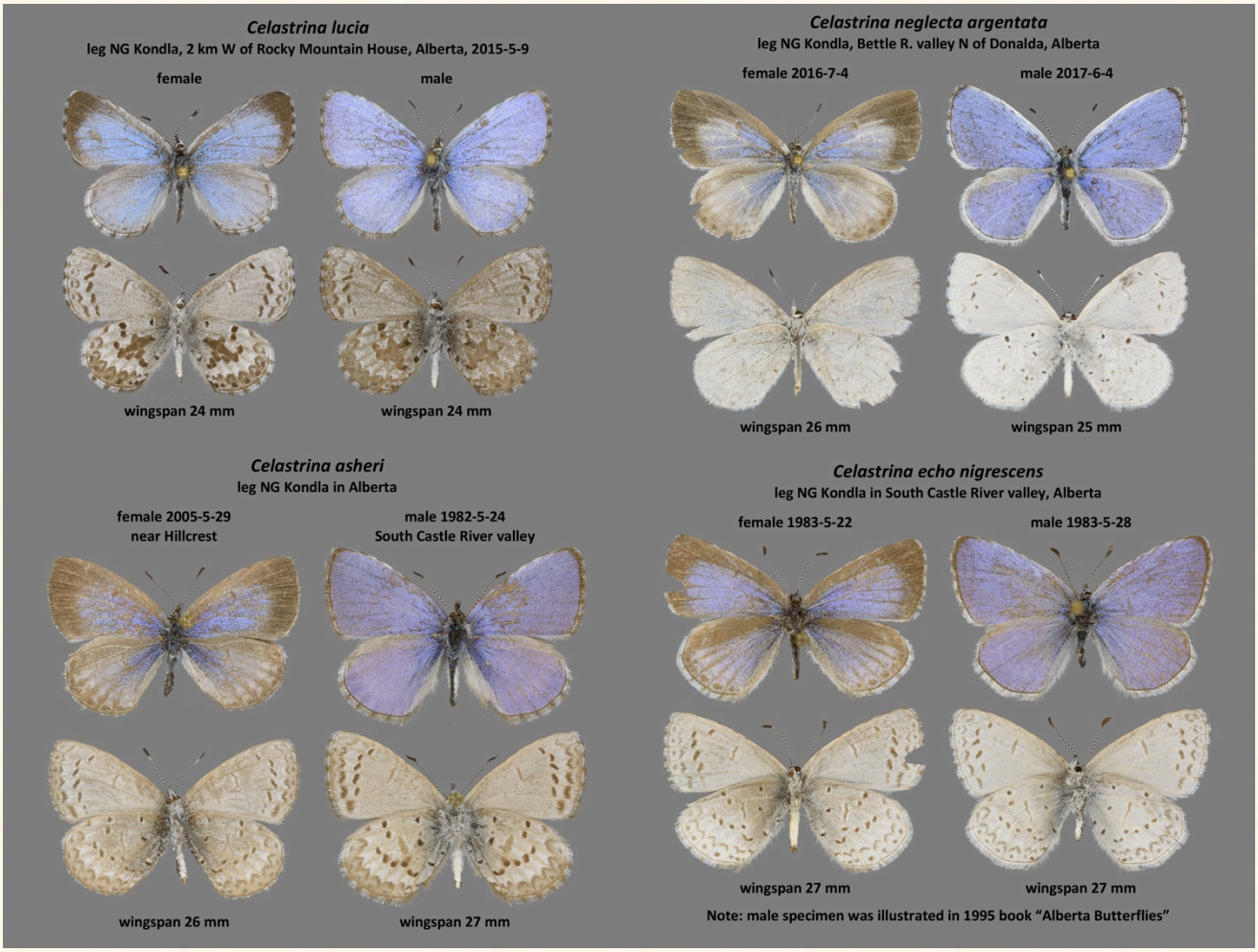
Colias philodice vitabunda, male dorsal and ventral.

Colias philodice eriphyle, white form female, Limestone Mountain, Alberta. Photo by Norbert Kondla.

A West Coast Lady from Alberta
Bob Brown

There is a story to this photograph but it is more about my poor judgment. There were many Painted Ladies (*Vanessa cardui*) around in 2017, to the extent that I had stopped chasing them for photos, and then stopped photographing them at all. I had spent one particular day on Wind Ridge near Canmore and was descending when I saw this butterfly near the trail. It was posing so nicely that I relented and took a single photo and then continued on my way. I later downloaded the photos of the day into Lightroom but didn't pay attention to this one, thinking it was *V. cardui*. In October of that year I photographed an American Painted Lady in Yosemite valley and began to think of West Coast Ladies and how I would know one if I saw it. I familiarized myself with the ID and resolved to pay more attention the following year. In May of 2018 I was reviewing my Canmore photos, looking for something else (another story) when I came across this photo again and recognized it for what it was. I didn't have to go afield to find this butterfly; I already had it on my hard drive. I posted it to e-butterfly and is the only Alberta specimen posted there to date (Dec 10, 2021). I posted it to iNaturalist in the spring of 2021. To date, the only other Alberta specimen I found there, was taken in 1979 by Norbert Kondla. In summary, *Vanessa annabella* from Alberta is either not seen much or not reported on these two sites. I wonder how many others I walked past over the years.

A New Blue Butterfly for Alberta
Greg Pohl



In case you haven't heard yet via other venues, a new blue butterfly species has been carved off from *Celastrina echo*. Welcome *Celastrina asheri*! The paper is very large with loads of photos, you can download it here:

https://archive.org/details/t-report-10-3-celastrina-asheri

Also, Norbert Kondla, one of the co-authors, has prepared a handy photo guide to separating the new species, shown above and available at:

https://flic.kr/p/2nhox77

This doesn't change things for most of Alberta, but this new species is present in southwestern Alberta from the Crowsnest Pass to Waterton (plus the Columbia Valley in British Columbia), where it flies in the springtime.

Ellis Bird Farm 2021 Butterfly Count Report
Delano Lewis

Introduction:

Given the historical emphasis of the Ellis Bird Farm (EBF), some may be tempted to ask, why count or study butterflies at a bird conservatory? Butterflies are good indicators of biodiversity trends and butterfly counts have become a model for citizen science worldwide. The hope is that the EBF Butterfly Count will become a model citizen science initiative throughout Central Alberta and Canada. Historically EBF hosts a Bug Jamboree in July/August of each year; this has been going on over the course of 20 years with counts occurring on the Bug Jamboree day in July or August. The Alberta Lepidopterist Guild (ALG) has been an integral part of this count which was started by Charley Bird. Other members such as Ted Pike, Dave Lawrie, John Acorn, and more recently Benny Acorn, along with many others have participated. Last year marked the 20th year since the count started and it was aptly commemorated by a publication by Benny Acorn (B. Acorn 2020); this was quite fitting as he is among the new generation of Alberta lepidopterists who are the future of ALG. In his article he paid homage to a number of contributors before him and it is on this contribution this author intends to build. I was invited to be a part of the research team at EBF by Myrna Pearman, former Biologist and Site Services Manager. It was from this invitation, as well as the drive to build a research program as an associate professor at Burman University that an entomologist (lepidopterist) came to be involved with a bird conservatory. With the changing of the guard from Myrna Pearman to Sandy Van Dijk my involvement has continued uninterrupted but It was purely by chance that this butterfly count started as I was focused on other entomology related projects. Fortuitously, after a conversation with Sandy about the 2021 Bug Jamboree, the decision was made that I would do a butterfly count for 2021 at EBF which morphed into a summer long count and now a proposed long term (longitudinal) study which also has the full support of the new site manager and biologist Carolyn Ross.

Methods:

Before the actual count started, a list of all known species of butterflies recorded from EBF was compiled. This list includes roughly 20 years of records from EBF Bug Jamboree butterfly counts beginning in 2000 (B. Acorn 2020). A spreadsheet was then created, including images of each species next to each name (Figure 1). Whilst all the other butterfly counts at EBF were done mostly during a short period of a day or so during their annual Bug Jamboree, with the exception of Benny Acorn's survey in 2020 which did not include counts but only recorded

Fig. 1

species observed, this count was conducted over a period of 65 days; in total, 9 counts were made. This makes this count somewhat unique and it is hoped that in future years the duration can be increased to a minimum of 100 days with at least 10 total samples over this period. The count was performed each time within 1 1/2 hours of solar noon based on work by Federico Riva when he was a doctoral student at the University of Alberta. Deviating slightly from the Pollard protocol (Pollard 1977), all butterflies identifiable to at least genus level within 5 meters of where the observer was walking were counted; a constant pace was maintained, with occasional stops to record or to attempt catching butterflies that needed a closer examination to determine species. Each count lasted approximately 1 hour. The route taken was the same used by Benny Acorn in 2020; it started by doing a loop around the main site starting at the visitor's center, then going down the path to the pond and butterfly garden, walking up past the cafe and old visitors center to the parking lot. From the parking lot one would then walk down the road to the west woods and stop at the entrance to the west woods (Figure 2). This approximately 1 km path gave a good variety of habitat for butterflies and was easily accessible.

Fig. 2

Results:

Butterfly abundance rose steadily up to peak abundance which occurred around the 23rd of July, then fell off rapidly and kept fluctuating until the 9th of September (Figure 3). A total of 15 butterfly species were identified (fritillaries all grouped as one due to the difficulty in field identifications of this guild of butterflies) over the sampling period. In order of abundance these were *Pieris rapae* (Cabbage White), *Thymelicus lineola* (European Skipper), *Colias philodice* (Clouded Sulphur), *Cercyonis pegala* (Common Wood Nymph), *Coenonympha californica* (Ringlet), *Speyeria* sp. (greater fritillaries), *Aglais milberti* (Milbert's

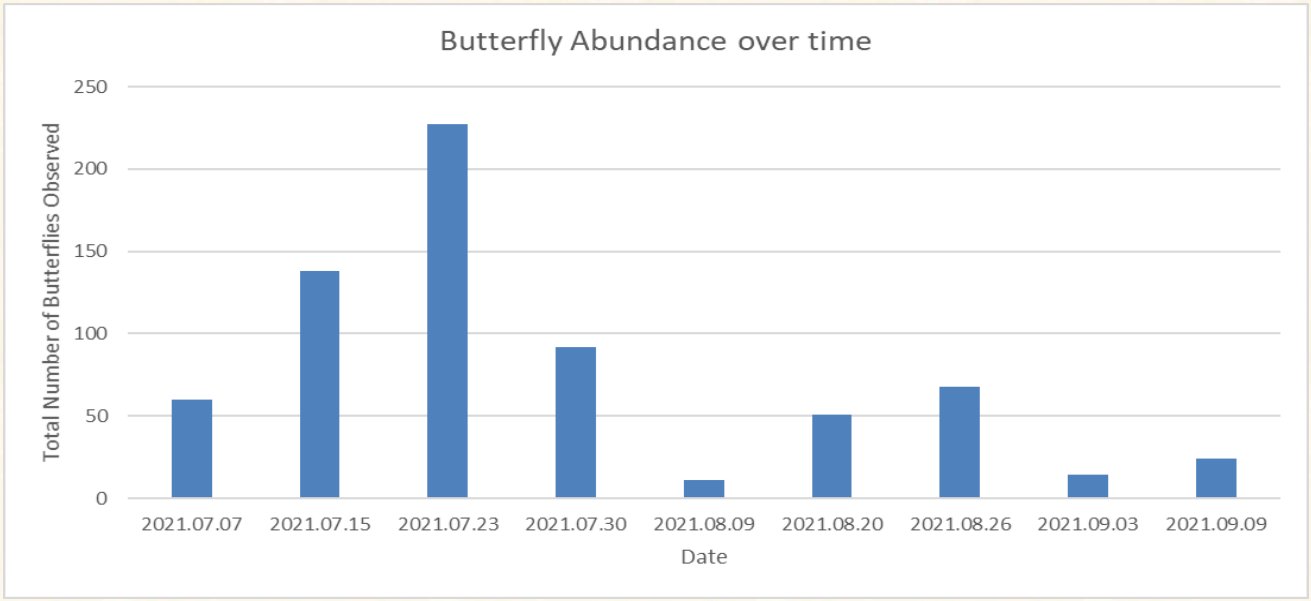


Figure 3. Butterfly abundance over time.

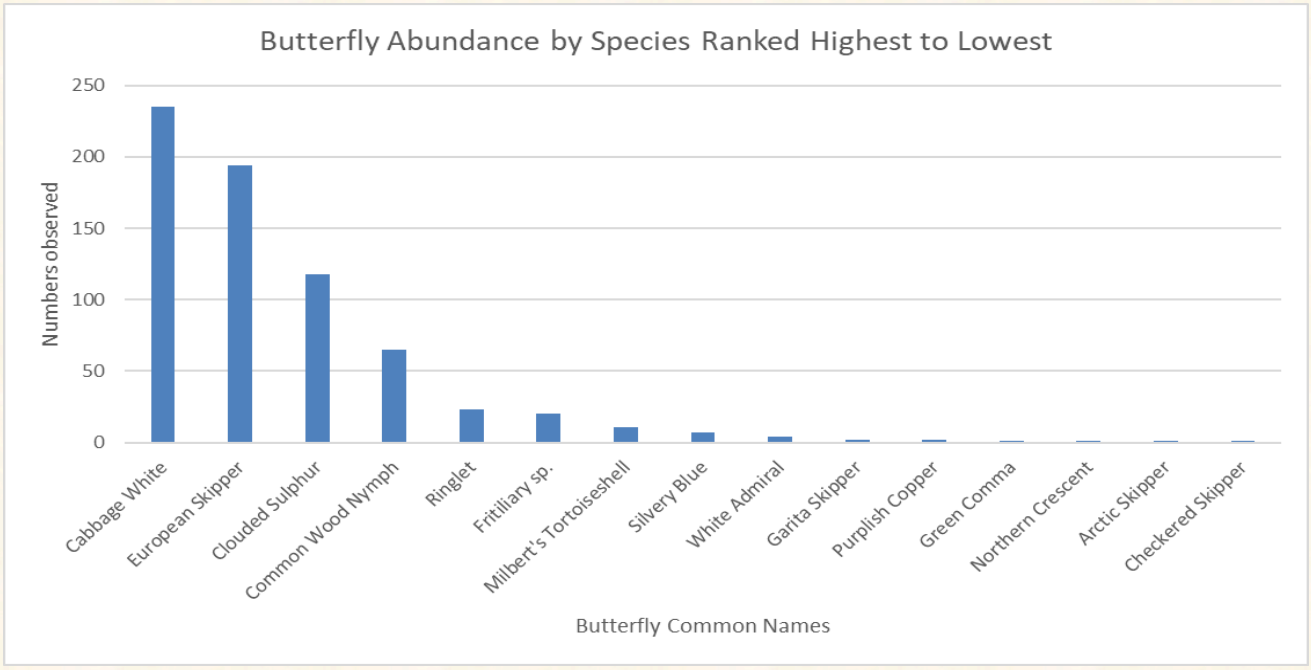


Figure 4. Butterfly abundance by species ranked highest to lowest.

Tortoiseshell), *Glaucopsyche lygdamus* (Silvery Blue), *Limenitis arthemis* (White Admiral), *Oarisma garita* (Garita Skipper), *Lycaena helloides* (Purplish Copper), *Polygonia faunus* (Green Comma), *Phyciodes cocyta* (Northern Crescent), *Carterocephalus palaemon* (Arctic Skipper), and *Pyrgus communis* (Checkered Skipper) (Figure 4). Five species accounted for over 90% of the observations. The 5 most abundant species were the same over the previous 20-year period of butterfly counts. The most abundant, and second most abundant species for the 20-year aggregate were *Thymelicus lineola* (European Skipper), and *Pieris rapae* (Cabbage

White), whilst the most abundant, and second most abundant species for the 2021 count were *Pieris rapae* (Cabbage White) and *Thymelicus lineola* (European Skipper). These two species alone accounted for roughly 60% of the butterfly abundance for both the previous 20-year aggregate and the 2021 count. Of the 21 butterflies seen in 2020 (fritillaries grouped as one; B. Acorn 2020), 12 were seen in 2021; this ties with 2001 as the second most observed species count after 2020. Two species not previously recorded, *Pyrgus communis* (Checkered Skipper) and *Lycaena helloides* (Purplish Copper) were seen, increasing the total known butterfly species recorded at EBF from 32 to 34 (when fritillary species are NOT grouped).

Comments:

While previous attempts at counting butterflies were admirable, they were lacking in standardization. However, they helped to form the backbone of this work and in fact Benny Acorn's observations in 2020 were much more extensive throughout the summer and formed the template for the 2021 count and were instrumental in working out the best path to take to get the maximum coverage of species. The observation made by Benny Acorn in 2020 are invaluable. The new count is not without its shortcomings, one of which is that the count is only done during a specific part of the day, near to solar noon, and would invariably miss some species. However, it is thought that near solar noon would give the largest coverage of species. Ideally, we would count from sunrise to sunset but neither the manpower or the financial resources currently exist to undertake such a venture. For the foreseeable future, efforts will be made to mirror this current effort so that multiyear comparisons can be made and more robust statistical analyses completed. We would like to thank John and Benny Acorn for the advice given and Ellis Bird Farm staff, contractors, and volunteers for their continued support of this project in the past and into the foreseeable future.

References:

Acorn, B. 2020. Butterflies of the Ellis Bird Farm. Alberta Lepidopterists' Guild Newsletter Fall 2020: 9 – 12.

Pollard, E. (1977). "A method for assessing changes in the abundance of butterflies". Biological Conservation. 12 (2): 115–134. doi:10.1016/0006-3207(77)90065-9. ISSN 0006-3207.

Two Quick Observations while rearing Polyphemus Moths (*Antheraea polyphemus*) in Alberta in 2021

David D. Lawrie

I raised a number of Polyphemus moths from eggs to cocoon last summer, and want to briefly report two things that I'd never observed before. All but one of the moths I raised are still in their cocoons, as expected. They should start emerging in the next couple of weeks with peak emergence expected late May to mid-June. If there is interest, I may report more details in the next Newsletter, once these have emerged.

Eggs were obtained from a wild female collected at an MV light at the Nature Conservancy Canada Ball-Berg property (about 50 km SE of Edmonton) on May 31, 2021. A wild male was collected at the same time. Several other individuals were seen, but not collected.

The eggs hatched about 10 days later and were fed on a variety of foodplants and all had pupated during the last week of July. A bit early based on prior experience (pupation usually occurring the first 2 weeks of August). Nothing too unusual so far.

Imagine my surprise when I checked the rearing cage August 1 and found a newly emerged adult male! This is the first time I have heard of a second brood of Polyphemus in Alberta, and I have raised them several times. The newly emerged male was very similar in size to a wild male collected the same night as the egg-

Fig 1. (Left) Wild male *A. polyphemus* collected May 31, 2021 at MV light; (Right) male reared from eggs obtained from wild female collected along with the male; emerged August 1, 2021. Just 61 days from freshly laid egg to adult!

donating female (Fig 1). John Acorn reported a similar experience this past summer, but also had never experienced this before, as did Fred Noddin and Melanie Patchell (to whom John gave some young caterpillars).

The summer of 2021 did have quite a bit of a heat wave. Connection?

Figure 2 shows my other surprise. Polyphemus caterpillars fluoresce under ultraviolet light similar to scorpions! Depending on the light source used, this can be quite visible, even under daylight conditions. A focused beam 365 nm LED flashlight was used for figure 2. Fluorescence is visible using fluorescent blacklight tubes, but only under dark conditions.

Perhaps this could be used to search for Polyphemus caterpillars in the wild? Something to try!

Update: A female emerged June 8, 2022. Will be used for “calling experiments”. Stay tuned!

Fig. 2 Polyphemus caterpillars (3rd and 4th instar, July 6 picture date) fluorescing under 365 nm UV light with daylight illumination . There are 12 larvae in the cage. How many can you find?

One of the pleasant ALG Zoom sessions from the previous winter. Thanks Dave Lawrie for organizing these!

Alberta Butterfly Roundup: Mini-Update 2022

John H. Acorn

In the last (2021) issue of the ALG News, I provided an update on the Alberta Butterfly Roundup, our attempt to reconfirm all of the species of butterflies known from Alberta. The Roundup began in 2015, and it will continue until we either find all of the species, or lose our motivation to do so. Hopefully, the former.

As you will notice from two of the preceding articles in this issue, one more species has been confirmed:

West Coast Lady (*Vanessa annabella*): June 29, 2017, Canmore, B. Brown

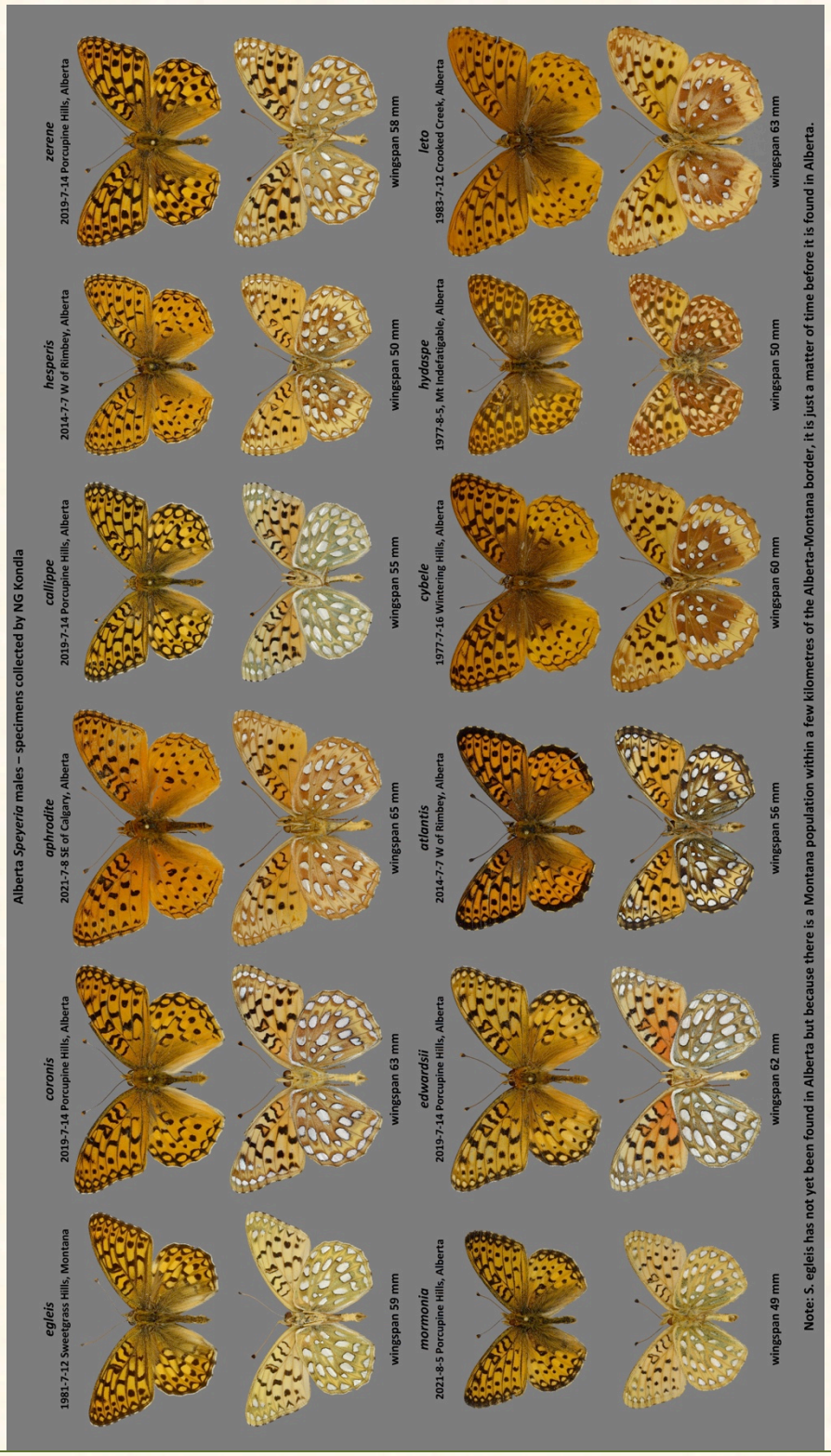
While another has been added to the unconfirmed list:

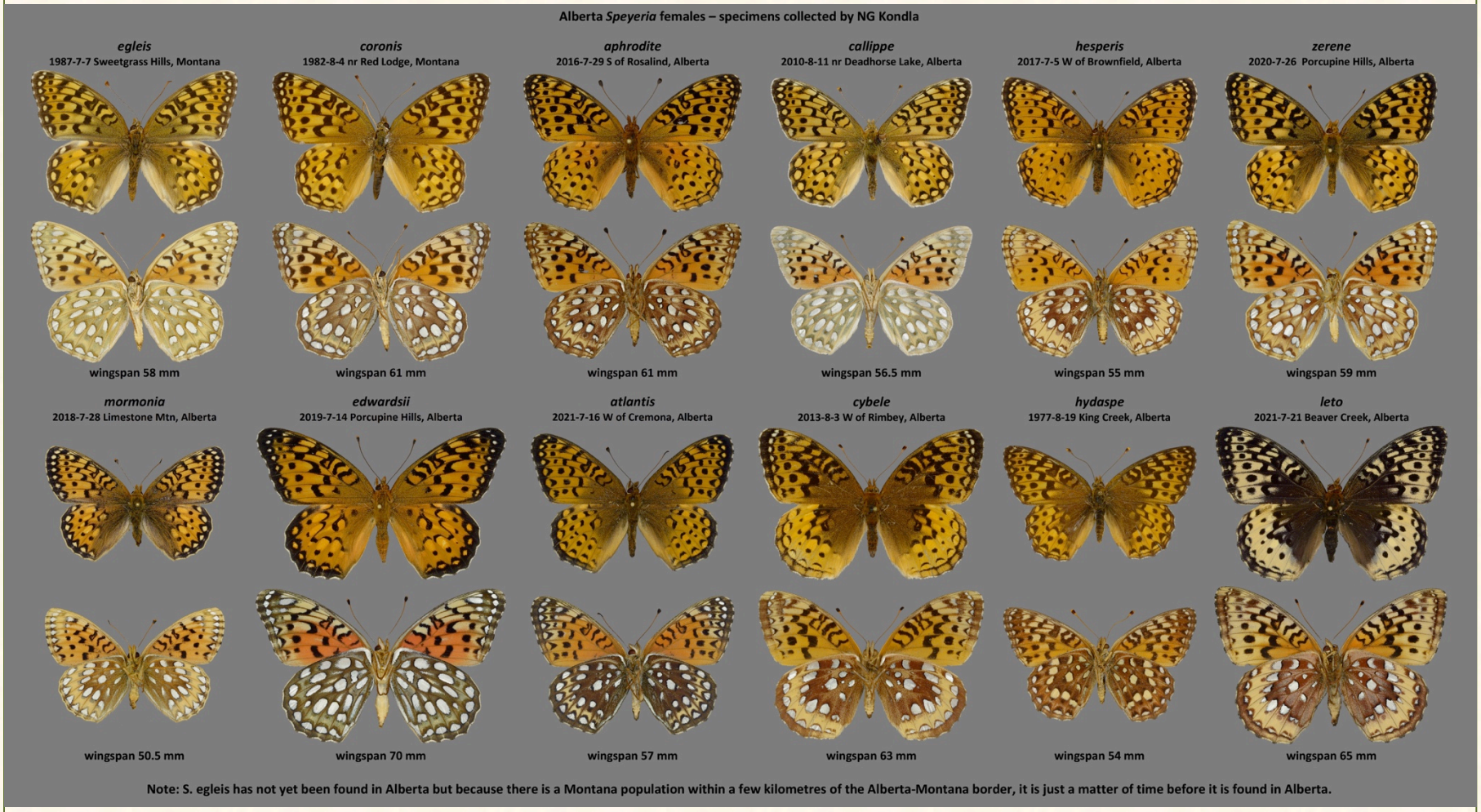
Asher's Blue (*Celastrina asheri*): spring, southwest corner.

This still leaves 19 species in need of reconfirmation, so let's hope some of them turn up this season.

Norbert Kondla's Fritillary Photographs, continued.

Continuing from our last issue, Norbert has sent two more fritillary images that he thought we might find interesting. If you want higher resolution versions, they can be found at https://flic.kr/p/2mTWoDj, and https://flic.kr/p/2mUMXmC




Alberta *Speyeria* females – specimens collected by NG Kondla
egleis
1987-7-7 Sweetgrass Hills, Montana
coronis
1982-8-4 nr Red Lodge, Montana
aphrodite
2016-7-29 S of Rosalind, Alberta
callippe
2010-8-11 nr Deadhorse Lake, Alberta
hesperis
2017-7-5 W of Brownfield, Alberta
zerene
2020-7-26 Porcupine Hills, Alberta
wingspan 58 mm
wingspan 61 mm
wingspan 61 mm
wingspan 56.5 mm
wingspan 55 mm
wingspan 59 mm
mormonia
2018-7-28 Limestone Mtn, Alberta
edwardsii
2019-7-14 Porcupine Hills, Alberta
atlantis
2021-7-16 W of Cremona, Alberta
cybele
2013-8-3 W of Rimbey, Alberta
hydaspe
1977-8-19 King Creek, Alberta
leto
2021-7-21 Beaver Creek, Alberta
wingspan 50.5 mm
wingspan 70 mm
wingspan 57 mm
wingspan 63 mm
wingspan 54 mm
wingspan 65 mm
Note: S. egleis has not yet been found in Alberta but because there is a Montana population within a few kilometres of the Alberta-Montana border, it is just a matter of time before it is found in Alberta.