ZooKeys 30: 1–156 (2009)
doi: 10.3897/zookeys.30.308
www.pensoftonline.net/zookeys

MONOGRAPH

A peer-reviewed open-access journal
ZooKeys
Launched to accelerate biodiversity research

A Revision of *Lasionycta* Aurivillius (Lepidoptera, Noctuidae) for North America and notes on Eurasian species, with descriptions of 17 new species, 6 new subspecies, a new genus, and two new species of *Tricholita* Grote

Lars G. Crabo[1,†], J. Donald Lafontaine[2,‡]

1 *Adjunct Professor, Washington State University, 724 14th Street, Bellingham, Washington, USA 98225-6302*
2 *Canadian National Collection of Insects, Arachnids, and Nematodes, Agriculture and Agri-Food Canada, KW Neatby Bldg., C.E.F., Ottawa, Ontario, Canada K1A 0C6*

† *urn:lsid:zoobank.org:author:48DA6EA6-9BB2-42C5-A793-814FD74E1302*
‡ *urn:lsid:zoobank.org:author:2227A860-B768-4A51-8FE4-F1F3EB1CAA7F*

Corresponding authors: *Lars G. Crabo* (lcrabo@nwrads.com), *J. Donald Lafontaine* (Don.Lafontaine@agr.gc.ca)

Academic editor: *Christian Schmidt* | Received 27 October 2009 | Accepted 30 November 2009 | Published 18 December 2009

urn:lsid:zoobank.org:pub:C26E1A82-0DD4-48EF-865C-9D8AA788B739

Citation: Crabo LG, Lafontaine JD (2009) A Revision of *Lasionycta* Aurivillius (Lepidoptera, Noctuidae) for North America and notes on Eurasian species, with descriptions of 17 new species, 6 new subspecies, a new genus, and two new species of *Tricholita* Grote. ZooKeys 30: 1–156. doi: 10.3897/zookeys.30.308

Abstract

The North American species of *Lasionycta* Aurivillius are revised to include 43 species and 13 subspecies using traditional methods and mitochondrial cytochrome oxidase subunit 1 (CO1) DNA sequence (barcode) analysis. Seven species-groups are recognized, and one group is further divided into seven subgroups. Seventeen species and six subspecies of *Lasionycta* are described: *L. anthracina* Crabo & Lafontaine, *L. benjamini medaminosa* Crabo & Lafontaine, *L. brunnea* Crabo & Lafontaine, *L. caesia* Crabo & Lafontaine, *L. carolynae* Crabo, *L. coracina* Crabo & Lafontaine, *L. fergusoni* Crabo & Lafontaine, *L. frigida* Crabo & Lafontaine, *L. gelida* Crabo & Lafontaine, *L. haida* Crabo & Lafontaine, *L. illima* Crabo & Lafontaine, *L. mono* Crabo & Lafontaine, *L. uniformis fusca* Crabo & Lafontaine, *L. uniformis handfieldi* Crabo & Lafontaine, *L. uniformis multicolor* Crabo & Lafontaine, *L. uniformis shasta* Crabo & Lafontaine, *L. perplexella* Crabo & Lafontaine, *L. pulverea* Crabo & Lafontaine, *L. sasquatch* Crabo & Lafontaine, *L. sierra* Crabo & Lafontaine, *L. silacea* Crabo & Lafontaine, *L. subalpina* Crabo & Lafontaine, and *L. subfuscula livida* Crabo & Lafontaine. *Lasionycta coloradensis* (Richards), *L. dolosa* (Barnes & Benjamin), *L. flanda* (Smith), *L. poca* (Barnes & Benjamin), and *L. subfumosa* (Gibson) are elevated to species.

The following new synonyms are recognized: *Scotogramma albinuda* Smith (= *Lasiestra phoca* Möschler), *Lasiestra klotsi* Richards (= *Scotogramma discolor* Smith), *Scotogramma infuscata* Smith (= *Mamestra promulsa* Morrison), *Lasionycta alberta* Barnes & Benjamin and *Anytus marloffi* Smith (= *Scotogramma perplexa* Smith), *Scotogramma sedilis* Smith (= *Scotogramma subfuscula* Grote), *Mamestra rainieri* Smith (= *Mamestra mutilata* Smith), *Anarta zemblica* Hampson (= *Anarta staudingeri* Aurivillius), and *Anarta etacta* Smith (= *Mamestra arietis* Grote). The Eurasian species are reviewed resulting in the following changes: *Lasionhada proxima* (Hübner), **comb**. **rev**., *Eriopygodes imbecilla* (Fabricius), **comb**. **rev**., *Lasionycta dovrensis* (Wocke), **stat**. **rev**. and *L. fumida* (Graeser), **stat**. **rev**. The genus *Psammopolia* Crabo & Lafontaine (type species: *Polia wyatti* Barnes & Benjamin) is described, resulting in the following new combinations: *Psammopolia arietis* (Grote), **comb**. **n**., *Psammopolia insolens* (Grote), **comb**. **n**., *Psammopolia ochracea* (Smith), **comb**. **n**., *Psammopolia sala* (Troubridge & Mustelin), **comb**. **n**., and *Psammopolia wyatti* (Barnes & Benjamin), **comb**. **n**. Two new species of the related genus *Tricholita* Grote are described: *T. ferrisi* Crabo & Lafontaine from southwestern Arizona and *T. knudsoni* Crabo & Lafontaine from western Texas. Adults and genitalia of all North American *Lasionycta* and *Psammopolia* species and the new *Tricholita* are illustrated. Keys to species-groups and species are presented. DNA barcodes of 39 of the 43 species were sequenced and are presented as neighbor-joining phylograms. The barcodes support the taxonomy at genus and species-group level, but not consistently at the sub-group level. At the species-level, performance of DNA barcodes was variable; 17 of the 39 barcoded species exhibited haplotype variation discordant with morphology, phenotype and distribution. A high frequency (43.6 %) of haplotypes were either shared among more than one species (representing eight species), or were closely similar and nested within haplotypic variation of other species (nine species).

Keywords
DNA barcode, Eriopygini, glacial refugium

Introduction

The Holarctic noctuid genus *Lasionycta* Aurivillius contains mostly small and medium-sized species that generally are somberly colored in shades of gray and brown. The North American species occur in tundra, alpine and subalpine areas, and conifer forests. Despite the drab appearance of most of the species, the arctic and alpine species have interested lepidopterists for many years. These species are often collected by butterfly enthusiasts because they are diurnal, visit flowers, and their white or yellow hindwings make them conspicuous in flight. Many females of predominantly nocturnal species also fly during the day, likely accounting for the fact that many of the earliest named species were described from females. Many species of *Lasionycta* are quite rare and while others may be common, they occur in inaccessible locations and are rarely collected.

Lafontaine and coworkers revised the *Lasionycta leucocycla* and *L. skraelingia* complexes in the 1980's (Lafontaine et al. 1986; Lafontaine and Kononenko 1988) following a surge of interest in the fauna of northwestern North America and northern Eurasia. They showed that several species occur on both continents and reduced the number of species in the *L. leucocycla* complex by reducing a number of taxa previously regarded as species to the rank of subspecies. More recent collecting in the mountains of western North America has greatly increased the amount of material available for study and

sparked further interest in the genus. Prior to this revision there remained confusion as to the number of species in the genus and the correct names for many North American taxa.

Identification of *Lasionycta* is challenging due to similarity of many of the species. The difficulty is compounded by intraspecies variation, both within populations and across geographical distributions. Furthermore, the genitalia, of great utility for species identification in many noctuid genera, are rather uniform within *Lasionycta* species-groups and are of limited utility for species identification. Given these difficulties, we examined long series of specimens from as many localities as possible to determine the number of taxa present in each region and to correctly identify the species. Male antennal structure, eye size, ventral wing pattern, and subtle color differences are often more useful for separating closely related taxa than forewing pattern or genitalia.

Most North American *Lasionycta* and selected related species were also evaluated by mitochondrial gene cytochrome *c* oxidase subunit 1 (CO1) DNA sequencing, although this was limited by age of the material in some cases. As with habitus and genitalia, DNA analysis was very helpful in some species-groups and of more limited value in others.

Materials and methods

Genitalia were prepared using standard methods for inflating the male vesica and female bursa (Lafontaine 2004). Terminology for wing markings and anatomy also follow this reference.

The latitude and longitude and elevation for type specimens is recorded in the form given on the original specimen label. Therefore, latitude and longitude is given in degrees and minutes or in decimal degrees, and elevation is given in feet or meters. The elevation can be converted from feet to meters by multiplying by the conversion factor 0.3048 m/ft.

The 658 base pair (bp) "barcode" region of the mitochondrial (mtDNA) cytochrome *c* oxidase subunit 1 (hereafter called CO1) gene of North American *Lasionycta*, *Psammopolia*, and *Tricholita* and selected Eurasian taxa were used to assess molecular variation. Dried specimen legs were sent to the University of Guelph (Ontario, Canada) to be sequenced as part of the "All Leps Barcodes of Life Campaign" (BOLD) (www.lepbarcoding.org). Recently collected material, less than ten years old, was submitted whenever possible. DNA extraction, amplification and sequencing protocols for the BOLD initiative are described in Hebert et al. (2003). Haplotype barcode sequences were compared with phylograms constructed using the neighbor-joining method, and phyletic distances were calculated unsing the Kimura-2-Parameter distance model as implemented on the Barcode of Life Data Systems website (http://www.barcodinglife.org) (Figs 247 and 248). All barcode sequences used for this study comprised of 600 or more base pairs and shorter sequences in taxa for which no higher quality data exist are available publicly on GenBank at the National Center for Biotechnology Information (http://www.ncbi.nlm.nih.gov/Genbank/). The DNA specimen data is presented with BOLD and GenBank accession numbers in Appendix 1.

Specimens were examined from the following collections:

AMNH American Museum of Natural History, New York, New York, USA
CDFC Clifford D. Ferris Collection, Laramie, Wyoming, USA.
CNC Canadian National Collection of Insects, Arachnids, and Nematodes, Ottawa, Ontario, Canada
GBC George Balogh Collection, Portage, Michigan, USA
JSC Jon Shepard Collection, Nelson, British Columbia, Canada
KEJC Kyle Evan Johnson Collection, Minnesota, USA
LGC Lars Crabo Collection, Bellingham, Washington, USA
OSU Oregon State University Collection, Corvallis, Oregon, USA
TLSC Texas Lepidoptera Survey Collection, Houston, Texas, USA
TMC Tomas Mustelin Collection, Seattle, Washington, USA
TSDC Terhune S. Dickel Collection, Anthony, Florida, USA
UASM Jim Troubridge Collection, now at University of Alberta, Strickland Museum, Edmonton, Alberta, Canada
USNM National Museum of Natural History, Washington, DC, USA [formerly, United States National Museum]
ZMH Zoological Museum, Helsinki, Finland

Additional repository abbreviations:

ANSP Academy of Natural Sciences, Philadelphia, Pennsylvania, USA
BMNH Natural History Museum, London, UK [British Museum of Natural History]
DHC Daniel Handfield Collection, Saint-Mathieu-de Beloeil, Quebec, Canada.
NHRS Naturhistoriska Riksmuseet, Stockholm, Sweden
TAMU Texas A & M University, College Station, Texas, USA
WSU Washington State University, Pullman, Washington, USA
ZMHB Museum für Naturkunde der Humboldt Universitat zu Berlin, Bereich Zoologisches Museum, Berlin, Germany

Many distribution records for eastern North America were obtained from Handfield (1999).

Lasionycta Aurivillius

Lasionycta Aurivillius, 1892b: 285. Type species: *Phlogophora skraelingia* Herrich-Schäffer by original designation.

Lasiestra Hampson, 1905: 47. Type species: *Dianthoecia phoca* Möschler by original designation.

Pseudanarta Kozhanchikov, 1947: 18. Type species: *Anarta bohemani* Staudinger by original designation. Preoccupied by *Pseudanarta* Grote, 1878.

Anartomima Boursin, 1952: 55. Replacement name for *Pseudanarta* Kozhanchikov.

Diagnosis. *Lasionycta* is placed in Hadeninae based on trifine hindwing venation (vein M2 vestigial), hairy eyes, and larva with a dorsoventrally flattened spinneret with the opening shaped as a narrow transverse slit with an apical fringe. Within Hadeninae, *Lasionycta* is classified in Eriopygini Fibiger and Lafontaine based on an undivided larval hypopharynx, lack of an inner tooth on the larval mandible, and features of the larval spinneret, including elongated shape and apical fringe confined to the end of groove (Fibiger and Lafontaine 2005).

Within Eriopygini, *Lasionycta* is characterized by the male genitalia, which have the following features: 1) an uncus with a nearly cylindrical base with a pointed or dorso-ventrally flattened tip; 2) a strap-like valve bearing a C-shaped clasper, an elongate digitus oriented 30–90° to the axis, a small to moderately large cucullus with a simple or compound corona, and a membranous flap on the mesial surface distal to the sacculus (post-saccular flap); 3) an elongate coiled or spiraled vesica bearing zero to six pointed subbasal cornuti with broad bases and a distal field of minute cornuti or one or two rows of spine-like cornuti oriented perpendicular to the vesica axis. The distal cornuti field is adjacent to a membranous wrinkled band running the length of the vesica.

Description. Head – Male antenna beadlike, biserrate, or bipectinate (1.1–5.4× as wide as central shaft) and fasciculate. Female antenna filiform and ciliate. Scape with a tuft of longer scales at dorsal base of antenna. Eye hairy, round to ellipsoid. Head covered in hair-like scales. **Thorax –** Vestiture dense hair-like scales or mixture of hair-like and weakly spatulate scales. Foretibia with epiphysis. Tarsal segments with three rows of spine-like setae. **Wings –** Ground color light to dark gray or gray brown. Wings of most species with typical noctuine lines and spots present (indistinct in several species). Hindwing nearly uniform gray or lighter gray, white, or yellow with variable dark suffusion and contrasting darker discal spot, postmedial line, and marginal band. **Male genitalia –** Uncus curved, slightly laterally compressed with hook-like apex or with distal portion dorsoventrally flattened with ovoid or spatulate apex. Valve elongate, strap-like, 4.5–8.0× as long as wide. Sacculus rounded, relatively weak, with costal lobe extending below or above costal margin of valve. Valve bearing a membranous flap on ventromesial surface distal to sacculus ("postsaccular flap") (lacking in *L. secedens* species-group). Distal portion of valve weakly to moderately constricted below cucullus (neck). Cucullus 0.65–1.50× as wide as valve, with corona of 1–4 rows of stout claw-like setae. Clasper cylindrical and curved posterodorsad. Digitus moderately sclerotized, oriented 30–45° ventrad, finger-like with variable width base, or more heavily sclerotized, oriented 90° ventrad, with a basal flange or prong (*L. subdita* species-group). Aedeagus cylindrical, tubular, or with single thorn-like or multiple-tipped raised apical projection on right; vesica 1.5–3.0× as long as aedeagus, curved and twisted to nearly straight beyond a subbasal bend or coil, distal part extending right and ventral to distal aedeagus, with zero to six basal cornuti (variable between and within species) comprised of a central spike from a smooth to crenulate button-like base; vesica with a wrinkled lightly sclerotized band along entire length, distal vesica with adjacent field of multiple setae as a band of in-

numerable velvety setae or one or more rows of stouter setae oriented perpendicular to vesica axis. **Female genitalia –** Ovipositor lobe membranous and pad-like covered with hair-like setae or stout and conical covered with short stout setae. Abdominal segment VIII 0.3–1.2× as long as wide, short in species with pad-like ovipositors and elongate in species with conical ovipositors, covered with variable number of short setae, greatest ventrally and along posterior margin. Ductus bursae moderately sclerotized, cylindrical to dorsoventrally flattened, distal ventral aspect turned onto adjacent dorsal membranous bursa as a flange-like supporting structure; some species groups with posterior end heavily sclerotized and expanded to left (*L. secedens* species-group) or anterior end expanded to right (*L. subdita* species-group). Corpus bursae membranous, spherical or ovoid, with 3 elongate signa separated by 90°, one on each surface except side with appendix bursae (1 ventral signum in *L. secedens* species-group), with very weak to prominent mesial constriction, most pronounced on dorsal side near appendix bursae origin. Appendix bursae membranous or lightly sclerotized, arising from left side (*L. skraelingia* species-group) or dorsum of posterior corpus bursae and extending anteriorly to left, or posterodorsad from corpus bursae; shape of appendix weakly to strongly coiled 570° (*L. phaea* and *L. secedens* species-groups, respectively) or straight with subapical 90° bend. Ductus seminalis at distal appendix bursae (posterior end in most species, anterior end in *L. skraelingia* species-group).

Early stages. Larvae are known for *L. skraelingia* (Herrich-Schäffer), *L. secedens* (Walker), *L. leucocycla* (Staudinger), *L. staudingeri* (Aurivillius), and *L. perplexa* (Smith) (Godfrey 1972; Ahola and Silvonen 2008). Hypopharynx undivided, mandible lacking a tooth on inner surface, spinneret long and narrow, and fringe at spinneret apex confined to a small area at end of dorsal groove (Fibiger and Lafontaine 2005).

Remarks. The *Lasionycta* species in this revision are included in *Anartomima* Boursin, *Lasiestra* Hampson, and *Lasionycta* in the Moths of North America checklist (Franclemont and Todd 1983). *Lasiestra* (type species: *Dianthoecia phoca* Möschler) has since been synonymized with *Lasionycta* (Lafontaine et al. 1986). *Lasionycta secedens* was first treated as a *Lasionycta* in Europe (Hacker et al. 2002). It resembles *L. skraelingia* and *L. phaea* (Hampson) and like them the vesica is long; superficially it differs mainly in hindwing color. Its generic placement was scrutinized for this work because both sexes of *L. secedens* differ from other *Lasionycta* by several seemingly unique anatomic features. Characters intermediate between *L. secedens* and other *Lasionycta* species were found in the *L. phaea* and *L. mutilata* species-groups. Also, CO1 gene sequence distance analysis nests *L. secedens* among other *Lasionycta* species-groups, usually closest to the *L. phaea* species-group. This supports its inclusion in *Lasionycta*, and it is herein treated as the sole member of the *L. secedens* species-group. A check list of the North American Lasionycta species is presented in Table 2.

Species included in *Lasionycta* in recent European literature are more diverse in appearance, morphology, and biology than in North America. Hacker et al. (2002) list 18 Palaearctic species in the genus. Four of these (*L. skraelingia*, *L. leucocycla*, *L. staudingeri*, and *L. secedens*) are Holarctic and are included in the current revision. Two other Asian

species, *L. buraetica* Kononenko and *L. corax* Kononenko, are related to Nearctic *L. phaea*, as is *L. alpicola* Lafontaine & Kononenko (Lafontaine and Kononenko 1988) which was omitted from this list. Four other species, *proxima*, *calberlai* (Staudinger), *imbecilla* (Fabricius), and *impar* (Staudinger), occur in Europe and were described and illustrated by Hacker et al. (2002). They have no close relatives in North America and were therefore evaluated to determine their relationship to other *Lasionycta*.

Proxima, the type species of *Lasionhada* Berio, 1981, has genitalia (Figs 190 and 245) similar to other *Lasionycta*. The male genital capsule resembles closely those of the *Lasionycta leucocycla* species-group in all characters including the presence of the post-saccular flap. However, the vesica differs from those of *Lasionycta* species in this revision in that the elongate band of distal setae are positioned on the membranous band, not at its margin. The female genitalia are similar to those of the *L. leucocycla* species-group but lack signa on the corpus bursae and have long symmetrically pointed ovipositor lobes, characters not found elsewhere in *Lasionycta*. The CO1 sequence of *proxima* suggests that it is an outlier from other *Lasionycta* species, usually clustering adjacent to them but occasionally grouping with related genera like *Tricholita* Grote (Fig. 247). It also differs biologically from other *Lasionycta* in that it occurs in dry temperate areas as low as sea level, whereas other *Lasionycta* species prefer conifer forests or tundra. For these reasons we transfer *proxima* back to *Lasionhada* as *Lasionhada proxima* (Hübner), comb. rev. The morphologic and DNA data suggest that *Lasionhada* is the sister group to *Lasionycta*.

Calberlai is the type species of *Clemathada* Beck, 1991 and was moved from *Lasionycta* back to this genus by Fibiger and Lafontaine (2005). They noted that it belongs in Hadenini, not Eriopygini, based on larva characters including a divided hypopharynx.

Imbecilla is the type species of *Eriopygodes* Hampson, 1905 and was first associated with *Lasionycta* by Hacker et al. (2002). It was examined and differs significantly from *Lasionycta* in several respects, including presence of a stout broadly ovate clasper, a vestigial digitus, and no postsaccular flap of the male valve (Fig. 191). It does not group with other *Lasionycta* on CO1 sequence analysis, instead clustering with *Lacinipolia lorea* (Guenée), which it also resembles superficially. *Lacinipolia* McDunnough remains a large heterogeneous genus in need of revision. *Imbecilla* is herein transferred back to *Eriopygodes* as *E. imbecilla* (Fabricius), comb. rev.

Impar was not available for examination for this revision but is illustrated by Hacker et al. (2002). Its habitus and vesica are somewhat atypical for *Lasionycta* although the genitalia are similar. We retain it in *Lasionycta* pending further review of the Eurasian Eriopygini.

The other eight species in the Hacker list (*L. hospita* Bang-Haas, *L. melanographa* Varga, *L. montanoides* Poole, *L. orientalis* (Alpharéky), *L. decreta* (Püngeler), *L. draudti* (F. Wagner), *L. hampsoni* Varga, and *L. levicula* (Püngeler)) are Asian and were not otherwise evaluated by Hacker et al. (2002) or by us in the current work. Only the first four of these species are included in *Lasionycta* by Poole (1989).

Four North American species included in *Lasionycta* in recent checklists (Franclemont and Todd 1982; Poole 1989) (*L. insolens* (Grote), *L. arietis* (Grote), *L. wy-*

atti (Barnes & Benjamin), and *L. ochracea* (Smith) and the recently described *L. sala* Troubridge & Mustelin) occur on Pacific Ocean sand beaches. Their larvae and adults differ structurally from other *Lasionycta*. Godfrey (1972) grouped *L. arietis* and *L. wyatti* separately from other *Lasionycta* (*L. perplexa* and an identified species of "*Lasiestra*" from Mt Rainier) in a comprehensive review of North American Hadenine larvae, recognizing that they formed a "very unique group." These beach species cluster on CO1 distance analysis, consistently nesting among *Lacinipolia* species and removed from other *Lasionycta*. These data indicate that they are not closely related to *Lasionycta*. A new genus, *Psammopolia* Crabo & Lafontaine, is described for them in this paper.

Many *Lasionycta* are alpine and have virtually no prospect for gene exchange between populations in different mountain ranges. It is not surprising that many populations differ slightly in appearance from those from nearby ranges. This revision required many decisions on whether to treat various levels of dissimilar disjunct populations as species, subspecies, or variation. After discovering convincing evidence that several *L. leucocycla* species-group taxa previously considered subspecies of *L. leucocycla* were species (e.g., *L. poca* (Barnes & Benjamin) and *L. flanda* (Smith)) greater weight was given to superficial characters of pattern and color, taking care not to over interpret variability in species like *L. uniformis* (Smith). Proposed changes were tested against DNA data to formulate the most congruous final classification. Nonetheless, we usually gave greater weight to morphology and habitus than DNA and recognize several species without any DNA sequence differences, especially where the ranges were found to abut or overlap without any intermediate forms in the areas of sympatry. Taxa were treated as subspecies when there were significant differences in appearance between large regional populations with only slight overlap in characters, especially in species with multiple CO1 haplotypes in which barcode differences were considered to be less reliable than in groups with less variable DNA. We resisted the temptation to name small populations (e.g., *L. promulsa* (Morrison) from the Uinta and Wasatch Mountains), except when highly disjunct (*L. uniformis shasta* ssp. n. in California and *L. uniformis handfieldi* ssp. n. in eastern Canada).

Barcode results. A total of 310 North American *Lasionycta* specimens were submitted for CO1 barcode sequencing. Of these, 208 produced sequences of 600 or more base pairs and 168 were complete (658 bp). No barcode results are available for four species (*L. carolynae*, *L. illima*, *L. macleani*, *L. mono*) and only incomplete sequences are available for eight more (*L. coracina*, *L. dolosa*, *L. flanda*, *L. lagganata*, *L. phaea*, *L. sasquatch*, *L. sierra*, *L. subfumosa*) (all barcode data is presented in the Appendix). The sample set is skewed by the availability of fresh material from the Pacific Northwest, Alberta, and Churchill, Manitoba and a relative paucity of suitable material from most other parts of North America. Most samples are from sub-groups in which variability suggested the possibility of several similar species. *Lasionycta uniformis*, *L. subfuscula*, *L. perplexa*, and *L. leucocycla* are particularly well sampled.

Twenty of the 39 species (51.3 %) with complete or partial sequences had a single CO1 haplotype. Five of these are only known from a single sequence, so the true

haplotype diversity of these species is unknown. Eleven species (28.2 %) had two haplotypes, and two species had three (5.1 %). There were no species with four or five haplotypes, but six species (15.4 %) had six to twelve haplotypes (*L. leucocycla*, *L. perplexa*, *L. promulsa*, *L. subfuscula*, *L. taigata*, *L. uniformis*). Eight of 39 species (20.5 %) shared haplotypes (*L. skraelingia* and *L. taigata*, *L. anthracina* and *L. flanda*, *L. poca* and *L. sasquatch*, and *L. coracina* and *L. leucocycla*). The haplotypes of 8 species differed by only one or two base pairs (*L. frigida* and *L. leucocycla*, *L. phoca* and *L. uniformis*, *L. pulverea* and *L. sierra*, *L. staudingeri* and *L. subfumosa*). The neighbor-joining trees (Figs 247 and 248) demonstrate that seven species are placed adjacent to or nested amongst multiple similar haplotypes of two polytypic species (*L. anthracina*, *L. flanda*, *L. frigida*, and *L. coracina* with *L. leucocycla; L. phoca*, *L. gelida*, and *L. discolor* with *L. uniformis*). Therefore, 17 *Lasionycta* species (43.6 %) have identical or similar barcodes demonstrating a high frequency of non-discrete haplotype clusters despite the relatively small number of highly polytypic species. Additional sampling of poorly represented species is likely to show an increase in polytypism and haplotype sharing.

The CO1 DNA barcodes were helpful for this taxonomic revision in several regards. Above the species level DNA was helpful in defining the generic limits. The DNA data support inclusion of *L. secedens* and exclusion of *Lasionhada proxima* and the beach species herein transferred to *Psammopolia*. Within *Lasionycta*, distance analysis shows species clustering with relatively large differences between such groups supporting the use of species-groups. These longer DNA tree branches mirror the morphology-based species-group classification described in this paper (Fig. 247). DNA results are less convincing at the sub-group level in the large *L. leucocycla* species group (Fig. 248). The seven sub-groups are comprised of one to ten superficially and structurally similar species. Most of the sub-group members show a tendency to form DNA clusters, but only the *L. subfuscula* group consisting of a single species lacks overlap with the other sub-groups. Members of the *L. staudingeri* sub-group are particularly widely dispersed amongst the entire species-group and its species or species pairs differ by over 6 bp from adjacent species. Although this result could be interpreted to mean that the sub-groups are paraphyletic or polyphyletic, it is probably due to presence of shared haplotypes and non-discrete species haplotype clusters.

Utility of CO1 DNA was also limited at the species level due to the presence of shared haplotypes, close haplotype similarities, and polytypic species as described above. Despite these shortcomings CO1 DNA proved useful in several instances. For example, DNA confirmed that *L. brunnea* sp. n. from the Canadian Rocky Mountains is distinct from similar-appearing populations of *L. uniformis fusca* ssp. n. from the central Rocky Mountains. DNA differences support that *L. poca*, a widely distributed species, and *L. frigida* sp. n., a closely similar species limited to a small range in the Canadian Rocky Mountains, are distinct, although sympatry of the two species in Alberta was also critical. DNA was also seminal in the decision to treat the disjunct *L. poca* and *L. coloradensis* as species rather than subspecies. In the *L. perplexa* sub-group,

large DNA sequence differences first brought to our attention that similar populations from the Pacific Northwest and the central Rocky Mountains, *L. perplexella* sp. n. and *L. subalpina* sp. n., were two species.

The distributions of many *Lasionycta* species reflect survival in Pleistocene glacial refugia and subsequent postglacial dispersal from refugia. Examples of taxa limited to known refugia include *L. coracina* sp. n., *L. carolynae* sp. n., and *L. subfumosa* (Gibson) in Beringia, *L. haida* sp. n. on the Queen Charlotte Islands of British Columbia, *L. uniformis handfieldi* in the Gaspé Peninsula of Quebec, and *L. leucocycla hampa* (Smith) in the White Mountains of New Hampshire. A detailed analysis is beyond the scope of this paper; however, it is interesting to speculate that several distinctive CO1 DNA haplotypes in Pacific Northwest populations of *L. subfuscula livida* ssp. n. and *L. uniformis multicolor* ssp. n. could have resulted from montane refugial isolation and postglacial dispersal. If a widespread species became divided into isolated populations during periods of glaciation the isolates would develop different haplotypes due to genetic drift. As a current example, isolated *L. subalpina* populations in the mountains of northwest Wyoming have distinct DNA haplotypes differing by nearly one per cent from those in the isolated Snowy Range in the southeast part of the state. Blending of populations could occur if the segregates remained interfertile and came into contact after the ice receded. The distinct CO1 haplotypes would be preserved since mitochondrial DNA reflects maternal lineage, whereas other evolved characteristics dependent on nuclear genes would be lost through interbreeding.

Species accounts

The species of *Lasionycta* are arranged into seven species-groups defined by male and female genital morphology. The uncus shape, vesica length, digitus morphology, and cucullus shape are the most important characters for separating species-groups in males. In females, ovipositor lobe shape and vestiture, appendix bursae position and shape, and ductus bursae shape are important distinguishing features. The classification based on morphology is supported by species groupings based on distance analysis of CO1 DNA sequences (Fig. 247).

Key to North American *Lasionycta* species-groups and *Psammopolia* gen. n.

Males

1. Digitus vestigial ..... ***Psammopolia***
– Digitus elongate (***Lasionycta***) **2**
2. Valve lacking membranous postsaccular flap ..... ***L. secedens* species-group**
– Valve with postsaccular flap **3**
3. Uncus nearly cylindrical with acute apex ..... ***L. leucocycla* species-group**

– Distal uncus dorsoventrally flattened with rounded or truncated apex..... **4**
4. Vesica very long (> 3× aedeagus length), straight or slightly curved beyond basal bend, distal part with apical field of velvety setae **5**
– Vesica shorter (< 3× aedeagus), coiled or spiraled with stout apical setae **6**
5. Uncus tip slightly expanded and rounded ..... ***L. skraelingia* species-group**
– Uncus tip spatulate with squared-off apex ..... ***L. phaea* species-group**
6. Digitus more heavily sclerotized than clasper, bent 90° ventrad at base with prong-like or flange-like subbasal projection ..... ***L. subdita* species-group**
– Digitus less heavily sclerotized than clasper, oriented 30–45° ventrad, cylindrical, without projections **7**
7. Valve with weakly constricted neck and small rounded cucullus; forewing with inconspicuous dark-filled reniform spot ..... ***L. luteola* species-group**
– Valve with strongly constricted neck and large triangular cucullus; forewing with large pale-filled reniform spot..... ***L. mutilata* species-group**

Females

1. Appendix bursae narrow and strongly spiraled **2**
– Appendix bursae bulbous, at most with indentation producing spiraled surface groove **3**
2. Ovipositor dorsoventrally asymmetrical with pointed elongate posterodorsal extension; wings pale sandy brown or silver gray ..... ***Psammopolia***
– Ovipositor lobes pad-like and symmetrical; forewings dark gray; hindwings yellow and black ..... ***L. secedens* species-group**
3. Ovipositor lobe sclerotized and conical, spade shaped, or rounded, covered with short stout setae at apex ..... ***L. leucocycla* species-group**
– Ovipositor lobe soft and pad-like, covered with hair-like setae **4**
4. Bursa copulatrix round with appendix bursae extending anteriorly from left side of corpus bursae ..... ***L. skraelingia* species-group**
– Bursa copulatrix ovoid; appendix bursae directed posterodorsad or to left from posterodorsal origin on corpus bursae..... **5**
5. Appendix bursae with spiraled surface groove; ductus bursae nearly cylindrical, without proximal or distal expansions..... ***L. phaea* species-group**
– Appendix bursae bulbous and broadly S-shaped, without surface groove; ductus bursae dorsoventrally flattened..... **6**
6. Anterior ductus bursae with focal expansion toward right > 1.5× ductus diameter near corpus bursae..... ***L. subdita* species-group**
– Ductus bursae lacking asymmetrical expansion near corpus bursae **7**
7. Ductus bursae 0.9–1.0× as long as corpus bursae; small species (forewing length 12–14 mm) with indistinct dark reniform spot ..... ***L. luteola* species-group**
– Ductus bursae relatively shorter, ~ 0.7× as long as corpus bursae; larger species (forewing length 16–18 mm) with large pale-filled reniform spot outlined in black ..... ***L. mutilata* species-group**

Lasionycta skraelingia species-group

The *L. skraelingia* species-group is characterized by the shape of the female bursa. The corpus bursae is round and the appendix bursae arises from its left side and extends straight anteriorly. The bursae of all other species-groups are ovoid with the appendix arising from the dorsal side of the posterior end. The ovipositor lobes are soft and covered by hair-like setae.

The male has a long vesica, approximately 3× the aedeagus length. The vesica has a 90° subbasal bend dorsad and toward the left, with a short broad diverticulum at the bend of the vesica bearing 1–3 tiny, spike-like cornuti. The distal vesica is gently curved and twisted with spiraling of the sclerotized band. It bears an elongate distal field of fine velvety cornuti. The valve has a short digitus that ends before reaching the ventral valve margin. The uncus is dorsoventrally flattened and slightly widened with a rounded apex. The male antennae are weakly biserrate, approximately 1.4× width of the shaft.

Males of the *L. phaea* and *L. secedens* species-groups also have long vesicae. The *L. phaea* species-group differs in having a broad spatulate uncus, and *L. secedens* can easily be distinguished from the *L. skraelingia* species-group by its yellow and black hindwing and by the genital characters given in its species-group description. Both *L. phaea* and *L. secedens* have a narrower beadlike antenna than those of the *L. skraelingia* species-group.

Lafontaine and Kononenko (1988) revised the *L. skraelingia* species-group. Only two species included by them are retained in the species-group in the present work, with the remainder forming the *L. phaea* species-group.

The *L. skraelingia* species-group has a Holarctic distribution with both species occurring in North America.

Key to the *L. skraelingia* species-group

1. Antemedial line nearly straight, undulating; forewing color even gray; Eurasia and far northwestern North America (Yukon) ..... ***L. skraelingia***
– Antemedial line uneven, zigzag; forewing ground color mottled with mixture of black, gray, and white scales; widely distributed in boreal North America ..... ***L. taigata***

Lasionycta skraelingia (Herrich-Schäffer)

Figs 1–3, 136, 194. Map 1

Phlogophora skraelingia Herrich-Schäffer, 1852: 57.
Lasionycta skraelingia; Aurivillius 1892b: 285.
Mamestra skraelingia; Staudinger and Rebel 1901: 159.
Lasionycta scraelingia; Hampson 1905: 56. Invalid emendation.

Lasionycta skroelingia; Warren 1910: 85. Misspelling.
Hada skraelingia; Hartig and Heinicke 1973: 193.
Lasionycta skraelingia; Lafontaine et al. 1986: 255.

Type material. Type: lost. The original description is sufficient to characterize the species (Lafontaine and Kononenko 1988). Type locality: Lapland.

Diagnosis. *Lasionycta skraelingia* is distinguished from *L. taigata* Lafontaine by its undulating antemedial line (irregular in *L. taigata*) and more even gray forewing (mottled in *L. taigata*). The cucullus of the male valve is larger in *L. skraelingia* than in *L. taigata*, and the digitus is very short. The female genitalia are similar, but the appendix bursae of *L. skraelingia* is shorter than that of *L. taigata*. The CO1 sequence of *L. skraelingia* is identical to one of several *L. taigata* haplotypes.

Distribution and biology. *Lasionycta skraelingia* is Holarctic, occurring from Scandinavia to northwestern North America. In North America this species is known from three specimens from Windy Pass, Ogilvie Mountains, Yukon. The adults are crepuscular and fly rapidly over small spruces. They are collected by hand netting, rarely if ever coming to a light. Dates are from late June to early July.

In Scandinavia the species is polyphagous when reared and has been fed on *Betula nana* L. (Betulaceae), *Polygonum aviculare* L. (Polygonaceae), and *Vaccinium uligonosum* L. (Ericaceae) (Ahola and Silvonen 2008). These authors report that Eurasian populations are biennial, likely also the case in North America. The Yukon specimens were been collected in two odd-numbered years.

***Lasionycta taigata* Lafontaine**
Figs 4, 5, 137, 195. Map 1

Lasionycta taigata Lafontaine, 1988: 905.

Type material. Holotype ♂ [CNC, examined]. Type locality: L'Anse-au-loup, Labrador, [Canada].

Diagnosis. Yukon specimens of *L. taigata* can be distinguished from *L. skraelingia* by the irregular antemedial line (undulating and gently curved in *L. skraelingia*). The genital features distinguishing these species are given under *L. skraelingia*. Six similar CO1 sequence haplotypes of *L. taigata* exist (Fig. 247), one of which is identical to that of *L. skraelingia*.

Distribution and biology. *Lasionycta taigata* occurs in open peatlands and fens in the taiga zone from Labrador, Churchill, Manitoba, and central Yukon southward to northern Maine, northern Minnesota, and southwestern Alberta. In contrast to *L. skraelingia* adults are nocturnal and come readily to light, and occur annually. Adults have been collected from late June through July.

Lasionycta secedens species-group

This species-group includes only *L. secedens*, an aberrant species within *Lasionycta* with a nearly filiform male antenna and several unique features of male and female genitalia (Figs 138 and 196). The uncus is short with a pointed tip, the valves taper from base to apex due to a large sacculus and small cucullus, and it is the only *Lasionycta* lacking a postsaccular flap. The aedeagus has a unique stout distal spine and long serpentine vesica with a long distal field of small setae. Females are the only members of the genus with an asymmetric widening of the left side of the posterior ductus bursae, a strongly spiraled appendix bursa, and fewer than three signa on the corpus bursae.

The rationale for including *L. secedens* in the genus is outlined in the *Lasionycta* Remarks section. The weakly spiraled appendix bursae and narrow male antennae of *L. phaea* suggest that it is an intermediate between *L. secedens* and more typical members of the genus. This is supported by the fact that *L. secedens* and *L. phaea* are placed adjacent to each other on CO1 distance analysis when all species-groups are included. Similarly, *L. mutilata* species-group males have a raised patch of multiple spines on the apical aedeagus and females have a corresponding widening in the posterior ductus bursae intermediate between the *L. secedens* species-group and other *Lasionycta* species-groups that lack both characters. We consider the absence of the male postsaccular flap in the *L. secedens* species-group to be a secondary loss.

Lasionycta secedens is widely distributed in the boreal zones of Eurasia and North America.

Lasionycta secedens (Walker)

Figs 7, 8, 138, 196. Map 2

Plusia secedens Walker, [1858]: 913.
Anarta secedens; Smith 1893a: 294.
Polia secedens; McDunnough 1938: 70.
Anartomima secedens; Franclemont and Todd 1982: 149.
Lasionycta secedens; Hacker et al. 2002: 152.
Anarta bohemani Staudinger, 1861: 370.
Anartomima bohemani; Boursin 1952: 55.
Anartomima secedens bohemani; Kononenko et al. 1989: 553.
Lasionycta secedens syn. *bohemani*; Hacker et al. 2002: 149.

Type material. *Plusia secedens*: **holotype** ♂ [BMNH, examined]. Type locality: St. Martin's Falls, Albany River, Hudson Bay, [Ontario, Canada]. *Anarta bohemani*: **holotype** ♂ [ZMHB, not examined]. Type locality: Lapland.

Diagnosis. *Lasionycta secedens* is easily identified without dissection by the combination of dark-gray to black-gray forewing and vivid yellow hindwing with black along the costal and distal margins. *Lasionycta leucocycla albertensis* (McDunnough) and *L.*

illima sp. n. that also have yellowish hindwings lack black on the costa. *Lasionycta secedens* is the only *Lasionycta* in which the male lacks a postsaccular flap and the female has a strongly spiraled appendix bursae.

Distribution and biology. *Lasionycta secedens* is Holarctic. North American populations are distributed from Labrador, northern Manitoba, and Alaska southward to northern Maine, northern Minnesota, and south-central British Columbia. It is found in boreal forest, especially bogs, and is both diurnal and nocturnal.

Ahola and Silvonen (2008) report that early instar larvae prefer to feed on the epidermis of leaves of *Vaccinium vitis-idaea* L. (Ericaceae), but is polyphagous when reared. In Scandinavia the larva overwinters twice. In Minnesota this species occurs in raised bogs with *V. vitis-idaea* (K. Johnson pers. comm.) suggesting that this is the foodplant in North America.

Geographical variation. Populations of *L. secedens* are arranged in two subspecies.

***Lasionycta secedens secedens* (Walker)**
Figs 7, 138, 196. Map 2

Plusia secedens Walker, [1858]: 913.

The nominate subspecies is the most common and widely distributed subspecies in North America, occurring from eastern Canada to northern British Columbia. The forewing is very dark gray with lighter gray-filled spots. The black hindwing marginal band is broader in *L. s. secedens* than in *L. s. bohemani* (Staudinger).

***Lasionycta secedens bohemani* (Staudinger)**
Fig. 8. Map 2

Anarta bohemani Staudinger, 1861: 370.

Subspecies *bohemani* has a Holarctic distribution, occurring across northern Eurasia. In North America it is restricted to Alaska and Yukon. It is less vividly colored than *L. s. secedens*. The forewing, including the filling of the spots, is uniform medium gray, with lines and spots outlined in black. The black marginal band on the hindwing is narrower than in the nominate subspecies. No structural or significant CO1 sequence differences exist between the subspecies.

***Lasionycta phaea* species-group**

The male genitalia of the *L. phaea* species-group resemble those of the *L. skraelingia* species-group, but the uncus is broadly flattened and spatulate with a squared-off apex and the

digitus is longer, extending below the valve. Females have a distinctly different bursa than those of the *L. skraelingia* species-group. The corpus bursae is ovoid, not rounded, with less sclerotized signa. The appendix bursae is attached to the dorsal corpus bursae rather than to the left side and extends dorsally and to the left. Its surface is grooved producing a weak spiral of approximately 1.5 turns. The male antenna is beadlike (*L. phaea*) to biserrate (1.5× as wide as shaft in two Asian species (Lafontaine and Kononenko 1988)).

Lasionycta phaea is the only North American member of the species-group. Three additional species, *L. alpicola* Lafontaine & Kononenko, *L. buraetica* Kononenko, and *L. corax* Kononenko, are found in central and western Asia (Lafontaine and Kononenko 1988).

The species in this species-group were included in the *L. skraelingia* species-group by Lafontaine and Kononenko (1988). In addition to the structural differences between the species-groups, *L. phaea* fails to group with *L. skraelingia* and *L. taigata* on CO1 distance analysis, instead clustering near *L. secedens* (Fig 247).

Lasionycta phaea (Hampson)

Figs 6, 139, 197. Map 2

Anarta phaea Hampson, 1905: 45.
Lasiestra impingens phaea; McDunnough 1938: 72.
Lasionycta phaea; Lafontaine and Kononenko 1988: 909.

Type material. Lectotype ♀ [BMNH, examined]. Type locality: Cambridge Bay, Victoria Land [Victoria Island, Nunavut, Canada]. The lectotype female was designated by Lafontaine and Kononenko (1988: 909).

Diagnosis. *Lasionycta phaea* is the only North American *Lasionycta* in which the male has a broadly spatulate uncus and the female a spiraled indentation on the appendix bursae. The moth resembles a small *L. taigata* or *L. skraelingia*. The reniform spot is smaller then in either of these species. The adult is diurnal, with reduced eyes, whereas the other species are nocturnal and have normal-sized or only slightly reduced eyes. The male antenna of *L. phaea* is nearly filiform whereas those of *L. taigata* and *L. skraelingia* are biserrate.

Distribution and biology. *Lasionycta phaea* is an arctic species. It has been collected from Baffin Island in northeastern Canada to the central Brooks Range in northern Alaska and southward along the west coast of Hudson Bay to Arviat, Nunavut. It is rare in collections. Adults are diurnal and occur on wet tundra. Collection dates range from late June to mid-July.

Lasionycta subdita species-group

The *L. subdita* species-group contains three allopatric species characterized by the male digitus and female ductus bursae. The digitus is heavily sclerotized with a nearly

perpendicular orientation to the valve and bears a flange-like ridge or pointed projection at the base. Those of other species-groups are less sclerotized, are oblique to the valve, and have a simple elongate shape. The uncus is dorsoventrally flattened and the tip is ovate. The vesica is 1.5× as long as the aedeagus, has a slightly expanded subbasal and mesial section, and is weakly twisted beyond a 90° subbasal dorsal and rightward bend. It bears 3–5 stout basal cornuti and a distal elongate patch of spines. The male antenna is bipectinate with T-shaped individual segments. The female has a dorsoventrally flattened ductus bursae with a unique sclerotized asymmetrical bulge toward the right near the corpus bursae. The ovipositor lobe is membranous and covered with hair-like setae. The appendix bursae arises from the dorsal corpus bursae and projects dorsally, 30° anteriorly, and leftward proximally, turning posteriorly before the apex.

Key to the *L. subdita* species-group

1. Distal forewing mottled with patches of dark scales; fringe checkered; occurring in northeastern North America ..... ***L. subdita***
– Distal forewing smooth with inconspicuous dark areas limited to the subterminal line; fringe nearly unicolorous; occurring in western North America **2**
2. Distal claviform spot a black bar; occurring in Rocky Mountains south of Beartooth Plateau on Montana-Wyoming border ..... ***L. conjugata***
– Claviform spot without a black bar; occurring north and west of Beartooth Plateau ..... ***L. fergusoni***

***Lasionycta subdita* (Möschler)**
Figs 9, 140, 198. Map 3

Dianthoecia subdita Möschler, 1860: 363.
Mamestra subdita; Smith 1893a: 129.
Lasionycta subdita; McDunnough 1938: 71.
Anarta membrosa Morrison, 1875a: 101.
Anarta membranosa; Smith 1893a: 294, misspelling.
Lasionycta membrosa; McDunnough 1938: 71.

Type material. *Dianthoecia subdita*: **holotype** ♂ [ZMHB, not examined]. Type locality: Labrador. *Anarta membrosa*: **type** lost. Type locality: New Hampshire. The type is presumed lost but the name was synonymized with *L. subdita* by Lafontaine and Kononenko (1988) based on details of the original description.

Diagnosis. This northeastern species can be identified by a combination of light-gray forewing with black orbicular and reniform spots filled with pale-gray scales, black claviform spot, and mottled distal forewing with a checkered fringe. It is most likely to be confused with *L. taigata*, also found in northeastern North America, but is readily distinguished from it by differences in the genitalia given in the key to species-groups.

The male digitus bears a stout basal spine. Those of the other species in the species-group have a broad basal flange. Females have a rounder corpus bursae and more blunt appendix bursae than the western species.

The CO1 DNA of *L. subdita* differs by more than 1.8 % from that of *L. conjugata* (Smith) and *L. fergusoni* sp. n.

Distribution and biology. *Lasionycta subdita* is predominantly a subarctic species. It occurs across Labrador, Quebec, and Ontario to Churchill, Manitoba on the west shore of Hudson Bay. A disjunct population is in the White Mountains of New Hampshire. The adults are nocturnal and come to light. They have been collected in July.

Lasionycta conjugata (Smith)

Figs 10, 141, 199. Map 3

Scotogramma conjugata Smith, 1899: 41.
Lasionycta conjugata; McDunnough 1938: 71.

Type material. Lectotype ♂ [USNM, examined]. Type locality: Garfield County, Colorado, [USA]. The lectotype was designated by Todd (1982: 54).

Diagnosis. *Lasionycta conjugata* has a pale-gray forewing with jet-black lines, spots, and bars between the claviform spot and postmedial line and orbicular and reniform spots. It occurs to the south of the range of *L. fergusoni*. This species is similar but its forewing is darker blue gray and lacks the black bars. The antennal segments of *L. conjugata* are triangular whereas those of *L. fergusoni* are T-shaped with narrow distal segments. The flange of the digitus is less prominent in *L. conjugata* than in *L. fergusoni*. The female genitalia are similar.

The CO1 sequences of *L. conjugata* and *L. fergusoni* differ by at least 1.7 %.

Distribution and biology. *Lasionycta conjugata* occurs in the Rocky Mountains from central Utah and Colorado north to the Beartooth Plateau on the Montana-Wyoming border. It flies in subalpine forests and is nocturnal. Adults have been collected from early July to late August.

Lasionycta fergusoni Crabo & Lafontaine, sp. n.

urn:lsid:zoobank.org:act:6B735C88-839A-4E0A-8EF7-BEF5B00029AB
Figs 11, 142, 200. Map 3

Type material. Holotype ♂: Canada, British Columbia, Pavilion Mtn, 6860', 50° 58' N 121° 41' W, 30 July 2000, Troubridge and Hensel. CNC. **Paratypes:** 41 ♂, 17 ♀. **Canada, British Columbia.** Same data as holotype (3 ♂, 2 ♀); Watch Peak, 8000[-8200]', 2 km N Panorama, [50° 28' N 116° 18' W], 23 July 1994, L. Crabo and J. Troubridge (2 ♀), 16–17 Aug. 1996, J. Troubridge (5 ♂), 24 July 1998, J. Troubridge (1 ♀); Mission Ridge, 50.76-[50.7]7° N 122.16-[122].20° W, 6000', 15–16

July 1994, L. Crabo and J. Troubridge (5 ♂, 1 ♀); Coast Range, Gott Pk, 50.36° N 122.14° W, 7100', L. G. Crabo (1 ♂); Fraser Cyn, Kirby Flat Rd, 50.596° N 121.719° W, 3700', 19 June 1999, L. G. and A. G. Crabo (1 ♂); **Washington.** Okanogan-Whatcom County line, Slate Peak, 48.73-[48].74° N 120–66-[120].67° W, 6800–7320', L. G. Crabo, 8 July 1988 (1 ♂), 13 July 2005 (1 ♂); Pend Oreille County, Monumental Mtn, 48.67° N 117.18° W, 5700', 23 June 2004, L. G. and E. K. Crabo (10 ♂, 5 ♀); Salmo Mtn, 48.86-[48].95° N 117.08-[117].10° W, 5860–6830', 17 July 2007, L. G. Crabo (5 ♂, 1 ♀); Stevens County, Chewelah Mt., 48.26-[48].29° N 117.56-[117].58° W, 4400–5100', 22 June 2004, L. G. and E. K. Crabo (3 ♂, 3 ♀); Whatcom County, Harts Pass, 48.73° N 120.66° W, 1950 m., 2 Aug. 1991, L. G. Crabo (2 ♂, 2 ♀); Yakima County, Bethel Ridge, 46.79° N 121.09° W, 1900 m., L. G. Crabo, 18 July 1997 (2 ♂), 23 July 1997 (1 ♂). AMNH, CDFC, CNC, GBC, JSC, LGC, OSU, TMC, UASM, USNM, WSU. The type series is restricted to British Columbia and Washington State.

Etymology. We take pleasure in naming this species after the late Douglas C. Ferguson. Doug had a keen interest in *Lasionycta* and recognized that this species was distinct from *L. conjugata*.

Diagnosis. *Lasionycta fergusoni* is similar to *L. conjugata* and has been confused with it for years. *Lasionycta fergusoni* is dark blue gray with a large orbicular spot that touches the reniform spot without an intervening black bar. Differences in the male antennal segments and genitalia between these species are described under *L. conjugata*. The species can also be separated by locality since *L. fergusoni* occurs north of the range of *L. conjugata*.

The CO1 sequences of *L. fergusoni* and *L. conjugata* differ by at least 1.7 %.

Description. Head – Antenna of male bipectinate and fasciculate, 2× as wide as central shaft, individual segments T-shaped with narrow distal segments oriented at right angle to shaft. Antenna of female filiform and ciliate. Dorsal antenna white with a few black scales. Scape white. Eye size normal. Palpus covered with pencil-lead and a few white scales. Frons with white and black hair-like scales anteriorly, black scales superiorly, appearing gray with a transverse black bar between eyes. Top of head white anteriorly, gray superiorly. **Thorax –** Vestiture a mixture of gray hair-like and white-tipped black bifurcated scales, appearing gray ventrally and hoary charcoal gray dorsally. Anterior prothoracic collar with a thick black stripe. Patagium gray with faint black at medial and posterior margins. Legs gray with distal tarsal segments ringed with white. **Wings –** Forewing length: males 12–17 mm (expanse 32–36 mm); females 15–18 mm (expanse 32–37 mm). Forewing ground color a nearly equal mixture of pencil-lead gray and white scales, appearing dark blue gray with slightly darker medial area. Basal line black, thin, undulating. Antemedial line black, single, slightly darker than postmedial line, excurved at claviform spot and posterior margin. Postmedial line single, black, scalloped between veins, broadly convex opposite cell and concave in fold, with slightly paler gray distal to line. Subterminal line pale and inconspicuous. Reniform and orbicular spots black, thin, filled with uniform gray slightly lighter than ground color. Orbicular spot elongate, oval, touching antemedial line and closely ap-

proaching or touching reniform spot without an intervening black bar. Reniform spot moderately large, weakly kidney shaped, with superior aspect extending toward apex. Claviform spot black, filled with ground color, extending from antemedial line to postmedial line without forming a black bar. Fringe gray with pale scales at veins, appearing slightly checkered. Ventral forewing nearly uniform dark gray, with diffuse dark postmedial line evident at costal margin and in cell. Fringe light gray, checkered darker gray between veins. Dorsal hindwing uniform medium-dark gray, with very faintly darker postmedial line and marginal area. Hindwing fringe two-toned with mottled gray proximal and light-gray distal components. Ventral hindwing with white scales with an even dusting of dark-gray scales, appearing hoary medium-gray, lighter than ventral forewing. A dark-gray basal dash present in some specimens. Discal spot dark gray, ovoid. Postmedial line similar to discal spot in color and intensity, gently undulating. Marginal band absent. Fringe slightly mottled light gray. **Abdomen –** Similar gray to dorsal hindwing. **Male genitalia –** (Fig. 142). Uncus flattened, ovate, with small distal hook. Valve 6× as long as wide. Sacculus 0.3× valve length, costal lobe extending above dorsal margin. Digitus heavily sclerotized, oriented perpendicular to valve, with subbasal semicircular flange with pointed projections like half a machine cog, distal portion curved distad, pointed. Cucullus 2× valve width, corona single. Aedeagus 5× as long as wide, tube shaped. Vesica 1.5× as long as aedeagus, shape as in species-group description, with 3–4 large crenulate dome-shaped cornuti with a short pointed central process, distal spines forming an irregular patch of relatively short cornuti oriented perpendicular to axis of vesica. **Female genitalia** – (Fig. 200). Ovipositor lobes with slight distal point, covered in long hair-like setae. Abdominal segment VIII 0.5× as long as wide, anterior apophysis 0.8× and posterior apophysis 1.2× length of abdominal segment VIII. Ductus bursae 0.7× corpus bursae length, ovoid and dorsoventrally flattened in cross-section, anterior portion rugose, slightly flattened and prominently expanded toward right adjacent to attachment to corpus bursae. Corpus bursae ovoid, bearing elongate signa on ventral, dorsal, and left surfaces. Appendix bursae shape as in species-group description, relatively bulbous.

Distribution and biology. *Lasionycta fergusoni* occurs from the southern Washington Cascades through British Columbia and Alberta to southern Yukon. It flies in subalpine forest and is nocturnal. Adults have been collected from late June to mid-August.

Lasionycta mutilata species-group

The *L. mutilata* species-group contains two similar species from the mountains and coast of northwestern North America. It is characterized by the combination of a dorsoventrally flattened uncus, an S-shaped valve with a 50° lateral bend at the base of the digitus, a large triangular cucullus with a long narrow neck, and a long rod-like digitus. The right side of distal aedeagus bears a raised area with multiple small spines. The vesica is 1.5× as long as the aedeagus and is widest mesially, extends to the right

beyond a subbasal bend to end to the right of the aedeagus, and bears 3–6 basal cornuti with sharp central spines arising from a conical base and a distal band of multiple spines oriented perpendicular to the vesica. The male antenna is weakly biserrate with diamond-shaped segments, 1.5× as wide as the shaft.

The female genitalia of *L. mutilata* (Smith) are similar to those of the *L. subdita* species-group but the posterior ductus bursae is slightly expanded leftward, probably to accommodate the raised area of the aedeagus, while the anterior part lacks an asymmetrical widening. The distal appendix bursae is broadly rounded.

Key to the *L. mutilata* species-group

1. Ventral thorax medium gray without brown tint; occurring on or near the mainland of northwestern North America.....***L. mutilata***
– Ventral thorax dark brown gray; occurring on the Queen Charlotte Islands of British Columbia .....***L. haida***

***Lasionycta mutilata* (Smith)**
Figs 12, 13, 143, 201. Map 4

Mamestra mutilata Smith, 1898: 246.
Lasionycta mutilata; McDunnough 1938: 71.
Mamestra rainieri Smith, 1900: 462, **syn. n.**
Mamestra rainierii; Dyar 1903: 156, misspelling.
Lasionycta rainieri; McDunnough 1938: 71.

Type material. *Mamestra mutilata*: **holotype** ♂ [USNM, examined]. Type locality: British Columbia. *Mamestra rainieri*: **holotype** ♂ [USNM, examined]. Type locality: Mount Rainier, Washington.

Diagnosis *Lasionycta mutilata* is a distinctive species from northwestern North America. It has a mottled silver-gray forewing with black lines and spots and patches of yellow green in the fold and distal to the subterminal line. The orbicular, claviform, and reniform spots are large and filled with the ground color. Adults are most similar to non-melanic specimens of *L. haida*, but can be identified by its gray ventral thorax, dark gray brown in *L. haida*. *Lasionycta mutilata* is shinier and bluer than *L. haida* and its spots are larger. The male genitalia and antennae of the species are indistinguishable. The species are easily distinguished by locality since *L. haida* occurs on the Queen Charlotte Islands.

The CO1 sequences of *L. mutilata* and *L. haida* differ by 1.55 %.

Distribution and biology. *Lasionycta mutilata* occurs from Oregon and Yellowstone National Park, Montana/Wyoming northward to the Alaskan Panhandle and the Rocky Mountains of Alberta. It is absent from the Queen Charlotte Islands. *Lasionycta mutilata* flies in high transition zone and subalpine conifer forest and is nocturnal. It has been collected from late June through August.

Geographical variation. *Lasionycta mutilata* has a nearly uniform appearance throughout its range. Some specimens from Ketchikan, Alaska are darker than those from elsewhere, but none shows the brown color characteristic of *L. haida*.

***Lasionycta haida* Crabo & Lafontaine, sp. n.**
urn:lsid:zoobank.org:act:A5B4DA69-7E14-49CD-88EF-B877B5A9A189
Figs 14, 15, 144. Map 4

Type material. Holotype ♂ (light form): [Canada], B[ritish] C[olumbia], Queen Charlotte Islands, Graham Id., SW of Dinan Bay, 2575', 23 July 1987, J. F. G. Clarke, N. L. duPré [alpine tundra, black light]/ Database # CNC LEP 00053375. USNM. **Paratypes:** 127 ♂. **Canada, British Columbia.** Same locality, date, and collectors as holotype (122 ♂); Same locality, date, and collectors as holotype/ Databased for CNC, NOCTUOIDEA # 6437, 6438, 6439, and 6440/ Barcodes of Life Project, University of Guelph, DNA # Noctuoidea 6437, 6438, 6439, and 6440 (4 ♂); Graham Island, 2 mi NE Dinan, 3100', 11–12 Aug. 1988, J.F.G. Clarke and N.L. McIntyre (2 ♂). CNC, LGC, USNM.

Etymology. This species is named after the Haida people, the original inhabitants of the Queen Charlotte Islands. It is a noun in apposition.

Diagnosis. *Lasionycta haida* is similar to *L. mutilata* and replaces it on the Queen Charlotte Islands, British Columbia. *Lasionycta haida* is the only dimorphic *Lasionycta* with both gray and dark-brown forms. The gray form is similar to *L. mutilata* but can be told from it by its dark gray-brown ventral thorax (gray in *L. mutilata*). In addition, the gray form of *L. haida* is browner than *L. mutilata* and its orbicular and reniform spots are smaller. In the distinctive brown form most of the forewing is dark gray brown with a greatly accentuated pattern due to persistent pale filling of lines and spots with luteous scales. The brown form cannot be confused with any other *Lasionycta* but resembles *Psammopolia arietis* (Grote) – until now included in *Lasionycta* (see Appendix) – that occurs on Queen Charlotte Island beaches. The male genitalia of *P. arietis* lack a digitus. The females of *L. haida* is unknown but is likely to be similar to that of *L. mutilata*, so they probably have pad-like ovipositors whereas those of *P. arietis* are long and pointed.

The CO1 sequences of *L. haida* and *L. mutilata* differ by 1.55 %. The two color forms of *L. haida* have identical sequences.

Description. Dimorphic with gray (light form) and dark-brown (dark form) forms. Gray form described first where differences exist. Female unknown. **Head –** Antenna of male weakly biserrate, appearing beadlike, 1.5× as wide as central shaft, dorsal segments white (light form) or dark gray proximally and tan distally (dark form). Scape white (light form) or tan (dark form). Eye rounded, normal size. Palpus dark brown gray, distal segment with light-gray scales (light form), or with few lighter scales (dark form). Frons covered in light-gray hair-like scales centrally and dark-gray scales laterally (light form), or just dark brownish-gray (dark form). Top of head cov-

ered with white-tipped light-brown scales centrally and white scales laterally (light form), or with brown scales except for white scales above eye (dark form). **Thorax –** Vestiture a mixture of dark-brown and white-tipped dark-brown scales, appearing silver gray and dark gray (light form), or hoary dark brown and silver gray (dark form); anterior thorax behind prothoracic collar nearly black and venter dark brown gray in both forms. Prothoracic collar light gray (light form) or hoary gray (dark form). Legs dark brownish gray, distal tarsal segments white. **Wings –** Forewing length 16–17 mm (expanse 32–33 mm). Forewing ground a mixture of gray-brown, black, white, and pale-luteous scales with a mixture of medium-gray and dark gray-brown scales, appearing slightly shiny gray with black lines and spots (light form), or appearing dark gray brown with light-gray lines and spots (dark form); a patch of luteous scales in fold distal to claviform spot (both forms). Lines black, filled with whitish gray. Basal and antemedial lines uneven. Antemedial line zigzagged near posterior margin. Postmedial line faint, evident as dark shade near costa and in cell. Postmedial line deeply scalloped between veins. Subterminal line whitish gray, evident due to preceding chevrons (light form), or preceded by black chevrons between veins, distinct due to lighter filling (dark form). Spots black. Orbicular spot round to slightly oval, slightly lighter gray than ground color (light form), or filled with whitish gray peripherally and dark brown-gray scales centrally (dark form). Reniform spot moderately large, kidney to heart shaped, with similar filling to orbicular spot. Claviform spot prominent, filled with ground color, extending to midpoint between antemedial and postmedial lines in most specimens. Fringe checkered with ground color and white. Ventral forewing smooth smoky gray brown, darkest in dark form. Dorsal hindwing gray, slightly darker and browner in dark form. Discal spot, postmedial line, and broad indistinct marginal band slightly darker gray than ground color. Fringe light gray basally, white distally. Ventral hindwing light gray anteriorly and medium gray elsewhere (light form), or smoky gray brown (dark form). Discal spot dark gray, large, round to arrowhead shaped. Postmedial line dark gray, sinuous. Marginal band indistinct. **Abdomen –** Gray, slightly lighter distally; color similar to dorsal hindwing in both forms. **Male genitalia –** (Fig. 144). Uncus dorsoventrally flattened, mesial and distal part ovate. Valve 5× as long as wide, S-shaped with 40° bend distal to base of digitus. Sacculus relatively small, 1× length of valve width, costal lobes not reaching dorsal margin of valve. Cucullus large, triangular, separated from remainder of valve by a narrow neck 0.5× valve width and 0.33× cucullus width. Corona consisting of a single row of over 50 claw-like setae. Digitus a straight thin rod 1× valve width in length, oriented 45° to long axis of valve. Aedeagus 5× as long as wide, with small raised spinulose process extending onto base of right side of vesica. Vesica 1.8× aedeagus length, with a weak subbasal coil in proximal ½ and gradual twist over distal ½ extending to right of distal aedeagus, bearing 3–4 (N = 2) cone-shaped central spike-like subbasal cornuti on coiled part and a long field of many small stout cornuti oriented perpendicular to long axis on distal straight part.

Distribution and biology. *Lasionycta haida* is restricted to the Queen Charlotte Islands, British Columbia. *Lasionycta haida* is only known from males despite a series

of over 120 specimens. Females of *L. mutilata* are commonly collected at light suggesting that *L. haida* females are flightless.

The 1987 collecting trip in which the most of the type series of this species was collected is recounted by Nancy L. duPré Clarke (1991). Although the identity of the moth is not discussed in the article, details such as "this expedition to 2575 feet on Graham Island" and "No sooner did we attach the light cords to the battery than we were bombarded by dozens of a single species of moth" leave little doubt that she is describing the collection of this species since over a hundred specimens were collected in a single night. The habitat is "well above tree line [with] sparse grasses and thick heather [covering] the nearly bare rock base."

Ferguson (1987) described another endemic alpine Queen Charlotte Island moth, *Xanthorhoe clarkeata* Fgn. (Geometridae), from material collected by J. F. G. Clarke in the mid 1980's. The Queen Charlotte Island glacial refugium and its endemic insects are discussed in this paper.

Lasionycta luteola species-group

The *L. luteola* species-group contains only *L. luteola* (Smith), a small (forewing length 12–14 mm) alpine species occurring in northwestern North America. It is characterized by the male and female genitalia. Males have an ovate flattened uncus, a strap-like valve with a relatively small cucullus, a straight digitus, and a vesica with a 360° subbasal coil with stout crenulate basal cornuti. Females have a soft pad-like ovipositor covered with long hairs, a relatively long ductus bursae (0.9× corpus bursae), and a strongly constricted bursa copulatrix with slightly smaller appendix bursae than corpus bursae. The male antenna is biserrate, approximately 1.8× as wide as the shaft.

The *L. luteola* species-group is structurally intermediate between the *L. mutilata* and *L. leucocycla* species-groups. The male uncus and basal vesica cornuti resemble those of the *L. mutilata* species-group whereas the valve and vesica shapes are more like those of the *L. leucocycla* species-group. In the female, the pad-like ovipositor is similar to that of the *L. mutilata* species-group but the cylindrical ductus bursae and smaller corpus bursae are like those of the *L. leucocycla* species-group.

The *L. luteola* species-group CO1 sequence differs from those of all other *Lasionycta* species by more than 2.9 %. *Lasionycta luteola* is always an isolated species on distance analysis, most often placed near the *L. mutilata* species-group (Fig. 247).

Lasionycta luteola (Smith)

Figs 16–18, 145, 202. Map 5

Scotogramma luteola Smith, 1893b: 101. Described again as new in Smith 1894: 56.
Lasiestra luteola; McDunnough 1938: 72.
Lasionycta luteola; Lafontaine et al. 1986: 264.

Type material. Lectotype ♂ [USNM, examined]. Type locality: Laggan [Lake Louise], Alberta. The lectotype male was designated by Todd (1982: 127).

Diagnosis. *Lasionycta luteola* is a small alpine species with a shiny mottled gray forewing with variable yellow patches, most evident in the fold in the median area. It has dark-gray antemedial, postmedial, and subterminal lines, inconspicuous spots, and variable dark-gray shading in the medial area and preceding the subterminal line. The reniform spot is evident only as a dark smudge in some specimens. The dorsal hindwing is uniform gray with a luteous white fringe. The underside of both wings has similar wide diffuse postmedial lines that contrast with the pale ground color and a relatively inconspicuous hindwing discal spot. *Lasionycta luteola* in traps can usually be identified by their undersides. The genitalia are described in the species-group section.

Distribution and biology. *Lasionycta luteola* is distributed from northern Washington and southwestern Alberta northward to southwestern Yukon. It occurs in alpine tundra. Adults are predominantly nocturnal but also fly during the day and feed on nectar at *Silene acaulis* (L.) Jacq. (Caryophyllaceae). *Lasionycta luteola* is usually common and can be abundant. It has been collected from mid-July to mid-August.

Geographical variation. Specimens from the Coast Range of British Columbia and the mountains of southwestern Yukon are most vividly colored and variable, often with bright yellow on the forewing and a mottled appearance. Specimens from the Rocky Mountains and northern British Columbia are more uniform gray.

Lasionycta leucocycla species-group

The *L. leucocycla* species-group is comprised of 33 species in North America. Males are defined by a cylindrical to slightly laterally compressed uncus tapered to a hook-like apex. Those of other species-groups are dorsoventrally flattened and laterally expanded with blunt tips. Females have ovipositor lobes covered by short peg-like cornuti whereas those of other species-groups are covered with hairs. The genitalia of most species are closely similar and are of limited use for identification of individual species. They are described in the following paragraphs, with significant features of each species subgroup and species noted subsequently as appropriate.

Males have a simple strap-like valve. The costal lobes are variable, small to moderately large. The cucullus is weak to moderate size (0.7–1.4× valve width) separated by a nearly absent to mildly constricted neck. The corona of 15–40 curved setae is arranged in a single row, a single row with irregular apical double row, a complete double row, or as an irregular patch up to 4 rows wide. The triangular or finger-like digitus is oriented 30–45° ventrad to the valve. The aedeagus is tubular without projections. The vesica is 1.5–2.0× as long as the aedeagus, the basal portion is coiled 360° (dorsad, then anterior, ventrad, and rightward) and its distal portion is gently twisted 180° to project rightward and/or ventrad. The 0–6 subbasal cornuti are located on the basal coil and are elongate, comprised of a central spike arising from a smooth cone-shaped base.

In the female, the ductus bursae is cylindrical, slightly expanded anteriorly. The corpus bursae is 1.1–1.6 x as long as the corpus bursae. The corpus bursae is ovoid and focally constricted distal to the appendix origin, about 50 % in most species, but weakly in the *L. staudingeri* and *L. impingens* sub-groups. The appendix bursae arises from the dorsal posterior margin of the corpus bursae and extends dorsad and posterior. Its base is slightly expanded and the distal third tapers bluntly following a 90° posterior and slight leftward bend. The bursa appears unisaccate in the sub-groups with weak constrictions.

The male antennae are variable in width, ranging from weakly biserrate to broadly bipectinate (1.4–5.4× as wide as the shaft).

The *L. leucocycla* species-group contains the majority of species in the genus and is significantly larger than the "*L. leucocycla* complex" of Lafontaine et al. (1986). They restricted the complex to *L. leucocycla* and present members of the *L. staudingeri* sub-group based on ellipsoid eyes and pale hindwings, both characters are likely adaptations to diurnal flight. We divide the species-group into seven sub-groups of similar-appearing species to aid identification, recognizing that this arrangement might not be entirely phylogenetically accurate. In fact, CO1 distance analysis divides the species-group into four major divisions – *L. subfuscula* (Grote), *L. caesia* sp. n. from the *L. phoca* sub-group, and two larger assemblages (Fig. 248). One of the large DNA groups contains the *L. leucocycla* and *L. perplexa* sub-groups plus *L. staudingeri* and *L. subfumosa* from the *L. staudingeri* sub-group. The other large assemblage contains the other *L. staudingeri* sub-group species (*L. lagganata* (Barnes & Benjamin), *L. quadrilunata* (Grote), *L. dolosa* (Barnes & Benjamin)), the *L. promulsa* and *L. impingens* sub-groups, and the remaining members of the *L. phoca* sub-group. DNA sequences are not available for several species (see Fig. 248).

Key to the *L. leucocycla* species-group

1. Forewings and hindwings mottled gray without other color scales, all forewing lines and spots including claviform spot present, AND ventral hindwing nearly uniform gray except for faint dark discal spot and postmedial line (*L. perplexa* and *L. subfuscula* sub-groups (Figs 106–122)) **2**
– Forewings and hindwings otherwise; if forewing gray then claviform spot absent, hindwing lighter colored, OR ventral hindwing with dark marginal band in addition to discal spot and postmedial line..... **10**
2. Male **3**
– Female **6**
3. Antenna broadly bipectinate, total width greater than 4× width of shaft ..... ***L. subfuscula***
– Antenna less than 4× width of shaft **4**
4. Antenna bipectinate, total width greater than 2.5× width of shaft ..... ***L. perplexa***
– Antenna biserrate, less than 2.1× width of shaft **5**
5. Ventral hindwing lighter gray than ventral forewing, hindwing discal spot darker than postmedial line (Figs 110–112); occurring north of southern Washington ..... ***L. perplexella***

– Ventral hindwing and forewing similar in color, hindwing discal spot similar in darkness to postmedial line (Figs 113–115); occurring from southern Idaho and Beartooth Plateau on Montana-Wyoming border southward (including California)..... ***L. subalpina***

6. Corpus bursae angled 30° to left from ductus bursae..... ***L. subfuscula***

– Corpus bursae and ductus bursae nearly straight..... **7**

7. Occurring south of southern Idaho and Beartooth Plateau (including California)..... **8**

– Occurring in Oregon or farther north..... **9**

8. Ventral hindwing much lighter gray than ventral forewing, hindwing discal spot darker than postmedial line (Figs 106–109)..... ***L. perplexa***

– Ventral hindwing and forewing similar color, hindwing discal spot and postmedial line similar in darkness (Figs 113–115)..... ***L. subalpina***

9. Orbicular spot filled with whitish scales, lighter than other spots and lines, irregular diamond, ovoid, or teardrop shaped (Figs 106–109) [character will not separate all specimens]..... ***L. perplexa***

– Orbicular spot round, slightly paler than ground color, similar to filling of lines, with a faint central ocellus (Figs 110–112) [character will not separate all specimens]..... ***L. perplexella***

10. Male costal lobe of sacculus extending above costal margin of valve with broad flattened apex (Figs 183, 184); female corpus bursae without prominent constriction at base of appendix bursae (Figs 238, 239) AND hindwing yellow brown, not white; Forewing bluish gray, usually with warm yellow and reddish areas, AND hindwing yellow brown with gray marginal band, prominent dorsally and faint ventrally (Figs 101–105)..... ***L. impingens***

– Costal lobe rounded, variable in size; corpus bursae with at least ¼× diameter constriction near ductus bursae, or if weakly constricted then hindwing ground white; appearance without above combination of characters..... **11**

11. Digitus of male valve flat, triangular, tapering evenly from base to apex (Figs 163–168), or strap-like with bluntly pointed apex (Fig. 169); corpus bursae of female weakly constricted (~ ¼× diameter) near ductus bursae (Figs 219–225); ventral and dorsal hindwing similar with pure white ground, dark basal suffusion, discal spot and sharply defined gray or black marginal band, and absent or very faint postmedial line (rarely prominent in heavily suffused specimens) (Figs 47–59) (*L. staudingeri* sub-group)..... **12**

– Digitus of male cylindrical (or rarely, tapering to a cylindrical apex if base triangular); corpus bursae with at least 50 % posterior constriction; hindwing without above combination of characters, if pure white then dorsal and ventral patterns dissimilar OR postmedial line prominent even in pale specimens..... **18**

12. Discal spot of dorsal hindwing large, ratio of width to height > 0.5 (Figs 54–58); male antenna weakly bipectinate (total width < 2× width of central shaft)..... **13**

– Discal spot of dorsal hindwing normal, width to height < 0.5; male antenna bipectinate (> 2× width of central shaft)..... **15**

13. Forewing light yellowish gray with distinct lines and spots (Fig. 54); occurring in Colorado ..... ***L. q. quadrilunata***

– Forewing slate gray with faint or absent lines; occurring north of Beartooth Plateau on Montana-Wyoming border **14**

14. Forewing with faint sinuous am line (Fig. 55–56); male digitus short and broad like an obtuse triangle and ending above valve margin ..... ***L. quadrilunata yukona***

– Forewing even slate gray, am line absent or straight if visible (Figs 57–58); digitus long, shaped like an acute triangle and extending below valve..... ***L. lagganata***

15. Forewing medium gray to dark gray with well-defined markings (Figs 47–49, 52–53)..... **16**

– Forewing otherwise, either light gray with indistinct lines and spots OR uniform dark gray without markings (Figs 50–51, 59) **17**

16. Forewing dark gray with patches of olive green; occurring in arctic (Figs 47–49)..... ***L. staudingeri***

– Forewing pale gray, lacking olive; occurring in Colorado (Figs 52–53)..... ***L. dolosa***

17. Forewing uniform slate gray, lacking all lines and spots (Fig. 59)..... ***L. carolynae***

– Forewing light gray with discernible lines and spots (Figs 50–51) ..... ***L. subfumosa***

18. Ventral hindwing postmedial line closer to marginal band than discal spot, or postmedial line too faint to assess; usually small species with forewing expanse less than 30 mm (Figs 19–46, 60, 91, 93) (exceptions to size rule: *L. sasquatch* (Figs 40–42), *L. benjamini* (Figs 43–46), *L. pulverea* (Figs 91, 93)) (*L. leucocycla* sub-group; *L. phoca* sub-group (part)) **19**

– Ventral hind wing postmedial line appearing closer to discal spot than marginal band; most species with expanse greater than 30 mm (exceptions to size rule: *L. phoca* (Figs 61, 62) and *L. macleani* (Fig. 94))..... **30**

19. Eye reduced when viewed from anterior (2× eye width / distance between outer eyes < 0.5)..... **20**

– Eye normal size (above ratio > 0.5)..... **23**

20. Forewing light gray checkered with dark gray along costa, in median area, and preceding subterminal line (Fig. 60); occurring in Sierra Nevada..... ***L. mono***

– Forewing more uniform, appearing mottled but not checkered; occurring elsewhere **21**

21. Dorsal hindwing dark gray (Figs 31–32); restricted to northern Yukon, northwestern Northwest Territories, and northern Alaska ..... ***L. coracina***

– Dorsal hindwing white or yellow; more widely distributed, including in region described above..... **22**

22. Male antenna bipectinate, total width > 2.1× central shaft; occurring in northern British Columbia, southern Yukon, and Alaska; ventral hindwing postmedial line complete (Figs 38, 39) ..... ***L. illima***
– Male antenna biserrate, < 2.1× central shaft; widely distributed in northern North America and Rocky Mountains; if from range described above then ventral hindwing postmedial line absent or restricted to veins near costa (Figs 25–26) ..... ***L. leucocycla***
23. Ventral hind wing lacking postmedial line; color of entire moth brownish (*L. pulverea* (part) (Figs 90–93) **42**
– Ventral hind wing with easily identified dark postmedial line; moth variably colored, including brown **24**
24. Color of entire moth dark, nearly black (Fig. 33); occurring in boreal forest zone of northeastern and north central North America ..... ***L. anthracina***
– Color of hindwing lighter with contrasting dark markings; occurring in Newfoundland, Labrador, or western North America..... **25**
25. Ventral hindwing brown or brownish gray (Figs 37, 40–46) **26**
– Ventral hindwing off white with at most a brown or orange tint (Figs 30, 34–36) **28**
26. Subterminal line strongly toothed basad in fold and preceded by a dark scales on veins producing a streaky appearance of distal forewing; ventral hindwing postmedial line with dark extensions along veins, appearing dentate (Figs 43–46) ..... ***L. benjamini***
– Subterminal line irregular and preceded by patchy darker shade but not as above, appearing mottled but not streaked; hindwing postmedial line dark and sinuous but not dentate..... **27**
27. Ventral hindwing discal spot and postmedial line thick and darker than marginal band (Fig. 37); occurring from northern Wyoming to New Mexico .... ***L. coloradensis***
– Ventral hindwing discal spot, postmedial line, and marginal band similar dark gray (Figs 40–42); occurring in western Washington and Oregon .... ***L. sasquatch***
28. Male antenna biserrate, total width < 2.1× width of central shaft; hindwing off-white with orange brown tint (Fig. 30); occurring in Newfoundland and southern Labrador) ..... ***L. flanda***
– Male antenna bipectinate, > 2.1× central shaft; ground color of hindwing white or off-white with faint brown tint; occurring in Northwest **29**
29. Dorsal hindwing white; ventral hindwing postmedial line thick and black, equal to discal spot and marginal band in intensity (Figs 35–36); widely distributed in northwestern North America including Alberta..... ***L. poca***
– Dorsal hindwing pale brownish off-white; ventral hindwing postmedial line lighter than discal spot and marginal band (Fig. 34); restricted to western Alberta..... ***L. frigida***

30. Ventral hindwing white to dark gray, without brown tint; dorsal forewing ground color gray (Figs 61–77, 79–81) (*L. phoca* sub-group (part)) **31**
– Ventral hindwing with yellow or brown tint; dorsal forewing brown, brownish gray, or olive brown (Figs 74, 78, 82–100) (*L. promulsa* sub-group; *L. phoca* sub-group (part)) **39**
31. Ventral hindwing with dark scales on veins between postmedial line and marginal band (Figs 63–69, 75) **32**
– Ventral hindwing with veins of ground color between postmedial line and marginal band **36**
32. Distal forewing with patches of white scales opposite cell and in fold; both sides of hindwing with extensive white areas and limited dark basal suffusion (Figs 63–64); occurring in subalpine areas in Wyoming and Colorado..... ..... ***L. discolor***
– Distal forewing without prominent white distal to postmedial line; hindwing gray or white with dark basal suffusion; occurring elsewhere..... **33**
33. Male corona predominantly single; forewing gray, without patches of bluish scales; occurring in Canadian Rocky Mountains or California (Figs 75, 80) (*L. uniformis* ssp.)..... **34**
– Male corona with more than two rows of setae; forewing dark gray to black with patches of blue-gray scales (Figs 65–69); occurring in Pacific Northwest **35**
34. Ventral hindwing white; forewing mottled gray with distinct lines and spots (Fig. 75); occurring in northern California..... ***L. uniformis shasta***
– Ventral hindwing light gray; forewing uniform gray with faint markings (Fig. 80); occurring in Rocky Mountains of Canada .... ***L. u. uniformis* (part)**
35. Dorsal hindwing white or pale gray with distinctly darker gray marginal band (Figs 65–67); female ovipositor lobes large and rounded (Fig. 232)..... ..... ***L. gelida***
– Dorsal hindwing dark gray with light scales limited to anal angle (Figs 68–69); female ovipositor lobes normal size and pointed when viewed from above (Fig. 231) ..... ***L. caesia***
36. Ventral hindwing postmedial line an indistinct black even arc touching discal spot; dorsal forewing dark gray (Figs 61–62); widely distributed in subarctic region from west coast of Hudson Bay eastward..... ***L. phoca***
– Ventral hindwing postmedial line not touching discal spot, or sinuous in fold if barely touching spot; distributed west of Hudson Bay or on Gaspé Peninsula of Quebec (*L. uniformis* ssp.)..... **37**
37. Ventral hindwing marginal band homogeneous gray, darker than postmedial line, with well-defined proximal margin; forewing nearly uniform gray, occasionally with olive scales (Figs 79, 81); occurring in Canadian Rocky Mountains and southern Yukon..... ***L. u. uniformis* (part)**

– Ventral hindwing marginal band interrupted by scales of ground color, lighter than postmedial line, with diffuse proximal margin; forewing variable, usually mottled with well-defined lines and spots (Figs 70–74, 76–77); occurring in Rocky Mountains in western United States, Pacific Northwest, and Gaspé Peninsula, Quebec **38**

38. Populations variable with medium-gray to blackish-gray ground color, with or without patches of yellow scales (Figs 70–73); occurring in Pacific Northwest from Washington Cascades northward to southwestern Yukon..... ..... ***L. uniformis multicolor***

– Populations more uniformly gray to brown gray (Figs 76–78); occurring in central Rocky Mountains from southern Montana to northern Utah and central Colorado ..... ***L. uniformis fusca***

– Ground color an even mixture of olive gray and yellow scales, appearing dark olive green (Fig. 74); occurring on Gaspé Peninsula of Quebec..... ..... ***L. uniformis handfieldi***

39. Discal spots of ventral forewing and hindwing prominent, similar in size and darkness (Figs 76–78, 87–94, 99, 100) **40**

– Discal spots of ventral forewing and hindwing both inconspicuous OR hindwing discal spot larger and darker than forewing spot (Figs 74, 82–86, 95–98)..... **44**

40. Dorsal forewing with patches of orange scales in medial area and distal to postmedial line producing a streak in fold, with similar scales distal to reniform spot and in subterminal area opposite cell; ventral hindwing pale with dark-gray postmedial line (Figs 99–100); occurring in Sierra Nevada..... ..... ***L. sierra***

– Dorsal forewing without patches of orange scales, yellow scales largely confined to filling of lines and spots if present; ventral hindwing postmedial line lighter than marginal band; occurring outside California **41**

41. Dorsal hindwing two-toned, pale with dark marginal band and easily discernible dark discal spot (Figs 90–94); male antenna bipectinate, total width > 3.5× width of shaft (male of *L. macleani* unknown); occurring in British Columbia and Alberta..... **42**

– Dorsal hindwing dark gray with indistinct discal spot (Fig. 85–89); male antenna biserrate, < 2.1× width of shaft; occurring in central Rocky Mountains..... **43**

42. Ventral hindwing much paler than dorsal surface, with arrowhead-shaped discal spot (Fig. 94); occurring in southwestern British Columbia..... ..... ***L. macleani***

– Ventral hindwing color similar to dorsum, with thinner chevron-shaped discal spot (Fig. 90–93); occurring in southwestern Alberta .... ***L. pulverea*** **(part)**

43. Ventral hindwing discal spot arrowhead shaped (Fig. 78) .... ***L. uniformis fusca*** **(part)**

– Ventral hindwing discal spot nearly round (Figs 87–89)..***L. promulsa*** **(part)**

44. Ventral hindwing discal spot arrowhead shaped, larger and more prominent than ventral forewing spot (Figs 74, 82–84, 95–98)..... **45**

– Ventral discal spots round or oval, similar in size (Figs 85–86) ....***L. promulsa*** **(part)**

45. Forewing olive gray with pale-ochre filling of lines and spots; ventral hindwing marginal band darker than postmedial line (Figs 95–98); occurring in Pacific Northwest and southwestern Alberta ..... ***L. silacea***

– Forewing smooth brown to olive brown lacking pale filling of lines; ventral hindwing postmedial line similar to or darker than marginal band (Figs 74, 82–84); occurring in Alberta, eastern British Columbia, northeastern Washington, or the Gaspé Peninsula of Quebec **46**

46. Forewing smooth brown to olive brown (Figs 82–84); occurring in the Rocky Mountains of Canada ..... ***L. brunnea***

– Forewing a mixture of yellow and gray scales, appearing hoary olive (Fig. 74); occurring on the Gaspé Peninsula of Quebec .....***L. uniformis handfieldi***

Lasionycta leucocycla sub-group

Most of the ten species in this sub-group are small (forewing length typically 12–13 mm with expanse < 30 mm). The forewings are dark gray to brown gray with distinct lines and a full complement of spots. The hindwing color is often whitish or pale yellow, though in a few species it is entirely dark, and the ventral postmedial line is closer to the marginal band than the discal spot. Many specimens have a black dash between the wing base and discal spot on the ventral hindwing. The male valve is 5.5–7.8× as long as wide. The costal lobe of the sacculus ends near the dorsal margin of the valve. Most species have a cucullus that is similar to the valve width in size with a weak neck and a corona comprised predominantly of a single row of setae, partially double near the apex. The digitus is cylindrical beyond a triangular base, rarely (in small species) entirely triangular like those of the *L. staudingeri* sub-group. The vesica is typical for the species-group with 0–3 basal cornuti. Female genitalia are typical for the species-group with small species having a smaller bursa.

Several of the species appear similar and the genitalia are indistinguishable in both sexes. They are best identified by combination of male antennal structure, eye size, wing color and pattern, and locality. The species in the sub-group are arranged in two groups by male antenna structure. Four species (*L. leucocycla*, *L. flanda*, *L. anthracina* sp. n., and *L. coracina*) have narrow biserrate antennae with triangular segments with a width to shaft ratio of less than 2.1. The six other species have a wider bipectinate antenna (*L. poca*, *L. coloradensis* (Richards), *L. illima*, *L. sasquatch* sp. n., *L. frigida*, and *L. benjamini* Hill) with narrowed, elongated distal segments, width to shaft greater than 2.1.

The following list groups species by male antennal width and eye size:
Antenna narrow; eye normal: *L. anthracina, L. flanda*
Antenna narrow; eye ellipsoid: *L. leucocycla, L. coracina*
Antenna wide; eye normal: *L. poca, L. coloradensis*, *L. sasquatch, L. frigida*, *L. benjamini*
Antenna wide; eye ellipsoid: *L. illima.*

***Lasionycta leucocycla* (Staudinger)**
Figs 19–29, 146, 147, 203. Map 6

Anarta leucocycla Staudinger, 1857: 296.
Lasiestra leucocycla; McDunnough 1938: 71.
Lasionycta leucocycla; Lafontaine et al. 1986: 257.
Anarta leucocycla var. *moeschleri* Staudinger, 1901; in Staudinger and Rebel 1901: 219.
Anarta staudingeri ab. *moeschleri*; Hampson 1905: 38.
Anarta staudingeri moeschleri; Warren 1912: 252.
Anarta leucocycla moeschleri; McDunnough 1925: 308.
Lasiestra leucocycla moeschleri; McDunnough 1938: 71.
Lasionycta leucocycla moeschleri; Lafontaine et al. 1986: 257.
Anarta hampa Smith, 1908: 111.
Lasiestra leucocycla hampa; McDunnough 1938: 71.
Lasionycta leucocycla hampa; Lafontaine et al. 1986: 257.
Anarta leucocycla albertensis McDunnough, 1925: 307.
Lasiestra leucocycla albertensis; McDunnough 1938: 72.
Lasionycta leucocycla albertensis; Lafontaine et al. 1986: 257.
Lasionycta leucocycla magadanensis Kononenko and Lafontaine, 1986: 260. Extralimital.

Type material. *Anarta leucocycla*: two **syntypes** [ZMHB, not examined]. Type locality: Greenland. *Anarta leucocycla* var. *moeschleri*: **holotype** [ZMHB, not examined]. Type locality: Labrador. *Anarta hampa*: **lectotype** ♂ [AMNH, examined]. Type locality: White Mountains, New Hampshire. Lectotype male designated by Todd (1982: 96). *Anarta leucocycla albertensis*: **holotype** ♂ [CNC, examined]. Type locality: Nordegg, Alberta.

Diagnosis. *Lasionycta leucocycla* is a small (forewing length 10–12 mm, males; 11–14 mm, females) widespread species from the arctic, subarctic, and northern Cordillera. It has a narrow biserrate male antenna, a dark-gray or gray-brown forewing with a pale ocellate orbicular spot, off-white to yellow hindwing, and the ventral hindwing postmedial line is faint or absent. The male and female genitalia of *L. leucocycla* are typical for the species group and are of limited use for diagnosis.

All *L. leucocycla* from east of Hudson Bay are distinguished from *L. flanda*, which occurs in Newfoundland and Labrador, by the white hindwings and ellipsoid eyes (hindwing yellow brown or whitish brown and eye rounded in *L. flanda*). Arctic *L. leucocycla* from west of Hudson Bay have white hindwings and are most likely to be confused with *L. staudingeri*, however *L. staudingeri* lacks an ocellus in the orbicu-

lar spot and is easily distinguished by genitalia in both sexes as described in the *L. leucocycla* species-group key. Other western populations of *L. leucocycla* have yellow hindwings and are likely to be confused only with *L. illima*. *Lasionycta illima* and the other western species in the *L. leucocycla* sub-group with pale hindwings (*L. poca* and *L. frigida*) have narrowly bipectinate antennae. These three species also have a dark ventral hindwing postmedial line, nearly absent in *L. leucocycla*.

Eight similar CO1 haplotypes were identified in *L. leucocycla* (Fig. 248). These differ by up to 1.15 % but overlap significantly with those of *L. coracina*, *L. anthracina*, *L. frigida*, and *L. flanda*. The CO1 sequences of all populations of *L. leucocycla* and *L. poca* differ by at least 2.2 %.

Distribution and biology. *Lasionycta leucocycla* is Holarctic (Lafontaine et al. 1986). In North America it occurs in the eastern arctic from Greenland southward to Labrador and northern Quebec, with a disjunct southern population in the White Mountains of New Hampshire. Its range extends westward across northern Nunavut and Northwest Territories to Yukon and Alaska, with southern extensions on the west coast of Hudson Bay and in the Rocky Mountains to the Beartooth Plateau on the Montana-Wyoming border. It flies over dry tundra. Most populations are strictly diurnal and have reduced eyes. Subspecies *L. l. hampa* from New England has slightly larger eyes but records suggest that it is diurnal. *Lasionycta leucocycla* has been collected from mid-June through August across its range.

Lasionycta leucocycla feeds on nectar at *Silene acaulis*, *Mertensia paniculata* (Ait.) G. Don (Boraginaceae), and a *Senecio* species, probably *S. lugens* Richardson (Asteraceae) (BC. Schmidt, pers. comm.).

The early stages were described by MacKay (1972). Lafontaine et al. (1986) compared the larvae of *L. leucocycla* and *L. staudingeri*.

Remarks. *Lasionycta leucocycla magadanensis* Kononenko and Lafontaine, which has a pale white hindwing and small eyes, is the only exclusively Eurasian taxon that belongs with *L. leucocycla*. *Lasionycta dovrensis* (Wocke) stat. rev. has large eyes and dark hindwing and flies near midnight, not during the day (Ahola and Silvonen 2008) suggesting strongly that it is a distinct species. The taxon *altaica* (Staudinger) was not examined but is probably best considered a subspecies of *L. dovrensis* based on similar size, habitus, and eyes.

Geographical variation. The North American populations of *L. leucocycla* are arranged in four subspecies.

Lasionycta leucocycla leucocycla (Staudinger)

Figs 19–22. Map 6

Anarta leucocycla Staudinger, 1857: 296.

The nominate subspecies occurs in arctic North America from Greenland and Ellesmere Island west to northern Yukon. It has a brown-gray forewing and a slightly

brownish off-white hindwing, usually with a large discal spot both the dorsal and ventral surfaces. The maculation tends to be obscure with slight blurring of the lines and spots.

***Lasionycta leucocycla moeschleri* (Staudinger)**
Figs 23, 146, 203. Map 6

Anarta leucocycla var. *moeschleri* Staudinger, 1901; in Staudinger and Rebel 1901: 219.

Lasionycta l. moeschleri (Staudinger) occurs in eastern Canada from the east coast of Hudson Bay and southern Labrador north to the arctic islands near the Ungava Peninsula, Quebec. It is similar to subspecies *leucocycla* but has a more crisply marked dark-gray to black forewing with pale better defined orbicular and reniform spots and a purer white hindwing. Subspecies *moeschleri* is most similar to *L. staudingeri* of all *L. leucocycla* due to its white hindwing color. They are sympatric on Baffin Island. Differences between them are given in the key and *L. leucocycla* Diagnosis section.

***Lasionycta leucocycla hampa* (Smith)**
Fig. 24. Map 6

Anarta hampa Smith, 1908: 111.

Subspecies *hampa* is restricted to the White Mountains of New Hampshire. It is slightly larger (forewing length 11–12 mm, male; 13–14 mm, female) than other eastern subspecies. The forewing is dark gray with distinct markings. The hindwing is white with a slightly scalloped postmedial line that is more prominent than in other *L. leucocycla* subspecies. Some females have patches of pale scales interrupting the marginal band. Subspecies *hampa* has been collected from mid-July to early August.

No recent material of *L. l. hampa* was available for DNA sequencing.

***Lasionycta leucocycla albertensis* (McDunnough)**
Figs 25–29, 147. Map 6

Anarta leucocycla albertensis McDunnough, 1925: 307.

Lasionycta leucocycla albertensis differs from other subspecies in having a yellow hindwing. Both surfaces of the hindwing have a thin discal spot and narrow marginal band. The forewing is gray to light gray brown, often with indistinct markings. Forewings of specimens from western Yukon and Alaska tend to be pale, those from Hudson Bay are

dark and distinctly marked, similar to those of subspecies *moeschleri*, and those from Rocky Mountain populations often have patches of yellow. Subspecies *albertensis* is similar to *Lasionycta illima* from Yukon and Alaska, which also has a pale-yellow hindwing. These species can be distinguished by characters described in the *L. leucocycla* diagnosis section.

In North America *L. l. albertensis* occurs from west-central Alaska and central Yukon southward in the Rocky Mountains to the Beartooth Plateau on the Montana-Wyoming border. Its range extends eastward to the west coast of Hudson Bay, but it is replaced by *L. l. leucocycla* near the arctic shore of the mainland. Intermediates between these subspecies are found in a narrow zone near treeline from Arviat, Nunavut to central Yukon. Subspecies *albertensis* also occurs in the Russian Far East (Lafontaine et al. 1986).

***Lasionycta flanda* (Smith), stat. rev.**
Figs 30, 148, 204. Map 9

Anarta flanda Smith, 1908: 111.
Lasiestra leucocycla flanda; McDunnough 1938: 71.
Lasionycta leucocycla flanda; Lafontaine et al. 1986: 257.

Type material. Lectotype ♂ [AMNH, examined]. Type locality: Newfoundland. The male lectotype was designated by Todd (1982: 84).

Diagnosis. *Lasionycta flanda* resembles *L. leucocycla* but has a yellow-brown hindwing and blue-gray forewing with patches of yellow scales. It has narrow biserrate male antenna and genitalia indistinguishable from those of *L. leucocycla*, but the eye is rounded, normal in size, whereas those of *L. leucocycla* are reduced in size. *Lasionycta flanda* is restricted to Newfoundland and Labrador. It is only likely to be confused with *L. l. moeschleri* in Labrador but can be distinguished by hindwing color and eye size. *Lasionycta flanda* tends to be larger than *L. l. moeschleri* (12–13 mm for *L. flanda* males compared with 10–12 mm for *L. l. moeschleri* males). The female bursa is similar to that of *L. leucocycla* but is larger.

The single available *L. flanda* CO1 sequence of is identical to that of *L. anthracina* and similar to those of *L. leucocycla*.

Distribution and biology. *Lasionycta flanda* is found on the island of Newfoundland and at Goose Bay in eastern Labrador and occurs on tundra. It has been collected from mid-July to early August. It is nocturnal and comes to light (D. Macaulay pers. comm.).

Remarks. Lafontaine et al. (1986) treated *L. flanda* as an endemic Newfoundland subspecies of *L. leucocycla*, but the taxa are sympatric in Labrador. Two typical, dusky *L. flanda* females with round eyes from Goose Bay were found amongst *L. l. moeschleri* at the CNC. *Lasionycta leucocycla* from nearby Cartwright and Hopedale have reduced ellipsoid eyes and white hindwings typical for *L. leucocycla moeschleri*.

***Lasionycta coracina* Crabo & Lafontaine, sp. n.**
urn:lsid:zoobank.org:act:884101B7-189C-4311-8A32-2C3EC330DE3B
Figs 31, 32, 149, 205. Map 7

Type material. Holotype ♂. Canada, Northwest Territories, Richardson Mts., 67.141° N 136.004° W, 690 m., 5 July 2009, L. Crabo and G. Morrell. CNC. **Paratypes:** 10 ♂, 20 ♀. **Canada, Northwest Territories.** Same data as holotype (6 ♂, 5 ♀). **Yukon.** British Mts, Firth R., 24 July 1956, E. P. Cashman/ Slide No. 8364 (1 ♀); same locality, 25 July 1956, R. E. Leech (1 ♀); Richardson Mts, km 413 [Dempster Hwy], 66.630° N 136.275° W, 840 m., 2–3 July 2009, L. Crabo and G. Morrell (1 ♂, 4 ♀); same locality and collectors, 5 July 2009 (7 ♀); km 416 Dempster Hwy, 22–28 June 1980, 750 m, Wood and Lafontaine/ Slide No. 8309 (1 ♂); Mi 252 Dempster Hwy, 1 July 1985, Tom Kral/ Databased for CNC, Noctuoidea # 10526/ Barcodes of Life Project, University of Guelph, DNA # Noctuoidea 10528 (1 ♀); km 465 Dempster Hwy, 4 July 1985, 800 m., J. and L. Troubridge/ Databased for CNC, Noctuoidea # 10286/ Barcodes of Life Project, University of Guelph, DNA # Noctuoidea 10286 (1 ♀); **USA, Alaska.** Cape Thompson, 3 Aug. 1961, B. S. Heming (2 ♂). CNC, LGC, UASM, USNM, personal collection of Glenn Morrell, Maine, USA.

Etymology. *Coracina* is Latin and means raven-like, a reference to the dark appearance and northern distribution of this species.

Diagnosis. *Lasionycta coracina* is a small entirely dark-gray species from northern Alaska, northern Yukon, and adjacent Northwest Territories. It resembles a dark *L. leucocycla* with which it is structurally indistinguishable in males and females. *Lasionycta coracina* differs from all *L. leucocycla* sub-group species except *L. anthracina* in having a dark dorsal hindwing. *Lasionycta anthracina* occurs far south and east of the range of *L. coracina.* The forewing apex of *L. coracina* is more sharply angled than that of *L. anthracina* and it is a duller gray without a warm brown tint. The hindwing fringe is pale in *L. coracina* whereas it is dark in *L. anthracina*.

The single available CO1 sequence of *L. coracina* is identical to one of the haplotypes of *L. leucocycla albertensis*.

Description. Head – Antenna of male weakly biserrate. Antenna of female filiform and ciliate. Dorsal antenna gray with scattered white scales in distal row on each segment. Scape mixed gray and white scales. Eye reduced, ellipsoid. Palpus covered with dark-gray and scattered white scales. Frons and top of head a mixture of dark-gray and white hair-like scales. **Thorax –** Vestiture of thorax a mixture of dark-gray and white hair-like scales, appearing uniform dark gray. Legs dark gray with lighter gray to white at distal end of tarsal segments. **Wings –** Forewing length: male 11–13 mm (expanse 23–30 mm); female 12–13 mm (expanse 24–31 mm). Forewing a mixture of slate gray, black, and white scales, appearing uniform to slightly mottled ash gray. Terminal area with luteous scales in some specimens. Basal, antemedial, and postmedial lines dark gray with slightly lighter filling. Basal and antemedial lines undulating. Medial line nearly obsolete, evident as slightly darker area between orbicular and reniform spots. Postmedial line moderately scalloped between veins, excurved between

top of cell and fold. Subterminal line pale, evident mostly due to irregular dark shading proximally. Spots dark gray, faint. Orbicular spot round, filled with ground color or pale-gray scales and a faint darker ocellus. Reniform spot faint, evident as a dark smudge. Claviform spot faint and small. Fringe of ground color to pale gray, weakly checkered with darker gray between veins. Ventral forewing brown gray with dark-gray discal spot, subterminal line, and terminal area. Dorsal hindwing dark brown gray with slightly darker gray postmedial line and wide marginal band. Discal spot inconspicuous, slightly darker gray than ground color. Hindwing fringe white. Ventral hindwing covered with pale-gray scales and heavily suffused with dark-gray scales, appearing slightly lighter than ventral forewing. Markings darker gray. Discal spot moderately large and thick. Postmedial line closer to marginal band than to discal spot, variable in darkness, evident only at costa in some specimens and nearly complete in others. Marginal band thin with sharply demarcated medial margin. Fringe uniform luteous to white. **Abdomen –** Uniformly dark gray. **Male genitalia –** (Fig. 149). Genital capsule and aedeagus as for *L. leucocycla* species-group and *L. leucocycla* sub-group descriptions. Valve approximately 6.8× as long as wide. Single vesica preparation examined lacks subbasal cornuti. **Female genitalia –** (Fig. 205) Ovipositor, segment VIII, and bursa copulatrix as in *L. leucocycla* species-group description. Corpus bursae approximately 1.3× ductus bursae length and 0.6× as wide as long with 50 % constriction near base. Appendix bursae relatively wide at base.

Distribution and biology. This species is only known from the Richardson and British Mountains in northern Yukon, adjacent Northwest Territories, and Cape Thompson in northwestern Alaska. Specimens were collected from late June to early August. The habitat in the Richardson Mountains is sparsely vegetated gravel tundra slopes with *Dryas* (Rosaceae) stripes. The adults feed at *Saxifraga* spp. (Saxifragaceae). The moths are diurnal, most active in the late afternoon and when cloudy.

Remarks. *Lasionycta coracina* is similar to *L. fumida* (Graeser) **stat. rev.** from eastern Russia, previously treated as a subspecies of *L. leucocycla* (Lafontaine et al. 1986), but differs structurally; *L. fumida* has a round eye unlike *L. leucocycla* and *L. coracina*, suggesting that it is nocturnal. The male valve of *L. fumida* is longer and more slender than that of either of the other two species.

Lasionycta anthracina Crabo & Lafontaine, sp. n.

urn:lsid:zoobank.org:act:4B1035B4-8962-48D0-9DD6-09701403151B
Figs 33, 150, 206. Map 7

Type Material. Holotype ♂. Canada, Quebec, St-Michel des Saints, Lac Dussault, 47°00.09 N, 73°53.67 W, D. Handfield, 25 juin 2004, Mercure de Sabloneux, Tourbiére, MONA: 10355; DH005607, *Lasionycta albinuda*, Sexe: Male, Forme: typique, Databased for CNC; Noctuoidea #6454, Barcodes of Life Project, University of Guelph, DNA# Noctuoidea 6454. CNC. **Paratypes** 10 ♂, 3 ♀. **Canada**. **Alberta**. Fort McMurray, 12 June 1953, Slide No. 8528 (1 ♂); **Labrador**. Cartwright, 10 Aug.

1955, E. E. Stearns/ PAPILLONS DU QUEBEC ET DU LABRADOR; Louis Handfield- Ed. Broquet- phot -1995 (1 ♂). **Ontario**. Black Sturgeon Lake, 27 June 1963 (1 ♂); Hymers, 9 Aug. 1911, H. Dawson (1 ♀); Thunder Bay Area, 28 June 1993, 12 July 1993, J. P. Walas, (2 ♂). Quebec: Baie Comeau, 54°47' N 66°47' W, 1 July 1948, E. G. Munroe/ PAPILLONS DU QUEBEC ET DU LABRADOR; Louis Handfield - Ed. Broquet- phot -1995 (1 ♂); same locality, date, and collector (1 ♀); Cap-de-la-Madeleine, 25 July 1954, 14–344, Fernand St. Louis (1 ♂); Forestville, 7 July 1950, R. deRuette (1 ♂); Granby, 31 July 1940, P. E. Mercier (1 ♂); Lac Mondor, Ste. Flore, 25 June 1951, E. G. Munroe (1 ♀). **USA**, **New Hampshire**. Mt Washington, Lake of the Clouds, 5000', 2 Aug. 1954, Becker, Munroe, and Mason (1 ♂). CNC, LGC, UASM.

Etymology. The name *anthracina* is derived from *anthracinus* meaning coal-black in Latin. It refers to the black color of this moth.

Diagnosis. *Lasionycta anthracina* is a small (forewing length 10–13 mm) nearly black species from the boreal forest zone of eastern and central Canada and northeastern United States. It is structurally similar to *L. leucocycla* except for large eyes and slightly more slender male valves. Other *L. leucocycla* sub-group species in its range, *L. leucocycla* and *L. flanda*, have light-colored hindwings. *Lasionycta anthracina* is most similar to *L. coracina* from far northwestern North America and can be told from it by characters listed under that species; *L. phoca* (Möschler), another dark species from northeastern Canada, is larger (forewing length 13–14 mm), gray rather than black, and has a thick ventral hindwing postmedial line that touches the discal spot; that of *L. anthracina* is thin and separate from the spot.

The CO1 sequence of *L. anthracina* is identical to that of *L. flanda* and similar to those of *L. leucocycla*.

Description. Head – Antenna of male biserrate, 1.7–2.0× width of shaft. Antenna of female filiform and ciliate. Dorsal antenna mostly black with few white scales at distal end of segments. Scape white. Eye size normal. Palpus with many dark-gray and fewer white scales laterally, mostly white scales medially. Frons and top of head covered with many black and a few white-tipped black scales. **Thorax –** Vestiture a mixture of black and white-tipped black hair-like scales, appearing black. Legs black with white rings at distal end of tarsal segments. **Wings –** Forewing length: males 10–12 mm (expanse 22–27 mm); females 11–13 mm (expanse 25–29 mm). Forewing with many dark-gray, fewer black, and very few white and pale-yellow scales, appearing charcoal gray with black lines and spots. Basal and antemedial lines double, filled with slightly paler gray. Postmedial line diffuse, black, strongest in cell and at costa. Postmedial line extended onto veins and slightly scalloped between veins, slightly excurved from costa to fold and then slightly oblique to posterior margin, bordered distally by paler gray and scattered white scales. Subterminal line luteous, thin, preceded by dark chevrons between veins. Orbicular spot round, filled with lighter gray scales and a faint darker ocellus. Reniform and claviform spots black, barely perceptible. Fringe of ground color, weakly checkered with black. Ventral forewing dark brown-gray with dark-gray discal spot, subterminal line, costa, and marginal area. Dorsal hindwing brown gray to nearly black, with darker gray discal spot, undulating medial band, and wide marginal

band. Fringe dark gray proximally, light gray distally. Ventral hindwing brown-gray with suffusion of dark-gray scales with dark-gray margins. A basal dash connecting the wing base and discal spot is present in some specimens. Discal spot moderately large, arrowhead shaped. Postmedial line undulating, complete, located closer to marginal band than discal spot. Marginal band very thin, indistinct medially. Fringe brown gray proximally, light whitish gray distally. **Abdomen –** Uniform dark gray. **Male genitalia –** (Fig. 150). Genital capsule and aedeagus as in the *L. leucocycla* species-group and *L. leucocycla* sub-group descriptions. Valve approximately 4.8–6.8× as long as wide. Two of three preparations examined demonstrate slight downward angulation of dorsal margin of valve near neck. Cucullus slightly smaller than average for species-group. Vesica without basal cornuti (N = 3). **Female genitalia –** (Fig. 206). Ovipositor lobe, segment VIII, and bursa copulatrix as described for *L. leucocycla* species-group. Bursa approximately 0.75× ductus length and 0.7× as wide as long.

Distribution and biology. *Lasionycta anthracina* occurs from the east coast of Labrador to northeastern Alberta southward to northern New Hampshire and Lake Superior in western Ontario. It flies in boreal forest and bogs and has been collected from mid-June to mid-August. It is nocturnal and comes to lights. *Lasionycta anthracina* and *L. leucocycla* occur in different habitats and are sympatric in the White Mountains, New Hampshire, Poste-de-la-Baleine, Quebec, and the vicinity of Cartwright, Labrador.

Remarks. This species was known as *L. albinuda* (Smith) for many years, but the name is now known to be a synonym of *L. phoca*.

***Lasionycta poca* (Barnes & Benjamin), stat. rev.**
Figs 35, 36, 151, 207. Map 8

Anarta poca Barnes & Benjamin, 1923: 73.
Lasiestra leucocycla poca; McDunnough 1938: 72.
Lasiestra poca; Franclemont and Todd 1983: 149.
Lasionycta leucocycla poca; Lafontaine et al. 1986: 257.

Type material. *Anarta poca*: **holotype** ♂ [USNM, examined]. Type locality: Pocahontas, Alberta.

Diagnosis. *Lasionycta poca* is a montane species occurring in northwestern North America. It has has a dark-gray forewing with crisp markings and a pale putty-white hindwing with dark basal suffusion, a black postmedial line, and a black marginal band. The underside is distinctive with crisp black discal spots and lines against the white ground. It resembles a white-hindwinged *L. leucocycla* but differs in having large eyes and a narrowly bipectinate male antenna that is 2.5–3.0× as wide as the shaft. The ventral hindwing of *L. poca* has a large discal spot and a prominent sinuous postmedial line that parallels the narrow marginal band; *L. leucocycla* lacks these characters. The male vesica of *L. poca* usually has two or three basal cornuti (range 0–3), whereas those

of most *L. leucocycla* have none or one (range 0–2). The female genitalia are indistinguishable.

Lasionycta poca is similar to *L. coloradensis*, *L. frigida*, *L. illima*, and *L. sasquatch*, all with similar male antennae. Differences between *L. poca* and these species are given in their diagnosis sections.

The CO1 sequence of *L. poca* differs from *L. leucocycla* by at least 2.2 % and from *L. coloradensis* by 0.85 %. It is identical to that of *L. sasquatch*.

Distribution and biology. *Lasionycta poca* occurs throughout the Rocky Mountains of Alberta, westward to the Coast Range in western British Columbia and southward in the Cascades to Okanogan County, Washington. A dark specimen from southern Yukon examined from a photograph is tentatively assigned to *L. poca* rather than *L. illima* but could not be examined to assess eye size. *Lasionycta poca* is predominantly alpine and is most common near timberline, but occasional specimens are collected in nearby forest. It is mainly nocturnal and is usually collected at light. Adults are found from mid-June through August.

Remarks. Lafontaine et al. (1986) treated *L. poca* as a subspecies of *L. leucocycla*. Evidence that *L. poca* and *L. leucocycla* are distinct species includes the structural and genetic differences described above and the presence of sympatry in western Alberta without intergradation.

***Lasionycta coloradensis* (Richards), stat. rev.**
Figs 37, 152, 208. Map 8

Lasiestra coloradensis Richards, 1943: 85.
Lasionycta leucocycla coloradensis; Lafontaine et al. 1986: 257.

Type material. *Lasiestra coloradensis*: **holotype** ♂ [ANSP, examined]. Type locality: Colorado Springs, Colorado.

Diagnosis. This species has similar markings to *L. poca* but both wings are brown, lesser so in the northern part of its range than in Colorado. The hindwing is light brown with a suffusion of dark scales. Some specimens are larger than those of *L. poca*. In Colorado *L. coloradensis* is most similar to unstreaked specimens of *L. benjamini medaminosa* ssp. n. Differences between them are described under *L. b. medaminosa*. *Lasionycta coloradensis* is superficially similar to *Hadena lafontainei* Troubridge and Crabo, also found in Colorado, but is easily differentiated by obvious genitalic differences (those of *H. lafontainei* are illustrated by Troubridge and Crabo (2002)).

The CO1 DNA sequences of *L. coloradensis* (Wyoming) and *L. poca* (Alberta, British Columbia, Washington, and Yukon Territory) differ by 0.85 %. The sequences are distinct without variation or shared haplotypes for all specimens sampled (Fig. 248), a total of three samples for *L. coloradensis* and five for *L. poca*. This difference in DNA, in conjunction with those in phenotype and biogeography, suggest that *L. coloradensis* is best treated as a species distinct from *L. poca*.

Distribution and biology. *Lasionycta coloradensis* occurs in the Rocky Mountains from the Montana-Wyoming border to New Mexico.

Remarks. Lafontaine et al. (1986) treated *L. coloradensis* as a subspecies of *L. leucocycla*. Structural and genetic differences between these species are similar to those distinguishing *L. poca* and *L. leucocycla*. *L. coloradensis* is sympatric with *L. leucocycla albertensis* on the Beartooth Plateau near the Montana-Wyoming border. We consider *L. coloradensis* and *L. poca* to be species rather than subspecies for reasons given in the Diagnosis section.

Lasionycta illima Crabo & Lafontaine, sp. n.

urn:lsid:zoobank.org:act:D30C403E-E74E-4A7D-A712-9F032AACB4EA
Figs 38, 39, 153, 209. Map 8

Type material. Holotype ♂. USA, Alaska, Mile 315 Richardson Hwy, 8 June 1951, Mason and McGillis. CNC. **Paratypes** 2 ♀. **Canada**. **Yukon**. Swim Lakes, 133° W 62° 13' N, 3200', 20 June 1960, E. W. Rockburne (1 ♀); Ross R, 132° 30' W 61° 56' N, 3000', 21 June 1960, J.E.H. Martin (1 ♀). CNC, LGC.

Etymology. The name *illima* is derived from the Latin *illimis* meaning clear or free of mud. It refers to the bright appearance of the hindwing of this species.

Diagnosis. *Lasionycta illima* resembles *L. poca* in size and markings, but has a luteous hindwing, nearly lacking basal suffusion, and a blue tint to the forewing. The genitalia of both sexes and male antenna are indistinguishable, but *L. illima* has ellipsoid eyes. It is the only species in the sub-group with a bipectinate antenna and reduced eye size (anterior width of both eyes excluding frons divided by distance between outer eyes = 0.41–0.48 in *L. illima*; 0.54–0.55 in *L. poca*). *Lasionycta illima* has the most northern distribution of the species with wide antenna, occurring from northern British Columbia to Alaska. *Lasionycta illima* is superficially similar to *L. frigida* from western Alberta, but can be told from it by eye size.

Lasionycta illima occurs with *L. leucocycla albertensis*, which also has a yellow hindwing. They are distinguished by the male antenna and hindwing postmedial line as described in the *L. leucocycla* diagnosis.

The CO1 sequence of *L. illima* is unknown.

Description. Head – Antenna of male bipectinate; individual segments 2.5× as wide as central shaft. Antenna of female filiform and ciliate. Dorsal antennal segments dark gray proximally, white distally. Scape white. Eye size moderately reduced, ellipsoid. Palpus pale luteous white with scattered dark-gray scales. Frons covered in nearly equal numbers of dark-gray and white hair-like scales. Top of head slightly darker than frons. **Thorax –** Vestiture a mixture of white and gray hair-like scales and bifurcate white-tipped gray scales, appearing light gray ventrally and gray with slightly darker bands on prothoracic collar and patagium dorsally. Legs covered with a mixture of dark-gray and pale-luteous white scales. Tarsal segments dark gray, ringed distally with white. **Wings –** Forewing length: male 12 mm (expanse 27 mm); female 12–13 mm

(expanse 26–28 mm). Forewing with nearly equal mixture of gray, black, and white, and fewer orange-yellow scales, appearing uneven, slightly bluish gray with patches of warm ochre gray, lightest beyond postmedial line. Basal line and antemedial line double, dark gray filled with pale gray, jagged. Medial line dark gray, strongest at costa and in fold. Postmedial line strongly scalloped between veins, gently excurved from costa to bottom of cell, then oblique to posterior margin. Subterminal line pale, uneven, preceded by nearly solid dark-gray shade. Spots dark gray. Orbicular spot nearly round, filled with pale-gray scales peripherally and a dark-gray central ocellus. Reniform spot less prominent than orbicular spot, weakly hourglass shaped, filled with slightly paler gray scales peripherally and dark-gray scales centrally. Claviform spot small, dark gray, filled with ground color. Fringe weakly scalloped light and dark gray. Ventral forewing whitish gray with slight dark-gray suffusion along costa and cubital veins. Markings similar dark gray. Discal spot large. Postmedial line complete. Marginal band sharply demarcated medially. Fringe more distinctly checkered than on dorsum. Dorsal hindwing ground color luteous white, with large dark-gray discal spot, scalloped postmedial line, and solid sharply demarcated dark-gray marginal band. Hindwing fringe medium gray proximally, nearly white distally. Ventral hindwing luteous off-white with scattered dark-gray scales. Markings all a similar dark gray. Basal dash present in most specimens. Discal spot large, similar in size and color to ventral forewing discal spot. Postmedial line complete, undulating, located near marginal band and parallel to its medial margin. Marginal band relatively thin with sharply demarcated medial margin. Fringe light gray proximally and white distally, faintly checkered. **Abdomen –** Similar to dorsal hindwing, covered with pale luteous-white and scattered dark-gray scales. **Male genitalia –** (Fig. 153). Genital capsule and aedeagus as described in the *L. leucocycla* species-group and *L. leucocycla* sub-group descriptions. Valve approximately 6.8× as long as wide, with weak neck at base of cucullus. Cucullus slightly rounded, with corona comprised of single row of setae. Vesica with 2 basal cornuti (N = 1). **Female genitalia –** Ovipositor, segment VIII, and bursa copulatrix as in *L. leucocycla* species-group description. Corpus bursae approximately 1.1× ductus bursae length and 0.7× as wide as long.

Distribution and biology. *Lasionycta illima* occurs from Pink Mountain in northeastern British Columbia through southern Yukon to eastern Alaska. Records suggest that it is predominantly nocturnal. It is very rare in collections.

Lasionycta frigida Crabo & Lafontaine, sp. n.

urn:lsid:zoobank.org:act:74F2198E-C747-46B9-9F9B-8D8783E51CF5
Figs 34, 154, 210. Map 7

Type material. Holotype ♂. Canada, Alberta, mouth of Prospect Creek, 1640 m, UV trap, 14 July 2001, subalpine spruce-pine-willow forest, G. G. Anweiler, Genitalia slide 95848, Databased for CNC Noctuoidea # 6627, Barcodes of Life Project, University of Guelph, DNA # Noctuoidea 6627. CNC. **Paratypes** 4 ♂, 3 ♀. **Canada**.

Alberta. Nordegg, 12 July 1939, K. Bowman, Slide No. 8335 (1 ♂, 1 ♀); Prospect Mtn above Prospect Creek, 2400 m, 17 July 1999, Rocky vegetated slopes nectaring on *Phlox* sp. Chris Schmidt, Genitalia slide 95847, Databased for CNC Noctuoidea # 6608/ Barcode of Life Project, University of Guelph, DNA # Noctuoidea 6608 (1 ♂); Prospect Mtn ~10 km SW Cadomin, 45–24W5, 2300 m, 17 July 1999, B. C. Schmidt (2 ♂); near Cadomin, mouth of Prospect Ck ~5500', 21 July 2000, UV light, Schmidt and Anweiler (1 ♀); Mt Tripoli, Cardinal Divide, 45–23W5, 18 July 1999, B. C. Schmidt (1 ♀). CNC, LGC.

Etymology. The name is derived from the Latin *frigidus* meaning cold. It refers to the cold habitats where this species occurs.

Diagnosis. *Lasionycta frigida* is similar to *L. poca* and occurs with it in western Alberta. They are structurally indistinguishable, including male antenna and eyes, but can be distinguished by color, hindwing markings, and CO1 barcode. *Lasionycta frigida* has a gray brown forewing with indistinct markings. The hindwing is brownish off-white and the postmedial line is paler than the marginal band. *Lasionycta poca* has a dark-gray forewing with crisper markings and a purer white hindwing with the dark postmedial line and marginal band similar in color. The CO1 sequence of *L. frigida* differs from that of *L. poca* by over 2 % and is more similar to those of *L. leucocycla*. It is the only species in the sub-group with a combination of a wide male antenna and a *L. leucocycla*-like CO1 haplotype. The other wide-antenna species resembling *L. leucocycla* have CO1 DNA more similar to *L. perplexa* than *L. leucocycla* (Fig. 248).

Lasionycta illima, another similar species with similar male antenna found to the north of *L. frigida*, has smaller eyes and a yellower hindwing. *Lasionycta frigida* is nearly indistinguishable in superficial appearance to northern Yukon populations of *L. l. leucocycla* (compare Figs 34 and 22) but differs in antennal structure. *Lasionycta frigida* is easily distinguished from the Alberta subspecies *L. l. albertensis* that has a yellow hindwing.

Description. Head – Antenna of male weakly bipectinate and fasciculate; individual segments 2.4× shaft width. Antenna of female filiform and ciliate. Dorsal segments dark gray proximally, white distally. Scape white. Eye normal size. Palpus covered with brownish off-white and few dark-gray scales. Frons covered by pale brown-gray hair-like scales. Top of head with equal mixture of dark-gray and white hair-like scales. **Thorax –** Vestiture a mixture of hair-like white and gray scales and bifurcate white-tipped gray scales, appearing light gray ventrally and hoary gray dorsally with slightly darker gray lines on prothoracic collar and patagium. Legs with equal mixture of gray and luteous off-white scales. Tarsal segments gray with scattered off-white scales, ringed distally with off-white. **Wings –** Forewing length: male 12 mm (expanse 26 mm); female 13 mm (expanse 27 mm). Ground color of forewing a mixture of light- to dark-gray, white, and luteous scales, appearing slightly uneven dark gray with faint brown tint. Basal, antemedial, and postmedial lines double, dark gray with pale-gray filling. Basal and antemedial lines undulating. Medial shade dark gray, faint, evident near costa and in cell. Postmedial line moderately scalloped, with darker proximal and faint distal components, mildly excurved near cell, otherwise oblique across wing. Subterminal line pale, sinuous,

preceded by prominent dark-gray chevrons between veins forming a nearly continuous dark line across the wing. Spots dark gray. Orbicular spot round, filled with light-gray scales peripherally and a dark-gray ocellus centrally. Reniform spot weakly hourglass shaped, filled with light gray peripherally and dark-gray scales centrally. Claviform spot faint, extending half distance between the antemedial and postmedial lines. Terminal area and fringe slightly darker than remainder of wing, fringe weakly checkered. Ventral forewing pale, slightly luteous gray with darker gray shade along costa and in cell. Markings all similar, dark gray. Discal spot moderately large. Postmedial line scalloped, complete across wing. Marginal band moderately sharply demarcated. Dorsal hindwing slightly brownish off-white with scattered dark-gray scales and dark-gray markings. Discal spot ovoid, prominent. Postmedial line undulating, weakly scalloped, more faint than discal spot and marginal band. Marginal band relatively wide, sharply demarcated. Hindwing fringe light gray proximally, brownish off-white distally. Ventral hindwing slightly brownish off-white with scattered dark-gray scales and darker gray markings than on ventral forewing. Discal spot large, ovoid. Postmedial line solid near anterior margin and fading near anal angle, fainter than ventral forewing postmedial line and other hindwing markings. Marginal band darker, narrower, and more sharply defined than ventral forewing marginal band. **Abdomen –** Covered with pale-luteous off-white and scattered gray scales, appearing light gray. **Male genitalia –** (Fig. 154). Genital capsule and aedeagus as in the *L. leucocycla* species-group and *L. leucocycla* sub-group descriptions. Valve approximately 5.5× as long as wide. Cucullus typical, corona single except double at apex. Vesica with a single basal cornutus (N = 1). **Female genitalia –** (Fig. 210). Ovipositor lobe, segment VIII, and bursa copulatrix as in the *L. leucocycla* species-group description. Corpus bursae approximately 1.4× as long as ductus bursae and 0.6× as wide as long. Proximal appendix bursae relatively bulbous.

Distribution and biology. *Lasionycta frigida* has a restricted range in the Alberta Rocky Mountains. The habitat is mixed forest in cold microclimates (C. Schmidt pers. comm.). It is nocturnal and comes to light, although one specimen was collected during the day. All specimens are from mid-July. This species is very rare in collections.

The Alberta front ranges where *L. frigida* occurs harbors the southernmost populations of several arctic and subarctic Lepidoptera suggesting that *L. frigida* might be a subarctic species. It should be sought farther north in Yukon and Alaska.

***Lasionycta sasquatch* Crabo & Lafontaine, sp. n.**
urn:lsid:zoobank.org:act:6F027F65-8A24-4336-9FCB-7DB65799EC68
Figs 40–42, 155, 211. Map 8

Type Material. Holotype ♂. USA, Washington, Kittitas Co, Quartz Mtn, 47.074° N 121.061° W, 1900 m., 16 July 2007, Lars G. Crabo. CNC. **Paratypes** 10 ♂, 9 ♀. **USA**. **Washington**. Same data as holotype (2 ♂); Kittitas County, Quartz Mtn, 6400', 15 July 1996, J. Troubridge, Genitalia slide 95852, Databased for CNC, Noctuoidea # 6593, Barcode of Life Project, University of Guelph, DNA # Noctuoidea 6593 (1 ♂);

same locality, date, and collector as last specimen, Databased for CNC, Noctuoidea # 6592, Barcodes of Life Project, University of Guelph, DNA # Noctuoidea 6593 (1 ♂); Kittitas Co, Quartz Mtn, Alpine Ridge Meadow, Light trap, T18N R14E S3, 6,232', 20 July 1998, K. Romain (1 ♂); Kittitas County, Lake Kachess, NF-4828, 47° 19.219 'N 121° 15.46' W, 760 m., T. Mustelin, Blacklight trap, 4 July 2009 (1 ♂, 2 ♀), 11 July 2009 (1 ♀), 16 July 2009 (2 ♀), 17–18 July 2009 (1 ♂, 2 ♀), 19–23 July, 2009 (1 ♂, 1 ♀). **Oregon**. Clatsop County, Saddle Mt., 8 July 1961, Kenneth Goeden (1 ♂). Josephine County, vic. Bolan Mt., 15 mi. SE, Cave Junction, c[irca] 5800', 19 July 1997 [no collector] (1 M, 1 F). CNC, LGC, OSU, TMC.

Etymology. This species is named for Sasquatch, the mythical ape-man of the Pacific Northwest. It is a noun in apposition.

Diagnosis. *Lasionycta sasquatch* resembles a large dark *L. poca* and replaces it in Oregon and most of western Washington. It is one of the largest species in the subgroup (expanse 30–36 mm compared to 25–31mm for *L. poca*). The forewing is charcoal gray to dark brown. The hindwing is dusky brown with a suffusion of dark scales, greatest basally, which tends to obscure the lines in some specimens. Structurally, *L. sasquatch* is similar to *L. poca* and is indistinguishable in male genitalia, but *L. sasquatch* has a slightly larger eye and its antennal segments are narrower (2.10–2.25× central shaft width in *L. sasquatch*; 2.5–3.0× shaft in *L. poca*). The female bursa is large for the sub-group, reflecting the large size of the moth. *Lasionycta sasquatch* is unlikely to be confused with other *Lasionycta* in its range.

Lasionycta sasquatch and *L. poca* have identical CO1 sequences.

Description. Head – Male antenna bipectinate and fasciculate, 2.10–2.25× as wide as central shaft. Female antenna filiform and ciliate. Dorsal segments gray. Scape white. Eye normal size. Labial palpus covered with pale brownish-gray, white and black scales. Frons white. Top of head cream, white, and black-tipped brownish-gray scales. **Thorax –** Vestiture a mixture of black, white, and white-tipped black hair-like and weakly spatulate scales, appearing uniform dark brownish gray. Legs covered by medium-gray and hair-like white and black-tipped light-brown scales. Tarsal segments slate gray ringed distally with white. **Wings –** Forewing length: male 14–16 mm (expanse 30–36 mm); female 15–16 mm (expanse 30–33 mm). Forewing ground color a mixture of dark-gray, white, and luteous scales, appearing dark brownish gray with scattered patches of yellow scales. Lines black, double, filled with lighter gray. Basal and antemedial lines irregular. Medial line weak, darkest near costa and in cell. Postmedial line moderately scalloped, inner component dark and outer component faint, oblique from costa to inner margin and mildly excurved at lower end of cell. Subterminal line irregular, pale, preceded by an irregular dark-gray shade with weak chevrons between veins. Spots black. Orbicular spot ovoid, nearly round, filled with light-gray scales peripherally and a dark-gray ocellus centrally. Reniform spot faint, kidney shaped, filled with ground color medially, light gray laterally, and dark gray centrally. Claviform spot small, extending ⅓ distance between antemedial and postmedial lines, filled with ground color. Fringe checkered light gray and black. Ventral forewing light brownish gray, dark gray on costa and in subterminal area, with darker gray markings. Discal spot rectangular or weakly chev-

ron shaped. Postmedial line indistinct, weakly scalloped, touching lower reniform spot. Fringe scalloped light brown and dark gray. Dorsal hindwing brownish off-white with dusting of dark-gray scales and dark-gray markings. Discal spot moderately large, laterally convex. Postmedial line less distinct than in *L. poca*, faint near anterior margin and increasing to intensity of marginal band below cell, slightly scalloped and angled apex lateral at lower end of cell. Marginal band wide with sharply demarcated medial margin. Hindwing fringe gray basally and pure white distally. Ventral hindwing brownish off-white with scattered dark-gray scales and dark-gray markings. Basal dash present in some specimens. Discal spot nearly black, darker than postmedial line and marginal band, ovoid. Postmedial line similar in darkness to marginal band, nearly as wide as discal spot and located closer to marginal band than to discal spot, gently undulating. Marginal band interrupted by lighter scales, lighter colored and less sharply demarcated than in *L. poca*. Fringe weakly scalloped pale luteous and light gray proximally, uniform whitish gray distally. **Abdomen –** Uniform light gray with black dorsal tufts on first two segments. **Male genitalia –** (Fig. 155). Genital capsule and aedeagus as in *L. leucocycla* species-group and *L. leucocycla* sub-group descriptions. Valve approximately 5.0–6.8× as long as wide, with mildly constricted neck. Cucullus normal for species-group, single with slightly irregular double corona at apex. Vesica with 0–1 subbasal cornuti (N = 2). **Female genitalia –** (Fig. 211). As in *L. leucocycla* species-group description. Corpus bursae relatively large, approximately 1.45× ductus bursae length and 0.6× as wide as long.

Distribution and biology. *Lasionycta sasquatch* is known from the Washington Cascades south of Snoqualmie Pass, Saddle Mountain in the Oregon Coast Range, and the Siskiyou Mountains in southwestern Oregon. It is nocturnal. The habitat is subalpine parkland at two locations in the Washington Cascades. The largest series examined was collected in old growth mid-elevation forest with western hemlock (*Tsuga heterophylla* (Raf.) Sarg.), Douglas-fir (*Pseudotsuga menziesii* (Mirbel) Franco), and fir (*Abies* sp.) (Pinaceae), and western red cedar (*Thuja plicata* Donn ex. D. Don) (Cupressaceae) (T. Mustelin pers. comm.). Adults have been collected in early and mid-July.

***Lasionycta benjamini* Hill**

Figs 43–46, 156, 157, 212, 213. Map 9

Lascionycta [sic] *benjamini* Hill, 1927: 6.
Lasionycta benjamini; McDunnough 1938: 71.

Type material. *Lasionycta benjamini*: **holotype** ♂ [USNM, examined]. Type locality: Mammoth, Inyo County, California. Poole (1989) states that there are four syntypes; however, the original description states that the species is described from seven males, one of which is designated as the holotype with data and deposited in the collection of Wm. Barnes (now in USNM). The holotype is in good condition except for a broken left antenna.

Diagnosis. *Lasionycta benjamini* is distinguished from other species of *Lasionycta* by its streaky brown-gray forewing with dark chevron-shaped spots proximal to the jagged

subterminal line. The hindwing is light brown gray with dark lines and spots. The male and female genitalia are typical for the *L. leucocycla* sub-group. *Lasionycta benjamini* is one of the larger species in the sub-group, intermediate between most species and *L. sasquatch*, the largest. The male antenna is strongly bipectinate, 2.75–3.35× the width of the shaft.

The CO1 sequences of *L. benjamini* form a distinct segregate, differing by over 1.5 % from other members of the sub-group (Fig. 248).

Distribution and biology. *Lasionycta benjamini* occurs in the Sierra Nevada of California and in the mountains of Nevada and Colorado. It flies in montane conifer forest and is nocturnal. Specimens have been collected from late June to mid-August.

Geographical variation. Populations of *L. benjamini* are arranged in two subspecies.

Lasionycta benjamini benjamini Hill

Figs 43, 44, 156, 212. Map 9

Lascionycta [sic] *benjamini* Hill, 1927: 6.

The nominate subspecies has an elongate oval orbicular spot and more prominently streaked appearance than *L. b. medaminosa*. It is also slightly larger and lighter in color. It occurs in California and Nevada. *Lasionycta b. benjamini* is unlikely to be confused with any other *Lasionycta* in its range.

Lasionycta benjamini medaminosa Crabo & Lafontaine, ssp. n.

urn:lsid:zoobank.org:act:7785A5D8-FCA9-47FB-8A01-66F929793AA4

Figs 45, 46, 157, 213. Map 9

Type material. Holotype ♂. USA, Colorado, Grand County, Co. Rd 50 (Beaver Creek Road), R78W, T1N, S15, 7680', 27 June 1991, T. S. Dickel, (MV lamp). CNC. **Paratypes** 9 ♂, 1 ♀. **USA**. **Colorado**: Same data as holotype (9 ♂, 1 ♀). CNC, LGC, TSDC.

Etymology. The name is derived from the Greek *medaminos* meaning worthless.

Diagnosis. Subspecies *medaminosa* occurs in Colorado. It is slightly smaller, less brown, and darker than *L. b. benjamini* and has a rounder orbicular spot and less streaky forewing. *Lasionycta b. medaminosa* resembles *L. coloradensis* with which it occurs. The subterminal line is less jagged in *L. b. medaminosa* than in *L. coloradensis*, and usually is preceded by a series of black chevrons, absent in *L. coloradensis*. The ventral hindwing discal spot and medial band of *L. b. medaminosa* are brown and less conspicuous than the black markings on *L. coloradensis*. Less streaky specimens of *L. b. medaminosa* are similar to *L. subalpina*, also found in Colorado. *Lasionycta b. medaminosa* has a well-defined hindwing marginal band and a bipectinate male antenna, whereas *L. subalpina* has lacks a marginal band and has a biserrate male antenna.

The CO1 sequences of the *L. benjamini* subspecies differ by 1.05 %.

Description. Head – Antenna of male bipectinate and fasciculate, individual segments 3.0–3.4× as wide as the central shaft. Antenna of female filiform and ciliate. Dorsal antenna segments dark gray proximally, light whitish gray distally. Scape cream colored. Eye normal size. Palpus with cream, gray-brown, and black-tipped gray-brown scales. Frons covered with grayish off-white scales. Top of head with white-tipped, black-tipped, and apically white black-tipped light gray-brown scales. **Thorax –** Vestiture of brown-gray, white-tipped brown-gray, and black hair-like and spatulate scales with grayish white narrow stalks, appearing gray brown. Prothoracic collar similar, tip light gray. Patagium light gray brown centrally, darker gray to nearly black peripherally. Legs mostly brownish gray with fewer grayish white and black scales. Tarsal segments brownish gray and scattered grayish off-white scales, distal segments ringed with off-white. **Wings –** Forewing length: males 11–13 mm (expanse 27–28 mm), females 13 mm (expanse 28 mm). Forewing ground predominantly of gray-brown scales, with fewer grayish-white, warm tan, and black scales, appearing slightly mottled gray brown. Basal, antemedial, and postmedial lines weakly double, dark gray filled with ground color or slightly lighter gray, indistinct. Basal line and antemedial line double, incomplete, most evident at costa. Medial line very weak and indistinct, most evident near costa and in cell. Postmedial line dentate, evident mostly as dark-gray lines on veins, oblique from costa to inner margin. Subterminal line pale, irregular, drawn sharply medially opposite cell and in fold, preceded by a series of prominent elongate black chevrons between veins. Spots dark gray. Orbicular spot ovoid but less elongate than that of *L. b. benjamini*, filled with pale-gray scales peripherally and a ground color to dark-gray ocellus centrally. Reniform spot narrow, kidney shaped, indistinct and incomplete in most specimens, filled with pale gray peripherally and ground color and dark gray centrally. Claviform spot black, prominent, extending between ⅔ to full distance from antemedial line to postmedial line. Fringe of ground color, weakly checkered with dark gray. Ventral forewing brownish off-white with suffusion of gray scales, heaviest in basal half of cell, costa with equal mixture of white and gray scales. Discal spot nearly black, shaped as a curved bar. Postmedial line dark gray, scalloped, oblique at costa then nearly perpendicular to posterior margin. Distal margin uniform gray, slightly paler than discal spot and postmedial line. Fringe checkered light gray brown and dark gray. Dorsal hindwing pale fuscous gray with scattered dark-gray scales and dark-gray markings. Discal spot chevron shaped. Postmedial line undulating and weakly scalloped in some specimens, touching lower discal spot. Marginal band wide with indistinct inner margin. Terminal line at base of fringe dark. Fringe similar to marginal band proximally, weakly checkered light gray and grayish white distally. Ventral hindwing brownish off-white with dusting of dark-gray scales. Discal spot nearly black, weakly arrowhead shaped. Postmedial line dark gray, lighter than discal spot and darker than marginal band, undulating and moderately scalloped, closer to marginal band than to discal spot. Marginal band dark gray, relatively thin with indistinct inner margin. Fringe with white and gray inner part and weakly checkered white and light gray outer part. **Abdomen –** Very light gray brown. Tufts on first two segments of white-tipped black scales with light gray-brown shafts. **Male genitalia –** (Fig. 157). Genital capsule and aedeagus as in *L. leucocycla* species-group and *L. leucocyc-*

la sub-group descriptions, indistinguishable from those of *L. b. benjamini*. Valve approximately 5.5–6.7× as long as wide. Neck at base of cucullus weak. Cucullus moderately large with corona comprised of a single row of setae. Vesica with 1–2 subbasal cornuti (N = 2). **Female genitalia –** (Fig. 213). Ovipositor lobe, segment VIII, and bursa copulatrix as in *L. leucocycla* species-group description, like those of *L. b. benjamini*. Corpus bursae approximately 1.6× ductus bursae length and 0.55× as wide as long.

Remarks. The two subspecies of *benjamini* may eventually prove to be distinct species, although there is slight overlap in appearance between them. *Lasionycta benjamini* has not been found in Utah between the ranges of the two subspecies.

Lasionycta perplexa sub-group

The three species in the *L. perplexa* sub-group are moderately sized with mottled gray to blue-gray forewings with dentate lines and distinct spots, including the claviform spot. The hindwings are nearly uniform gray on both surfaces, with markings limited to the darker discal spot and postmedial line. Males are easily sorted by antennal structure – either biserrate or bipectinate – and locality. Females are difficult to identify and are best identified by association with males. The three species resemble *L. subfuscula*, although males are easily differentiated by their narrower antennae (over 4× width of the shaft in *L. subfuscula*). Females can be told from those of *L. subfuscula* by the nearly straight orientation of the corpus bursae to the ductus bursae (angled 30° in *L. subfuscula*).

The male genitalia are similar to those of the *L. leucocycla* sub-group, with a weak constriction below the moderate-size cucullus bearing a corona of a single row. The costal lobe of the sacculus is variable, extending to or above the valve margin. The vesica shape is typical for the species-group and the basal part bears 0–3 cornuti.

The female genitalia are also similar to those of the *L. leucocycla* sub-group. The corpus bursae is ovoid with a slightly pointed anterior end. The corpus bursae is straight or only slightly angled toward the left from to the ductus bursae. Females of the three species cannot be differentiated structurally.

Lasionycta perplexa (Smith)

Figs 106–109, 158, 214. Map 10

Scotogramma perplexa Smith, 1888: 469.
Lasionycta perplexa; McDunnough 1938: 71.
Anytus marloffi Dyar, 1922: 167, **syn. n.**
Lasionycta marloffi; McDunnough 1938: 71.
Lasionycta alberta Barnes & Benjamin, 1923: 74, **syn. n.**

Type material. *Scotogramma perplexa* **holotype** ♀ [MSU, examined]. Type locality: Colorado. *Anytus marloffi*: **holotype** ♀ [USNM, examined]. Type locality: Wallace,

Idaho. *Lasionycta alberta*: **holotype** ♂ [USNM, examined]. Type locality: Nordegg, Alberta. The female holotypes of *Scotogramma perplexa* Smith and *Anytus marloffi* Dyar have a form of the orbicular spot that clearly identifies them as synonyms of *L. perplexa*.

Diagnosis. This dark blue-gray species is the most widely distributed in the subgroup and overlaps with the ranges of both of the other species. The male antenna is bipectinate with elongate distal segments (width > 2.8× central shaft) whereas those of *L. perplexella* and *L. subalpina* are biserrate with blunt-tipped triangular segments similar to those of *L. leucocycla* (width < 2.1× shaft). Females of *L. perplexa* are similar to those of *L. perplexella*, *L. subalpina*, and *L. subfuscula* and can only be structurally distinguished from *L. subfuscula* by lack of angulation at the base of the corpus bursae. In general, the forewing of *L. perplexa* is dark blue gray and the whitish filling of the irregular or diamond-shaped orbicular spot is the palest marking. The orbicular spots of the other species are usually rounder and less contrastingly pale. Females of *L. perplexa* can be distinguished from *L. subalpina* but not *L. perplexella* by the underside as described in the key to species and under *L. subalpina*.

The male valve of *L. perplexa* is slightly longer than those of the other species, has a relatively small costal lobe, and has slight downward angulation of the costal margin distal to the digitus that is lacking in *L. perplexella* and *L. subalpina*.

Six *L. perplexa* CO1 haplotypes exist which differ by up to 1.1 % (Fig. 248). They differ from those of *L. perplexella* by over 1.95 % and from those of *L. subalpina* by over 2.6 %.

Distribution and biology. *Lasionycta perplexa* is widely distributed from southern Alaska and Yukon in the North to California, Utah, and Colorado in the South. A disjunct population is found on the east coast of Hudson Bay at Kuujjuaraapik [Poste-de-la-Baleine, Great Whale River]. It flies in conifer forest, typically at lower elevations than *L. perplexella* or *L. subalpina*, although they are often collected together where their ranges overlap. *Lasionycta perplexa* is one of the most common *Lasionycta* species in collections. Adults are found from mid-June through August.

The larva of *L. perplexa* was described by Crumb (1956) from Washington. It feeds on alder (*Alnus* sp.) (Betulaceae).

Geographical variation. Most populations of *L. perplexa* are dark blue gray with little variation. Those from northern Nevada are lighter colored with indistinct markings. Several populations from central Utah are very light, nearly silver gray. Specimens from Yukon, Alaska, and Quebec are smaller than those from elsewhere.

Lasionycta perplexella Crabo & Lafontaine, sp. n.

urn:lsid:zoobank.org:act:D9079DC1-8D24-40EC-93DE-B0064DC28F89
Figs 110–112, 159, 215. Map 11

Type Material. Holotype ♂. Canada, British Columbia, Pavilion Mtn, 50°58' N 121° 41' W, 6860', 30 July 2000, Troubridge & Hensel. CNC. **Paratypes** 99 ♂, 15 ♀. **Canada**. **Alberta**. Hailstone Butte, Route 532, 50.20° N 114.44° W, 6600–6800', 18 July

2006, L. G. Crabo (8 ♂, 4 ♀). **British Columbia**. Same data as for holotype (58 ♂, 1 ♀); Gott Peak, 50.36° N 122.14° W, 7100', 30 July 1994, L. Crabo and J. Troubridge (1 ♂), 6 Aug. 2005, L. G. Crabo (1 ♂, 1 ♀), 26 July 2006, L. G. Crabo (10 ♂, 1 ♀); Coast Range, Perkins Peak, 51.82-[51.8]3° N 125.02-[125.0]5° W, 6230–7400', L. G. Crabo (1 ♂); Mission Ridge, 50.76-[50.7]7° N 122.16-[122].20° W, 6000', 15–16 July 1994, L. Crabo and J. Troubridge (6 ♂, 1 ♀); Watch Peak, 50.47-[50].48° N 116.29° W, 7900–9300', 23 July 1994, L. Crabo and J. Troubridge (3 ♂, 1 ♀). **Yukon**. Montana Mtn, 60.07-[60.0]8° N 134.68-[134].72° W, 1670–1860 m., 3 July 1989, L. G. Crabo and J. P. Pelham (1 ♂). **USA**. **Washington**. Chelan County, Junior Point Camp Ground, 47.99° N 120.39° W, 2010 m., 4 Aug. 1989, L. Crabo and C. Coughlin (7 ♂, 4 ♀); Okanogan County, Tiffany Meadows, 48.69° N 119.96° W, 6200', 7 Aug. 1993, L. G. and A. G. Crabo (1 ♀); Whatcom County, Harts Pass, 48.73° N 120.66° W, 2000 m., 25 July 1987, L. G. Crabo (1 ♂), 8 Aug. 1987, L. G. Crabo (1 ♂, 1 ♀), 2 Aug. 1991 (1 ♂). AMNH, CNC, LGC, OSU, UASM, USNM, WSU.

Etymology. The name *perplexella* refers to the resemblance of this species to a small *L. perplexa*.

Diagnosis. *Lasionycta perplexella* closely resembles *L. perplexa* but the male antenna is biserrate rather than bipectinate as described under *L. perplexa*. Females of these species cannot be reliably differentiated without DNA sequencing and are best sorted by association with males. Subtle differences in their appearance are described under *L. perplexa*. *Lasionycta perplexella* is structurally indistinguishable from *L. subalpina*, including the antenna, but can be sorted by locality since *L. perplexella* occurs in the Pacific Northwest and *L. subalpina* is found in the central Rocky Mountains and Sierra Nevada. They also have different ventral hindwings as described under *L. subalpina*.

The male genitalia of *L. perplexella* and *L. subalpina* are indistinguishable. The valves are shorter than those of *L. perplexa* and have a larger costal lobe that extends above the valve. The part of the vesica extending beyond the basal coil is shorter than in *L. perplexa*. The female genitalia are indistinguishable.

The CO1 sequences of *L. perplexella* differ by at least 1.95 % from those of *L. perplexa*. Two known CO1 haplotypes of *L. perplexella* differ by 0.5 % (Fig. 248).

Description. Head – Antenna of male biserrate and fasciculate, individual segments triangular, 1.9–2.1× as wide as central shaft. Antenna of female filiform and ciliate. Dorsal segments charcoal gray proximally and white distally. Scape white, tuft of scales at dorsal antenna white-tipped gray. Eye normal sized. Palpus of brownish off-white, white, and charcoal scales. Frons with equal mixture of white and dark-gray hair-like scales. Top of head white-tipped dark-gray, dark-gray, and few white scales. **Thorax –** Vestiture a mixture of light- and medium-gray hair-like scales and white-tipped medium- and dark-gray scales, appearing pencil-lead gray. Prothoracic collar dark gray anteriorly and silver gray posteriorly. Patagium with ground color of thorax centrally and darker gray peripherally. Legs covered with slate gray and white scales. Tarsal segments slate gray with distal white rings. **Wings –** Forewing length: male 11–14 mm (expanse 30–36 mm); females 13–15mm (expanse 33–36 mm). Ground color of forewing a mixture of medium- and dark-gray, white, and scattered luteous scales,

appearing slightly mottled pencil-lead gray. Basal, antemedial, and postmedial lines double, dark gray with lighter gray filling, strongest at costa. Basal and antemedial line jagged, zigzagged. Medial line dark gray, complete. Postmedial line scalloped between veins, inner part clearly defined and outer part barely visible, broadly convex from costa to bottom of cell, and then nearly straight to posterior margin of wing. Subterminal line pale gray, irregular, preceded by a darker gray shade forming chevrons between veins. Spots dark gray. Orbicular spot round to oval, filled with light gray peripherally and a dark-gray ocellus centrally, lighter filling usually similar to filling of transverse lines, rarely lightest shading on forewing. Reniform spot kidney shaped, variable in size and conspicuousness, barely visible in a few specimens and complete and filled with pale gray peripherally and dark gray centrally in most specimens. Claviform spot filled with ground color, extending ¼ to ½ distance from antemedial line to postmedial line. Fringe dark gray, very weakly checkered with medium-gray between veins. Ventral forewing slightly brownish medium gray with scattered lighter scales along costa, distal to postmedial line, and at apex. Discal spot slightly darker gray. Postmedial line faint, most evident anterior to lower cell. Distal wing uniform dark gray. Dorsal hindwing light brownish gray with slightly darker gray discal spot, postmedial line, and indistinct marginal band. Hindwing fringe two-toned, dark gray proximally and light gray distally. Ventral hindwing a mixture of off-white and scattered gray scales, lighter gray than ventral forewing. Discal spot dark gray, relatively small, ovoid to weakly triangular. Postmedial line relatively faint, sinuous, most evident near costal margin. Marginal band of darker gray suffusion than remainder of wing. Fringe light gray. **Abdomen –** A mixture of light- and medium-gray scales. Dorsal tuft on first segment with white-tipped charcoal colored scales. **Male genitalia –** (Fig. 159). Genital capsule and aedeagus as in *L. leucocycla* species-group and *L. perplexa* sub-group descriptions. Valve approximately 6× as long as wide. Costal lobe of sacculus larger than that of *L. perplexa*, extending dorsal to valve margin. Vesica with 0–2 basal cornuti (N = 2), distal straight part slightly shorter than in *L. perplexa*. **Female genitalia –** (Fig. 215). Ovipositor lobe, segment VIII, and bursa copulatrix as in *L. leucocycla* species-group and *L. perplexa* sub-group descriptions. Corpus bursae approximately 1× as long as ductus bursae and 0.7× as wide as long.

Distribution and biology. *Lasionycta perplexella* occurs from southern Yukon to southern Alberta and southern Washington. It is found in subalpine spruce and fir forest, typically at higher elevation than *L. perplexa*. Adults are nocturnal and come to light. It has been collected from mid-July through August.

***Lasionycta subalpina* Crabo & Lafontaine, sp. n.**
urn:lsid:zoobank.org:act:65270BB7-028C-4339-898E-AA8297244034
Figs 113–115, 160, 216. Map 11

Type material. Holotype ♂. USA, Utah, Summit County, Bald Mountain Pass, 40.686-[40].698° N 110.889-[110].906° W, 10700', 22 July 2006, L. G. Crabo.

CNC. **Paratypes** 30 ♂, 1 ♀. **USA**. **Utah**. Summit County: Same data as holotype (25 ♂); Sanpete County, Ephraim, 8 mi. E., 39.317-[39].337° N 111.448-[111].470° W, 10700', 22 July 2006, L. G. Crabo (2 ♂). **Wyoming**. [Fremont County], Dubois, pine forest, 2600 m., 5 July 1992, ad luc., Kauri Mikkola (1 ♂), 6 July 1992 (1 ♂, 1 ♀), 9 July 1992 (1 ♂). AMNH, CDFC, CNC, GBC, LGC, MZHF, OSU, TMC, USNM, WSU.

Etymology. The name *subalpina* refers to the habitat where this species is most common.

Diagnosis. *Lasionycta subalpina* is similar to *L. perplexella*, which it replaces in the central Rocky Mountains and Sierra Nevada. The ventral hindwing of *L. subalpina* is medium brown gray similar to the ventral forewing with a relatively inconspicuous discal spot. The ventral hindwings of *L. perplexa* and *L. perplexella* are light gray, lighter than the ventral forewing, and have a darker discal spot. In practice, *L. subalpina* and *L. perplexella* are sorted most easily by locality because *L. subalpina* occurs south of the range of *L. perplexella*. *Lasionycta subalpina* occurs with *L. perplexa*. The antenna, biserrate in *L. subalpina* and bipectinate in *L. perplexa*, differentiates males of these two species where they occur together. Also, *L. subalpina* is smaller and darker than *L. perplexa*, but females are best sorted by the ventral appearance, given above. A few specimens of *L. benjamini medaminosa* resemble *L. subalpina*. Differences between their hindwings are described under *L. b. medaminosa*.

The genitalia of both sexes of *L. subalpina* are indistinguishable from those of *L. perplexella*. Differences between them and *L. perplexa* are described under *L. perplexella*.

The CO1 sequences of *L. subalpina* differ by over 2.6 % from those of *L. perplexa* and *L. perplexella*, a large distance for the genus *Lasionycta*, and form a relatively distinct segregate on the DNA tree. CO1 haplotypes of *L. subalpina* populations from northwestern Wyoming differ from those in the Snowy Range, southeastern Wyoming, by 0.93 %. Other *L. subalpina* populations from Colorado, Utah, and California have not been sequenced.

Description. Head – Antenna of male biserrate and fasciculate with triangular segments, 1.9–2.1× as wide as central shaft. Antenna of female filiform and ciliate. Dorsal segments dark gray proximally, white distally. Scape white, dorsal tuft of scales brownish gray. Eye normal size. Palpus covered with brownish gray, slate gray, and white scales. Frons with equal mixture of white and slate gray hair-like scales. Top of head of slate gray, white-tipped gray, and white scales, darker gray anteriorly and lighter posteriorly. **Thorax –** Vestiture white-tipped dark-gray scales, appearing nearly uniform pencil-lead gray. Legs, including tarsi, covered with slate gray and fewer white scales, distal tarsal segments ringed with white. **Wings –** Forewing length: male 13–15 mm (expanse 29–33 mm); female 13–16 mm (expanse 30–35 mm). Ground color of forewing a mixture of slightly brownish medium-gray, darker slate-gray scales, and fewer white and luteous scales, appearing slightly hoary mottled brownish gray. Basal, antemedial, and postmedial lines double, dark-gray with lighter gray filling. Basal and antemedial lines uneven. Medial line slightly darker gray than ground, barely evident except near costa. Postmedial line scalloped between veins, broadly convex from costa to bottom of cell, then nearly straight

to posterior margin. Subterminal line pale whitish gray, irregular, preceded by darker gray shade forming chevrons between veins in some specimens, usually less dark and contrasting than in *L. perplexella*. Spots dark gray. Orbicular spot round or weakly ovoid, filled with pale gray similar to filling of reniform peripherally and dark gray centrally. Reniform spot weakly kidney shaped, similar in conspicuousness to orbicular spot, filled with peripheral pale gray and central dark gray. Claviform spot filled with ground color, variable in size extending ⅓ to ½ distance from antemedial line to postmedial line. Fringe weakly checkered medium and dark gray. Ventral forewing nearly uniform gray except lighter along posterior margin and costa with mixture of dark-gray and white scales. Discal spot usually absent, weakly evident in a few specimens. Postmedial line incomplete, evident only near costa. Fringe gray, weakly checkered. Dorsal hindwing uniform slightly brownish gray, unmarked or with faint discal spot and postmedial line in a few specimens. Hindwing fringe two-toned, dark gray basally and light gray distally. Ventral hindwing with nearly equal mixture of whitish gray and gray scales, appearing hoary but otherwise similar to ventral forewing color to naked eye. Discal spot round to ovoid, only slightly darker gray than postmedial line. Postmedial line gray, undulating. Marginal area similar to remainder of hindwing. Fringe similar to remainder of ventral hindwing or slightly lighter gray, weakly checkered in some specimens. **Abdomen** – Mixture of slightly brownish light-gray and dark-gray scales. Dorsal tuft of white-tipped dark-gray scales. **Male genitalia** – Male genitalia indistinguishable from those of *L. perplexella*. **Female genitalia** – Female genitalia indistinguishable from those of *L. perplexella*.

Distribution and biology. *Lasionycta subalpina* occurs from southern Idaho and the Beartooth Plateau on the Montana-Wyoming border to Colorado and central Utah as well as in the Sierra Nevada of California. It is most common in subalpine forests, on average at higher elevations than *L. perplexa,* but also occurs in mid-elevation pine forests with *L. perplexa*. Adults are nocturnal and come to light. It has been collected from mid-July through August.

Lasionycta subfuscula sub-group

This sub-group includes only *L. subfuscula*, a moderately large gray species with distinct dark lines and spots, including the claviform spot. It resembles members of the *L. perplexa* sub-group. Males have the widest antenna of any *Lasionycta*, over 4× as wide as the central shaft, and are easily identified without magnification. Females are the only species in the species-group in which the corpus bursae is angled 30° leftward at its junction with the ductus bursae.

The valve is elongate with a moderate constriction at the base of the cucullus. The costa is angled slightly ventrad beyond the digitus. The costal lobe is prominent, extending above the valve margin. The cucullus is smaller relative to the valve than in the *L. perplexa* sub-group, and bears a corona of a singe row of setae. The digitus is angled 30° to the valve axis and is relatively long and slender. The female appendix bursae is slightly more slender than those of the *L. perplexa* sub-group.

CO1 distance analysis suggests that *L. subfuscula* is a sister group to a large assemblage containing the species of the *L. leucocycla* and *L. perplexa* sub-groups, *L. staudingeri*, and *L. subfumosa*.

***Lasionycta subfuscula* (Grote)**
Figs 116–122, 161, 162, 217, 218. Map 12

Anarta subfuscula Grote, 1874b: 244.
Lasionycta subfuscula; McDunnough 1938: 71.
Scotogramma sedilis Smith, 1899: 43, **syn. n.**
Lasionycta sedilis; McDunnough 1938: 71.

Type Material. *Anarta subfuscula*: **holotype** ♀ [BMNH, examined]. Type locality: Colorado Territory. *Scotogramma sedilis*: **lectotype** ♀ [USNM, examined]. Type locality: Garfield County, Colorado. The lectotype female was designated by Todd (1982: 192).

Diagnosis. Males of *L. subfuscula* are unmistakable due to their wide bipectinate antennae (almost 5× shaft diameter). Females have a unique angled corpus bursae described in the *L. subfuscula* sub-group description. Females are difficult to separate from those of the *L. perplexa* sub-group without dissection, especially *L. perplexa* that is similar in size. Useful characters for differentiating them are listed under *L. perplexa*. In addition, the claviform spot of *L. subfuscula* is usually shorter than that of *L. perplexa*. *Lasionycta subfuscula* is less difficult to distinguish from *L. perplexella* and *L. subalpina* because females of these species tend to be smaller.

The CO1 sequences of *Lasionycta subfuscula* demonstrate larger differences than those of other *Lasionycta* species. Six haplotypes exist which differ by up to 2.09 % (Fig. 248).

Distribution and biology. *Lasionycta subfuscula* occurs from southwestern British Columbia and southwestern Alberta south to southern Oregon in the West and to southern Colorado and Utah in the Rocky Mountains. Adults fly in transition zone and subalpine forests. It has been collected from mid-June to early September.

Geographical variation. Populations of *L. subfuscula* are arranged in two subspecies.

***Lasionycta subfuscula subfuscula* (Grote)**
Figs 116–119, 161, 217. Map 12

Anarta subfuscula Grote, 1874b: 244.

The nominate subspecies is medium gray to pale whitish gray. The dark medial area contrasts with the ground color in pale specimens and the pale-filled lines and spots are prominent in darker populations. Specimens from Utah are paler than those from Colorado and Wyoming with some populations being very light gray. *Lasionycta s.*

subfuscula is less likely than *L. s. livida* to be confused with *L. perplexa*. *Lasionycta s. subfuscula* is found from the Wind River Mountains of Wyoming and southeastern Idaho to southern Colorado and Utah.

CO1 DNA suggests that a disjunct population on Steens Mountain in southeastern Oregon (haplotype SUB5 in Fig. 248) belongs to this subspecies despite having a more uniform gray forewing than other populations. Three CO1 haplotypes differing by 1.3 % are in *L. s. subfuscula*, one in Colorado, one in Utah, and one in southeastern Oregon. Although most Utah specimens are paler than those from Colorado, there is enough overlap in phenotype that we consider these the same subspecies.

Lasionycta subfuscula livida **Crabo & Lafontaine, ssp. n.**
urn:lsid:zoobank.org:act:4CC1F77E-699F-4C30-9E95-4FE56C4BB93A
Figs 120–122, 162, 218. Map 12

Type Material. Holotype ♂. USA, Washington, Kittitas Co, Quartz Mtn, 47.07° N 121.08° W, 1900 m., 25 July 2009, L. and E. Crabo. CNC. **Paratypes** 60 ♂, 52 ♀. **USA**. **Washington**. Same data as holotype (28 ♂, 6 ♀); Same locality as holotype, 14 July 1990, L. and A. Crabo (6 ♂, 11 ♀), 7 July 2005, L. G. Crabo (1 ♂, 1 ♀), 14 July 2005, L. Crabo and C. Coughlin (1 ♂, 1 ♀); Gnat Flat, 47.09° N 120.93° W, 1400 m., 15 July 1988, L. G. Crabo (1 ♂, 1 ♀); Lake Kachess, NF-4828, 47° 19.219' N 121° 15.46' W, 2700', T. Mustelin, Blacklight trap, 1 July 2009 (2 ♀), 4 VII 2009 (1 ♂, 1 ♀), 10 July 2009 (2 ♀), 11 July 2009 (2 ♂, 2 ♀), 12 July 2009 (1 ♂), 14 July 2009 (1 ♀), 16 July 2009 (2 ♂, 1 ♀), 17–18 July, 2009 (1 ♀), 24–26 July 2009 (1 ♀); FR 54 near Stampede Pass, 47° 16' N 121° 19' W, 900 m., T. Mustelin, blacklight trap (1 ♀); Yakima Co., Bethel Ridge, 46.79° N 121.09° W, 1900 m., 29 July 1989, L. G. Crabo & J. P. Pelham (11 ♂, 14 ♀), 18 July 1997, L. G. Crabo (1 ♂, 2 ♀), 23 July 1997, L. G. Crabo (1 ♂), 2 Sept. 1997, L. G. Crabo (2 ♀), 5 July 2005, L. G. Crabo (2 ♂, 1 ♀), 12 July 2005, L. Crabo and C. Coughlin (2 ♂, 1 ♀). AMNH, CDFC, CNC, GBC, JSC, LGC, OSU, TMC, USNM, WSU.

The type series is restricted to Kittitas and Yakima Counties, Washington, USA.

Etymology. The name *livida* is derived from the Latin *lividus* meaning bluish or lead-colored and refers to the forewing color of this subspecies.

Diagnosis. *Lasionycta subfuscula livida* is more uniform dark gray than nominate *subfuscula* and has less conspicuous lines and spots. It occurs in the Pacific Northwest from southern British Columbia and Alberta to southwestern Oregon. Females of this subspecies are easily confused with those of *L. perplexa* and *L. perplexella*. Distinguishing features are given under these species.

Description. Head – Antenna of male strongly bipectinate and fasciculate, greater than 4× as wide as central shaft. Antenna of female filiform and ciliate. Dorsal segments mostly slate gray with few white scales proximally; mostly white with a few gray scales distally. Scape white, dorsal tuft brownish off-white to pale gray. Eye normal size. Palpus covered with equal mixture of gray and cream to predominantly slate-gray

scales. Frons whitish gray to gray centrally, dark gray laterally. Top of head covered with light-gray to white-tipped slate-gray hair-like scales. **Thorax –** Vestiture a mixture of hair-like and bifurcate white, black, and white-tipped light brownish-gray to slate-gray scales, appearing light gray to hoary dark gray. Prothoracic collar apex lightly banded with dark gray anteriorly and whitish gray posteriorly. Patagium dark gray to black peripherally. Posterior thorax with weak black-tipped tufts. Legs with mixture of brownish gray to slate gray and white scales. Tarsal segments slate gray ringed distally with white. **Wings –** Forewing length: male 15–17 mm (expanse 32–37 mm); female 16–18 mm (expanse 34–39 mm). Forewing ground color a mixture of lead-gray, slightly brownish-gray, charcoal, white and pale-luteous scales, appearing mottled slightly bluish medium to dark gray. Basal, antemedial, and postmedial lines double, dark gray with slightly lighter gray filling, both components of each line strongest on costa. Basal line and antemedial line undulating, drawn inward on veins. Medial line dark gray, faint to moderately dark. Postmedial line scalloped between veins with prominent medial and very weak distal components, convex from costa to lower cell then oblique to posterior margin. Subterminal line pale, slightly luteous, irregular, preceded by prominent charcoal-gray shading forming chevrons between veins. Terminal line dark gray, strongest between veins. Spots dark gray to black. Orbicular spot slightly ovoid to eye shaped, filled with slightly paler gray scales and a dark central ocellus. Reniform spot moderately large, kidney or slightly figure-eight shaped with pale gray peripheral and dark-gray central filling. Claviform spot filled with ground color, variable in size, extending ½ to full distance between the antemedial and postmedial lines. Fringe with inner row of scales lighter gray medially and darker distally and outer row dark gray, weakly to strongly checkered with darker gray. Ventral forewing medium to dark gray, slightly lighter below fold, costa with mixture of white and charcoal scales, appearing hoary. Discal spot, postmedial line, and terminal line slightly darker. Fringe light gray, checkered with darker gray between veins. Dorsal hindwing fuscous gray, slightly darker distal to postmedial line and without a distinct marginal band. Discal spot faint. Postmedial line barely visible. Terminal line thin, dark gray. Fringe with proximal row of dark gray-tipped light brownish-gray scales and distal row of white scales. Ventral hindwing light fuscous gray with suffusion of medium-gray scales, appearing slightly lighter than ventral forewing. Discal spot dark gray, darker than postmedial line, variable in width, comma to semilunar in shape. Postmedial line gray, variable, incomplete, diffuse or scalloped, fainter than discal spot. Terminal line thin, dark gray. Fringe with proximal row of dark-tipped pale-gray scales and distal row of pale-gray scales. **Abdomen –** Covered with brownish medium-gray to mixture of dark-gray and brownish medium-gray scales. Dorsal tufts on proximal segments of white-tipped gray scales. **Male genitalia –** As for *L. subfuscula* sub-group description. **Female genitalia –** As for *L. subfuscula* sub-group description.

Distribution. *Lasionycta s. livida* is found in the Pacific Northwest from southwestern British Columbia and extreme southwestern Alberta to southern Oregon. It is common in transition zone conifer forest where it has been collected from mid June to early September.

Remarks. Two CO1 haplotypes differing by 0.8 % are in the southwestern British Columbia populations of *L. s. livida*, whereas only one of the haplotypes has been found in Washington. No consistent other differences were found to suggest that these DNA haplotypes represent separate species; however, the type series is restricted to Washington to avoid confusion.

Lasionycta staudingeri sub-group

The *L. staudingeri* sub-group contains six diurnal species in North America. All except *L. carolynae* are small (expanse < 30 mm). The hindwings are white with black or gray marginal bands and discal spots on both sides and usually lack postmedial lines. The forewings are light to dark gray and have indistinct markings in several species. Males have a broad digitus, triangular in shape in all species except *L. carolynae*, and lack basal cornuti on the vesica. The valves are weakly to moderately constricted at the base of the cucullus, and the cucullus varies from small to large for the genus. The corona is compound with at least two complete rows of setae in all species except *L. carolynae* which has a single row of setae. The female bursa is weakly constricted less than one-fourth its width with a small appendix bursae, appearing unisaccate. The ductus bursae is weakly sclerotized.

Species in the *L. staudingeri* sub-group are dispersed throughout the *L. leucocycla* species-group without clustering on CO1 distance analysis. This suggests that the *L. staudingeri* sub-group might be polyphyletic, although superficial and structural similarity suggests otherwise.

Lafontaine et al. (1986) grouped the species in this species-group with *L. leucocycla* based on similar appearance, diurnal habits, and ellipsoid eyes.

Lasionycta staudingeri (Aurivillius)

Figs 47–49, 163, 219. Map 13

Anarta schoenherri Staudinger, 1861: 373, not Zetterstedt, 1839.
Anarta staudingeri Aurivillius, 1891a: 176. Replacement name for *Anarta schoenherri* Staudinger.
Lasiestra staudingeri; McDunnough 1938: 71.
Hada staudingeri; Hartig and Heinicke 1973: 193.
Lasionycta staudingeri; Lafontaine et al. 1986: 261.
Anarta zemblica Hampson, 1905: 47, **syn. n.**
Anarta preblei Benjamin, 1933: 59.
Lasiestra leucocycla preblei; McDunnough 1938: 72.
Lasiestra preblei; Franclemont and Todd 1983: 149.
Lasionycta staudingeri preblei; Lafontaine et al. 1986: 261.
Lasionycta staudingeri sajanensis Kononenko, 1986, in Lafontaine et al. 1986: 263. Extralimital

Type material. *Anarta staudingeri*: **holotype** [NHRS, not examined]. Type locality: Dovre, Norway. *Anarta zemblica*: **holotype** ♀ [BMNH, examined]. Type locality: Shuberta Bay, Zovaya Zembla, Russia. *Anarta preblei*: **holotype** ♂ [USNM, examined]. Type locality: St. Paul Island, Alaska.

Diagnosis. *Lasionycta staudingeri* is a small arctic species with a mottled dark-gray forewing. The hindwing is typical for the sub-group, although those of some specimens are heavily suffused with black. Males of *L. staudingeri*, *L. subfumosa*, and *L. dolosa* differ from other *Lasionycta* in having a corona comprised of an irregular double row of setae. The base of the cucullus is mildly constricted and the digitus is small and shaped like an equilateral triangle. Females have a small corpus bursae with a weak mesial constriction. *Lasionycta staudingeri* and *L. subfumosa* are arctic species whereas *L. dolosa* occurs in Colorado. North American *L. staudingeri* belong to subspecies *preblei* (Benjamin) characterized by olive patches on the forewing and dark suffusion on the basal hindwing, features absent in *L. subfumosa*. *Lasionycta staudingeri* is also darker gray than *L. subfumosa*.

Lasionycta staudingeri is similar to *L. leucocycla* with which it occurs. It can be separated from *L. leucocycla* without dissection by the absence of an ocellus in the orbicular spot (present in *L. leucocycla*), and by a more bipectinate male antenna (> 2× central shaft width in *L. staudingeri*; ≤ 2× shaft in *L. leucocycla*).

Distribution and biology. *Lasionycta staudingeri* is Holarctic and the nominate subspecies occurs in Eurasia. In North America *L. s. preblei* is widely distributed north of the 60th parallel. This subspecies also occurs in the eastern Palaearctic (Lafontaine et al. 1986). *Lasionycta staudingeri* is diurnal and flies over dry scree tundra. Adults have been collected from late June to mid-August.

The larva of *L. staudingeri* feeds on *Empetrum nigrum* L. in Finland and was described by Lafontaine et al. (1986). It is polyphagous when reared (Ahola and Silvonen 2008).

Remarks. We follow Lafontaine et al. (1986) in treating North American populations as conspecific with Eurasian populations, although this has not been evaluated by DNA sequencing. *Lasionycta subfumosa* from Victoria Island and Alaska and *L. dolosa* from Colorado were previously treated as subspecies of *L. staudingeri* (Lafontaine et al. 1986).

Lasionycta staudingeri preblei (Benjamin)

Figs 47–49, 163, 219. Map 13

Anarta preblei Benjamin, 1933: 59.

Subspecies *preblei* has a Holarctic distribution, occurring across northern North America from Baffin Island to western Alaska and southward to 60° North. Its range extends into northeastern Siberia at least as far as the Kolyma River. The forewing has a more mottled pattern than subspecies *staudingeri* with patches of yellow-green shading on the dark-gray ground color; in *staudingeri* the forewing is mainly dark blackish gray with the maculation highlighted in white.

***Lasionycta dolosa* (Barnes & Benjamin) stat. rev.**
Figs 52, 53, 164, 220. Map 13

Anarta dolosa Barnes & Benjamin, 1923: 72.
Lasiestra dolosa; McDunnough 1938: 72.
Lasionycta staudingeri dolosa; Lafontaine et al. 1986: 261

Type material. Holotype ♂ [USNM, examined]. Type locality: Bullion Peak, Hall Valley, Colorado.

Diagnosis. *Lasionycta dolosa* resembles a pale-gray to brown-gray *L. staudingeri* with a wider male antenna (2.7–3.4× shaft width in *L. dolosa* versus 2.2× in *L. staudingeri*). These species and *L. subfumosa* have indistinguishable genitalia in both sexes. The male corona is comprised of a double row of setae. *Lasionycta dolosa* is restricted to Colorado and can be distinguished from the other species by locality.

Lasionycta dolosa is most likely to be confused with *L. quadrilunata* in Colorado. Males can be identified without dissection by the width of the antenna, bipectinate in *L. dolosa* and weakly biserrate in *L. quadrilunata*. Also, *L. dolosa* has a narrower hindwing discal spot (quadrate in *L. quadrilunata*), and a well-defined orbicular spot (indistinct in *L. quadrilunata*).

The CO1 sequences of *L. dolosa* and *L. staudingeri preblei* differ by 3.7 %, a very large amount for the genus *Lasionycta*, and are placed far apart in the *leucocycla* species-group DNA tree (Fig. 248).

Distribution and biology. *Lasionycta dolosa* is diurnal and occurs above timberline in the Rocky Mountains of Colorado. It flies over gravelly scree. Most adults have been collected from early July to mid-August.

***Lasionycta subfumosa* (Gibson), stat. rev.**
Figs 50, 51, 164, 221. Map 13

Anarta subfumosa Gibson, 1920: 34
Lasiestra leucocycla subfumosa; McDunnough 1938: 72.
Lasionycta staudingeri subfumosa; Lafontaine et al. 1986: 261.

Type Material. Holotype ♂ [CNC, examined], Type locality: Armstrong Point, Victoria Island, Canada.

Diagnosis. *Lasionycta subfumosa* is a light-gray species from the arctic northwest. It is similar to *L. staudingeri* with which it is structurally indistinguishable. *Lasionycta subfumosa* has light-gray forewing with faint markings and absent orbicular spot, whereas *L. staudingeri* is dark gray with patches of olive and has prominent markings, including an orbicular spot. *Lasionycta subfumosa* also resembles *L. quadrilunata yukona* Lafontaine that also occurs in Alaska, but it differs from *L. subfumosa* in having a large quadrate hindwing discal spot. The male

of *L. subfumosa* has a double corona and a strongly biserrate antenna, whereas that of *L. q. yukona* has four rows of setae in the corona and a weakly biserrate antenna.

The CO1 sequence of Alaskan *L. subfumosa* is similar to that of *L. staudingeri preblei*, differing by 0.37 %.

Distribution and biology. *Lasionycta subfumosa* is known from Victoria Island and Banks Island in the Northwest Territories and the Darby Mountains on the Seward Peninsula of Alaska. It is diurnal. Adults have been collected from late June through July and are very rare in collections.

Remarks. Lafontaine et al. (1986) treated *L. subfumosa* as a subspecies of *L. staudingeri*. The isolated Alaskan record of *L. subfumosa* from within the range of *L. staudingeri* suggests that the taxa are distinct.

Lasionycta quadrilunata (Grote)

Figs 54–56, 166, 167, 222, 223. Map 14

Anarta quadrilunata Grote, 1874b: 244
Lasiestra quadrilunata; McDunnough 1938: 71.
Lasionycta quadrilunata; Lafontaine et al. 1986: 263.
Lasionycta quadrilunata yukona Lafontaine, 1986: 264.

Type material. *Anarta quadrilunata*: **holotype** ♀ [USNM, examined]. Type locality: Colorado Territory. *Lasionycta quadrilunata yukona*: **holotype** ♀ [CNC, examined]. Type locality: 17 km WNW Burwash Flats, Yukon.

Diagnosis. *Lasionycta quadrilunata* is an alpine species characterized by a large hindwing discal spot, a short broad digitus resembling an obtuse triangle, and a small rounded cucullus bearing a corona of four rows of setae. The forewing is light gray or slate gray with a yellow or olive tint. The dark-gray transverse lines are prominent but the spots are indistinct. The female bursa is similar to that of *L. staudingeri* but *L. quadrilunata* has an increased number of short setae on abdominal segment VIII, similar to *L. lagganata*.

The male antenna of *quadrilunata* is weakly biserrate, almost beadlike (1.4× the width of the central shaft).

Distribution and biology. Records of *L. quadrilunata* form an arc on a map, from south-central Alaska down the spine of the Rocky Mountains to Colorado. It flies over scree tundra and is diurnal. The flight period is from mid-July to early August.

Geographical variation. The populations of *L. quadrilunata* are arranged in two subspecies.

***Lasionycta quadrilunata quadrilunata* (Grote)**
Figs 54, 166, 222. Map 14

Anarta quadrilunata Grote, 1874b: 244

The nominate subspecies is light gray to light olive with contrasting dark lines and spots and pale areas, especially distal to the postmedial line and in the terminal area. It is restricted to the mountains of Colorado. This subspecies is most likely to be confused with *L. dolosa* with which it occurs. Differences between these taxa are described under *L. dolosa*.

***Lasionycta quadrilunata yukona* Lafontaine**
Figs 55, 56, 167, 223. Map 14

Lasionycta quadrilunata yukona Lafontaine, 1986: 264.

Subspecies *yukona* is a darker than the nominate subspecies and the maculation is muted by the darker ground color and the lack of pale shading. Some specimens are more olive gray and resemble subspecies *quadrilunata*, but the maculation is still more muted. *Lasionycta q. yukona* can appear similar to *L. subfumosa*, which occurs in the arctic in western Northwest Territories and northern Alaska, in having a relatively unmarked gray forewing. Differences between these species are listed under *L. subfumosa*. Farther south *L. q. yukona* is only likely to be confused with *L. lagganata* that occurs in the Alberta Rocky Mountains. The two species can be differentiated without dissection by the shape of the antemedial line, irregular in *L. q. yukona*, ill defined but straight in *L. lagganata*. In the male genitalia, *L. q. yukona* has a broadly triangular digitus and a small rounded cucullus. The digitus of *L. lagganata* is much longer and the cucullus is large and triangular.

Records of this subspecies are from the Alaska Range, southwestern Yukon, the Alberta Rocky Mountains, and the Beartooth Plateau in Montana. It flies over fine shale scree tundra and feeds on nectar on a *Saxifraga* species at Prospect Mountain, Alberta (BC. Schmidt, pers. comm.). Most specimens have been collected during the daytime, but they are also collected uncommonly at night by light trapping (D. Macaulay pers. comm.).

The CO1 sequences of the two *L. quadrilunata* subspecies differ by 0.16 %.

***Lasionycta lagganata* (Barnes & Benjamin)**
Figs 57, 58, 168, 224. Map 13

Anarta lagganata Barnes & Benjamin, 1924: 118.
Lasiestra lagganata; McDunnough 1938: 72.
Lasionycta lagganata; Lafontaine et al. 1986: 263.

Type material. Holotype ♀ [USNM, examined]. Type locality: Laggan [Lake Louise], Alberta.

Diagnosis. *Lasionycta lagganata* has a slate-gray forewing with nearly obsolete dark lines and a white hindwing with a large discal spot and dark marginal band. The forewing is often quadrate with a blunt apex. Males have a long digitus shaped like an acute triangle and a large triangular cucullus with a corona comprised of four irregular rows of setae. The male antenna is weakly biserrate, about 1.6× as wide as the shaft.

Lasionycta lagganata has a limited range in the Canadian Rocky Mountains where it is only likely to be confused with *L. quadrilunata yukona*. Specimens of *L. lagganata* have a nearly straight antemedial line whereas that of *L. q. yukona* is sinuous. Males can be distinguished by the shape of the digitus, long in *L. lagganata* and short and broad in *L. quadrilunata*. The corpus bursae of *L. lagganata* is larger than that of *L. quadrilunata*. *Lasionycta lagganata* is also similar to *L. carolynae* that occurs in Yukon. Differences between these species are described under *L. carolynae*.

Distribution and biology. *Lasionycta lagganata* is only known from three localities in southwestern Canada: Banff and Waterton National Parks in Alberta and the Purcell Mountains in southeastern British Columbia. It is diurnal and flies on fine shale scree slopes with sparse vegetation. Adults have been collected from mid-July to mid-August. *Lasionycta lagganata* is very rare in collections.

Lasionycta carolynae Crabo, sp. n.

urn:lsid:zoobank.org:act:8E1A181E-5A9F-4B90-9725-4BBD4E3AE748
Figs 59, 169, 225. Map 14

Type material. Holotype ♂: Canada, Yukon, Ogilvie Mts, Windy Pass [km 153 Dempster Highway], 65.022° N 138.248° W, 1350 m., 30 June 2009, L. Crabo and G. Morrell. CNC. **Paratypes** 11 ♂, 2 ♀. **Canada**. **Yukon**. Same data as holotype (1 ♂); same locality and collectors as holotype, 1 July 2009 (8 ♂, 2 ♀); Richardson Mts, km 413 Dempster Hwy, 66.630° N 136.275° W, 840 m., 2–3 July 2009, L. G. Crabo and G. Morrell (1 ♂), 5 July 2009 (1 ♂). CNC, LGC, personal collection of Glenn Morrell, Maine, USA.

Etymology. I take great pleasure in naming this species after my wife Carolyn Coughlin.

Diagnosis. *Lasionycta carolynae* is the only species of *Lasionycta* with a uniform slate-gray forewing lacking any hint of dark lines or spots. It is most likely to be confused with *L. lagganata* or dark specimens of *L. quadrilunata yukona*. *Lasionycta carolynae* differs from both of these species in having a narrow discal spot on the dorsal and ventral hindwing and by lacking any trace of forewing markings. The discal spots of both of the other species are wide, appearing quadrate. The apex of the forewing is more pointed in *L. carolynae* than in *L. lagganata*. The male antenna of *L. carolynae* is more strongly biserrate than in the other species (2.0× the shaft in *L. carolynae*; less than 1.6× shaft in the other species). The male genitalia are most similar to those of *L.*

lagganata, but the clasper is wider, the digitus is wider and usually has a blunt apex, and the cucullus is smaller; they also differ from those of *L. lagganata* and all other species in the *L. staudingeri* sub-group in having a corona at the apex of the valve consisting of a single row of setae. The female genitalia are similar to those *L. lagganata*.

The CO1 sequence of *L. carolynae* is unknown.

Description. Head – Antenna of male deeply biserrate and fasciculate, 2.0–2.1× as wide as central shaft. Antenna of female filiform and ciliate. Dorsal segments covered with shiny slate-gray scales, some specimens with a few light brown-gray scales near base. Scape a mixture of slate-gray and light brown-gray scales. Eye reduced, ellipsoid, weakly hairy. Palpus covered with short light brown-gray scales and long hair-like dark brown-gray scales. Frons and top of head covered with medium-gray and slate-gray scales. **Thorax –** Vestiture entirely dark-gray and light gray-tipped and dark-gray hair-like scales, appearing slate gray. Legs slate gray; hindtibia with scattered medium-gray scales. Tarsal segments slate gray ringed distally with medium-gray scales. **Wings –** Forewing length: male 13–14 mm (expanse 30–32 mm); female 15 mm (expanse 33 mm). Forewing covered with uniform slate-gray scales, appearing glossy slate gray. All lines and spots absent. Fringe same color as remainder of forewing. Ventral forewing whitish gray with dark-gray shading on basal area, discal spot, costa, outer and posterior margins, and on veins. Postmedial line absent. Fringe dark gray basally, medium gray to dark gray distally. Dorsal hindwing ground color white, suffused with a few slate-gray scales; wing base and posterior margin heavily suffused with blackish gray. Veins medium gray. Discal spot blackish gray, thin, chevron shaped. Postmedial line absent. Marginal dark blackish-gray band sharply demarcated on outer ¼–⅓ of wing. Fringe dark gray basally, light, medium or dark gray distally. Ventral hindwing ground color white, lightly suffused with medium-gray scales; basal wing and area medial to cell nearly uniform medium gray. Veins medium gray. Discal spot dark gray, thin, comma shaped. Postmedial line absent. Marginal band dark gray, on outer ¼–⅓ of wing. Fringe dark gray basally, white, medium gray, or dark gray distally. **Abdomen –** Mainly covered with slate gray scales; longer brownish-gray scales covering male genitalia. **Male genitalia –** Similar to those of *L. lagganata* in most features including relatively broad uncus and broad flat juxta. Differing from those of *L. lagganata* in broader clasper; broader digitus (more apically blunt in two of four males examined), and in corona consisting of a single row of setae. **Female genitalia –** Similar to those of *L. lagganata*.

Distribution and biology. *Lasionycta carolynae* is found in the Ogilvie and Richardson Mountains, Yukon, where it flies over shale scree slopes. Adults are diurnal and feed at *Dryas octopetala* L. (Rosaceae) and *Silene acaulis* in the Ogilvie Mountains and a *Saxifraga* species in the Richardson Mountains. The type series, the only known specimens of this species, was collected in late June and early July.

Remarks. *Lasionycta carolynae* is unique among species in the *L. staudingeri* sub-group in having a single row of setae in the corona on the male valve, compared to 2–4 rows in other species in the sub-group. In this character it resembles species

in other sub-groups, especially those in the *L. leucocycla* sub-group. It is included in the *L. staudingeri* sub-group because other characters, such as bursa shape, lack of a postmedial line in the hindwing, and the habitus and genital similarities to *L. lagganata*.

Lasionycta phoca sub-group

The *L. phoca* sub-group contains seven mostly medium-size (expanse 30–36 mm) species from alpine or subarctic habitats. Most occur in western North America, with two in the Northeast. The forewing is gray to brown gray with dark basal, antemedial, and postmedial lines; the orbicular and reniform spots are weakly defined, evident mostly due to pale filling, and the claviform spot is absent; in several species the forewing is mottled with white, blue gray, or yellow. The dorsal hindwing is typically dark with a pale fringe. The ventral hindwing, often useful for diagnosis, is white to pale gray (rarely brownish gray) with dark chevron- or arrowhead-shaped discal spot, postmedial line, and marginal band. A small species from the Sierra Nevada (*Lasionycta mono* sp. n.) with a hindwing resembling species in the *L. staudingeri* sub-group is associated with this sub-group by the shape of the valve.

The male valve is elongate with a weak to moderate narrowing at the base of the cucullus. The cucullus is fairly stout and similar to those of the *L. leucocycla* sub-group in shape. The corona is variable, simple with partial double row near the apex in most species, but comprised of several rows in two species. The digitus is cylindrical. The female genitalia are similar to those of the *L. leucocycla* sub-group. The corpus bursae is ovoid with a 50 % medial constriction and an appendix bursae of similar size to the corpus bursae. The male antennae are biserrate with triangular individual segments 1.5–2.1× as wide as the central shaft.

Species in this sub-group are among the most difficult to identify in the genus. The genitalia are only helpful in a few of the species and the male antennae are generally indistinguishable. Most species resemble each other and several are variable to the point where individuals approach other species in appearance. For this reason, a definitive diagnosis is easiest when series can be examined. Identification is simplified by narrowing the possibilities by locality since no more than three species occur in a region (see Table 1). The habitus, especially the ventral hindwing pattern, can then be used for definitive diagnosis. Species status was determined by lack of evidence of intergradation in areas of sympatry together with genital and DNA differences in most cases. Assessment of species limits was most difficult in *L. uniformis*, a variable widely distributed species with many local forms and several CO1 haplotypes. The rationale for treating it as one species are discussed under *L. uniformis*.

The CO1 DNA sequences of all *phoca* sub-group species except *L. caesia* are similar (that of *L. mono* is unknown), clustering with those of *L. lagganata*, *L. quadrilunata*, and *L. dolosa* (Fig. 248). The sequences of *L. caesia*, *L. brunnea*, *L. gelida* sp. n., *L. discolor* (Smith), and *L. phoca* are fairly uniform, although this could be an artifact of

small sample sizes. In contrast, many haplotypes exist for several *L. uniformis* subspecies which are intermixed with those of the other species in the DNA tree (Fig. 248). Despite this overlap, CO1 distance analysis was useful for determining the number of taxa in a region. For example, comparison of all *L. phoca* sub-group DNA samples from the Canadian Rocky Mountains identifies two dominant haplotype clusters that correlate with *L. u. uniformis* and *L. brunnea*. Similarly, two main haplotypes from the central United States Rocky Mountains correspond to *L. discolor* and *L. uniformis fusca*. However, more haplotypes than identifiable species exist in the Pacific Northwest. Two of the haplotypes correspond to *L. gelida* and *L. caesia*. The other three major clusters are similar but variable and cannot be sorted by appearance to more than one taxon in *L. uniformis multicolor*.

***Lasionycta phoca* (Möschler)**
Figs 61, 62, 170, 226. Map 15

Dianthoecia phoca Möschler, 1864: 197.
Scotogramma phoca; Smith 1893a: 129.
Lasiestra phoca; Hampson, 1905: 47
Lasionycta phoca; Lafontaine et al. 1986: 264.
Scotogramma albinuda Smith, 1903: 19, **syn. n.**
Lasionycta albinuda; McDunnough 1938: 71.

Type material. *Lasiestra phoca*: **holotype** [ZMHB, not examined]. Type locality: Labrador. *Scotogramma albinuda*: **lectotype** ♀ [AMNH, examined]. Type locality: Rama, Labrador. The female lectotype was designated by Todd (1982: 10).

Diagnosis. *Lasionycta phoca* is a very dark species from subarctic northeastern North America. It is nearly uniform dark charcoal gray with black lines and spots. *Lasionycta phoca* is smaller than any other *L. phoca* sub-group species except *L. mono* (expanse ≤ 30 mm). The black ventral hindwing postmedial line is diffuse but prominent. It forms a smooth arc and touches or nearly touches the discal spot. Other species, including *L. uniformis handfieldi* that occurs on the Gaspé Peninsula, have a hindwing medial band that is thinner, undulating, and well separated from the spot. These characters also differentiate *L. phoca* from *L. anthracina*, a smaller nearly black *L. leucocycla* sub-group species from boreal forest habitat in eastern North America.

The male and female genitalia and male antenna of *L. phoca* are typical for the subgroup. The male corona is single except near the apex of the valve.

The two CO1 sequences of *L. phoca* are most similar to that of *L. u. uniformis*, differing by at least 0.24 %.

Distribution and biology. *Lasionycta phoca* occurs in eastern and central Canada with records from Labrador to the west coast of Hudson Bay. Adults fly over tundra, are diurnal and nocturnal, and come to light. It has been collected in June and July.

***Lasionycta uniformis* (Smith)**
Figs 70–81, 227–229, 171–173. Map 16

Scotogramma uniformis Smith, 1893b: 101. Again described as new in Smith 1894: 58.
Lasiestra uniformis; McDunnough 1938: 72.
Lasionycta uniformis; Lafontaine et al. 1986: 265.

Type material. Listed under subspecies accounts.

Diagnosis. Ironically *L. uniformis* is arguably the most variable species in the genus. It is widespread, occurring mostly near timberline in the mountains of western North America. Most populations can be identified by a combination of dorsal forewing and ventral hindwing characters. The dorsal forewing ground color is medium to dark gray, usually with discernible lines and less prominent spots, with variable amounts of other colors. The ventral hindwing ground color is pale whitish gray and almost all specimens have a dark thick arrowhead- or chevron-shaped discal spot. The postmedial line is usually more prominent than the marginal band; however, the opposite is true in the nominate subspecies from the Canadian Rocky Mountains. A few populations from the central Rocky Mountains are brown gray, but this is atypical for the species as a whole. In general, the darkness of the ventral hindwing markings correlates with the darkness of the dorsal forewing. Distinguishing features of each subspecies are given in greater detail below.

The male valve has a straight costal margin. The corona is comprised of a single row of setae except for a partial double row at the apex. The vesica has 0–3 basal cornuti. The female genitalia and male antenna are typical for the species sub-group.

The CO1 sequence of *L. uniformis* is variable with twelve haplotypes separated by up to 1.5 %. They are intermixed with those of *L. phoca*, *L. brunnea*, and *L. discolor* (Fig. 248).

Distribution and biology. *Lasionycta uniformis* is widely distributed in the mountains of western North America. It occurs from southern Yukon to northern California and Colorado, with an isolated population in eastern Quebec. It flies over alpine tundra and is most common on rocky slopes near treeline. It is predominantly nocturnal and is attracted to light, although it can be found feeding at moss campion, *Silene acaulis*. Adults have been collected from early July to late August.

Remarks. The variability of this species is a challenging problem in the genus *Lasionycta*. Variation exists within populations such as that in the Coast Range of southwestern British Columbia and between populations across greater distances. Examples of the latter include different ventral hindwing patterns in the nominate subspecies in the Canadian Rockies and most other populations, the presence of dark populations in south-central British Columbia east of lighter brightly-colored ones in the Coast Range, consistent habitus differences between populations in different central Rocky Mountain ranges, and distinctive disjunct populations on Mt. Shasta in California and Mt. Albert in Quebec. The CO1 variation in this species is similar to that found in the habitus. At first glance, variation in the habitus and DNA in Pacific Northwest

populations suggests multiple species. However, intermediates between extreme forms are readily found when large series are available and no significant differences between DNA haplotypes exist demonstrating that there is only one taxon, here assigned to *L. u. multicolor*. In regard to the interpopulation variability, slight overlap in habitus between populations, absence of structural differences, overall similarity of the DNA in light of evidence that DNA variation is common in several populations, absence of sympatry of distinct morphs, suggestion of a cline between subspecies *uniformis* and *multicolor* (discussed under subspecies *uniformis*), and similar habitat preference across the entire range argue that all populations are best considered a single species, *L. uniformis*.

Geographical variation. The populations of *L. uniformis* are arranged in five subspecies.

Lasionycta uniformis uniformis (Smith)

Figs 79–81, 171, 227. Map 16

Scotogramma uniformis Smith, 1893b: 101.

Type material. Holotype ♂ [USNM, examined]. Type locality: Laggan [Lake Louise], Alberta.

Diagnosis. The nominate subspecies from the Canadian Rocky Mountains is aptly named. Most specimens have a uniform medium-gray forewing with faint markings. Some specimens have olive scales in the forewing spots. The dorsal hindwing is uniform gray, with lighter areas along the anterior margin in some specimens, and a white fringe. The ventral hindwing is unique in *Lasionycta*. It is pale whitish gray with a dark-gray chevron-shaped discal spot, very faint postmedial line, and solid dark-gray marginal band.

Lasionycta uniformis is most likely to be confused with *L. brunnea* with which it occurs. Differences between them are given under *L. brunnea*. *Lasionycta uniformis* also occurs with *L. promulsa* from which it is readily distinguished by the hindwing ground color and pattern. That of *L. promulsa* is yellow brown with a relatively faint discal spot and marginal band.

The four CO1 haplotypes of this subspecies differ by up to 0.8 %.

Distribution and geographical variation. *Lasionycta u. uniformis* occurs in the Rocky Mountains and Purcell Mountains of southwestern British Columbia north to northeastern British Columbia.

The *L. uniformis* population from Pink Mountain in northeastern British Columbia is variable and shows intergradation between subspecies *uniformis* and subspecies *multicolor*. Some specimens with distinctly marked vividly colored dorsal forewings resembling those of *L. u. multicolor* show the typical ventral pattern of subspecies *uniformis*. Conversely, some specimens have the opposite combination of characters with a drab dorsal pattern and pale ventral hindwings with a dark postmedial line and fainter marginal band. This population is assigned to the nominate subspecies based on the most

typical form at this location and the proximity of the locale to other *L. u. uniformis* populations. Farther north and west at Montana Mountain in southwestern Yukon most specimens show characters most consistent with *L. u. multicolor* and are assigned to that subspecies. Very little material is available from the mountains in northern British Columbia. It is expected that a cline between these subspecies exists in this region.

Specimens have been collected during daytime but it is most common at night, even at the northernmost extent of its range. It has been collected from early July to mid-August.

***Lasionycta uniformis multicolor* Crabo & Lafontaine, ssp. n.**
urn:lsid:zoobank.org:act:9FAC8E64-5BF3-4EE8-9C45-6DDE56DA3175
Figs 70–73, 172, 228. Map 16

Type material. Holotype ♂. Canada, British Columbia, Gott Peak, 7100', 50° 21' N 122° 08' W, 13 July 2001, J. Troubridge. CNC. Paratypes 326 ♂, 77 ♀. **Canada**. **British Columbia**. Same data as holotype (1 ♂); same locality as holotype, 29 July 2000, J. Troubridge and H. Hensel (178 ♂, 40 ♀), 30 July 1994, L. Crabo and J. Troubridge (29 ♂), 23 Aug. 1996, J. Troubridge (1 ♂), 29 July 2000, J. Troubridge (3 ♂, 2 ♀); 17 Aug. 2000, J. Troubridge (5 ♂, 3 ♀); 6 Aug. 2005, L. G. Crabo (1 ♂), 26 July 2006, L. G. Crabo (74 ♂, 22 ♀); Mission Ridge, 5800', 50° 45' N 119° 37' W, 10 July 1998, J. Troubridge (1 ♂, 3 ♀), 15–16 July 1994, L. Crabo and J. Troubridge (33 ♂, 7 ♀). AMNH, CDFC, CNC, GBC, JSC, LGC, OSU, TMC, UASM, USNM, WSU.

The type series is restricted to Gott Peak and Mission Ridge in the southern British Columbia Coast Range.

Etymology. The name *multicolor* is derived from the Latin and has the same meaning in English. It refers to the vivid color and myriad forms of this subspecies.

Diagnosis. *Lasionycta u. multicolor* is a protean subspecies from the Pacific Northwest. Its forewing is gray to dark gray with variable patches of yellow or blue gray in the basal, postmedial, and terminal areas producing a number of color forms that appear mottled gray, blue gray, yellow, yellow green, or nearly black. The variability is most marked in the British Columbia Coast Range. The hindwing postmedial line is darker than the marginal band.

This subspecies is partially sympatric with *L. caesia* and *L. gelida*, but can be separated from both species by features of the hindwing and genitalia. *Lasionycta u. multicolor* has a pale-gray ventral hindwing with a narrow postmedial line and lighter patchy marginal band lacking dark scaling on the veins. That of *L. caesia* has a wider less distinct postmedial line, a marginal band of similar darkness to the line, and dark scaling on the veins. *Lasionycta u. multicolor* is distinguished from *L. gelida* by the ground color of the dorsal hindwing, gray with broad dark marginal band in *L. u. multicolor* and pale whitish-gray with thinner dark marginal band in *L. gelida*. Males of *L. u. multicolor* have a corona that is mostly single. Those of *L. caesia* and *L. gelida* are compound with several rows of setae. The female genitalia are similar, but the oviposi-

tors of *L. u. multicolor* are normal for the species-group whereas those of *L. gelida* are large and rounded apically.

This subspecies has four CO1 haplotypes differing by up to 1.2 %.

Description. Head – Antenna of male biserrate and fasciculate, individual segments triangular, 1.5–2.1× as wide as central shaft. Antenna of female filiform and ciliate. Dorsal segments slate gray proximally, mostly white with scattered slate-gray scales distally. Scape luteous off-white. Eye normal size. Palpus covered with slate gray and luteous off-white scales. Frons luteous off-white centrally, gray laterally. Top of head a mixture of cream and white-tipped gray hair-like scales. **Thorax** – Vestiture hair-like luteous off-white and white-tipped gray scales, appearing a uniform slightly luteous gray. Legs covered with slate-gray and luteous scales. Tarsal segments slate gray with distal ring of luteous scales. **Wings** – Forewing length: males 14–16 mm (expanse 31–36 mm); females 14–16 mm (expanse 33–36 mm). Forewing covered with medium- to dark-gray, light to dark ochre-yellow, and pale bluish-white scales; appearing patchy medium to dark gray with very variable blue-gray, light- to dark-yellow, or greenish-gray patches, most prominently proximal to antemedial line, adjacent to postmedial line, and in terminal area. Lines dark gray, single. Basal and antemedial lines undulating to jagged. Medial line dark gray, weak to moderately dark. Postmedial line scalloped between veins, convex from costal margin to fold, then oblique to posterior margin. Subterminal line uneven, pale, same as terminal area in vividly colored specimens. Spots dark gray, less conspicuous than lines. Orbicular spot variable in size, round to ovoid, filling usually same color as basal area, with or without a dark-gray ocellus. Reniform spot kidney shaped, variable in prominence, evident mostly due to darker black medial part and filling; filling similar to basal area in color peripherally but usually less vivid than filling of orbicular spot, with variable dark-gray central filling in entire spot or limited to lower part. Claviform spot absent. Fringe same color as terminal area, weakly to strongly checkered with gray between veins. Ventral forewing gray, with variable suffusion of pale-luteous scales in fold, distal to discal spot, and distal to postmedial and subterminal lines. Costa darker gray, usually mixed with yellow scales. Discal spot dark gray, thin and small. Postmedial line dark gray, variable, usually thick and undulating but occasionally scalloped between veins or only evident near costa. Postmedial line pale, preceded by a wide dark-gray shade. Fringe yellow gray, checkered with darker gray between veins. Dorsal hindwing gray with darker markings. Discal spot chevron- to half-moon shaped. Postmedial line thick, similar to discal spot in darkness, undulating. Marginal area similar to discal spot and postmedial line, broad with diffuse inner margin. Fringe light gray and pale yellow proximally, pale yellow distally. Ventral hindwing luteous off-white with dusting of gray scales. Discal spot prominent, dark gray, arrowhead shaped. Postmedial line located near discal spot, slightly lighter gray than discal spot, thick and slightly ill defined, nearly even with slight undulation near anal angle. Marginal band gray, similar in darkness to postmedial line or slightly lighter, interrupted by patchy suffusion of ground color, moderately wide with diffuse inner margin. Fringe two toned, proximal row luteous off-white with scattered light-gray scales, distal portion uniform luteous off-white. **Abdomen** –

Light gray, luteous distally in males. **Male genitalia** – (Fig. 172) Genital capsule and aedeagus as in *L. leucocycla* species-group and *L. phoca* sub-group descriptions. Valve approximately 7–8× as long as wide with moderately constricted neck. Digitus moderately long. Cucullus moderate size, usually with pointed apex, with corona comprised mainly of a single row of setae, partially double at apex. Vesica with 0–3 basal cornuti (N = 7). **Female genitalia** – (Fig. 228) Ovipositor lobe, segment VIII, and bursa copulatrix as in the *L. leucocycla* species-group and *L. phoca* sub-group descriptions.

Distribution and geographical variation. *Lasionycta u. multicolor* occurs from Montana Mountain in southwestern Yukon, south in the British Columbia Coast Range to the Cascades in southern Washington. The southern populations extend east to the Okanagan Trench. Populations from the Coast Range and northern Washington are variable whereas other Washington specimens are more uniformly gray. Those from mountains east of the Coast Range in British Columbia are very dark, resembling the eastern species *L. phoca*.

Lasionycta uniformis fusca Crabo & Lafontaine, ssp. n.

urn:lsid:zoobank.org:act:5963F711-8C0D-4C26-B6DC-CA2F3B5DAB80
Figs 76–78, 173, 229. Map 16

Type material. Holotype: ♂. USA, Colorado, Estes Park, 11 mi WNW, 11,000', 25 July 1967, D. F. Hardwick. CNC. **Paratypes** 21 ♂, 4 ♀. **USA**. **Colorado**. Same data as holotype, (2 ♂); Estes Park, 12 mi WNW, 11,600', 22–30 July 1967, D. F. Hardwick (11 ♂, 3 ♀); Mt. Evans, 3450 m., timberline, 17 July 1993, K. Mikkola (2 ♂); Chaffee Co., Cottonwood Pass, 19 July 1982, G. Balogh (1 ♀); Park Co., Pennsylvania Mt., near Fairplay, 11,500', 11, 17 July 1979, P. G. Kevan (4 ♂); Guanella Pass Co., 11,000', 17 July 1998, D. E. Bowman (2 ♂). CNC, GBC, LGC, MZHF.

The type series is restricted to Colorado.

Etymology. The name is derived from the Latin *fuscus* meaning dark. It refers to the dark, drab coloration of this subspecies relative to *L. u. multicolor*.

Diagnosis. *Lasionycta u. fusca* occurs in the central Rocky Mountains. Like subspecies *multicolor* it differs from the nominate subspecies in having more distinct forewing markings. The ventral hindwings are similar to those of subspecies *multicolor*, although the postmedial line of *L. u. fusca* is often wider. This subspecies is less colorful than *L. u. multicolor*, being gray, greenish gray, or brown gray depending on location. The individuals of each population are less variable than those of *L. u. multicolor*, although there is variation between populations in different mountain ranges.

Lasionycta u. fusca occurs with *L. discolor* in Colorado and Wyoming and pale specimens resemble this species. The dorsal hindwing of *L. u. fusca* has a sinuous postmedial line and lacks white distal to it, whereas *L. discolor* has a weakly dentate line with white between the line and marginal band. The ventral hindwing of *L. u. fusca* is pale gray and lacks dark veins, whereas that of *L. discolor* is nearly pure white with dark veins. *Lasionycta u. fusca* tends to have fewer cornuti on the male vesica (up to three),

whereas *L. discolor* has up to six. Females are structurally indistinguishable. Brownish populations of *L. u. fusca* can be mistaken for *L. promulsa* but have a larger arrowhead-shaped ventral hindwing discal spot than this species. The brown populations are also similar to *L. brunnea* but are easily distinguished by locality since *L. brunnea* occurs from northeastern Washington and further north in the range of *L. u. uniformis*.

The CO1 DNA of *L. u. fusca* appears to be less variable than that of *L. u. multicolor*. The three haplotypes differ by up to 0.8 %.

Description. Head – Antenna and eye similar to subspecies *multicolor* in males and females. Scape cream with a few gray scales. Palpus covered with mostly cream and a few gray scales. Frons white centrally, gray laterally. Top of head covered with white, black, and white-tipped black hair-like scales. **Thorax –** Vestiture of white, gray, and luteous (in specimens with luteous scales on forewing) hair-like scales, appearing uniform medium to dark gray with a luteous tint in specimens with yellow on forewings. Legs with gray to dark-gray and white to luteous off-white scales. Tarsal segments dark gray with few white scales, ringed distally with white. **Wings –** Forewing size same as subspecies *multicolor*. Ground color a mixture of medium- to dark-gray, white, and pale- to dark-luteous scales, appearing patchy greenish gray, dark gray, or slightly brownish gray; yellow scales more diffuse and forming less solid patches than in subspecies *multicolor*. Basal, antemedial and postmedial lines weakly double with light-gray to luteous filling. Basal and antemedial lines irregular. Postmedial line dark gray, moderately prominent and darkest near costa. Postmedial line moderately scalloped between veins. Subterminal line pale gray to luteous, irregular, preceded by an indistinct dark-gray shade. Spots dark gray. Orbicular spot round to oval, slightly variable in size, variably filled with ground color, whitish gray, or luteous, without or with a dark-gray ocellus. Reniform spot relatively inconspicuous, kidney shaped, filling usually pale whitish gray peripherally and ground color to dark gray centrally, medial part and adjacent pale filling most prominent. Claviform spot absent. Terminal line dark gray, thin, most evident between veins. Fringe light to medium gray or luteous, weakly checkered with darker gray between veins. Ventral forewing uniform light to medium gray centrally with lighter luteous off-white to light brownish gray from fold to posterior margin and distal to subterminal line; costa a mixture of dark-gray and luteous scales. Discal spot prominent, dark gray with anterior half thickest and darkest, slightly smaller and lighter than hindwing discal spot. Subterminal line dark gray with anterior part darkest, prominent in all but the lightest specimens but slightly lighter than hindwing subterminal line, broad and somewhat indistinct, slightly scalloped in some specimens. Distal wing slightly darker due to dusting of dark-gray scales, condensed to a weak subterminal line in some specimens. Fringe light gray to pale luteous, checkered with dark gray between veins. Dorsal hindwing ground color a mixture of light- and medium-gray scales with very faint brown tinge, lightest near anal angle, with slightly darker markings. Discal spot arrowhead shaped. Postmedial line broad, slightly ill defined and undulating, not scalloped. Marginal band broad and poorly defined medially. Fringe pale gray to luteous gray proximally, pure to luteous white distally. Ventral hindwing faintly luteous to brownish white with dusting of gray scales. Discal spot

dark gray, darker than other ventral markings, thick and arrowhead shaped. Postmedial line prominent in all but lightest specimens, but lighter than discal spot, usually wider than in subspecies *multicolor*, slightly indistinct and undulating near posterior margin. Marginal band paler gray than postmedial line, with diffuse inner margin interrupted by pale scales. Fringe luteous off-white, proximal row patchy light gray in most specimens. **Abdomen –** A mixture of light-gray to luteous and medium-gray scales. Long scales covering male genitalia uniformly pale gray to luteous. **Male genitalia –** The male genitalia are indistinguishable from those of *L. u. multicolor*. **Female genitalia –** The female genitalia are indistinguishable from those of *L. u. multicolor*.

Distribution and geographical variation. *Lasionycta u. fusca* occurs from central Colorado and northern Utah to the Beartooth Plateau on the Wyoming-Montana border. The population of each mountain range tends to have a distinct appearance. Colorado specimens are dark greenish gray, those from the Snowy Range in southern Wyoming are lighter greenish gray, Beartooth Plateau populations are gray, whereas populations from the Uinta Mountains, Utah and the Big Horn Mountains, Wyoming are brown gray. Most examined specimens are from mid- to late July.

Remarks. This subspecies was previously known as *L. discolor,* now recognized as a synonym of *Lasiestra klotsi* Richards.

***Lasionycta uniformis shasta* Crabo & Lafontaine, ssp. n.**
urn:lsid:zoobank.org:act:E6C1581B-1051-44FA-86D2-2EFD92E0BD20
Fig. 75. Map 16

Type material. Holotype ♂. USA, California, Siskiyou County, Mount Shasta, Panther Meadows, 7500', 23 July 1965, E. and I. Munroe. CNC. **Paratype** 1 ♂. **USA. California**. Same locality as holotype except elevation 7600', 20 Aug. 2000, J. Troubridge, Databased for CNC Noctuoidea #10484, Barcodes of Life Project, University of Guelph, DNA #Noctuoidea 10484 (1 ♂). CNC.

Etymology. The name refers to Mount Shasta. It is a noun in apposition.

Diagnosis. *Lasionycta u. shasta* is paler than other subspecies. The forewing is light blue gray with pale-gray mottling. It is the only subspecies of *L. uniformis* that consistently has dark veins on the ventral hindwing (rarely present in *L. u. uniformis*). *Lasionycta u. shasta* is unlikely to be confused with any other *Lasionycta* in its range.

The CO1 sequence of this subspecies is most similar to two of the *L. u. multicolor* haplotypes.

Description. Only known from males. **Head –** Antenna of male similar to subspecies *multicolor*. Scape luteous off-white. Palpus luteous off-white with a few gray scales. Frons white centrally, light gray laterally. Top of head mostly white with a few gray and white-tipped gray scales. **Thorax –** Vestiture cream and white-tipped gray hair-like scales, appearing uniform luteous light gray. Legs with gray and luteous off-white scales. Tarsal segments gray with few white scales, ringed distally with white. **Wings –** Forewing length 14 mm (expanse 32 mm). Forewing ground color

a mixture of gray, white, and luteous scales, appearing mottled gray with light-gray patches, most prominently basal to antemedial line, distal to reniform spot, and in subterminal and terminal areas. Lines dark gray. Basal and antemedial lines uneven. Medial line dark gray, moderately prominent. Postmedial line evenly scalloped between veins, excurved from costa to lower end of cell, then oblique to posterior margin. Subterminal line uneven, pale gray, preceded by slightly patchy dark-gray shade. Terminal line dark gray, evident between veins. Spots dark gray. Orbicular spot round, filled with light bluish gray and a dark-gray central ocellus. Reniform spot kidney shaped, inconspicuous, filled with light gray peripherally and dark gray centrally. Claviform spot absent. Fringe slightly lighter gray than ground color, weakly checkered with darker gray between veins. Ventral forewing uniformly gray, suffused with light gray from fold to posterior margin and with pale-luteous scales distal to reniform spot and postmedial line. Discal spot dark gray, prominent but lighter than hindwing discal spot. Postmedial line dark gray, wide and slightly ill defined, scalloped between veins. Marginal area heavily suffused with dark gray. Terminal line dark gray, interrupted on veins. Fringe luteous white, checkered with gray between veins. Dorsal hindwing ground slightly peach-tinted off-white, suffused with gray scales, especially basal to postmedial line. Markings dark gray. Discal spot arrowhead shaped. Postmedial line prominent, scalloped. Marginal band solid with indistinct inner margin. Hindwing fringe pale gray proximally, nearly white distally. Ventral hindwing luteous off-white with dusting of gray scales, heaviest basal to postmedial line. Markings and veins dark gray. Discal spot darkest gray, arrowhead shaped. Postmedial line similar in prominence to that of subspecies *multicolor*, undulating. Marginal band similar in darkness to postmedial line, with indistinct slightly scalloped inner margin. Fringe pale gray and white proximally, white distally. **Abdomen –** A mixture of light- and medium-gray scales. Long scales covering male genitalia luteous light gray. **Male genitalia –** Indistinguishable from those of subspecies *multicolor*.

Distribution. *Lasionycta u. shasta* occurs on Mount Shasta in the Cascade Range of northern California. It might be more widely distributed in northern California and Oregon in the southern Cascades or Klamath Mountains.

***Lasionycta uniformis handfieldi* Crabo & Lafontaine, ssp. n.**
urn:lsid:zoobank.org:act:9A6FA52E-051A-43F6-8086-E478F2A22C84
Fig. 74. Map 16

Type Material. Holotype ♀. Canada, Quebec, Gaspé-Ouest Co, Parc de la Gaspésies, Mont Albert, 3 July 1987, 1070 m, Yves-Pascal Dion, Slide CNC No. 9901, Database #CNC LEP 00053369. CNC. **Paratype** 1 ♀. Same locality as holotype, except elev 3500–3750', 21 July 1933, W. J. Brown, Slide Female CNC No. 9956. CNC.

Etymology. This subspecies is named in honor of Louis Handfield in recognition of his contributions to the study of Lepidoptera in Quebec.

Diagnosis. *Lasionycta u. handfieldi* occurs on Mount Albert in the Gaspé Peninsula of Quebec. It is hoary dark olive gray due to a suffusion of luteous scales on a black background. The dorsal hindwing ground color has a faint peach-colored tint. This subspecies is most likely to be confused with *L. phoca*, which occurs farther north in Labrador and Quebec. *Lasionycta u. handfieldi* is greenish and has a pale-brown ventral hindwing with separate line and spot. *Lasionycta phoca* is blackish gray and has a dark-gray ventral hindwing with the postmedial line touching the discal spot.

Lasionycta u. handfieldi represents a curious disjunct occurrence of an otherwise western species. The Gulf of St. Lawrence harbors other disjunct western plants and animals, likely remnants of a Pleistocene glacial refugium.

The worn paratype was correctly associated with *L. uniformis* by Rockburne and Lafontaine (1976).

Description. Known only from females. **Head –** Antenna of female filiform and ciliate. Dorsal antennal segments dark gray proximally, luteous distally. Scape luteous with a few gray scales. Eye normal size. Palpus covered with luteous and gray scales. Frons luteous off-white centrally, dark gray laterally. Top of head covered with luteous and dark-gray scales. **Thorax –** Vestiture hair-like with black, olive-gray, and luteous scales, appearing dark olive gray. Legs covered with mixture of luteous and gray scales. Tarsal segments dark gray with luteous ring of scales distally. **Wings –** Forewing length 15 mm (expanse 35 mm). Forewing ground color a mixture of black, gray-olive, luteous, and white scales, appearing hoary greenish gray; medial area, apex, and fold distal to subterminal line lighter greenish yellow due to a heavy suffusion of yellow scales. Lines and spots black. Basal line evident only at costa. Antemedial line thick and jagged. Medial line incomplete, most evident near costa and posterior margin. Postmedial line sawtooth shaped, drawn inward between veins, gently excurved from costa to lower cell, then oblique to inner margin. Subterminal line pale luteous, preceded by faint dark-gray shade. Orbicular spot obsolete, evident as a yellow streak. Reniform spot inconspicuous, evident mostly due to light yellow peripheral and black central filling. Claviform spot absent. Fringe luteous, weakly checkered with gray olive between veins. Ventral forewing uniform dark gray centrally with patchy suffusion of light brownish-gray scales in fold, distal to reniform spot, and in subterminal and terminal areas. Discal spot a dark-gray bar, much thinner and lighter than hindwing discal spot. Postmedial line dark gray, moderately thick and ill defined. Postmedial line pale, preceded by a gray shade of similar darkness to postmedial line. Fringe luteous, weakly scalloped with gray between veins. Dorsal hindwing ground color peach-tinted pale gray, palest at costa and at anal angle, moderately suffused with dark-gray scales. Markings dark gray. Discal spot large, arrowhead shaped. Postmedial line weakly scalloped, undulating near anal margin. Marginal band broad, diffuse proximally. Fringe two-toned with luteous proximal and white distal components. Ventral hindwing pale brownish gray with dusting of gray scales, appearing weakly peppered with dark-gray markings. Discal spot nearly black, weakly arrowhead shaped. Postmedial line ill defined due to suffusion with lighter scales, undulating. Marginal band indistinct, heavily suffused with lighter scales. Fringe nearly uniform faintly brownish off-white. **Ab-**

domen – Abdomens of both type specimens removed for genitalia dissection. **Female genitalia –** Female genitalia indistinguishable from those of *L. u. uniformis*.

***Lasionycta brunnea* Crabo & Lafontaine, sp. n.**
urn:lsid:zoobank.org:act:378D6DC4-75E6-4F25-9734-546A78A11C3A
Figs 82–84, 174, 230. Map 15

Type material. Holotype ♂. Canada, British Columbia, Watch Peak, 8000, 2 km N of Panorama, [50.47-.48° N 116.29° W] 16–17 Aug. 1996, J. Troubridge. CNC. Paratypes 276 ♂, 47 ♀. **Canada**. **British Columbia**. Same data as holotype (109 ♂, 37 ♀); same locality as holotype, 23 July 1994, L. Crabo and J. Troubridge (35 ♂, 4 ♀), 1 Aug. 2000, Troubridge and Hensel (132 ♂, 6 ♀). AMNH, CDFC, CNC, GBC, JSC, LGC, OSU, TMC, USNM, WSU.

The type series is restricted to Watch Peak, British Columbia.

Etymology. The name *brunnea* is derived from *brunneus* meaning brown in Medieval Latin. It refers to the dominant color of the moth.

Diagnosis. *Lasionycta brunnea* is a smooth dark-brown species from Alberta, eastern British Columbia, and northeastern Washington. The forewing is uniform olive brown with faint markings. The ventral hindwing is light gray brown with an arrowhead-shaped discal spot, dark postmedial line, and faint marginal band. This is the only *L. phoca* sub-group species that is consistently brown.

Lasionycta brunnea occurs with *L. u. uniformis*, another plain moth, in most of its range. They can be distinguished by color, especially when fresh, since *L. brunnea* is brown on both sides whereas *L. uniformis* is gray without a brown tint. They also differ in the relative darkness of the ventral hindwing markings. The postmedial line of *L. brunnea* is darker than the marginal band (similar to other *L. uniformis* subspecies), whereas *L. u. uniformis* has a faint postmedial line and darker marginal band. *Lasionycta brunnea* occurs with *L. promulsa* and can be confused with it because both are brownish. The ventral hindwing of *L. promulsa* differs in having a small discal spot and inconspicuous postmedial line. Brown-gray populations of *L. uniformis fusca* resemble *L. brunnea* but have more prominent forewing markings and are easily distinguished by locality since *L. u. fusca* occurs in the central Rocky Mountains.

The male valve of *L. brunnea* is similar to that of *L. uniformis* but has a slight downward bend distal to the digitus and a slightly rounder cucullus. The female genitalia are indistinguishable.

Lasionycta brunnea demonstrates no variation in the CO1 gene (N = 7). It differs from *L. u. uniformis* by up to 1.2 % and from *L. u. multicolor* by up to 0.9 %.

Description. Head – Antenna of male biserrate and ciliate, individual antennal segments triangular, 1.7–1.8× as wide as central shaft. Antenna of female filiform and ciliate. Dorsal segments mostly slate gray, distal portions of some specimens with scattered luteous scales. Scape cream. Eye normal size. Palpus covered with cream and light-gray scales of variable proportions in different specimens. Frons cream centrally,

light gray laterally. Top of head covered with cream, black-tipped tan, and apically white black-tipped tan hair-like scales. **Thorax** –Vestiture similar to scales on top of head, appearing even dark olive gray to brown gray, tip of prothoracic collar slightly darker in some specimens. Legs covered with fuscous gray scales. Tarsal segments dark gray, ringed distally with luteous scales. **Wings –** Forewing length: males 13–15 mm (expanse 30–35 mm); females 15–16 mm (expanse 34–36 mm). Forewing covered with a mixture of dark-tipped medium-gray, olive-gray, and light to dark ochre-yellow scales, appearing even brown gray to olive gray. Basal, antemedial, and postmedial lines weakly double, medium to dark gray with olive-yellow filling. Basal line smudged, evident only at costa in some specimens. Antemedial line irregular. Medial line faint, most evident at costa. Postmedial line variable, faint to more prominent than other lines, scalloped between veins, excurved from costa to lower cell, then oblique to posterior margin. Subterminal line faint, pale yellow, preceded by darker gray chevrons between veins in some specimens. Terminal line thin, gray. Spots gray, similar in darkness to lines. Orbicular spot oval, nearly round to oblong, filled with ground color or yellow scales, with a faint gray ocellus in some specimens. Reniform spot kidney shaped, very faint, with olive-yellow scales on margin and ground color to medium gray centrally. Claviform spot absent. Fringe olive yellow, checkered with ground color or gray between veins. Ventral forewing evenly fuscous gray with suffusion of pale-yellow scales in fold to posterior margin, along costa, distal to discal spot, and in subterminal area. Discal spot gray, much lighter and thinner than hindwing discal spot with only anterior spot evident in some specimens. Postmedial line gray, indistinct, only evident near costa in most specimens. Fringe yellow white, weakly checkered with gray. Dorsal hindwing ground color medium to dark brownish gray. Markings dark gray, only evident in specimens with lighter ground color. Discal spot arrowhead shaped. Postmedial line indistinct, most evident as an oblique line from level of posterior edge of discal spot to inner margin of wing near anal angle. Fringe brownish to ochre off-white with a few gray scales in middle row. Ventral hindwing luteous to brownish off-white with a suffusion of gray scales, appearing dusty light brownish gray. Discal spot dark brownish gray, slightly ill defined, arrowhead shaped. Postmedial line brownish gray with scattered lighter scales, lighter than discal spot but slightly darker than marginal band, sinuous. Marginal band brownish gray, ill defined and interrupted with dusting and patches of paler scales with a dark streak at anal angle. Fringe luteous to brownish off-white, proximal row with scattered brown-gray scales. **Abdomen –** Dark gray with ochre scales covering male genitalia. **Male genitalia –** (Fig. 174) Genital capsule and aedeagus generally as in the *L. leucocycla* species-group and *L. phoca* sub-group descriptions. Valve with slight downward angulation distal to digitus and moderately constricted neck. Cucullus moderately large and slightly rounded. Corona a single row of setae. Vesica with 1–3 basal cornuti (N = 3). **Female genitalia –** (Fig. 230) Ovipositor lobe, segment VIII, and bursa copulatrix as in *L. leucocycla* species-group and *L. phoca* sub-group descriptions.

Distribution and biology. *Lasionycta brunnea* occurs in Rocky Mountains of Alberta north to Pink Mountain in northeastern British Columbia, and in the Purcell

and Selkirk Mountains in southwestern British Columbia and northeastern Washington. It flies in alpine tundra and is most common near timberline. It has been collected from mid-July through August.

***Lasionycta caesia* Crabo & Lafontaine, sp. n.**
urn:lsid:zoobank.org:act:80722CAD-CBD9-4509-A2DC-C6BAC25846F6
Figs 68, 69, 175, 231. Map 17

Type material. Holotype ♂. Canada, British Columbia, Gott Peak, [50.36° N 122.14° W], 7100', 13 July 2001, J. Troubridge. CNC. **Paratypes** 213 ♂, 31 ♀. **Canada**. **British Columbia**. Same data as holotype (5 ♂, 3 ♀); same locality as holotype, 20 Aug. 1993, A. & L. Crabo & J. Troubridge (1 ♂), 30 July 1994, L. Crabo & J. Troubridge (1 ♂), 23 Aug. 1996, J. Troubridge (18 ♂), 29 July 2000, J. Troubridge (13 ♂, 1♀), 17 Aug. 2000, J. Troubridge (54 ♂, 4♀), 10 Aug. 2001, J. Troubridge (16 ♂, 3 ♀), 6 Aug. 2005, L. G. Crabo (16 ♂, 2 ♀), 26 July 2006, L. G. Crabo (82 ♂, 16 ♀); Mission Ridge, 5800', 50° 45' N 119° 37' W, 15–16 July 1994, L. Crabo & J. Troubridge (3 ♂), 10 July 1998, J. Troubridge (1 ♀); Coast Range, Perkins Peak, 6230–7400', 51.82-[51.8]3° N 125.02-[125.0]5° W, 5 Aug. 2005, L. G. Crabo (4 ♂, 1 ♀). AMNH, CDFC, CNC, GBC, JSC, LGC, OSU, TMC, USNM, WSU.

The type series is restricted to British Columbia.

Etymology. The name *caesia* is derived from the Latin *caesius* meaning blue gray. It refers to the color on the forewing of this species.

Diagnosis. *Lasionycta caesia* is an attractive species from the Pacific Northwest. It has a charcoal gray forewing with patchy lighter blue gray to greenish blue proximal to the antemedial line and distal to the postmedial line. The dorsal hindwing is dark gray with white scales at the anal angle and a white fringe. The ventral hindwing is whitish gray with dark-gray basal suffusion, discal spot, equally dark postmedial line and marginal band, and dark scaling on the veins. The male corona is compound with up to three irregular rows of setae. The female genitalia are similar to those of other species in the sub-group, but the appendix bursae is relatively short.

Lasionycta caesia occurs with *L. u. multicolor* and *L. gelida* and is similar to both species. Differences between *L. caesia* and *L. u. multicolor* are given under the latter species. Males of *L. caesia* and *L. gelida* both have a compound male corona. The dorsal hindwing of *L. gelida* differs from that of *L. caesia* in being pale whitish gray with a dark marginal band. Females of *L. caesia* have normal size ovipositor lobes whereas those of *L. gelida* are large and rounded.

The CO1 sequence of *L. caesia* is the most distinctive in the *L. phoca* sub-group. It is placed as an isolated segregate in the DNA tree and differs from the other species by over 1.4 %. It is placed as a sister group to a large group of species that includes the other *L. phoca* sub-group species (Fig. 248).

Description. Head – Antenna of male biserrate and fasciculate, individual segments triangular, 1.6–1.9× as wide as central shaft. Antenna of female filiform and

ciliate. Dorsal segments dark gray proximally, yellow distally. Scape white, tuft at base of dorsal antenna cream and gray. Eye normal size. Palpus gray laterally, luteous white medially. Frons luteous white centrally, gray laterally. Top of head a mixture of cream and charcoal-gray scales, darkest posteriorly. **Thorax –** Vestiture cream and dark-gray hair-like scales, darkest gray posterior to prothoracic collar. Prothoracic collar lighter than central thorax with white to cream apex. Patagium dark gray centrally, cream peripherally. Legs covered with dark-gray and a few cream scales. Tarsal segments dark gray, ringed distally with pale-luteous scales. **Wings –** Forewing length: males 13–15 mm (expanse 30–34 mm); females 14–16 mm (expanse 32–35 mm). Forewing ground color a mixture of slate- and charcoal-gray scales, appearing charcoal gray. Area proximal to antemedial line, postmedial area adjacent to reniform spot, and most of area distal to postmedial line covered with bluish white, yellow, and fewer gray scales, appearing light blue gray to blue green. Basal, antemedial, and postmedial lines black, single. Basal and antemedial lines irregular. Medial line black, moderately strong but only slightly darker than ground color. Postmedial line scalloped between veins, strongly convex from costa to lower end of cell and then oblique to posterior margin, distinct due to lighter shading in adjacent subterminal area. Subterminal line pale blue gray, similar to adjacent terminal area, preceded by patchy black shade interrupted opposite cell and in fold. Terminal line thin, black, interrupted between veins. Spots black. Orbicular spot relatively small, round, filled with similar color as antemedial area and a small central ocellus in some specimens. Reniform spot inconspicuous, narrow kidney shaped, filled with same color as antemedial area peripherally and dark gray centrally, strongest in lower half. Claviform spot absent. Fringe luteous off-white and gray, checkered darker gray between veins. Ventral forewing shiny smoky gray, suffused with pale whitish gray from fold to posterior margin and variably suffused with luteous off-white scales between discal spot and postmedial line, in subterminal space, and in terminal space, strongest at apex. Discal spot thin, inconspicuous. Postmedial line similar to ground color but slightly darker at costa, wide and ill defined, evident mostly due to adjacent lighter areas. Veins in subterminal area dark in specimens with light background. Subterminal line preceded by a smoky-gray shade in some specimens. Fringe luteous off-white, checkered with dark gray between veins. Dorsal hindwing medium gray, lightest between postmedial line and anal angle, heavily suffused with slate gray elsewhere. Discal spot faint, bar-like. Postmedial line slightly darker than ground color, ill defined, even. Marginal band uniform dark gray with indistinct inner margin. Fringe luteous off-white with small numbers of gray scales in medial row, white distally. Ventral hindwing shiny whitish gray with heavy dusting of gray scales medial to postmedial line. Veins dark, most evident between postmedial line and marginal band. Discal spot dark, nearly black, arrowhead shaped. Postmedial line dark gray, lighter than discal spot, wide and ill defined, even. Marginal band uniform dark gray similar to postmedial line, relatively narrow and with better demarcated inner margin than in most other species in the *L. phoca* sub-group. Fringe luteous off-white. **Abdomen –** Covered with uniform fuscous-gray scales. Longer scales covering male genitalia luteous gray. **Male genitalia –** (Fig. 175) Genital capsule and aedeagus generally as in

L. leucocycla species-group and *L. phoca* sub-group descriptions. Valve approximately 5–6× as long as wide, with moderately constricted neck gradually tapered from level of base of clasper to cucullus. Cucullus moderately large, slightly rounded with compound corona of three irregular rows of setae near apex and two rows toward ventral margin. Vesica with 0–2 basal cornuti. **Female genitalia –** (Fig. 231) Ovipositor lobe, segment VIII, and bursa copulatrix as in *L. leucocycla* species-group and *L. phoca* sub-group descriptions. Bursa copulatrix slightly smaller than average for species-group with relatively short appendix bursa.

Distribution and biology. *Lasionycta caesia* occurs in the Cascade Mountains of northern Washington and the British Columbia Coast Range to 58 degrees north latitude. It occurs in rocky alpine tundra near tree line and is nocturnal. It has been found from mid-July to mid-August. Adults are often common where they occur but are rarely collected due to limited access to the proper habitat.

***Lasionycta gelida* Crabo & Lafontaine, sp. n.**
urn:lsid:zoobank.org:act:F55AC251-5828-48FB-BEDE-B186CD800442
Figs 65–67, 176, 232. Map 15

Type material. Holotype ♀. Canada, British Columbia, [Mt. Waddington, ca. 7000', 16 Aug. 1982, Craig Andrews. CNC. **Paratypes** 2 ♂. **Canada**. **British Columbia**. Gott Peak, 7100', 50° 21' N 122° 08' W, 29 July 2000, Troubridge and Hensel (1 ♂); Same locality, 26 July 2006, L. G. Crabo (1 ♂). CNC, LGC.

Etymology. *Gelida* is derived from the Latin *gelidus* meaning cold, frosty and icy, a reference to the rocky glacial locale where the holotype was collected.

Diagnosis. *Lasionycta gelida* is a rare species from southwestern British Columbia. Its forewing is mottled dark gray with scattered pale blue-gray scales, most prominently basal to the antemedial line, distal to the postmedial line, and distal to the reniform spot. The dorsal hindwing is pale gray with a faint discal spot, faint postmedial line, and darker marginal band. The ventral hindwing is whitish gray with a chevron-shaped discal spot, variably dark postmedial line (dark only on the veins in the female holotype), homogeneously dark marginal band, and absence of dark scales on the veins between the postmedial line and marginal band. Structurally, the corona of the male valve is similar to that of *L. caesia* with several rows of setae and the cucullus of *L. gelida* is slightly smaller. The female has a unique large rounded ovipositor lobe and a relatively short ductus bursae. *Lasionycta gelida* occurs with *L. u. multicolor* and *L. caesia*. Differences between *L. gelida* and these taxa are given under each of these species.

The CO1 sequences of the two males are identical. This haplotype differs by over 0.9 % from that of *L. u. multicolor* and by 1.8 % from that of *L. caesia*.

Description. Head – Antenna of male biserrate and fasciculate, 1.8–1.9× as wide as central shaft, individual segments triangular. Antenna of female filiform and ciliate. Dorsal antenna mostly charcoal gray, distal end of segments proximal part of antenna partially covered with yellow scales. Scape white. Eye normal size.

Palpus covered with mostly cream and fewer gray scales. Frons cream hair-like scales centrally, gray laterally. Top of head a mixture of cream and gray hair-like scales, mostly cream in lighter specimens and gray in dark female holotype. **Thorax –** Vestiture cream and gray hair-like scales, proportion varying with darkness of specimen. Prothoracic collar gray anteriorly, cream apically. Legs light fuscous gray. Tarsal segments charcoal gray, ringed distally with white. **Wings –** Forewing length: male 14 mm (expanse 31 mm); female 16 mm (expanse 36 mm). Forewing ground color a mixture of slate- and charcoal-gray, pale bluish-white, and few luteous scales, appearing dark gray. Area proximal to antemedial line and distal to postmedial line heavily suffused with bluish-white scales, appearing powdery blue gray, less prominently than in *L. caesia*. Postmedial area distal to reniform spot and subterminal area adjacent to postmedial line lighter whitish gray. Basal, antemedial, medial, and postmedial lines dark gray. Basal and antemedial lines slightly irregular. Medial line faint, most evident near costa. Postmedial line scalloped between veins, gently excurved from costa to lower cell then oblique to posterior margin. Subterminal line pale, irregular, preceded by a patchy dark-gray shade. Terminal line charcoal gray, interrupted between veins. Spots dark gray. Orbicular spot variable, small, oval, filled with ground color in two specimens and evident as a pale streak in one. Reniform spot relatively small and thin, half-moon shaped, filled with gray similar to postmedial area. Claviform spot absent. Fringe luteous off-white, checkered with dark gray between veins. Ventral forewing uniform medium to dark gray, whitish gray from fold to posterior margin, suffused with light yellow along costa, near discal spot and in subterminal area. Discal spot chevron shaped, similar gray to central wing. Postmedial line similar gray, variable in prominence, evident near costa in female holotype and across entire wing in male paratypes. Marginal band slightly darker uniform gray, relatively sharply defined medially. Fringe luteous off-white, checkered with gray between veins. Dorsal hindwing ground whitish gray with slight dusting of gray scales, appearing much whiter than those of *L. uniformis multicolor* and *L. caesia*. Discal spot light gray, thin. Postmedial line variable, gray, evident only on veins in two specimens and as a wide ill defined line in one. Marginal band uniform dark gray with diffuse inner margin. Fringe uniform pale luteous off-white. Ventral hindwing pale luteous white with basal dusting of gray scales, appearing much paler than those of *L. uniformis multicolor* and *L. caesia*. Discal spot dark gray similar to central ventral forewing discal spot, chevron shaped. Postmedial line similar gray, variable in prominence, evident mostly on veins in female holotype and one male paratype and across wing as an ill defined wide line in third specimen. Marginal band relatively thin with distinct inner margin, uniform darker gray than discal spot and postmedial line. Fringe pale luteous off-white. **Abdomen –** Covered in uniform fuscous gray scales. Longer scales covering male genitalia slightly luteous gray. **Male genitalia –** (Fig. 176) Genital capsule and aedeagus as in *L. leucocycla* species-group and *L. phoca* sub-group descriptions. Valve approximately 6.5× as long as wide, with moderately constricted neck. Cucullus relatively small, with

compound corona comprised of three irregular rows of setae at apex tapering to two rows toward ventral margin. Vesica with 3 basal cornuti (N = 2). **Female genitalia –** (Fig. 232) Abdominal segment VIII and bursa copulatrix generally as in *L. leucocycla* species-group and *L. phoca* sub-group descriptions. Ovipositor lobes large for genus and apically rounded. Ductus bursae relatively short. Bursa typical for species sub-group, slightly larger than that of *L. caesia*.

Distribution and biology. This species is known from three specimens from the British Columbia Coast Range. Craig Andrews collected the female holotype during the day while mountain climbing. The two males were taken at light in rocky tundra slightly above timberline. Collection dates are from late July to mid-August.

***Lasionycta discolor* (Smith)**
Figs 63, 64, 177. Map 15

Scotogramma discolor Smith, 1899: 42.
Lasiestra discolor; McDunnough 1938: 72.
Lasionycta discolor; Lafontaine et al. 1986: 264.
Lasiestra klotsi Richards, 1943: 87, **syn. n.**
Lasionycta klotsi; Lafontaine et al. 1986: 164.

Type material. *Scotogramma discolor*: **holotype** ♂ [USNM, examined]. Type locality: Park County, Colorado. *Lasiestra klotsi*: **holotype** ♂ [ANSP, Philadelphia, examined]. Type locality: Hall Valley, Park County, Colorado.

Diagnosis. *Lasionycta discolor* occurs in the central Rocky Mountains. It can be recognized by the combination of gray forewing with patches of white to greenish-yellow scales, most pronounced in the subterminal area, and gray and white dorsal hindwing. The ventral hindwing is white with a gray discal spot, postmedial line, thin marginal band, and veins. The male valve of *L. discolor* is similar to that of *L. uniformis* but is slightly narrower. The number of basal cornuti on the vesica is variable, but there are often between four and six. The female genitalia are indistinguishable from those of *L. uniformis*.

Lasionycta discolor occurs with *L. uniformis fusca* and resembles pale specimens of it. The dorsal hindwing of *L. discolor* has white on both sides of the postmedial line, which is weakly dentate below the cell, and the ventral hindwing has dark veins and an uninterrupted marginal band. The hindwing of *L. u. fusca* is darker gray without white areas and the postmedial line is sinuous but not dentate. The underside lacks dark scaling on the veins and the marginal band contains pale scales. The vesica of *L. uniformis* has fewer cornuti than that of *L. discolor*, usually 0–3.

Distribution and biology. *Lasionycta discolor* occurs in the Rocky Mountains of Colorado and on the Beartooth Plateau in Wyoming. It flies over alpine tundra and is both diurnal and nocturnal. Most adults have been collected in late July.

Remarks. This species was known as *L. klotsi* for many years.

Lasionycta mono **Crabo & Lafontaine, sp. n.**
urn:lsid:zoobank.org:act:1D026DE2-BFFB-4DFD-9FC9-1AC87CEC8BC6
Figs 60, 178. Map 15

Type material. Holotype ♂. USA, California, near Mono Pass, NW Inyo Co, 12000 ft, 9 Aug. 1951, C. D. MacNeill. CNC.

Etymology. The name refers to the type locality, Mono Pass. It is appropriate because the species is known from a singleton. It is a noun in apposition.

Diagnosis. *Lasionycta mono* is a distinctive species from the high Sierra Nevada and can not be confused with any other *Lasionycta*. The forewing is checkered dark and light gray. The ventral hindwing is whitish gray with gray discal spot and distinct marginal band, and lacks a postmedial line. It is the smallest species in the sub-group (expanse 26 mm). The male valve appears to taper to a blunt terminus because it lacks a neck and the cucullus is barely wider than the adjacent valve. The digitus is cylindrical and extends well beyond the cucullus. The ventral hindwing resembles those of the *L. staudingeri* sub-group, but *L. mono* differs from this sub-group in having a long cylindrical digitus. The female of *L. mono* is unknown.

Description. *Lasionycta mono* known only from male holotype. **Head** – Antenna of male weakly biserrate and fasciculate with triangular segments (only base of right antenna remains). Dorsal antenna mostly whitish gray with a few darker gray scales. Scape cream with a few gray scales. Eye reduced in size, ellipsoid. Palpus covered mostly in pale-luteous scales with long, gray hair-like scales. Frons covered with long, brown, strap-like scales. Top of head covered in white and a few gray hair-like scales. **Thorax –** Vestiture dark-gray and white hair-like scales, appearing uniform gray with lighter gray prothoracic collar. Legs and underside of thorax mainly brown with increasing pale-brown and luteous scales farther out on legs, especially toward distal end of tarsal segments. **Wings –** Forewing length 13 mm (expanse 26 mm). Ground color mainly of pale grayish-white scales with scattered darker scales and darker brownish-gray scales concentrated in medial area and outer half of subterminal area. Basal line absent. Antemedial line dark gray, excurved and gently undulating, widened to form a triangle at costa. Medial line thick, dark gray, partially touching antemedial line and joined to postmedial line below cell producing a large dark-gray patch, interrupted by ground color in lower part of cell, and widened to a triangle at costa. Postmedial line gray, weakly scalloped between veins and very faint, excurved from costa to lower end of cell then nearly straight to posterior margin. Subterminal line irregular, white, preceded by a broad dark-gray shade except opposite cell and in fold. Terminal line thin, gray, interrupted at veins. Orbicular and claviform spots absent. Reniform kidney shaped, pale gray, filled with ground color peripherally and dark gray centrally. Fringe white checkered with light gray between veins. Ventral forewing pale luteous gray suffused with dark-gray scales, heavily at base and lightly elsewhere. Discal spot gray, thin. Postmedial line absent. Subterminal area dark gray at apex. Fringe white, checkered with gray between veins, checkering darkest near apex of wing. Dorsal hindwing white with suffusion of gray scales, appearing medium gray, paler at costa. Discal spot gray, asym-

metrical, chevron shaped with posterior end longer than anterior end. Postmedial line absent. Marginal area slightly darker than remainder of wing. Fringe gray basally, white distally. Ventral hindwing white, suffused with dark-gray scales, heavily at base and lightly elsewhere. Discal spot similar dark gray to wing base, asymmetrical, chevron shaped with longer posterior limb. Postmedial line absent. Marginal band dark gray suffused with white scales, even in width with sharply-defined inner margin. Fringe light gray basally, white distally. **Abdomen –** Dark gray, distal scales covering genitalia luteous off-white. **Male genitalia –** (Fig. 178) Genital capsule and aedeagus generally as in the *L. leucocycla* species-group and *L. phoca* sub-group descriptions. Valve 4.9× as long as wide, with a minimal neck. Cucullus small and rounded, similar in width to distal valve. Corona comprised of a single row of setae. Digitus long and slender, extending distal to ventral cucullus. Vesica lacking basal cornuti.

Distribution and biology. This species is known only from the type locality in the Sierra Nevada. The habitat is most likely rocky tundra. *Lasionycta mono* has ellipsoid eyes suggesting that it is diurnal.

Lasionycta promulsa sub-group

The *L. promulsa* sub-group is comprised of five species from western North America characterized by brownish color and ventral hindwing pattern. All are gray brown, tan, or yellow brown. The ventral hindwing of most species has a smaller or thinner discal spot and less conspicuous marginal band than those of the *L. leucocycla* and *L. phoca* sub-groups. The species are similar in size to those in the *L. phoca* sub-group.

The male valve is relatively long and slender with a small to moderately sized cucullus. The corona is usually single, sometimes partially double at the apex. The digitus is oriented closer to the valve than in all other sub-groups except the *L. subfuscula* subgroup. The vesica usually has two adjacent subbasal cornuti, although the number of cornuti varies between zero and two, and the cornuti in the distal band are relatively short. The female genitalia are typical for the *L. leucocycla* species-group but have relatively large corpora bursae in most species (relatively small in *L. macleani* (McDunnough)). The male antennae are strongly biserrate or bipectinate.

The CO1 sequences of all species except *L. silacea*, sp. n. are tightly clustered together with *L. impingens* (Walker) with only slight differences between species. *Lasionycta impingens* differs structurally from the *L. promulsa* species-group members and is placed in its own species-group below.

Lasionycta promulsa (Morrison)

Figs 85–89, 179, 233. Map 18

Mamestra promulsa Morrison, 1875a: 97.
Scotogramma promulsa; Dyar 1903: 159.

Lasiestra promulsa; McDunnough 1938: 72.
Lasionycta promulsa; Lafontaine et al. 1986: 264.
Scotogramma infuscata Smith, 1899: 42, **syn. n.**
Lasiestra infuscata; McDunnough 1938: 72.
Lasionycta infuscata; Lafontaine et al. 1986: 265.

Type material. *Mamestra promulsa*: **syntypes** 2 ♀ [MSU, examined]. Type locality: Colorado. *Scotogramma infuscata*: **lectotype** ♀ [USNM, examined]. Type locality: Gibson Mountains, Colorado. The lectotype female was designated by Todd (1982: 108).

Diagnosis. The forewing of this widely distributed species is uniform gray brown to yellow brown. The lines are variable, usually fairly inconspicuous, and the spots are faint. The orbicular spot is most often oval, rarely round, and lacks an ocellus. The ventral hindwing is gray brown with an indistinct marginal band and a small ill-defined discal spot. The genitalia of both sexes are typical for the sub-group. *Lasionycta promulsa* is distinguished from the few brown species in the *L. leucocycla* and *L. phoca* sub-groups by the ventral hindwing. The discal spot is larger and the postmedial line and band are darker and better defined in these two. In addition, the male antenna of *L. promulsa* is slightly wider than in the *L. phoca* sub-group (≥ 2.1× central shaft in *L. promulsa*, usually < 2× shaft in the *L. phoca* sub-group). *Lasionycta promulsa* occurs with *L. pulverea*, sp. n. in Alberta and *L. silacea* in the Pacific Northwest. Differences between them are described under these species.

The seven CO1 haplotypes of this species are tightly clustered and differ by up to 0.7 % (Fig. 248).

Distribution and biology. *Lasionycta promulsa* occurs from Rampart House in northern Yukon to southwestern British Columbia in the west and southern New Mexico in the Rocky Mountains. It is most common near timberline and is nocturnal. The northern Yukon populations are found in sage grassland, although those on Montana Mountain in southwest Yukon occur in rocky alpine tundra like other populations to the south. *Lasionycta promulsa* flies from mid-July through August.

Geographical variation. The ground color and forewing lines vary between regions. *Lasionycta promulsa* is mostly dull gray brown without contrasting markings. Colorado material is mostly warmer yellow brown and the transverse lines are dark. The Uinta Mountain population in northeastern Utah is an unmarked orange brown, while that from the Wasatch Range in central Utah is pale chalky gray with darker lines.

Remarks. This species was known as *L. infuscata* for many years.

Lasionycta macleani (McDunnough)

Figs 94, 234. Map 20

Anarta macleani McDunnough, 1927: 207.
Lasiestra macleani; McDunnough 1938: 72.

Lasionycta macleani; Lafontaine et al. 1986: 265.

Type material. Holotype ♀ [CNC, examined]. Type locality: Mt. McLean, British Columbia.

Diagnosis. *Lasionycta macleani* is known only from the female holotype from southwest British Columbia. It has a yellow-brown forewing with dark antemedial, medial, and postmedial lines and a round orbicular spot containing a dark ocellus. The dorsal hindwing is pale buff with a chevron-shaped discal spot and sharply demarcated marginal band. The ventral surface of the fore- and hindwing is luteous off-white with a large black arrowhead-shaped discal spot and thin marginal band on each wing. The appendix bursae is relatively thin, resembling those of the *L. leucocycla* species-group. The male is unknown. *Lasionycta macleani* is most similar to *L. pulverea* from Alberta but has a thicker ventral hindwing discal spot. The bursa, particularly the appendix, of *L. pulverea* is larger and more bulbous than that of *L. macleani*.

Distribution and biology. *Lasionycta macleani* is known only from Mt. McLean where it was collected on July 11 with *L. luteola*, most likely during daytime at or above timberline on the east or southeast slope. Attempts by Jim Troubridge and the senior author to find it on the more accessible west side of Mt. McLean were unsuccessful.

***Lasionycta pulverea* Crabo & Lafontaine, sp. n.**
urn:lsid:zoobank.org:act:B97208CB-F906-49B7-9646-C1CEAEF1ADE2
Figs 90–93, 180, 235. Map 20

Type material. Holotype ♂. Canada, Alberta, Blairmore, 5 July 1918, K. Bowman. CNC. **Paratypes** 30 ♂, 5 ♀. **Canada**. **Alberta**. Hailstone Butte, [50° 12' N 114° 26' W, 6500'], Kananaskis Country, 13 July 1995, J. Troubridge, Databased for CNC, Noctuoidea # 10526, Barcodes of Life Project, University of Guelph, DNA # Noctuoidea 10526 (1 ♂), 14 July 1990, J. Troubridge (1 ♀), 19 July 1993, J. Troubridge (1 ♂), 19 July 1993, J. Troubridge, Databased for CNC, Noctuoidea # 10524, Barcodes of Life Project, University of Guelph, DNA # Noctuoidea 10524 (1 ♂), 24 July 1994, J. Troubridge (7 ♂), 24 July 1994, L. Crabo and J. Troubridge (5 ♂), 25 July 1998, J. Troubridge (4 ♂, 1 ♀), 25 July 1998, J. Troubridge, Databased for CNC, Noctuoidea # 10525/ Barcodes of Life Project, University of Guelph, DNA # Noctuoidea 10525 (1 ♂), 18 July 2006, L. G. Crabo (6 ♂, 2 ♀); Lethbridge, 20 June 1926, H. L. Seamans (1 ♀); Nordegg, 19 July 1917 [no collector] (1 ♂). AMNH, CNC, LGC, UASM, USNM.

Etymology. The name is derived from the Latin *pulvereus* meaning dusty. It refers to the powdery appearance of the wings of the moth.

Diagnosis. *Lasionycta pulverea* is a yellow-brown species from southwestern Alberta. It resembles *L. macleani* and has a similar ocellate orbicular spot and a two-toned dorsal hindwing, but the hindwing discal spots are thinner on both sides. The male genitalia are typical for the sub-group with a slender valve and small cucullus, although

the vesica has only zero to one cornuti. The appendix bursae of *L. pulverea* is relatively bulbous. The male antenna is bipectinate with slender branches and is wider than those of other *L. promulsa* or *L. phoca* sub-group species (3.7× central shaft). *Lasionycta pulverea* occurs with *L. promulsa* from which it is distinguished by the longer and thinner discal spot and wider male antenna.

The CO1 sequence of *L. pulverea* is most similar to that of *L. sierra* sp. n.

Description. Head – Antenna of male bipectinate and fasciculate, 3.7× as wide as central shaft. Antenna of female filiform and ciliate. Dorsal segments covered with light gray-brown scales. Scape and tuft white with a few gray scales. Eye normal size. Palpus pale luteous with a few gray scales. Frons cream centrally, a few gray scales laterally. Top of head a mixture of cream and black-tipped cream scales, appearing brownish gray. **Thorax –** Vestiture similar to top of head. Legs covered with slate-gray and luteous scales. Tarsal segments slate gray, ringed distally with luteous scales. **Wings –** Forewing length: males 12–15 mm (expanse 29–34 mm); females 14–15 mm (expanse 32 mm). Forewing ground color a mixture of gray-brown, whitish-gray, and tan scales, appearing powdery gray brown with a slight yellow cast, slightly darker gray near costa and in terminal area. Lines gray, single, normally distinct but very faint in a few specimens. Basal and antemedial lines undulating. Medial line faint, most evident at costa, absent in cell, and barely visible below cell. Postmedial line moderately scalloped between veins, broadly convex from costa to lower end of cell then oblique to posterior margin. Subterminal line irregular, pale luteous, preceded by a uniform light-gray shade. Terminal line gray, interrupted at veins. Spots gray. Orbicular spot round, filled with ground color or whitish-gray scales and a gray central ocellus. Reniform spot prominently concave laterally, filled with ground color peripherally and gray centrally. Claviform spot absent. Fringe ground color, slightly checkered with gray between veins. Ventral forewing brownish gray off-white, palest near posterior margin, suffused with gray scales in terminal area and lightly on veins in a few specimens. Costa a mixture of pale yellow-brown and gray scales. Discal spot dark gray, comma shaped. Postmedial line faint, relatively wide and ill defined. Fringe pale yellow brown, weakly checkered with light gray between veins. Dorsal hindwing light yellow brown or gray brown. Discal spot dark gray, comma shaped. Postmedial line lighter gray than discal spot, darkest posterior to discal spot, nearly straight across wing and touching posterior discal spot. Marginal band broad with moderately well-defined inner margin, slightly lighter gray than discal spot. Fringe gray brown basally, luteous white distally. Ventral hindwing light yellow brown to gray brown, lighter than ventral forewing. Discal spot dark gray, slightly darker than forewing discal spot, asymmetrical, chevron shaped with longer posterior extension than anterior one. Postmedial line gray, faint, indistinct. Marginal band gray, suffused with ground color, ill-defined inner margin. Fringe pale luteous and light gray basally, white distally. **Abdomen –** Covered by a mixture of pale brownish-gray and light- to dark-gray scales. **Male genitalia –** (Fig. 180) Genital capsule and aedeagus generally as in the *L. leucocycla* species-group and *L. promulsa* sub-group descriptions. Valve approximately 6.5–7.5× as long as wide, with a weak neck and relatively small cucullus. Corona mainly single, partially double at apex.

Vesica with 0–1 basal cornuti. **Female genitalia –** (Fig. 235) Ovipositor lobe, segment VIII, and bursa copulatrix as in *L. leucocycla* species-group and *L. promulsa* sub-group descriptions. Appendix bursae relatively large, expanded at base.

Distribution and biology. *Lasionycta pulverea* has a restricted range in the Rocky Mountain foothills of Alberta from Nordegg to Blairmore, with a single specimen in the CNC from Lethbridge. It is most common in subalpine parkland and is nocturnal. Specimens have been collected between early and mid-July.

***Lasionycta silacea* Crabo & Lafontaine, sp. n.**
urn:lsid:zoobank.org:act:381AEAA7-B91F-485B-A931-C3B046A6A724
Figs 95–98, 181, 236. Map 19

Type material. Holotype ♂. Canada, British Columbia, Blowdown Pass near Gott Peak, [50° 21' N 122° 08' W], 7100', 5–6 Aug. 1993, J. Troubridge. CNC. **Paratypes** 202 ♂, 78 ♀. **Canada**. **British Columbia**. Same data as holotype (3 ♂, 2 ♀); same locality as holotype, 5–6 Aug. 1993, L. Crabo and J. Troubridge (2 ♂, 1 ♀), 20 Aug. 1993, L. and A. Crabo and J. Troubridge (5 ♂, 3 ♀), 30 July 1994, L. Crabo and J. Troubridge (28 ♂, 3 ♀), 23 Aug. 1996, J. Troubridge (9 ♂, 2 ♀), 17 Aug. 2000, J. Troubridge (1 ♂), 6 Aug. 2005, L. G. Crabo (19 ♂, 7 ♀), 26 July 2006, L. G. Crabo (14 ♂, 1 ♀); Gott Peak near Duffy Lake, 30 July 1994, J. Troubridge (35 ♂, 9 ♀); Mt. McLean, 6–7000', 16 July 1994, J. Troubridge (4 ♂, 4 ♀); Mission Ridge, 5800', 50° 45' N 119° 37' W, 15–16 July 1994, L. Crabo and J. Troubridge (7 ♂, 2 ♀), 10 July 1998, J. Troubridge (6 ♂, 1 ♀); Coast Range, Perkins Peak, 51.82-[51.8]3° N 125.02-[125.0]3° W, 6230–7400', 5 Aug. 2005, L. G. Crabo (1 ♂, 1 ♀); **USA**. **Washington**. Chelan County, Junior Point, 47° 59' N 120° 23' W, 6100', 4 Aug. 1989, L. Crabo and C. Coughlin (1 ♂, 1 ♀), 27 Aug. 1998, J. Troubridge (10 ♂, 10 ♀); Kittitas County, Quartz Mtn ., [47.074° N 121.081° W] 6400', 14 July 1990, L. G. and A. G. Crabo (2 ♀), 15 July 1996, J. Troubridge (4 ♂), 28 July 2003, L. G. and E. K. Crabo (1 ♂), 14 July 2005, C. Coughlin and L. Crabo (5 ♂, 6 ♀), 16 July 2007, L. G. Crabo (1 ♂, 3 ♀), 25 July 2009, L. G. and E. K. Crabo (1 ♂, 1 ♀); Okanogan-Whatcom County line, Slate Peak, 48.73-[48].74° N 120.66-[120].70° W, 7320', 7 Aug. 1988, L. G. Crabo (2 ♀), 8 Aug. 1988, L. G Crabo (2 ♀), 13 Aug. 1993, J. and L. Troubridge (21 ♂, 4 ♀), 13 July 2005, L. G. Crabo (9 ♂); Yakima County, Bethel Ridge, [46.79° N 121.09° W], 6500', 29 July 1989, L. G. Crabo and J. P. Pelham (5 ♂, 1 ♀), 18 July 1997, L. G. Crabo (1 ♂, 2 ♀), 4, 25 July 1996, 18 July 1997, and 22 Aug. 1997, J. Troubridge (7 ♂, 7 ♀), 27 July 2003, L. G. and E. K. Crabo (2 ♂, 1 ♀). AMNH, CDFC, CNC, GBC, JSC, LGC, OSU, TMC, UASM, USNM, WSU.

Etymology. *Silacea* is derived from the Latin *silaceus* meaning like yellow ocher. It refers to the yellow color on the forewing of the moth.

Diagnosis. *Lasionycta silacea* has an olive-brown forewing with ochre patches and filling of lines and spots. It is found in the Pacific Northwest. Vivid specimens are unmistakable due to the olive and yellow color. Drab specimens are similar to *L. promulsa*

with which it occurs in British Columbia, but can be recognized by the faint ocellus in the orbicular spot and yellower underside with a larger hindwing discal spot. The orbicular spot of *L. promulsa* lacks an ocellus, its underside is gray brown, without a yellow cast, and the ventral hindwing discal spot is small and indistinct. The male and female genitalia of *L. silacea* are similar to those of *L. promulsa* but the appendix bursae is more pointed posteriorly.

Lasionycta silacea has the most divergent CO1 sequences in the *L. promulsa* subgroup, differing from other species by over 1.3 %. The two haplotypes differ by 0.16 %.

Description. Head – Antenna of male strongly biserrate and fasciculate, 2.2–2.6× as wide as central shaft, individual segments triangular with slightly concave distal side and acute apices. Antenna of female filiform and ciliate. Dorsal antenna segments dark olive gray proximally, slightly lighter olive gray distally. Scape light grayish yellow, tuft at base of dorsal antenna light gray. Eye normal size. Palpus light grayish yellow medially, similar scales mixed with gray scales laterally. Frons light grayish yellow centrally, light gray laterally. Top of head a mixture of entirely pale yellowish-gray hair-like scales and similar scales banded subapically with dark gray and tipped with white, appearing light olive gray. **Thorax –** Vestiture uniform, same as top of head. Legs with femora covered with olive-gray and yellow scales, tibiae with slate-gray and pale-luteous scales, tarsal segments mostly slate gray ringed distally with pale luteous. **Wings –** Forewing length: males 14–17 mm (expanse 32–37 mm); females 16–18 mm (expanse 36–38 mm). Forewing ground color a mixture of medium to dark olive-gray, ochre and tan to orange scales, appearing slightly mottled medium to dark olive gray with patches of light to medium grayish ochre. Basal, antemedial, and postmedial lines slightly darker olive gray, ill defined, weakly double with grayish-ochre filling. Basal and antemedial lines irregular. Medial line complete but faint. Postmedial line moderately scalloped between veins, evenly excurved from costa to lower cell then nearly straight to end perpendicular to posterior margin. Subterminal line gray ochre, slightly irregular, preceded by a uniform slightly darker gray-olive shade. Terminal line thin, gray olive. Spots similar color to lines. Orbicular spot round to oval, filled with ground color or slightly lighter scales and an ocellus of same color as spots and lines. Reniform spot kidney shaped, faint, filled with light gray ochre peripherally and same color as lines centrally. Claviform spot absent. Fringe darker gray basally and lighter gray ochre distally, faintly checkered with gray olive between veins. Ventral forewing light olive gray centrally and distal to expected position of the subterminal line, lighter gray ochre in anterior cell, distal to discal spot, and in subterminal area anterior to cubital vein. Discal spot slightly darker, bar like, evident due to lighter scales adjacent to anterior half of spot. Postmedial line similar gray to forewing margin, ill defined, darkest and widest near costa, faint elsewhere. Terminal line thin, evident between veins. Fringe gray ochre, checkered with olive gray between veins. Dorsal hindwing ground color pale gray yellow dusted with dark-gray scales, lighter at costa. Discal spot barely evident, chevron shaped. Postmedial line gray, ill defined, irregular and slightly scalloped in a few specimens. Marginal band fuscous gray, wide with indistinct inner margin, extending proximal-

ly almost to postmedial line. Fringe light to medium ochre. Ventral hindwing pale grayish ochre to light gray brown, darker at costa, with dusting of light- to medium-gray scales. Veins slight darker gray, especially distal to postmedial line. Discal spot an ill defined triangle, darker gray than other hindwing markings. Postmedial line light gray, usually inconspicuous and incomplete but occasionally prominent and complete. Marginal band light to medium gray, with ill-defined inner margin. Fringe light to medium ochre. **Abdomen –** Covered with uniform yellow-gray scales. **Male genitalia –** (Fig. 181) Genital capsule and aedeagus as in *L. leucocycla* species-group and *L. promulsa* sub-group descriptions. Valve approximately 6–7× as long as wide, with costal lobe of sacculus extending above costal valve margin and moderate neck at base of cucullus. Corona single, partially double at apex. Digitus oriented 30° ventral to valve. Vesica with 1–2 (N = 5) slightly angled spike-like basal cornuti placed adjacent to each other on vesica coil. **Female genitalia –** (Fig. 236) Ovipositor lobe, segment VIII, and bursa copulatrix generally as in *L. leucocycla* species-group and *L. promulsa* sub-group descriptions. The corpus bursae relatively large. The distal appendix bursae is relatively slender and pointed.

Distribution and biology. *Lasionycta silacea* occurs from the British Columbia Coast Range and Washington Cascades to extreme southwestern Alberta. It is common near treeline. Adults are nocturnal and fly from early July through August.

***Lasionycta sierra* Crabo & Lafontaine, sp. n.**
urn:lsid:zoobank.org:act:5B1099ED-68BE-4C0B-8D25-B00413C453BF
Figs 99, 100, 182, 237. Map 20

Type material. Holotype ♂. USA, California, Mono County, Lee Vining, 7 mi WSW, 9600', 6 Aug.. 1967, D. F. Hardwick. CNC. **Paratypes** 8 ♂, 12 ♀. **USA**. **California**. Fresno Co, Sierra Nevada, Mono Pass to overlook to Golden Lake, 37.424–442° N 118.771–765° W, 11400–12040', 19–20 Aug. 1998, L. G. Crabo (2 ♂); Inyo County, Bishop, 14 mi SW, 9500', 8 Aug. 1967, D. F. Hardwick (2 ♀); Mono County: same locality as holotype, 12 Aug. 1967, D. F. Hardwick (2 ♀), 13 July 1967, D. F. Hardwick (1 ♀), 14 Aug. 1967, D. F. Hardwick (1 ♂); E of Tioga Pass, Saddlebag Lake to Warren Fork, 37.94-.95° N 119.21-.25° W, 8520–9640' elev., 30 July 1995 and 1 Aug. 1995, J. Troubridge and L. G. Crabo (1 ♂, 3 ♀); same data as last specimen, Databased for CNC, Noctuoidea # 6565, Barcodes of Life Project, University of Guelph, DNA # Noctuoidea 6565 (1 ♀); Tioga Pass, 37.94° N 119.21–25° W, 8500–9600', 21.Aug..1998, L. Crabo and G. Morrell (3 ♂, 2 ♀); Tioga Pass, 8500–10000', 31 July 1995, Troubridge and Crabo, Databased for CNC, Noctuoidea # 6566, Barcodes of Life Project, University of Guelph, DNA # Noctuoidea 6566 (1 ♂); same data as last specimen, Databased for CNC, Noctuoidea # 6567, Barcodes of Life Project, University of Guelph, DNA # Noctuoidea 6567 (1 ♀). AMNH, CNC, LGC, USNM.

Etymology. This species is named for the Sierra Nevada where it occurs. It is a noun in apposition.

Diagnosis. *Lasionycta sierra* occurs in the Sierra Nevada and cannot be mistaken for any other *Lasionycta* in is range. It has a mottled gray forewing with olive-yellow and orange-yellow patches, a pale-filled ocellate orbicular spot, and a two-toned dorsal hindwing with a wide gray marginal band. The ventral hindwing has a darker postmedial line than other *L. promulsa* sub-group species, resembling those of *L. uniformis multicolor* and *L. u. fusca* in the *L. phoca* sub-group. The male valve is similar to those of other *L. promulsa* sub-group species. The band of cornuti on the distal vesica is comprised of a single row of unusually short spines. The female genitalia are similar to those of most other members of the sub-group.

The CO1 sequence of *L. sierra* is most similar to that of *L. pulverea*, differing by 0.18 %.

Description. Head – Antenna of male weakly bipectinate and fasciculate, 2.0–2.5× as wide as central shaft. Antenna of female filiform and ciliate. Dorsal antennal segments dark olive proximally, slightly lighter olive distally. Scape light grayish white. Eye normal size. Palpus light grayish white medially, similar scales mixed with gray laterally. Frons light grayish white centrally, gray laterally. Top of head a mixture of hair-like cream scales, tricolored scales with cream basally, black subapically, white at apex. **Thorax** – Vestiture similar to top of head, with a few broader gray scales at anterior prothoracic collar, appearing nearly uniform yellow gray or olive gray, central patagium slightly darker gray. Legs covered with a mixture of dark-gray and light-yellow scales. Tarsal segments nearly uniform dark gray ringed distally with yellow. **Wings** – Forewing length: males 14–15 mm (expanse 32–34 mm); females 15–16 mm (expanse 35–36 mm). Forewing ground color a mixture of brown-gray, yellow, and orange-yellow scales, appearing mottled olive brown with patches of yellow and orange, most prominent luteous or orange areas forming two streaks interrupted by transverse lines, one from reniform spot to lateral margin and other in fold from wing base to anal angle. Lines brown gray, single. Basal and antemedial lines irregular, jagged. Medial line broad and similar in darkness to other lines. Postmedial line moderately scalloped between veins, weakly convex from costa to lower cell and then oblique to posterior margin. Subterminal line pale brownish yellow, slightly irregular, preceded by a slightly patchy gray-brown shade, interrupted by luteous or orange streak opposite reniform spot and in fold and forming dark chevrons between veins in dark specimens. Spots similar to lines. Orbicular spot round to ovoid, filled with luteous or light-gray scales slightly lighter than ground color and containing an ocellus in most specimens. Reniform spot inconspicuous, kidney shaped, filled peripherally with luteous to orange and centrally with gray brown similar to adjacent median line. Claviform spot absent. Fringe light yellow to pale olive gray, checkered with gray brown between veins. Ventral forewing uniform fuscous gray near cubital vein and distal to expected position of subterminal line, suffused with light-gray scales from fold to posterior margin with luteous off-white scales in cell, in fold, distal to reniform spot in postmedial area, and in subterminal area. Costa a mixture of light-yellow and dark-gray scales. Discal spot kidney to chevron shaped, dark gray brown, nearly equal in darkness to ventral hindwing discal spot. Postmedial line light to dark gray brown, similar in darkness to ventral hindwing postmedial line, diffuse to lightly scalloped between veins. Fringe light yellow brown checkered with gray brown between veins. Dorsal

hindwing ground color light brownish yellow with suffusion of light-gray scales. Discal spot gray, chevron shaped to weakly arrowhead shaped. Postmedial line gray, slightly ill defined, nearly touching marginal band near costa and adjacent to marginal band to inner margin of wing. Marginal band uniform dark fuscous, broad with moderately well-defined inner margin. Fringe light gray basally, white distally. Ventral hindwing grayish light yellow brown with suffusion of dark-gray scales. Discal spot dark gray, relatively small, weakly arrowhead shaped and similar in prominence to ventral forewing discal spot. Postmedial line relatively wide and well defined, variable in darkness from equal to discal spot and much darker than marginal band to fainter than spot and marginal band. Marginal band relatively narrow and moderately well-defined, gray, variable in darkness, lighter or darker than postmedial line. Fringe similar to hindwing ground color. **Abdomen** – Covered with a mixture of light-fuscous and few darker gray scales. **Male genitalia** – (Fig. 182) Genital capsule and aedeagus as in *L. leucocycla* species-group and *L. promulsa* sub-group descriptions. Valve slender, approximately 7.5–9.0× as long as wide, with a moderate neck at base of cucullus. Cucullus relatively small, with corona comprised of a single row of setae. Vesica with 1–2 basal cornuti and band of distal spines comprised of a single row of very short cornuti. **Female genitalia** – (Fig. 237) Ovipositor lobe, segment VIII, and bursa copulatrix as in *L. leucocycla* species-group and *L. promulsa* sub-group descriptions.

Distribution and biology. *Lasionycta sierra* occurs in the Sierra Nevada of California and flies in subalpine forests and alpine tundra. Adults are nocturnal and have been collected from late July through August.

Lasionycta impingens sub-group

The *L. impingens* sub-group contains only *L. impingens*, a small to medium-size species with gray forewings and light yellow-brown hindwings. The male valve has a prominent costal lobe of the sacculus with a broad flattened apex (those of other *Lasionycta* species are conical or rounded). The vesica lacks subbasal cornuti and is relatively slender. The female bursa appears unisaccate due to minimal constriction similar to those in the *L. staudingeri* sub-group and the appendix bursae is small and curved distally. The male antenna is narrowly bipectinate, 1.46–2.0× as wide as the central shaft.

The *L. impingens* sub-group clusters with most of the species in the *L. promulsa* sub-group on CO1 distance analysis.

Lasionycta impingens (Walker)

Figs 101–105, 183, 184, 238, 239. Map 21

Anarta impingens Walker, 1857: 700.
Lasiestra impingens; McDunnough 1938: 72.
Lasionycta impingens; Lafontaine et al. 1986: 264.
Mamestra curta Morrison, 1875a: 96.
Anarta curta; Dyar 1903: 160.

Lasiestra impingens curta; McDunnough 1938: 72.
Orthosia perpura Morrison, 1875b: 66.
Anarta perpura; Dyar 1903:160.
Lasiestra perpura; McDunnough 1938: 72.
Anarta nivaria Grote, 1876: 107.
Lasiestra nivaria; McDunnough 1938: 72.

Type material. *Anarta impingens*: **syntype** ♂. [BMNH, examined]. Type locality: [Canada, Alberta] Rocky Mountains. *Mamestra curta*: **syntypes** 1 ♂, 1 ♀. [MSU, examined]. Type locality: Colorado. Wilterding (1997) states that there is a holotype, but both specimens are labeled "Type." *Orthosia perpura*: **holotype** ♀. [MSU, examined]. Type locality: Colorado, not New York as stated in Poole (1989). *Anarta nivaria*: **holotype** ♂. [BMNH, examined]. Type locality: Colorado Territory.

Diagnosis. *Lasionycta impingens* is a small to medium-sized species (expanse 25–32 mm) with a gray forewing with orange scales in the medial area and a light yellow-brown hindwing. The dorsal hindwing has equally dark discal spot and wide marginal band whereas the marginal band is suffused with the ground color and is more faint than the discal spot on the ventral side. *Lasionycta impingens* occurs from Yukon to Colorado. It can usually be identified without dissection. Male and female genitalia characters are given in the *L. impingens* sub-group section.

Distribution and biology. *Lasionycta impingens* occurs from southern Yukon to Colorado. It is diurnal and nocturnal and comes to light. Adults are common in alpine tundra and are often collected by butterfly enthusiasts. It feeds on nectar of a *Penstemon* species (Scrophulariaceae) on the Beartooth Plateau, Montana, as well as on *Mertensia paniculata* (Ait.) G. Don (Boraginaceae), and a *Senecio*, likely *S. lugens* Richardson (Asteraceae) at Pink Mountain, British Columbia (BC. Schmidt, pers. comm.). The moth is found in July and August.

Geographical variation. Populations of *L. impingens* are arranged in two subspecies. There is only slight overlap in the appearance of the subspecies and we considered treating them as species despite absence of structural differences. However, occasional specimens from the range of each taxon are very similar indicating that use of subspecies is appropriate (compare Fig. 102 with Fig. 105 and Fig. 104 with Figs 101 and 103).

The CO1 sequences of subspecies *L. i. impingens* and *L. i. curta* (Morrison) differ by 0.16 %.

***Lasionycta impingens impingens* (Walker)**
Figs 101–103, 183, 238. Map 21

Anarta impingens Walker, 1857: 700.

Subspecies *impingens* is small (expanse 25–27 mm) and has a dark lead-gray forewing with relatively inconspicuous dark markings. The dorsal hindwing marginal band is

usually homogeneously dark. It occurs from southern Yukon southward in the Rocky Mountains to southern British Columbia and Alberta, and in southwestern British Columbia at Pavilion north of Lillooet.

***Lasionycta impingens curta* (Morrison)**
Figs 104, 105, 184, 239. Map 21

Mamestra curta Morrison, 1875a: 96.
Orthosia perpura Morrison, 1875b: 66.
Anarta nivaria Grote, 1876: 107.

Subspecies *curta* is found in the Rocky Mountains from southern Montana to Colorado. It has a light gray forewing with prominent yellow or orange tinting, a dark postmedial line, and dark shading preceding the subterminal line. The dorsal hindwing marginal band contains lighter scales and appears patchy. This subspecies is larger than *L. i. impingens* (expanse 27–32 mm).

***Psammopolia* Crabo & Lafontaine, gen. n.**
urn:lsid:zoobank.org:act:867DA10D-1DC7-43C3-A331-04219C8B235D

Type species: *Polia wyatti* Barnes & Benjamin.

Gender: Feminine.

Etymology. The name is derived from the Greek psammos meaning sand and *Polia*, a genus of Hadenine moths.

Diagnosis. *Psammopolia* is distinguished from *Lasionycta* by the male digitus, vesica, and female ovipositor lobes. The digitus is reduced to a sclerotized plate in *Psammopolia* whereas it is elongate in *Lasionycta*. The valve of *Psammopolia* is S-shaped due to lateral angulation at the base of the neck and expansion of the ventral margin. The *L. mutilata* species-group of *Lasionycta* has similar angulation, but lacks the ventral expansion. The cucullus of *Psammopolia* bears a patch of medially oriented setae on the anal angle separate from the corona, which is unknown in *Lasionycta*. The vesica of *Psammopolia* differs from *Lasionycta* in having the most prominent twist mesially rather than basally, and the wrinkled folding band of the apical ½ of the vesica is entirely covered with long spines as in *Lasionhada*, whereas in *Lasionycta* the spines are confined to one or two irregular rows along the margin of the wrinkled area. The ovipositor lobes of *Psammopolia* are very long and asymmetrically pointed, longest dorsally; those of *Lasionycta* are symmetrical and rounded or truncated. The corpus bursae of *Psammopolia* is pointed apically, strongly angled posteriorly near the base of the ductus bursae, and lacks signa. The appendix bursae is sclerotized and extended leftward as a tight coil.

Description. Head – Male antenna beadlike or bipectinate, densely fasciculate; female antennae filiform, ciliate. Eye very densely hairy, normal size. Head covered with hair-like

and bifid scales. **Thorax –** Covered in dense hair like and bifid scales. Forewing length 14–24 mm. **Wings –** Forewings cream, light brown gray, reddish brown, silver gray, or dark gray. Forewing with normal lines and spots. Hindwing cream to fuscous. **Male genitalia –** Uncus cylindrical, tapered distally to a fine hook-like point. Juxta shield shaped, smooth. Valve S-shaped with approximately 50° lateral bend distal to clasper, 3.7–4.3× as long as wide; ventral margin broadly expanded and convex; sacculus relatively small, costal lobe not reaching costal margin, postsaccular flap present; clasper C-shaped, projecting mesially and slightly dorsad; digitus vestigial, base present as a sclerotized plate; cucullus symmetrically triangular with slight distal extension at anal margin, 0.7–1.3× as wide as valve and separated by a narrow neck 0.2–0.6× valve width and 0.2–0.6× cucullus width; corona a single row of stout setae; an additional patch comprised of a double row of short claw-like setae directed basad at anal margin. Aedeagus tubular, 5× as long as wide. Vesica about 2.5× aedeagus length, with subbasal bend toward right, mesial part with loose 180–270° coil, distal part straight; proximal vesica 1× aedeagus width, gradually widening to 2× width at apex; lacking basal cornuti; a sclerotized band extending the length of the vesica; band on distal ½ of vesica bearing an elongate patch of small spine-like cornuti pointed obliquely posterior, patch widest at apex. **Female genitalia –** Ovipositor lobes elongate, 1.5–3.0× as long as wide and 0.27–0.43× as long as ductus bursae, asymmetrically acutely pointed, longest dorsally; apices granulose, remainder covered with fine hair-like setae, longest basally and very short distally. Segment VIII 0.33–0.50× as long as wide; posterior apophyses 1.6–2.0× as long as anterior apophyses. Ductus bursae uniformly sclerotized, slightly dorsoventrally flattened, slightly angled toward right, 3.6× as long as wide, narrowest ¼ length from ostium bursae and widest anteriorly near junction with corpus bursae. Corpus bursae 1–2× as long as ductus bursae, angled 45–60° to right from ductus bursae, asymmetrically elliptical, widest ⅓ of distance from posterior to anterior end and pointed at anterior end; lacking signa. Appendix bursae arising from dorsal surface of posterior corpus bursae adjacent to junction with ductus bursae and extending toward left, moderately sclerotized and slightly rugose, even in width and coiled 320–360° near base with distal part slightly curved and projecting dorsad or poster with ductus seminalis at apex.

Early stages. The larvae of *P. arietis* and *P. wyatti* were described and compared to other hadenine larvae by Godfrey (1972). He grouped them together separate from other *Lasionycta*. The hypopharynx is undivided and is covered uniformly by fine spines. The spinneret length is equal to or greater than twice Lps-1. The mandible lacks an inner tooth. The head is withdrawn and covered by a cervical shield. The epicranial suture is ½ of the length of the frons.

Remarks. *Psammopolia* has several adaptations to living in sand, including pointed ovipositor lobes, reduced or absent larval prolegs, and a prognathous larval head. A check list of Psammopolia species is presented in Table 2.

Key to species of *Psammopolia*

1. Dorsal forewing gray; occurring from northern California to southwest Alaska ..**2**
– Dorsal forewing gray brown to tan; occurring from Sonoma County, California to Baja California.....**3**

2. Orbicular spot oval; larger species (forewing length ≥ 18 mm); male valve with broad expansion of mesial ventral margin; corpus bursae > 1.8× ductus bursae length ..... ***P. wyatti***
– Orbicular spot nearly round; smaller species (forewing length ≤ 18 mm); mesial valve weakly expanded; corpus bursae < 1.8× ductus length ***P. arietis***
3. Orbicular spot incomplete, open along vein R and outlined in black scales; forewing dark gray brown to reddish brown; male antenna bipectinate; female corpus bursae > 1.5× length of ductus bursae ..... ***P. ochracea***
– Orbicular spot complete, pale, without dark outline; forewing cream, tan, or medium gray brown; male antenna weakly biserrate; corpus bursae equal to ductus bursae length **4**
4. Orbicular spot round or ovoid; occurring on the central California coast north of Carmel; male cucullus wider than valve at base of clasper; female ovipositor lobes 0.4× length of ductus bursae..... ***P. insolens***
– Orbicular an elongate oval; occurring in San Luis Obispo County; cucullus width less than valve at clasper; female ovipositor lobes < 0.3× ductus bursae length ..... ***P. sala***

***Psammopolia arietis* (Grote), comb. n.**
Figs 125, 126, 185, 240. Map 23

Mamestra arietis Grote, 1879: 207.
Lasionycta arietis; McDunnough 1938: 71.
Anarta etacta Smith, in Dyar 1900: 493, **syn. n.**

Type material. *Mamestra arietis*: **syntype** ♂ [BMNH, examined]. Type locality: California. *Anarta etacta*: **holotype** ♀ [USNM, examined]. Type locality: Kukak Bay, [Aleutian Islands], Alaska.

Diagnosis. *Psammopolia arietis* is a relatively small (expanse < 18 mm) gray species from the West Coast north of Mendocino, California. It occurs with *P. wyatti* and can be recognized from it by smaller size, darker gray color, and features of the spots. The orbicular spot of *P. arietis* is nearly round and it and the reniform spot are filled with pale gray peripheral and darker gray central scales. In *P. wyatti*, the orbicular spot is oval and it and the reniform spot are usually filled with whitish scales. The male genitalia of *P. arietis* resemble those of *P. wyatti* but are less massive with a less expanded ventral margin and smaller cucullus. The female corpus bursae of *P. arietis* is slightly shorter relative to the ductus bursae than that of *P. wyatti* (corpus/ductus = 1.75× for *P. arietis*; 1.85–2.0× for *P. wyatti*).

Distribution and biology. *Psammopolia arietis* occurs on Pacific Coast sand beaches from Mendocino, California to southwestern Alaska. It is absent from the inland Strait of Georgia. Adults are nocturnal and come to light. Specimens are from late July to early September.

Crumb (1956) and Godfrey (1972) described larvae from Newport, Oregon. It lives in sand dunes and feeds on *Lathyrus littoralis* (Nutt.) Endl. (Fabaceae), *Polygonum paronychia* Cham. & Schltdl. (Polygonaceae), *Abronia latifolia* Eschsch. (Nyctaginaceae), and an unspecified grass (Poaceae). It has reduced prolegs with crochets.

***Psammopolia wyatti* (Barnes & Benjamin), comb. n.**
Figs 123, 124, 186, 241. Map 22

Polia wyatti Barnes & Benjamin, 1926: 111.
Lasionycta wyatti; McDunnough 1938: 71.

Type material. Holotype ♀ [USNM, examined]. Type locality: Fort Canby, Washington.

Diagnosis. *Psammopolia wyatti* is a large whitish silver-gray species with a large pale orbicular spot. The genitalia of both sexes of *P. wyatti* are the largest in the genus. The male valve has a large triangular cucullus and a flattened expanded ventral valve margin proximal to the clasper base. *Psammopolia wyatti* occurs with *P. arietis* throughout its range. Differences between them are described under *P. arietis*.

Distribution and biology. *Psammopolia wyatti* occurs from southern Oregon to the Queen Charlotte Islands, British Columbia. Adults fly over sand beaches, are nocturnal, and come to light. It has been collected from late May to early September.

The larva is described by Crumb (1956) and Godfrey (1972). It feeds on *Polygonum paronychia*, *Abronia latifolia*, *Tanacetum camphoratum* Less. (Asteraceae), and a grass. The prolegs are obsolescent except in early instars, are fused to the venter, and lack crochets. Larvae in various stages of development are found throughout the year.

***Psammopolia insolens* (Grote), comb. n.**
Figs 129, 130, 187, 242. Map 22

Dianthoecia insolens Grote, 1874a: 65.
Mamestra insolens; Smith 1893a: 115.
Lasionycta insolens; McDunnough 1938: 71.
Taeniocampa earina Morrison, 1874: 158–159; not Harvey, 1874 as listed in Franclemont and Todd (1982).
Mamestra earina; Smith 1893a: 115.
Lasionycta earina; McDunnough 1938: 71.

Type material. *Dianthoecia insolens*: **syntype** ♀ [BMNH, examined]. Type locality: California. *Taeniocampa earina*: **holotype** ♀ [BMNH, examined]. Type locality: California.

Diagnosis. *Psammopolia insolens* is a large variable brown-gray species from the central California Coast. It is sexually dimorphic, with smaller, paler, and more smoothly

patterned males and larger darker females with a sandy appearance. Some males have the normal pattern replaced by a streaky appearance with a serrated black subterminal area. *Psammopolia insolens* occurs with *P. ochracea*. The biserrate antenna (bipectinate in *P. ochracea*), allows males to be easily identified. The female corpus bursae of *P. insolens* is smaller than that of *P. ochracea* (1.0× vs. 1.5× ductus length). The orbicular spot as described in the key can also be used to distinguish them. *Psammopolia insolens* is most similar to *P. sala*, which occurs in southern California. Differences are given under *P. sala*.

Distribution and biology. *Psammopolia insolens* occurs on Pacific Coast sand beaches in central California from Carmel to Bodega Bay, Sonoma County. Most specimens are from near San Francisco. Specimens have been collected in May and from mid-September through October. It is the most common of the Californian species in collections.

***Psammopolia sala* (Troubridge & Mustelin), comb. n.**
Figs 131, 132, 188, 243. Map 22

Lasionycta sala Troubridge & Mustelin, 2006, in Mustelin, 2006: 37.

Type material. Holotype ♂ [CNC, examined]. Type locality: San Simeon Dunes, Oceana, San Luis Obispo County, California.

Diagnosis. This recently described species is restricted to the isolated dune of San Luis Obispo County, California. It is pale powdery sandy brownish gray and has a pale elongate orbicular spot. *Psammopolia sala* occurs within the range of *P. ochracea*. The biserrate antenna (bipectinate in *P. ochracea*), can be used to identify males. Females are distinguished from all *Psammopolia* by a shorter ovipositor lobe (0.27× as long as the ductus bursae in *P. sala*; 0.40× in other species). *Psammopolia sala* is most similar in appearance and structure to *P. insolens* from central California. Males of *P. sala* have a smaller cucullus than *P. insolens* (0.7× valve width compared to 1.0× width for *P. insolens*). The length of the ovipositor described above distinguishes females.

Distribution and biology. *Psammopolia sala* is restricted to the type locality where it flies over outer coastal dunes. It has been found in May and again in September and October.

***Psammopolia ochracea* (Smith), comb. n.**
Figs 127, 128, 189, 244. Map 23

Xylomiges ochracea Smith, 1892: 75.
Lasionycta ochracea; McDunnough 1938: 71.

Type material. Syntypes [USNM, examined]. Type locality: Alameda County, California. Smith attributed the authorship to Riley; however, Smith wrote the description

and published the name so the authorship goes to Smith. Riley is listed as author in most lists except Poole (1989).

Diagnosis. *Psammopolia ochracea* is the smallest and most widely distributed Californian species. It is dark brown, often reddish, and has a large orbicular spot that is open along the radial vein. The conspicuous orbicular and reniform spots are outlined in black and filled with pale scales peripherally and darker ground scales centrally. The genitalia of both sexes are similar to those of *P. arietis*. The male is the only *Psammopolia* with a bipectinate antenna. Females differ from the other Californian species in the length of the corpus bursae, 1.75× the ductus bursae in *P. ochracea*, 1.0× in *P. insolens* and *P. sala*.

Distribution and biology. *Psammopolia ochracea* is found in coastal California between San Francisco and Los Angeles. It flies in September and October. It occurs on sand beaches and is nocturnal.

Tricholita Grote

Two undescribed species of *Tricholita* Grote came to our attention during this revision because of their similarity to *Lasionycta*. *Tricholita* can be distinguished from most *Lasionycta* by the white scales in the reniform spot. In the male genitalia of *Tricholita* the valve lacks a corona but has an adherent patch of long setae near the apex on the inner dorsal surface, the valve lacks the postsaccular flap characteristic of most *Lasionycta*, *Psammopolia*, and *Lacinipolia*, and the surface of the vesica lacks the band of cornuti that borders the wrinkled folding surface of the vesica in *Lasionycta*, *Eriopygodes*, and *Lacinipolia*, or covers the entire wrinkled surface in *Psammopolia* and *Lasionhada*. In the female genitalia the sclerotized surface of the ductus bursae does not extend onto the corpus bursae as in *Lasionycta*, *Psammopolia*, and *Lacinipolia* where it forms a sclerotized trough-like plate in the junction of the corpus bursae and ductus bursae. We take this opportunity to describe these species.

Tricholita knudsoni Crabo & Lafontaine, sp. n.

urn:lsid:zoobank.org:act:1E40D7AE-7121-45EB-AA74-80633422A180
Figs 133, 134, 192, 246. Map 24

Type Material. Holotype ♂. USA, Texas, Uvalde Co, Concan, 1–2 Oct. 1994, E. Knudson. CNC. **Paratypes** 4 ♂, 6 ♀. **USA. Texas**. Same data as holotype (2 ♂, 5 ♀); same locality as holotype, 20 Oct. 1994, C. Bordelon (1 ♂, 1 ♀); Val Verde Co, Dolan Falls/Devil's River, 3–10 Oct. 1994, J. Gillaspy (1 ♂). CNC, TAMU, TLSC, USNM.

Other material examined. USA. Texas. Brewster Co, Big Bend Nat. Park, Chisos Basin, 14 Sept. 1982, E. Knudson (1 ♂, 3 ♀); Big Bend Nat. Park, Green Gulch, 6–10 Sept. 2008 Bordelon & Knudson (1 ♀); Jeff Davis Co, Davis Mts State Park, 25 Aug. 1979, E. Knudson (1 ♂); Culberson Co, Guadalupe Mts Nat. Park, Dog Canyon, 15 Sept. 1990, E. Knudson (1 ♂, 2 ♀), 25 Aug. 1995, Bordelon & Knudson (2 ♂, 1 ♀).

Etymology. We are pleased to name this species after Edward Knudson who has done so much to advance the study of Lepidoptera in Texas and adjacent areas of the United States and Mexico.

Diagnosis. *Tricholita knudsoni* is readily recognized in its western Texan range by the mottled yellow-brown and dark-brown pattern of the forewing, the white shading around and often in the reniform spot, and the bipectinate male antenna. The male genitalia are characterized by the apically pointed valves without a corona, and the long, straight digitus that projects posteriorly from the ventral apex of the valve. In the female genitalia the ovipositor lobes are tapered posteriorly, the sclerotization of the ductus bursae does not extend as far anteriorly as the corpus bursae, and the appendix bursae is a C-shaped lobe on the right side of the corpus bursae posteriorly. It is most closely related to *Tricholita ferrisi* from southeastern Arizona; it can be distinguished by the comparative characters given in the diagnosis of *T. ferrisi*.

Description. Head – Antenna of male bipectinate and fasciculate, 3.5 x as wide as the central shaft. Dorsal antenna dark brown with a few pale-brown scales. Scape white ventrolaterally, brown dorsally. Eye hairy, normal size. Palpus covered with broad, light- and dark-brown scales. Frons and top of head covered with strap-like light- and dark-brown scales. **Thorax –** Vestiture on tegula, slender with expanded apices on center of thorax and on slightly differentiated prothoracic and metathoracic tufts; scales brown on tegula with dark-brown scales on margin, and pale gray-brown scales on center of thorax and tufts. Thorax generally appearing brown with tegula margined in blackish brown. Legs covered with dark- medium- and pale-brown scales with pale scales mainly at distal end of tarsal segments. **Wings –** Forewing length 15–16 mm (expanse 33–35 mm). Forewing ground color a mixture of dark-brown, yellow-brown or reddish-brown, and pale brownish-gray scales, appearing a mottled dark and light brown with yellow brown (or reddish brown) mainly in subterminal area and orbicular and claviform spots. Basal, antemedial, and postmedial lines double, slightly darker than ground color, filled with yellow brown, variable in prominence. Medial line a faint darker shade from reniform spot to lower margin of wing. Postmedial line scalloped between veins, weakly excurved opposite cell. Subterminal line defined mostly by contrast between yellow-brown shading in subterminal area with darker gray-brown shading in terminal area; terminal area with darker shading. Terminal line black, between veins. Veins in subterminal and terminal areas black. Orbicular spot oval, outlined in black, usually filled with paler yellow-brown shading than ground color. Reniform spot rectangular or slightly kidney shaped, partially outlined in black, but mainly defined by white scales that surround most of spot with a few brown scales in middle. Claviform spot outlined in black, small, extending ½ distance to postmedial line with black dash in fold between spot and pm line. Subterminal area with black or dark brownish-gray streaks opposite reniform spot and opposite claviform spot. Fringe dark brown basally, paler brown distally with contrasting yellow or white dot at base of fringe at end of each wing vein. Ventral forewing dark grayish brown with dark gray-brown shading on postmedial line and veins. Ground color paler distal to postmedial line than elsewhere. Discal spot a diffuse pale shade. Terminal line and fringe

similar to that on upper surface but shades of brown less contrasting. Dorsal hindwing brown with dark blackish-brown shading in veins, terminal line, and faint discal spot. Postmedial line not evident. Terminal line continuous, black. Fringe mainly yellow brown basally, gray brown medially, and buffy white distally. Ventral hindwing pale gray brown, heavily suffused with dark gray brown on veins, anterior part of wing and on prominent postmedial line and rounded to chevron-shaped discal spot. Terminal line and fringe as in forewing underside. **Abdomen –** Mixed light to medium gray-brown scales, a dorsal tuft on first segment comprised of white-tipped dark-gray scales; numerous long yellow-brown scales over male genitalia. **Male genitalia –** (Fig. 192). Uncus dorsoventrally flattened, evenly tapered toward base and apex. Valve 5.4× as long as wide, nearly even in width to base of digitus, then tapered to a bluntly pointed apex; without a corona or a differentiated cucullus. Sacculus large, about 0.45× length of valve and extending over costal margin of valve; postsaccular flap absent. Clasper C-shaped, similar to those of *Lasionycta*. Digitus long, about 3× valve width, nearly straight with sharply pointed tip, extending 15° ventrally to valve axis to tip of valve. Aedeagus cylindrical, 7× as long as wide. Vesica 1.3× as long as aedeagus, with 90° subbasal bend to left, then curving through 90° toward apex to project anteriorly; vesica with short, rounded, subbasal, medial, and subapical diverticula and 3 long spike-like subbasal cornuti. **Female genitalia –** (Fig. 246). Ovipositor lobe long and tapered to point, covered with short and long setae. Ductus bursae 0.9× as long as corpus bursae, evenly and heavily sclerotized almost to corpus bursae, slightly narrower mesially than anteriorly and posteriorly. Corpus bursae oval, tapered posteriorly, without signa. Appendix bursae C-shaped, on right posterior margin of corpus bursae with apex curling toward ductus bursae with ductus seminalis at apex.

Distribution and biology. *Tricholita knudsoni* is known from western Texas from Concan westward to the Chisos, Davis, and Guadalupe Mountains. All known specimens were collected at light between late August and late October.

Tricholita ferrisi Crabo & Lafontaine, sp. n.

urn:lsid:zoobank.org:act:F53D45D8-5B93-4389-9780-5255EDFCA54C
Figs 135, 193. Map 24

Type Material. Holotype ♂. USA, Arizona, Cochise Co, Chiricahua Mts, Shaw Peak, Trail above Onion Saddle, 7630', 31°56.01' N 109°15.79'W, 22 July 2007, C. D. Ferris. CNC. **Paratypes** 4 ♂. **USA**, **Arizona**. Same data as holotype (3 ♂); Cochise Co, Huachuca Mts, Ash Canyon, 5170', 31°23.17' N 110°14.28' W, 26 July 2007, C. D. Ferris (1 ♂). CDFC, CNC, LGC.

Etymology. We take pleasure in naming this species for Clifford Ferris who collected this species and recognized it as new.

Diagnosis. *Tricholita ferrisi* is easily distinguished from all *Lasionycta* species by the lack of a corona on the cucullus and the straight digitus. No other species of *Tricholita* in Arizona resembles *T. ferrisi*. It is most similar to *Tricholita knudsoni* but the forewing

has more gray shading, the reniform spot is not as contrasting, the hindwing is much paler, and in the male genitalia the sacculus is shorter and more triangular, the ventral margin of the valve is notched subapically defining a weak cucullus, and the vesica lacks basal and medial diverticula.

Description. Known only from males. **Head –** Antenna of strongly bipectinate and fasciculate, 4.5 x as wide as central shaft. Dorsal antenna light gray. Scape white, dorsal tuft of scales at base of antenna white-tipped gray. Eye hairy, normal size. Palpus covered with light to dark gray-brown scales with a few white scales. Frons covered with hair-like dark gray-brown scales. Top of head with hair-like scales, most scales tri-colored white at base, dark gray-brown from mid-point to near apex, and white-tipped apically with a few entirely white; overall appearing medium gray brown. **Thorax –** Vestiture similar to top of head, or with dark gray brown part of scales replaced by grayish red brown posterior to prothoracic collar. Legs covered with dark-gray, light-tan, and white scales, some similar to white-tipped scales on head and thorax; tarsal segments dark gray, ringed distally with light tan. **Wings –** Forewing length 13 mm (expanse 28 mm). Forewing ground color a mixture of gray, gray brown to red brown, dark brown, and white scales; overall appearing slightly shiny gray brown to slightly reddish brown; subterminal area slightly lighter than remainder of wing; costa with four small patches of luteous scales distal to cell most evident with magnification. Basal, antemedial, and postmedial lines darker gray brown, variable in prominence. Basal line faint. Antemedial line most prominent below cell, slightly irregular and extended a short distance medially along vein 1A + 2A. Medial line faint and diffuse, most evident as an indistinct dark gray-brown smudge proximal to reniform spot and on costa. Postmedial line faintly scalloped on veins, weakly excurved opposite cell and then nearly straight at 45° to wing to posterior margin. Subterminal line darker gray, incomplete, forming a series of diffuse blackish-gray patches between veins. Terminal line absent. Spots gray brown, faint. Orbicular spot ovoid and small, filled with slightly lighter gray than ground color. Reniform spot upright oval, filled with pure white peripherally, light to dark gray centrally and on inner margin. Claviform spot absent. Fringe light gray, checkered with dark gray brown between veins. Ventral forewing pale whitish gray, scales luteous near anterior margin, suffused with light to dark gray. Costa mixed with light-yellow and dark gray-brown scales. Discal spot punctate to nearly absent. Postmedial line dark gray, diffuse, most prominent marking on wing. Terminal line complete, gray brown, faint to dark. Fringe mottled light gray to luteous gray proximally, darker and slightly checkered gray distally. Dorsal hindwing white with mild to moderate suffusion of dark-gray scales distal to discal spot near costa and more diffusely distal to postmedial line, overall appearing shiny slightly dusty whitish gray. Discal spot faint, thin, weakly chevron shaped. Postmedial line gray, faint and diffuse. Terminal line continuous, faint to dark gray brown. Fringe similar to ground color with scattered gray scales in proximal row. Ventral hindwing pale white suffused with light- to dark-gray scales, especially anteriorly. Discal spot gray, relatively small and diffuse. Postmedial line dark gray, similar in color to ventral forewing postmedial line, sinuous. Terminal line thin, gray. Fringe white with scattered gray scales. **Abdomen –** Mixed light to medium gray-brown scales, a dorsal tuft on first segment comprised of white-tipped dark-gray

scales. **Male genitalia –** (Fig. 193). Uncus with apical ⅔ dorsoventrally flattened, 3× as wide as cylindrical basal ⅓ with apex abruptly tapered to rounded bluntly-pointed apex. Valve 4.7× as long as wide, nearly even in width to base of digitus, then tapered abruptly on ventral margin to define a small cucullus lacking a corona. Sacculus 0.35× length of valve, costal lobe barely reaching dorsal margin of valve; postsaccular flap absent. Cucullus 0.46× valve width. Clasper C-shaped, similar to those of *Lasionycta*. Digitus relatively long, 1.7× valve width, nearly straight with sharply pointed tip, extending 45° to valve axis to apex of valve. Aedeagus cylindrical, 7× as long as wide. Vesica 2× as long as aedeagus, with 90° subbasal bend to left, then gently twisted to apex, four stout spine-like subbasal cornuti with bulbous bases; distal vesica without spines along wrinkled folding area, with a rounded apical diverticulum.

Distribution and biology. *Lasionycta ferrisi* is only known from Onion Saddle in the Chiricahua Mountains and Ash Canyon in the Huachuca Mountains of southwestern Arizona at elevations between 1575 and 2325 meters. All known specimens were collected by light trap in late July.

Table 1. *Lasionycta* species arranged by geographical regions

Pacific Northwest (Washington, Oregon, W British Columbia)

Lasionycta brunnea Crabo & Lafontaine (NE WA)
Lasionycta caesia Crabo & Lafontaine
Lasionycta fergusoni Crabo & Lafontaine
Lasionycta gelida Crabo & Lafontaine
Lasionycta haida Crabo & Lafontaine (Queen Charlotte Islands, BC)
Lasionycta i. impingens (Walker)
Lasionycta luteola (Smith)
Lasionycta macleani (McDunnough)
Lasionycta mutilata (Smith)
Lasionycta perplexa (Smith)
Lasionycta perplexella Crabo & Lafontaine
Lasionycta poca (Barnes & Benjamin)
Lasionycta promulsa (Morrison)
Lasionycta sasquatch Crabo & Lafontaine
Lasionycta silacea Crabo & Lafontaine
Lasionycta subfuscula livida Crabo & Lafontaine
Lasionycta s. subfuscula (Grote) (Steens Mountain, OR)
Lasionycta uniformis multicolor Crabo & Lafontaine

California

Lasionycta b. benjamini Hill
Lasionycta mono Crabo & Lafontaine
Lasionycta perplexa (Smith)
Lasionycta sierra Crabo & Lafontaine

Lasionycta subalpina Crabo & Lafontaine

Lasionycta uniformis shasta Crabo & Lafontaine (Mt Shasta)

Central Rocky Mountains (Beartooth Plateau, Colorado, Utah, New Mexico)

Lasionycta benjamini medaminosa Crabo & Lafontaine

Lasionycta conjugata (Smith)

Lasionycta discolor (Smith)

Lasionycta dolosa (Barnes & Benjamin)

Lasionycta impingens curta (Morrison)

Lasionycta leucocycla albertensis (McDunnough) (Beartooth Plateau)

Lasionycta perplexa (Smith)

Lasionycta coloradensis (Richards)

Lasionycta promulsa (Morrison)

Lasionycta q. quadrilunata (Grote)

Lasionycta quadrilunata yukona Lafontaine (Beartooth Plateau)

Lasionycta subalpina Crabo & Lafontaine

Lasionycta s. subfuscula (Grote)

Lasionycta uniformis fusca Crabo & Lafontaine

Canadian Rocky Mountain region (Alberta and eastern British Columbia)

Lasionycta anthracina Crabo & Lafontaine (eastern AB)

Lasionycta brunnea Crabo & Lafontaine

Lasionycta fergusoni Crabo & Lafontaine

Lasionycta frigida Crabo & Lafontaine

Lasionycta illima Crabo & Lafontaine (Pink Mountain, BC)

Lasionycta i. impingens (Walker)

Lasionycta lagganata (Barnes & Benjamin)

Lasionycta leucocycla albertensis (McDunnough)

Lasionycta luteola (Smith)

Lasionycta mutilata (Smith)

Lasionycta perplexa (Smith)

Lasionycta perplexella Crabo & Lafontaine

Lasionycta poca (Barnes & Benjamin)

Lasionycta promulsa (Morrison)

Lasionycta pulverea Crabo & Lafontaine

Lasionycta quadrilunata yukona Lafontaine

Lasionycta s. secedens (Walker)

Lasionycta silacea Crabo & Lafontaine (Waterton, AB)

Lasionycta subfuscula livida Crabo & Lafontaine (Waterton, AB)

Lasionycta taigata Lafontaine

Lasionycta u. uniformis (Smith)

Alaska and Yukon

Lasionycta carolynae Crabo

Lasionycta coracina Crabo & Lafontaine

Lasionycta fergusoni Crabo & Lafontaine

Lasionycta illima Crabo & Lafontaine
Lasionycta i. impingens (Walker)
Lasionycta leucocycla albertensis (McDunnough)
Lasionycta l. leucocycla (Staudinger)
Lasionycta luteola (Smith)
Lasionycta mutilata (Smith) (AK panhandle)
Lasionycta perplexa (Smith)
Lasionycta perplexella Crabo & Lafontaine
Lasionycta phaea (Hampson)
Lasionycta poca (Barnes & Benjamin)
Lasionycta promulsa (Morrison)
Lasionycta quadrilunata yukona Lafontaine
Lasionycta secedens bohemani (Staudinger)
Lasionycta skraelingia (Herrich-Schäffer)
Lasionycta staudingeri preblei (Benjamin)
Lasionycta subfumosa (Gibson)
Lasionycta taigata Lafontaine
Lasionycta uniformis multicolor Crabo & Lafontaine

Northeastern North America (north and east of Hudson Bay)

Lasionycta anthracina Crabo & Lafontaine
Lasionycta flanda (Smith)
Lasionycta leucocycla hampa (Smith) (White Mountains, NH)
Lasionycta leucocycla moeschleri (Staudinger)
Lasionycta l. leucocycla (Staudinger) (high arctic)
Lasionycta perplexa (Smith) (Great Whale River, QU)
Lasionycta phaea (Hampson) (high arctic)
Lasionycta phoca (Möschler)
Lasionycta s. secedens (Walker)
Lasionycta subdita (Möschler)
Lasionycta uniformis handfieldi Crabo & Lafontaine (Gaspé Peninsula, QU)

Table 2. Check List of North American *Lasionycta* Auriv. and *Psammopolia* Crabo & Laf.

LASIONYCTA Auriv., 1892

LASIESTRA Hamp., 1905

PSEUDANARTA Kozhanchikov, 1947

ANARTOMIMA Boursin, 1952

Lasionycta skraelingia species-group

skraelingia (H.-S., 1852, *Phlogophora*)

scraelingia; Hamp. 1905, invalid emendation.

skroelingia; Warr. 1910: 85, misspelling.

taigata Laf., 1988

Lasionycta secedens species-group

secedens (Wlk., [1858], *Plusia*)

a. bohemani (Stgr., 1861, *Anarta*)

Lasionycta phaea species-group

phaea (Hamp., 1905, *Anarta*)

Lasionycta subdita species-group

subdita (Mösch., 1860, *Dianthoecia*)

membrosa (Morr., 1875, *Anarta*)

conjugata (Sm., 1899, *Scotogramma*)

fergusoni Crabo & Laf., 2009, **sp. n.**

Lasionycta mutilata species-group

mutilata (Sm., 1898, *Mamestra*)

rainieri (Sm., 1900, *Mamestra*), **syn. n.**

rainierii; Dyar 1903, misspelling.

haida Crabo & Laf., 2009, **sp. n.**

Lasionycta luteola species-group

luteola (Sm., 1893, *Scotogramma*)

Lasionycta leucocycla species-group

Lasionycta leucocycla sub-group

leucocycla (Stgr., 1857, *Anarta*)

magadanensis Kon. & Laf., 1986, extralimital

a. moeschleri (Stgr., 1901, *Anarta*)

b. hampa (Sm., 1908, *Anarta*)

c. albertensis (McD., 1925, *Anarta*)

flanda (Sm., 1908, *Anarta*), **stat. rev.**

coracina Crabo & Laf., 2009, **sp. n.**

anthracina Crabo & Laf., 2009, **sp. n.**

poca (B. & Benj., 1923, *Anarta*), **stat. rev.**

coloradensis (Richards, 1943, *Lasiestra*), **stat. rev.**

illima Crabo & Laf., 2009, **sp. n.**

frigida Crabo & Laf., 2009, **sp. n.**

sasquatch Crabo & Laf., 2009, **sp. n.**

benjamini Hill, 1927

a. medaminosa Crabo & Laf., 2009, **ssp. n.**

Lasionycta perplexa sub-group

perplexa (Sm., 1888, *Scotogramma*)

marloffi (Dyar, 1922, *Anytus*), **syn. n.**

alberta B. & Benj., 1923, **syn. n.**

perplexella Crabo & Laf., 2009, **sp. n.**

subalpina Crabo & Laf., 2009, **sp. n.**

Lasionycta subfuscula sub-group

subfuscula (Grt., 1874, *Anarta*)

sedilis (Sm., 1899, *Scotogramma*), **syn. n.**

a. livida Crabo & Laf., 2009, **ssp. n.**

Lasionycta staudingeri sub-group

staudingeri (Auriv., 1891, *Anarta*)

schoenherri (Stgr., 1861, *Anarta*), preocc. by *Anarta schoenherri* Zett., [1840].

zemblica (Hamp., 1905, *Anarta*), **syn. n.**

sajanensis Kon., 1986, extralimital

a. preblei (Benj., 1933, *Anarta*)

dolosa (B. & Benj., 1923, *Anarta*), **stat. rev.**

subfumosa (Gibson, 1920, *Anarta*), **stat. rev.**

quadrilunata (Grt., 1874, *Anarta*)

a. yukona Laf., 1986

lagganata (B. & Benj., 1924, *Anarta*)

carolynae Crabo, 2009, **sp. n.**

Lasionycta phoca sub-group

phoca (Mösch., 1864, *Dianthoecia*)

albinuda (Smith, 1903, *Scotogramma*), **syn. n.**

uniformis (Sm., 1893, *Scotogramma*)

a. multicolor Crabo & Laf., 2009, **ssp. n.**

b. fusca Crabo & Laf., 2009, **ssp. n.**

c. shasta Crabo & Laf., 2009, **ssp. n.**

d. handfieldi Crabo & Laf., 2009, **ssp. n.**

brunnea Crabo & Laf., 2009, **sp. n.**

caesia Crabo & Laf., 2009, **sp. n.**

gelida Crabo & Laf., 2009, **sp. n.**

discolor (Sm., 1899, *Scotogramma*)

klotsi (Richards, 1943, *Lasiestra*), **syn. n.**

mono Crabo & Laf., 2009, **sp. n.**

Lasionycta *promulsa* sub-group

promulsa (Morr., 1875, *Mamestra*)

infuscata (Sm., 1899, *Scotogramma*), **syn. n.**

macleani (McD., 1927, *Anarta*)

pulverea Crabo & Laf., 2009, **sp. n.**

silacea Crabo & Laf., 2009, **sp. n.**
sierra Crabo & Laf., 2009, **sp. n.**
Lasionycta impingens sub-group
impingens (Wlk., 1857, *Anarta*)
a. curta (Morr., 1875, *Mamestra*)
perpura (Morr., 1875, *Orthosia*)
nivaria (Grt,, 1876, *Anarta*)
PSAMMOPOLIA Crabo & Laf., 2009
arietis (Grt., 1879, *Mamestra*), **comb. n.**
etacta (Sm., 1900, *Anarta*), **syn. n.**
wyatti (B. & Benj., 1926, *Polia*), **comb. n.**
insolens (Grt., 1874, *Dianthoecia*), **comb. n.**
earina (Morr., 1874, *Taeniocampa*)
sala (Troubridge & Mustelin, 2006, *Lasionycta*), **comb. n.**
ochracea (Sm., 1892, *Xylomiges*), **comb. n.**

Acknowledgements

Jim Troubridge was a friend and field companion to the senior author during the 1990's when he lived in the Pacific Northwest. Our talks increased the understanding of *Lasionycta* and his energy and cleverness were inspirational. Jim obtained many type specimen photographs, made numerous genitalia dissections, and prepared material at the CNC for DNA sequencing. He was a gracious host during visits to Ottawa.

Jocelyn Gill, CNC, a delightfully positive person, mounted the genitalia preparations, took all photographs, and prepared the plates. Her skill is without equal. This would be a far lesser work without her contributions.

Mike Pogue and David Adamski provided type photographs from the USNM. Ron Priest provided type photographs from MSU. George Balogh, Michigan, Clifford Ferris, Wyoming, Dave Grimaldi, New York, Louis Handfield, Quebec, Ed Knudson, Texas, Kauri Mikkola, Finland, and Tomas Mustelin, Washington provided access to specimens in their care. Doug and Sherri Macaulay, Peace River, Alberta provided distribution data and material for DNA analysis. Jon Shepard, British Columbia and Kyle Adam Evans, Wisconsin provided distribution data. Merrill Peterson, Western Washington University, Washington allowed use of his facilities. Henry Hensel, New Brunswick spread field pinned material and provided information on the biology of eastern North American species.

Chris Schmidt, Ottawa, Ontario provided access to specimens, made numerous critical observations and suggestions to improve the manuscript, and helped to prepare the DNA data for submission to GenBank.

Gary Anweiler, Alberta and anonymous reviewers provided helpful suggestions.

Gunnar Träff, Fagersta, Sweden, a dear friend, mentor, and inspiration, took the senior author collecting for *Lasionycta skraelingia* in 1980 and ignited a passion for the genus.

References

Ahola M, Silvonen K (2008) Larvae of Northern European Noctuidae, Volume 2. KuvaSeppälä Yhtiöt Oy, Vaasa, 672 pp.

Aurivillius C (1892a) Nordens fjärilar. Macrolepidoptera. Aktiebolaget Hiertas Bokförlg, Stockholm, 277 pp.

Aurivillius C (1892b) Eine neue palaearktische Eulengattung. Entomologisk Tidskrift 13: 285–286.

Barnes W, Benjamin FH (1923) Notes and new species. Contributions to the Natural History of the Lepidoptera of North America 5(2): 62–96.

Barnes W, Benjamin FH (1924) Notes and new species. Contributions to the Natural History of the Lepidoptera of North America 5 (3): 99–199.

Barnes W, Benjamin FH (1926) Notes and new species (Lepid., Phalaenidae). Pan-Pacific Entomologist 2: 106–110.

Beck H (1991) Taxonomische änderungen bei den Noctuinae, Cuculliinae, und Plusiinae (Noctuidae, Lepidoptera). Atalanta 22: 175–232.

Benjamin FH (1933) Notes on Phalaenidae from arctic America supplemented with material from high altitudes. Pan-Pacific Entomologist 9: 53–62.

Berio E ([1981] 1980–1981) Modificazioni al sistema delle Hadeninae e Cucullinae Italiene attuchmente seguito (Lepidoptera - Noctuidae). Annali del Museo Civico di Storia Naturale Giacomo Doria 83: 1–19.

Boursin C (1952) Beiträge zur Kenntnis der Agrotidae-Trifinae, XLIX. Synonymie-notizen nebst verschiedenen bemerkungen, III. Zeitschrift für Lepidopterologie 2: 49–69.

Clarke NLD (1991 In the field with Dr. Clarke. Journal of the Lepidopterists' Society 45: 82–84.

Crumb SE (1956) The larvae of the Phalaenidae. United States Department of Agriculture, Technical Bulletin 1135, Washington, D.C., 356 pp.

Dyar HG (1900) Papers from the Harriman Alaska Expedition. XII. Entomological Results (6): Lepidoptera. Proceedings of the Washington Academy of Sciences 2: 487–501.

Dyar HG ([1903] 1902) A list of North American Lepidoptera and key to the literature of this order of insects. Bulletin of the United States National Museum 52, xix + 723 pp.

Dyar HG (1922) New American Moths (Lepidoptera). Insecutor Inscitiae menstruus 10: 166–173.

Ferguson DC (1987) *Xanthorhoe clarkeata* (Geometridae), a new species and possible endemic of the Queen Charlotte Islands, British Columbia. Journal of the Lepidopterists' Society 41: 98–103.

Fibiger M, Lafontaine JD (2005) A review of the higher classification of the Noctuoidea (Lepidoptera) with special reference to the Holarctic fauna. Esperiana 11: 7–92.

Franclemont JG, Todd EL (1983) Noctuidae. pp. 120–159. In: Hodges RW, Dominick T, Davis DR, Ferguson DC, Franclemont JG, Munroe EG, Powell JA (1983) Check List of the Lepidoptera of America north of Mexico. E. W. Classey Ltd. and the Wedge Entomological Research Foundation, London, xxiv + 284 pp.

Gibson A (1920) Report of the Canadian Arctic Expedition 1913–18, Vol. 3: Insects, Part I: Lepidoptera. J. deLabroquerie Tache, Ottawa, 58 pp.

Godfrey GL (1972) A review and reclassification of larvae of the subfamily Hadeninae (Lepidoptera, Noctuidae) of America north of Mexico. United States Department of Agriculture, Technical Bulletin, 1450: 1–265.

Grote AR (1874a) List of the Noctuidae of North America. Bulletin of the Buffalo Society of the Natural Sciences 2: 1–77.

Grote AR (1874b) Descriptions and notes on the Noctuidae. Proceedings of the Boston Society of Natural History 16: 239–245.

Grote AR (1876) On a new species of *Anarta* and on an allied genus, with a note on the genus *Adita*. Annals of the Lyceum of Natural History of New York 11: 107–109.

Grote AR (1878) Descriptions of Noctuidae, chiefly from California. Bulletin of the United States Geological and Geographical Survey of the Territories 4: 169–196.

Grote AR (1879) On *Lithophane* and new Noctuidae. Bulletin of the United States Geological and Geographical Survey of the Territories 5: 201–208.

Hacker H, Ronkay L, Hreblay M (2002) Hadeninae I. Noctuidae Europaeae, Vol. 4. Entomological Press, Sorö, 419 pp.

Hampson GF (1905) Catalogue of the Lepidoptera Phalaenae in the British Museum, Vol. 5. Taylor and Francis, London, 634 pp.

Handfield L (1999) Le guide des papillons du Québec. Version scientifique. Vol. 1. Broquet, Boucherville, 982 pp.

Hartig F, Heinicke W (1973) Systematisches Verzeichnis der Noctuiden Europas (Lepidoptera – Noctuidae). Entomologica 9: 187–214.

Herrich-Schäffer GAW (1852) Systematische Bearbeitung der Schmetterlinge von Europa, zugleich als text, revision und supplement zu Jakob Hübner's Sammlung europäisher Schmetterlinge, 6 (suppl.): 1–178.

Hebert PDN, Cywinska A, Ball SL, deWaard JR (2003) Biological identifications through DNA barcodes. Proceedings of the Royal Society of London. Series B. Biological Sciences 270: 313–321.

Hill CA (1927) Three new moths from the southwest. Bulletin of the Southern California Academy of Science 26: 6–7.

Kononenko VS, Lafontaine JD, Mikkola K (1989) An annotated check list of noctuid moths (Lepidoptera, Noctuidae) of Beringia. Entomologicheskoye Obozreniye 68: 549–567. Reprinted in English in Entomological Review 69: 117–138, 1990.

Kozhanchikov I (1947) The systematics of genera of the *Anarta* group (Lepidoptera, Noctuidae) in relation to ecology and geographic distribution of the species of *Anarta* Ochs. Entomological Review 29: 12–35.

Lafontaine JD (2004) Noctuoidea, Noctuidae (part), Noctuinae (part – Agrotini). In: Hodges RW (Ed) The Moths of America North of Mexico fasc. 27.1. The Wedge Entomological Research Foundation, Washington, 385 pp.

Lafontaine JD, Kononenko VS, McCabe TL (1986) A Review of the *Lasionycta leucocycla* complex (Lepidoptera: Noctuidae) with descriptions of three new subspecies. The Canadian Entomologist 118: 255–279.

Lafontaine JD, Kononenko VS (1988) A revision of the *Lasionycta skraelingia* Herrich-Schäffer) species complex (Lepidoptera: Noctuidae). The Canadian Entomologist 120: 903–916.

MacKay MR (1972) The larvae of Canadian arctic Noctuidae (Lepidoptera). The Canadian Entomologist 104: 859–872.

McDunnough J (1925) Notes on some species of the genus *Anarta* (Lepidoptera). The Canadian Entomologist 57: 307–309.

McDunnough J (1927) The Lepidoptera of the Seton Lake region, British Columbia. The Canadian Entomologist 59: 193–199, 207–214.

McDunnough J (1938) Check list of the Lepidoptera of Canada and the United States of America. Part 1 Macrolepidoptera. Memoirs of the Southern California Academy of Sciences 1: 1–275.

Möschler HB (1860) Beiträge zur Lepidopteren-Fauna von Labrador. Wiener Entomologische Monatschrift 4: 329–381.

Möschler HB (1864) Beiträge zur Schmetterlingsfauna von Labrador. Wiener Entomologische Monatschrift 8: 193–200.

Morrison HK (1874 [1875]) Descriptions of new Noctuidae. Proceedings of the Boston Society of Natural History 17: 131–166.

Morrison HK (1875a) Notes on North American Lepidoptera. Annals of the Lyceum of Natural History of New York 11: 91–104.

Morrison HK (1875b) Notes on the Noctuidae, with descriptions of certain new species. Proceedings of the Academy of Natural Sciences of Philadelphia, 1875: 55–71. Issued 1876.

Mustelin T (2006) Taxonomy of southern California Erebidae and Noctuidae (Lepidoptera) with descriptions of twenty-one new species. Zootaxa 1278: 1–47.

Poole RW (1989) Lepidopterorum Catalogus (New Series), fascicle 118, Noctuidae. E. J. Brill, Leiden, 1314 pp.

Richards AG (1943) Two new species of *Lasiestra* from Colorado (Lepidoptera: Phalaenidae). Entomological News 54: 85–88.

Rockburne EW, Lafontaine JD (1976) The Cutworm Moths of Ontario and Quebec. Canada Department of Agriculture, Ottawa, No. 1593, 164 pp.

Smith JB (1888) New genera and species of North American Noctuidae. Proceedings of the United States National Museum 10: 450–479.

Smith JB (1892) Contributions toward a monograph of the Noctuidae of boreal America. Revision of *Xylomiges* and *Morrisonia*. Proceedings of the United States National Museum 15: 65–86.

Smith JB (1893a) Catalogue of the Lepidopterous superfamily Noctuidae found in boreal America. Bulletin of the United States National Museum, No. 44, 424 pp.

Smith JB (1893b) New species of Noctuidae. Entomological News 4: 98–102.

Smith JB (1894) Descriptions of new genera and species of Noctuidae. Transactions of the American Entomological Society 21: 39–88.

Smith JB (1898) Notes on the genus *Mamestra* Ochs., with descriptions of new species. Entomological News 9: 240–251.

Smith JB (1899) Notes on *Scotogramma* and *Oncocnemis* with descriptions of new species. Journal of the New York Entomological Society 7: 37–44.

Smith JB (1900) A hundred new moths of the family Noctuidae. Proceedings of the United States National Museum 22: 413–495.

Smith JB (1903) New noctuids for 1903, No. 2, with notes on *Mamestra* and *Scotogramma*. Journal of the New York Entomological Society 11: 1–24.

Smith JB (1908) New species and genera of the Lepidopterous family Noctuidae for 1907, Part 2. Annals of the New York Academy of Sciences 18: 91–127.

Staudinger O (1857) Beitrag zur Kenntniss der nordischen *Anarta*-Arten. Stettiner Entomologische Zeitung 18: 289–298.

Staudinger O (1861) [Reise nach Finmarken]. 1, Macrolepidoptera. Stettiner Entomologische Zeitung 22: 342–404.

Staudinger O, Rebel H (1901) Catalog der Lepidopteren des Palaearctischen Faunengebietes. R Friedländer & Sohn, Berlin, 368 pp.

Todd EL (1982) The noctuid type material of John B. Smith (Lepidoptera). United States Department of Agriculture, Technical Bulletin 1645, 228 pp.

Troubridge JT, Crabo LG (2002) A review of the Nearctic species of *Hadena* Schrank, 1802 (Lepidoptera: Noctuidae) with descriptions of six new species. Fabreries, 27: 109–154.

Walker F (1857) List of the specimens of lepidopterous insects in the collection of the British Museum 11: 493–764. Edward Newman, London.

Walker F ([1858] 1857) List of the specimens of lepidopterous insects in the collection of the British Museum 12: 765–982. Edward Newman, London.

Warren W (1909–1914) Noctuidae. In: Seitz A (Ed) Die Gross-Schmetterlinge der Erde. Die Gross-Schmetterlinge der Palaearktischen Faunengebietes. 3. Die eulenartigen Nachtfalter. Alfred Kernen, Stuttgart. iv + 511 pp. + 52 pls.

Wilterding JH (1997) Type specimens of Lepidoptera in the Tepper collection at Michigan State University. Journal of the New York Entomological Society 105: 65–104.

Figures 1–39. ***Lasionycta*** **adults. 1** *L. skraelingia* ♂, Sweden, Torne Lappmark, Jukkasjärvi **2** *L. skraelingia* ♂, Canada, Yukon, km 155 Dempster Hwy, 900 m **3** *L. skraelingia* ♀, Canada, Yukon, km 156 Dempster Hwy, 65.05°N 138.32–34°W, 960 m **4** *L. taigata* ♂, Canada, Labrador, vic. Schefferville **5** *L. taigata* ♂ paratype, Canada, Labrador, L'Anse-au-loup, 51°32'N 56°49'W **6** *L. phaea* ♀, Canada, Nunavut, Bernard Harbour **7** *L. s. secedens* ♂, Canada, Quebec, Gaspé Pen., vic. Holland Lake, nr Murdochville **8** *L. secedens bohemani* ♂, Canada, Yukon, Mile 31 W of Dawson **9** *L. subdita* ♂, Canada, Manitoba, 24 km E Churchill at N Study Centre **10** *L. conjugata* ♂, USA, Utah, Sanpete County, Great Basin Exp. Sta., 8850' **11** *L. fergusoni* ♂, Canada, British Columbia, Pink Mt., 57°03'N 122°51'W, 3800–5400' **12** *L. mutilata* ♂, Canada, British Columbia, Pavilion Mtn., 50°58'N 121°41'W, 6860' **13** *L. mutilata* ♂, Canada, British Columbia, Watch Peak **14** *L. haida* ♂, paratype, Canada, British Columbia, Queen Charlotte Islands, Graham Id., SW of Dinan Bay, 2575' **15** *L. haida* ♂, paratype, Canada, British Columbia, Queen Charlotte Islands, Graham Id., SW of Dinan Bay, 2575' **16** *L. luteola* ♂, Canada, Alberta, Hailstone Butte, Kananaskis Country **17** *L. luteola* ♂, Canada, British Columbia, Gott Peak, 50°21'N 122°08'W, 7100' **18** *L. luteola* ♂, Canada, British Columbia, Watch Pk., 50°20'N 116°17'W, 8070' **19** *L. l. leucocycla* ♂, Greenland, Sondrestrom Air Base **20** *L. l. leucocycla* ♂, Canada, Nunavut, Ellesmere Island, Hazen Camp, 81°49'N 71°18'W **21** *L. l. leucocycla* ♂, Canada, Nunavut, Bernard Harbour, Dolphin & Union Strait **22** *L. l. leucocycla* ♀, Canada, Yukon, Porcupine River, 67°37'N 138°10'W **23** *L. leucocycla moeschleri* ♀, Canada, Quebec, Great Whale River **24** *L. leucocycla hampa* ♂, USA, New Hampshire, Mount Washington **25** *L. leucocycla albertensis* ♀, USA, Alaska, Big Delta **26** *L. leucocycla albertensis* ♂, Canada, Yukon, Montana Mt., S. of Carcross, 6500' **27** *L. leucocycla albertensis* ♂, Canada, Manitoba, Churchill, 24 km E at Northern Study Centre **28** *L. leucocycla albertensis* ♂, Canada, Manitoba, Churchill, 24km E at Northern Studies Centre **29** *L. leucocycla albertensis* ♂, USA, Wyoming, Beartooth Plateau, Clay Butte, 9500' **30** *L. flanda* ♂, Canada, Newfoundland, Gander **31** *L. coracina* ♂, holotype, Canada, Northwest Territories, Richardson Mts., 67.141°N 136.004°W **32** *L. coracina* ♀, paratype, Canada, Northwest Territories, Richardson Mts., 67.141°N 136.004°W **33** *L. anthracina* ♂, paratype, Canada, Quebec, St.-Michel des Saints, Lac Dussault, 47°00.09'N 73°53.67'W **34** *L. frigida* ♂, paratype, Canada, Alberta, Prospect Creek, nr. Cadomin **35** *L. poca* ♀, paratype, Canada, Alberta, Pocahontas **36** *L. poca* ♂, Canada, Alberta, Hailstone Butte, Kananaskis Country **37** *L. coloradensis* ♂, USA, Colorado, Park Co., Pike National Forest, Wagon Tongue Campground, T13S R72W S15 **38** *L. illima* ♂, Canada, British Columbia, Pink Mt., 57°03'N 122°51'W, 3800–5400' **39** *L. illima* ♂, holotype, USA, Alaska, mi 315 Richardson Hwy.


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39

Figures 40–78. ***Lasionycta*** **adults. 40** *L. sasquatch* ♂, paratype, USA, Washington, Kittitas County, Quartz Mountain, 47.074°N 121.081°W, 1900 m **41** *L. sasquatch* ♂, paratype, USA, Oregon, Clatsop County, Saddle Mountain **42** *L. sasquatch* ♀, paratype, USA, Washington, Kittitas County, Lake Kachess, NF-4828, 47°19.219'N 121°15.46'W **43** *L. b. benjamini* ♂, USA, California, Mono Co., Tioga Pass, 8500–10000' **44** *L. b. benjamini* ♂, USA, Nevada, White Pine County, Humboldt National Forest, Timber Creek Campground, 2590 m. **45** *L. benjamini medaminosa* ♂, holotype. USA, Colorado, Grand Co., Co. Rd 50 (Beaver Cr. Rd) R78W T1N S15, 7680' **46** *L. benjamini medaminosa* ♂, paratype. USA, Colorado, Grand Co., Co. Rd 50 (Beaver Cr. Rd) R78W T1N S15, 7680' **47** *L. staudingeri preblei* ♀, Canada, Yukon, British Mts, 69°15'N 140°02'W, 630 m **48** *L. staudingeri preblei* ♂, Canada, Nunavut, vic. Arviat **49** *L. staudingeri preblei* ♂, USA, Alaska, St. Paul Island **50** *L. subfumosa* ♂, USA, Alaska, Darby Mts., Omilak **51** *L. subfumosa* ♂, Canada, [Nunavut], Victoria Land [Island], Armstrong Point **52** *L. dolosa* ♂, USA, Colorado, Pennsylvania Mt **53** *L. dolosa* ♂, USA, Colorado, Mt Evans, 14000' **54** *L. q. quadrilunata* ♂, USA, Colorado, Clear Creek Co., Mt Goliath, 12000' **55** *L. quadrilunata yukona* ♂, Canada, Alberta, Prospect Mt, ~10 km SW Cadomin, 2300 m **56** *L. quadrilunata yukona* ♂, Canada, Yukon, Montana Mt, 10 km S Carcross, 60.076°N 134.690°W **57** *L. lagganata* ♂, Canada, British Columbia, Watch Peak, 9300' **58** *L. lagganata* ♂, Canada, British Columbia, Watch Peak, W of Invermere **59** *L. carolynae* ♀, paratype, Canada, Yukon, Ogilvie Mts, km 153 Dempster Hwy **60** *L. mono* ♂, holotype, USA, California, Mono Pass NW, 12000' **61** *L. phoca* ♂, Canada, Manitoba, 24 km E Churchill at Northern Study Centre **62** *L. phoca* ♂, Canada, Manitoba, 24 km E Churchill at Northern Study Centre **63** *L. discolor* ♂, USA, Colorado, El Paso Co. Pikes Peak, T14S R69WS.13ne, 3960 m **64** *L. discolor* ♂, USA, Wyoming, Park Co., Beartooth Highway, 2 miles east of Long Lake **65** *L. gelida* ♂, paratype, Canada, British Columbia, Coast Range, Gott Peak, 50°36'N 122°14'W, 7100' **66** *L. gelida* ♀, holotype, Canada, British Columbia, Coast Range, [Mt. Waddington], 7000' **67** *L. gelida* ♂, paratype, Canada, British Columbia, Gott Peak, 50°21'N 122°08'W, 7100' **68** *L. caesia* ♂, Canada, British Columbia, Gott Peak, 50°21'N 122°08'W, 7100' **69** *L. caesia* ♂, Canada, British Columbia, Blowdown Pass, nr Duffy Lake, 7100' **70** *L. uniformis multicolor* ♂, Canada, British Columbia, Gott Peak, 50°21'N 122°08'W, 7100' **71** *L. uniformis multicolor* ♂, Canada, British Columbia, Apex Mt, 49°21'N 119°54', 7380' **72** *L. uniformis multicolor* ♂, Canada, British Columbia, Gott Peak, 50°21'N 122°08'W, 7100' **73** *L. uniformis multicolor* ♂, Canada, British Columbia, Gott Peak., 50°21'N 122°08'W, 7100' **74** *L. uniformis handfieldi* ♀, holotype, Canada, Quebec, Gaspé-Ouest Co., Parc de la Gaspésie, Mt Albert, 1070 m **75** *L. uniformis shasta* ♂, holotype, USA, California, Siskiyou County, Mt Shasta, Panther Meadows, 7500' **76** *L. uniformis fusca* ♂, USA, Colorado, Gunnison Co., 0.5 mi NW Cottonwood Pass, 12400' **77** *L. uniformis fusca* ♂, USA, Wyoming, Albany Co., N. of Libby Cr., T16N R79W S16, 10750' **78** *L. uniformis fusca* ♂, USA, Utah, Summit Co., Bald Mt Pass, 40.686–698°N 110.889–906°W, 10700'

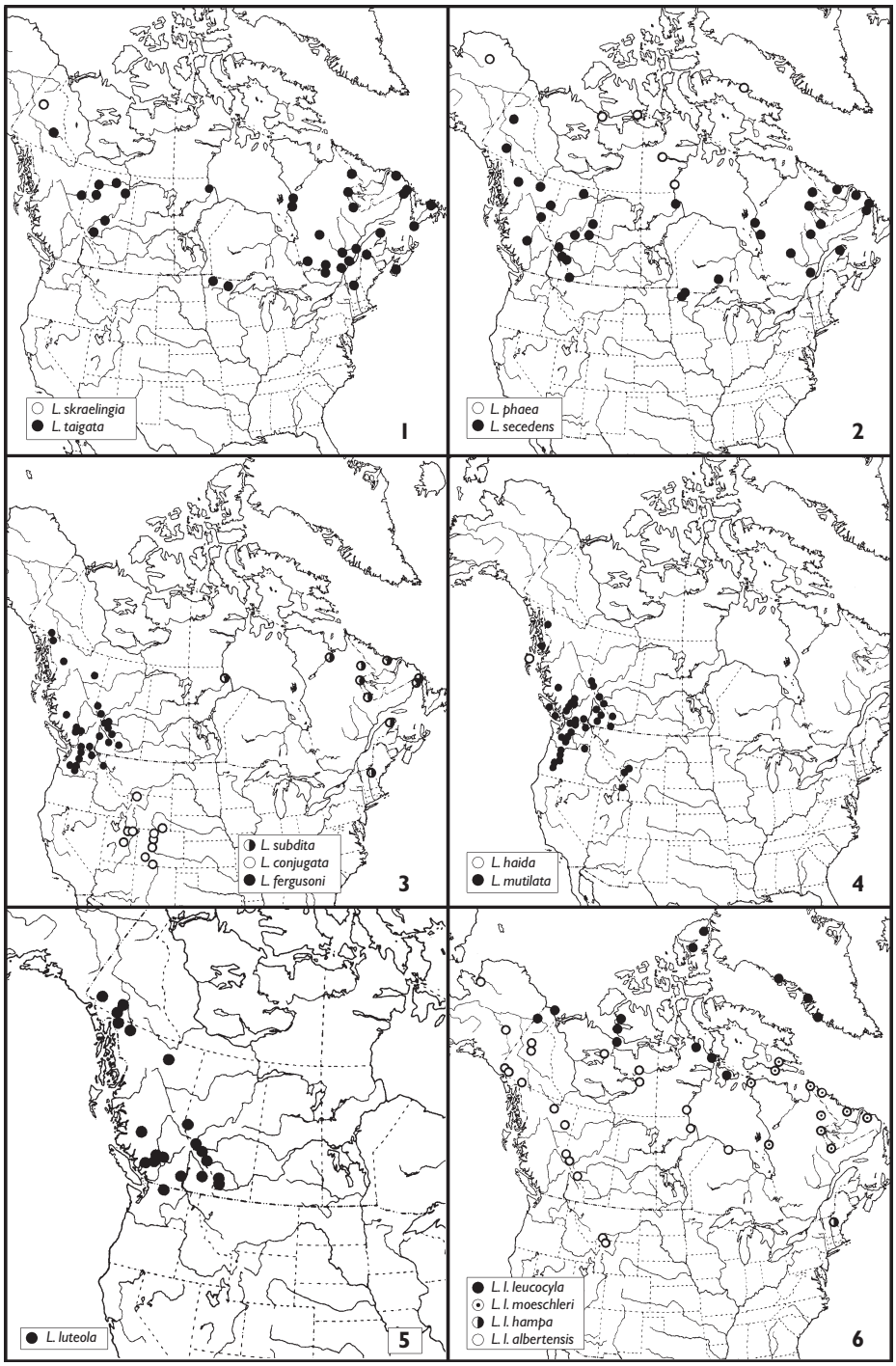

40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78

Figures 79–108. *Lasionycta* adults. 79 *L. uniformis* ♂, Canada, British Columbia, Watch Peak, 2 km N Panorama, 8000' **80** *L. uniformis* ♂, Canada, Alberta, Parker Ridge, 6500–7500' **81** *L. uniformis* ♂, Canada, British Columbia, Watch Peak, 2 km N Panorama, 8000' **82** *L. brunnea* ♂, Canada, British Columbia, Watch Peak, 2 km N Panorama, 8000' **83** *L. brunnea* ♂, Canada, British Columbia, Watch Peak, 2 km N Panorama, 8000' **84** *L. brunnea* ♀, Canada, British Columbia, Watch Peak, 2 km N Panorama, 8000' **85** *L. promulsa* ♂, USA, Utah, Summit Co., Bald Mt. Trailhead **86** *L. promulsa* ♂, USA, Utah, Sanpete Co., Wasatch Plateau nr Ephraim, 11000' **87** *L. promulsa* ♂, Canada, Alberta, Wigwam Creek, Cadomin Road, 8 mi S of Hinton **88** *L. promulsa* ♂, Canada, British Columbia, Gott Pk., 50°21'N 122°08'W, 7100' **89** *L. promulsa* ♀, Canada, Yukon, Rampart House **90** *L. pulverea* ♂, Canada, Alberta, Hailstone Butte, 50°12'N 114°26'W, 6500' **91** *L. pulverea* ♂, holotype, Canada, Alberta, Blairmore **92** *L. pulverea* ♂, Canada, Alberta, Hailstone Butte **93** *L. pulverea* ♂, Canada, Alberta, Hailstone Butte, 50°12'N 114°26'W, 6500' **94** *L. macleani* ♀, holotype, Canada, British Columbia, Lillooet, Mt. McLean, 6–7200' **95** *L. silacea* ♂, Canada, British Columbia, Gott Peak., 50°21'N 122°08'W, 7100' **96** *L. silacea* ♂, Canada, British Columbia, Mt. McLean, 6000–7000' **97** *L. silacea* ♀, USA, Washington, Yakima Co., Bethel Ridge, 6300' **98** *L. silacea* ♂, Canada, British Columbia, Gott Pk., 7100–8000' **99** *L. sierra* ♂, USA, California, Mono Co., Tioga Pass, 8500–10000' **100** *L. sierra* ♂, USA, California, Fresno Co., Mono Pass to overlook Golden Lk, 37.424–442°N 118.771–765°W, 11400–12040' **101** *L. i. impingens* ♂, Canada, Alberta, Bow Pass, 6000' **102** *L. i. impingens* ♂, Canada, Alberta, Kakwa Provincial Park, Sulphur Ridge, 54.150°N 119.752°W, 6730' **103** *L. i. impingens* ♀, Canada, British Columbia, Pink Mt summit, 57.065°N 122.865°W, 1700 m **104** *L. i. curta* ♂, USA, Wyoming, Albany Co., Snowy Range Pass, T16N R79W S20, 12000' **105** *L. i. curta* ♂, USA, Colorado, Summit Co., Copper Mountain, ~10000' **106** *L. perplexa* ♂, USA, Oregon, Linn Co., lava 3 mi W of Santiam Junction **107** *L. perplexa* ♀, Canada, British Columbia, Kirby Flats Rd., 50°32'N 121°43'W **108** *L. perplexa* ♀, USA, Oregon, Baker Co., Wetmore Campground.

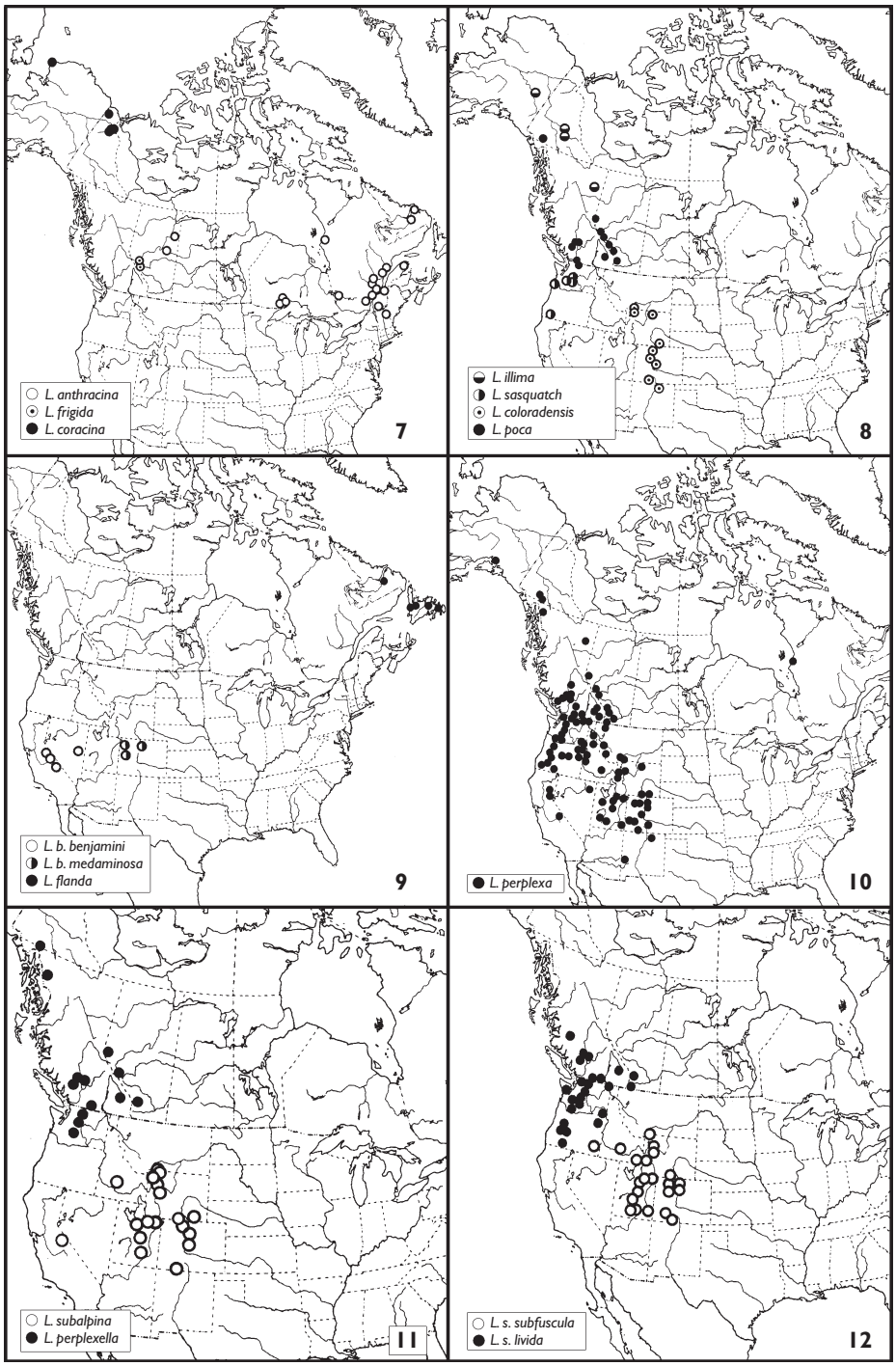

79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107
108

Figures 109–135. ***Lasionycta***, ***Psammopolia***, ***and Tricholita*** **adults. 109** *L. perplexa* ♂, USA, Utah, Tooele Co., 13 mi SW Grantsville, Loop Camp, 7400' **110** *L. perplexella* ♂, Canada, British Columbia, Pavilion Mt., 50°58'N 121°41'W, 6860' **111** *L. perplexella* ♂, Canada, British Columbia, Pavilion Mt., 50°58'N 121°41'W, 6860' **112** *L. perplexella* ♀, Canada, British Columbia, Pavilion Mt., 50°58'N 121°41'W, 6860' **113** *L. subalpina* ♂, USA, Wyoming, Dubois, 2600m **114** *L. subalpina* ♂, USA, Wyoming, Beartooth Highway, 1 mile east of Long Lake **115** *L. subalpina* ♀, USA, Colorado, Nederland, Science Lodge, 9500' **116** *L. s. subfuscula* ♂, USA, Colorado, San Miguel Co., Telluride, 8745' **117** *L. s. subfuscula* ♀, USA, Colorado, San Miguel Co., Telluride, 8745' **118** *L. s. subfuscula* ♂, USA, Utah, Summit Co., Bald Mt. Pass, 40.686–698°N 110.889–906°W, 10700' **119** *L. s. subfuscula* ♀, USA, Utah, Sanpete Co., Great Basin Experiment Station nr Ephraim, 8850' **120** *L. subfuscula livida* ♂, Canada, British Columbia, Mt. McLean **121** *L. subfuscula livida* ♀, paratype. USA, Washington, Chelan Co., Junior Pt, 47°59'N 120°23'W, 6100' **122** *L. subfuscula livida* ♂, USA, Washington, Kittitas Co., Quartz Mt., 47.07°N 121.08°W, 1900 m **123** *P. wyatti* ♂, Canada, British Columbia, Stubbs Island, 49°09'N 125°56'W **124** *P. wyatti* ♂, Canada, British Columbia, 3 mi SE Fanny Bay **125** *P. arietis* ♂, Canada, British Columbia, Queen Charlotte Islands, Moresby Island, sandspit **126** *P. arietis* ♀, Canada, British Columbia, Queen Charlotte Islands, Moresby Island, sandspit **127** *P. ochracea* ♂, USA, California, Halfmoon Bay **128** *P. ochracea* ♀, USA, California, San Francisco **129** *P. insolens* ♂, USA, California, Halfmoon Bay **130** *P. insolens* ♀, USA, California, Halfmoon Bay **131** *P. sala* ♂, paratype, USA, California, San Luis Obispo Co, Dune Lakes 5 mi SE Oceano **132** *P. sala* ♂, holotype, USA, California, San Luis Obispo Co., Dune Lakes 5mi. SE Oceano **133** *T. knudsoni* ♂, holotype. USA, Texas, Uvalde Co, Concan **134** *T. knudsoni* ♀, paratype, USA, Texas, Uvalde Co, Concan **135** *T. ferrisi* ♂, holotype, USA, Arizona, Cochise Co, Chiricahua Mts, Shaw Peak, Trail above Onion Saddle.

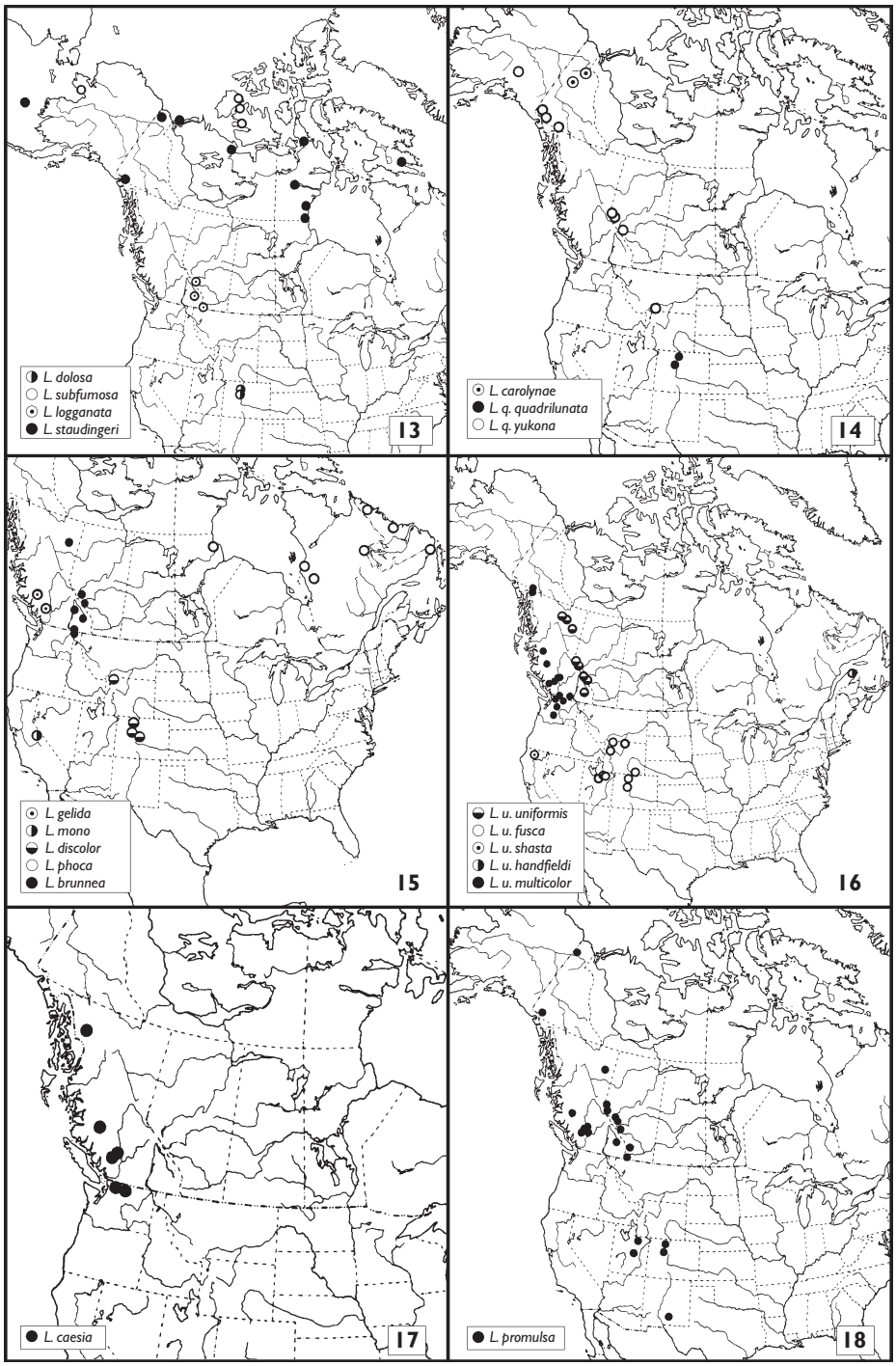

109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135



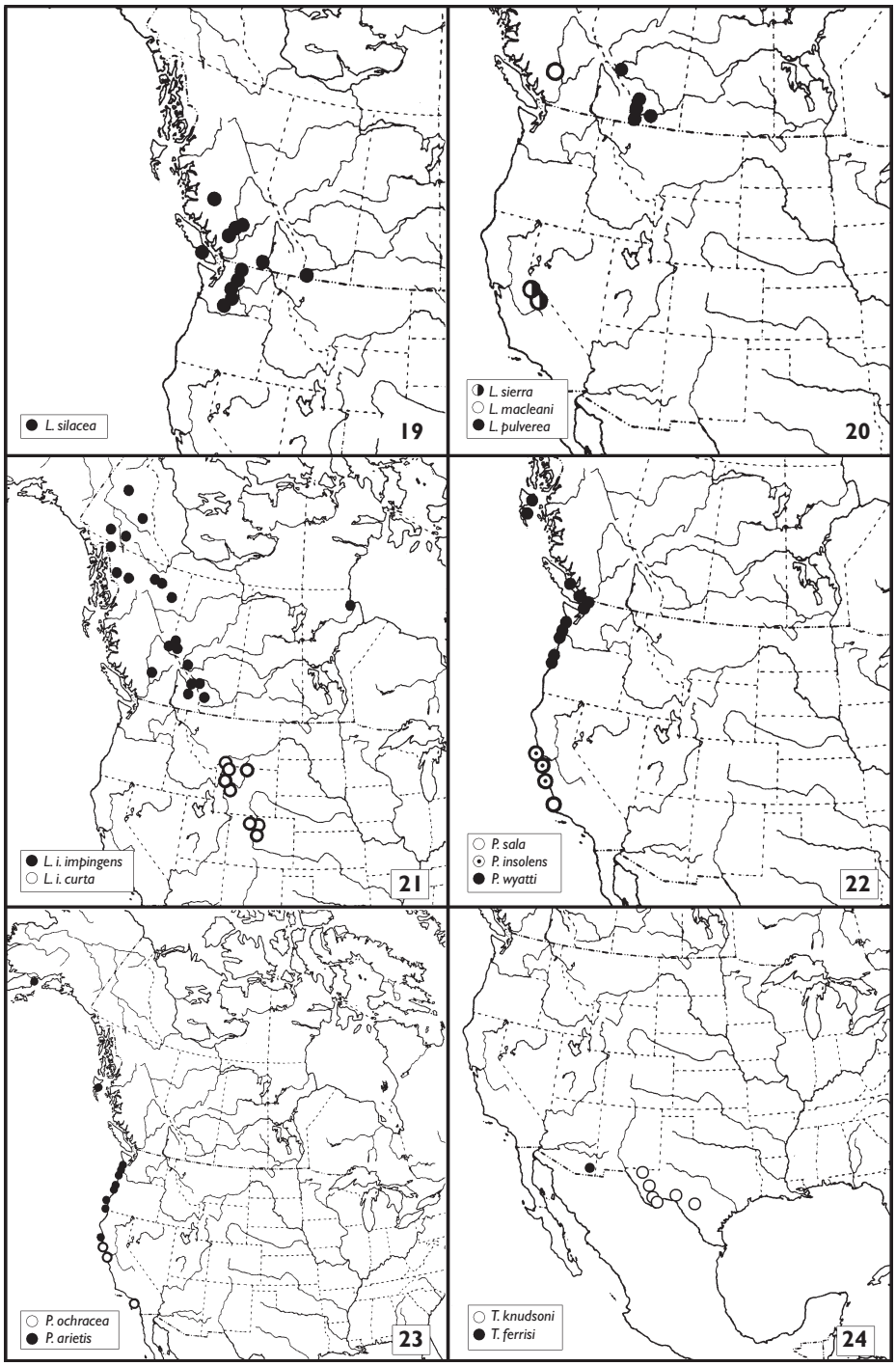
Maps 1–6. Distribution of *Lasionycta* species. 1 *Lasionycta skraelingia* and *L. taigata* **2** *Lasionycta secedens* and *L. phaea* **3** *Lasionycta subdita*, *L. conjugata*, and *L. fergusoni* **4** *Lasionycta mutilata* and *L. haida* **5** *Lasionycta luteola* **6** *Lasionycta leucocycla*.



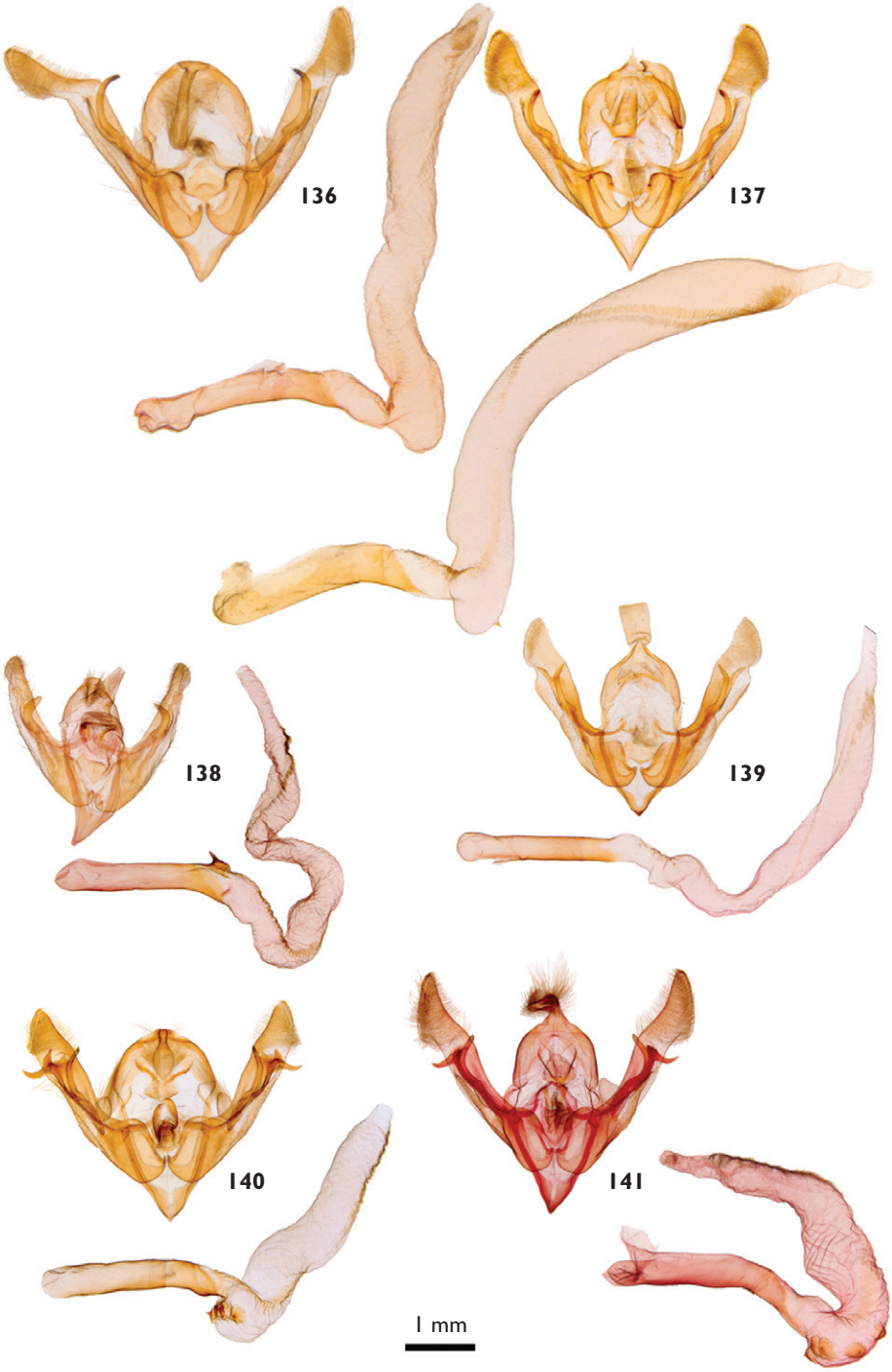
Maps 7–12. Distribution of *Lasionycta* species. 7 *Lasionycta anthracina*, *L. coracina* and *L. frigida* **8** *Lasionycta poca*, *L. coloradensis*, *L. sasquatch* and *L. illima* **9** *Lasionycta flanda* and *L. benjamini* **10** *Lasionycta perplexa* **11** *Lasionycta perplexella* and *L. subalpina* **12** *Lasionycta subfuscula*.



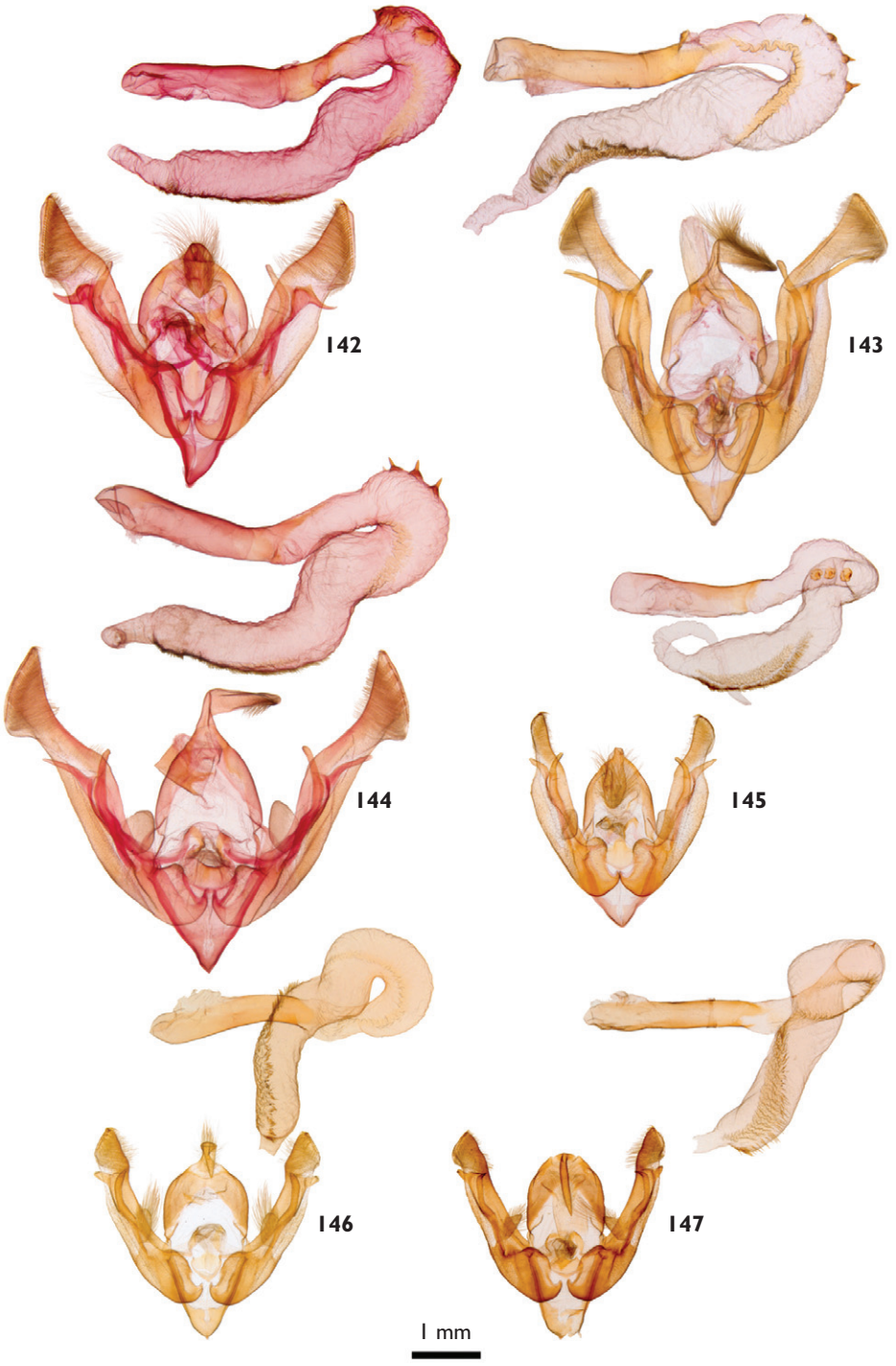
Maps 13–18. Distribution of *Lasionycta* species. 13 *Lasionycta staudingeri*, *L. subfumosa*, *L. dolosa* and *L. lagganata* **14** *Lasionycta carolynae* and *L. quadrilunata* **15** *Lasionycta phoca*, *L. discolor*, *L. brunnea*, *L. gelida*, and *L. mono* **16** *Lasionycta uniformis* **17** *Lasionycta caesia* **18** *Lasionycta promulsa*.



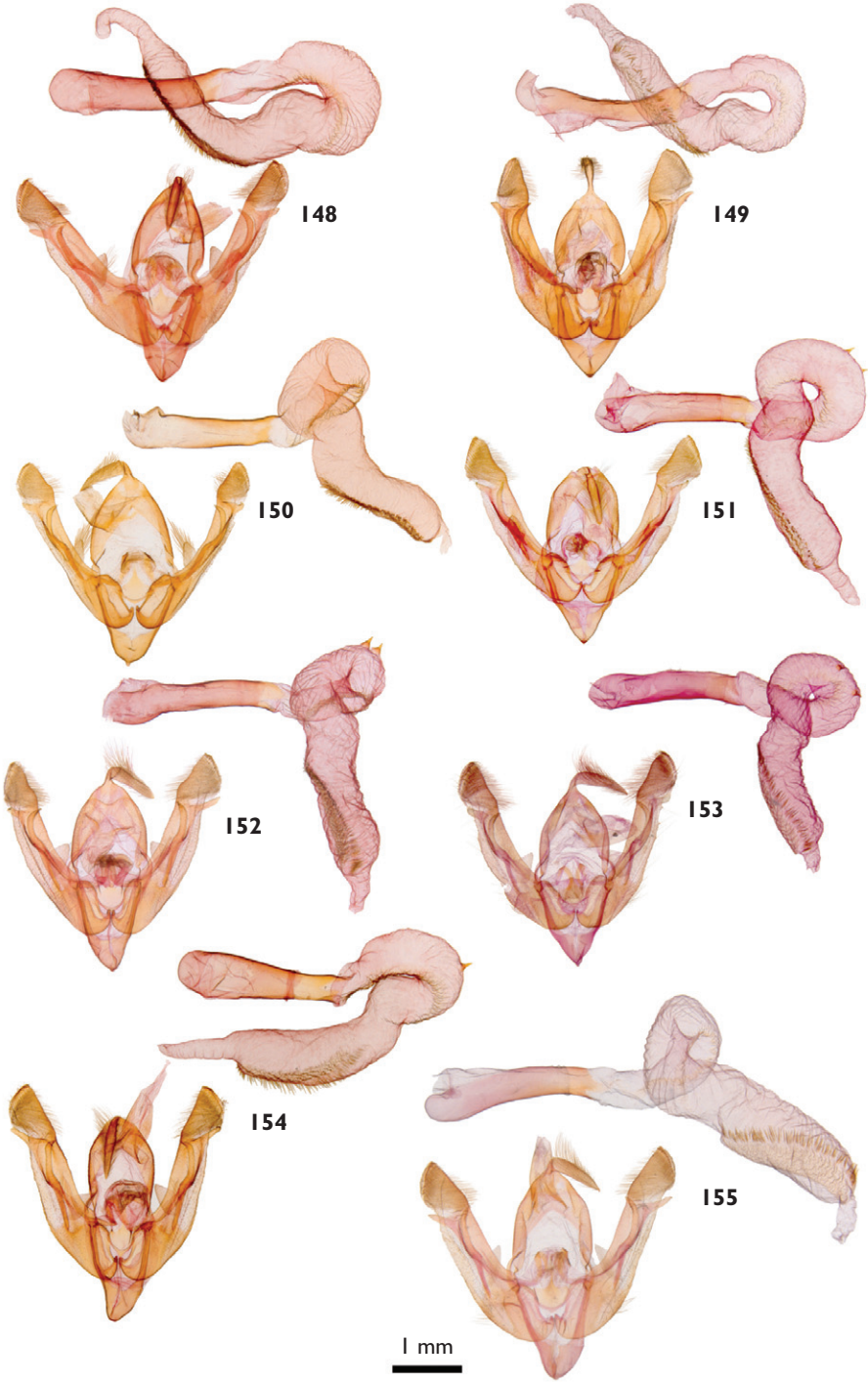
Maps 19–24. Distribution of *Lasionycta*, *Psammopolia*, and *Tricholita* species. 19 *Lasionycta silacea* **20** *Lasionycta macleani*, *L. pulverea*, and *L. sierra* **21** *Lasionycta impingens* **22** *Psammopolia wyatti*, *P. insolens*, and *P. sala* **23** Distribution of *Psammopolia arietis* and *P. ochracea* **24** *Tricholita knudsoni* and *T. ferrisi*



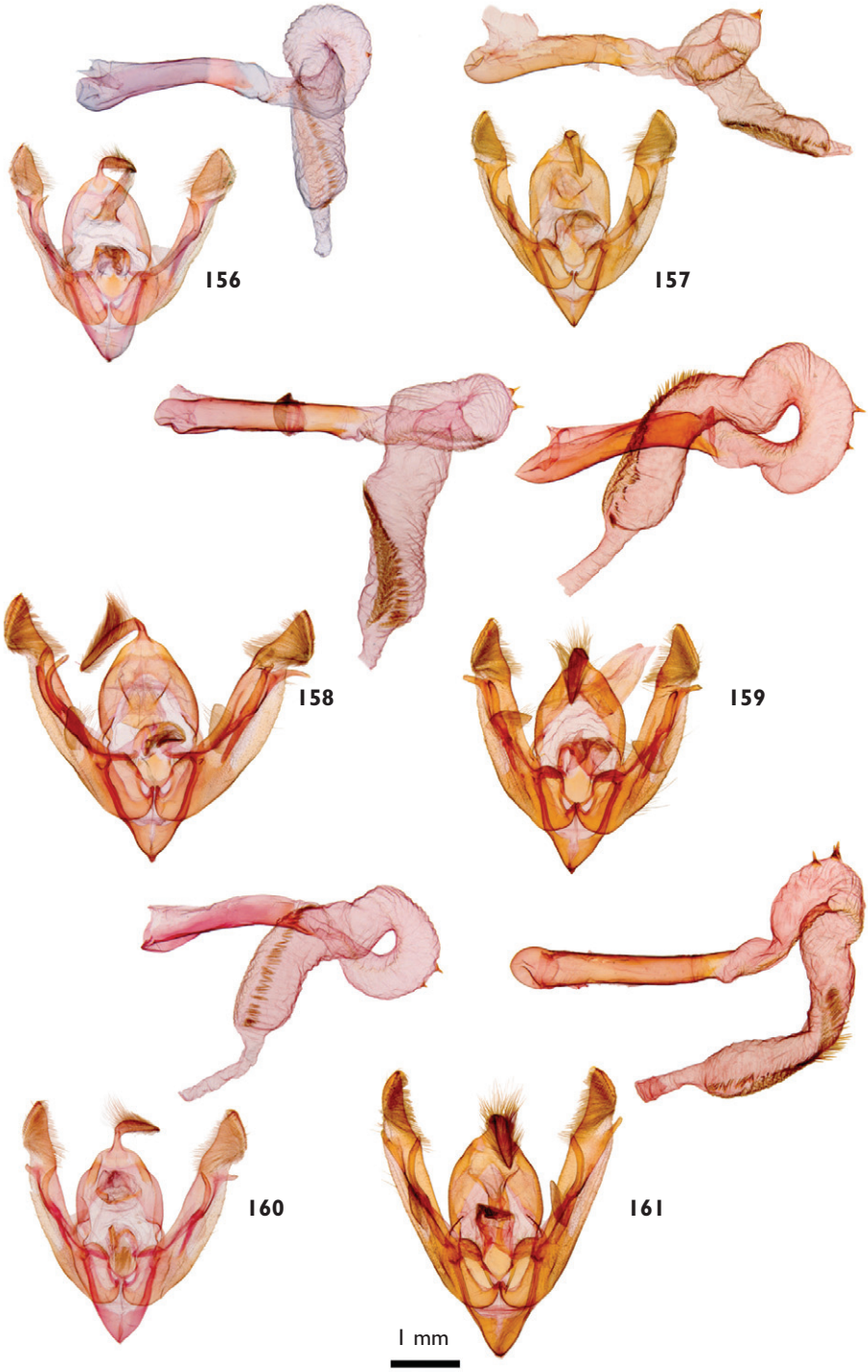
Figures 136–141. ***Lasionycta*** **male genitalia (valves and aedeagus). 136** *L. skraelingia* **137** *L. taigata* **138** *L. secedens* **139** *L. phaea* **140** *L. subdita* **141** *L. conjugata*.



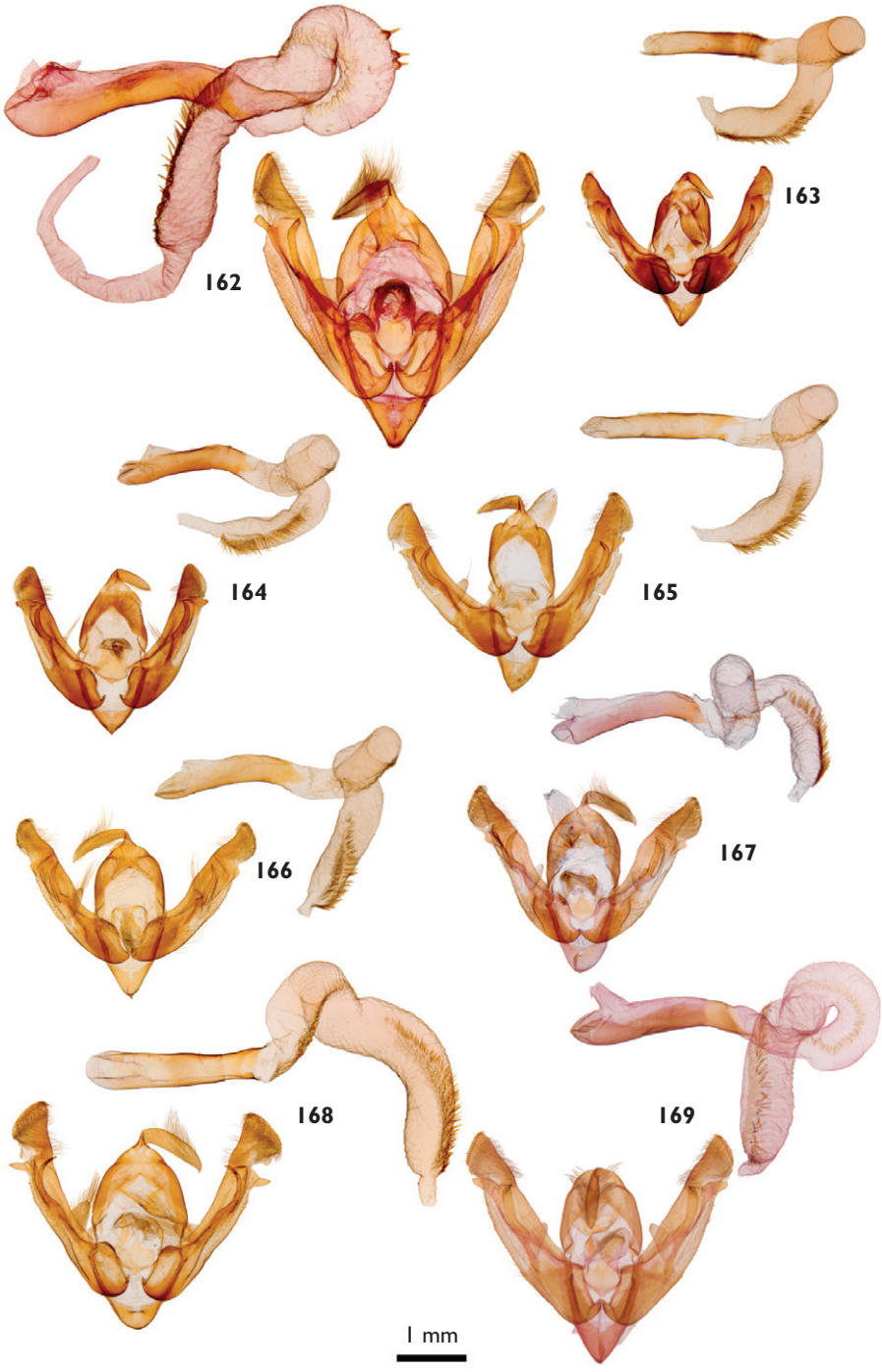
Figures 142–147. ***Lasionycta*** **male genitalia (valves and aedeagus). 142** *L. fergusoni* **143** *L. mutilata* **144** *L. haida* **145** *L. luteola* **146** *L. leucocycla moeschleri* **147** *L. leucocycla albertensis*.



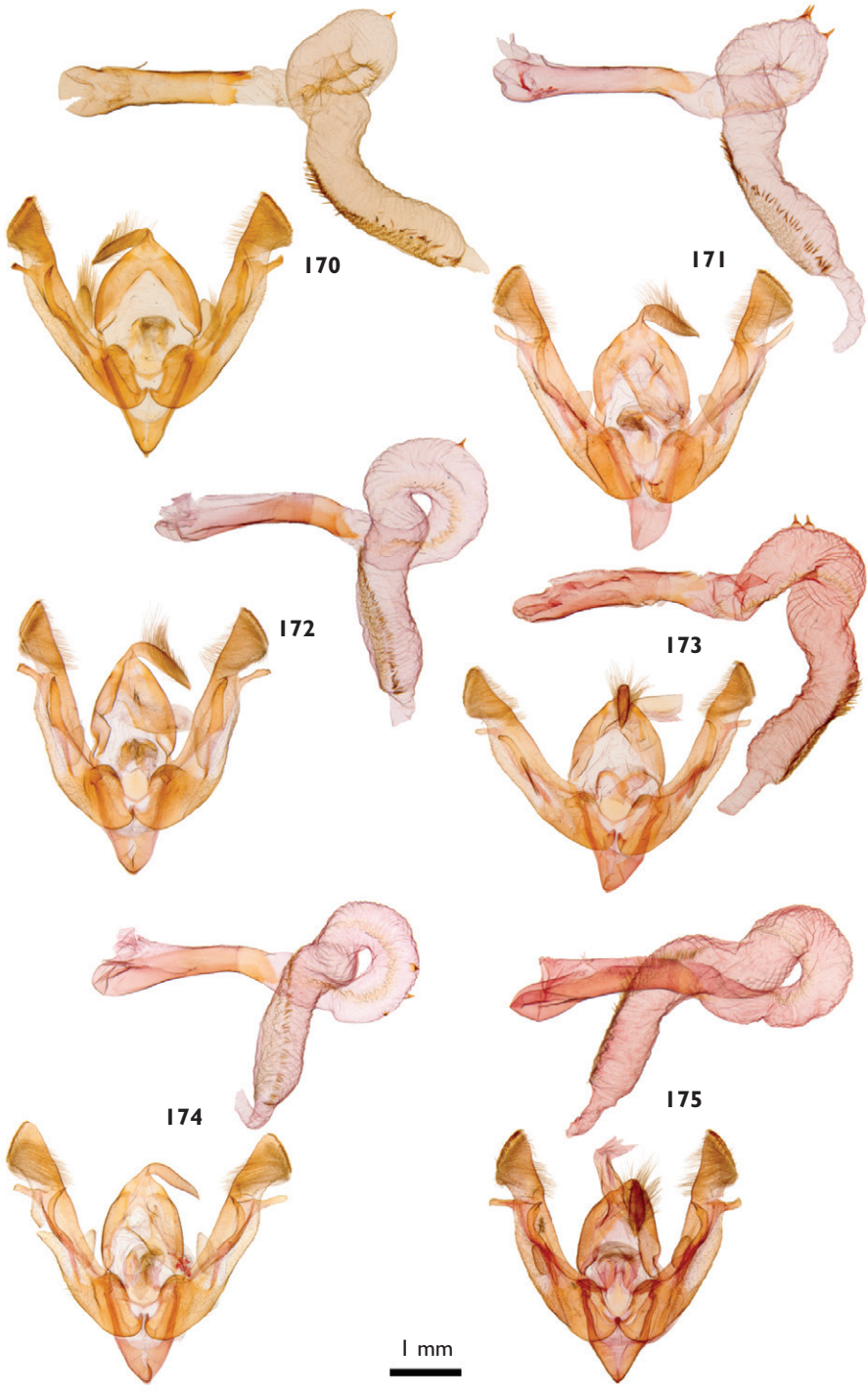
Figures 148–155. ***Lasionycta*** **male genitalia (valves and aedeagus). 148** *L. flanda* **149** *L. coracina* **150** *L. anthracina* **151** *L. poca* **152** *L. coloradensis* **153** *L. illima* **154** *L. frigida* **155** *L. sasquatch*.



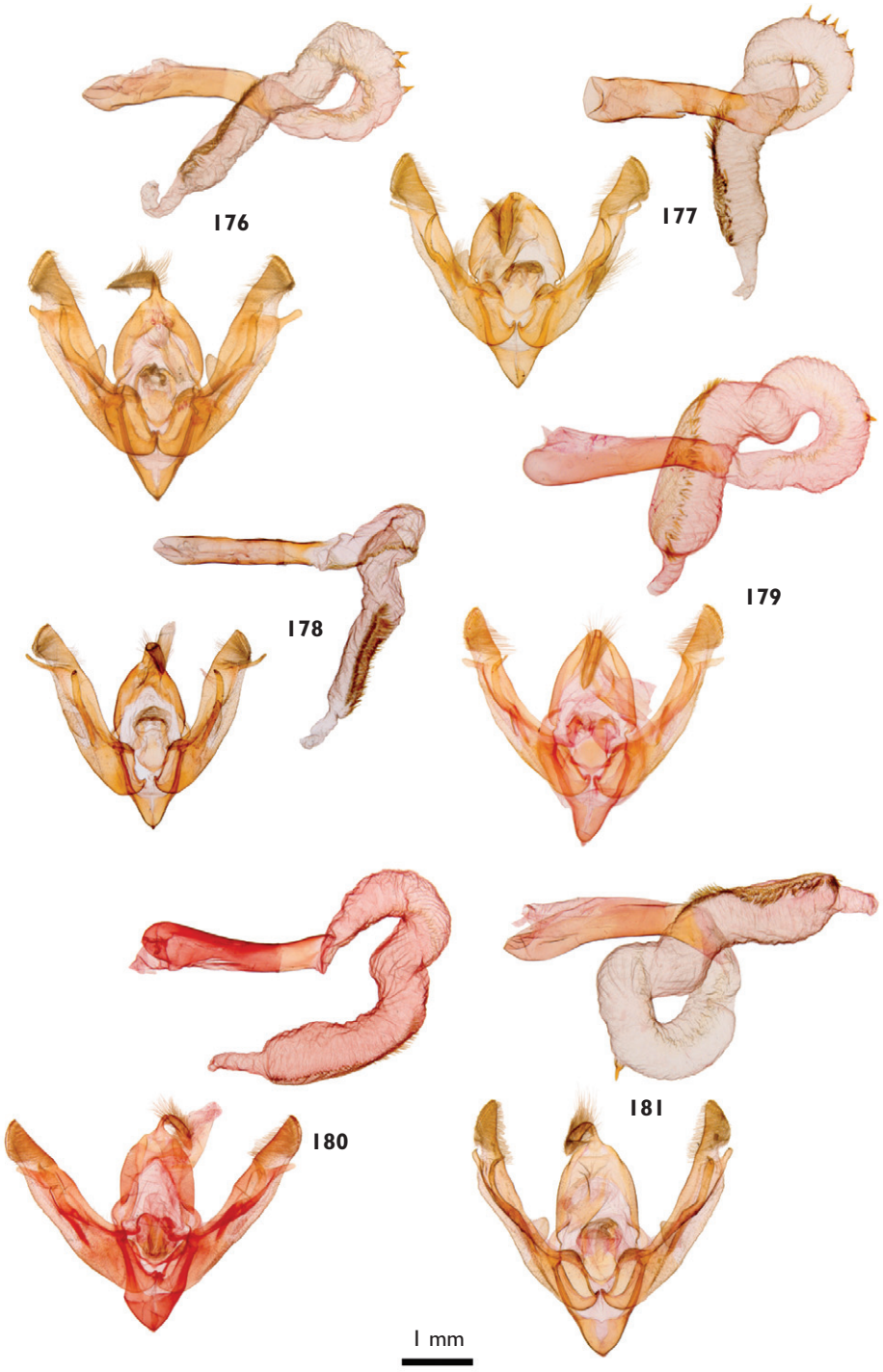
Figures 156–161. ***Lasionycta*** **male genitalia (valves and aedeagus). 156** *L. b. benjamini* **157** *L. benjamini medaminosa* **158** *L. perplexa* **159** *L. perplexella* **160** *L. subalpina* **161** *L. s. subfuscula.*



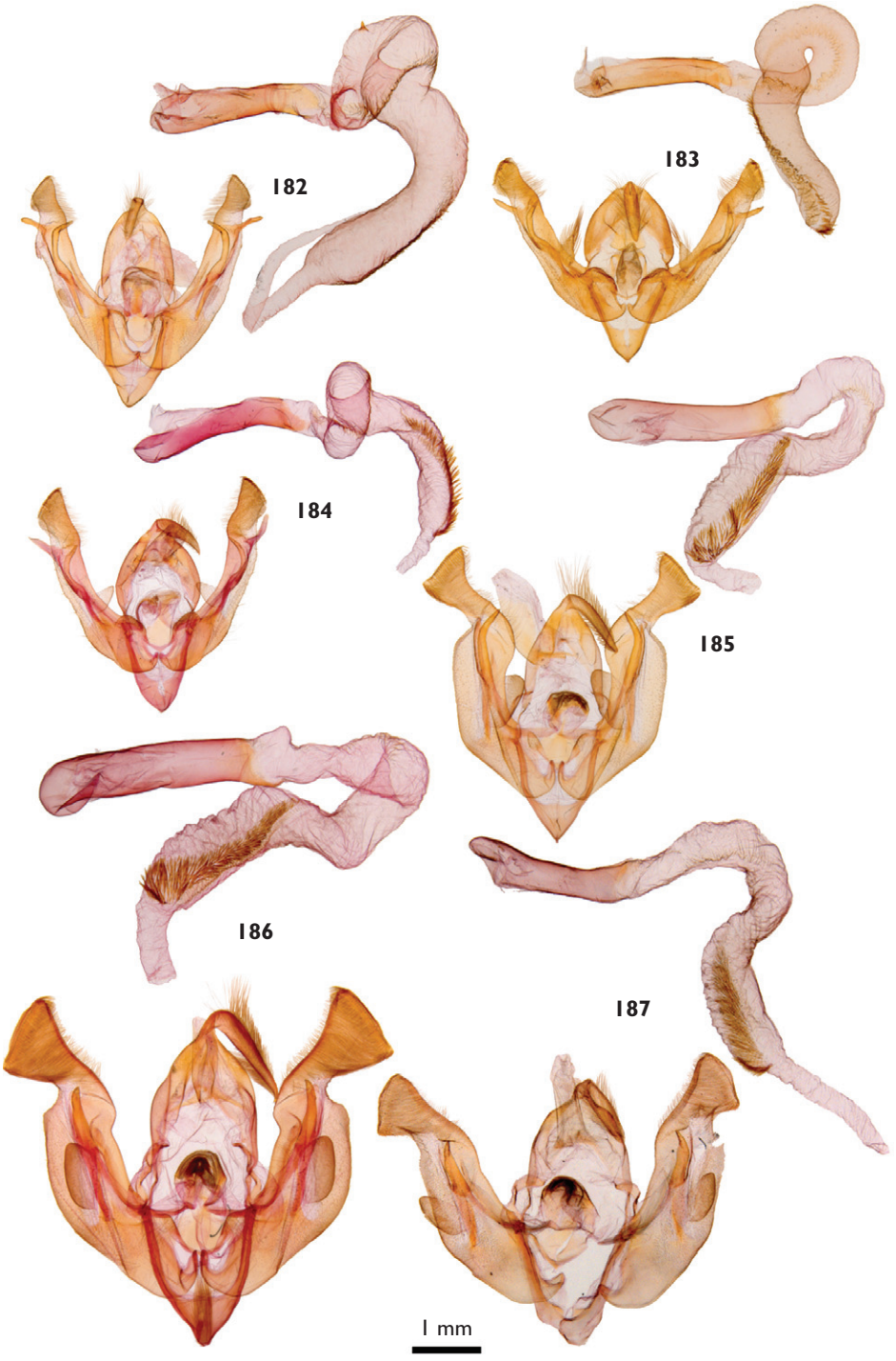
Figures 162–169. ***Lasionycta*** **male genitalia (valves and aedeagus). 162** *L. subfuscula livida* **163** *L. staudingeri preblei* **164** *L. dolosa* **165** *L. subfumosa* **166** *L. q. quadrilunata* **167** *L. quadrilunata yukona* **168** *L. lagganata* **169** *L. carolynae*.



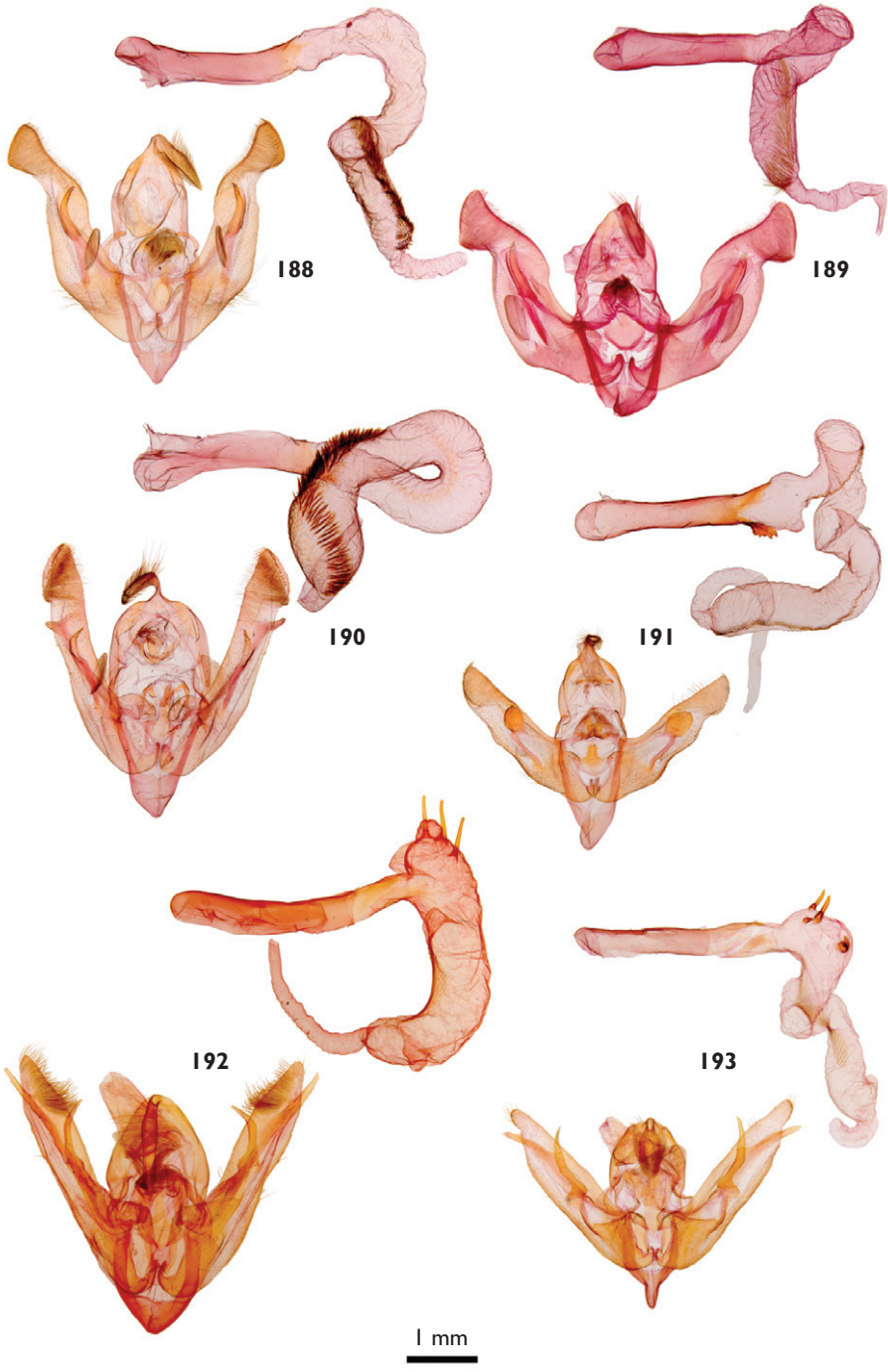
Figures 170–175. ***Lasionycta*** **male genitalia (valves and aedeagus). 170** *L. phoca* **171** *L. u. uniformis* **172** *L. uniformis multicolor* **173** *L. uniformis fusca* **174** *L. brunnea* **175** *L. caesia*.



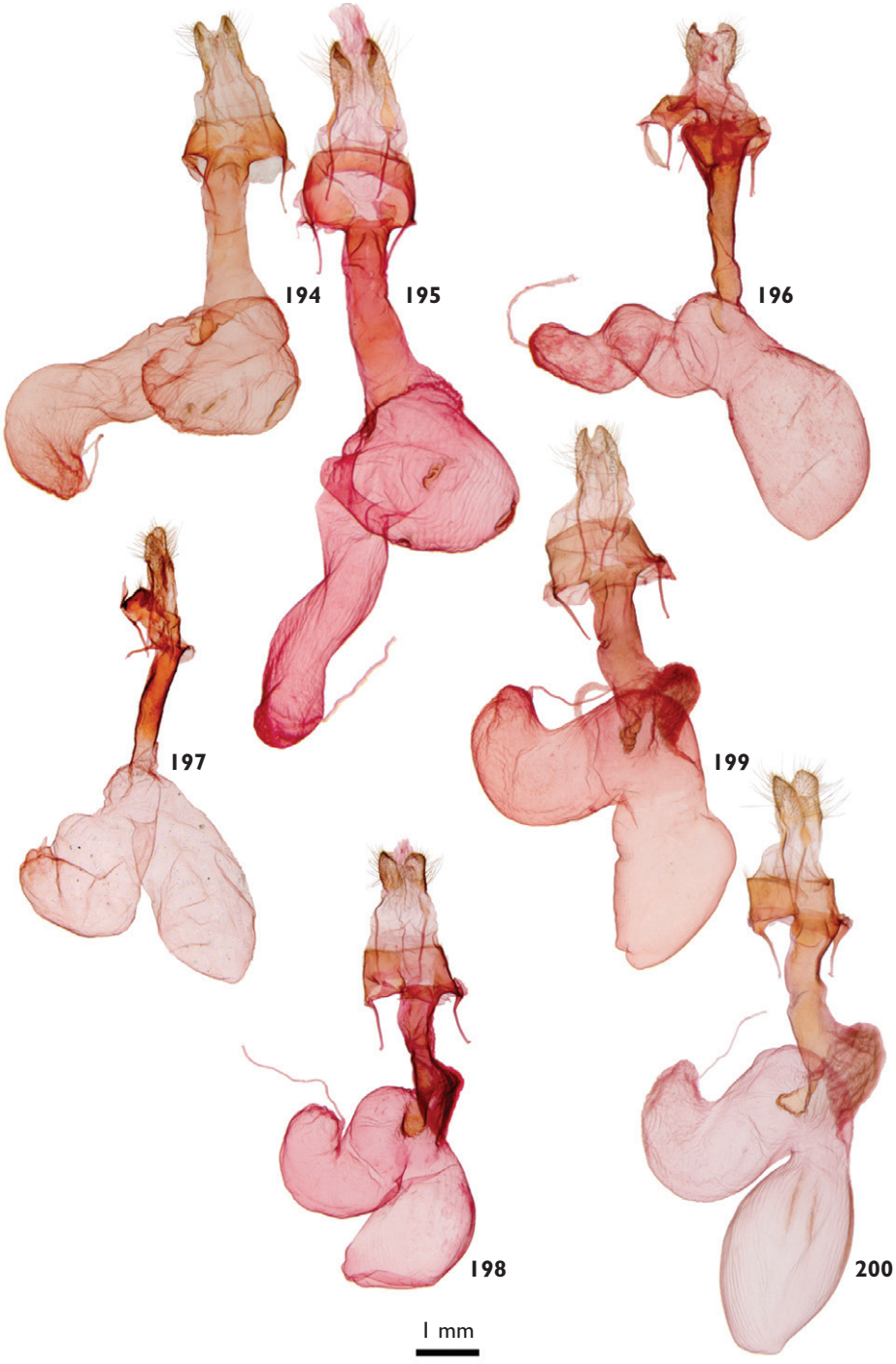
Figures 176–181. ***Lasionycta*** **male genitalia (valves and aedeagus). 176** *L. gelida* **177** *L. discolor* **178** *L. mono* **179** *L. promulsa* **180** *L. pulverea* **181** *L. silacea*.



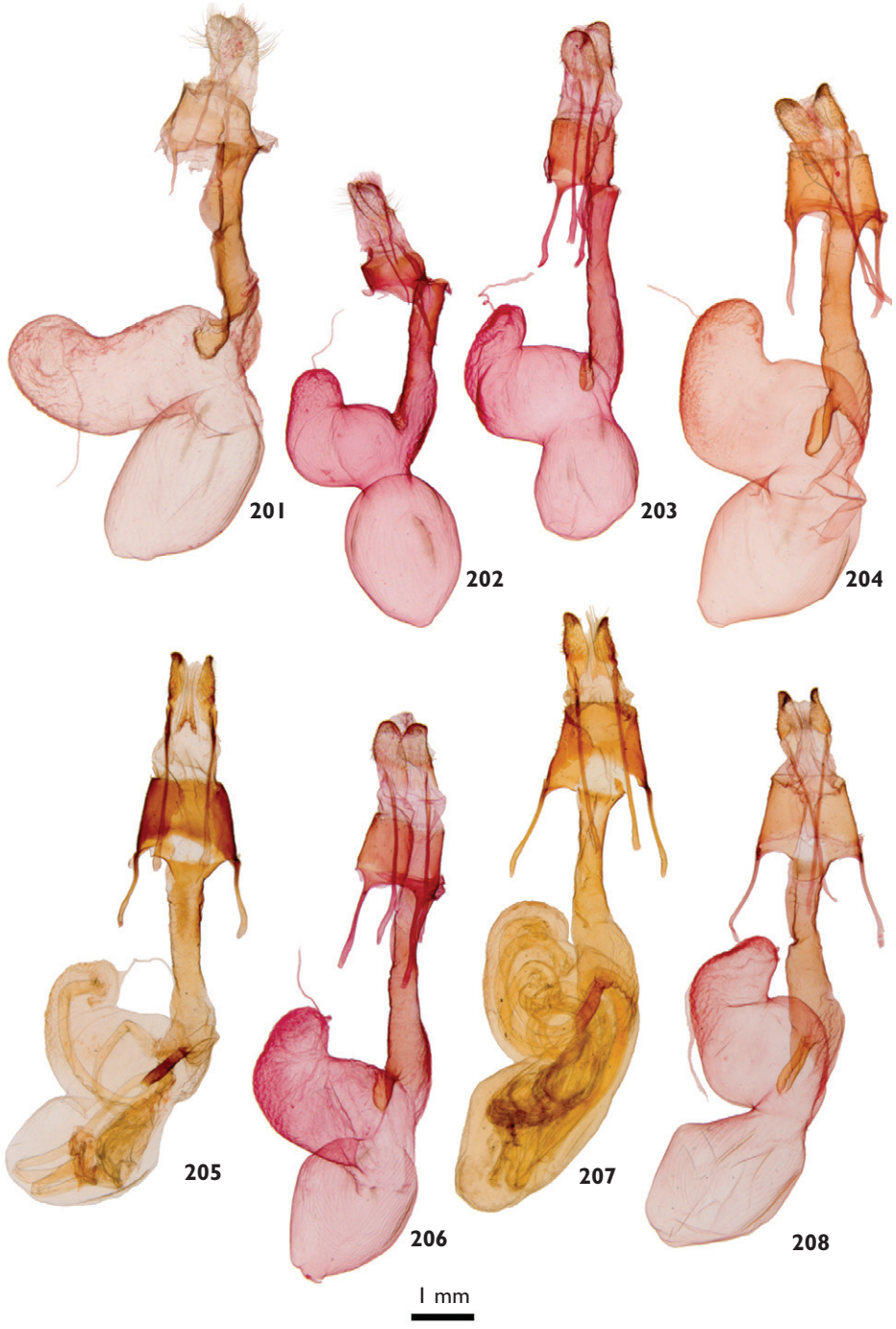
Figures 182–187. ***Lasionycta*** **and** ***Psammopolia*** **male genitalia (valves and aedeagus) 182** *L. sierra* **183** *L. i. impingens* **184** *L. i. curta* **185** *Psammopolia arietis.* **186** *P. wyatti* **187** *P. insolens.*



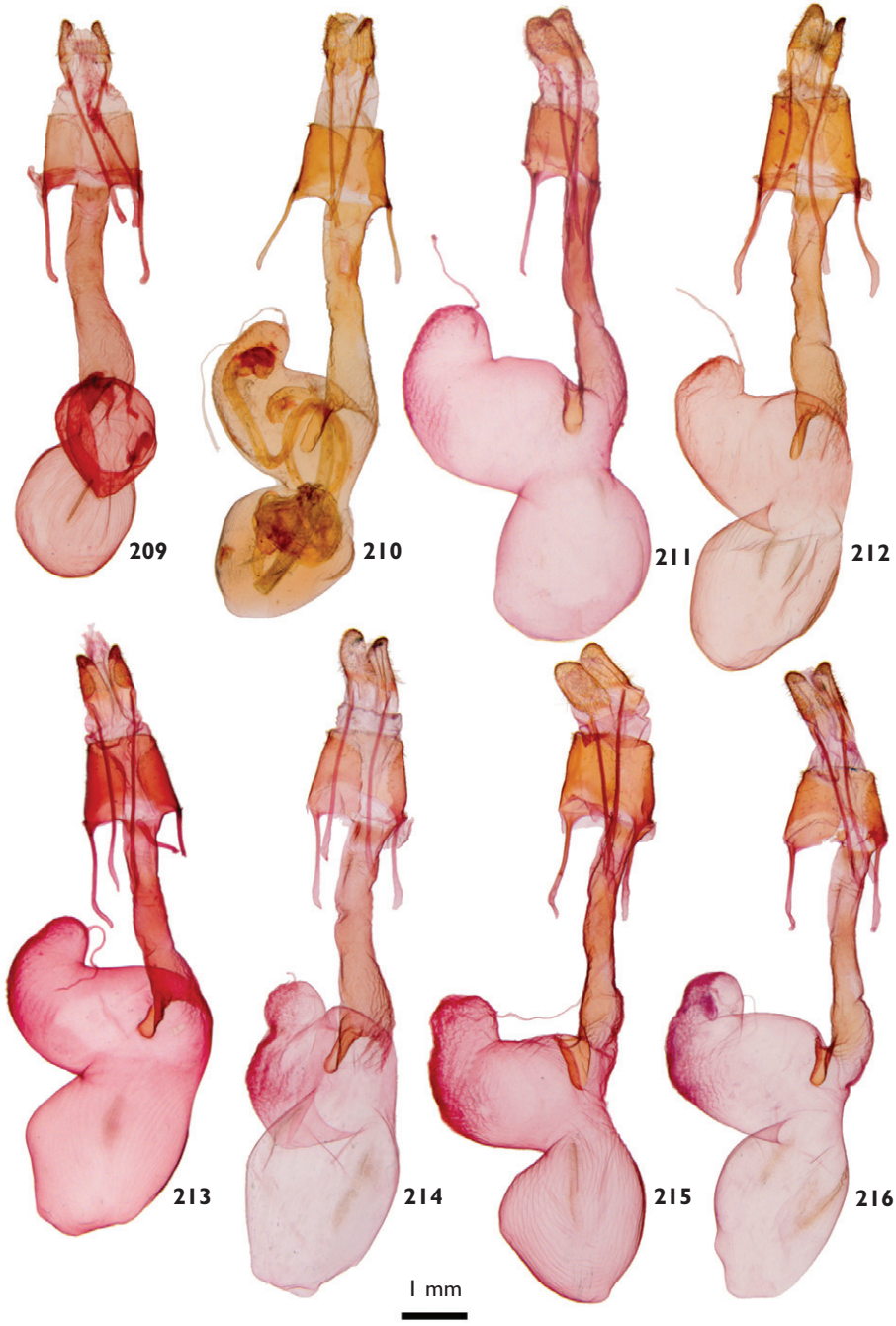
Figures 188–193. ***Psammopolia***, ***Lasionhada***, ***Eriopygodes*** **and** ***Tricholita*** **male genitalia (valves and aedeagus). 188** *P. sala* **189** *P. ochracea* **190** *Lasionhada proxima* **191** *Eriopygodes imbecilla* **192** *Tricholita knudsoni* **193** *T. ferrisi*.



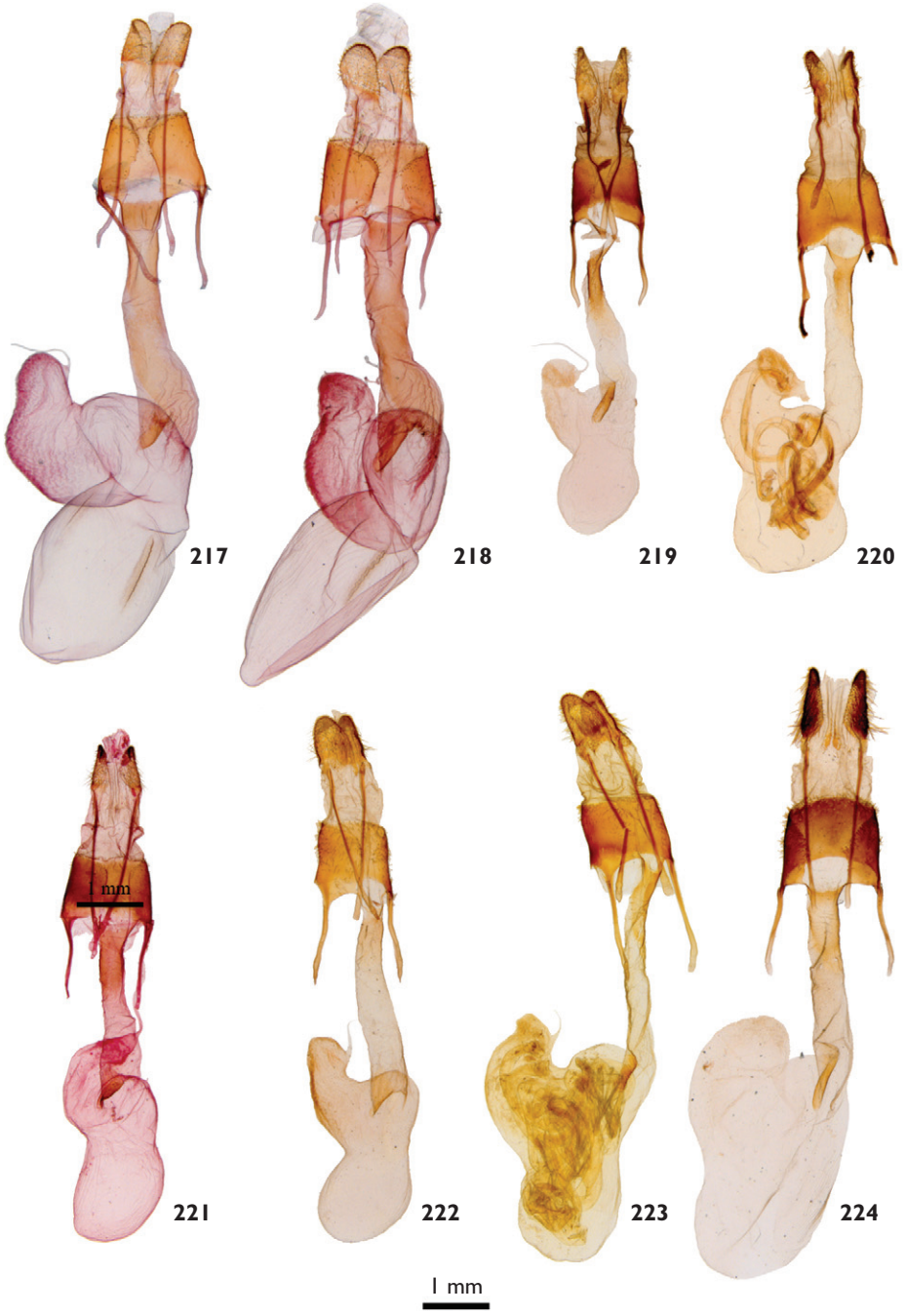
Figures 194–200. ***Lasionycta*** **female genitalia. 194** *L. skraelingia* **195** *L. taigata* **196** *L. secedens* **197** *L. phaea* **198** *L. subdita* **199** *L. conjugata* **200** *L. fergusoni*.



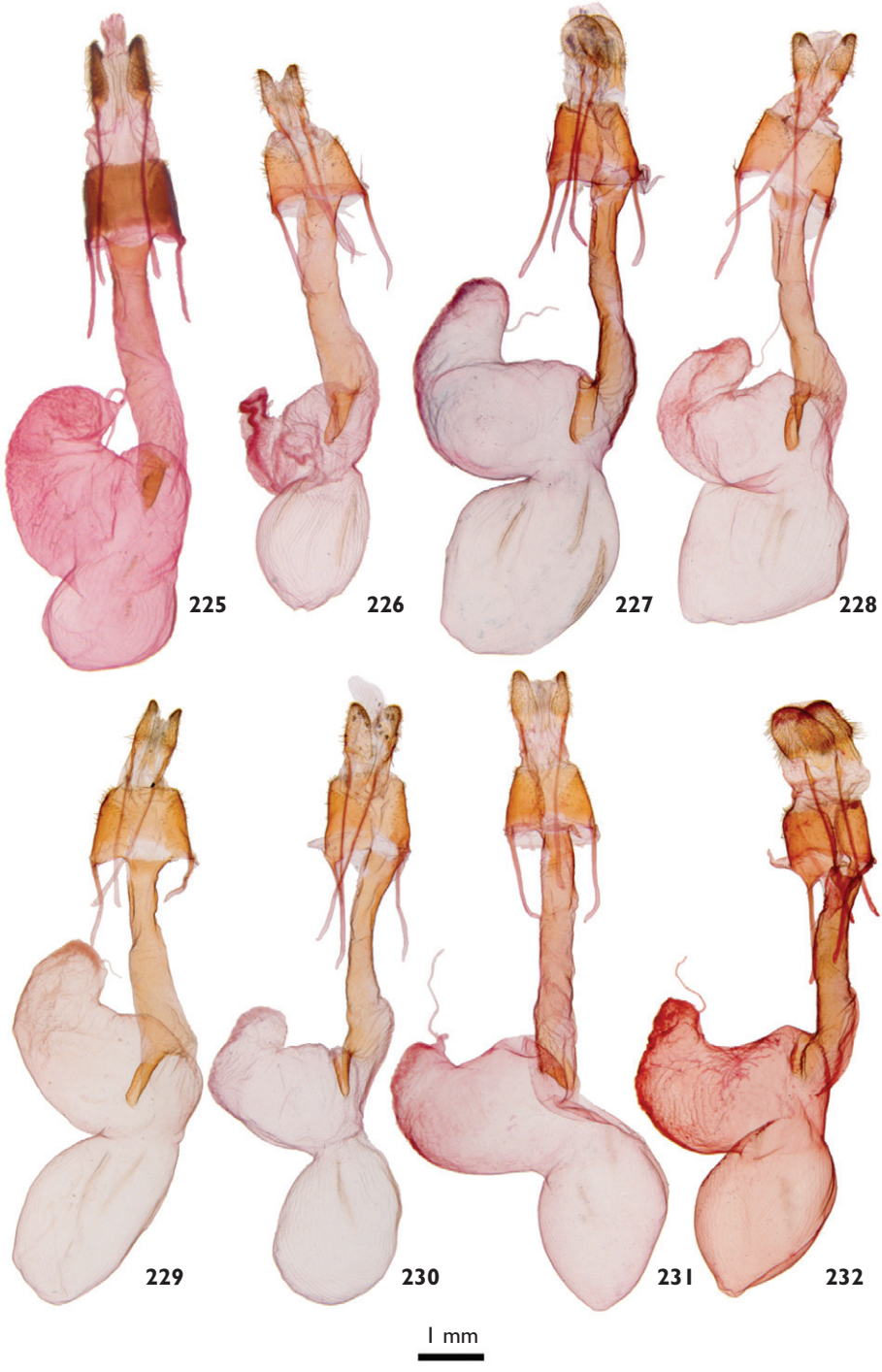
Figures 201–208. ***Lasionycta*** **female genitalia. 201** *L. mutilata* **202** *L. luteola* **203** *L. leucocycla* **204** *L. flanda* **205** *L. coracina* **206** *L. anthracina* **207** *L. poca* **208** *L. coloradensis*.



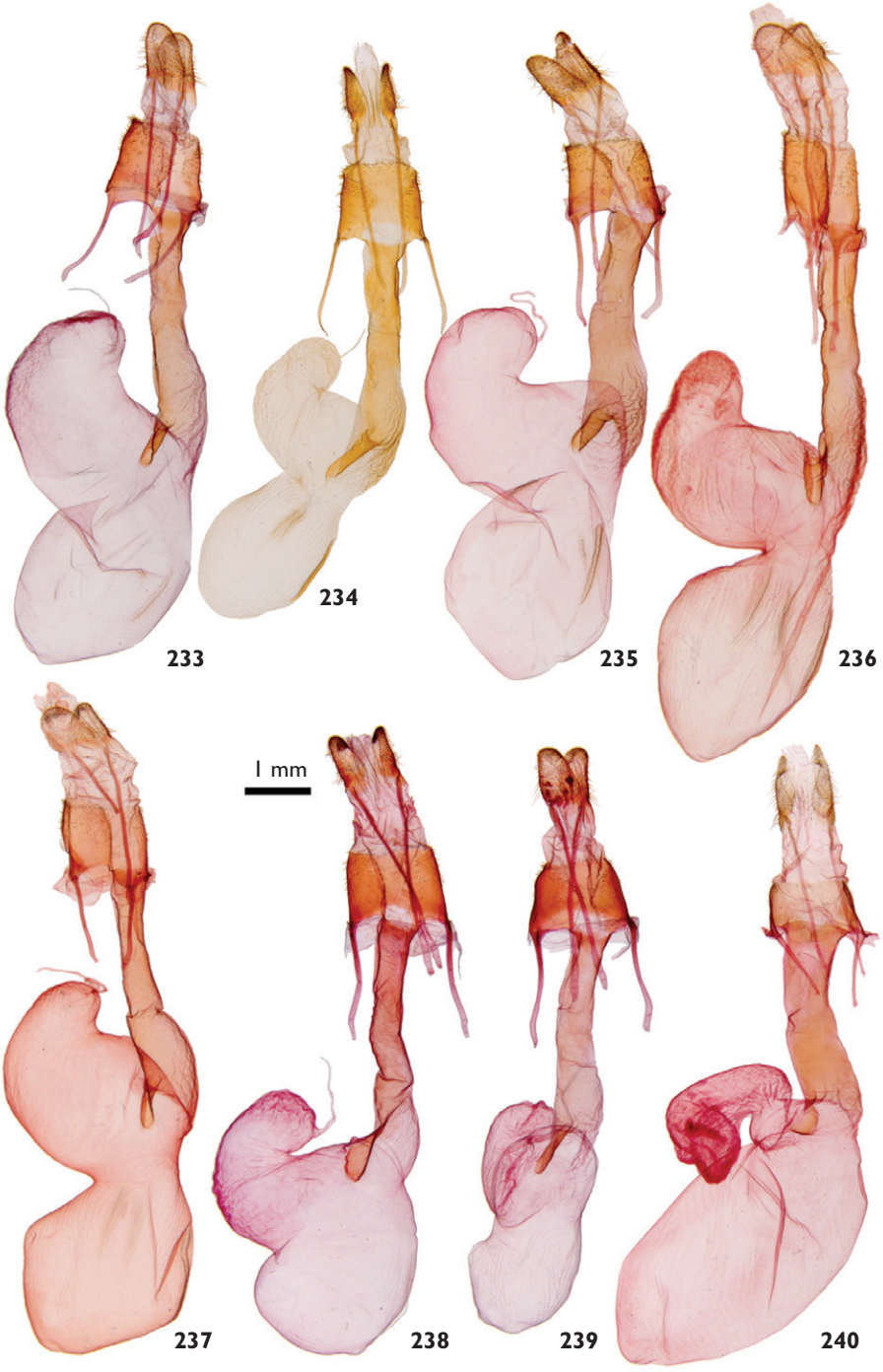
Figures 209–216. ***Lasionycta*** **female genitalia. 209** *L. illima* **210** *L. frigida* **211** *L. sasquatch* **212** *L. b. benjamini* **213** *L. benjamini medaminosa* **214** *L. perplexa* **215** *L. perplexella* **216** *L. subalpina*.



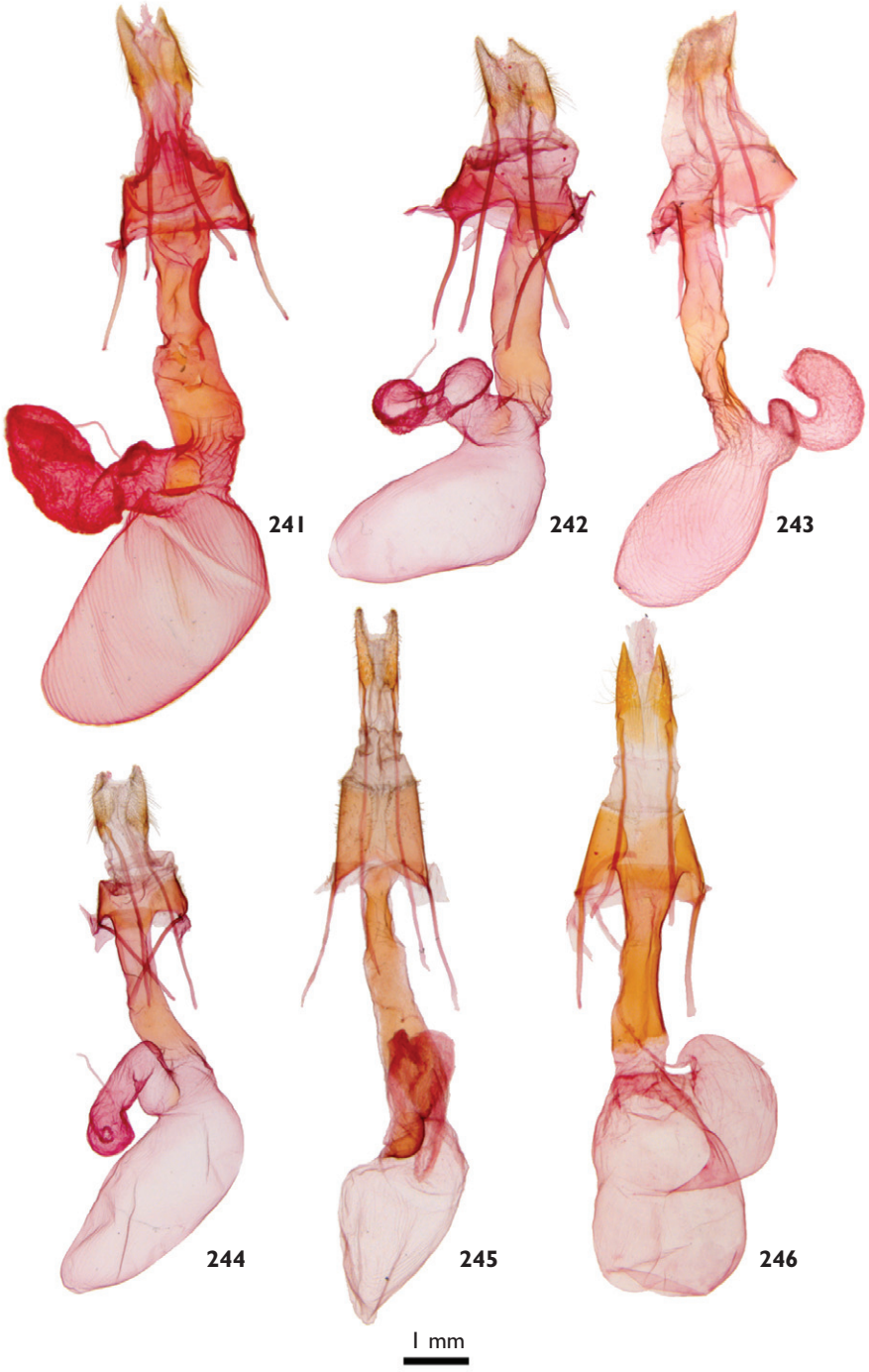
Figures 217–224. ***Lasionycta*** **female genitalia. 217** *L. s. subfuscula* **218** *L. subfuscula livida* **219** *L. staudingeri preblei* **220** *L. dolosa* **221** *L. subfumosa* **222** *L. q. quadrilunata* **223** *L. quadrilunata yukona* **224** *L. lagganata*.



Figures 225–232. ***Lasionycta*** **female genitalia. 225** *L. carolynae* **226** *L. phoca* **227** *L. u. uniformis* **228** *L. uniformis multicolor* **229** *L. uniformis fusca* **230** *L. brunnea* **231** *L. caesia* **232** *L. gelida*.



Figures 233–240. ***Lasionycta*** **and** ***Psammopolia*** **female genitalia. 233** *L. promulsa* **234** *L. macleani* **235** *L. pulverea* **236** *L. silacea* **237** *L. sierra* **238** *L. i. impingens* **239** *L. i. curta* **240** *Psammopolia arietis*.



Figures 241–246. ***Psammopolia*, *Lasionhada*, and *Tricholita* female genitalia. 241** *P. wyatti* **242** *P. insolens* **243** *P. sala* **244** *P. ochracea* **245** *Lasionhada proxima* **246** *Tricholita knudsoni*.

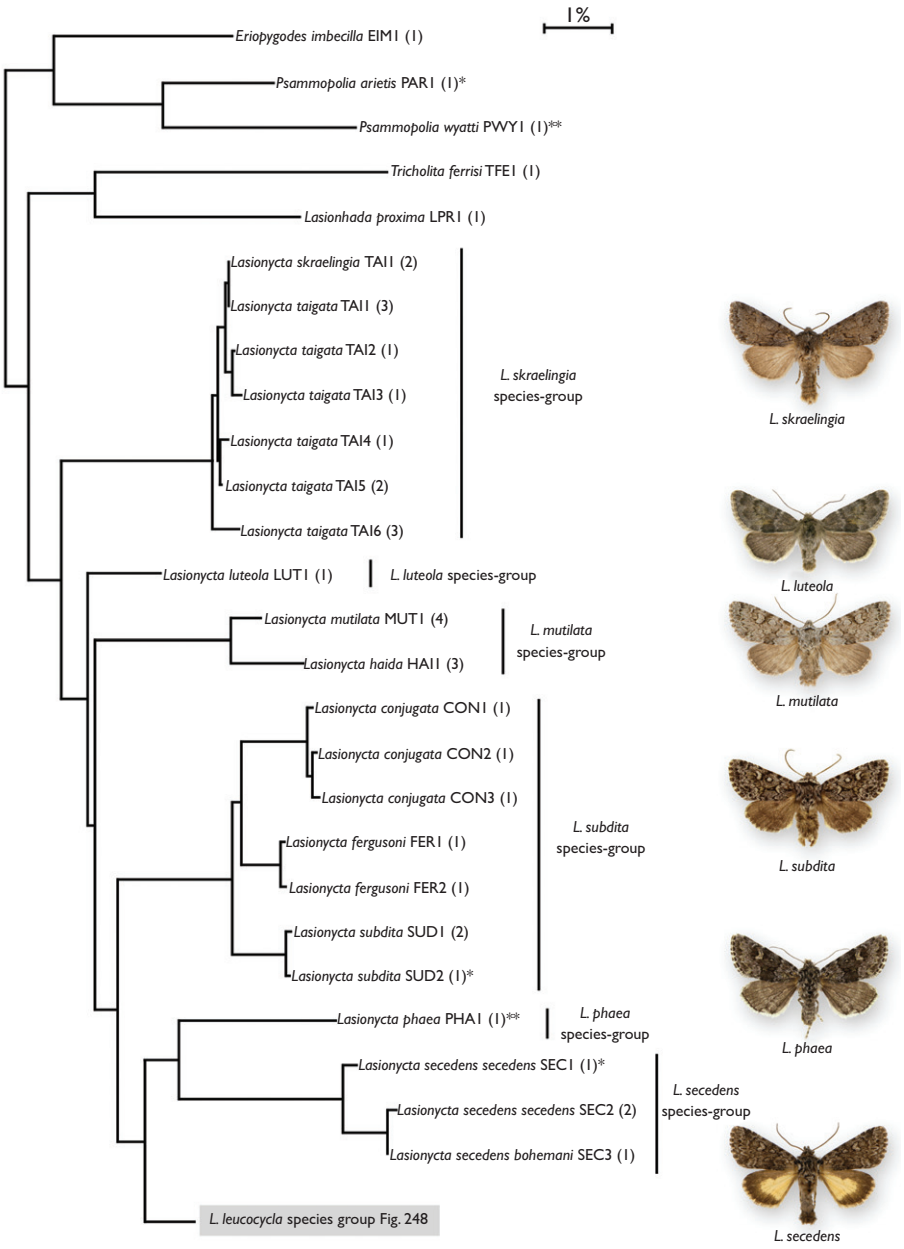


Figure 247. Neighbor-joining CO1 tree of North American *Lasionycta*, *Psammopolia*, *Tricholita ferrisi* and Eurasian *Lasionhada proxima* and *Eriopygodes imbecilla*. Incomplete haplotypes with 600–657 base pairs are denoted with (*) and those with 550–599 base pairs with (**). The letter and number code after each species is a unique haplotype identifier followed by the number of samples in parentheses. No data is available for *Psammopolia insolens*, *P. sala*, or *P. ochracea*. The illustrated species show a member of each species-group and are scaled to the same size. The *Lasionycta leucocycla* species-group is shown in Fig. 248.

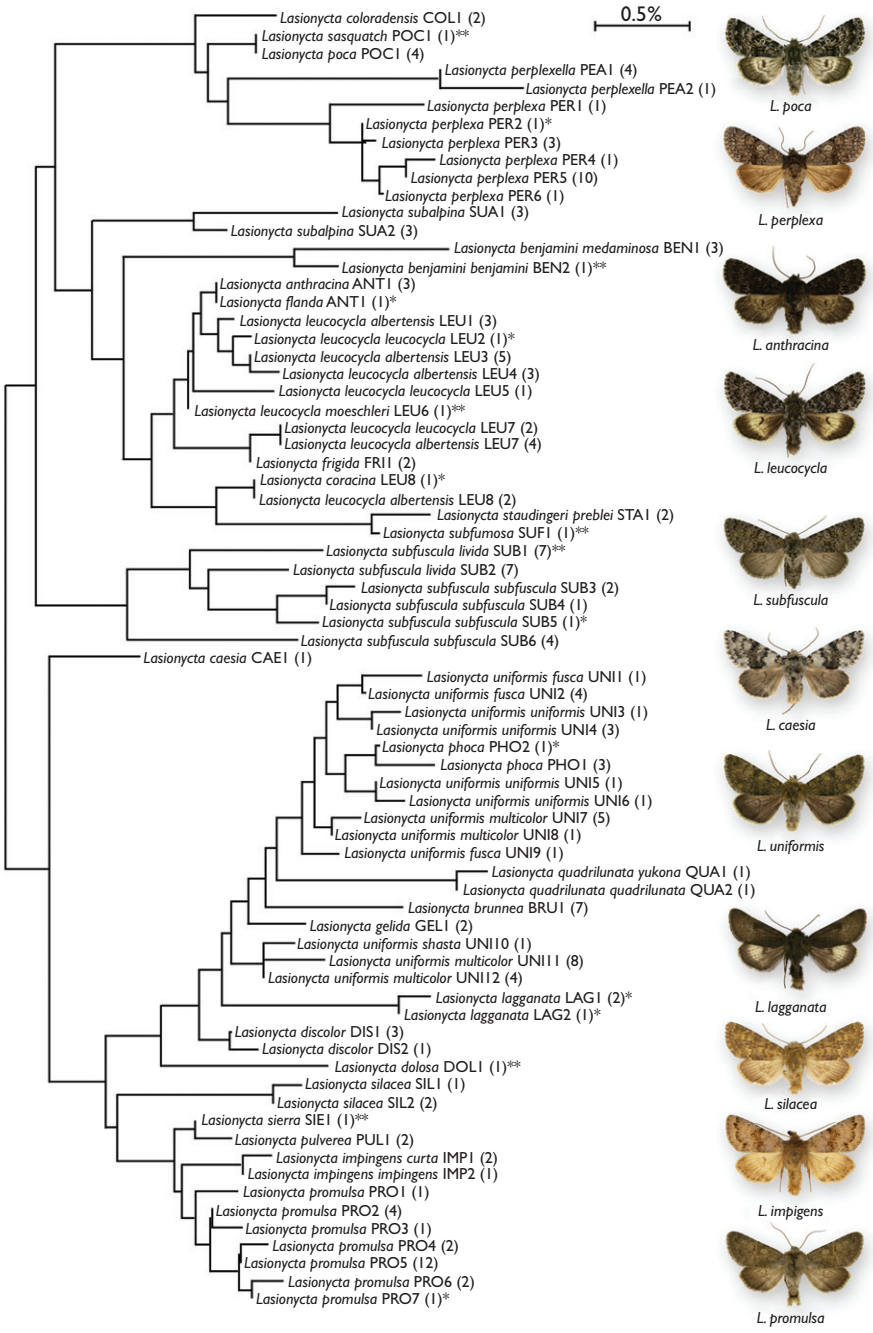


Figure 248. Neighbor-joining CO1 tree of the North American *Lasionycta leucocycla* species-group. Symbols and codes are the same as in Fig. 247. No data is available for *Lasionycta carolynae*, *L. illima*, *L. leucocycla hampa*, *L. macleani*, *L. mono*, or *L. uniformis handfieldi*. The illustrated specimens demonstrate the variation in appearance of the species-group and are scaled to the same size.

Appendix

Data for high-quality CO1 sequences (longer than 600 bp, with selected shorter sequence data for taxa in which no longer sequences are available). Taxon name, full specimen data, BOLD number, and haplotype code are listed for each sample. Sequences have been submitted to GenBank but accession numbers were not availbale at the time of publication.

Species	Haplo-type	Voucher #	Seq. length	Country	Prov./ State	Locality	Latitude	Longitude	Date	Collector	Deposi-tion
Eriopygodes imbecilla	EIM1	NOC14860	658	FIN		Near Tammisaari	-	-	12-Aug-2007	Lauri Kalia	CNC
Lasionhada proxima	LPR1	NOC14857	658	FIN		Near Espoo, Kauk-lahti	-	-	29-Jun-2007	Kalev & Mik-kola	CNC
Lasionycta anthracina	ANT1	CNCNoctuoidea6454	658	CAN	QC	Lac Dussault	47,000	-73,883	25-Jun-2004	D. Handfield	CNC
Lasionycta anthracina	ANT1	DH010161	658	CAN	QC	St-Michel des Saints, Lac Dussault	47,002	-73,894	29-Jun-2005	D. Handfield	DHC
Lasionycta anthracina	ANT1	DH010162	658	CAN	QC	St-Michel des Saints, Lac Dussault	47,002	-73,894	29-Jun-2005	D. Handfield	DHC
Lasionycta benjamini benjamini	BEN2	CNCNoctuoidea10521	588	USA	CA	Tioga Pass	37,940	-119,210	01-Aug-1995	J. Troubridge and L. Crabo	CNC
Lasionycta benjamini medaminosa	BEN1	CNCNoctuoidea10491	615	USA	CO	Stuntz Ridge, Colo-rado NM, 2358m	-	-	09-Jun-1994	T. Dickel	CNC
Lasionycta benjamini medaminosa	BEN1	CNCNoctuoidea10492	615	USA	CO	Harpers corner rd., Colorado NM	-	-	10-Jun-1994	T. Dickel	CNC
Lasionycta benjamini medaminosa	BEN1	CNCNoctuoidea6606	658	USA	CO	Stuntz Ridge, Colo-rado NM, 2358m	-	-	09-Jun-1994	T. Dickel	CNC
Lasionycta brunnea	BRU1	CNCNoctuoidea6730	658	CAN	BC	Watch Peak, 2km N Panorama, 2400m	50,333	-116,283	01-Aug-2000	J. Troubridge	CNC
Lasionycta brunnea	BRU1	CNCNoctuoidea10318	658	CAN	BC	Watch Peak, 2km N Panorama, 2400m	50,333	-116,283	16-Aug-1996	J. Troubridge	CNC
Lasionycta brunnea	BRU1	CNCNoctuoidea6559	601	CAN	BC	Pink Mountain	57,050	-122,850	28-Jun-1998	J. Troubridge	CNC
Lasionycta brunnea	BRU1	CNCNoctuoidea6556	658	CAN	BC	Pink Mountain	57,050	-122,850	28-Jun-1998	J. Troubridge	CNC
Lasionycta brunnea	BRU1	CNCNoctuoidea6551	658	CAN	BC	Pink Mountain	57,050	-122,850	28-Jun-1998	J. Troubridge	CNC
Lasionycta brunnea	BRU1	LEP031959	658	USA	WA	Pend Oreille Co., Salmo Mountain, 6345m	-	-	17-Jul-2007	L. G. Crabo	CNC

Species	Haplo-type	Voucher #	Seq. length	Country	Prov./ State	Locality	Latitude	Longitude	Date	Collector	Deposi-tion
Lasionycta brunnea	BRU1	LEP031961	658	USA	WA	Pend Oreille Co., Salmo Mountain, 6345m	-	-	17-Jul-2007	L. G. Crabo	CNC
Lasionycta caesia	CAE1	CNCNoctuoidea6572	658	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	13-Jul-2001	J. Troubridge	CNC
Lasionycta coloradensis	COL1	CNCNoctuoidea6596	605	USA	WY	Woods Landing, 2325m	-	-	28-May-1998	J.S. Nordin	CNC
Lasionycta coloradensis	COL1	CNCNoctuoidea6595	658	USA	WY	Woods Landing, 2325m	-	-	28-May-1998	J.S. Nordin	CNC
Lasionycta conjugata	CON1	CNCNoctuoidea6451	658	USA	CO	Fraser, 2820m	-	-	03-Jul-1992	T. Dickel	CNC
Lasionycta conjugata	CON2	CNCNoctuoidea6449	658	USA	WY	Fox Park, 2712m	-	-	03-Jul-1999	J. Nordin	CNC
Lasionycta conjugata	CON3	CNCNoctuoidea6450	658	USA	WY	Albany Co., T16N R79W S14 ctr., 3006m	-	-	15-Jul-2000	C. D. Ferris	CNC
Lasionycta coracina	LEU8	CNCNoctuoidea10286	613	CAN	YT	Km 465 Dempster Highway, 800m	-	-	04-Jul-1985	J. Troubridge	CNC
Lasionycta discolor	DIS1	CNC LEP 00053297	658	USA	WY	Park Co., Bear Tooth Hwy, 2miE of Long Lake	-	-	23-Jul-1998	G. Balogh	CNC
Lasionycta discolor	DIS1	CNCNoctuoidea6642	658	USA	CO	Cottonwood Pass, 3720m	-	-	13-Jul-1997	J. Nordin	CNC
Lasionycta discolor	DIS1	CNCNoctuoidea6625	658	USA	CO	Cottonwood Pass, 3720m	-	-	13-Jul-1997	J. Nordin	CNC
Lasionycta discolor	DIS2	CNCNoctuoidea6622	658	USA	CO	Trail Ridge Road, Larimer Co., 3180m	-	-	18-Jul-1998	P. Opler	CNC
Lasionycta dolosa	DOL1	CNCNoctuoidea6599	558	USA	CO	Mount Goliath, 3600m	-	-	13-Jul-1998	D. Bowman	CNC
Lasionycta fergusoni	FER1	CNCNoctuoidea6448	658	CAN	BC	Pink Mountain	57,050	-122,850	28-Jun-1998	J. Troubridge	CNC
Lasionycta fergusoni	FER2	CNCNoctuoidea6446	658	CAN	AB	Cardinal Divide, SW Cadomin, 2140m	-	-	21-Jul-2000	G. Anweiler	CNC
Lasionycta flanda	ANT1	CNC LEP 00054405	637	CAN	NL	Wiltondale, 10kmW nr communication tower,	49,370	-52,738	20-Jul-2008	Doug and Sherri Macaulay	CNC

Species	Haplo-type	Voucher #	Seq. length	Country	Prov./ State	Locality	Latitude	Longitude	Date	Collector	Deposi-tion
Lasionycta frigida	FRI1	CNCNoctuoidea6627	658	CAN	AB	Prospect Creek (mouth)	52,967	-117,325	14-Jul-2001	G. Anweiler	CNC
Lasionycta frigida	FRI1	CNCNoctuoidea6608	658	CAN	AB	Prospect Mountain, 2400m	-	-	17-Jul-1999	Chris Schmidt	CNC
Lasionycta gelida	GEL1	NOC14848	609	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	29-Jul-2000	Troubridge & Hensel	CNC
Lasionycta gelida	GEL1	NOC14849	658	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	26-Jul-2006	LG. Crabo	CNC
Lasionycta haida	HAI1	CNCNoctuoidea6440	658	CAN	BC	Graham Island, SW Dinan Bay, 772m	-	-	23-Jul-1987		CNC
Lasionycta haida	HAI1	CNCNoctuoidea6439	658	CAN	BC	Graham Island, SW Dinan Bay, 772m	-	-	23-Jul-1987		CNC
Lasionycta haida	HAI1	CNCNoctuoidea6438	658	CAN	BC	Graham Island, SW Dinan Bay, 772m	-	-	23-Jul-1987		CNC
Lasionycta impingens curta	IMP1	CNC LEP 00053296	658	USA	WY	Park Co., Bear Tooth Hwy, 1miE of Long Lake	-	-	26-Jul-1998	G. Balogh	CNC
Lasionycta impingens curta	IMP1	CNC LEP 00053295	658	USA	WY	Park Co., Bear Tooth Hwy, 1miE of Long Lake	-	-	26-Jul-1998	G. Balogh	CNC
Lasionycta impingens impingens	IMP2	CNCNoctuoidea10493	658	CAN	BC	Pavillion Mountain	50,967	-121,683	30-Jul-2000	Troubridge and Hensel	CNC
Lasionycta lagganata	LAG1	CNC LEP00052968	643	CAN	BC	Watch Peak, 2km N Panorama, 2400m	50,333	-116,283	23-Jul-1994	J. Troubridge	CNC
Lasionycta lagganata	LAG1	CNC LEP00052966	643	CAN	BC	Watch Peak, 2km N Panorama, 2400m	50,333	-116,283	16-Aug-1996	J. Troubridge	CNC
Lasionycta lagganata	LAG2	CNCNoctuoidea6624	605	CAN	BC	Watch Peak, 2km N Panorama, 2400m	50,333	-116,283	17-Aug-1996	J. Troubridge	CNC
Lasionycta leucocycla albertensis	LEU3	CNCNoctuoidea10478	615	CAN	BC	Pink Mountain	57,050	-122,850	28-Jun-1998	J. Troubridge	CNC
Lasionycta leucocycla albertensis	LEU7	CNCNoctuoidea10260	658	CAN	BC	Pink Mountain	57,050	-122,850	13-Jul-2005	B. C. Schmidt	CNC
Lasionycta leucocycla albertensis	LEU7	CNCNoctuoidea10259	658	CAN	BC	Pink Mountain	57,050	-122,850	13-Jul-2005	B. C. Schmidt	CNC

Species	Haplo-type	Voucher #	Seq. length	Country	Prov./ State	Locality	Latitude	Longitude	Date	Collector	Deposi-tion
Lasionycta leucocycla albertensis	LEU3	CNCNoctuoidea10258	658	CAN	BC	Pink Mountain	57,050	-122,850	13-Jul-2005	B. C. Schmidt	CNC
Lasionycta leucocycla albertensis	LEU7	CNCNoctuoidea10257	658	CAN	BC	Pink Mountain	57,050	-122,850	13-Jul-2005	B. C. Schmidt	CNC
Lasionycta leucocycla albertensis	LEU3	CNCNoctuoidea10256	658	CAN	BC	Pink Mountain	57,050	-122,850	13-Jul-2005	B. C. Schmidt	CNC
Lasionycta leucocycla albertensis	LEU7	CNCNoctuoidea10479	603	CAN	BC	Pink Mountain	58,050	-122,851	29-Jun-1998	J. Troubridge	CNC
Lasionycta leucocycla albertensis	LEU3	CNCNoctuoidea10480	605	CAN	BC	Pink Mountain	59,050	-122,852	30-Jun-1998	J. Troubridge	CNC
Lasionycta leucocycla albertensis	LEU3	CNCNoctuoidea10255	658	CAN	YT	Montana Mountain 10km S Carcross	60,076	-134,690	29-Jun-2004	B. C. Schmidt	CNC
Lasionycta leucocycla albertensis	LEU1	CNCNoctuoidea6633	658	CAN	MB	24km E Churchill	-	-	11-Jul-2001	H. Hensel	CNC
Lasionycta leucocycla albertensis	LEU8	CNCNoctuoidea6632	658	CAN	MB	24km E Churchill	-	-	12-Jul-2001	H. Hensel	CNC
Lasionycta leucocycla albertensis	LEU4	CNCNoctuoidea10463	655	CAN	MB	24km E Churchill	-	-	27-Jun-1989	H. Hensel	CNC
Lasionycta leucocycla albertensis	LEU1	CNCNoctuoidea10467	658	CAN	MB	24km E Churchill	-	-	30-Jun-1989	H. Hensel	CNC
Lasionycta leucocycla albertensis	LEU4	CNCNoctuoidea10466	658	CAN	MB	24km E Churchill	-	-	30-Jun-2001	H. Hensel	CNC
Lasionycta leucocycla albertensis	LEU1	CNCNoctuoidea10464	614	CAN	MB	24km E Churchill	-	-	05-Jul-2001	H. Hensel	CNC
Lasionycta leucocycla albertensis	LEU8	CNCNoctuoidea10461	616	CAN	MB	24km E Churchill	-	-	11-Jul-2001	H. Hensel	CNC
Lasionycta leucocycla albertensis	LEU4	CNCNoctuoidea10465	657	CAN	MB	24km E Churchill	-	-	11-Jul-2001	H. Hensel	CNC
Lasionycta leucocycla leucocycla	LEU7	CNCNoctuoidea10457	658	CAN	YT	Porcupine River	67,617	-138,167	05-Jul-1987	J. Troubridge	CNC
Lasionycta leucocycla leucocycla	LEU7	CNCNoctuoidea10458	658	CAN	YT	Porcupine River	67,617	-138,167	05-Jul-1987	J. Troubridge	CNC
Lasionycta leucocycla leucocycla	LEU5	CNCNoctuoidea6626	658	CAN	NT	Holman	-	-	21-Jun-1988	J. Troubridge	CNC

Species	Haplo-type	Voucher #	Seq. length	Country	Prov./ State	Locality	Latitude	Longitude	Date	Collector	Deposi-tion
Lasionycta leucocycla leucocycla	LEU2	CNCNoctuoidea10533	605	CAN	NU	Bernard Harbour	-	-	11-Jul-1988	J. Troubridge	CNC
Lasionycta leucocycla moeschleri	LEU6	CNCNoctuoidea11985	564	CAN	QC	Poste de la Baleine	-	-	29-Jul-1990	Seppo Kop-penen	CNC
Lasionycta luteola	LUT1	CNCNoctuoidea6585	658	CAN	BC	Apex Mountain	49,350	-119,900	21-Jul-2000	J. Troubridge	CNC
Lasionycta mutilata	MUT1	CNCNoctuoidea6445	658	CAN	BC	Mount Cheam	49,017	-121,700	20-Jul-2002	Troubridge	CNC
Lasionycta mutilata	MUT1	CNCNoctuoidea6444	658	CAN	BC	Mount Cheam	49,017	-121,700	20-Jul-2002	Troubridge	CNC
Lasionycta mutilata	MUT1	CNCNoctuoidea6443	658	CAN	BC	Pavillion Mountain	50,967	-121,683	30-Jul-2000	Troubridge	CNC
Lasionycta mutilata	MUT1	UASM24708	658	CAN	AB	Limestone Mtn.	51,920	-115,420	29-Jul-2002	Mengersen, E.	UASM
Lasionycta perplexa	PER3	CNCNoctuoidea6573	658	USA	NV	Angel Lake	41,010	-115,040	23-Jul-2001	Troubridge	CNC
Lasionycta perplexa	PER3	CNCNoctuoidea10483	617	USA	NV	Angel Lake	41,010	-115,040	23-Jul-2001	Troubridge and Lafontaine	CNC
Lasionycta perplexa	PER2	CNCNoctuoidea10482	616	USA	NV	Angel Lake, 2550m	41,017	-115,067	23-Jul-2001	J. Troubridge	CNC
Lasionycta perplexa	PER1	CNCNoctuoidea6576	658	USA	OR	Frissell Point	44,217	-122,100	26-Jul-2001	J. Troubridge	CNC
Lasionycta perplexa	PER5	BCSC133	658	CAN	AB	Waterton Lakes N.P., Chief Mtn Hwy, 4.4km SW summit	49,100	-113,903	07-Jul-2005	Schmidt, B. C.	UASM
Lasionycta perplexa	PER5	UASM41452	658	CAN	AB	Waterton Lakes N.P., Belly R. cmpgd.	49,100	-113,950	07-Jul-2005	G.G. Anweiler	UASM
Lasionycta perplexa	PER5	UASM41451	658	CAN	AB	Waterton Lakes N.P., Belly R. cmpgd.	49,100	-113,950	07-Jul-2005	G.G. Anweiler	UASM
Lasionycta perplexa	PER5	CNCNoctuoidea10499	658	CAN	BC	Watch Peak, 2km N Panorama, 2400m	50,333	-116,283	01-Aug-2000	J. Troubridge	CNC
Lasionycta perplexa	PER5	CNCNoctuoidea6577	658	CAN	BC	Fraser Canyon, Kirby Flats Rd.	50,533	-121,717	21-Jun-2001	J. Troubridge	CNC
Lasionycta perplexa	PER6	CNCNoctuoidea6578	658	CAN	BC	Fraser Canyon, Kirby Flats Rd.	50,533	-121,717	21-Jun-2001	J. Troubridge	CNC
Lasionycta perplexa	PER5	UASM24134	658	CAN	AB	Brown Creek R.A., 30 km NNW Nordeggg	52,750	-116,350	19-Jul-2002	G. G Anweiler	UASM

Species	Haplo-type	Voucher #	Seq. length	Country	Prov./ State	Locality	Latitude	Longitude	Date	Collector	Deposi-tion
Lasionycta perplexa	PER5	UASM24133	658	CAN	AB	Brown Creek R.A., 30 km NNW Nordeggg	52,750	-116,350	19-Jul-2002	G. G Anweiler	UASM
Lasionycta perplexa	PER4	UASM24132	658	CAN	AB	Brown Creek R.A., 30 km NNW Nordeggg	52,750	-116,350	19-Jul-2002	G. G Anweiler	UASM
Lasionycta perplexa	PER5	UASM58285	604	CAN	AB	Prospect Creek (mouth)	52,967	-117,384	21-Jul-2000	Schmidt, B. C.; Anweiler, G.	UASM
Lasionycta perplexa	PER5	UASM58284	604	CAN	AB	Prospect Creek (mouth)	52,967	-117,384	21-Jul-2000	Schmidt, B. C.; Anweiler, G.	UASM
Lasionycta perplexa	PER5	BCSC132	658	CAN	YT	Tarfu Lake cmpgd.	60,070	-133,810	30-Jun-2004	Schmidt, B. C.	UASM
Lasionycta perplexa	PER3	CNCNoctuoidea12126	658	USA	WY	Dubois, pine forest, 2600m	-	-	06-Jul-1992	Kauri Mikkola	CNC
Lasionycta perplexella	PEA1	CNCNoctuoidea10297	658	USA	WA	Bethel Ridge	46,790	-121,090	01-Aug-1993	J. Troubridge	CNC
Lasionycta perplexella	PEA2	CNCNoctuoidea10500	658	CAN	BC	Mount Kobau	49,100	-119,650	17-Jul-1998	J. Troubridge	CNC
Lasionycta perplexella	PEA1	CNCNoctuoidea10502	658	CAN	BC	Pavillion Mountain	50,967	-121,683	30-Jul-2000	Troubridge and Hensel	CNC
Lasionycta perplexella	PEA1	CNCNoctuoidea10501	658	CAN	BC	Pavillion Mountain	50,967	-121,683	30-Jul-2000	Troubridge and Hensel	CNC
Lasionycta perplexella	PEA1	CNCNoctuoidea10296	658	CAN	BC	Pavillion Mountain	50,967	-121,683	30-Jul-2000	Troubridge and Hensel	CNC
Lasionycta phaea	PHA1	CNCNoctuoidea10486	594	CAN	NU	Arviat	-	-	13-Jul-1994	H. Hensel	CNC
Lasionycta phoca	PHO2	CNCNoctuoidea6734	658	CAN	MB	24km E Churchill	-	-	01-Jul-2003	C. Paddock	CNC
Lasionycta phoca	PHO2	CNCNoctuoidea6453	658	CAN	MB	24km E Churchill	-	-	01-Jul-2003	C. Paddock	CNC
Lasionycta phoca	PHO2	CNCNoctuoidea6735	658	CAN	MB	24km E Churchill	-	-	07-Jul-2003	C. Paddock	CNC
Lasionycta phoca	PHO1	DH008666	648	CAN	NL	Labrador City, Base du Mont-Smokey	-	-	11-Jul-2004	Daniel Hand-field	DHC
Lasionycta poca	POC1	CNCNoctuoidea6736	658	CAN	BC	Mount Cheam	49,167	-121,700	20-Jul-2002	J. Troubridge	CNC
Lasionycta poca	POC1	CNCNoctuoidea6737	658	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	29-Jul-2000	J. Troubridge	CNC
Lasionycta poca	POC1	CNCNoctuoidea6590	658	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	15-Aug-2001	J. Troubridge	CNC
Lasionycta poca	POC1	CNCNoctuoidea10250	658	CAN	YT	Takhini River, 8km N of Kusawa L.	60,688	-136,076	27-Jun-2004	B. C. Schmidt	CNC

Species	Haplo-type	Voucher #	Seq. length	Country	Prov./ State	Locality	Latitude	Longitude	Date	Collector	Deposi-tion
Lasionycta promulsa	PRO6	LEP031956	658	USA	UT	Summit Co., Bald Mountain Pass	40,692	-111,898	22-Jul-2006	L. G. Crabo	CNC
Lasionycta promulsa	PRO6	LEP031957	658	USA	UT	Summit Co., Bald Mountain Pass	40,692	-111,898	22-Jul-2006	L. G. Crabo	CNC
Lasionycta promulsa	PRO5	CNCNoctuoidea6611	658	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	13-Jul-2001	J. Troubridge	CNC
Lasionycta promulsa	PRO5	CNCNoctuoidea10509	658	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	10-Aug-2001	J. Troubridge	CNC
Lasionycta promulsa	PRO5	CNCNoctuoidea6613	658	CAN	BC	Fraser Canyon, Kirby Flats Rd.	50,533	-121,717	18-Jul-2000	J. Troubridge	CNC
Lasionycta promulsa	PRO5	CNCNoctuoidea6612	658	CAN	BC	Fraser Canyon, Kirby Flats Rd.	50,533	-121,717	18-Jul-2000	J. Troubridge	CNC
Lasionycta promulsa	PRO5	CNCNoctuoidea6617	658	CAN	BC	Pavillion Mountain	50,967	-121,683	30-Jul-2000	Troubridge	CNC
Lasionycta promulsa	PRO5	CNCNoctuoidea6616	658	CAN	BC	Pavillion Mountain	50,967	-121,683	30-Jul-2000	Troubridge	CNC
Lasionycta promulsa	PRO5	CNCNoctuoidea6615	658	CAN	BC	Pavillion Mountain	50,967	-121,683	30-Jul-2000	Troubridge	CNC
Lasionycta promulsa	PRO5	CNCNoctuoidea10515	658	CAN	AB	Brown Creek R.A., 30 km NNW Nordeggg	52,750	-116,350	14-Jul-2000	G. Anweiler	CNC
Lasionycta promulsa	PRO3	CNCNoctuoidea10514	658	CAN	AB	Brown Creek R.A., 30 km NNW Nordeggg	52,750	-116,350	14-Jul-2000	G. Anweiler	CNC
Lasionycta promulsa	PRO5	CNCNoctuoidea10511	658	CAN	AB	Brown Creek R.A., 30 km NNW Nordeggg	52,750	-116,350	14-Jul-2000	G. Anweiler	CNC
Lasionycta promulsa	PRO7	UASM24169	621	CAN	AB	Brown Creek R.A., 30 km NNW Nordeggg	52,750	-116,350	19-Jul-2002	G.G. Anweiler	UASM
Lasionycta promulsa	PRO5	CNCNoctuoidea10519	658	CAN	AB	Prospect Creek at McLeod R	52,967	-117,325	14-Jul-2001	G. Anweiler	CNC
Lasionycta promulsa	PRO5	CNCNoctuoidea10517	658	CAN	AB	Prospect Creek at McLeod R	52,967	-117,325	14-Jul-2001	G. Anweiler	CNC
Lasionycta promulsa	PRO5	CNCNoctuoidea10512	658	CAN	AB	Prospect Creek at McLeod R	52,967	-117,325	14-Jul-2001	G. Anweiler	CNC

Species	Haplo-type	Voucher #	Seq. length	Country	Prov./ State	Locality	Latitude	Longitude	Date	Collector	Deposi-tion
Lasionycta promulsa	PRO2	CNCNoctuoidea10518	658	CAN	AB	Prospect Creek at McLeod R	52,967	-117,325	14-Jul-2001	G. Anweiler	CNC
Lasionycta promulsa	PRO2	CNCNoctuoidea10516	658	CAN	AB	Prospect Creek at McLeod R	52,967	-117,325	14-Jul-2001	G. Anweiler	CNC
Lasionycta promulsa	PRO4	UASM2182	658	CAN	AB	Prospect Creek (mouth)	52,967	-117,325	21-Jul-2000	G.G. Anweiler	UASM
Lasionycta promulsa	PRO1	LEP031955	658	USA	UT	Sanpete Co., Ephraim, 8 mi E	-	-	21-Jul-2006	L. G. Crabo	CNC
Lasionycta promulsa	PRO2	CNCNoctuoidea6609	658	CAN	AB	Cardinal Divide, SW Cadomin, 2140m	-	-	21-Jul-2000	G. Amweiler	CNC
Lasionycta promulsa	PRO4	CNCNoctuoidea10520	615	CAN	AB	Cardinal Divide, SW Cadomin, 2140m	-	-	21-Jul-2000	G. Anweiler	CNC
Lasionycta promulsa	PRO2	CNCNoctuoidea10513	658	CAN	AB	Cardinal Divide, SW Cadomin, 2140m	-	-	21-Jul-2000	G. Anweiler	CNC
Lasionycta pulverea	PUL1	CNCNoctuoidea6634	601	CAN	AB	Hailstone Butte	50,200	-114,433	24-Jul-1994	J. Troubridge	CNC
Lasionycta pulverea	PUL1	CNCNoctuoidea10525	658	CAN	AB	Hailstone Butte	51,200	-113,433	25-Jul-1998	J. Troubridge	CNC
Lasionycta quadrilunata quadrilunata	QUA2	CNC LEP00052969	658	USA	CO	Clear Creek Co., Mount Goliath	-	-	07-Sep-1994	D.E. Bowman	CNC
Lasionycta quadrilunata yukona	QUA1	CNCNoctuoidea6643	658	CAN	AB	Prospect Mountain, 2300m	-	-	17-Jul-1999	Chris Schmidt	CNC
Lasionycta sasquatch	POC1	CNCNoctuoidea6591	568	USA	WA	Bethel Ridge	46,790	-121,090	01-Aug-1993	J. Troubridge	CNC
Lasionycta secedens bohemani	SEC3	LEP037940	658	CAN	YT	Dawson, Cassiar Dome, 1244m	-	-	18-Jun-2007	C.S. Guppy & G.E. Hutchings	CNC
Lasionycta secedens secedens	SEC2	CNCNoctuoidea10506	658	CAN	QC	holland Lk., Murdochville	-	-	03-Jul-2003	G. Hensel	CNC
Lasionycta secedens secedens	SEC2	CNCNoctuoidea10505	658	CAN	QC	holland Lk., Murdochville	-	-	03-Jul-2003	G. Hensel	CNC
Lasionycta secedens secedens	SEC1	DH001484	632	CAN	QC	Baie James, Chisasibi	-	-	11-Jul-2002	Daniel Handfield	DHC
Lasionycta sierra	SIE1	CNCNoctuoidea6566	567	USA	CA	Tioga Pass	37,940	-119,210	31-Jul-1995	J. Troubridge	CNC

Species	Haplo-type	Voucher #	Seq. length	Country	Prov./ State	Locality	Latitude	Longitude	Date	Collector	Deposi-tion
Lasionycta silacea	SIL2	CNCNoctuoidea6618	658	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	23-Aug-1996	J. Troubridge	CNC
Lasionycta silacea	SIL1	CNCNoctuoidea6726	658	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	17-Aug-2000	J. Troubridge	CNC
Lasionycta silacea	SIL2	CNCNoctuoidea6728	658	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	13-Aug-2001	J. Troubridge	CNC
Lasionycta skraelingia	TAI1	LEP031954	658	CAN	YT	km 155 Dempster Hwy	-	-	07-Jul-1985	L. G. Crabo	CNC
Lasionycta skraelingia	TAI1	NOC14665	658	CAN	YT	Dempster Hwy., km 155, 900m	-	-	06-Jul-1985	J.D. Lafontaine	CNC
Lasionycta staudingeri preblei	STA1	CNCNoctuoidea10530	657	CAN	YT	British Mountains	69,283	-140,050	24-Jun-1984	Wood and Lafontaine	CNC
Lasionycta staudingeri preblei	STA1	CNCNoctuoidea10531	658	CAN	YT	British Mountains	69,283	-140,050	24-Jun-1984	Wood and Lafontaine	CNC
Lasionycta subalpina	SUA2	CNC LEP00054227	658	USA	TX	Hidalgo Co., Bentsen State Park	-	-	18-Apr-1997		CNC
Lasionycta subalpina	SUA1	NOC14859	658	USA	WY	Dubois, pine forest, 2600m	-	-	05-Jul-1992	Kauri Mikkola	CNC
Lasionycta subalpina	SUA1	NOC14858	658	USA	WY	Dubois, pine forest, 2600m	-	-	05-Jul-1992	Kauri Mikkola	CNC
Lasionycta subalpina	SUA1	CNC LEP 00032099	658	USA	WY	Park Co., Bear Tooth Hwy, 1miE of Long Lake	-	-	26-Jul-1998	G. Balogh	CNC
Lasionycta subalpina	SUA2	CNC LEP00054226	658	USA	WY	Albany Co., T16N R79W S14 ctr., 3109m	-	-	11-Jul-2000	C.D. Ferris	CNC
Lasionycta subalpina	SUA2	CNC LEP00054225	658	USA	WY	Albany Co., T16N R79W S14 ctr., 3109m	-	-	23-Jul-2000	C.D. Ferris	CNC
Lasionycta subdita	SUD1	CNCNoctuoidea10487	658	CAN	MB	24km E Churchill	-	-	29-Jun-2001	H. Hensel	CNC
Lasionycta subdita	SUD1	CNCNoctuoidea10488	658	CAN	MB	24km E Churchill	-	-	02-Jul-2001	H. Hensel	CNC
Lasionycta subdita	SUD2	DH008667	611	CAN	NL	Labrador City, Base du Mont-Smokey	-	-	14-Jul-2004	Daniel Handfield	DHC
Lasionycta subfumosa	SUF1	CNCNoctuoidea10527	570	USA	AK	Omilak, Darby Mountains	-	-	20-Jun-1986	J. Troubridge	CNC

Species	Haplo-type	Voucher #	Seq. length	Country	Prov./ State	Locality	Latitude	Longitude	Date	Collector	Deposi-tion
Lasionycta subfuscula livida	SUB1	CNCNoctuoidea10541	615	USA	OR	Frissell Point	44,217	-122,100	26-Jul-1996	J. Troubridge	CNC
Lasionycta subfuscula livida	SUB1	CNCNoctuoidea10288	658	USA	OR	Frissell Point	44,217	-122,100	28-Jul-2001	J. Troubridge	CNC
Lasionycta subfuscula livida	SUB1	CNCNoctuoidea10543	606	USA	WA	Bethel Ridge	46,790	-121,090	18-Aug-1995	J. Troubridge	CNC
Lasionycta subfuscula livida	SUB1	CNCNoctuoidea10547	658	CAN	BC	Mount Cheam	49,017	-121,700	20-Jul-2002	Troubridge	CNC
Lasionycta subfuscula livida	SUB2	NOC14850	658	CAN	BC	Mount Kobau	49,100	-119,650	17-Aug-1998	Crabo & Trou-bridge	CNC
Lasionycta subfuscula livida	SUB 2	CNCNoctuoidea10293	658	CAN	BC	Watch Peak, 2km N Panorama, 2400m	50,333	-116,283	01-Aug-2000	J. Troubridge	CNC
Lasionycta subfuscula livida	SUB1	CNCNoctuoidea6579	658	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	29-Jul-2000	J. Troubridge	CNC
Lasionycta subfuscula livida	SUB1	CNCNoctuoidea10292	658	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	15-Aug-2001	J. Troubridge	CNC
Lasionycta subfuscula livida	SUB1	CNCNoctuoidea10290	658	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	15-Aug-2001	J. Troubridge	CNC
Lasionycta subfuscula livida	SUB2	CNCNoctuoidea6580	658	CAN	BC	Fraser Canyon, Kirby Flats Rd.	50,533	-121,717	06-Jul-1999	J. Troubridge	CNC
Lasionycta subfuscula livida	SUB5	NOC14854	658	CAN	BC	Fraser Canyon, Kirby Flats Rd.	50,533	-121,717	10-Jul-1999	LG. Crabo	CNC
Lasionycta subfuscula livida	SUB2	CNCNoctuoidea10289	658	CAN	BC	Fraser Canyon, Kirby Flats Rd.	50,533	-121,717	10-Jul-1999	J. Troubridge	CNC
Lasionycta subfuscula livida	SUB2	CNCNoctuoidea10549	658	CAN	BC	Fraser Canyon, Kirby Flats Rd.	50,533	-121,717	07-Jul-2000	J. Troubridge	CNC
Lasionycta subfuscula livida	SUB2	CNCNoctuoidea10535	617	CAN	BC	Fraser Canyon, Kirby Flats Rd.	50,533	-121,717	21-Jun-2001	J. Troubridge	CNC
Lasionycta subfuscula subfuscula	SUB3	CNC LEP 00053294	658	USA	UT	Summit Co., Bald Mountain Pass	40,692	-111,898	22-Jul-2006	Lars Crabo	CNC
Lasionycta subfuscula subfuscula	SUB4	CNC LEP 00053291	658	USA	UT	Summit Co., Bald Mountain Pass	40,692	-111,898	22-Jul-2006	Lars Crabo	CNC
Lasionycta subfuscula subfuscula	SUB5	NOC14852	643	USA	OR	Harney County, Steens Mountain, Fish L., 2260m	42,730	-118,640	27-Jul-1991	LG. Crabo	CNC
Lasionycta subfuscula subfuscula	SUB6	CNCNoctuoidea10548	658	USA	CO	Beaver Creek Road	-	-	14-Jul-1987	T. Dickel	CNC

Species	Haplo-type	Voucher #	Seq. length	Country	Prov./ State	Locality	Latitude	Longitude	Date	Collector	Deposi-tion
Lasionycta subfuscula subfuscula	SUB6	CNCNoctuoidea10544	614	USA	CO	Grand Co., 3.9mi SW of Fraser	-	-	14-Jul-1988	T.S. Dickel	CNC
Lasionycta subfuscula subfuscula	SUB6	CNCNoctuoidea10545	615	USA	CO	Grand Co., Corona Pass	-	-	30-Jul-1988	T.S. Dickel	CNC
Lasionycta subfuscula subfuscula	SUB3	CNCNoctuoidea10779	658	USA	UT	Wash. County, Leeds Canyon	-	-	27-May-1989	R.C. Mower	CNC
Lasionycta subfuscula subfuscula	SUB6	CNCNoctuoidea10539	658	USA	CO	Lake Irene, 3180m	-	-	10-Jul-1994	P. Opler	CNC
Lasionycta taigata	TAI5	CNCNoctuoidea10489	658	CAN	QC	Papineau, Laval P.W.R.	46,383	-75,233	29-Jun-2003	J. Troubridge and D. Lafon-taine	CNC
Lasionycta taigata	TAI1	DH010319	658	CAN	QC	St-Michel des Saints, Lac Dussault	47,002	-73,894	29-Jun-2005	D. Handfield	DHC
Lasionycta taigata	TAI1	DH010332	658	CAN	QC	St-Michel des Saints, Lac Dussault	47,002	-73,894	29-Jun-2005	D. Handfield	DHC
Lasionycta taigata	TAI5	DH010333	658	CAN	QC	St-Michel des Saints, Lac Dussault	47,002	-73,894	29-Jun-2005	D. Handfield	DHC
Lasionycta taigata	TAI6	DH010331	658	CAN	QC	St-Michel des Saints, Lac Dussault	47,002	-73,894	29-Jun-2005	D. Handfield	DHC
Lasionycta taigata	TAI1	CNC LEP 00054404	637	CAN	NL	Wiltondale, 10kmW nr commu-nication tower,	49,370	-52,738	20-Jul-2008	Doug and Sherri Macaulay	CNC
Lasionycta taigata	TAI4	NOC14668	658	CAN	QC	Laurentides, km 127 on hwy 175 06c. Lac Plourde	-	-	25-Jun-2005	George Hensel	CNC
Lasionycta taigata	TAI6	NOC14666	658	CAN	QC	Laurentides, km 127 on hwy 175 06c. Lac Plourde	-	-	25-Jun-2005	George Hensel	CNC
Lasionycta taigata	TAI3	CNCNoctuoidea10490	658	CAN	MB	24km E Churchill	-	-	03-Jul-2003	H. Hensel	CNC
Lasionycta taigata	TAI2	NOC14667	658	CAN	AB	Holmes Crossing, 1109m	-	-	26-Jun-2004	G. Arnweiler & D. Macaulay	CNC
Lasionycta taigata	TAI6	DH010318	658	CAN	QC	St-Michel des Saints, Lac Dussault	-	-	29-Jun-2005	D. Handfield	DHC
Lasionycta uniformis fusca	UNI9	LEP031958	658	USA	UT	Summit Co., Bald Mountain Pass	40,692	-111,898	22-Jul-2006	L. G. Crabo	CNC

Species	Haplo-type	Voucher #	Seq. length	Country	Prov./ State	Locality	Latitude	Longitude	Date	Collector	Deposi-tion
Lasionycta uniformis fusca	UNI2	CNCNoctuoidea6620	658	USA	CO	Lake Irene, 3180m	-	-	18-Jul-1998	P. Opler	CNC
Lasionycta uniformis fusca	UNI1	CNCNoctuoidea6619	658	USA	CO	Guanella, 3180m	-	-	17-Jul-1998	D. Bowman	CNC
Lasionycta uniformis fusca	UNI2	CNCNoctuoidea6582	612	USA	WY	Lewis Lake, 3225m	-	-	15-Jul-1998	J. Nordin	CNC
Lasionycta uniformis fusca	UNI2	CNCNoctuoidea6583	658	USA	WY	Lewis Lake, 3225m	-	-	15-Jul-1998	J. Nordin	CNC
Lasionycta uniformis fusca	UNI2	CNCNoctuoidea6581	658	USA	WY	Lewis Lake, 3225m	-	-	15-Jul-1998	J. Nordin	CNC
Lasionycta uniformis multicolor	UNI11	CNCNoctuoidea6639	658	USA	WA	Junior Point	47,983	-120,383	05-Aug-1999	J. Troubridge	CNC
Lasionycta uniformis multicolor	UNI11	CNCNoctuoidea10364	658	USA	WA	Junior Point	47,983	-120,383	05-Aug-1999	J. Troubridge	CNC
Lasionycta uniformis multicolor	UNI12	CNCNoctuoidea6640	658	CAN	BC	Apex Mountain	49,350	-119,900	21-Jul-2000	J. Troubridge	CNC
Lasionycta uniformis multicolor	UNI12	CNCNoctuoidea10276	658	CAN	BC	Apex Mountain	49,350	-119,900	18-Jul-1992	J. Troubridge	CNC
Lasionycta uniformis multicolor	UNI11	CNCNoctuoidea6644	658	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	29-Jul-2000	J. Troubridge	CNC
Lasionycta uniformis multicolor	UNI11	CNCNoctuoidea6641	658	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	29-Jul-2000	J. Troubridge	CNC
Lasionycta uniformis multicolor	UNI8	CNCNoctuoidea6568	658	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	13-Jul-2001	J. Troubridge	CNC
Lasionycta uniformis multicolor	UNI11	CNCNoctuoidea6570	658	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	13-Jul-2001	J. Troubridge	CNC
Lasionycta uniformis multicolor	UNI11	CNCNoctuoidea6569	658	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	13-Jul-2001	J. Troubridge	CNC
Lasionycta uniformis multicolor	UNI7	CNCNoctuoidea10273	613	CAN	BC	Blowdown Pass	50,350	-122,133	12-Jul-1992	J. Troubridge	CNC
Lasionycta uniformis multicolor	UNI7	CNCNoctuoidea10274	658	CAN	BC	Blowdown Pass	50,350	-122,133	29-Jul-2000	J. Troubridge	CNC
Lasionycta uniformis multicolor	UNI7	CNCNoctuoidea10281	658	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	29-Jul-2000	J. Troubridge	CNC
Lasionycta uniformis multicolor	UNI11	CNCNoctuoidea10485	658	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	29-Jul-2000	J. Troubridge	CNC
Lasionycta uniformis multicolor	UNI7	CNCNoctuoidea10279	614	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	13-Jul-2001	J. Troubridge	CNC

Species	Haplo-type	Voucher #	Seq. length	Country	Prov./ State	Locality	Latitude	Longitude	Date	Collector	Deposi-tion
Lasionycta uniformis multicolor	UNI7	CNCNoctuoidea10363	658	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	13-Jul-2001	J. Troubridge	CNC
Lasionycta uniformis multicolor	UNI11	CNCNoctuoidea10278	658	CAN	BC	Gott Peak, Coast Range	50,350	-122,133	13-Jul-2001	J. Troubridge	CNC
Lasionycta uniformis multicolor	UNI12	CNCNoctuoidea6631	658	CAN	BC	Pavillion Mountain	50,967	-121,683	30-Jul-2000	Troubridge	CNC
Lasionycta uniformis multicolor	UNI12	CNCNoctuoidea10287	658	CAN	BC	Pavillion Mountain	50,967	-121,683	30-Jul-2000	Troubridge and Hensel	CNC
Lasionycta uniformis shasta	UNI10	CNCNoctuoidea10484	658	USA	CA	Mt. Shasta	41,350	-122,200	27-Aug-2000	J. Troubridge	CNC
Lasionycta uniformis uniformis	UNI5	CNCNoctuoidea6629	658	CAN	BC	Watch Peak, 2km N Panorama, 2400m	50,333	-116,283	17-Aug-1996	J. Troubridge	CNC
Lasionycta uniformis uniformis	UNI6	CNCNoctuoidea6628	658	CAN	BC	Watch Peak, 2km N Panorama, 2400m	50,333	-116,283	17-Aug-1996	J. Troubridge	CNC
Lasionycta uniformis uniformis	UNI4	CNCNoctuoidea6553	612	CAN	BC	Pink Mountain	57,050	-122,850	28-Jun-1998	J. Troubridge	CNC
Lasionycta uniformis uniformis	UNI4	CNCNoctuoidea6558	658	CAN	BC	Pink Mountain	57,050	-122,850	28-Jun-1998	J. Troubridge	CNC
Lasionycta uniformis uniformis	UNI4	CNCNoctuoidea6555	658	CAN	BC	Pink Mountain	57,050	-122,850	28-Jun-1998	J. Troubridge	CNC
Lasionycta uniformis uniformis	UNI3	CNCNoctuoidea10317	658	CAN	AB	Cardinal Divide, SW Cadomin, 2140m	-	-	21-Jul-2000	G.G. Anweiler, C. Schmidt	CNC
Psammopolia arietis	PAR1	CNCNoctuoidea10498	651	USA	WA	Grayland	46,180	-124,080	26-Aug-2002	K. Talbot	CNC
Psammopolia wyatti	PWY1	CNCNoctuoidea10496	562	CAN	BC	Vancouver Island, Cordova Spit	-	-	10-Aug-1994	J. Troubridge	CNC
Tricholita ferrisi	TFE1	NOC14851	658	USA	AZ	Cochise County, Shasta Peak Trail, Onion Saddle	-	-	22-Jul-2007	C.D. Ferris	CNC