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# *The Taxonomic Report*

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## **Taxonomic discoveries enabled by genomic analysis of butterflies**

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### ***Epargyreus* in northwestern North America**

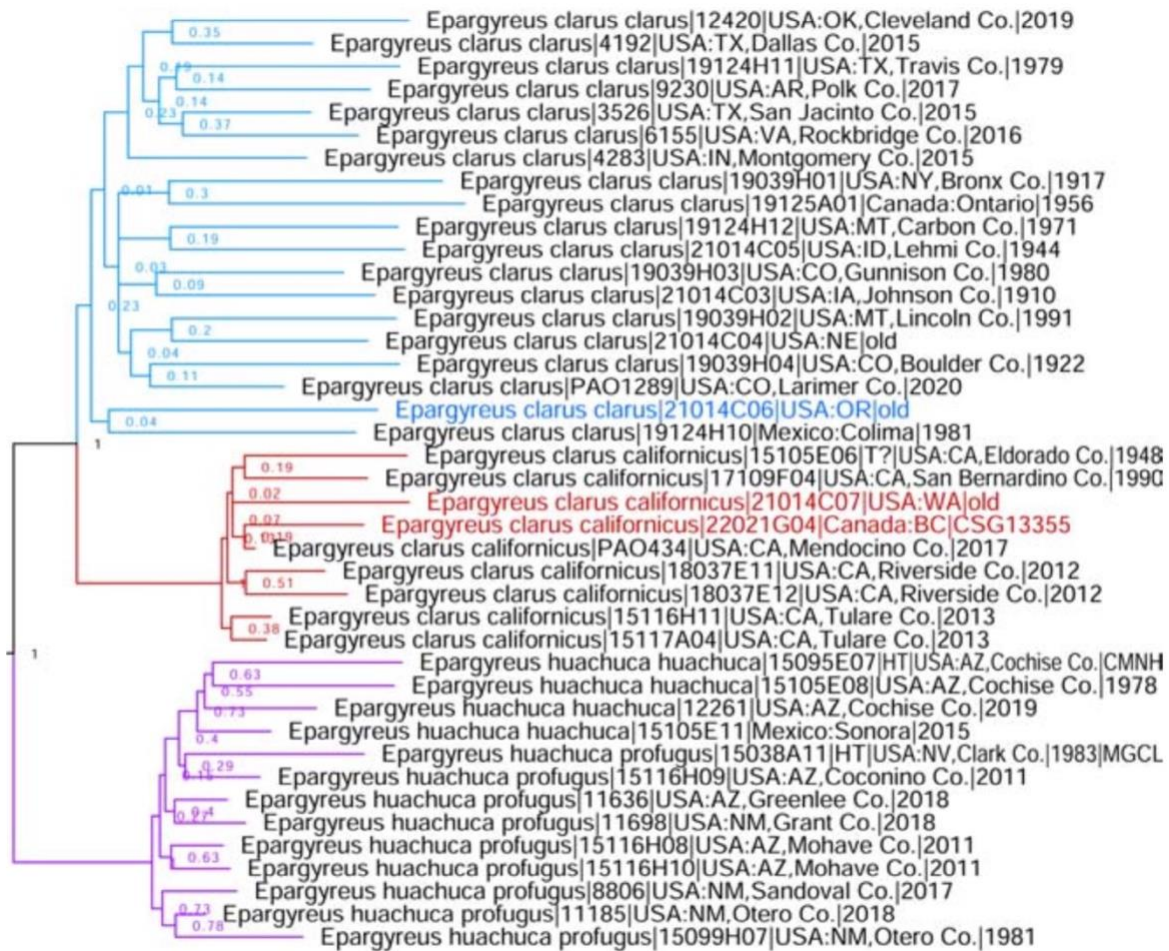
**Fig. 36.** *Epargyreus* specimens from the northwestern US (dorsal: left, ventral: right) collected approximately one century ago and their labels: *Epargyreus clarus clarus* from USA: Oregon (above the line) and *Epargyreus clarus californicus* from USA: Washington (below the line). All images are to scale, including labels.



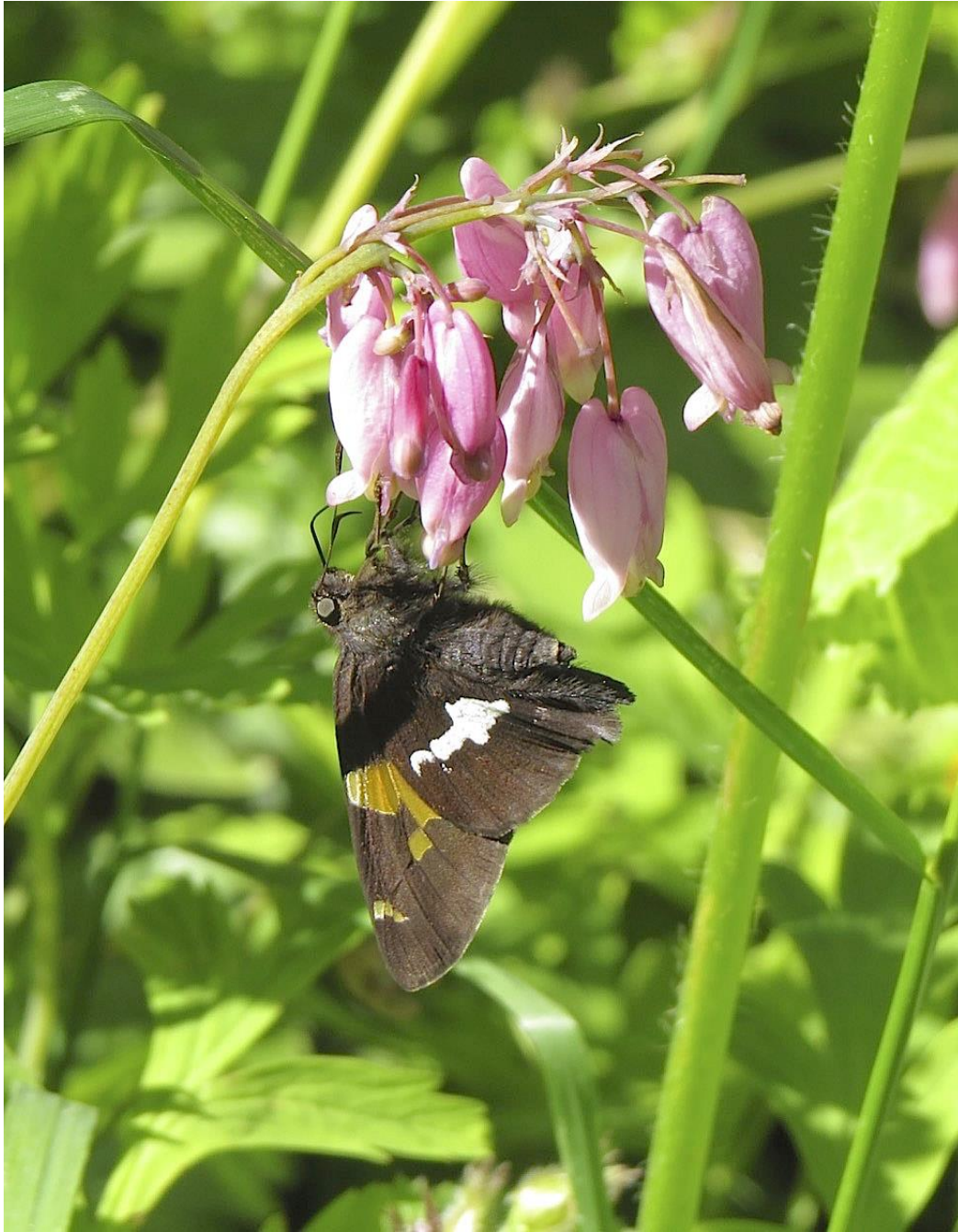
As we previously found (Zhang et al. 2020), resident *Epargyreus* Hübner, [1819] (type species *Papilio tityrus* Fabricius, 1775, a junior homonym, valid name for this species is *Papilio clarus* Cramer, 1775) is represented in the USA by two species: *Epargyreus clarus* (Cramer, 1775) (type locality "Suriname", later corrected to USA: Virginia, Rockingham Co.) and *Epargyreus huachuca* Dixon, 1955 (type locality in USA: Arizona, Cochise Co.). Here, we clarify the status of *Epargyreus* populations in northwestern North America. We observed (Zhang et al. 2020) that genetic differentiation within *Epargyreus clarus californicus* MacNeill, 1975 (type locality USA: CA, El Dorado Co., China Flat) was substantially lower than that of the nominotypical *Epargyreus clarus*, suggesting a recent bottleneck and possible recolonization of the vast range of *E. c. californicus* (Fig. 37, red vs. blue, Z chromosome tree). To probe older distribution of these taxa in the northwestern USA, we sequenced two specimens (in CMNH) collected more than a century ago in the states of Oregon and Washington (Fig. 36). Consistent with their phenotypes discussed by Warren (2005), one was *E. clarus clarus* (Fig. 37 blue, NVG- 21014C06) and the other was *E. clarus californicus* (Fig. 37 red, NVG- 21014C07), supporting the hypothesis that eastern *E. c. clarus* reaches Oregon, and Californian *E. c. californicus* reaches Washington, and they did so a century ago.

We also sequenced a piece of exuviae (no specimen) from pupation (on 29 July 2018) of a larva reared from an egg found on giant vetch (*Vicia nigricans* var. *gigantea* (Hook.) Broich) by Christian Gronau in Canada: British Columbia, Cortes Island, Manson's Landing, and it was *E. clarus californicus* (Fig. 37, red, NVG-22021G04). The Cortes Island population (Fig. 38) extends the range of sub-species *californicus*, which ranges from southern California (Riverside Co., Fig. 37) to British Columbia.

The first record of *E. clarus* on Cortes Island was a photograph of an adult taken in June 2014 by C. Gronau, and he and Barry Saxifrage have thoroughly documented the use of giant vetch as the larval foodplant (first record of it as a foodplant for *E. clarus*), through oviposition observations, finding many eggs and larvae, and rearing larvae from eggs. Black locust occurs on Cortes Island, but Gronau and Saxifrage have not found any evidence it is used as a foodplant. Cortes Island is about 320 km north of the Seattle area, Washington where the nearest *E. clarus* presently occur, and about 520 km from the nearest extant *E. clarus clarus* populations in southeastern British Columbia. Most Seattle area records are *E. clarus clarus*, with some known to be temporary introductions from larvae brought in on nursery stock of black locust (*Robinia pseudoacacia* L.) from eastern North America; however, some records are of *E. clarus californicus* that may be either migrants from the south or may reproduce locally on an unknown foodplant (Jonathan P. Pelham, pers. comm.). Giant vetch is widespread in the Seattle area; hence, it (or other vetch species) is a potential foodplant for resident populations of *E. clarus californicus*.



**Fig. 37.** *Epargyreus clarus clarus* (blue, top), *E. c. californicus* (red, middle), and *E. huachuca* (purple, below). Specimens discussed are labeled in color.



**Fig. 38.** *Epargyreus clarus californicus* nectaring on **giant vetch [sic]\*** in Canada: British Columbia, Cortes Island, 50.0239N 124.9817W, 1-Jun-2019 © Christian Gronau (with permission).

**\*Correction (by Christian Gronau): native Fringed Bleeding Heart (*Dicentra eximia*)**