PROC. ENTOMOL. SOC. WASH.
86(2), 1984, pp. 452–459

TWO NEW GENERIC NAMES FOR GROUPS OF HOLARCTIC AND PALEARCTIC ARCTIINI (LEPIDOPTERA, ARCTIIDAE)

D. C. Ferguson

Systematic Entomology Laboratory, IIBIII, Agricultural Research Service, USDA, % National Museum of Natural History, Washington, D.C. 20560.

Abstract.—Research to identify and define all genera closely related to the nearctic *Apantesis* Walker and *Grammia* Rambur, which are herein treated as distinct, led to the conclusion that two mainly palearctic genera of this group are unnamed. These new genera are described as *Holoarctia,* with *Nemeophila cervini* Fallou as the type species, and *Palearctia,* with *Arctia glaphyra mannii* Alpheraky as the type species. *Neoarctia sordida* McDunnough is referred to the synonymy of *Holoarctia cervini.* An identification key is provided for the four closely related genera, *Holoarctia, Palearctia, Neoarctia,* and *Hyperborea.*

During my recent research toward a comprehensive generic revision of a large section of the holarctic Arctiini, it became apparent that *Nemeophila cervini* Fallou, 1864, from the Alps, belongs to a discrete group of three species for which no generic name is available. *Grammia* Rambur, 1866, and *Orodemnias* Wallengren, 1885 (the latter a junior synonym of *Grammia*), have been used for *cervini,* but neither applies to it because their type species, *Bombyx quenseli* Paykull, 1793, is not congeneric. The unexpected discovery of a closely related new species, *Orodemnias fridolini* Torstenius, 1971, with its almost circumpolar distribution from Sweden through Russia and Siberia to Alaska, has aroused widespread interest in the group, and I thought it important to provide needed generic names and summarize my conclusions concerning the relationships of these moths without further delay.

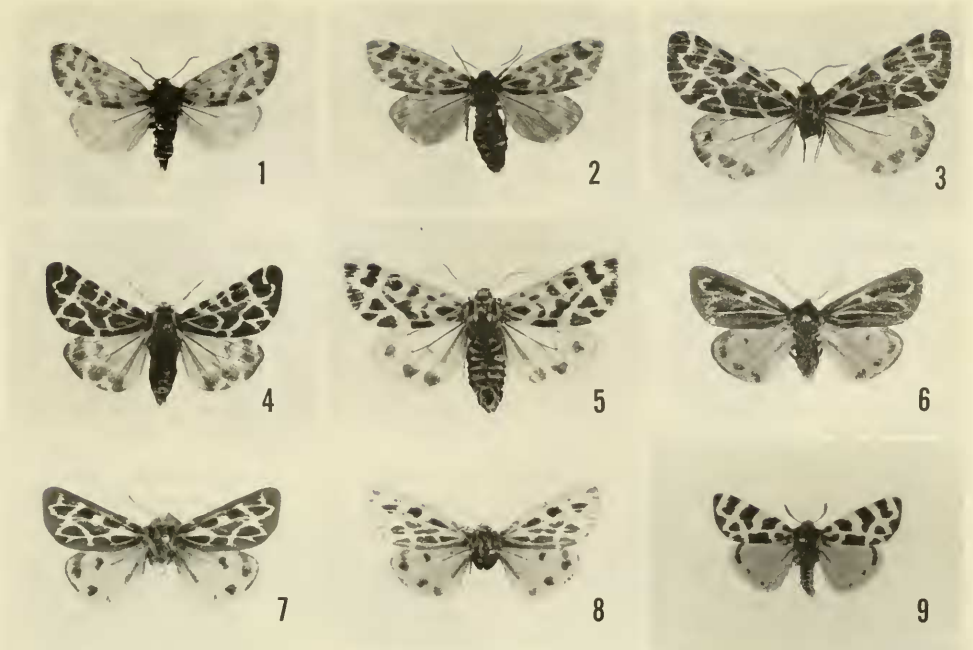
The genus represented by *cervini,* which I shall call *Holoarctia,* n. gen., belongs to a small, arctic-alpine complex of four closely related but conveniently distinguishable genera. Of these, only *Neoarctia* Neumoegen and Dyar and *Hyperborea* Grum-Grshimailo have been named. *Neoarctia* is a genus of three species known only from the Rocky Mountain region from Colorado to the Yukon Territory, and *Hyperborea* is a genus of only one mainly Siberian species that occurs also in Alaska (Ferguson, 1972: 222). In order to define and discuss the generic status of *cervini* and to make meaningful comparisons, I here include also a description of the fourth genus of this complex, a central Asian group of probably 10 or 12 species for which I herein propose the name *Palearctia,* n. gen.

Holoarctia Ferguson, New Genus

Figs. 1–5, 10, 11, 15

Type species: Nemeophila cervini Fallou, 1864.

Diagnosis.—Forewing pattern (Figs. 1–5) with full complement of 5 transverse pale bands, usually apparent at least at costa, but sometimes in part suffused or



Figs. 1–9. 1, *Holoarctia cervini* (Fallou) ♂, Wallis. 2, same, ♀, Zermatt. 3, *H. pungeleri* (Bang-Haas) ♂, "Tunkinsche Weisberge, Sajan Gbg., Turan, 2000 m. Juli" (BMNH). 4, *H. fridolini* (Torstenius) ♂, Mile 21, Teller Road, Seward Peninsula, Alaska, 22 July 1976, Alaska Lepid. Surv. 5, same, ♀, Toolik Lake, Alaska, 14 July 1975, Alaska Lepid. Surv. 6, *Palearctia naryna* (Bang-Haas) ♂, no data (described from Narynsk, Tien Shan region). 7, *P. glaphyra mannii* (Alpheraky) ♂, no data (USNM). 8, same, ♀, no data (USNM). 9, *P. erschoffi* (Alpheraky) ♂, no data (USNM). About natural size.

confluent; species of *Palearctia* (Figs. 6–9), *Neoarctia,* and *Hyperborea* have no more than 4 transverse bands. Longitudinal band in 1st anal fold of forewing always absent, but present in species of *Palearctia* and *Hyperborea.* Hindwing whitish or yellow, marked with the usual dark spots; these may be confluent, reduced, or absent, or entire hindwing may be suffused with dark shading.

Male genitalia (Figs. 10, 11).—Uncus tapering apically to a nearly straight or only slightly bent tip, not strongly bent in hooklike configuration characteristic of *Neoarctia* and some species of *Palearctia*; valve stout, simple, tapered, not truncated or bilobed, but its shape extremely variable in *cervini*; juxta longer than wide, medially cleft basally, somewhat convex, bilaterally spinulate distally; aedeagus stout, somewhat bowed, with one dorsal patch of small spines distally; everted vesica longer than half length of aedeagus.

Female genitalia (Fig. 15).—Ductus bursae straight, flattened, sclerotized for slightly less than its full length, shorter than corpus bursae, only about half as long as ductus bursae of species of *Neoarctia*; corpus bursae almost globular, with two signa; proximal part of ductus seminalis enormously enlarged, not obviously coiled, about as much distended as corpus bursae and having appearance of a second lobe; anterior apophyses lost.

Remarks.—The included species are *Holoarctia cervini* (Fallou), of the Alps of France, Switzerland, and Austria, Mongolia (see Alberti, 1971: 375), and the Rocky Mountains of Alberta and British Columbia, Canada (= *Neoarctia sordida*

McDunnough, 1921, new synonymy); *H. fridolini* (Torstenius), which I consider to be a distinct species and not a subspecies of *cervini* as originally described, found in northern Sweden, the Kola Peninsula in Russia, arctic Siberia, and Alaska; and *H. pungeleri* (Bang-Haas, 1927), from the Sayan Mountains, central Siberia.

I am aware that the spelling of *Holoarctia* is similar to that of *Holarctia* M. E. Smith, a synonym of *Grammia* Rambur (Arctiidae), and *Holarctias* Prout, a synonym of *Scopula* Schrank (Geometridae), and that it disregards a recommendation of the Code that names with small differences of spelling be avoided. However, it is not a homonym (Int. Code Zool. Nomen., Art. 56(a)).

Palearctia Ferguson, New Genus

Figs. 6–9, 12–14, 16

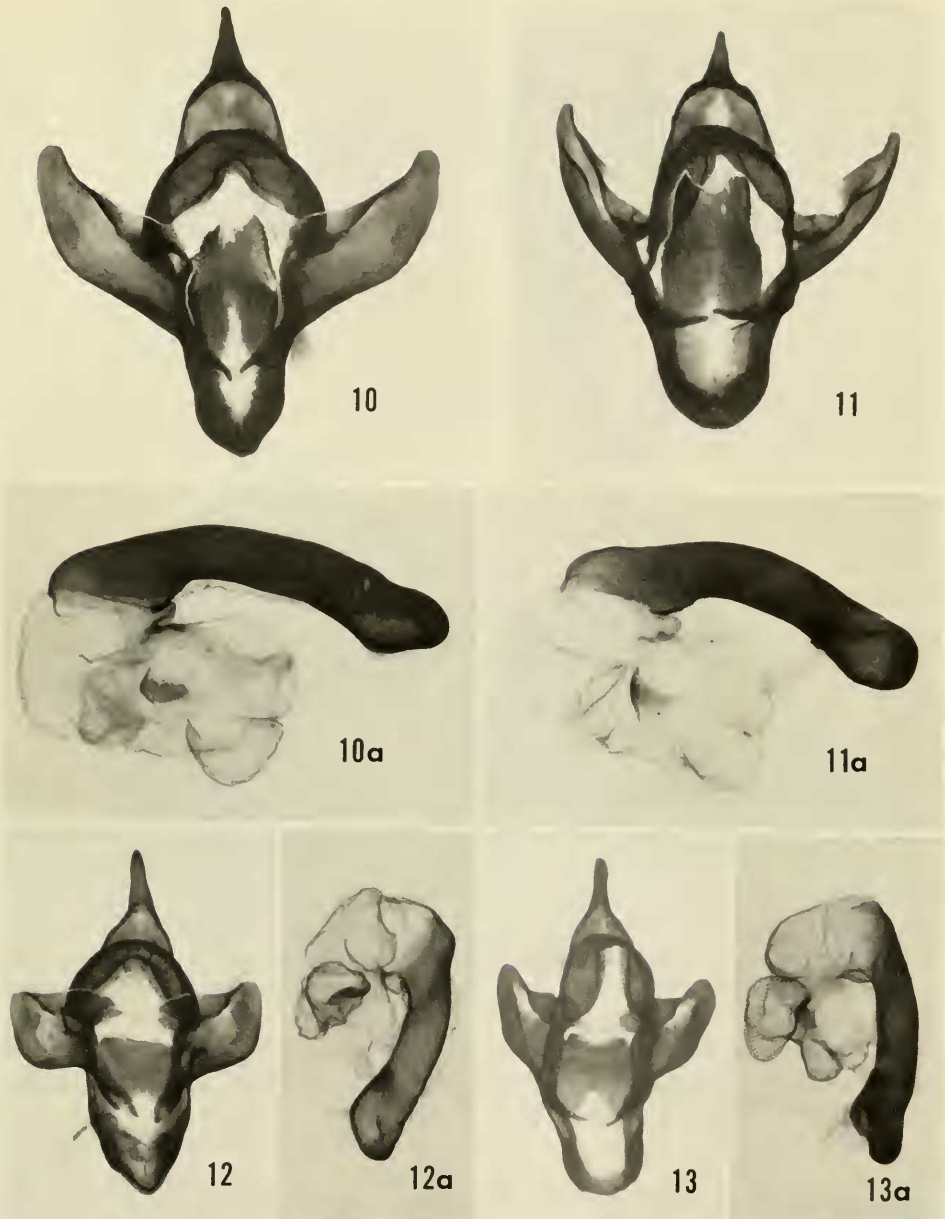
Type species: Arctia glaphyra mannii Alpheraky, 1881.

Diagnosis.—Forewing pattern like that of *Holoarctia* species except that no more than 4 transverse bands may be seen at costa, and longitudinal band in 1st anal fold is present. Hindwing red, orange, pink, yellow, or white (rarely all dark), with 3 or more dark submarginal spots that may be connected to form a continuous band, and with or without dark discal spot. Palpi shorter than those of other genera in group, hardly protruding beyond frontal hair in either sex.

Male genitalia (Figs. 12–14).—Eighth segment peculiar in that eighth sternite is lost or nearly so, i.e. unsclerotized. Otherwise similar to those of *Holoarctia* except that uncus has base reduced or narrowed relative to size of process; juxta less elongated, variable but usually about as wide as long and without spines or spicules; valve variable from short, stubby and truncated to about same length as that of *Holoarctia* species but, if elongated, tip bent inward (Fig. 14); also, base of costa produced inwardly as a strong sclerite toward posterolateral angle of juxta, a character not found in other genera of group, and probably representing a remnant of the transtilla as seen in many members of the *Arctia-Hyphoraia* and *Phragmatobia-Ocnogyna* groups; aedeagus short, curved, with a distal patch of minute spines dorsally just before vesica, less conspicuous than those of *Holoarctia* (or sometimes absent) and not situated on a humplike elevation as in species of *Holoarctia*; vesica smaller, more compact, but with about same arrangement of lobes and scobinate surfaces as *Holoarctia*.

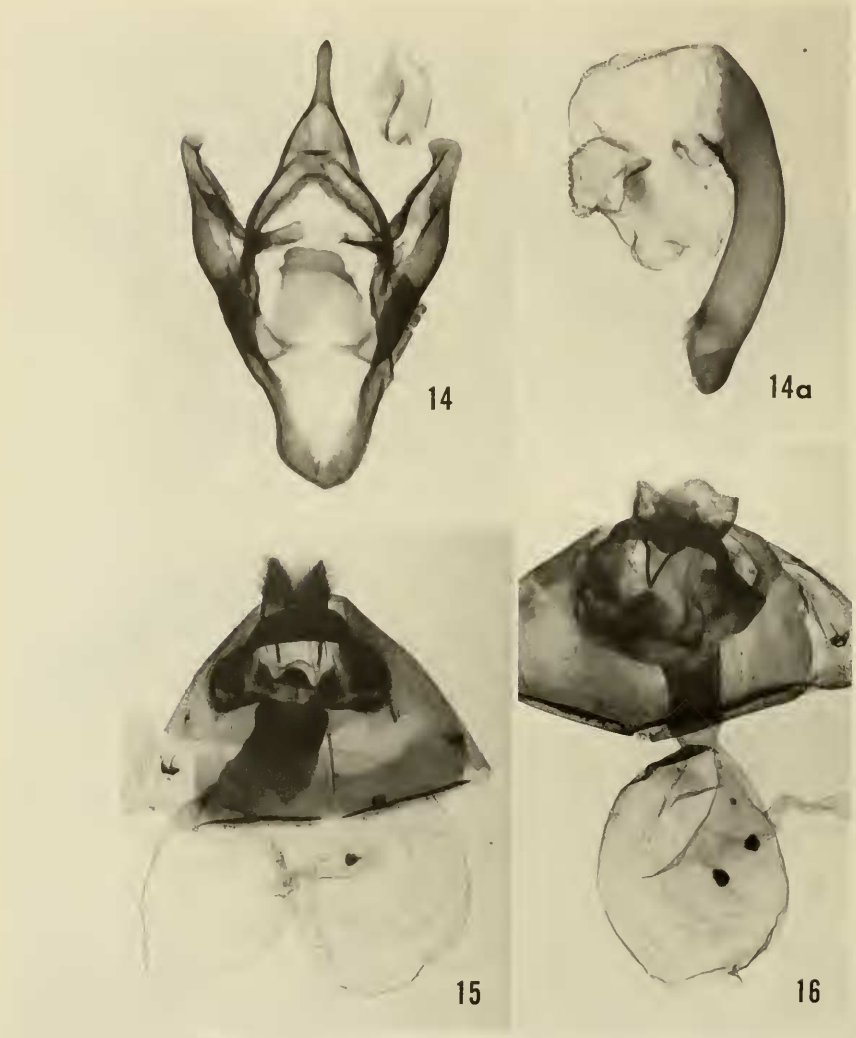
Female genitalia (Fig. 16) (based on one specimen of type species only).—Like those of *Holoarctia* species, but ductus bursae less sclerotized at ostium, ductus seminalis not greatly enlarged, and corpus bursae with rudimentary third signum in addition to two fully developed ones. Anterior apophyses present but reduced.

Remarks.—I include in the genus *Palearctia* all of the subspecies, forms and aberrations treated by Bang-Haas (1927: 62–68) under *Micrarctia glaphyra* Eversmann, *M. buraetica* Bang-Haas, and *M. kindermanni* Staudinger; by Seitz (1910: 83–84) under *Micrarctia rupicola* Grum-Grshimailo, *M. postflavida* Hampson (Fig. 14), *M. glaphyra* Eversmann, and *M. kindermanni* Staudinger; and by Draudt (1931: 78–79) under *M. glaphyra* Eversmann, *M. buraetica* Bang-Haas, *M. kindermanni* Staudinger, *M. erschoffi* Alpheraky (Fig. 9), and *M. ladakensis* Bang-Haas. I examined and dissected the type species of *Micrarctia* Seitz, 1910, namely *Nyctemera trigona* Leech, and do not consider it to be congeneric with or closely related to any of the above. "*Micrarctia*" *y-albula* (Oberthür) and



Figs. 10–13. Male genitalia. 10, *Holoarctia cervini,* the Alps. 10a, aedeagus of same. 11, *H. fridolini,* Alaska. 11a, aedeagus of same. 12, *Palearctia glaphyra mannii,* no data. 12a, aedeagus of same. 13, *P. naryna,* no data. 13a, aedeagus of same.

"*M.*" *sieversi* (Grum-Grshimailo), included in the same genus by Seitz, also are not congeneric and belong in the *Phragmatobia-Ocnogyna* group. I have examined and dissected 6 distinct species of *Palearctia* and would deduce from the illustrations in works of the above authors that there must be several more species

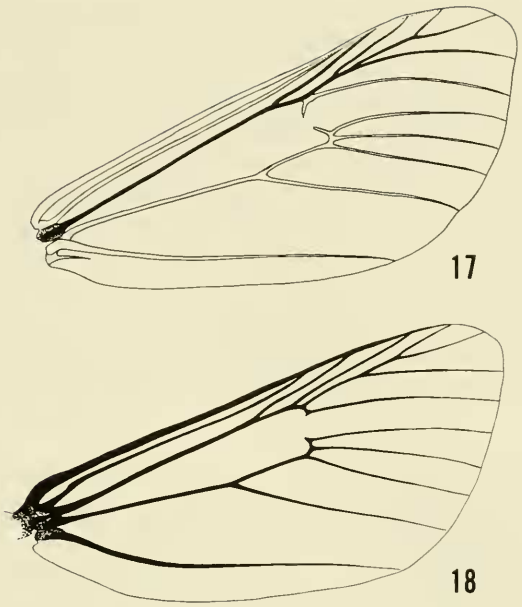


Figs. 14–16. Male and female genitalia. 14, *Palearctia postflavida* ♂, "Skoio La," July 1887, J. H. Leech (BMNH). 14a, aedeagus of same. 15, *Holoarctia fridolini* ♀, Alaska. 16, *Palearctia glaphyra mannii* ♀, no data. Figures of genitalia not to scale.

among the many named forms. I chose to designate *mannii* (Figs. 7, 8, 12, 16) as the type species as it is the only one of which I have seen both sexes. The species of *Palearctia* are badly in need of revision, but material is not easily obtained. They occur in the mountains of Kashmir, Tibet, Sinkiang, Mongolia, and adjacent regions of the U.S.S.R. *Palearctia glaphyra mannii* was described from between 6500 and 10,000 feet in the Kuldja district, Tien Shan Mountains, Sinkiang.

Discussion

The genera *Neoarctia, Holoarctia, Palearctia, Hyperborea, Grammia,* and *Apantesis* Walker, *Notarctia* M. E. Smith, and *Chelis* Rambur belong to a complex



Figs. 17–18. Venation. 17, *Holoarctia cervini* (Fallou); radial veins in solid black. 18, *Grammia quenseli* (Paykull).

of closely related genera that I will call the *Holoarctia-Grammia* series. The superficially similar palearctic genus *Cymbalophora* Rambur is not one of them but appears to be an aberrant member of the *Arctia-Hyphoraia* series, according to its venation and genitalia. The classification of those genera treated here and of the Arctiini in general has been much complicated by historical misconceptions. Contrary to what was implied by its generic placement until now, *cervini* is not most closely related to species of *Grammia* but would have been better assigned to *Neoarctia.* McDunnough (1921: 167) noted this, if only indirectly, when he described *Neoarctia sordida* from Banff, Alberta, referring to it as "a new species of *Neoarctia,* probably closest to *cervina* (sic) Fall. from the Alps." I examined the type of *sordida* and concluded that it represents the very same species as *cervini* (not the Eurasian and Alaskan *fridolini,* as one would have expected). *Grammia* is a relatively large North American genus of about 30 species, of which only two, *quenseli* (Paykull) and *turbans* (Christoph), extend also into the Palearctic Region. All of the species formerly included in *Apantesis* in North American lists (e.g. Hodges et al., 1983: 117) I now refer to *Grammia* with the exception of *phalerata* (Harris), *vittata* (F.), and *nais* (Drury) (plus two others that will be treated later), which are the true *Apantesis* species, and *proxima* (Guérin-Méneville), which I remove to *Notarctia* M. E. Smith, 1938.

The group consisting of *Neoarctia, Holoarctia, Palearctia,* and *Hyperborea* may be distinguished from other Arctiini by unique combinations of features that will be described in more detail in my forthcoming revision. All have reduced eyes, most have reduced antennal branches, and nearly all are diurnal. The forewing venation never has an accessory cell, except perhaps in rare aberrant specimens, and it has a radial system with 4 branches arising beyond the end of the discal

cell (Fig. 17), like most arctiids (3 in *Grammia, Notarctia,* and *Apantesis*—Fig. 18); the male genitalia have a normal uncus with wide base and slender process (unlike the triangular uncus of many arctiid genera), generally no development of the transtilla, a rather simple, flat valve, and a special kind of juxta that is generally as long as or longer than wide and often medially cleft basally. The genus *Grammia,* on the other hand, has a different and highly characteristic kind of valve with a stout basal half, a node or ridge near the middle, and an abruptly flattened, blade-like distal half. The form of the valve in *Grammia* remains remarkably constant throughout the whole diverse array of species from *quenseli* and *turbans* to such extreme forms as *virgo* (L.), *arge* (Drury), and *placentia* (J. E. Smith), with never a suggestion of anything transitional to the type of valve found in the *Holoarctia-Hyperborea* group. The problem is not in distinguishing these genera from *Grammia* but from one another. To help clarify the differences, I have prepared the following key.

Key to the Four Genera of the *Neoarctia-Hyperborea* Group

1. Forewing never with longitudinal, pale stripe in 1st anal fold (Figs. 1–5). Arctic Eurasia and the Alps, Alaska, and the Rocky Mts. 2
– Forewing nearly always with longitudinal, pale stripe in 1st anal fold (Figs. 6–9). Central Asia, Siberia, Alaska 3
2. Forewing with 3–4 transverse bands only (sometimes indistinct or lost), longitudinal bands or lines wanting; median space marked only with an enlarged pale patch at costa. Juxta not spinulate; aedeagus straight, with two spinulate patches apically; uncus bent subapically in a somewhat hooklike form. Rocky Mts., Colorado to Yukon ..... *Neoarctia*
– Forewing with full complement of 5 transverse bands in addition to at least partial, thin, longitudinal vein lines; median space marked with two separate transverse bands toward costa except in occasional, very dark specimens. Juxta with spinulate patches; aedeagus bowed, with one spinulate patch apically; uncus essentially straight. Arctic Eurasia to Alaska, Mts. of Central Asia and western Canada ..... *Holoarctia*
3. Male genitalia with valve entire, not bilobed; juxta without spinules or penicilli. Male antennae obviously bipectinate. Forewing with or without vein pattern, and with antemedial and/or medial bands, or vestiges of them, present at least between costa and 1st anal fold. Hindwing with ground color red or yellow, rarely white or all black. Central Asia ..... *Palearctia*
– Male genitalia with valve bilobed, and juxta bearing a pair of denticulated penicilli in posterolateral corners. Male antennae with very short branches, appearing simple without magnification. Forewing always with fully developed vein pattern but entirely without antemedial or medial bands between costa and 1st anal fold. Hindwing ground color whitish. Siberia and Alaska ..... *Hyperborea*

Acknowledgments

I thank all who contributed to this study by providing information, advice, or specimens. These include: J. D. Lafontaine, Biosystematics Research Institute, Agriculture Canada, Ottawa; E. M. Pike, Fairview, Alberta; K. W. Philip, Institute

of Arctic Biology, University of Alaska, Fairbanks; O. Sotavalta, Helsinki, Finland; and A. Watson, British Museum (Natural History). The North American occurrence of *Hyperborea czekanowskii* and *Holoarctia fridolini* has been made known entirely through the efforts of Kenelm W. Philip and his Alaska Lepidoptera Survey. One of only two North American specimens of *Holoarctia cervini* was collected and brought to my attention by E. M. Pike. I thank Charles Covell, University of Louisville, Allan Watson, British Museum, and Manya Stoetzel, of this laboratory, for reviewing the manuscript. Photography was by the author, and drawings by Mary Lou Cooley, staff illustrator, Systematic Entomology Laboratory.

Literature Cited

Alberti, B. 1971. Lepidopteren aus der Mongolischen Volksrepublik. Dtsch. Entomol. Z. N.F. 18: 361–376.

Alpheraky, S. 1881. *In* O. Staudinger, Beitrag zur Lepidopteren-Fauna Central-Asiens. Stett. Entomol. 42: 393–424.

Bang-Haas, O. 1927. Horae Macrolepidopterologicae Regionis Palaearcticae (Verlag Staudinger & Bang-Haas, Dresden-Blasewitz) 1: XXVII + 128 pp., 11 pls.

Draudt, M. 1931–32. Arctiidae, pp. 61–94, pls. 5–7. In A. Seitz, 1930–34, Die Gross-Schmetterlinge der Erde 2, Suppl. Alfred Kernen, Stuttgart. VII + 315 pp., 16 pls.

Fallou, M. J. 1864. Description d'un nouveau Lépidoptère Hétérocère du genre *Nemeophila* Steph. Ann. Soc. Entomol. Fr. 4(4): 23–26, pl. 1, fig. 2.

Ferguson, D. C. 1972. New records of Lepidoptera from the United States (Arctiidae, Geometridae, Epiplemidae). J. Lepid. Soc. 26: 222–225.

Hodges, R. W., and others. 1983. Check list of the Lepidoptera of America north of Mexico. E.W. Classey Ltd. and The Wedge Entomological Research Foundation, London. xxiv + 284 pp.

McDunnough, J. 1921. Note on the generic position of two Canadian Arctiids with descriptions of new species (Lepid.). Can. Entomol. 53: 167–168.

Paykull, G. von. 1793. Beskrivelse over 5 arter nye nat.-sommerfluge (Bombyx, Noctua). Skr. Naturhist-Selskabet Kiøbehavn 2(2): 97–102.

Rambur, P. 1866. Catalogue systématique des Lépidoptères de l'Andalousie (2). J.B. Bailliere, Paris. 412 + xi pp., 22 pls.

Seitz, A. 1910. Arctiidae, pp. 43–108, pls. 11–18. In A. Seitz, 1910–13, Die Gross-Schmetterlinge der Erde 2. Alfred Kernen, Stuttgart. VII + 497 pp., 56 pls.

Smith, M. E. 1938. A revision of the genus *Apantesis* Walker (Lepidoptera, Arctiidae). Thesis Abstract, University of Illinois, Urbana. 12 pp.

Torstenius, S. 1971. *Orodemnias cervini* Fallou ssp. *fridolini* n. ssp. (Lepidoptera, Arctiidae). Entomol. Tidskr. 92: 173–177.

Wallengren, H. D. J. 1885. Skandinaviens Heterocer-Fjärilar beskrifne 2(3): 257–444.