

**NOTE*****Arctia plantaginis* (Lepidoptera: Erebidae: Arctiinae) in Newfoundland, a disjunct population 1800 km east of its previously known range in North America**

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Arctia plantaginis (L., 1758) (Lepidoptera: Erebidae: Arctiinae) is a Holarctic moth species (Hegna et al. 2015) widely distributed in the temperate region of the northern hemisphere, but in North America largely restricted to the West (Figure 1). The species was formerly placed in the genus *Parasemia* Hübner, 1820, a synonym of *Arctia* Schrank, 1802, according to Rönkä et al. (2016). Specimens from the Boreal ecozone in Canada, particularly Alaskan populations, tend to be mostly black, whereas specimens from western montane regions express reduced black markings (Hegna et al. 2015).

A population of *Arctia plantaginis* was encountered by BL on the Avalon Peninsula of Newfoundland at Cape St Mary's Ecological Reserve (46.8232°N, 54.1955°W) on 2 August 2016. The vegetation above the cliffs (Figure 2) is "one of the world's most southerly expanses of sub-Arctic tundra" as mentioned on http://www.ecc.gov.nl.ca/parks/wer/r_csme/. At around noon that day, moths were seen flying rapidly just above the vegetation, which suggested that they were males responding to female pheromones. This proved to be correct as two copulating pairs were found (Figures 3) when males were followed. Identification of a captured male specimen was confirmed by comparison to specimens in the CNC and by DNA barcoding.

Surprisingly, the species was not recorded for Newfoundland by Morris (1980), nor from Labrador by Morris (1980) and Handfield (1999; personal communication). In fact, until its discovery in Newfoundland in the summer of 2016, the known range of the species in North America extended eastward only to the Abitibi region of Québec, near the eastern border of Ontario, in the clay belt south of James Bay (Néron 1986; Handfield 1999) (Figure 1). This region is 1800 km west of the Cape St. Mary's locality in Newfoundland. The lack of previous *Arctia plantaginis* records in Newfoundland hinted at the possibility of a recent introduction of this species from Europe; however, the collecting sites list provided by Morris (1980, p. 297) shows that historically (pre-1980), no Lepidoptera records are known from the south-western point of Avalon Peninsula, west of St. Mary's Bay, and thus the *Arctia plantaginis* population may simply have gone undetected.

To unravel the phylogenetic affinities of the Newfoundland population and thus possibly reveal its geographic origin, a leg of the voucher specimen was sent by BCS for sequencing of the DNA CO1 barcode to the Biodiversity Institute of Ontario in Guelph, Canada for DNA extraction, amplification, and sequencing. The result of this investigation is, that among the 646 sequenced specimens of *Arctia plantaginis* from across the Holarctic (Barcode of Life Data System, www.boldsystems.org; Hegna et al. 2015), the Cape St. Mary's specimen has the same haplotype as nine other Canadian specimens from Alberta, Saskatchewan and British Columbia (Zahiri et al. 2014). This and similar haplotypes are restricted entirely to North America (Hegna et al. 2015).

Thus, the population of *Arctia plantaginis* at Cape St. Mary's represents an Eastern Canadian disjunct population most closely related to those of more western locations in Canada and Alaska. We believe that this species has a restricted distribution within Newfoundland, and that this population is a Grand Banks Refugium relict that has remained undetected by naturalists, until now.

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Figure 1. Map of the distribution of *Arctia plantaginis* in North America with some of the phenotypes present, including that of the Cape St. Mary's population in Newfoundland.

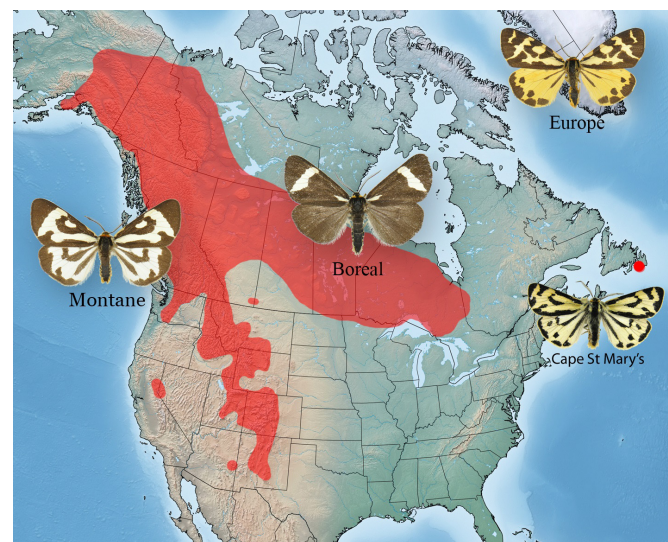


Figure 2. Landscape at Cape St. Mary's Ecological Reserve.



Figures 3. Copulating pair (male above) of *Arctia plantaginis* photographed at Cape St. Mary's on 2 August 2016.

