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Source: Proceedings of the Entomological Society of Washington, 120(1):153-166.

Published By: Entomological Society of Washington

<https://doi.org/10.4289/0013-8797.120.1.153>

URL: <http://www.bioone.org/doi/full/10.4289/0013-8797.120.1.153>

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**A NEW SPECIES OF *NIDITINEA* (TINEIDAE: TINEINAE) WITH A
PREFERENCE FOR BIRD NESTS, AND THE KNOWN LARVAL
HABITATS OF THE SPECIES IN THE UNITED STATES**

urn:lsid:zoobank.org:pub:B5B86FFA-9EF6-4EC9-BD21-C92017E4E13A

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Abstract.—We describe and illustrate *Niditinea sabroskyi*, **new species**, the larvae of which are associated with bird nests. We provide diagnostic information to distinguish the new species from the other two species occurring in the United States, *Niditinea fuscella* (Linnaeus, 1758) and *Niditinea orleansella* (Chambers, 1873). Although there is a considerable amount of published literature on the biology of the most common species, *N. fuscella*, owing to the difficulty of identifying species of *Niditinea*, host records are unreliable. We show that *N. sabroskyi* is predominantly a bird nest associate, and that specimens identified as *N. fuscella* and previously associated with bird nests are actually misidentified. We also summarize the larval habitat information from specimens with confirmed identifications.

Key Words: host, phoebe, *Polistes*, prothonotary warbler, caracara, song sparrow, American robin, European house sparrow, starling, osprey, chicken feathers, flying squirrel, chicken coop, whale bone, grasshopper eggs, wheat, deer tick

DOI: 10.4289/0013-8797.120.1.153

The genus *Niditinea* Petersen, 1957 (Tineidae: Tineinae) is represented by 13 species with a presumed original Holarctic distribution (Robinson 2009). Two described species occur in North America: *N. fuscella* (Linnaeus, 1758) and *N. orleansella* (Chambers, 1873). *Niditinea fuscella* is a cosmopolitan species with several common names: brown-dotted clothes moth, European house moth, poultry house moth, and common clothes moth. It is linked with human activity and trafficking of goods harboring proteinaceous stored products and/or associated arthropod remains. Previous authors have reviewed the larval associations of *Niditinea*, particularly *N. fuscella* (Robinson and Nielsen 1993, Robinson 2009, Hinton 1956). Robinson (2009) called *N. fuscella* a stored products pest but added that

records suggested it is a generalist feeder on arthropod remains in media ranging from bat guano and chicken manure to artificial bird nests. The biology of the second species, *Niditinea orleansella*, is unknown, but it is morphologically similar to species occurring in other biogeographic regions that have been associated with tree-hole nests (Robinson 2009). All species of *Niditinea*, however, are difficult to identify even for accomplished specialists, so biological associations recorded in the literature should be treated with caution.

We were confronted with this difficulty as a result of a routine submission of some caterpillars and pupae to the Systematic Entomology Laboratory (USDA, ARS) for identification. Mr. Mike Bailey, a volunteer at the Big Island Wildlife Area near Marion, Ohio, found the specimens in the nest of a prothonotary warbler. Fortunately, one of the pupae contained a nearly fully developed adult male. The male genitalia did not match those of either *N. fuscella* or *N. orleansella*, but the comparison of genitalia of the three species revealed that specimens in the National Insect Collection (USNM) identified mostly as *N. fuscella* were actually three species. We also discovered that every specimen associated with bird nests were the new species from Ohio and not the two known species.

This contribution is not intended to be a revision of the genus nor a comprehensive treatment of feeding strategies of *Niditinea*, but rather a clarification of inaccurate historical reports and a tool to prevent further misidentification of the species based on specimens at the USNM. In this report we describe the new species and provide illustrations and guidance for the identification of the described species that we know occur in the United States. We also summarize the larval habitats recorded for specimens we can correctly identify including many that were previously misidentified in the literature. The

data suggest that the previously known species, *N. fuscella* and *N. orleansella*, are not associated with bird nests. All records in the USNM of bird nest associations, in fact, are specimens of the new species. We hope this work provides a tool for correctly identifying the species of *Niditinea* and adds to the understanding of host specificity of larval Tineidae.

MATERIALS AND METHODS

After discovery of the new species, we compiled all adult and immature specimens in the USNM that had been previously determined as *Niditinea* and explored special collections of biological associated specimens. We examined larvae for species level characters and associated specimens of larvae with reared adult specimens. Additional information about the specimens examined can be found in an online database maintained by the U.S. National Museum of Natural History, Department of Entomology Collections (<http://collections.nmnh.si.edu/search/ento/>; indexed by the unique identifier USNMMENTnnnnnnnn). MAM dissected and prepared genitalia from adult specimens following the methods of Clarke (1941) and Robinson (1976), took measurements with an ocular micrometer from the left side of the specimen when possible, and captured and edited images using a Visionary Digital imaging station and GIMP software. Morphological terminology follows Kristensen (2003). All specimens examined and the holotype of the new species are deposited in the National Museum of Natural History, Washington D.C., U.S.A. (USNM).

RESULTS

Niditinea Petersen, 1957: 134

Type species: *Tinea fuscipunctella* Haworth, 1828: 562, by original designation [= (Phalaena) *Tinea fuscella* Linnaeus, 1758: 539].

The type of *Niditinea orleansella*:

Chambers (1873) described *Tinea orleansella* from what apparently was a single male specimen from New Orleans, Louisiana. In the original description he recorded a single alar expanse of 3/8 inches with no range and a single "date" of November. Likewise, there is no other indication in the description of more than a single specimen. Davis (1990) wrote there was a single syntype in poor condition at the Museum of Comparative Zoology (MCZ) and no other syntypes were known. He affixed a lectotype label to the specimen, but did not publish the designation. Based on the original description of Chambers, it seems the specimen at the MCZ is the sole Chambers specimen and should be considered the holotype by monotypy. The labels of the specimen are as follows:

white paper: Kentucky (crossed out in ink) / Chambers. [black print]

red paper: Type [black print] / 14949 [black ink]

white paper: male symbol genitalia on / slide 2587 / D.R. Davis [black print except numerals written in ink]

white label: Lectotype [red print] male symbol [black ink] / *Tinea* [black ink] / *orleansella* [black ink] / By [red print] Davis Ch. [black ink]

white label: *T. Orleansella* [black ink] / Chamb [black ink] / C.E.V.85 [black ink]

white label: MCZ-ENT / 00014949 / square barcode [black print]

***Niditinea sabroskyi* Metz and Davis,
new species**

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(Figs. 1–3, 8–11, 20)

Diagnosis.—*Niditinea sabroskyi* can be distinguished from other species in the United States by having the lighter

scales on the body and wings tending to reddish-orange and the dark forewing spots larger and more defined in specimens that are in good condition (Figs. 2–3), but definitive identification requires genitalia dissection. The valva lacks processes on the inner face and the apex is rounded (Fig. 9), the dorsum of the uncus in lateral view is smoothly rounded (Fig. 10), the apex of the uncus in posterior view is broad and straight or slightly emarginate, the spines on the dorsum of the gnathos are shorter with a length about equal to the width of the base (Fig. 10), the two spines on the corpus bursae are equal in size, and the spine arising from medioapical angle of the signum is directed anteriorly and is inset in a vertically oriented concavity which is longer than wide (Fig. 20).

Etymology.—This species is named in honor of Dr. Curtis William Sabrosky (3 April 1910–5 October 1997) who, although a highly recognized dipterist, collected and took the time to pin and spread these tiny moths. Dr. Sabrosky served as President of the International Commission on Zoological Nomenclature (1977–1983).

Description.—*Head*: Scales on head mostly reddish orange with some creamy-white scales, scales narrow, rough, near eye margin dark brown. Antenna 0.7X length of forewing, scales dark brown with copper lustre, male flagellomeres with dense, semierect golden setae ventrally extremely short, scape with distinct pecten of dark brown scales. Labial palpus 1.2X longer than maxillary palpus, scales a reddish hue of beige medially, dark brown laterally, first and second segments with multiple reddish-beige setae ventrally, second segment with dark brown setae laterally and at dorsal apex, some setae on dorsal apex medially reddish beige. Maxillary palpus upturned with silvery white scales.

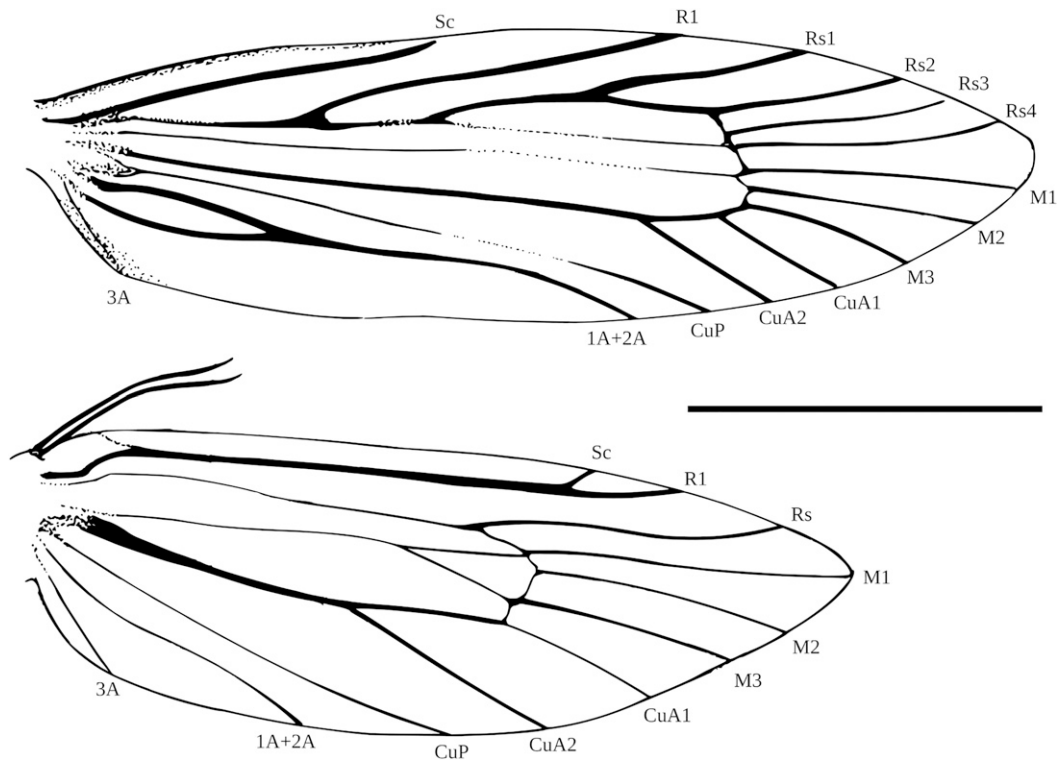
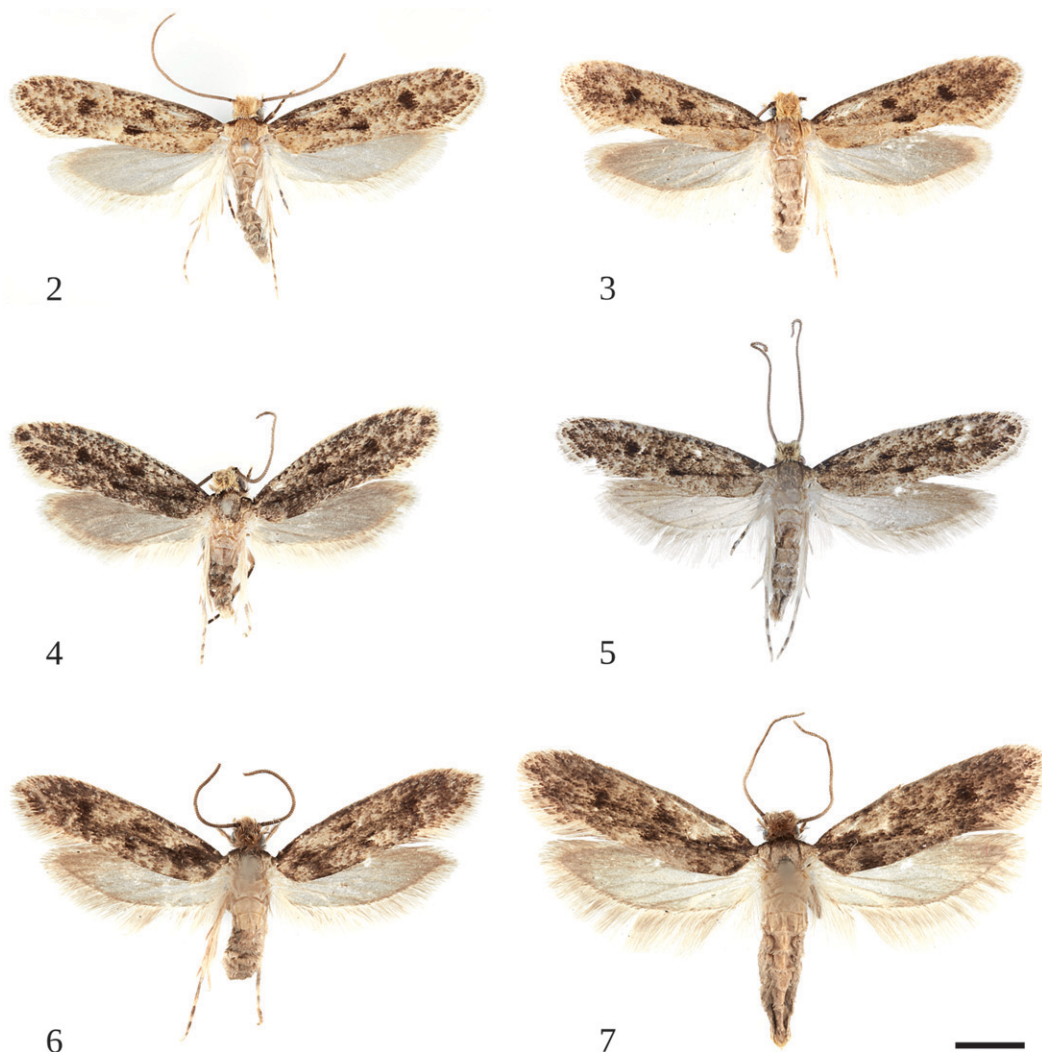


Fig. 1. Wing venation of ♀ *Niditinea sabroskyi*, new species (USNM slide # 28453). Scale bar = 2.0 mm.

Thorax: Dorsally with reddish-beige scales mixed with few dark brown scales throughout, long, narrow, parallel-sided, with a patch of dark brown scales anteriorly on tegula and at tip of scutum, ventral scales silvery white. Leg scales silvery white, with dark brown scales on anterior surface of foreleg and lateral surface of midtibia and midtarsal segments. Forewing (Figs. 1–3) length 5.2–6.9 mm, with all five branches of R present and separate, Rs4 terminating on costa before apex, accessory cell indistinct, open, M1–3 all separate, CuA1–2 separate, CuP relatively distinct, 1A and 2A with basal fork, then fused for, 2/3 their remaining length, male retinaculum moderately curved, dorsal scales reddish beige with scattered dark brown scales, with a more concentrated band of dark

brown scales through center of wing from base to tip, along base of costal margin, and in checkered pattern around apical circumference, with three large dark brown spots, one at apex of discal cell, one in cell at base of R₁, and one directly posterior to that on CuP, anal area with less dense dark brown scales forming an anal patch below longitudinal band, ventral scales brown with copper lustre except anal area reddish beige with silvery lustre. Fringe first row scales reddish beige with dark brown tips, second row scales reddish beige with silvery lustre. Hindwing length 4.5–6.0 mm, with M1–3 separate, CuA1, 2, CuP, 1-3A well developed, frenulum a single bristle in male, 2 bristles in female, scales brown with copper lustre. Fringe first row scales reddish beige with

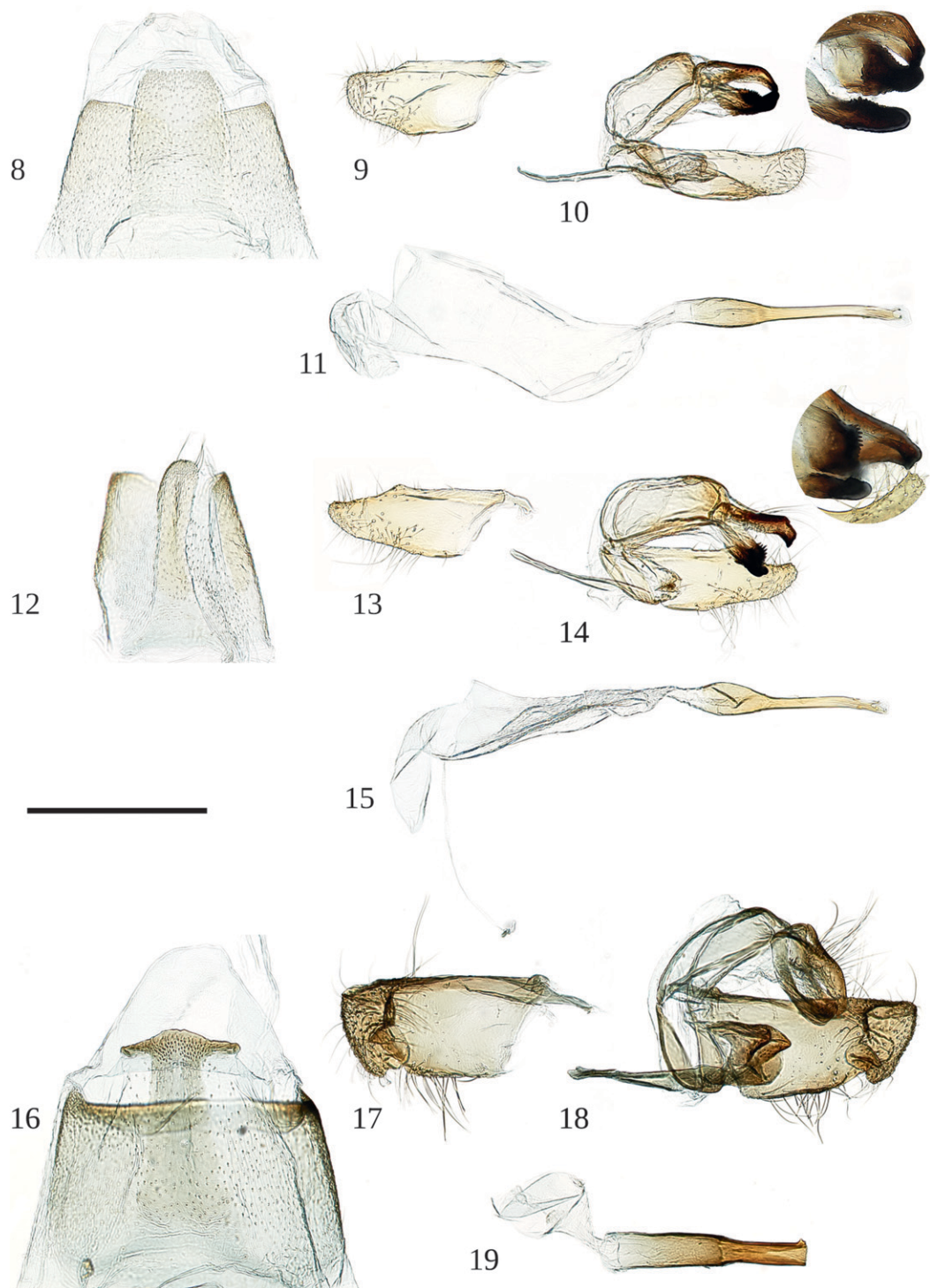


Figs. 2–7. Dorsal habitus. 2, ♂ *Niditinea sabroskyi*, new species (USNMENT01200360); 3, ♀ *Niditinea sabroskyi*, new species (USNMENT01200384); 4, ♂ *Niditinea orleansella* (USNMENT01200358); 5, ♀ *Niditinea orleansella* (USNMENT01200359); 6, ♂ *Niditinea fuscella* (USNMENT01200362); 7, ♀ *Niditinea fuscella* (USNMENT01200361). Scale bar = 2.0 mm.

silvery lustre and slightly darker tips, second row scales reddish beige with silvery lustre, tips compound with 3–6 branches.

Abdomen: Scales brown with coppery lustre dorsally, reddish beige with silvery lustre laterally and ventrally, with no discernible pattern. Tergite 8 (Fig. 8) not T-shaped, elongate-rectangular, length 1.5X width, posterior margin slightly

emarginate. Male genitalia (Figs. 9–11) with tegumen rectangular, deeply emarginate anteriorly, length 2X height, uncus in lateral view smoothly arched, beak-like, in dorsal view triangular, apex blunt to slightly emarginate, gnathos subequal in length to uncus, split into right and left halves, beak-like, with an elevated base covered with dense spines about equal in height to width at base,



Figs. 8–19. Male genitalia. 8, T8, *Niditinea sabroskyi*, new species (USNM slide # 146,486); 9, valva, same; 10, genital capsule, same, with closeup of gnathos teeth and uncus tip; 11, phallus, same. 12, T8, *Niditinea orleansella*, (USNM slide # 146,488); 13, valva, same; 14, genital capsule, same, with closeup of gnathos teeth and uncus tip; 15, phallus, same. 16, T8, *Niditinea fuscella*, (USNM slide # 146,484); 17, valva, same; 18, genital capsule, same; 19, phallus, same. Scale bar = 0.5 mm.

vinculum ligulate, very short in lateral view, fused dorsally with valva, with an anteriorly-directed, digitate saccus with a length 30X width, apex tapered with no expansion, valva length including trans-tilla in lateral view 3X height at highest point, apex broadly rounded, lacking any medial processes, juxta tubular, surrounding phallus, with slightly extended lateral lobes, phallus cylindrical, posterior half narrower, apex deeply emarginate forming lateral prongs, bulbus ejaculatorius large and oblong, larger than phallus, with no visible cornutus. Female genitalia (Fig. 20) with length of posterior apophysis 1.75X that of anterior apophysis, antrum 0.2X length of anterior apophysis, remainder of ductus bursae very slender, approximately same length as anterior apophysis, corpus bursae oval, caudal end tapering to junction with ductus bursae, length 2.3X length of posterior apophysis, spines in corpus bursae equal in size and at approximately same position on length of corpus bursae, signum a pair of long, leaf-like blades typical of genus, cephalic end with acute point laterally, medioapical angle of signum inset in a vertically oriented concavity which is longer than wide with spine directed anteriorly.

Type material.—Holotype ♂ (USNM-ENT01200219, USNM slide # 146,324), Maryland, 13 mi. E. Cumberland, 39.7, -78.53, 10.VII.1955, Rf Robin? Nest, Em 10.VII.55, C.W. Sabrosky (USNM). Paratypes: 8 ♂♂ (USNM-ENT01200217, USNM-ENT01200218, USNM-ENT01200378, USNM-ENT01200379, USNM-ENT01200380, USNM-ENT01200381, USNM-ENT01200382, USNM-ENT01200383), 5 ♀♀ (USNM-ENT01200373, USNM-ENT01200374, USNM-ENT01200375, USNM-ENT01200376, USNM-ENT01200377), same data as holotype (USNM).

Additional specimens examined.—DISTRICT OF COLUMBIA: 1 ♂ (USNM-ENT01200220), Washington, 38.91, -77.04, 2.II.1913, ex birds nests Song Spar. [*Melospiza melodia*] Issued 05.III.13, R.C. Shannon. FLORIDA: 2 ♂♂ (USNM-ENT01200875, USNM-ENT01200876), 1 mi S Lake Marion, 28.04, -81.53, 15.III.1956, reared from caracara nest, Howden & Howell; 3 ♀ (USNM-ENT01200103, USNM-ENT01200880, USNM-ENT01200888), Gainesville, 3722 SW 19th St. S. side Bivens Arm Lk., 29.65, -82.36, 02.IV.2014, in chicken feathers, P. Skelley, J. Hayden; 2 ♂♂ (USNM-ENT01200885, USNM-ENT01200886), 1 ♀ (USNM-ENT01200878), Gainesville, 3722 SW 19th St. S. side Bivens Arm Lk., 29.65, -82.36, 31.III.2014, in chicken feathers, P. Skelley, J. Hayden; 1 ♂ (USNM-ENT01200877), Gainesville, 3722 SW 19th St. S. side Bivens Arm Lk., 29.65, -82.36, 24.III.2014, in chicken feathers, P. Skelley; 2 ♂♂ (USNM-ENT01200102, USNM-ENT01200889), 1 ♀ (USNM-ENT01200879), Gainesville, 3722 SW 19th St. S. side Bivens Arm Lk., 29.65, -82.36, 30.III.2014, in chicken feathers, P. Skelley. ILLINOIS: Putnam County: 1 ♂ (USNM-ENT01200887), 2.VI.1967, M.O. Glenn; 1 ♂ (USNM-ENT01200881), 15.VI.1965, M.O. Glenn; 1 ♀ (USNM-ENT01200882), 15.VI.1965, M.O. Glenn; 1 ♂ (USNM-ENT01200884), 24.VI.1965, M.O. Glenn; 1 ♂ (USNM-ENT01200883), 21.VIII.1967, M.O. Glenn; 1 ♀ (USNM-ENT01200892), 31.VII.1958, M.O. Glenn; 1 ♀ (USNM-ENT01200894), 27.V.1969, M.O. Glenn; 1 ♂ (USNM-ENT01200893), 9.VIII.1966, M.O. Glenn. MARYLAND: 2 ♂♂ (USNM-ENT01200221, USNM-ENT01200222), 3 ♀♀ (USNM-ENT01200385, USNM-ENT01200386, USNM-ENT01200387), Bell, 38.97, -76.8, 8.VII.1927, bred from starling [*Turdus vulgaris*] nest, W.L.

McAtee; 1 ♀ (USNMENT01200384), Bethesda, 38.98, -77.1, 11.VIII.1959, rf robin's nest; em 11.VIII.59, C.W. Sabrosky; 3 ♂♂ (USNMENT01200105, USNMENT01200345, USNMENT01200347), 6 ♀♀ (USNMENT01200104, USNMENT01200346, USNMENT01200348, USNMENT01200349, USNMENT01200350, USNMENT01200351), Jackson's Island, 38.04, -75.83, 11.VIII.1919, in phoebe nest, H. Barber; 2 ♂♂ (USNMENT01200106, USNMENT01200107), Wittman, 38.8, -76.28, 03.IX.1984, from osprey nest over open water of tidal river, W.E. Steiner & J.E. Lowry; 1 ♂ (USNMENT01200243), 1 ♀ (USNMENT01200244), Wittman, 38.8, -76.28, 30.IX.1984, HOST: DRD533 nest of osprey, em. 30.IX.1984, W. Steiner; 1 ♀ (USNMENT01200224), Wittman, 38.8, -76.28, 02.II.2008, dormant *Polistes* nest em. 3–5.III.2008, Warren E. Steiner, Jill M. Swearingen; 1 ♀ (USNMENT00430453), Plummers Island, VII.1905, A. Busck; 1 ♂ (USNMENT01200891), Prince Georges County, Glenridge, 12.VII.1987, J.F.G. Clarke; 2 ♂♂ (USNMENT01200890, USNMENT01200899), Oxon Hill, Henson Creek, 3.IX.1983, D.R. Davis; 1 ♀ (USNMENT01200895), same locality, 16.VIII.1978, D.R. Davis. MASSACHUSETTS: 1 ♀ (USNMENT01200896), Martha's Vineyard, F.M. Jones, 1.IX; 1 ♂ (USNMENT01200898), same data, 19.VIII.1949; 1 ♂ (USNMENT01200897), same data, 16.VIII.1948; 1 ♂ (USNMENT01200900), same data, 3.VIII; 1 ♂ (USNMENT01200901), Barnstable, 18.VIII.1952, C.P. Kimball; 1 ♂ (USNMENT01200902), same data, 1.VII.1949; 1 ♂ (USNMENT01200903), same data, 4.IX.1952. MISSOURI: 1 ♀ (USNMENT01200904), Jackson County, Independence, 30.VIII.1967, taken at UV light, J.R. Heitzman. NEW HAMPSHIRE: 1 ♂ (USNMENT01200905), Hampton, 7.VIII.1904, S.A. Shaw. NEW JERSEY: 1 ♂ (USNMENT01200909), Oakland, 12.VIII.1948, C.P. Kimball; 1 ♂ (USNMENT01200907), Camden, 10.IX.1968. NEW YORK: 2 ♂♂ (USNMENT01200360, USNMENT01200908), Long Island, Eatons Neck, 8.VI.1971, E. Jäckh; 1 ♂ (USNMENT01200906), same data, 9.VI.1971; 2 ♂♂ (USNMENT01200923, USNMENT01200931), Ithaca, Six Mile Creek, 29.V.1959, R.W. Hodges; 2 ♂♂ (USNMENT01200919, USNMENT01200933), same data, 19.IX.1957; 1 ♂ (USNMENT01200917), same data, 13.IX.1958; 1 ♀ (USNMENT01200927), same data, 26.V.1959; 2 ♂♂ (USNMENT01200925, USNMENT01200928), same locality, 31.V.1957, J.G. Franclemont; 1 ♂ (USNMENT01200932), same data, 31.VIII.1957; 1 ♂ (USNMENT01200916), same data, 6.V.1957; 1 ♂ (USNMENT01200916), Monroe County, 11.VIII.1949, C.P. Kimball; 1 ♂ (USNMENT01200922), same data, 3.VIII.1949; 1 ♂ (USNMENT01200913), same data, 16.VI.1949. NORTH CAROLINA: 1 ♂ (USNMENT01200343), 1 ♀ (USNMENT01200388), Wilmington, 34.23, -77.94, 10.VIII.1918, bred from human excreta Hunter # 9149, Max Kisliuk; 1 ♀ (USNMENT01200389), same data, 29.VIII.1919; 1 ♂ (USNMENT01200342), 1 ♀ (USNMENT01200344), same data, 7.VIII.1918; 1 ♂ (USNMENT01200124), same data, 14.VIII.1919. OHIO: 1 ♂ (USNMENT01200874), Big Island Wildlife Area, 40.59, -83.24, 11.IX.2007, found inside prothonotary warbler nest. OKLAHOMA: 1 ♂ (USNMENT01200929), Sequoyah County, Tenkiller Lake, 3 mi W. Blackgum, 6–9.VII.1979, D. & M. Davis; 1 ♀ (USNMENT01200918), Murray County, Arbuckle Mts., 1 km W. Turner Falls, 19–30.VII.1984, Don & Mignon Davis. TEXAS:

1 ♀ (USNMENT01200911), Harris County, Houston, 8.III.1968, A. & M.E. Blanchard; 2 ♂♂ (USNMENT01200926, USNMENT01200934), Kerrville, Bishop No 17,287, 25.IX.1931, A.W. Lindquist. WEST VIRGINIA: 1 ♀ (USNMENT 01200920), Morgan County, Sleepy Creek Forest, 17.VII.2008, J. Glaser; 1 ♀ (USNMENT01200912), same data, 15.VII.2006; 1 ♂ (USNMENT01200930), same data, 21.V.2011; 1 ♂ (USNMENT 01200914), same data, 8.IX.2005.

Distribution.—We identified specimens from the District of Columbia, Florida, Illinois, Maryland, Massachusetts, Missouri, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oklahoma, Texas, and West Virginia.

Remarks.—We explored DNA-barcode evidence that shows there are at least three undescribed species of *Niditinea* in North America. Specimens in hand that we determined to be *N. orleansella* sensu stricto by dissection, belong to a group of specimens with a haplotype distinct from three other species clusters formed by North American specimens identified as *N. orleansella* and a cluster of European specimens identified as *N. striolella* Matsumura, 1931. We do not have barcode data for any specimens we identified as *N. sabroskyi*, so we do not know if they would form one or more additional clusters or belong to one of the clusters misidentified as *N. orleansella*. We do not anticipate conducting additional revisionary work on *Niditinea* in the near future, but feel clarifying the host associations warrants a description of the new species. Because of the DNA-barcode evidence, the great difficulty identifying species historically, and to prevent further taxonomic problems in the future, we designate as type material only the series of specimens collected by

Dr. Sabrosky near Cumberland, Maryland. While our current examination allows us to differentiate this new species from the others known to occur in North America and the level of morphological variation does not allow circumscribing more distinct species, we acknowledge the possibility of delineating more species in the future with molecular data.

Adult specimens of *Niditinea* from the United States in good condition can be identified to species by color alone. The scales of the head and dorsum of the thorax of *N. sabroskyi* tend towards reddish-orange, and the anal area of the forewing is less infuscate (Figs. 2–3). The head and thoracic scales of *N. orleansella* tend to creamy-white with dark gray to black scales, and the anal area of the forewing is usually infuscate with dark gray scales (Figs. 4–5). The head and thoracic scales of *N. fuscella* are darker, but tend towards brown with dark brown scales, and the anal area of the forewing is less differentiated, usually with a broad band or spot adjacent to the hind margin (Figs. 6–7). The species can easily be distinguished based on male genitalia (Figs. 8–19). The valva of *N. fuscella* is rectangular at the apex with medial processes (Figs. 17–18). The valva of the other two species lack medial processes; the apex is narrowly tapered in *N. orleansella* (Figs. 13–14) and broadly rounded in *N. sabroskyi* (Figs. 9–10). Both *N. orleansella* and *N. sabroskyi* have a dense patch of spines on the dorsal surface of the gnathos. These patches are dark and distinct and often visible on undissected specimens, sometimes appearing as two dark dots. The spines on *N. sabroskyi* are noticeably longer, which can be seen at moderate magnification with a stereomicroscope. Another feature sometimes visible in undissected males is the apex of the uncus, which is broad and sometimes

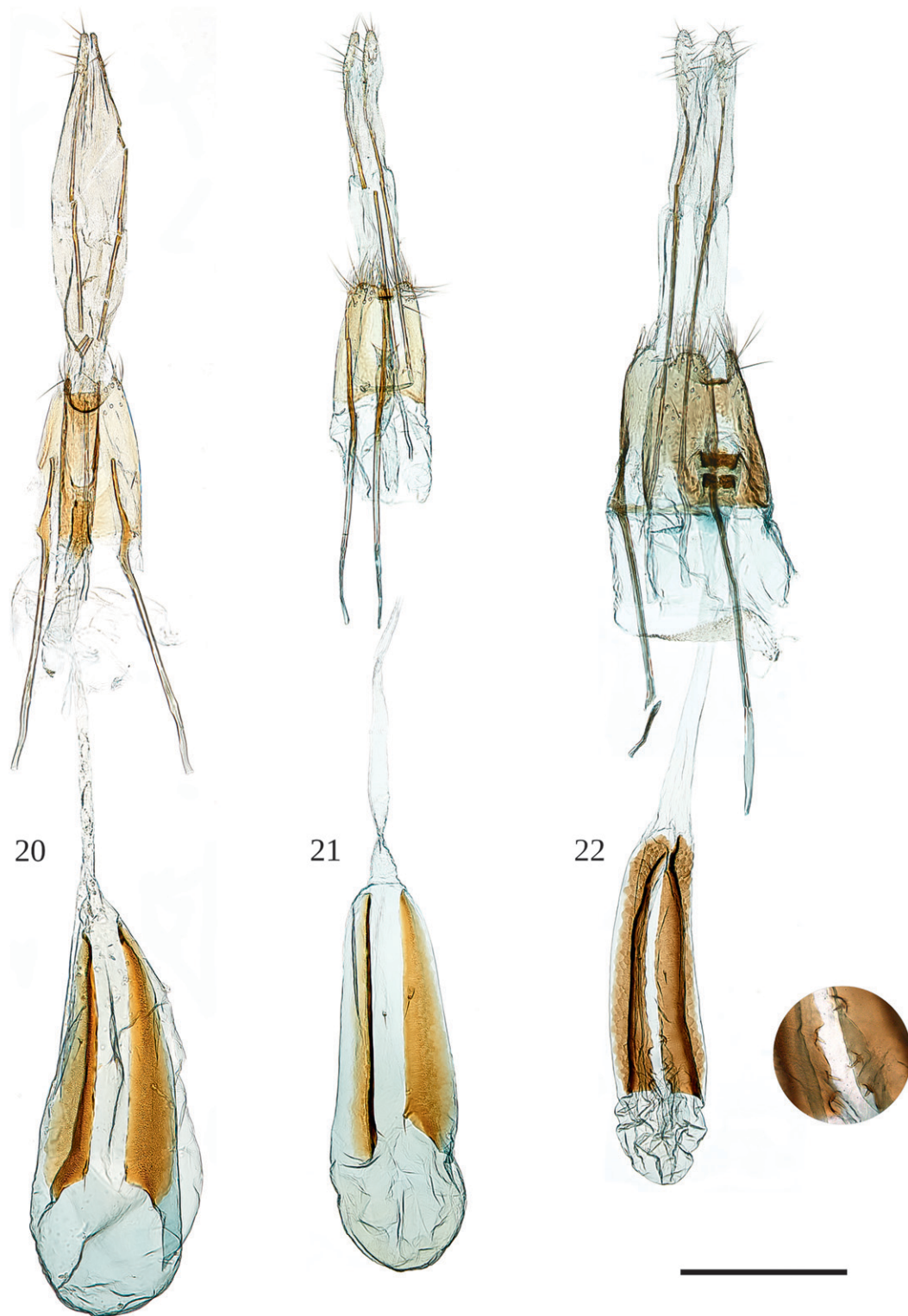
emarginate on *N. sabroskyi*, narrow and blunt on *N. orleansella*, and pointed in *N. fuscella*. Females can also be identified to species based on the genitalia (Figs. 20–22). In *N. fuscella* there are at least three spines on the medio-apical angle of the signum, whereas there is only one in the other species. In *N. sabroskyi* the spine is inset in a depression (Fig. 20) whereas in *N. orleansella* the spine is at the end of a tube elevated above the surface of the signum (Fig. 21).

We found no morphological characters among the limited sample of larvae at hand to differentiate the species, so larval habitat data is based only on the adult specimens we could determine using morphology of the genitalia and association by event. All of these records are from localities in the United States (Fig. 24). We found a total of 80 specimens with biological associations indicating larval habitat distributed among the three species of *Niditinea*: 12 events from 12 different localities involving *N. fuscella*, nine events from seven different localities involving *N. orleansella*, and 12 events from 10 separate localities involving *N. sabroskyi* (Figs. 23–24). *Niditinea fuscella* is most diverse in larval habitat being recorded from dried potatoes, “hair mattress,” dead Isabella tiger moth, American robin carcass, dry animal feed, chicken coop, whale bone, grasshopper eggs, wheat, deer tick carcass, and bird seed. There are only two larval habitats of *N. orleansella*, nests of *Polistes* and a flying squirrel nest box, but there are five independent events of *N. orleansella* being reared from an abandoned *Polistes* nest. *Niditinea sabroskyi* is recorded from many different and varied events, but the majority are the nests of birds. The larval habitats of *N. sabroskyi* include nests of phoebe, *Polistes*, prothonotary warbler, caracara,

song sparrow, American robin, European house sparrow, starling, osprey, human privy, and chicken feathers. The single event of *N. sabroskyi* reared from a *Polistes* nest involved specimens that were cohabitating with specimens of *N. orleansella* from the same abandoned nest.

DISCUSSION

The association of *N. sabroskyi* with the nests of birds is strongly supported with few exceptions. The three exceptions - abandoned *Polistes* nest, human privy, and chicken feathers - deserve some exploration. While there are obvious similarities between an abandoned insect nest and chicken feathers with the nests of birds, the association with human waste seems less obvious. The specimens of *N. sabroskyi* from North Carolina are specifically noted as being from “human excreta,” but this may be an overstatement. The specimens were collected by Max Kisliuk, Jr. (United States Bureau of Entomology) in part “to study the insects involved [with the problem of sanitary disposal of human excreta in unsewered communities]” (Annual Report of the Surgeon General of the Public Health Service of the United States, U.S. Government Printing Office, 1920, p. 70). We could not find details of this study, however, the report included descriptions of different types of privies and mostly flies that issue from the treatments of human waste. Three of the Kisliuk specimens include silk cocoons covered with sand grains, so we suspect these specimens emerged from a habitat associated with human waste and all the insects associated with human waste, and that the larvae are feeding not on human waste, but products of the associates with the waste. It could be that females of *N. sabroskyi* prefer to oviposit in cryptic habitats with detritus.



Figs. 20–22. Female genitalia. 20, *Niditinea sabroskyi*, new species (USNM slide # 146,487); 21, *Niditinea orleansella*, (USNM slide # 146,489); 22, *Niditinea fuscella*, (USNM slide # 146,485) with magnification of spines on signum. Scale bar = 0.5 mm.

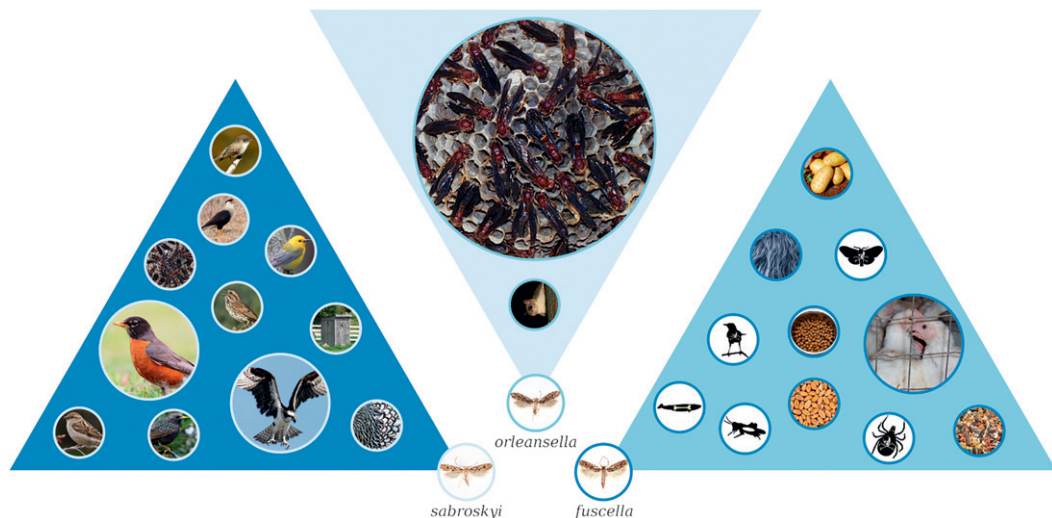


Fig. 23. Known larval habitats of the species of *Niditinea* in the United States. The variety of “hosts” is indicated by the number of image circles inside the colored triangles associated with each species of *Niditinea*. The size of an image circle indicates the number of records documenting the “host,” ranging from a single record for most image circles up to a maximum of five independent records of *N. orleansella* reared from uninhabited *Polistes* nests. “Hosts” of *N. sabroskyi* include nests of phoebe, *Polistes*, prothonotary warbler, caracara, song sparrow, American robin, European house sparrow, starling, osprey; human privy, and chicken feathers. “Hosts” of *N. orleansella* include nests of *Polistes* and flying squirrel. “Hosts” of *N. fuscella* include dried potatoes, “hair mattress,” dead *Isabella* tiger moth, American robin carcass, dry animal feed, chicken coop, whale bone, grasshopper eggs, wheat, deer tick carcass, and bird seed. See Acknowledgements for image credits.

This would include not only bird nests, but any other secluded site with a food source. We only can infer from reared records from known sources and not from specimens collected pseudo-randomly (e.g., at light). The distribution of the species (Fig. 24) does not seem to suggest any spatial relationship, rather it probably indicates undersampling.

Almost more profound is the lack of association with bird nests of *N. fuscella*, which is reported widely in the literature as a nest associate. We can speak directly to one particular source of this information. Waldo Lee McAtee (1927, 1929) conducted two successive assessments of the insects associated with bird houses in localities in Maryland. In his first report (1927) he recorded many specimens of *Tinea* sp. associated

with nests of different species of birds, but in his subsequent report (1929) he identified species as *Tinea fuscipunctella* Haworth (= *N. fuscella*) including specimens in his previous report (1927). A great number of the specimens McAtee examined are probably lost, but we can confirm at least some of his specimens from nests of starling, phoebe, and English sparrow are actually *N. sabroskyi*. Hinton (1956) cites McAtee and many other sources we cannot verify with the specimens at hand. We suspect the error occurring in McAtee’s works (1927, 1929) is the case for many more of the bird nest associations erroneously repeated in reviews of the literature for *N. fuscella*. Our findings suggest *N. fuscella* is much more general in larval habitat preference, so less prone to cryptic

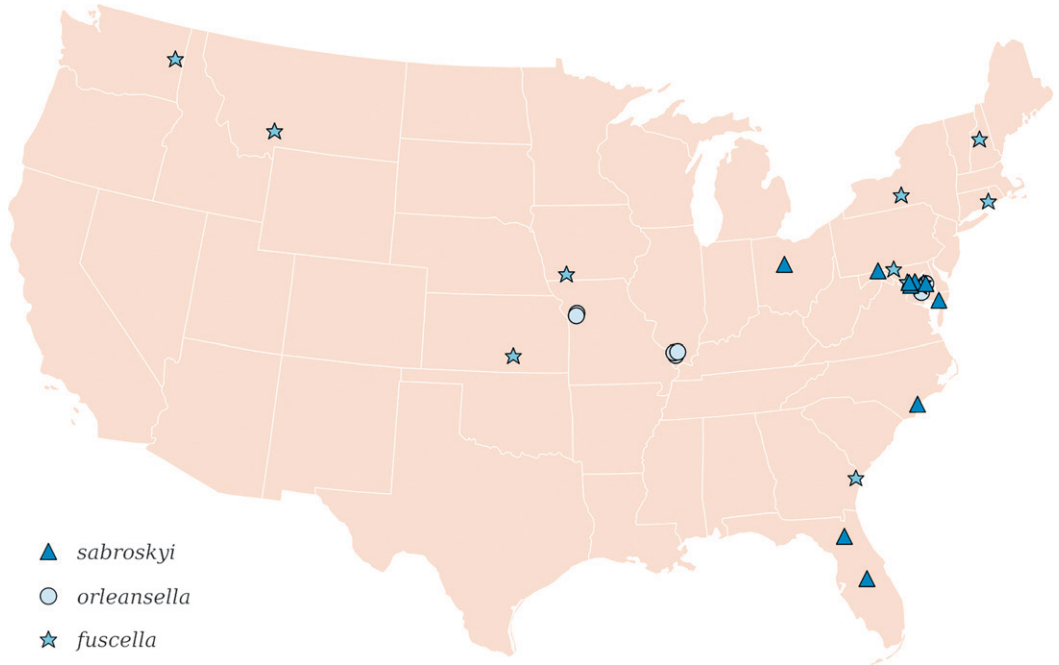


Fig. 24. Localities for the records documenting the known larval habitats of the species of *Niditinea* in the United States.

feeding like in a bird nest. Again, there does not appear to be any spatial pattern among the specimens for which we had larval habitat data (Fig. 24).

ACKNOWLEDGMENTS

We thank Mr. Michael Bailey (volunteer) and Ms. Donna Schwab (Assistant Wildlife Management Supervisor, ODNR) from Big Island Wildlife Area for submitting the specimens for identification that inspired this work. Philip D. Perkins and Rachel L. Hawkins (Museum of Comparative Zoology, Harvard University) facilitated access to images of the type of *N. orleansella*. Reinhard Gaedike, Marko Mutanen, Greg Pohl, Jeremy deWaard, Arild Johnson, Jayme Sones, Ken Stead, Tomasz Jaworski, and Jean-François Landry provided access to barcoded specimens in the Barcode of Life Data Systems to help in determining

the distribution of the United States species. Two anonymous reviewers provided very helpful and insightful suggestions. Mention of trade names or commercial products in this publication is solely for the purpose of providing specific information and does not imply recommendation or endorsement by the USDA; USDA is an equal opportunity provider and employer. Image credits: Polistes nest, Hornetboy1970, https://commons.wikimedia.org/wiki/File:Red-WaspNest_cropped.jpg; flying squirrel, Laszlo Ilyes, <https://www.flickr.com/photos/laszlo-photo/927878773/>; dog food, Marco Verch, [https://commons.wikimedia.org/wiki/File:Trockenfutter_-_Hundefutter_\(23218256045\).jpg](https://commons.wikimedia.org/wiki/File:Trockenfutter_-_Hundefutter_(23218256045).jpg); European house sparrow, Chris Waits, [https://commons.wikimedia.org/wiki/File:Passer_domesticus_female_\(4\)_cropped.jpg](https://commons.wikimedia.org/wiki/File:Passer_domesticus_female_(4)_cropped.jpg); starling, Tim Felce, [https://commons.wikimedia.org/wiki/File:Starling_\(5503763150\).jpg](https://commons.wikimedia.org/wiki/File:Starling_(5503763150).jpg); song

sparrow, Linda Tanner, https://commons.wikimedia.org/wiki/File:Melospiza_melodia_5.jpg; prothonotary warbler, Mdf and Fir0002, https://en.wikipedia.org/wiki/File:Protonotaria-citrea-002_edit.jpg; eastern phoebe, Katja Schulz, [https://commons.wikimedia.org/wiki/File:Eastern_Phoebe_\(15342146618\).jpg](https://commons.wikimedia.org/wiki/File:Eastern_Phoebe_(15342146618).jpg); American robin, Mdf, <https://commons.wikimedia.org/wiki/File:Turdus-migratorius-002.jpg>; crested caracara, Manjith Kainickara, https://commons.wikimedia.org/wiki/File:Crested_Caracara_2.jpg.

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