

BOREAL OLETHREUTINI 2. (TORTRICIDAE): WING AND GENITALIA ILLUSTRATIONS, A NEW  
SYNONYMY, AND A NEW HOLARCTIC ADDITION

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**ABSTRACT.** We provide photographs of wings and genitalia of the Holarctic *Tia enervana* (Erschoff), *Olethreutes aquilonanus* (Karvonen), *O. heinrichanus* (McDunnough), *O. concretanus* (Wocke), *O. nordegganus* (McDunnough), and the Nearctic *O. mengelanus* (Fernald), *O. costimaculanus* (Fernald), and *O. bowmananus* (McDunnough). We report *O. kennethanus* McDunnough to be a junior synonym of *O. nordegganus* (McDunnough). We present new Nearctic distribution records for *O. heinrichanus* and *O. bowmananus*, and the first Palaearctic records for *O. nordegganus*, which establish it as Holarctic. Recent discoveries change to 63% the Beringian tortricids that are also Holarctic.

**Additional key words:** Holarctic, Nearctic, Palaearctic.

We previously reported 11 boreal species of Tortricidae newly confirmed or discovered to be Holarctic (Jalava & Miller 1998, Miller 1995). Here we revisit eight of these species, all poorly known. The wings of four have not been illustrated before, and sexes of four have not previously been associated or their female genitalia illustrated. Larval foodplants of all but one are still unknown. The scant knowledge of boreal tortricids results from lack of collecting and rearing, and from inadequate handbook treatment. The latter fault is meant to be at least partially redressed here. The new findings presented result from collecting sponsored by the Finnish Lepidopterological Society and the Finnish Academy of Science (Proj. No. 20), and from closer scrutiny of existing collections.

References to body size derive from forewing lengths, which were measured to the nearest 0.5 mm with a ruler.

Depository abbreviations are as follows: ANSP, Academy of Natural Sciences, Philadelphia, Pennsylvania; CNC, Canadian National Collection, Ottawa, Ontario; UCB, Essig Museum of Entomology, University of California, Berkeley, California; INHS, Illinois Natural History Survey, Champaign, Illinois; MZH, Finnish Museum of Natural History, Helsinki, Finland; BMNH, Natural History Museum, London, England; UMSP, University of Minnesota Entomology Museum, St. Paul, Minnesota; USNM, U. S. National Museum of Natural History, Washington, DC; ZIN, Zoological Institute, St. Petersburg, Russia.

*Tia enervana* (Erschoff)

(Figs. 1–3)

Forewing length 6.0–8.0 mm (n = 13). We previously confirmed that this taxon is Holarctic (Jalava & Miller 1998). Genitalia of one or both sexes have been line illustrated by Dang (1990), Kuznetsov (1987), Heinrich (1926), and McDunnough (1922). The wings were illustrated in color by Kuznetsov et al. (1998). Here, we reillustrate in one place the wings and genitalia (Figs. 1–3).

Material examined is in CNC, MZH, UCB, USNM, ZIN, as enumerated by Jalava and Miller (1998).

*Olethreutes aquilonanus* (Karvonen)

(Figs. 4–6)

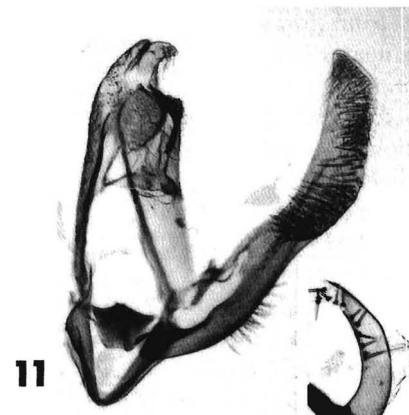
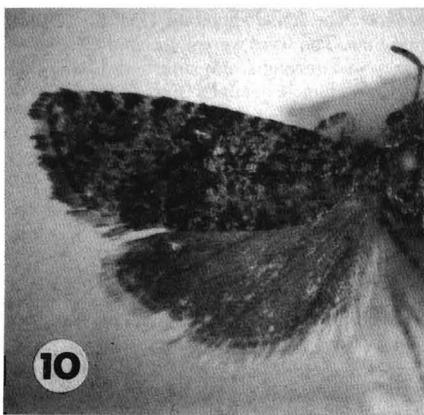
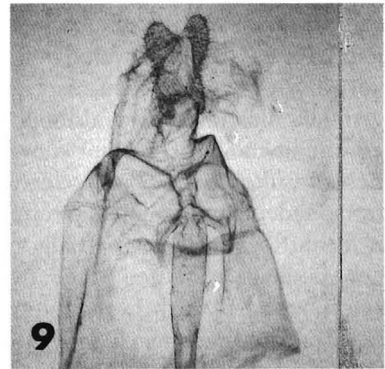
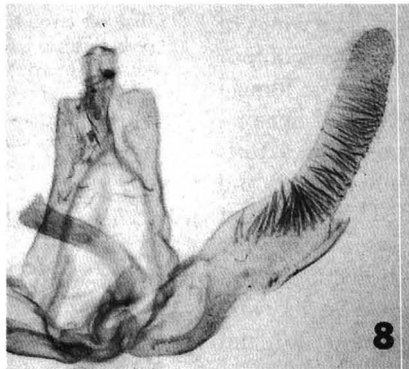
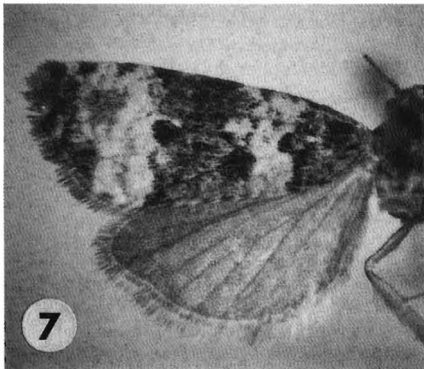
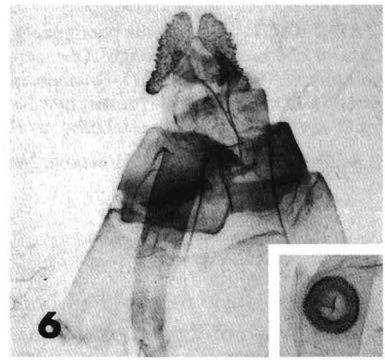
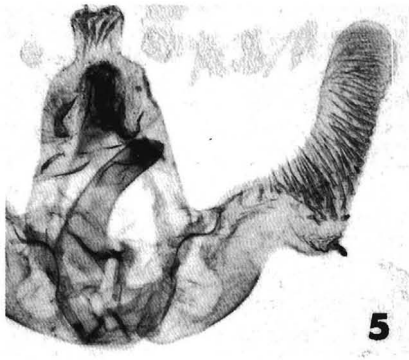
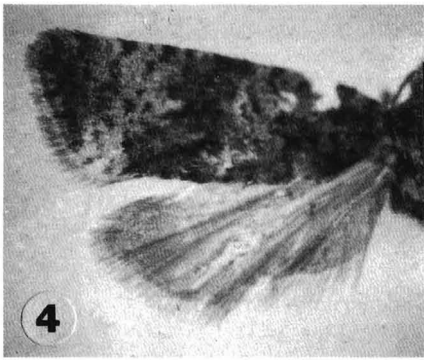
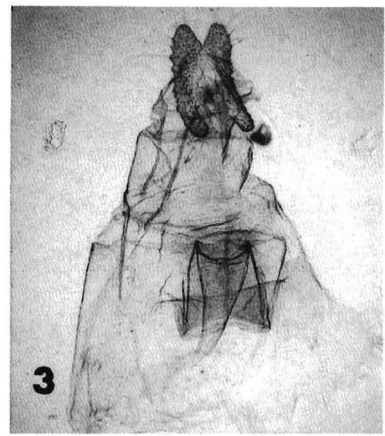
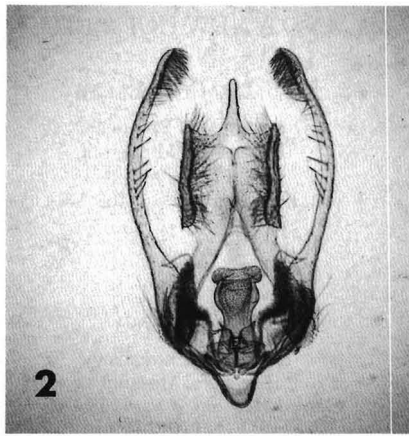
Forewing length 6.5–7.0 mm (n = 3). We previously reported this species as new to the Nearctic, which established it as Holarctic (Jalava & Miller 1998). The wings were photo illustrated by Karvonen (1932) and Kuznetsov and Mikkola (1991) (as *O. kononenkoi*), and the male genitalia line illustrated by Kuznetsov and Mikkola (1991) (as *O. kononenkoi*). The female genitalia (Fig. 6) are illustrated here for the first time. The sexes were associated by simultaneous capture, similarity in forewing scale pattern and body size, and equally unique male and female genitalia (Figs. 5, 6).

Material examined is in MZH, as enumerated by Jalava and Miller (1998).

*O. heinrichanus* (McDunnough)

(Figs. 7–9)

Forewing length 7.0–9.0 mm (n = 14). We previously reported this species to be Holarctic by synonymy (Jalava & Miller 1998). The wings were photo illustrated by Karvonen (1932) (as *Argyroploce hyperboreana*), and the male genitalia line illustrated by Heinrich (1926). Newly examined Canadian specimens fill a previous gap in Nearctic records between Labrador and Yukon Territory, and also provide the first female genitalia illustration (Fig. 9). Distribution records are now essentially circumpolar. The sexes were associated by simultaneous capture, and similarity in forewing scale pattern and body size.



Material examined is in MZH and UCB, as enumerated by Jalava and Miller (1998), plus 8 males, 1 female, Knob Lake, Quebec, 11-24-VII-48, E. G. Munroe, genit. slides WEM 36971-3, and 1 genit. in vial on pin; 1 male, Bathhurst Inlet, Northwest Territories, 30-VII-51, W. I. Campbell; 1 male, Kuusamo, Finland, 6-VII-83, K. Saloranta, genit. in vial on pin (CNC).

*O. concretanus* (Wocke)

(Figs. 10–12)

Forewing length 5.0–5.5 mm (n = 3). We previously reported this species as new for the Nearctic, and thus Holarctic (Jalava & Miller 1998). Kuznetsov (1987) line illustrated the male genitalia. As far as we know, the wings and female genitalia are illustrated here for the first time (Figs. 10, 12). The sexes were associated by simultaneous capture and similarity in forewing scale pattern and body size. This species appears to have the smallest body size among boreal *Olethreutes*.

Material examined is in MZH and UCB, as enumerated by Jalava and Miller (1998).

*O. nordegganus* (McDunnough)

(Figs. 13–15)

*Argyroplote nordeggana* McDunnough (1922).

*Olethreutes nordeggana*; Heinrich (1926).

*O. kennethana* McDunnough (1941); Jalava and Miller (1998).

**New Synonymy.**

*O. obsoletana* (not Zetterstedt 1840); Miller (1985), Kuznetsov and Mikkola (1991).

Forewing length 7.0–10.0 mm (n = 43). McDunnough (1941) expressed uncertainty whether *nordegganus* and *kennethanus* were separate entities. In light of our study, the differences he cited between them appear to be individual rather than specific. For example, McDunnough's (1941) comparative illustrations of male valvae show that the extent of spining between sacculus and cucullus is minimal in *nordegganus* and maximal in *kennethanus*. Our sample encompasses these illustrated extremes and all gradations between them (n = 14). Dark areas of the forewing also vary from rust to blackish-brown among individuals.

We report *O. nordegganus* here as new for the Palaearctic, which makes it Holarctic. It appears that records of *O. obsoletanus* from northeast Siberia (Kuznetsov & Mikkola 1991) are misidentified *O. nordegganus*. The easternmost *O. obsoletanus* we have seen are from Buryatia (east of Lake Baikal), ~3000 km from the Pacific Ocean. Genitalia of these two species are superficially similar, but diagnostic differences lie in the number, size, and arrangement of vesical cornuti (Jalava & Miller 1998). Our most recently examined material confirms that the *O. obsoletanus* vesica has two to three plates each bearing a cluster of short cornuti, whereas the *O. nordegganus* vesica lacks such plates, but has from one to eight long, separate cornuti.

In addition to McDunnough's (1922, 1941) line illustrations of the male genitalia, Heinrich (1926) photo illustrated them, and line illustrated the female genitalia. The wings (Fig. 13) are illustrated here for the first time.

Material examined is in CNC, MZH, UCB, USNM, as enumerated by Jalava and Miller (1998), plus the following: *nordegganus* holotype male, Nordegg, Alberta, 14-VII-21, J. McDunnough, genit. slide Arg. 13 m (CNC); 1 *nordegganus* paratype male, same data as holotype except 18-VII-21; 1 male, Mt. McKinley Pk., Alaska, 3-VII-38, G. P. Engelhardt; 16 males, Peters Lk., Alaska, 14-VII-73, J. F. G. Clarke, genit. slides USNM 24173–6, 9; 3 males, McKinley Park, Alaska, 5-VIII-31, F. W. Morand, genit. slide WEM 154971; 1 female, Umiat, Alaska, 1950, N. A. Weber No. 2686, genit. slide WEM 154975 (USNM); 1 male, nr. Anderson, Alaska, 26-VI-79, P. Opler and J. Powell; 16 males nr. Cantwell, Alaska, 26–28-VI-79, P. Opler and J. Powell, genit. slides JAP 4463, 4476 (UCB); 1 male, 40 km NE Mistassini, Quebec, 22-VII-92, K. Mikkola; 1 male, 97 km post Dempster Hwy., Yukon Territory, 6-VII-94, L. Kaila; 11 males, nr. Kulu village, Magadan oblast, Russia, 10–15-VII-97, Jalava and Tammaru, genit. slides JJ 4, 5, 7–12, 15–17/10–29–97; 1 male, Upper Kolyma River, Magadan oblast, Russia, 26-VII-87, K. Mikkola, genit. slide WEM 215961 (MZH).

*O. mengelanus* (Fernald)

(Figs. 16–18)

Forewing length 7.5 mm (n=3). This species is thus far known only from the Nearctic. Heinrich (1926) photo illustrated the male genitalia, and line illustrated the female genitalia; he also photo illustrated the wings (Heinrich 1935). Because these illustrations are scattered, and the wing pattern variable, we reillustrate wings and genitalia here (Figs. 16–18). In addition to the published distribution records mentioned by Jalava and Miller (1998) and Danks (1981), MacKay and Downes (1969) noted that adults of this species from Ellesmere Island, Northwest Territories, had been misidentified as *Aphania* sp. in the report of Oliver (1963). MacKay and Downes also stated that on Ellesmere Island the larvae feed among leaves of *Dryas integrifolia* Vahl (Rosaceae), but this record needs confirmation as larvae from this plant were not reared to the adult stage for positive identification.

Material examined is in MZH, UMSP, and USNM, as enumerated by Jalava and Miller (1998).

*O. costimaculanus* (Fernald)

(Figs. 19–21)

Forewing length 6.5–7.0 mm (n = 6). This species, thus far known only from the Nearctic, is superficially similar to the Holarctic *O. dalecarlianus* (Guenée) and the Palaearctic *O. ledianus* (L.) (Jalava & Miller 1998). Heinrich (1926) line illustrated the female genitalia, and photo illustrated the male genitalia. The wings (Fig. 19) are illustrated here for the first time. The lectotype female illustrated here was designated by Miller (1970).

Material examined is in INHS, MZH, USNM, as enumerated by Jalava and Miller (1998).

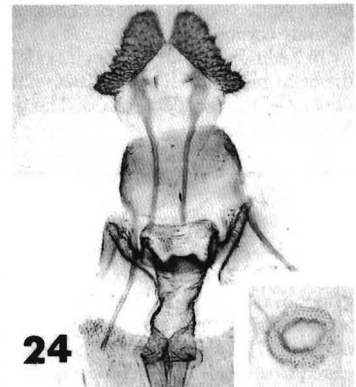
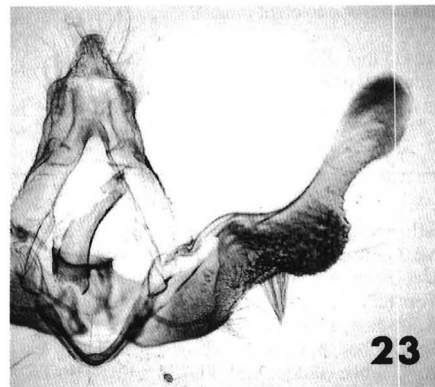
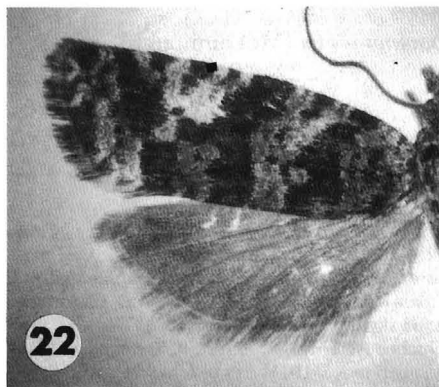
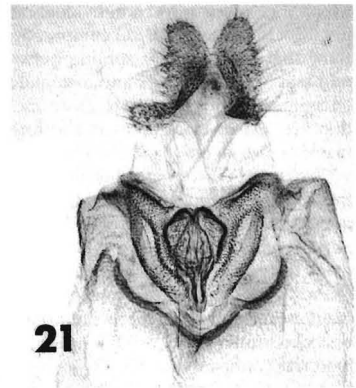
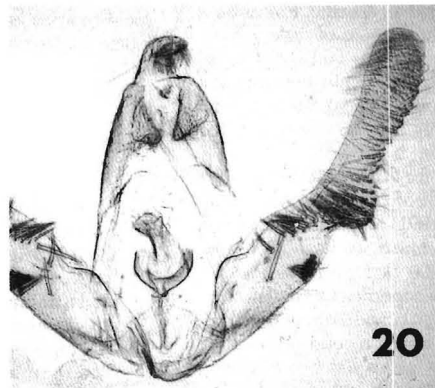
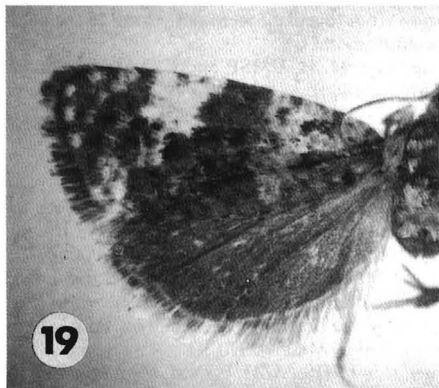
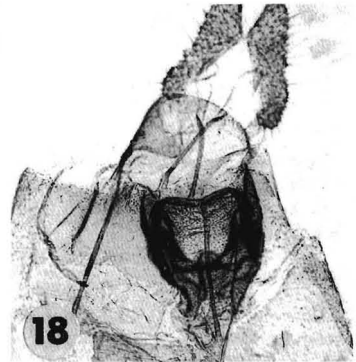
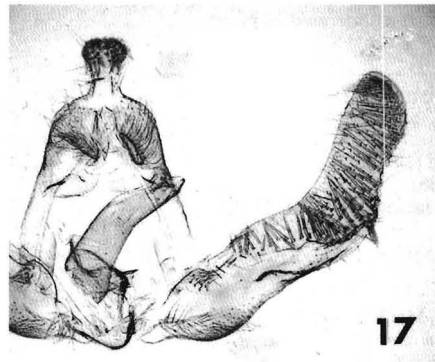
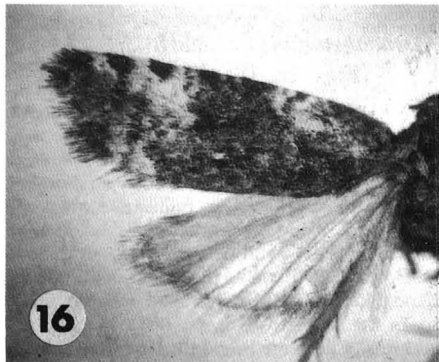
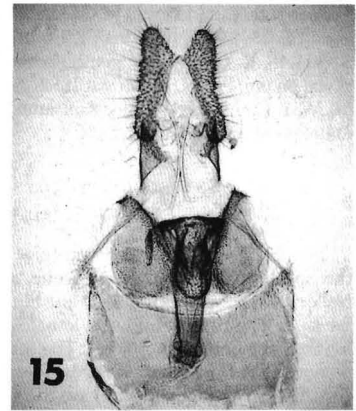
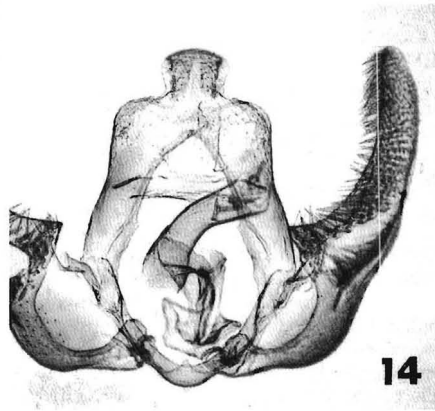
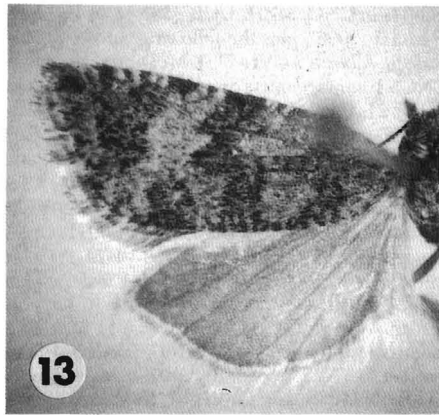
*O. bowmanus* (McDunnough)

(Figs. 22–24)

Forewing length 7.5–8.0 mm (n = 12). No illustrations of this Nearctic species accompanied its description (McDunnough 1923),

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FIGS. 1–12. Wings and genitalia of Olethreutini. Unless otherwise shown or stated, signa are absent. 1–3, *Tia enervana*. 1, Wings of male from Nordegg, Alberta (*tulgana* holotype). 2, Genitalia of male from Peters Lake, Alaska (USNM slide 24168). 3, Sterigma and associated structures of female from Schrader Lake, Alaska (slide WEM 154972). Signum slight or nonexistent. FIGS. 4–6. *Olethreutes aquilonanus*. 4, Wings of male from Ogilvie Mts., Yukon Territory. 5, Genitalia of male from Ogilvie Mts., Yukon Territory (slide WEM 151972). 6, Sterigma and associated structures of female from Kilpisjärvi, Finland (slide WEM 1512954). Inset shows signum at same scale. FIGS. 7–9. *O. heinrichanus*. 7, Wings of male from Knob Lake, Quebec. 8, Genitalia of male from Knob Lake, Quebec (slide WEM 36971). 9, Sterigma and associated structures of female from Knob Lake, Quebec (slide WEM 36973). FIGS. 10–12. *O. concretanus*. 10, Wings of female from Murphy's Dome, 32 km NW of Fairbanks, Alaska. 11, Genitalia of male from Eagle Pass, 105 km SW of Circle, Alaska (slide JAP 4564). Inset shows aedeagus at same scale. 12, Sterigma and associated structures of female from Upper Kolyma River, Magadan oblast, Russia (slide WEM 151973).





but the whole male genitalia were photo illustrated by Heinrich (1926). The wings (Fig. 22) and female genitalia (Fig. 24) are illustrated here for the first time. The sexes were associated by simultaneous capture and similarity in forewing scale pattern and body size.

We earlier differentiated this species from *O. exaridanus* Kuznetsov (Jalava & Miller 1998). It also superficially resembles *O. magadanus* (Falkovitsh), but differs in structural details. The structural differences chiefly concern the mid-valval spined area, which is flatter and more rounded in outline than in *O. magadanus*.

Material examined is in MZH and USNM, as enumerated by Jalava and Miller (1998) for *O. bowmananus*, plus the following: 7 males, 1 female, Schrader Lk., Alaska, 2-13-VII-73, J. F. G. Clarke, genit. slides USNM 24165-6, WEM 94974 (USNM); and *O. magadanus*, 1 male, 21-VII-89, Upper Anadyr River, Chukchi Peninsula, Russia, K. Mikkola, genit. slide WEM 94972; 2 males, 15-VII-87, Upper Kolyma River, Magadan oblast, Russia, K. Mikkola, genit. slides JJ 2/5.10.1994, WEM 285962 (MZH).

#### DISCUSSION

Two forewing pattern groups are evident in Olethreutini treated here: (i) the simple bifasciate type in *Tia enervana*, *Olethreutes aquilonanus*, *O. heinrichanus*, *O. concretanus*, and (ii) the white-marked-costa type in *O. mengelanus*, *O. costimaculanus*, and *O. bowmananus*. Whether such groups reflect convergence or inheritance remains to be determined.

The number of Beringian tortricid species that are Holarctic previously stood at 61% (42/69) (Jalava & Miller 1998). Some adjustments to these tallies are now necessary: (i) Removing *O. obsoletanus*, which does not appear to be Beringian, (ii) Adding *O. nordegganus*, which is reported here to be both Beringian and Holarctic, and (iii) Adding *Clepsis danilevskiyi* Kostjuk, which was recently reported elsewhere to be Beringian and Holarctic (Kuznetsov et al. 1998). These adjustments increase the percentage of Beringian tortricids which are also Holarctic to 63 (44/70). The rapid rate at which boreal Tortricidae have recently been discovered to be Holarctic suggests that the numbers will climb still higher with further investigation.

#### ACKNOWLEDGMENTS

For loaning specimens under their care, we thank J. W. Brown, R. W. Hodges, R. L. Brown (USNM), P. T. Dang (CNC), V. I. Kuznetsov (ZIN), K. Methven (INHS), and J. A. Powell (UCB).

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Received for publication 23 April 1999; revised and accepted 3 March 2000.

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FIGS. 13-24. Wings and genitalia of Olethreutini. Unless otherwise shown or stated, signa are absent. FIGS. 13-15, *Olethreutes nordegganus*. 13, Wings of male from Peters Lake, Alaska. 14, Genitalia of male from Peters Lake, Alaska (USNM slide 24169). 15, Genitalia of female from Peters Lake, Alaska (USNM slide 24174). Signum a tiny scobinate patch, not shown. FIGS. 16-18, *O. mengelanus*. 16, Wings of male from "Greenland". 17, Genitalia of male from Ogilvie Mts., Yukon Territory (slide JJ 42/9-12-94). 18, Genitalia of female from "Greenland" (USNM slide 72157). Corpus bursae missing from slide, so the signum, a scobinate patch (Heinrich 1926), is not shown. FIGS. 19-21, *O. costimaculanus*. 19, Wings of lectotype female. 20, Genitalia of male from Ogilvie Mts., Yukon Territory (slide JJ 1/4-15-95). 21, Genitalia of lectotype female (slide WEM 1512951). FIGS. 22-24, *O. bowmananus*. 22, Wings of paratype male from Nordegg, Alberta. 23, Genitalia of male from Schrader Lake, Alaska (USNM slide 24165). 24, Genitalia of female from Schrader Lake, Alaska (USNM slide 24166). Inset shows signum at same scale.