# The genus *Alucita* in North America, with description of two new species (Lepidoptera: Alucitidae)

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**Abstract**—The North American fauna of Alucitidae is shown to include three widespread species: *Alucita montana* Barnes *et* Lindsey, 1921 (*nec* Cockerell), *Alucita adriendenisi* **sp. nov.** (type locality: Manitoulin Island, Ontario, Canada), and *Alucita lalannei* **sp. nov.** (type locality: Maynooth, Ontario, Canada). *Alucita hexadactyla* (L., 1758) and *A. huebneri* Wallengren, 1862 do not occur in North America. The three North American species are described and illustrated. *Alucita montana* is found from southwestern Quebec and Vermont, west to British Columbia, and south to Arizona, California, and Texas; its caterpillar is associated with *Symphoricarpos* spp. (Caprifoliaceae). *Alucita adriendenisi* is known from northwestern Quebec and New York, west to Alberta and the Northwest Territories, with more southern populations (isolated?) in West Virginia, Arizona, and Texas; its caterpillar feeds on flowers of *Lonicera dioica* L. (Caprifoliaceae) in Michigan. *Alucita lalannei* has been found in Ontario, Manitoba, and Alberta, Canada; its host plant is unknown.

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**Résumé**—La faune nord-américaine des Alucitidae comprend trois espèces largement réparties : *Alucita montana* Barnes *et* Lindsey, 1921 (*nec* Cockerell), *Alucita adriendenisi* **sp. nov.** (localité type : Île Manitoulin, Ontario, Canada) et *Alucita lalannei* **sp. nov.** (localité type : Maynooth, Ontario, Canada). *Alucita hexadactyla* (L., 1758) et *A. huebneri* Wallengren, 1862 ne sont pas présentes en Amérique du Nord. Les trois espèces nord-américaines sont décrites et illustrées. *Alucita montana* se rencontre de l'ouest du Québec et au Vermont jusqu'en Colombie-Britannique et le long des montagnes vers le sud jusqu'en Arizona, en Californie et au Texas; sa chenille est inféodée aux *Symphoricarpos* spp. (Caprifoliaceae). *Alucita adriendenisi* se rencontre du nord-ouest du Québec et dans l'Etat de New-York jusqu'en Alberta et dans les Territoires du Nord-Ouest, ainsi que plus au sud en Arizona, en Virginie occidentale et au Texas; sa chenille se nourrit des fleurs de *Lonicera dioica* L. (Caprifoliaceae) au Michigan. *Alucita lalannei* a été trouvée en Ontario, au Manitoba et en Alberta, Canada; sa plante hôte n'est pas connue.

## Introduction

The genus *Alucita* Linnaeus, 1758 belongs to the family Alucitidae, which includes 186 species in the world (Gielis 2003). They are commonly known as the many-

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plumed moths because most members of the family have both wings deeply divided multiple times. The larvae feed as borers in buds, flowers, fruits, and shoots, or make galls on at least eight families of dicotyledonous plants, including Caprifoliaceae, Bignoniaceae, and Rubiaceae (Dugdale *et al.* 1999).

The North American fauna of Alucitidae is depauperate compared with that of Europe, where 16 species are recognized (15 in genus *Alucita*; Buszko 1996). In 1921 Barnes and Lindsey reviewed the information available at the time and recognized a single North American species as *Alucita montana* Cockerell, 1889. However, Cockerell (1889) had mentioned that he applied the name *montana* as a manuscript name to specimens he sent to correspondents, one of whom, Lord Walsingham, identified Cockerell's specimens as *A. hexadactyla* L., a decision that Cockerell accepted (1889). The description of *A. montana* by Barnes and Lindsey (1921) made the name valid. The latest North American list (Heppner 1983) records one species, *Alucita hexadactyla* L., with the name *montana* Cockerell as a nomen nudum. Heppner (1987) later mentioned that there appeared to be at least two undescribed species other than *A. hexadactyla* in North America.

When B Landry collected a specimen of *Alucita* in southwestern Quebec in May 1993 (Landry 1994), it was the first time that the family Alucitidae was recorded for the province and it prompted a quest for information that led to the present project. A study of the specimens then in the Canadian National Collection of Insects (CNC) and a comparison with available literature (notably Scholz and Jäckh 1994) showed that *A. hexadactyla* was not the species found in Quebec and that there were two widespread species in Canada and in some areas of the United States, especially in the West. Later, a third species was discovered among CNC material.

The purpose of this study is to describe the three widespread *Alucita* species in North America. We have seen one specimen of another species of *Alucita* taken in southern Florida, but John Heppner is working on it.

## Material and methods

More than 710 specimens form the basis of this study. They come from the following collections:

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|---|---|
| BMNH | The Natural History Museum, London, United Kingdom |
| CCDB | Private collection of Charles D Bird, Erskine, Alberta, Canada |
| CGJB | Private collection of George J Balogh, Portage, Michigan, United States of America |
| CJKM | Private collection of John K Morton, Waterloo, Ontario, Canada |
| CNC | Canadian National Collection of Insects and Arachnids, Ottawa, Ontario, Canada |
| CSUC | CP Gillette Museum of Arthropod Diversity, Colorado State University, Fort Collins, Colorado, United States of America |
| CTLM | Private collection of Timothy L McCabe, Albany, New York, United States of America |
| CTSD | Private collection of Terhune S Dickel, Ocala, Florida, United States of America |
| CUIC | Cornell University Insect Collection, Ithaca, New York, United States of America |
| EMEC | Essig Museum of Entomology, University of California, Berkeley, California, United States of America |
| NFRC | Northern Forestry Centre Insect Museum, Edmonton, Alberta, Canada |

| | |
|---|---|
| USNM | National Museum of Natural History, Washington, District of Columbia, United States of America |
| UVCC | University of Vermont, Burlington, Vermont, United States of America |
| ZMAN | Zoologisch Museum, Universiteit van Amsterdam, Amsterdam, Netherlands |

Some of the specimens collected by BL will be deposited in the Muséum d'histoire naturelle, Geneva, Switzerland (MHNG).

In the list of specimens examined for *A. montana*, county names are omitted unless the county is the locality or where there are possible ambiguities. Abbreviations are spelled out except for measurements for elevation and direction, which are standardized. In the list of paratypes for the new species, the information is transcribed as such from the labels except for dates of collecting, which are standardized, and abbreviated words are spelled out when they are first encountered in each list, except for abbreviations for direction and metric distances. Additional abbreviations are BL (Bernard Landry), JFL (Jean-François Landry), and MIC (microlepidoptera slide number in the CNC).

The forewing length was measured with a reticule on the dissecting scope for as many specimens as possible. However, only a few specimens were easily measurable because most of them had the plumes drooping.

The photographs were made with a JVC® digital camera mounted on a Leica® MZ APO stereomicroscope or a Zeiss® Axioskop microscope and using the AutoMontage™ system, except for the scanning electron micrographs. The maps were generated with MapInfo®. The latitude and longitude coordinates were found with www.topozone.com for the localities in the United States of America and http://geonames.nrcan.gc.ca for localities in Canada.

## Key to the North American species of *Alucita*

1. Head scales uniformly coloured (Figs. 4, 5); forewing length usually between 6.6 and 8.1 mm (one female had forewing length of 5.9 mm) . . . . . *A. adriendenisi*
1′. Head scales bicoloured, paler at their base; forewing length between 5.6 and 6.9 mm . . . . . 2
2. Uncus apically separated in four downcurved points of about equal length (as in *A. adriendenisi*) (Fig. 10); corpus bursae enlarged near middle and ductus seminalis situated laterally, directly in line with lateral position of signum (as in *A. adriendenisi*) (Figs. 17, 20) . . . . . *A. lalannei*
2′. Uncus apically separated into two broad and divergent points each with a small terminal notch (Fig. 9); corpus bursae not broadened near middle (either appearing constricted near middle if containing a spermatophore or appearing long, rather narrow, and parallel sided) and ductus seminalis inserted laterally, whereas signum is dorsal (Figs. 15, 18) . . . . . *A. montana*

## Taxonomy

### *Alucita montana* Barnes *et* Lindsey

(Figs. 1, 6, 9, 12, 15, 18, 21)

*Alucita hexadactyla* (*nec* Linnaeus, 1758: 542); Walsingham 1880: 66, pl. 3, Fig. 16; Cockerell 1889: 213, 214; Heppner 1983: 25; Covell 1984: 435, pl. 58, Fig. 23; Heppner 1987: 401; Landry 1994: 26, Fig. 1; Grehan *et al.* 1995: 13; Handfield *et al.* 1997: 47, 92; Arnett 2000: 674, Fig. 27.42.

*Orneodes hexadactyla* (*nec* Linnaeus, 1758: 542); Fernald 1891: 88; Comstock 1895: 238; Fernald 1898: 62; Dyar 1899: 140, pl. 1, Fig. 6; Houghton 1902: 89;

Fernald 1903: 448; Dyar 1904: 924; Meyrick 1910: 3; Meyrick 1913: 42; Barnes and McDunnough 1917: 152.

*Alucita montana* Cockerell, 1889: 213 (nomen nudum); Barnes *et* Lindsey 1921: 449, 450, pl. 42, Fig. 21, pl. 54, Fig. 10; Gielis 2003: 113.

*Orneodes montana* Cockerell, 1889: 213 (nomen nudum); Forbes 1923: 652, 653 (part).

*Alucita huebneri* (*nec* Wallengren, 1862: 24); Borror *et al.* 1976: 500.

*Alucita* sp.: Landry 1995: 7.

### Notes about synonymy

Citations prior to Landry (1994) and Arnett (2000) may not all refer to this species, but we were unable to verify them because of the lack of identifiable voucher specimens and the absence of useful characters when morphological information was provided.

### Type material

**Syntype:** ♀, with the following labels all in black ink: (*i*) "TDA Cockerell/ Co Col" [typed]; (*ii*) "A71/ Custer Co. Colo./ Alucita montana Cockerell/ n. sp." [hand-written]; (*iii*) "Alucita/ very close to/ polydactyla/ Z." [hand-written]; (*iv*) "Apparently examined by Zeller./ One of Cockerell's original/ specimens of his "montana," MS./ 4 bars [?]from cleft [?]a [?]faint/ [?]segment FW, but apparently/ not hexadactyla. [?]W [with bars above and underneath]" [hand-written]; (*v*) "Genitalia/ no 38 ♀/ T.B. Fletcr" [typed except for number and female sign]; (*vi*) "Presented by/ T. Bainbridge Fletcher/ B.M. 1949–487" [typed]. This specimen is in the BMNH, but the dissected abdomen and genitalia could not be located (K Tuck, personal communication).

### Other specimens examined

231 ♂ and 217 ♀ as follows. **CANADA. Alberta:** Allen Hall acreage (3 km S Nevis) (CCDB, CNC); Buffalo Lake Conservation Area (18.5 km N Stettler) (CCDB); Dorothy (BMNH); Dry Island Buffalo Jump Provincial Park (20 km E Huxley) (CCDB, CNC, NFRC); Dunvegan (Highway 2 at Peace River) (NFRC); Erskine (5 Maple Close, and 12 km SSE) (CCDB); Lethbridge (CNC); Lloydminster (Sunnydale) (CNC, MHNG); Lowden Springs Conservation Area (17 km S Stettler) (CCDB); Milk River Ridge (10 km N junction 820 and 501, 4300 ft) (CNC, NFRC); Red Deer River badlands (10 km W Drumheller) (CNC); Rochon Sands Provincial Park (CCDB); Sherwood Park (vicinity) (CNC, NFRC). **British Columbia:** Agassiz (CNC); Cranbrook (CNC); Duncan (CNC); Falkland (CNC); Golden (ZMAN); Goldstream (USNM); Grand Forks (CNC); Kaslo Cr[?]. (USNM); Kootenay National Park (Sinclair Canyon, 2 mi. E Radium) (EMEC); Okanagan Landing (USNM); Oliver (1000 ft) (CNC); Saanich District (CNC); Salmon Arm (CNC); Seton Lake (CNC); Sidney (NFRC); Summerland (CNC); Vernon (CNC, MHNG); Victoria (CNC); Wellington (CNC). **Manitoba:** Aweme (CNC); Brandon (NFRC); Fort Garry (NFRC); Grand Valley Campground (5 km W Brandon) (CNC, MHNG); Ninette (CNC); Riding Mountain Park (CNC). **Ontario:** Fitzwilliam Island (Rattlesnake Harbor) (CJKM, MHNG); Frontenac County (Perth Road) (CNC, MHNG); Kinburn (CNC); Manitoulin District (La Cloche Peninsula) (CJKM, CNC); Manitoulin Island (East Bluff of Gore Bay, Sheguiandah, and South end Pike Lake) (CJKM, CNC, MHNG); Marmora (CNC); Sharbot Lake (14 km SSE) (CNC); South March (CNC). **Quebec:** Aylmer (Chemin Klock and 18 rue Washington) (CNC, MHNG). **Saskatchewan:** 30 km N Big River (CNC); Indian Head (CNC); Katepwa Lake (CNC); Moosejaw (CNC); Regina (CNC); Saskatoon (CNC). **UNITED STATES. Arizona:** Pinetop (CNC); Walnut

Canyon (6 1/3 mi. EESE Flagstaff, 6500 ft) (USNM); White Mountains (7200 ft, 7200 – 11 500 ft, near Rice, and near McNary Post Office) (USNM). **California:** Big Creek Reserve (Monterey Co.) (EMEC); Blodgett Forest (13 mi. E Georgetown) (EMEC); Carson Ridge (EMEC); Cedar Pass (N Alturas, Modoc Co.) (EMEC); Cool (EMEC); Devil's Punchbowl (EMEC); Donner Summit (EMEC); Empire Cave (USNM); Fallen Leaf Lake (El Dorado Co.) (EMEC); Forest Hill (CNC); Grace Valley Ranch (near Onyx Summit, 2475 m) (EMEC); Herbert Creek (3 mi. W New Almaden) (EMEC); Inverness (EMEC); Inverness Park (EMEC); Kneeland (69 Prairie Lane) (EMEC); Manker Flat Campground (4 air km E Mount Baldy Post Office, 6000′) (EMEC); Marine Corps Air Station Miramar (EMEC); Mendocino County (1 mi. N Piercy) (EMEC); Miami Ranger Station (USNM); Mill Valley (CUIC); Oakland (hills back of) (EMEC); Palomar Mountain Observatory Road (4800′) (EMEC); Paso Robles (1 mi. S Meadow Valley, 4100′) (EMEC); Potwisha (3 mi. NE Ash Mountain Headquarters) (EMEC); Rancho La Sierra (USNM); Santa Cruz County (4 mi W Loma Prieta) (EMEC); Santa Cruz Island (La Cascada) (EMEC); Silverado Canyon (Santa Ana Mountains, 1650′) (EMEC); Soledad Canyon (EMEC); Spring Mountain (CNC); Table Mountain (1 air km N Big Pines, 7200′) (EMEC); University of California Russell Farm/ Reserve (4 mi. NE Orinda) (EMEC); Willits (CNC); Wolf Mountain (5 mi. SW Grass Valley) (EMEC); York Mountain (8 mi. W Templeton) (EMEC). **Colorado:** Boulder (BMNH, USNM); Buckhorn Canyon (11.5 mi. NW Masonville) (CSUC); Clear Creek County (3 mi. W Empire) (CGJB); Colorado Springs (CUIC); Denver (CUIC, USNM); Rocky Mountain National Park (Fern Lake trailhead) (CSUC); Fort Collins (5100 Greenview Crescent, 4950′, and Mail Crescent) (CSUC); Glenwood Springs (USNM); Great Sand Dunes (Mosca Creek, 8200 ft) (USNM); Hidden Point (8 mi. NNW Castle Rock, 6400 ft) (CSUC); Lookout Mountain (2395 m) (BMNH); Mesa Verde National Park (USNM); Radium State Wildlife Area (County Road 11 at Black-tail Creek, 7040 ft) (CNC, CTSD, MHNG); Rist Canyon (CSUC); Valley View Lodge (8 mi. S Steamboat Springs) (USNM); Viestenz-Smith Mountain Park (9.8 mi. W Loveland, *ca*. 5700 ft) (CNC, CTSD); Zapata Ranch (9000 ft) (USNM). **Idaho:** Latah County (6 mi. NE Moscow) (EMEC). **Iowa:** Sioux City (USNM). **Michigan:** Drummond Island (Maxton Plains) (CGJB, CNC, MHNG). **Minnesota:** Becker Co. (6 mi. SW Detroit Lakes) (EMEC); Buffalo State Park (CNC); Moorhead (Clay Co.) (EMEC). **Montana:** Chestnut Cave (Gallatin Co.) (USNM); Dry Creek Cave (Gallatin Co.) (USNM); Sweet Grass County (7 3/4 mi. N Big Timber, near Big Timber Creek) (USNM). **Nebraska:** Fort Niobrara National Wildlife Refuge (USNM). **Nevada:** Austin Summit (Lander Co.) (EMEC); Lehman Creek (11 km W Baker) (EMEC); Timber Creek (7 air mi. E McGill, 8800′) (EMEC); Toiyabe National Forest (Bob Scott Campground, 7300–7500 ft) (USNM). **New Mexico:** Bear Trap Camp (28 mi. SW Magdalena) (USNM); Carozozo [probably = Carrizozo] (USNM); Mesilla (MHNG, USNM); Sangre de Cristo Mountains (near Cowles) (MHNG, USNM). **North Dakota:** Badlands, Burning Coal Vein Campground (CNC). **Oregon:** Clackamas Co. (near Wilsonville) (EMEC); Eugene (BMNH); Grants Pass (BMNH); Spring Creek (USNM); 28 mi. SE Joseph (5400 ft) (USNM); Umpqua River (14 mi. N Tiller) (CNC). **South Dakota:** Elk Point (USNM); Rockerville (*ca.* 4500 ft) (CNC). **Texas:** Marfa (USNM). **Utah:** Callao (USNM); Great Basin Experimental Station (near Ephraim, 8850 ft) (USNM); Logan (EMEC, USNM); Major's Flat (Ephraim Canyon, 7100 ft) (USNM); Snake Creek (*ca*. 3 mi. NW Midway) (USNM); Spring Creek (8840 ft) (CSUC); Timpooneke Campground (Mount Timpanogos, 8000 ft) (EMEC); Wasatch Co. (7 mi. E Springville, 6000′) (EMEC). **Vermont:** Grand Isle (Barnesbay) (UVCC). **Washington:** Bellingham (MHNG, USNM); Bodie Mountain (5200 ft) (USNM); Bremerton (CNC); Kamiack Butte (CUIC); Lake

Crescent (Rosemary Inn) (USNM); Lost Lake (near Havillah) (USNM); Port Townsend (USNM); Pullman (EMEC, USNM); Tacoma (CUIC); Tenino (CNC).

## Diagnosis

Males of *A. montana* are best recognized by the shape of the uncus, which has the apex separated into two broad and divergent points or branches each terminated by a small emargination (Fig. 9). In *A. adriendenisi* (Fig. 11) and *A. lalannei* (Fig. 10) the uncus is terminated by four points more or less equally separated from each other. Specimens of *A. montana* are generally smaller (4.7–6.9 mm forewing (FW) length) than those of *A. adriendenisi* (6.5–8.1 mm FW length) but are the same size as those of *A. lalannei* (5.6–6.3 mm FW length). Females must be dissected to confirm identification. In females of *A. montana* (Figs. 15, 18) the ductus bursae gradually broadens over its length, the corpus bursae is narrow and parallel sided or shows a constriction near the middle, the ductus seminalis is inserted on the ductus bursae on the right side, and the signum is dorsal. In the female genitalia of *A. adriendenisi* (Figs. 16, 19) and *A. lalannei* (Figs. 17, 20) the ductus bursae is narrow over its entire length, the corpus bursae is enlarged near the middle, and the ductus seminalis is inserted at the base of the corpus bursae on the right side in line with the signum.

## Redescription

**Head** with most scales dirty white at their base and gradually becoming more or less pale brown or greyish brown toward tip; with few uniformly white scales at base of antenna and uniformly dark brown scales along eye margin anteriorly and posteriorly; scales of frontoclypeus more uniformly coloured, almost white, slightly darker toward tip. Maxillary palpus dark brown. Labial palpus with white below and dark brown above on first segment; second segment with white band medially, not reaching apex ventrally, and as single row of scales dorsoapically, with most scales of lateral surface bicoloured, white to pale yellowish brown at base and brown at apex; third segment mostly dark brown with white patch dorsally at base, sometimes with another white patch at apex or mostly white on dorsal edge, brown scales bicoloured, white at their base; third segment about three-quarters of length of second. Antenna dorsally at base mostly greyish brown (sometimes almost black) with first row of scales on first few flagellomeres sometimes paler, contrasting with second row of scales; subsequent flagellomeres with scales gradually paler; scape mostly white ventrally, with longitudinal dark brown stripe and longitudinal band of white scales, becoming greyish white from base of scape to approximately tenth flagellomere ventrally. **Thorax** with scales bicoloured, pale whitish beige at their base and mostly pale brown (sometimes slightly ochreous brown) at apex, although darker brown at bases of tegulae, base of mesoscutum between tegulae, apices of larger scales at tips of tegulae, and base and apex of metascutum; dark blackish brown on mesoscutellum. Foreleg pale greyish brown on coxa, dark brown laterally on femur, tibia, and tarsomeres, with scales dirty white at their base, with a few white scales at middle and tip of tibia and apices of tarsomeres I, II, and V (sometimes also III and IV but less conspicuous). Midleg similar to foreleg, with dark brown scales slightly paler and with more conspicuous white scaling at apices of tarsomeres III and IV. Hind leg paler than midleg, more prominently beige, including middorsal tibial tuft, with slightly darker brown scaling dorsally on tibia, laterally on lateral tibial spines, and on most of dorsal surfaces of tarsomeres I to IV. Forewing length: males 4.7–6.3 mm; females: 5.2–6.9 mm. Forewing (Fig. 1) with scales bicoloured, white to pale beige at bases, pale brown to dark brown at apices, except for some pure white scales; costa with seven to nine darker brown spots, first spot

subbasal, small, sometimes absent, second spot (before base of second wing cleft) darker, next four to six dark brown, third between clefts I and II, fourth at cleft I, fifth and sixth equally separated from fourth and seventh, sixth not reaching inner margin of plume, seventh covering apical sixth of first plume or appearing separated into three small spots, seventh and eighth often connected on inner margin of plume or fused, usually with a few white scales before and after darker spots on costa, on inner margin of spot six, and in fringe before and after spots, except sixth; inner margin with pair of black spots subbasally and before cleft V; each plume with basal pale brown section followed by darker brown section, another pale brown section, a second dark brown section, another pale brown section, and a dark brown spot apically, with most distinct dark brown sections at ends of plumes II to IV and bases of plumes III to VI, with white scales at base and apex of each darker brown section; fringe concolorous with each section but with scattered ochreous maroon scales, white at bases of tufts and at apex of each plume. Hind wing with bicoloured scales as in forewing, almost as a pattern of alternating pale and dark brown changing with each half-scale, with only a few small spots of dark brown or white; fringe concolorous with adjacent scales, with few ochreous scales. **Abdomen** dorsally with most scales bicoloured, white to greyish white at their base and various shades of brown, including ochre sometimes, at their apex, with dark brown row at apical margin of tergum I sometimes interrupted by white scales in middle, with pure white scales in row at apical margins of terga II to VII, white also over genitalia; ventrally all white or dirty white to pale greyish brown with white at apical margins of sterna and greyish brown spots laterally. Male sternum VIII (Fig. 6) with broad, more or less rounded emargination mediobasally, with lateral plates of scent scales more or less conical, apical margin slightly emarginated with rounded melanized area on each side of emargination; tergum VIII narrow, with thin but strongly melanized anterior margin, broadly convex, more lightly and widely melanized and with short posterolateral extension at each lateral end, with narrow band of scent scales posteriorly.

**Male genitalia** ($n$ = 39) (Figs. 9, 12). Uncus narrow with distal half only slightly widened, slightly downcurved near middle, apically separated into two broad and divergent points or branches each terminated by small emargination. Gnathos with median arm straight, narrow, set at 45° angle from slightly curved and shorter basal arms, apex bluntly rounded. Tegumen short, compact, rounded dorsally. Juxta with pair of long and narrow arms with short and sparse setation, without angle between arms and basal plate. Valva with cucullus short, slightly widened in distal half, rounded apically; basal processes short, symmetrical, narrow, apically rounded, with short tooth on external edge. Arms of vinculum long, narrow, joined ventrally in slightly rounded V. Aedeagus apically with large sclerotized plate dorsally and smaller one ventrally; vesica with single elongate cornutus slightly less than one-fifth of length of aedeagus and pointed at both ends.

**Female genitalia** ($n$ = 64) (Figs. 15, 18). Papillae anales elongate, narrowly rounded apically. Posterior apophyses thin, extended to middle of segment VIII. Segment VIII mostly membranous except for strongly melanized dorsal band connecting bases of anterior apophyses; with long setae on apical margins ventrally and dorsally. Anterior apophyses thin, with small zone of melanization at base dorsally with a few short setae, straight, extended along lateral margins of segments VIII and VII to about middle of segment VII. Ostium bursae in dorsoventrally flattened, sclerotized cavity with almost straight lateral margins, a more strongly melanized band with scobination medially, and small plates laterally in constriction before ductus bursae. Ductus bursae narrow at base, gradually widening to about 3 times its basal girth, with scobination over its entire length. Ductus seminalis inserted on right side at two-thirds of ductus

bursae. Corpus bursae (when containing spermatophore) with enlarged, circular, scobinate basal section, medially constricted, distal portion without scobination; signum situated dorsally, made of densely set scobinations forming circular depression; spermatophore a narrow tube of variable length that begins slightly sinuated at about middle of ductus bursae, reaches bottom of corpus bursae, and loops back broadly to end in sphere in basal portion of corpus bursae (pressure exerted by spermatophore on walls of distended distal portion of corpus bursae makes this portion look dorsoventrally flattened). Apical margin of sternum VII slightly concave; tergum VII slightly longer that sternum VII, with apical margin straight.

## Comments

Cockerell (1889) first mentioned *A. montana* as a manuscript name for specimens from Custer County, Colorado, that he sent to various authorities for identification. One such authority, Lord Walsingham, identified Cockerell's specimens as *A. hexadactyla* L. (Cockerell 1889). Cockerell never formally published the name nor did he refer to *montana* in subsequent papers. Barnes and Lindsey (1921, p 449) provided the first description of *A. montana* with illustrations of the adult and male genitalia and recorded Custer County as the type locality. Therefore, Barnes and Lindsey are the authors of *A. montana*. Barnes and Lindsey did not actually mention that they examined type material, but it is clear that they were referring to the specimens collected by Cockerell in Custer County as the types, as shown by their mention of type locality. We found one female specimen from Custer County collected by Cockerell in the BMNH. We were hoping to select this specimen, with a genitalia preparation numbered 38 (by TB Fletcher), as the lectotype. Unfortunately, the genitalia preparation could not be found (K Tuck, personal communication), and the specimen cannot be identified with certainty. We are, however, confident that it belongs to *A. montana* Barnes *et* Lindsey because the 29 specimens we have examined from Colorado all belong to *A. montana*, and its forewing length of about 6 mm (the uncertainty is due to downcurved plumes) is in the size range for this species. Given that there may be additional syntypes in one or more collections elsewhere, a complete specimen could be found that would make a better lectotype. If the genitalia of the BMNH specimen were found, that specimen could be designated as the lectotype.

Until recently, *A. montana* Barnes *et* Lindsey had a junior primary homonym, *A. montana* Zaguljaev, 1993. Gielis (2003) proposed *Alucita kazachstanica* as a replacement name for the latter.

*Alucita montana* (Fig. 21) is distributed from southwestern Quebec (Gatineau) and Vermont in the East to British Columbia in the Northwest, south to Arizona, California, and Texas.

One to four spermatophores were found in the corpus bursae of dissected females.

## Life history

In El Dorado County, California, *A. montana* was reared from *Symphoricarpos vaccinioides* Rydb. (Caprifoliaceae) by DL Wagner (specimens in EMEC). Leaves with cocoons were collected between 2 and 4 July 1983, and moths emerged on 25 and 27 August of the same year (J Powell, personal communication).

We have also examined two specimens from California (Santa Clara Co., in EMEC) that have a label with "*Symphoricarpos albus*", probably indicating that they were found as adults on the plant (PA Opler, personal communication).

In addition, Dyar (1904) recorded a specimen under the name *Orneodes hexadactyla* L. that was probably bred from leaves of snowberry (*Symphoricarpos* sp.)

from the Kootenay Land District of British Columbia. This record almost undoubtedly refers to *A. montana*, as we have not found the other species of *Alucita* in British Columbia, and the host plant matches.

This species overwinters in the adult stage, as shown by collecting dates in December and January, although many collecting dates are in April and May, as well as September and October. Moths have been collected also in all summer months, even in Canada. Overwintering sites have been recorded as caves and houses. Specimens collected by TL McCabe (personal communication) in winter in an abandoned bank swallow (*Riparia riparia* (L.)) nest in Muskoda, Clay County, Minnesota, may belong to this species, but the specimens were not located. The moths are attracted to light.

## *Alucita adriendenisi* sp. nov.

(Figs. 3–5, 8, 11, 13, 16, 19, 22)

*Orneodes montana* Cockerell, 1889: 213 (nomen nudum); Forbes 1923: 652, 653 (part).
*Alucita* sp.: Landry 2000: 8.

### Notes on synonymy

Forbes (1923) referred to a species found from New York (Ithaca) to the western United States. We have been able to examine one specimen from Ithaca in the CUIC and confirm that it is *A. adriendenisi*; however, Forbes's (1923) mention of the western United States probably refers to specimens of *A. montana*.

### Type material

**Holotype:** ♂. **CANADA. Ontario:** Manitoulin Is[land]., Gore Bay, 4.viii.1979 (JK Morton) (CNC Type No. 22878). **Paratypes:** 69 ♂ and 88 ♀. **CANADA. Alberta:** 1 ♂, Big Knife Prov[incial]. Park, 1.v.2002 (CD Bird) (CCDB); 1 ♀, 19 km E Trochu, west side of Tolman Bridge, 9.viii.2002 (CD Bird) (CCDB); 2 ♂ (one dissected, Gielis 3624), Carson, Pegasus P[rovincial]. P[ark]., n[ea]r. Whitecourt, 25–29.vii.1989 (C and A van Nidek) (ZMAN); 1 ♂ (dissected, MIC 3671), Edmonton, Univ[ersity]. campus, 9.x.1984 (J-F Landry) (CNC); 1 ♀ (dissected, MIC 4082), Edmonton, Em[erged]. 4–2, Inc[?]. 76, no num[?], Host ? (no collector) (CNC); 1 ♂ (dissected, BL 1452), Edm[onton]., 10.xi.1951 (JH Brown) (CNC); 1 ♂, Edmonton, Winterburn Road, 17.iv.1983 (GD Braybrook) (CNC); 3 ♂, 2 ♀, Edmonton, 8 km SE Sherwood Park, aspen forest at dusk, 18.v.2003 (GR Pohl) (CNC, NFRC); 6 ♂, 5 ♀, same locality, aspen forest edge at dusk, 28.vii.2003 (GR Pohl) (CNC, NFRC); 3 ♂, 4 ♀, same locality, aspen forest edge in afternoon, 29.vii.2003 (J-F Landry) (CNC); 1 ♂, House River, F[or]t. McMurray, 25.viii.1932 (G Cinnamon) (CNC); 1 ♂, Jasper, 24.vii.1926 (J McDunnough) (CNC); 1 ♂, Olds (no date or collector) (USNM); 1 ♀ (dissected, BL 1484), 8 km SE Sherwood Pk., meadow, 10.viii.1996 (GR Pohl) (NFRC); 1 ♂ (dissected, MIC 4790), same locality as preceding, 16.vii.1998 (GR Pohl) (NFRC); 10 ♂ (1 dissected, JFL 1589), 12 ♀ (1 dissected, JFL 1590), 8 km NW Winfield, 22–23.iv., 20.v., 6.viii., 17.viii., 18.viii., 9.ix.2000, 7.iv., 2.viii.2001 (CD Bird) (CCDB, CNC); 1 ♀ (dissected, BL 1460), 30 km NW Zama Lake, 59°20′N, 118°27′W, C[anadian] F[orest] S[ervice] Zama study site, 19.ix.1996 (GR Pohl) (NFRC). **Northwest Territories:** 1 ♂ (dissected, BL 1501), [Wood?] Buffalo Pk., Bear River, 12.ix.1926 (J Russell) (CNC); 1 ♂, Fort Smith, 15.viii.1950 (JB Wallis) (CNC); 1 ♀ (dissected, BL 1465), Fort Simpson, 20.viii.1950 (DP ?Whillans) (CNC). **Ontario:** 1 ♂ (genitalia prepared for SEM), 1 ♀, same data as holotype (CJKM, CNC); 2 ♂, same data as holotype except 12.ix.1976 and 25–27.v.1978 (CJKM, CNC); 1 ♂, 1 ♀, Manitoulin Is., S end Pike Lake, 23.v.1995 (JK

Morton) (CJKM, MHNG); 2 ♀ (one dissected, MIC 4074), Manitoulin Is., S end Pike Lake, 26.vii.1995 and 14.x.1995 (JK Morton) (CJKM, CNC); 1 ♂, Manitoulin Is., Pike Lake outlet, 9.v.1979 (JK Morton) (CJKM); 1 ♂, Manitoulin Is., Sheguiandah, N of Bass Lake, 19.viii.1982 (JK Morton) (CJKM); 1 ♀ (dissected, BL 1456), Manitoulin Is., The Cave, W side L[ake]. Mindemoya, 2–6.v.1980 (JK Morton) (CJKM); 1 ♂, Manitoulin Is., McLean's Park, New England r[oa]d, 2.vi.1997 (JK Morton) (CJKM); 1 ♀, Manitoulin Is., 5 mi[les] S of Gore Bay, 16.v.1977 (JK Morton) (CJKM); 1 ♂, Manitoulin Is., IR 22, WSW of West Bay, 14.x.1995 (JK Morton) (CJKM); 1 ♀, Manitoulin Is., New England rd., N end, 29.v.1997 (JK Morton) (CJKM); 1 ♀ (dissected, BL 1457), Manitoulin Is., New England rd nr H[igh]w[a]y 6, 2.vi.1997 (JK Morton) (CJKM); 1 ♂ (dissected, MIC 4784), 1 ♀ (dissected, BL 1455), Manitoulin Is., rd. to Campbell H[ea]d., 5.vi., 7.ix.1997 (JK Morton) (CNC, MHNG); 1 ♀ (dissected, MIC 4789), Manitoulin Is., escarpment W of West Bay, 27.vii.1990 (JK Morton) (CJKM); 1 ♀, Flower Pot Is., Tobermory, 16.viii.1974 (JK Morton) (CJKM); 2 ♀ (one dissected, MIC 4079), Flower Pot Is., Tobermory, campsite, 6.vi.1984 (JK Morton) (CJKM, CNC); 1 ♀, Cove Is. H[ar]b[o]r., Tobermory, 6.vi.1984 (JK Morton) (CJKM); 1 ♂ (dissected, MIC 4071), Fitzwilliam Is., Rattlesnake Hbr., 2.x.1980 (JK Morton) (CJKM); 1 ♀, Manitoulin Dist[rict]., Cup and Saucer trail, entrance, 27.v.1995 (JK Morton) (CJKM); 1 ♂, Trenton, 5.iv.[19]05 (Evans) (CNC); 1 ♂, W Ontario, Upsala, 22.vii.1955 (AB Klots) (USNM); 1 ♂, Geraldton, 28.viii.1954 (JCE Riotte) (USNM); 1 ♀, Geraldton, 14–19.vii.1955 (AB Klots) (USNM); 1 ♂, Black Sturgeon Lake, 14.vi.[19]64, Trap light (no collector) (CNC); 1 ♀ (dissected, MIC 4070), Frontenac Co[unty]., Perth Road, 8.v.1970, u[ltra]. v[iolet]. light (P Ward) (CNC); 1 ♂, Frontenac Co., Perth Road, 3.iv.1974 (P Ward) (CNC). **Quebec:** 1 ♀, Abitibi-Ouest, La Sarre, route de Dupuy, 27.vii.1999, jour (B Landry) (MHNG); 6 ♂ (three dissected, BL 1429, BL 1440, BL 1441), 8 ♀ (one dissected, BL 1428), Abitibi-Ouest, La Sarre, luz, 24.viii.2002 (B Landry) (CNC, MHNG); 1 ♂, Laniel, 19.ix.1938 (AR Hall) (CNC). **Saskatchewan:** 1 ♂ (dissected, JFL 1606), Amisk Lake, reared honeysuckle FIS W64 1449(01), em. 20.vii.1964, NFC (NFRC); 2 ♀ (one dissected, JFL 1604), vicinity Big River, plot B5-C, # 145 and # 147, UV trap, 7.ix.1993 (GR Pohl) (CNC, NFRC); 1 ♀, same data as preceding except plot X, 7.ix.1994 (NFRC). **Unknown province:** 1 ♀ (dissected, BL 1486) ?Strathcona, 30.v.[19]05 (no collector) (CNC). **UNITED STATES. Arizona:** 1 ♂, Apache Co., White M[oun]t[ain]s., near McNary P[ost]. O[ffice]., 15–30.ix.1925 (OC Poling) (USNM); 1 ♂, Cochise Co., Chiricahua Mountains, Cave Creek Canyon, 5400′, 13.iii.1966 (JG Franclemont) (USNM); 1 ♂ (dissected, BL 1468), Cochise Co., Chiricahua Mts, Rattlesnake Cave, 15.vi.1962 (RE Graham) (USNM); 3 ♀ (one dissected, BL 1461), Cochise Co., Chiricahua Mt's., Southwestern Research Station, 17, 19, 24.iv.1962 (CW Kirkwood) (CNC); 1 ♀ (dissected, BL 1470), Cochise Co., S[outh] W[estern] R[esearch] S[tation], 5 mi. W Portal, 15.iv.1969 (AB Klots) (USNM); 1 ♀ (dissected, BL 1462), Cochise Co., Cave Creek Ranch, W of Portal, 15.iv.1988 (G Balogh) (CGJB); 1 ♀, Cochise Co., Copper Canyon, 6000′, 15.iv.[19]86, bl[acklight]. (J Powell) (EMEC); 1 ♂, White Mts., Apache Ind[ian]. Res[erve]., El[evation]. 7000 f[ee]t., 15–30.vi.[19]25 (OC Poling) (USNM); 3 ♀ (one dissected, USNM 1895), White Mts., Apache Ind. Res., El. 7000 ft., 1–15.vii.[19]25 (OC Poling) (USNM); 1 ♀ (dissected, USNM 1896), White Mts., San Carlos Ind. Res., 15–30.vi.1925 (OC Poling) (USNM); 4 ♂ (one dissected, USNM 1887), 12 ♀ (one dissected, USNM 1888), Coconino Co., West Fork, 6500′, 16 mi. SW Flagstaff, 7.viii.1961 (1 ♀), 10.viii.1961 (1 ♂, 3 ♀), 13.viii.1961 (2 ♂, 4 ♀), 20.viii.1961 (1 ♂, 4 ♀) (RW Hodges) (MHNG, USNM); 1 ♂, 5 ♀, Coconino Co., West Fork, 6500′, 16 mi. SW Flagstaff, 3.viii.1965 (1 ♀), 17.viii.1964 (1 ♂, 4 ♀) (JG Franclemont) (USNM). **Michigan:** 1 ♂ (dissected, MIC 4792), Alger Co., near Sable Falls, 7.ix.1992 (GJ Balogh) (CGJB);

1 ♂ (dissected, BL 1454), Keweenaw Co., Ft Wilkins S[tate] P, 25.vi.1997, ex larva, flowers of Lonicera dioica, iss[ued]. 5.viii.1997 (GJ Balogh) (CGJB); 1 ♂, 1 ♀, Montmorency Co., [no date] (R Beebe) (CUIC). **New York:** 1 ♀ (dissected, JFL 1610), Ithaca, Wyckoff Flat Fall, 17.iv.1913 (MC Stiyke) (CUIC). **Texas:** 1 ♀ (dissected, BL 1447), Brewster Co., Chisos Mts, Panther Pass, 6000′, 2.vi.1973 (RW Hodges) (USNM).

## Etymology

The name honors Adrien Denis, who in the late 1930s assisted entomologist Carl E Atwood in Laniel, Témiscamingue, Quebec, where one specimen of *A. adriendenisi* was collected. CE Atwood and A Denis worked at a now closed Forest Insect Research Station of the then Forest Entomology Division of the Department of Agriculture of Canada. CE Atwood was the father of internationally acclaimed writer Margaret Atwood, who supports the Nature Discovery Fund of the Canadian Museum of Nature. We are pleased to answer Margaret Atwood's request to honor a man whose skills and dedication were instrumental in the successful operations of the site where he worked during many field seasons. Accompanying her father, along with the rest of the family, to spend the summer in a bush camp left a significant impression on Margaret Atwood as a young girl, which has reverberated in her writings.

## Diagnosis

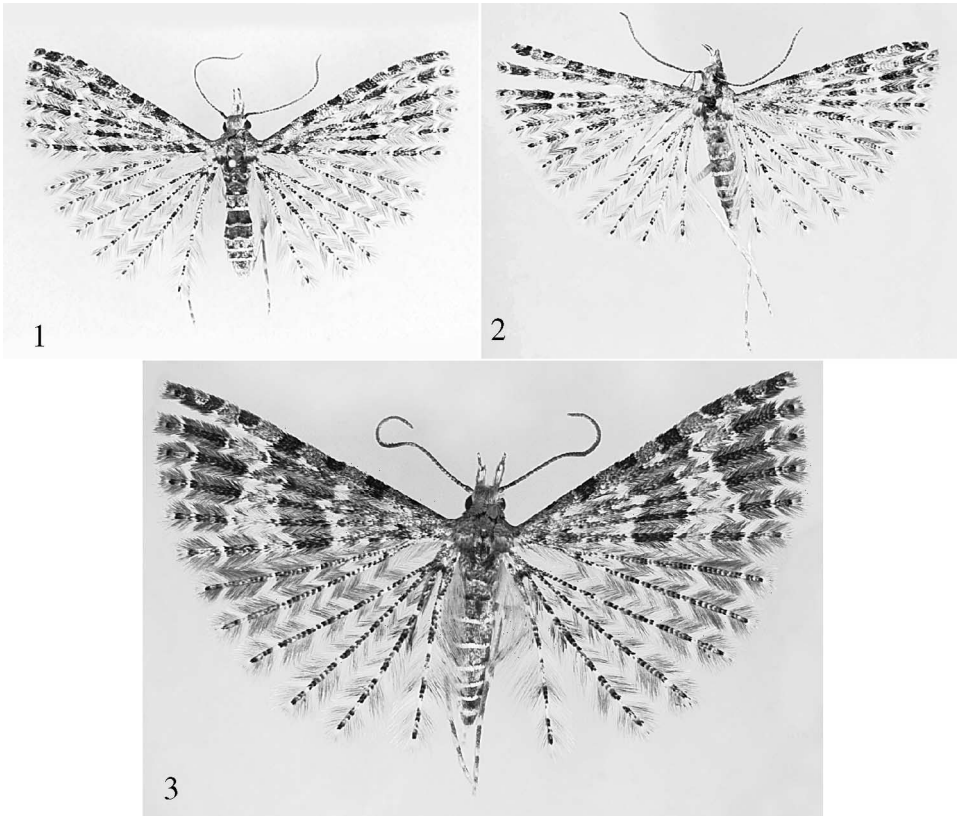
*Alucita adriendenisi* is, on average, larger than both *A. montana* and *A. lalannei* (see details in *A. montana* Diagnosis above), and the head scales are uniformly greyish brown, as opposed to bicoloured (dirty white at their base to pale brown or greyish brown at their tip) in *A. montana* and *A. lalannei*. The male genitalia have the uncus apically divided in four well-separated downcurved points (Fig. 11), more or less as in *A. lalannei* (Fig. 10), while that of *A. montana* (Fig. 9) is apically divided in two, with each tooth slightly notched to form a pair of short points. For details on how to identify *A. lalannei* and *A. adriendenisi* on the basis of male genitalia, see Diagnosis for *A. lalannei* below. The female genitalia of *A. adriendenisi* (Fig. 16) and *A. lalannei* (Fig. 17) have the corpus bursae broadest in the middle, while that of *A. montana* (Fig. 15) is longer, narrow, tubelike, or constricted in the middle if it contains a spermatophore. The insertion of the ductus seminalis is in a straight line with the signum on the right side in *A. adriendenisi* (Fig. 19) and *A. lalannei* (Fig. 20), whereas the ductus seminalis is lateral and the signum dorsal in *A. montana* (Fig. 18). Female genitalia characters to distinguish *A. adriendenisi* from *A. lalannei* are given below in the Diagnosis for *A. lalannei*.

## Description

**Head** (Figs. 4, 5) almost uniformly pale greyish brown with a few white and dark brown scales around eye. Maxillary palpus dark brown. Labial palpus with white below and dark brown above on first segment; second segment with white medially, dorsoapically, and as band not reaching apex ventrally, with most of lateral surface scales bicoloured, white to pale greyish brown at their base and brown to greyish brown at their apex; third segment mostly dark brown with scales bicoloured, white at base, with white patch dorsally at base, sometimes with another white patch at apex or mostly white on dorsal edge; third segment about three-quarters of length of second, including ventral tuft of second segment. Antenna dorsally at base mostly dark brown (sometimes almost black) with first set of scales on first few flagellomeres sometimes paler,

contrasting with second set of scales, subsequent flagellomeres with scales gradually paler, with scape and pedicel mostly white ventrally, with longitudinal dark brown stripe and longitudinal band of white scales from base of scape extending on 4–5 flagellomeres or less. **Thorax** (Fig. 4, part) with scales bicoloured, pale greyish brown at their base and mostly greyish brown at their apex, although darker brown at bases of tegulae, base of mesoscutum between tegulae, apices of larger scales at tips of tegulae, on base and tip of metascutum, and dark blackish brown on mesoscutellum. Foreleg pale greyish brown on coxa, with whitish scales apically; femur slightly darker than coxa; tibia and tarsomeres dark brown with scales dirty white at their base, with a few white or beige scales at apex and middle (sometimes) of tibia and at apices of tarsomeres I, II, and V, but also sometimes III and IV. Midleg similar to foreleg but paler and with more conspicuous beige or white scaling at apices of all tarsomeres. Hind leg like midleg yet paler, more prominently beige, including middorsal tibial tuft, with slightly darker brown scaling dorsally on tibia, laterally on lateral tibial spines, and on most of dorsal surfaces of tarsomeres I to IV. Forewing length: males, 6.6–7.8 (holotype) mm; females, 6.6–8.1 mm (one specimen = 5.9 mm). Forewing (Fig. 3) with scales bicoloured, white to pale beige at their base, pale brown to dark brown at their apex, except for some pure white scales and a few scales with an orange–brown tinge; costa with seven to nine darker brown spots, first spot subbasal, small, poorly differentiated, second spot (before base of second wing cleft) darker, next four to six dark brown, third between clefts I and II, fourth at cleft I, fifth and sixth equally separated from fourth and seventh, fourth and sixth not reaching inner margin of plume, seventh covering apical sixth of first plume or appearing separated into three small spots by white markings, seventh and eighth usually connected on inner margin, usually with a few white scales before and after these darker spots, on inner margin of sixth spot, and in fringe before and after spots, except sixth; inner margin with pair of darker brown spots subbasally, also with small black spots before clefts (often absent on cleft II); each plume with basal pale brown section followed by darker brown section, another pale brown section, a second dark brown section, another pale brown section, and a dark brown spot apically, with most distinct dark brown sections at ends of plumes II to IV and at about basal third of plumes III to VI, with white scales at base and apex of each darker brown section; fringes concolorous with each section but with few scattered orange–brown scales and fringe scales at apex of each plume, white at their base. Hind wing with bicoloured scales as in forewing, almost as a pattern of alternating pale and dark brown changing with each half-scale, with only a few small spots of dark brown or white sometimes becoming gradually more conspicuous on plumes III to VI; fringe concolorous with adjacent scales, with few orange-tinged scales toward plumes IV and V. **Abdomen** dorsally with scales bicoloured, dirty white at their base and greyish brown to dark brown at their apex, with row of dark brown at apical margins of tergum I, with row of white at apical margins of terga II to VII, beige or white around genitalia; ventrally mostly white to dirty white with greyish brown spots sometimes laterally. Male sternum VIII (Fig. 8) with broad, more or less broadly rounded emargination mediobasally, with lateral plates of scent scales more or less oval with posterior margins more convex than anterior margins and medially with narrow melanized projection directed anteromedially, apical margin slightly emarginated although not melanized, with narrow pockets on each side of emargination; tergum VIII narrow, with strongly melanized anterior margin, broadly convex, each lateral end more lightly and widely melanized and with short posterolateral extension, with narrow band of scent scales posteriorly.

**Male genitalia** ($n$ = 14) (Figs. 11, 13). Uncus wide, about one-third longer than tegumen, widened toward apex, almost straight in lateral view, apically divided in four




**FIGURES 1–3. Habitus of North American *Alucita* species: 1, *A. montana*, female, California, Contra Costa County, forewing length 6.25 mm; 2, *A. lalannei*, holotype, Ontario, Maynooth, forewing length 5.6 mm; 3, *A. adriendenisi*, female paratype, Quebec, Abitibi-Ouest, forewing length 7.94 mm.**

points directed downward, median points narrow, lateral points situated at apices of triangular lateroapical corners, appearing set at more or less right angle from median points in ventral view. Gnathos with median arm straight, slightly shorter than tegumen, set at about 45° angle from slightly curved and shorter basal arms, apically rounded and enlarged. Tegumen compact, slightly rounded dorsally. Juxta with pair of rather long and wide, laterally compressed arms, with short and sparse setation, apically rounded. Valva with cucullus narrow, as long as tegumen, only slightly widened toward apex, apically rounded; basal processes short, with few setae, symmetrical, thumb-like, with or without extra knobs. Arms of vinculum long, narrow, U-shaped at ventral junction and shortly projected upward. Aedeagus narrow, slightly curved, apically with large sclerotized plate; coecum penis (section before connection with ductus ejaculatorius) nearly half total length of aedeagus; vesica with pair? of short sclerotized plates associated with some scobination but without other cornuti.

**Female genitalia** ($n$ = 25) (Figs. 16, 19). Papillae anales long, narrowly rounded apically. Posterior apophyses thin, basally following lateral margins of abdomen, extended to middle of segment VIII. Segment VIII mostly membranous except for strongly melanized dorsal band connecting bases of anterior apophyses; with long setae on apical margins ventrally and dorsally. Anterior apophyses thin, with small zone of melanization at base dorsally adorned with a few short setae, straight along lateral


**FIGURES 4–5. Head of *A. adriendenisi*, paratype, Quebec, Abitibi-Ouest: 4, dorsal view; 5, lateral view.**

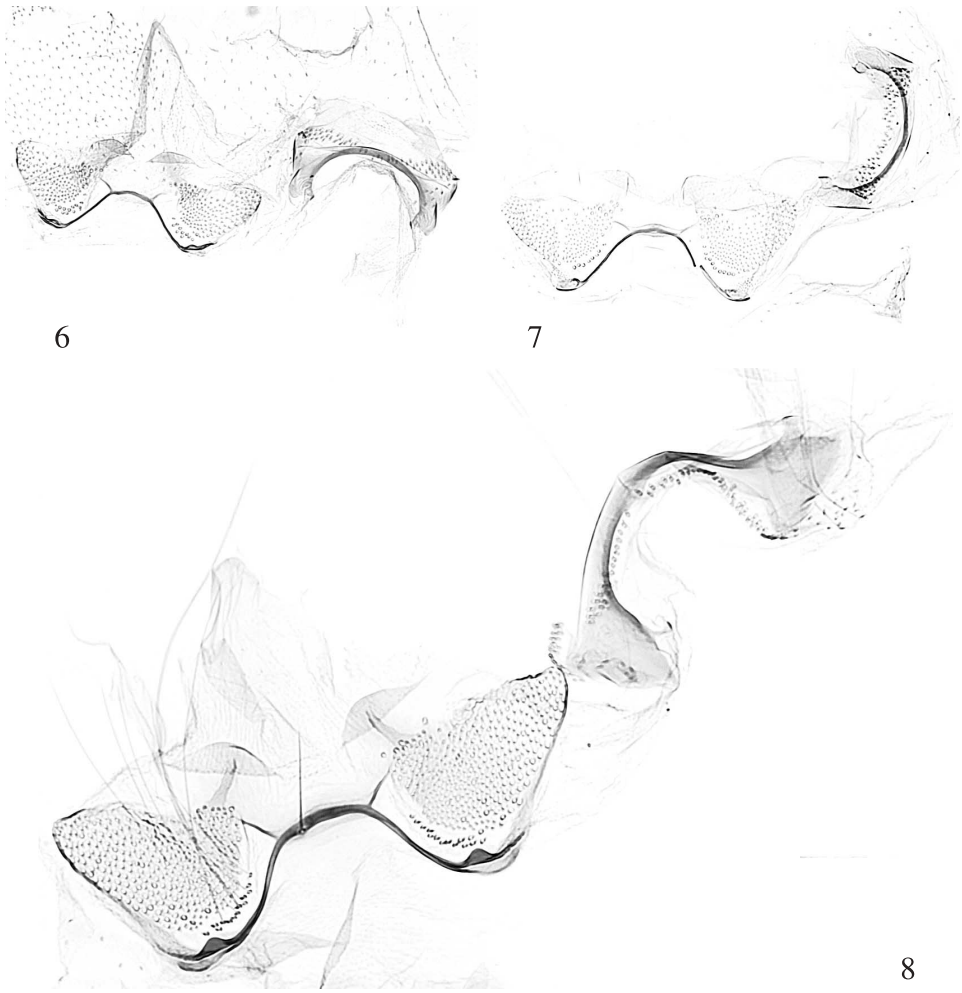
margins of segments VIII and VII, reaching about middle of segment VII. Ostium bursae in dorsoventrally flattened sclerotized cavity (antrum) with straight or slightly convex lateral margins, narrower than length of transverse connecting band of anterior apophyses, with more strongly melanized band medially and with scobination; with small plates laterally in constriction before ductus bursae. Ductus bursae short (about one-fifth of length of corpus bursae), narrow, not distinctly widened before corpus bursae, scobinated. Ductus seminalis inserted on right side at base of corpus bursae, in straight line with signum of corpus bursae. Corpus bursae large and elongate, wider before middle, scobinated on basal half except laterally and posteriorly around connection with ductus seminalis, sometimes with short bump at inception of ductus seminalis, without median constriction, with signum made of densely set scobinations forming circular depression situated shortly before middle, at 0.3–0.35 ($n$ = 10) distance between ductus seminalis and anterior end of corpus bursae; spermatophore beginning as narrow tube with short coil followed by wider unfolding coil over apical sphere, descending to anterior end of corpus bursae, then abruptly looped back and terminating in sphere located at position of signum. Apical margin of sternum VII slightly concave; tergum VII slightly longer that sternum VII, with apical margin straight.

## Life history

A specimen of *A. adriendenisi* was reared by George Balogh from a larva found feeding on flowers of *Lonicera dioica* L. (Caprifoliaceae) in Keweenaw County, Michigan. Another specimen was reared from honeysuckle (*Lonicera* sp.) at Amisk Lake, Saskatchewan.

This species overwinters in the moth stage, as shown by series of specimens collected in the dark zone of a cave in December, January, and March in West Virginia. An overwintering specimen was also collected under the bark of a dead elm (*Ulmus* sp., Ulmaceae) in Ontario. We have also examined specimens collected from April to November.

The moths are attracted to light but also fly in the daytime (morning, afternoon, and dusk). One specimen was collected one hot and sunny morning of late July by BL in La Sarre, Abitibi, Quebec, after it had flown into a parked pickup truck.



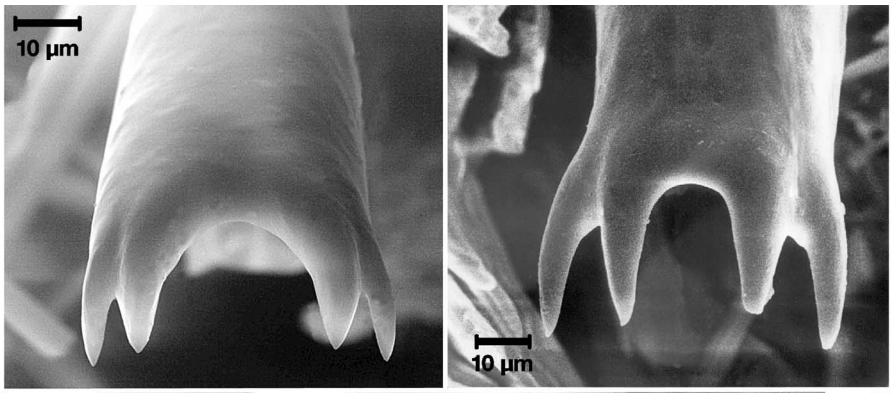

**FIGURES 6–8. Segment VIII of North American *Alucita* species (sternum on the left): 6, *A. montana*; 7, *A. lalannei*; 8, *A. adriendenisi*.**

In Edmonton (Alberta) in 2003 moths were flying in good numbers in an aspen forest where *Lonicera* spp. and *Symphoricarpos* spp. were abundant. The 2002 La Sarre (Quebec) series also came from an apsen forest where *Diervilla lonicera* Mill. (Caprifoliaceae) is common.

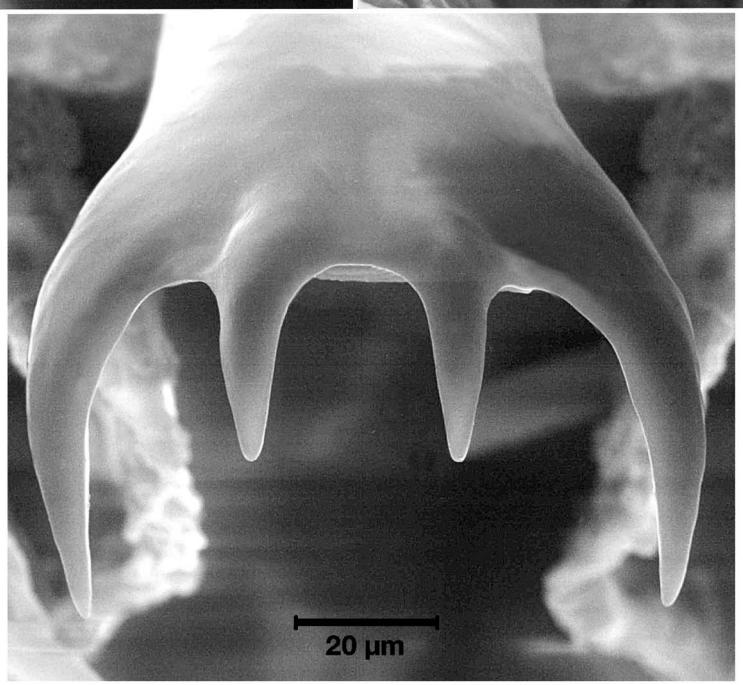
## Comments

The distribution of *A. adriendenisi* (Fig. 22) extends from western Quebec (Abitibi) and New York State in the East to Alberta and the Northwest Territories in the Northwest, with southern populations (isolated?) in West Virginia, Arizona, and Texas.

It has not been possible to determine with certainty whether the vesica of this species and that of the following contain one or two sclerotized plates. If the vesica could be everted, a feat that we could not achieve, this question would undoubtedly be answered and other characters would certainly become available.




9 10




11

**FIGURES 9–11. Apex of uncus of North American *Alucita* species: 9, *A. montana*; 10, *A. lalannei*; 11, *A. adriendenisi*.**

## *Alucita lalannei* sp. nov.

(Figs. 2, 7, 10, 14, 17, 20, 22)

### Type material

**Holotype:** ♂. **CANADA. Ontario:** Maynooth, 6.ix.1965 (JEH Martin) (CNC Type No. 22879). **Paratypes:** 23 ♂ and 21 ♀ as follows. **CANADA. Alberta:** 2 ♂, 1 ♀, Edmonton, 8 km SE Sherwood Park, aspen forest at dusk, 18.v.2003 (GR Pohl) (NFRC); 2 ♂, 1 ♀, same locality, aspen forest edge at dusk, 28.vii.2003 (GR Pohl) (NFRC); 11 ♂, 11 ♀, same locality, aspen forest edge in afternoon, 29.vii.2003 (J-F Landry) (CNC); 8 ♂ (four dissected, BL 1438, MIC 4081, MIC 4793, MIC 4794), 5 ♀ (one dissected, BL 1439), George Lake, 53°57′N, 114°06′W, 11.viii.1983, afternoon in

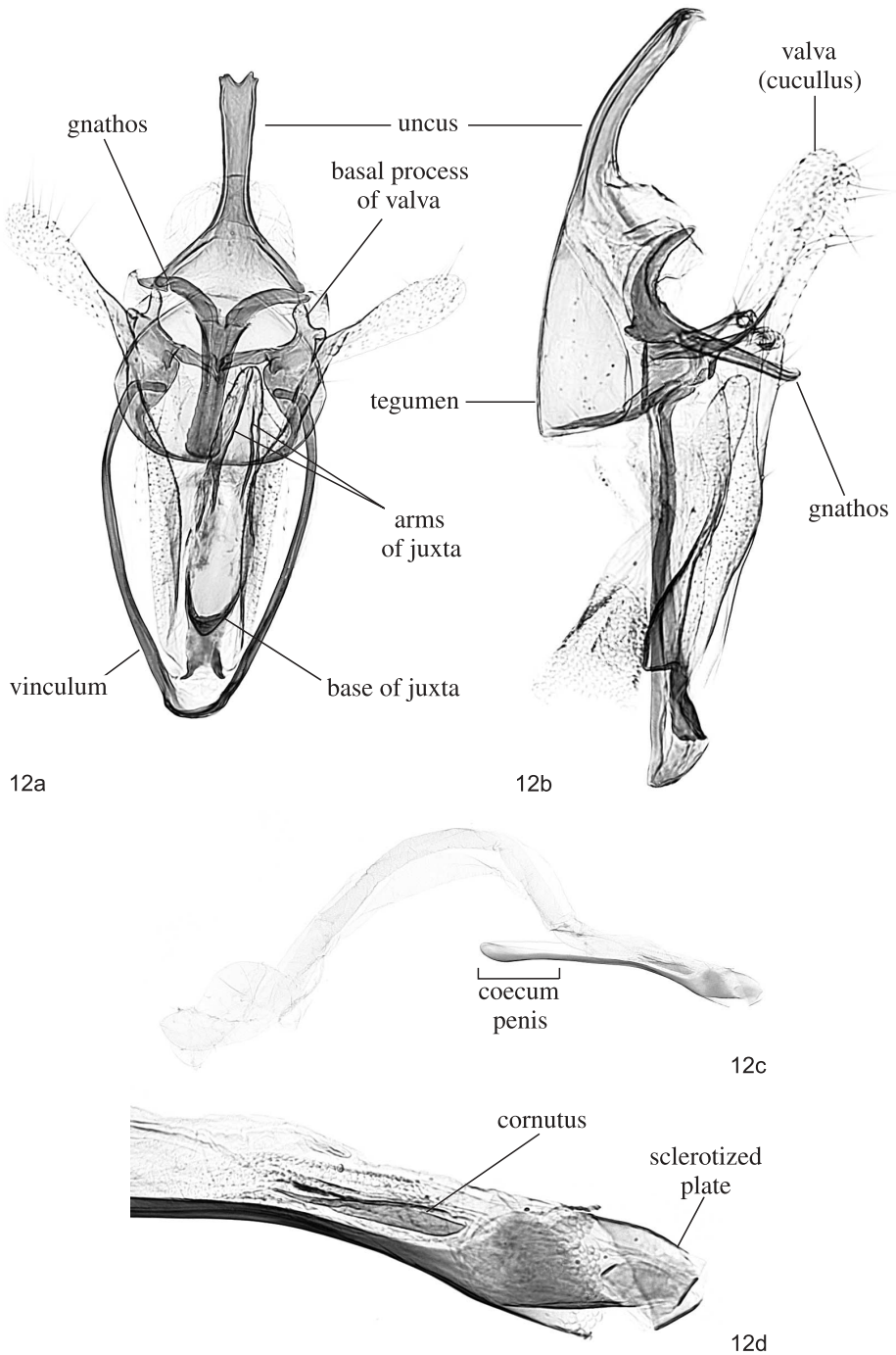



**FIGURE 12. Male genitalia of *Alucita montana*: (*a*) ventral view without aedeagus; (*b*) lateral view without aedeagus; (*c*) aedeagus; (*d*) apex of aedeagus.**

aspen forest (J-F Landry) (CNC, MHNG); 1 ♂ (dissected, JFL 1603), Lakeland Prov[incial]. P[ar]k., Lac La Biche, Touchwood Lake R[oa]d., Malaise Trap M2–2, 3.v.1994 (GR Pohl) (NFRC). **Manitoba:** 1 ♂ (dissected, MIC 4083), Riding M[oun]t[ain]. P[ark]., 4.vi.1938 (J McDunnough) (CNC). **Ontario:** 2 ♂ (one dissected, BL 1464), 3 ♀ (one dissected, BL 1499), same data as holotype (CNC, MHNG); 1 ♀ (dissected, MIC 4073), Manitoulin Dist[rict]., Gov[ernmen]t. Rd. B N of Bidwell Rd., 27.viii.1995 (JK Morton) CJKM); 1 ♀ (dissected, BL 1485), Ottawa, 1.vi.1905 (CH Young) (CNC).

## Etymology

The name honors Mario Lalanne, an engineer from Montréal, Quebec, for his substantial contribution to the Nature Discovery Fund of the Canadian Museum of Nature. To M Lalanne and his wife, Hortense Michaud-Lalanne, the description, classification, and cataloguing of the species on Earth is the most urgent scientific task facing humanity today.

## Diagnosis

This new species is similar to the other two North American species in colour and pattern. In size, *A lalannei* (forewing length 5.6–6.3 mm) is similar to *A. montana* (forewing length 4.7–6.9 mm) and both are, on average, smaller than *A. adriendenisi* (forewing length 6.5–8.1 mm). The male uncus of *A. lalannei* (Fig. 10) is similar to that of *A. adriendenisi* (Fig. 11) in having four points that are equally spaced from each other, whereas *A. montana* (Fig. 9) has the uncus separated into two major points each with a small apical notch. The male genitalia of *A. lalannei* can be distinguished from those of *A. adriendenisi* (Fig. 13) by the broader and shorter basal processes of the cucullus (Fig. 14*a*), the elongate (rather than short) plates of the vesica (Fig. 14*d*), the gnathos that is not apically widened (Fig. 14*a*), the uncus that is about as long as the tegumen (instead of one-third longer) (Fig. 14*b*), the coecum penis being one-third of the total length of the aedeagus rather than about half its length (Fig. 14*c*), and the smaller lateral points of the uncus (Figs. 10, 14*b*). In the female genitalia, *A. lalannei* can be separated from *A. adriendenisi* as follows: the antrum is nearly as broad as it is long and as broad or broader than the length of the transverse connecting band of the anterior apophyses (Fig. 17), and the corpus bursae at the base of the ductus seminalis is scobinated laterally and posteriorly (Fig. 20) in *A. lalannei*; in *A. adriendenisi* the antrum is narrower than its length and narrower than the length of the transverse connecting band of the anterior apophyses (Fig. 16), and the area of the corpus bursae around the base of the ductus seminalis is devoid of scobination (Fig. 19).

## Description

**Head** with most scales bicoloured, whitish grey to pale greyish brown at their base and becoming various shades of greyish brown at their apex, with some thin, unicolorous white and dark brown scales around eye; frontoclypeus dirty white. Maxillary palpus dark brown. Labial palpus white ventrally and dark brown dorsally on first segment; second segment with white dorsally, as band, not quite reaching apex ventrally, with most scales of lateral surface bicoloured, white to pale shades of brown at their base and brown at their apex; third segment mostly dark brown with scales bicoloured, subbasally with white ring larger dorsally, sometimes with another white patch at apex dorsally or mostly white on dorsal edge; third segment about four-fifths of length of second. Antenna dorsally at base mostly dark brown (sometimes almost black), sometimes with white on scape and pedicel, with first set of scales on first few

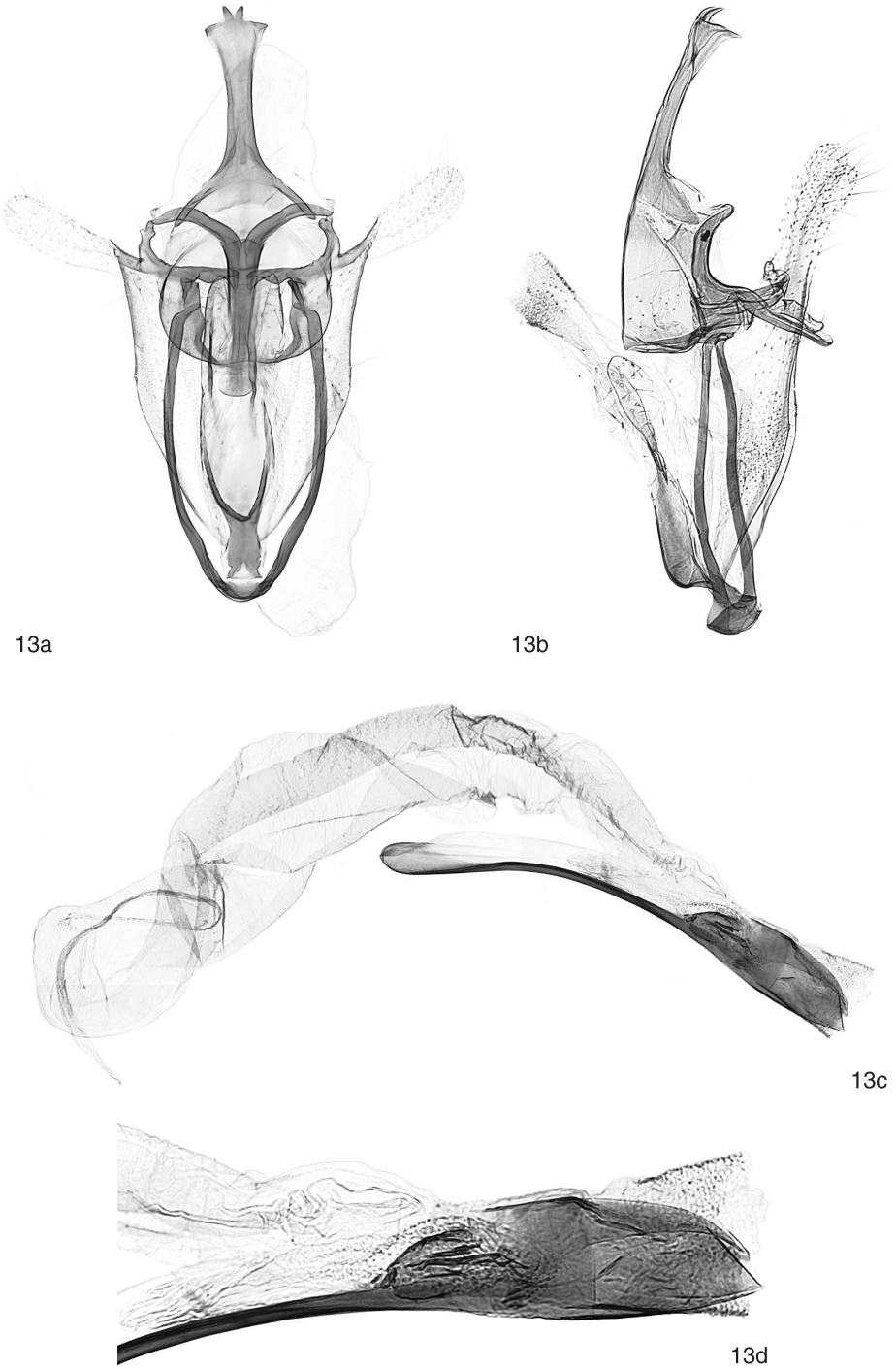



**FIGURE 13. Male genitalia of *Alucita adriendenisi*: (*a*) ventral view without aedeagus; (*b*) lateral view without aedeagus; (*c*) aedeagus; (*d*) apex of aedeagus.**

flagellomeres sometimes paler, contrasting with second set of scales, subsequent flagellomeres with scales gradually paler, greyish brown; scape and pedicel mostly white ventrally, with longitudinal dark brown stripe and longitudinal band of white scales from base of scape to about fifth flagellomere ventrally. **Thorax** with scales bicoloured, pale whitish beige at their base and mostly pale greyish brown at their apex, although darker greyish brown at base of mesoscutum between tegulae, bases and tips of tegulae, mesoscutellum, and apical margin of metascutum. Foreleg pale greyish brown on coxa, dark brown on femur, tibia and tarsomeres with scales dirty white at their base, with a few white scales beyond middle and at tip of tibia and at apices of tarsomeres I, II, and V. Midleg like foreleg, with dark brown scaling slightly paler, greyish brown, with white scaling at apices of tarsomeres III and IV. Hind leg paler than midleg, more prominently whitish beige, including middorsal tibial tuft, with slightly darker brown scaling dorsally on tibia, laterally on lateral tibial spines, and on most of dorsal surfaces of tarsomeres I to IV. Forewing length: males, 5.6 (holotype) to 6.3 mm; females, 5.6–5.9 mm. Forewing (Fig. 2) with scales bicoloured, white to pale beige at their base, pale brown to dark brown at their apex, except for some pure white scales; costa with seven to nine dark brown spots, first spot subbasal, small, poorly differentiated, second spot before base of second wing cleft darker (sometimes costa generally darker brown at base and first two spots not apparent), next four to six spots dark brown, third between clefts I and II, fourth at cleft I, fifth and sixth equally separated from fourth and seventh, sixth not reaching inner margin of plume, seventh covering apical sixth of first plume or appearing separated into three small spots, seventh and eighth most often connected, usually with a few white scales before and after darker spots on costa, on inner margin of spot VI, and in fringe before and after spots, except sixth; inner margin with pair of black spots subbasally and before cleft V; each cleft usually (with exception of second) with a few dark brown scales; each plume with basal pale brown section followed by darker brown section, another pale brown section, a second dark brown section, another pale brown section, and a dark brown spot apically, with most distinct dark brown sections at ends of plumes II to IV and bases of plumes III to VI, with white scales at base and apex of each darker brown section; fringe concolorous with each section but with few scattered ochreous maroon scales and white at base of each tuft at apices of all plumes. Hind wing with bicoloured scales as in forewing, almost as a pattern of alternating pale and dark brown changing with each half-scale, with more contrasting dark brown or white spots, especially toward fringes V and VI; fringe concolorous with adjacent scales, with few reddish-brown scales, white at apex of each plume. **Abdomen** dorsally with most scales bicoloured, white to greyish white at their base and pale to dark greyish brown at their apex, with dark brown row at apical margin of tergum I, with pure white row at apical margins of terga II to VI, white or ivory also over genitalia and sometimes at apex of sternum VII, sometimes with dark brown patch in middle of sterna II to VI; ventrally dirty white with greyish-brown spots laterally. Male sternum VIII (Fig. 7) with broadly rounded emargination mediobasally, with lateral plates of scent scales more or less conical with anterior margins more convex than posterior margins, latter medially with diffused melanized area connecting to posterior margin on each side of median emargination; tergum VIII narrow, with strongly melanized anterior margin, broadly convex, more lightly and widely melanized at each lateral end, with narrow band of scent scales posteriorly.

**Male genitalia** ($n$ = 5) (Figs. 10, 14). Uncus as in *A. adriendenisi* except shorter, about as long as tegumen, and with apical points shorter, especially lateral points, which are directed more posteriorly than laterally. Gnathos as in *A. adriendenisi* except median arm thicker in lateral view at base and with apex not enlarged. Tegumen dorsally slightly rounded. Juxta as in *A. adriendenisi*. Valva with cucullus slightly shorter than

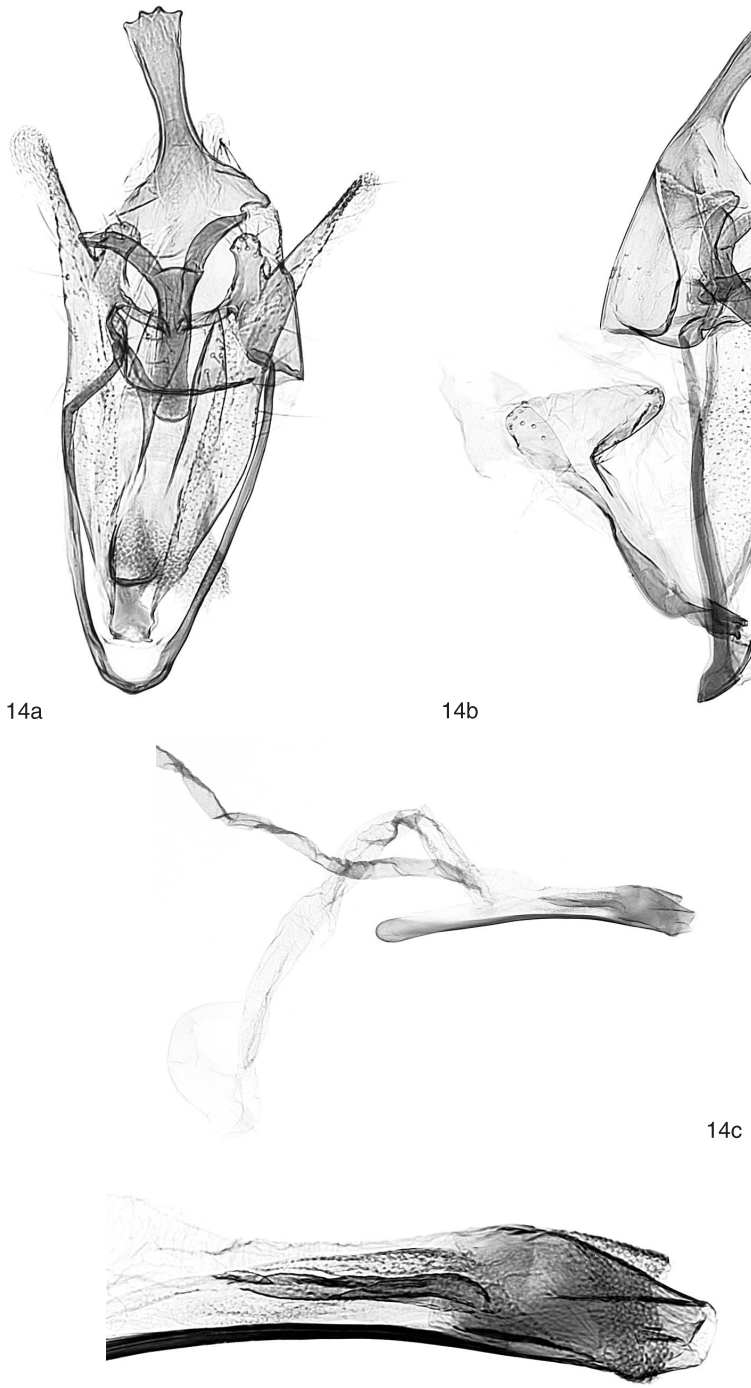
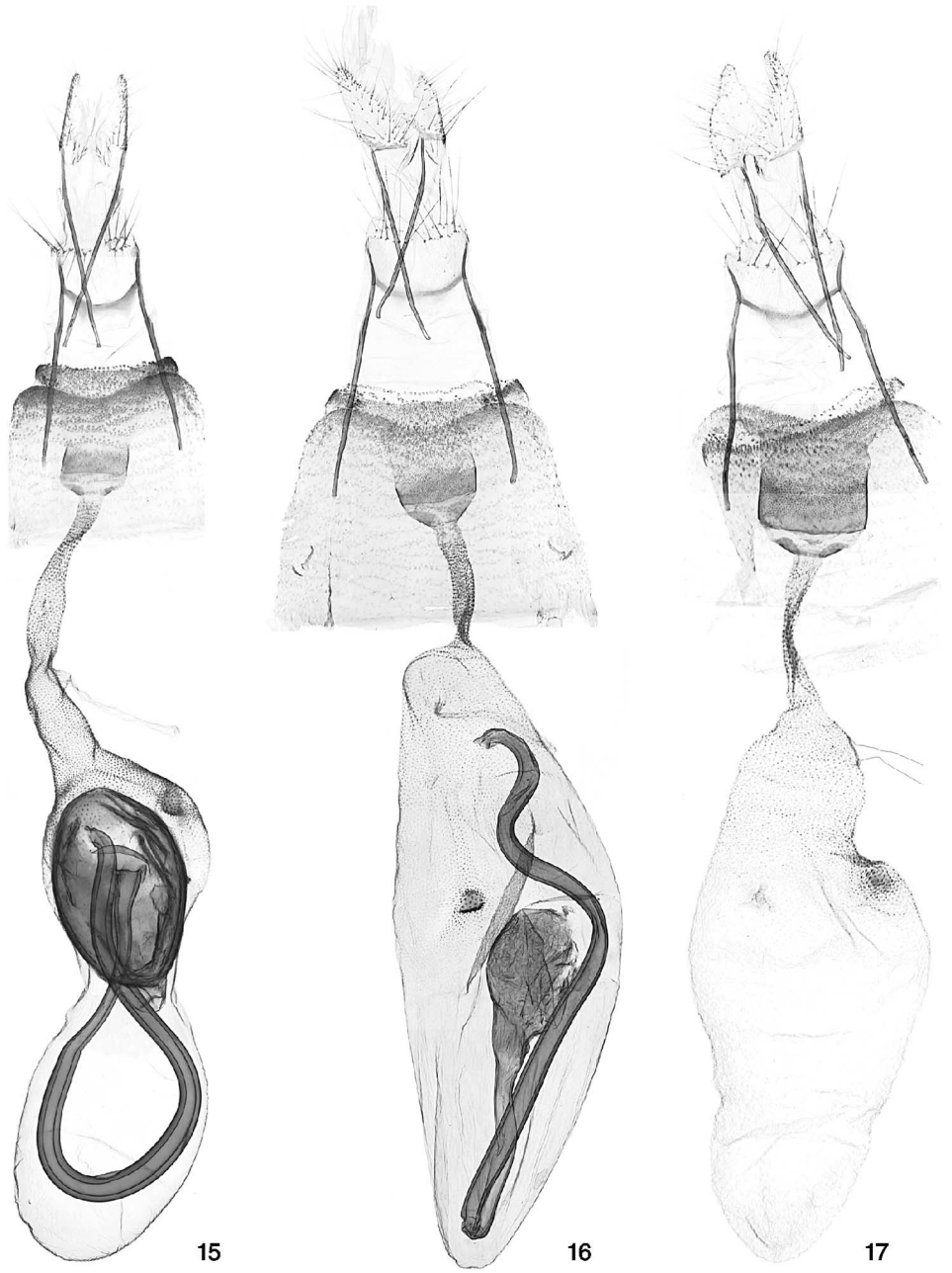
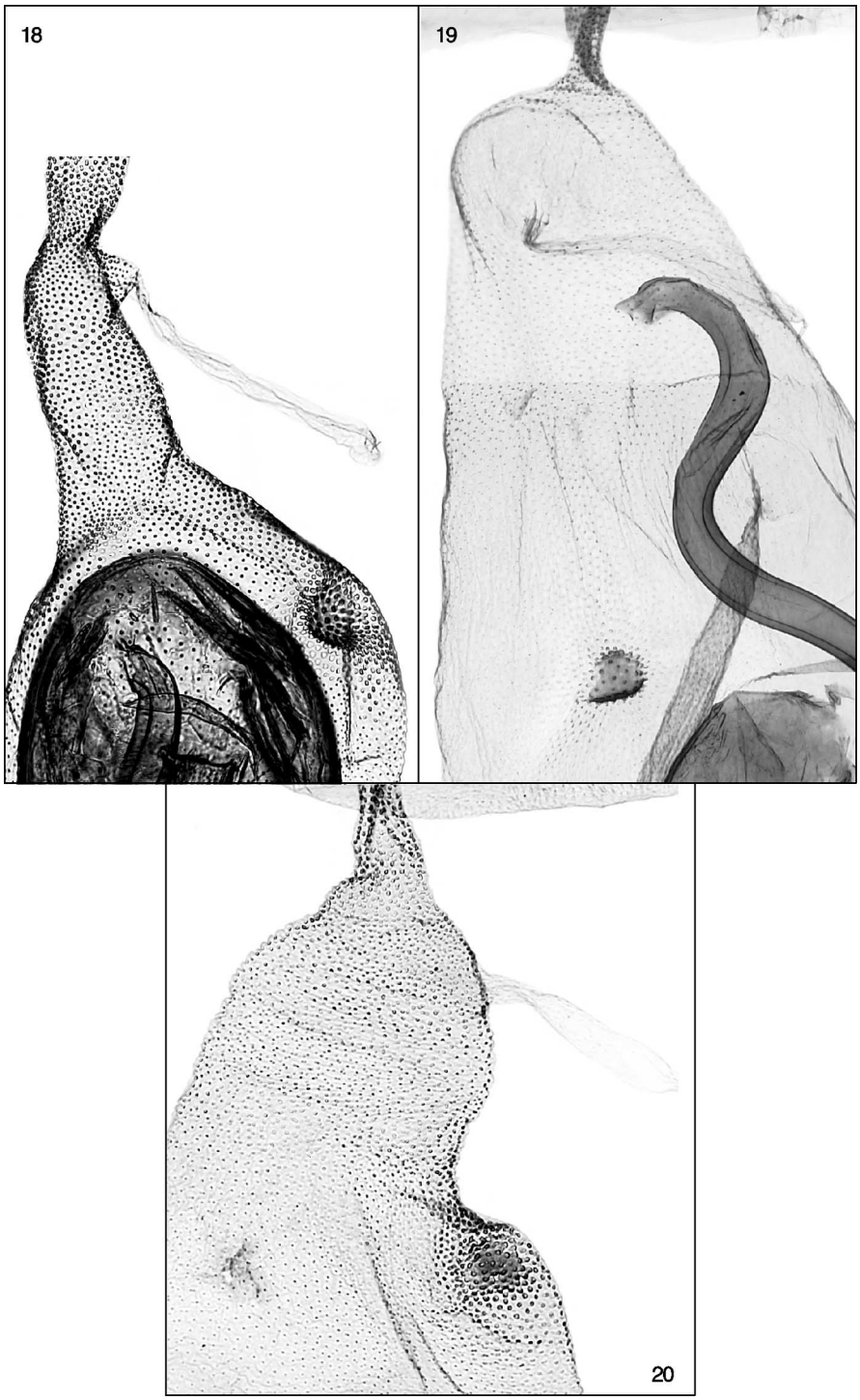



**FIGURE 14. Male genitalia of *Alucita lalannei*: (*a*) ventral view without aedeagus; (*b*) lateral view without aedeagus (right valva broken and right arm of juxta bent); (*c*) aedeagus; (*d*) apex of aedeagus.**




**FIGURES 15–17. Female genitalia of North American *Alucita* species: 15, *A. montana*; 16, *A. adriendenisi*; 17, *A. lalannei*.**

tegumen, slightly wider than that of *A. adriendenisi*, not distinctly enlarged toward apex, apically rounded; basal process shorter but more robust than that of *A. adriendenisi*, plate-like, in ventral view about as wide as long or a little longer than wide, sparsely setose, and apically rounded. Vinculum as in *A. adriendenisi*. Aedeagus




**FIGURES 18–20. Female signum and position of ductus seminalis of North American *Alucita* species: 18, *A. montana*; 19, *A. adriendenisi*; 20, *A. lalannei*.**

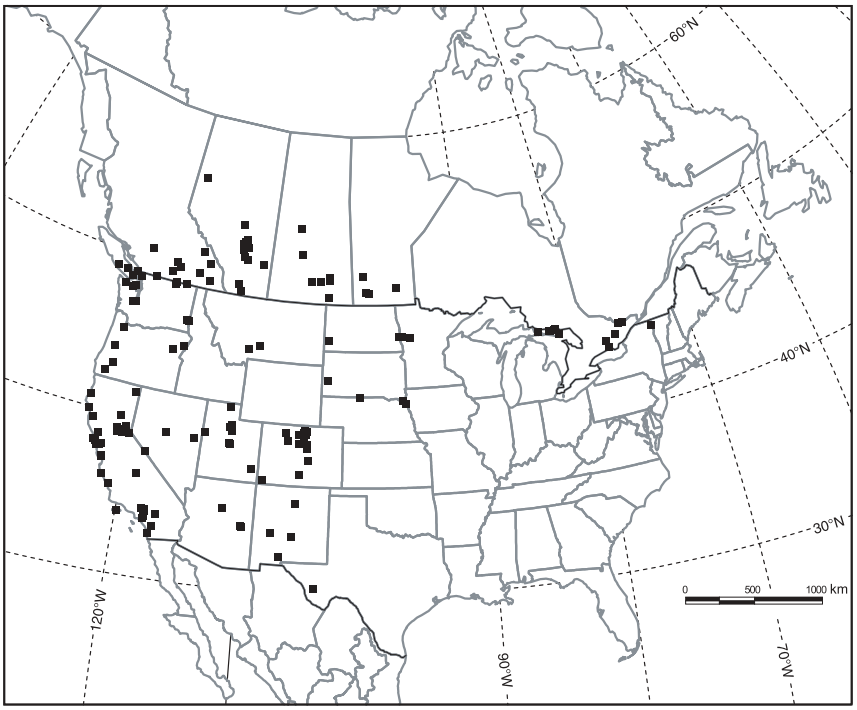



**FIGURE 21. Distribution of *Alucita montana*.**

narrow, slightly curved, apically with large sclerotized plate of indistinct shape; coecum penis one-third of total length of aedeagus; vesica with pair? of elongate and narrow plates of indistinct shape associated with some scobination but without other cornuti.

**Female genitalia** ($n$ = 4) (Figs. 17, 20). Papillae anales, anterior and posterior apophyses, and segment VIII as in *A. adriendenisi* except for slightly less extensive melanized zone at bases of anterior apophyses dorsally. Antrum nearly as broad as long, about as wide or wider than length of transverse connecting band of anterior apophyses, and lateral plates in constriction before ductus bursae generally smaller than in *A. adriendenisi*. Ductus bursae narrow, short, slightly less than one-fifth of length of corpus bursae, scobinated, slightly widened before connection with corpus bursae. Ductus seminalis as in *A. adriendenisi*. Corpus bursae large and elongate, rather narrow at base, without bump at inception of ductus seminalis or median constriction, doubling in girth below signum, then gently tapering to same girth as base; scobinated on basal half, including all around inception of ductus seminalis, but less strongly so below signum; signum as in *A. adriendenisi* although generally slightly smaller and located at 0.26–0.3 ($n$ = 3) distance between inception point of ductus seminalis and distal end of corpus bursae; spermatophore shape not recorded. Segment VII apical margins as in *A. adriendenisi*, but sternum VII margin less strongly concave.

## Life history

Moths fly in the afternoon and at dusk and occur as early as May and as late as September, thus indicating that the species probably overwinters as adults, like its congeners. Examination of the female genitalia of the Edmonton series shows that females collected in May had spermatophores and their abdomen was more strongly melanized than in females collected in July, which did not bear spermatophores. This suggests that

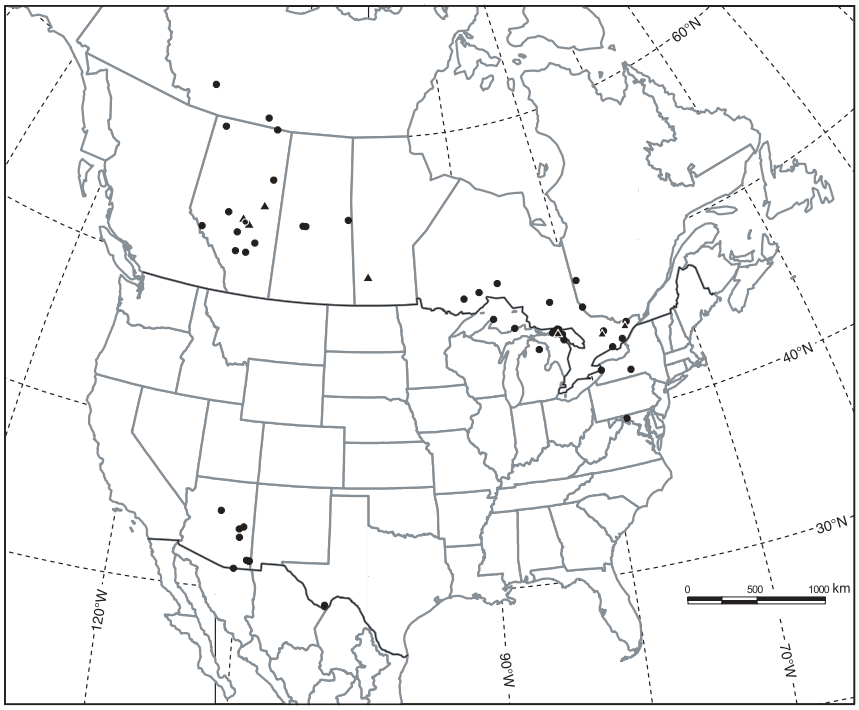



**FIGURE 22. Distribution of North American species of *Alucita*: *A. adriendenisi* (●) and *A. lalannei* (▲).**

moths flying in May had lived longer than those flying in July, probably in hibernation, and that they mated probably after coming out of hibernation.

The aspen forest where the Edmonton series was collected harbours an abundance of *Lonicera* spp. and *Symphoricarpos* spp., which are possible host plants.

### Comments

*Alucita lalannei* has been collected in southern Ontario, Manitoba, and central Alberta (Fig. 22). This species appears more closely related to *A. adriendenisi* than to *A. montana* on the basis of the similarity of the shape of the uncus and corpus bursae and position of the ductus seminalis.

## Addendum

We have also studied 25 specimens of *Alucita adriendenisi* with the following data: West Virginia, Berkeley County, Potomac River (Indian) Cave, 2 miles NW of Bedington, January, March, December, 1951 and 1972 (JFG Clarke, and Davis and Bush, respectively). These were forgotten when we listed the paratypes data and they have not been labelled paratypes, but the locality is plotten on the distribution map (Fig. 22). They are deposited in the USNM.

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