

April 1993

## New Distribution Records of the Tiger-Moth Genus *Phragmatobia* in North America (Lepidoptera: Arctiidae: Arctiinae)

Julian P. Donahue  
*Natural History Museum of Los Angeles County*

Follow this and additional works at: <https://scholar.valpo.edu/tgle>



Part of the [Entomology Commons](#)

---

### Recommended Citation

Donahue, Julian P. 1993. "New Distribution Records of the Tiger-Moth Genus *Phragmatobia* in North America (Lepidoptera: Arctiidae: Arctiinae)," *The Great Lakes Entomologist*, vol 26 (1)  
Available at: <https://scholar.valpo.edu/tgle/vol26/iss1/3>

This Peer-Review Article is brought to you for free and open access by the Department of Biology at ValpoScholar. It has been accepted for inclusion in *The Great Lakes Entomologist* by an authorized administrator of ValpoScholar. For more information, please contact a ValpoScholar staff member at [scholar@valpo.edu](mailto:scholar@valpo.edu).

NEW DISTRIBUTION RECORDS OF THE TIGER-MOTH GENUS  
*PHRAGMATOBIA* IN NORTH AMERICA  
(LEPIDOPTERA: ARCTIIDAE: ARCTIINAE)

Julian P. Donahue<sup>1</sup>

ABSTRACT

New distribution records for all three Nearctic species of *Phragmatobia* include state records (the first records for the states indicated) of *P. lineata* (Maryland, Wisconsin); *P. fuliginosa rubricosa* (Ohio, South Dakota), and *P. assimilians* (Idaho, Montana, Pennsylvania, Wisconsin), all representing southern range extensions at those longitudes except for the Wisconsin records of *P. lineata*, which are northern range extensions. *Chelone glabra* (Scrophulariaceae) is reported as a larval hostplant of *P. lineata*, and descriptive notes on the larva of this species are included. Midwinter activity of a larva crawling on snow is reported for *P. fuliginosa rubricosa*. The rare original description of *Phragmatobia dallii* Packard, 1870, is reproduced.

Since the late John H. Newman and I reviewed the North American species of *Phragmatobia* (Donahue and Newman, 1966), I have examined additional material in several collections (see Acknowledgments, where acronyms used to indicate the source of specimens examined are explained), resulting in the discovery of a number of significant new distribution records. I include only first records for a state, records from a region where the species has been infrequently collected and/or may be in danger of extirpation, or records from localities sufficiently distant from the previously documented distribution to be of interest. The distribution maps here are those used for the 1966 paper, with the additions and corrections cited in the present paper. In the species accounts I include several corrections and additions to that earlier paper; states and counties within each state are arranged alphabetically.

Despite the partial larval descriptions in some of the species accounts, more rearing and comparative larval morphological studies are needed before we have a clear understanding of the larval systematics in this genus. Existing larval descriptions are persistently conflicting, incomplete, and sometimes based on misidentification of the parent female or offspring, or on an assumed identity for a field-collected larva. One such example is Saunders' (1863: 372) report of the larva of *P. fuliginosa* from St. Catherines [sic], Ontario, which clearly refers to the fall webworm, *Hyphantria cunea* (Drury), predating by five years the first recognized report of this species from Canada [this misidentification will be elaborated upon in a separate paper].

<sup>1</sup>Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles, CA 90007-4057.

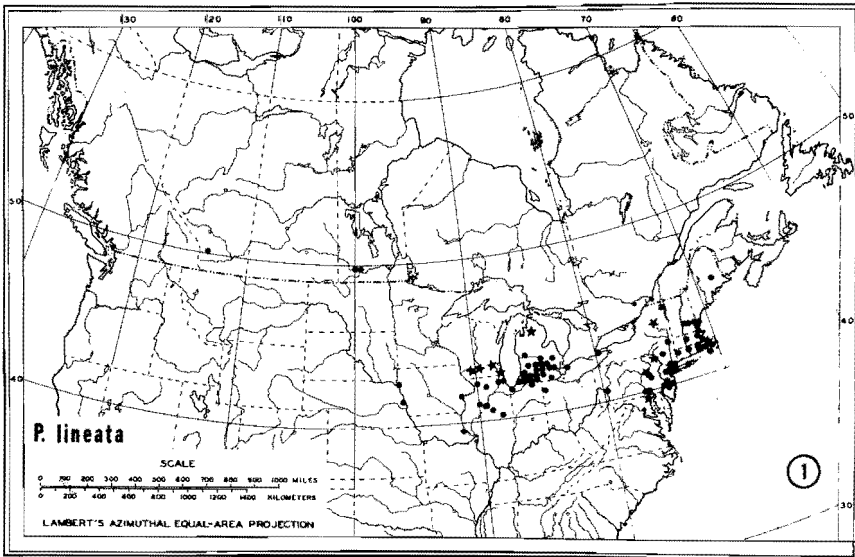


Figure 1. Distribution of *Phragmatobia lineata*; dots represent localities previously published by Donahue & Newman (1966), stars represent new localities for specimens examined and included in the present paper, triangles represent reliable records published or communicated by others.

### PHRAGMATOBIA Stephens, 1828

Correction to 1966 paper: *Phragmatobia* was proposed in 1828 (Stephens, 1828: 55, 73), not 1829 as we stated, although Stephens subsequently proposed the same name twice again in 1829; see Watson et al. (1980: 153) for further details.

We mentioned, without further discussion, five Neotropical species that were, or had been, placed in *Phragmatobia*. Three of them, together with five additional species, are still catalogued in *Phragmatobia* (Watson and Goodger, 1986: 28), but Ferguson (1985: 241) recently proposed the new genus *Sonorarcia* for two of them [*S. fervida* (Walker) and *S. nundar* (Dyar)], the latter he reported from the United States for the first time (Huachuca Mts., Cochise Co., Arizona). I expect that further study will demonstrate that *Phragmatobia* is a strictly Holarctic genus with no Neotropical representatives.

### PHRAGMATOBIA LINEATA Newman & Donahue, 1966 (fig. 1)

Corrections to 1966 paper: I have re-identified as *P. lineata* the 2 female specimens from ILLINOIS: Peoria Co. (Elmwood) and INDIANA: Lake Co. (Clarke), previously identified and mapped as *P. fuliginosa*.

New Records: MARYLAND [STATE RECORD]: BALTIMORE CO., Stevenson, 27 June 1959, Robert S. Bryant (1 male, RSB); same locality, emerged 14 June 1965 from larva collected on *Chelone glabra* (Scrophulariaceae) in late May-early June of the same year (1 female, RSB). [This is a new

foodplant record for the genus in North America, but not a surprising one, considering the polyphagous nature of the group.]

MASSACHUSETTS: PLYMOUTH CO.: East Wareham, Agricultural Experiment Station, 6, 12, & 21 July 1971, W.E. Tomlinson (3 males, FSCA).

MICHIGAN: OTSEGO CO.: T29N, R3W, Section 13, mature larva collected 30 March 1968 as it crawled on exposed peat at the margin of a leatherleaf (*Chamaedaphne calyculata*)-Labrador tea (*Ledum groenlandicum*) bog (both Ericaceae); spun cocoon the same evening, adult moth emerged in laboratory 11 April 1968. (1 male, JPD #68-6, MSUE). [This record was published without rearing details by Newman and Nielsen (1973: 36).] Because of the locality (in the Northern Lower Peninsula, more than 100 miles north of any previously known Michigan locality for *P. lineata*), and the uniformly yellow, short, even-length setae, I initially mistook the larva for that of *Cygnia oregonensis* (Stretch); however, unlike that common species, the skin of this larva was blackish (not yellow). The setal color is in accord with the partial larval description given earlier (Donahue and Newman, 1966: 45), while the black skin, not previously noted, may aid field workers in the discrimination of the similar larvae of these two moths.

NEW YORK: McCabe (1990: 8-9,) reports rearing this species from ova obtained from a female collected in the daytime at Browns Tract Pond bog, HAMILTON CO., near the northern limit of known distribution, and figures (p. 29) a larva reared on *Spiraea latifolia* (Rosaceae). He notes that fewer than 10% (of an unspecified number) of the larvae pupated; the rest diapaused and overwintered, but did not survive (McCabe, pers. comm.). The preserved larva I examined from that rearing is distinctly two toned: the setae of abdominal segments 2-6 are predominantly yellowish, contrasting sharply with the blackish setae on the anterior and posterior ends; the skin is dusky, but not blackish as I observed in the Michigan specimen noted above, although some fading may have occurred in alcohol.

PENNSYLVANIA: SCHUYLKILL CO.: Schuylkill Haven, 27 & 30 June 1969, Wm. Houtz (4 males, LACM); [no city], 16 July 1971, J. Gilbert (2 males, ER). WAYNE CO.: South Sterling, 15 July 1918, Ernest Baylis (1 male, CMP).

WISCONSIN [STATE RECORDS]: DANE CO.: T9N, R6E, Sec. 29, 29 June 1981, Les Ferge (1 male, LAF). IOWA CO.: Dodgeville, T7N, R3E, Sec. 31, 27 July 1975 (1 male) & 24 Aug. 1975 (2 males), Wm. E. Sieker (LACM). KENOSHA CO.: T1N, R23E, Sec. 31, 22 July 1989, Les Ferge (2 males, LAF). WAUKESHA CO.: T5N, R17E, Sec. 16, 2 July 1989, Les Ferge (1 male, LAF).

#### *PHRAGMATOBIA FULIGINOSA RUBRICOSA* (Harris, 1841) (fig. 2)

Corrections to 1966 paper: see the discussion above under *P. lineata* for the reidentification of 2 specimens from Illinois and Indiana, originally cited as *P. fuliginosa rubricosa*.

Although *Phragmatobia fuliginosa* is a Holarctic species, said to occur across the entire Palearctic Region from England to Japan (Seitz, 1910: 79), it should be noted that the genitalia figured for this species (from an unspecified locality) by Kôda (1988: 9-11, fig. 62) appear to belong to some other species of *Phragmatobia*; details of the valva and aedeagus differ significantly from those of "true" *P. fuliginosa* from western Europe and North America.

Additional references: Dyar (1899: 130) observed that *Phragmatobia fuliginosa* ". . . possibly occurs in Alaska. The National Museum has a specimen collected by Dr. Stejneger on Bering Island, off Kamchatka." We confirmed

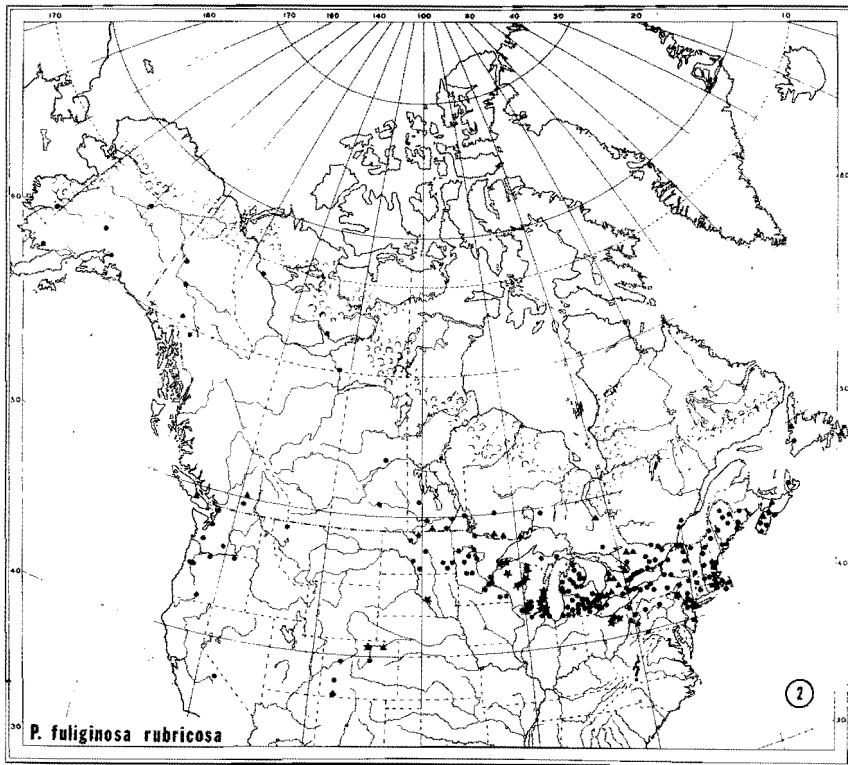


Figure 2. Distribution of *Phragmatobia fuliginosa rubricosa*; symbols as for Fig. 1, scale as in Fig. 3. "Bush" pattern represents approximate northern limit of forests (tree line).

the presence of this species in Alaska and cited a number of specimens examined. We did examine the Bering Island specimen in the USNM that Dyar mentioned, but excluded it from consideration in our review because it was extralimital to our study (Bering Island is in the Komandorskiye Islands, Russia), and it did not appear to be referable to any of the Nearctic taxa we were studying; the Palearctic *Phragmatobia* fauna, beset with many names for few species, remains a taxonomic quagmire to the best of my knowledge.

Ferguson (1975: 10) reports the successful rearing of this species on *Plantago major* (Plantaginaceae) in Nova Scotia, from eggs laid by a female found flying by day on 3 May 1954. This reference provides the specific name of the foodplant (on p. 5) and information on parental behavior that were lacking from the label data we published for some of the reared offspring (Donahue and Newman, 1966: 56).

Morris (1980: 80) adds one Newfoundland locality (Colinet) to the two previously mapped (Donahue and Newman, 1966: fig. 36), and confirms that it has not yet been reported from Labrador. Curiously, his summary of this species' distribution repeats the statement that it occurs "south along the

Appalachian Mountains into the Carolinas," apparently based on the nearly identical but still unconfirmed statements by Holland (1903: 126) and Seitz (1919: 302) which we noted in our review. Although we first questioned the occurrence of this species in the Carolinas over 25 years ago, I have still not seen any specimens from south of Pennsylvania. It is quite possible that this moth may eventually be found at high elevations in the southern Appalachians, but Holland's reason for believing this to be so remains a mystery.

Another perplexing southern record of this moth appeared in Lindroth (1957: 72), who, with a bit more precision than Holland, reported *Phragmatobia fuliginosa rubricosa* from the state of South Carolina. I can only conclude his record is also based on that of Holland (1903: 126), the only likely source I could find among his references.

It is likely that Rothschild's (1910: 116) records of *P. fuliginosa rubricosa* from "Florida," far outside the range of the species, actually refer to specimens from Florida, Orange County, New York. I have, however, discovered a "Florida" specimen from Florida City [Dade Co.], Florida, 21 April 1934, "Coll. R.H. Andrews, Lloyd M. Martin" (1 male, LACM). There are two possible explanations for this label: it was applied in error, or the collectors happened to capture a specimen imported (perhaps as an immature) by a tourist from the usual range of this species. I am reasonably confident that this species is not a normal resident of Florida.

The bibliography of North American *Phragmatobia* would not be complete without mentioning a long-overlooked publication by Packard (1870), the subject of a brief note by Banks (1920) that summarized its contents. This paper is so rare that only two copies are known to exist, one in the Museum of Comparative Zoology, Harvard University, the second in the National Agricultural Library, Beltsville, Maryland (D.C. Ferguson, pers. comm.). On p. 29 of that paper Packard describes *Phragmatobia dallii* as new, from an unspecified number of specimens taken on 15 June [1867?] somewhere in Alaska. Because of the scarcity of this publication, I reproduce here the complete original description:

*Phragmatobia Dallii* n. sp. Pl. II, fig. 14. It is rather smaller than *P. rubricosa*, with the thorax deep reddish brown, being a little darker than in *P. rubricosa*, while the abdomen is a little darker, with a row of black dots on each side. The fore wings are plain rusty reddish brown, being duller and more tawny than in *P. rubricosa*, with no markings, except the single black discal dot; hind wings dusky, being almost wholly black, with the inner edge deep red, while the costal edge is pale red, with the apex dusky, and the fringe pale red; discal dot black; beneath uniform dusky tawny, with the discal dots prominent; hind wings reddish on the basal half of the costa, and on the inner edge. Legs as in *P. rubricosa*. Length of the fore wing, 0.50; length of body, 0.50 inch. It differs from *P. rubricosa* in its smaller size, the uniform tawny reddish brown wings, and in wanting the two dark bands on the fore wings, and in the hind wings being almost wholly dusky. Taken June 15.

Packard's reference to *P. rubricosa* having "two dark bands on the fore wings" indicates that his concept of that taxon actually referred to *P. assimilans* or, more likely, to the species subsequently named *P. lineata*, a commonly made mistake (Donahue and Newman, 1966: 41, 45). Packard's description of *P. dallii* accords well with Alaskan specimens of *P. fuliginosa rubricosa*, and I agree with Franclemont (1983: 117) that *P. dallii* is a junior subjective synonym of *P. fuliginosa rubricosa*. In his entry for this and the other new species of moth Packard described in that paper, *Gastropacha alascensis*, Franclemont (1983: 107, 117) questioned the availability of the names, presumably

based on the rarity of the publication and its distribution. It is worth noting that the two new species of wasps Packard described in the same paper, *Vespa tripunctata* and *Vespa alascensis*, have been treated as available since at least 1931, as junior synonyms of *Vespula austriaca* (Panzer) and *V. vulgaris* (Linnaeus), respectively (Bequaert, 1931: 90, 106; Miller, 1961: 8, 19; Krombein et al., 1979: 1519, 1521).

**New Records:** CANADA: ONTARIO: Riotte (1992: 126) reports *P. fuliginosa* from the following counties not previously mapped: BRUCE, ESSEX, LAMBTON, MIDDLESEX, NIPISSING, RAINY RIVER, SIMCOE, and WELLINGTON.

U.S.A.: COLORADO: DENVER CO.: Denver, 30 April 1892, at light (1 male, CSU, Acc. No. 334). LARIMER CO.: Fort Collins, at light, 11 April 1892, 17 & 26 July 1897, 19 July [Sept.?] 1930 (4 males, CSU, Acc. No. 1080, 2654, 2670). Rothschild (1910: 116) also recorded two males each from "Larima" County and Durango, [LA PLATA CO.], Colorado. Ferguson (pers. comm.) reports a specimen from MORGAN CO.: Muir Spring Park and Recreation Area, Fort Morgan, 4300 ft. [1310 m.], 17 July 1987, Terhune S. Dickel (1 male, USNM).

OHIO [STATE RECORDS]: CUYAHOGA CO.: Hunting Valley, Orange Twp., 30 July 1943, B. Quay (1, sex unrecorded, UMMZ). PORTAGE CO.: Ravenna, 28 Dec. 1969, G.S. Ensinger (1 larva, crawling on 14" of snow in field; sky sunny, ambient temperature ca. 30°F; larva preserved, MSUE). WAYNE CO.: Wooster, 14 May & 5 July 1962, 23 July 1963, 8 Aug. 1960, A.I. Good (5 males, CMP).

PENNSYLVANIA: WAYNE CO.: South Sterling, 28 July 1918, Ernest Baylis (1 male, CMP).

SOUTH DAKOTA [STATE RECORDS]: BUFFALO CO.: Fort Thompson, 20-24 July 1974, J.M. Cicero (3 males, 2 females, LACM); Crow Creek, near Fort Thompson, 20-24 July 1974, J.M. Cicero (2 males, LACM).

WISCONSIN: recent intensive survey work in this state by Les Ferge, and specimens in LACM, demonstrate that the species is widely distributed in Wisconsin, as expected. New county records represented in these two collections are: BAYFIELD, DOUGLAS, IOWA, JACKSON, KENOSHA, MARATHON, ONEIDA, OZAUKEE, RUSK, SHEBOYGAN, WAUKESHA, and WALWORTH, with dates of 12 May, 20 June, and 13 July-29 Aug.

### *PHRAGMATOBIA ASSIMILANS* Walker, 1855 (fig. 3)

Correction to 1966 paper: the caption for fig. 37 on p. 73 was inadvertently omitted; it should read "distribution of *P. assimilans*; symbols as in Fig. 36."

**Additional Reference:** Ferguson (1975: 10) reports finding mature larvae crawling on the ground in winter in two Nova Scotia localities (HALIFAX CO.: Waverley; HANTS CO.: Mount Uniacke); they pupated without feeding, producing adult moths on 6 March 1949 and 29 March 1951, respectively.

**New Records:** CANADA: NEW BRUNSWICK: KENT CO.: Kouchibouguac National Park, 1 May 1977, J.D. Lafontaine Code 5191Q (1 male, CNC); same locality, 13 June 1977, J.D. Lafontaine Code 5279A (1 male, CNC).

ONTARIO: RENFREW CO.: La Passe, 23, 24, & 31 May 1980, E.W. Rockburne (3 males, CNC). Riotte (1992: 126) reports *P. assimilans* from the following Ontario counties not previously mapped: FRONTENAC, LEEDS, RAINY RIVER, and SIMCOE.

QUEBEC: RIMOUSKI CO.: 5 km NW St. Guy, elev. 1100 feet, 14 June 1980, John E. Rawlins (6 males, CMP).

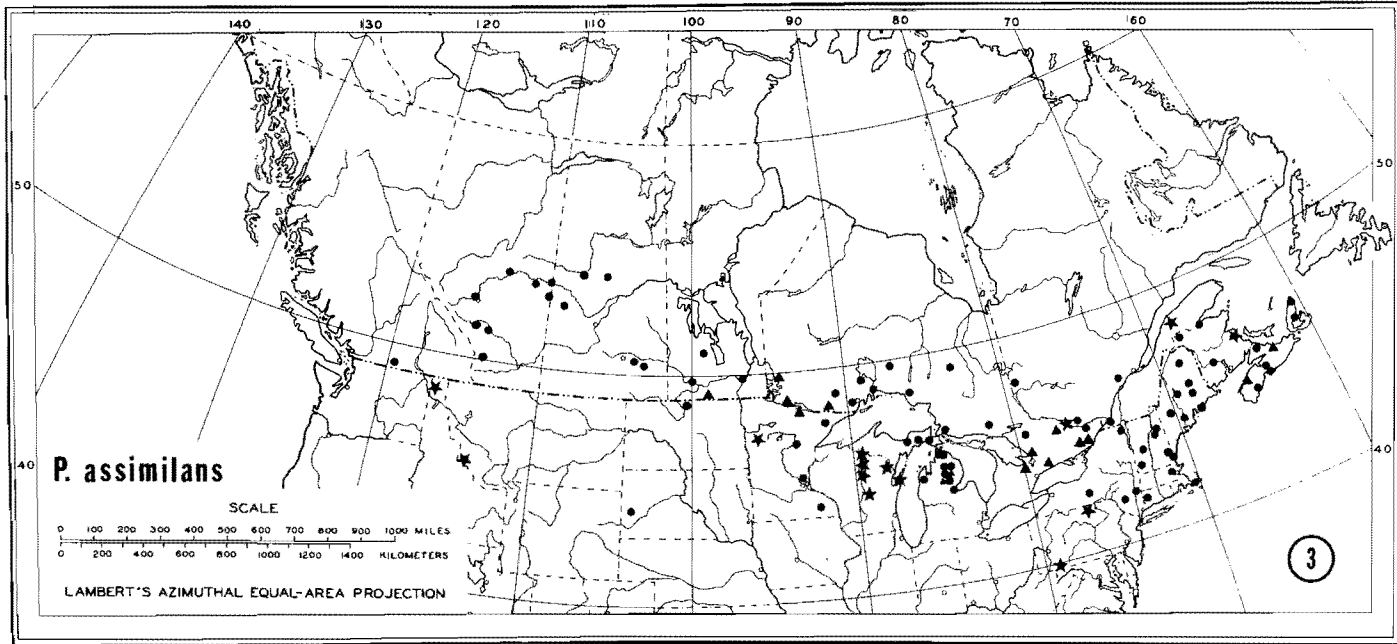


Figure 3. Distribution of *Phragmatobia assimilans*; symbols as for Fig. 1.



U.S.A.: IDAHO [STATE RECORD]: BONNER CO.: Priest Lake, T60N, R4W, Sec. 19, elev. 2400 ft., 30 May 1972, O.B. Howell (1 male, LACM).

MICHIGAN: OTSEGO CO.: T29N, R2W, Section 18, 20 March 1966, J.P. Donahue #66-1: 2 larvae presumed to be this species found on tree trunks, one 7 ft (2.1 m) above the ground on the south side of a large aspen (*Populus tremuloides*; Salicaceae), the other 2.5 ft (0.8 m) above the ground on an elm (*Ulmus* sp.; Ulmaceae); ambient temperature ca. 35°F. (1.7°C); sky with a thin overcast. The larvae refused food: 1 spun a thin, flimsy cocoon on 22 March 1966, pupated the next day, but died; the other larva was photographed and preserved. (1 larva, 1 pupa, LACM.)

MINNESOTA: BECKER CO.: Big Twin Lake, "6-4-71" [4 June 1971], T.L. McCabe (1 male, LACM).

MONTANA [STATE RECORD]: RAVALLI CO.: Hamilton, 23 May 1956 ("cold night"), C.B. Philip (1 male, CAS). This is the southern-most locality known for this species in the Rocky Mountains.

NEW YORK: McCabe (1990: 9) discusses and illustrates (p. 30) a larva tentatively identified as this species, collected on *Apocynum androsaemifolium* (Apocynaceae) at Beaver Meadow, HAMILTON CO., 21 Aug. 1977; the specimen died in the pupal stage. Many other larvae were observed wandering at the time. The larva is described as having rather stiff, uniform, yellowish hairs. McCabe (pers. comm.) reports that *P. assimilans* is the most abundant *Phragmatobia* in the Adirondacks, where he has observed thousands of males but no females.

PENNSYLVANIA [STATE RECORDS]: BRADFORD CO.: 8 mi. E. of Canton, near Holcomb Pond, 13 May 1980, John E. Rawlins (4 males, CMP). [This locality in northern Pennsylvania is less than 60 miles [96 km] SSW of Ithaca, New York, the nearest locality from which this species has been previously recorded.] SOMERSET CO.: Mt. Davis, elevation 885 meters, 10 May 1986, J.E. Rawlins & S. Thompson (6 males, CMP). This is the southernmost record of the species. The moths were taken in hemlock (*Tsuga canadensis*; Pinaceae) forest just below the highest point in Pennsylvania, flying with the noctuid *Feralia comstocki* (Grote); the leaves of the deciduous trees at that site had not yet expanded, indicating an early spring phenology (Rawlins, pers. comm.), the characteristic period for adult activity of this moth.

WISCONSIN [STATE RECORDS]: DOOR CO.: T30N, R28E, Sec. 9, 9 June 1984, Les Ferge (1 male, LAF). MARATHON CO.: Nine Mile Swamp Area, 14 May 1976, Les Ferge (2 males, LAF). MARINETTE CO.: T37N, R18E, Sec. 26, 23 May 1981, Les Ferge (1 male, LAF). ONEIDA CO.: Lake Katherine, near Hazelhurst, 23 April to 11 June (the preponderance from May), 1947-1963, H.M. Bower (56 males, LACM). VILAS CO.: T43N, R8E, Sec. 31, 10 June 1983, Les Ferge (1 male, LAF). WAUSHARA CO.: Lake Lucerne, 25 May 1975, Wm. E. Sieker (1 male, LAF).

To prevent future misunderstanding about the evidence supporting the belief that *P. assimilans* is a strictly univoltine spring species, it is pertinent to address here the problem raised by several of Bower's specimens from his Oneida Co. locality that appear to bear erroneous collecting dates. There are three such specimens in LACM (not cited above) from Lake Katherine, dated 1 July 1961 (2 males) and 27 July 1961 (1 male). These specimens are part of a pinned, unspread series with labels printed by and applied at LACM, after the Bower collection was deposited there in 1964. I believe that these July dates, applied by hand to the printed data label, represent errors in transcription of the dates originally on the specimens. In a series of 49 specimens labeled at LACM, dates of collection have been inked onto the labels in three different ways: May 27, 1963; V-27-63; and 5-27-63; Bower himself apparently used the last system exclusively on specimens he labeled himself. I have been unable to find any Bower specimens with temporary labels, but I believe it is

safe to assume that they would have been dated similarly. There is also a series of eight males in the USNM from the same locality and collector, with the months of collection transcribed to the Roman numerals VII and VIII (July and August, respectively). If "May" and "June" are substituted, the USNM specimens would have a more reasonable range of dates between 6 May and 2 June 1960, in concordance not only with most of Bower's other specimens, but with the flight season of the species throughout its range (the latest unquestioned record I have seen is 6 July, in northern Maine). Although Bower may have reared some specimens that emerged prematurely, accounting for the summer label dates, if this were the case one would expect to find in his collection at least one parent or reared female, but no Wisconsin females of *P. assimilans* are known. Sanders (1991: 58) reports an even narrower window of adult flight activity at Black Sturgeon Lake, in northwestern Ontario near Lake Superior: in nine consecutive years of light trapping (1960-1968), this species was only captured between 25 May and 10 June.

#### ACKNOWLEDGMENTS

This paper is dedicated to the memory of my friend and companion, John H. Newman—his Welsh humor and knowledge of moths enriched my years at Michigan State University. I thank J.D. Lafontaine and the late C.L. Hogue for their thoughtful comments on an earlier draft of this manuscript, and D.C. Ferguson for similar useful suggestions and valuable bibliographic assistance. I am grateful to the following individuals, institutions, and curators for the opportunity to examine specimens in their care. The collections and the abbreviations by which they have been cited above are as follows (with the exception of UMMZ and CSU, acronyms agree with those proposed by Heppner and Lamas, 1982): CAS (California Academy of Sciences, P.H. Arnaud, Jr.); CMP (Carnegie Museum of Natural History, J.E. Rawlins); CNC (Canadian National Collection, J.D. Lafontaine); CSU (Colorado State University, Fort Collins); ER (the late Ed Reid); FSCA (Florida State Collection of Arthropods, H.V. Weems, Jr.); LACM (Natural History Museum of Los Angeles County); LAF (Leslie A. Ferge private collection); MSUE (Michigan State University Entomology Museum, the late R.L. Fischer); RSB (Robert S. Bryant); UMMZ (University of Michigan Museum of Zoology); USNM (U.S. National Museum of Natural History, D.C. Ferguson).

#### LITERATURE CITED

- Banks, N. 1920. A rare pamphlet (Hym., Lep., Neur.). *Entomol. News* 31: 176.  
 Bequaert, J. 1931. A tentative synopsis of the hornets and yellow-jackets (Vespinae: Hymenoptera) of America. *Entomologica Americana* 12 (n.s.): 71-138, 6 figs.  
 Donahue, J.P. and J.H. Newman. 1966. The genus *Phragmatobia* in North America, with the description of a new species (Lepidoptera: Arctiidae). *Mich. Entomol.* 1(2): 35-74.  
 Dyar, H.G. 1899. Notes on Alaskan Arctiidae. *Entomol. News* 10: 130-131.  
 Ferguson, D.C. 1975. Host records for Lepidoptera reared in eastern North America. U.S. Dept. Agric., Tech. Bull. No. 1521. 49 p.  
 Ferguson, D.C. 1985. Contributions toward reclassification of the world genera of the tribe Arctiini, part 1—introduction and a revision of the *Neoarctia-Grammia* group (Lepidoptera: Arctiidae; Arctiinae). *Entomography* 3: 181-275.  
 Franclemont, J.G. 1983. Arctiidae. In: Hodges, Ronald W., et al., eds., *Check List of the*

- Lepidoptera of America North of Mexico. E.W. Classey Ltd. & Wedge Entomological Research Foundation. pp. 114-119.
- Heppler, J.B. and Gerardo Lamas. 1982. Acronyms for world museum collections of insects, with an emphasis on Neotropical Lepidoptera. Bull. Entomol. Soc. Amer. 28(3): 305-315.
- Holland, W.J. 1903. The Moth Book. A popular guide to a knowledge of the moths of North America. New York: Doubleday, Page & Company. xxiv + 479 p., 48 col. pls., 263 figs.
- Kóda, N. 1988. A generic classification of the subfamily Arctiinae of the Palaearctic and Oriental Regions based on the male and female genitalia (Lepidoptera, Arctiidae). Part II. Tyô Ga 39: 1-79.
- Krombein, K.V., P.D. Hurd, Jr., D.R. Smith, and B.D. Burks, eds. 1979. Catalog of Hymenoptera in America north of Mexico. 3 vols. Washington, D.C.: Smithsonian Institution Press.
- Lindroth, C.H. 1957. The Faunal Connections between Europe and North America. 344 p. New York: John Wiley & Sons, Inc.
- McCabe, T.L. [1990] 1991. Atlas of Adirondack Caterpillars with a host list, rearing notes and a selected bibliography of works depicting caterpillars. New York State Mus. Bull. 470: iv + 112 p., illustr.
- Miller, C.D.F. 1961. Taxonomy and distribution of Nearctic *Vespula*. Canad. Entomol. Suppl. 22: 52 p., 84 figs.
- Morris, R.F. 1980. Butterflies and moths of Newfoundland and Labrador. The Macrolepidoptera. Agriculture Canada, Publ. 1691. 407 p., 34 col. pls., 40 figs.
- Newman, J.H. and M.C. Nielsen. 1973. Moth species new to Michigan. Great Lakes Entomol. 6(2): 33-45.
- Packard, A.S. 1870. Notice of Hymenoptera and Nocturnal Lepidoptera, collected in Alaska, by W.H. Dall, Director Sci. Corps, W.U.T. Exp. Trans. Chicago Acad. Sci. 2: 25-32, plate 2. [Expanded title at the beginning of Article II on p. 25: Notice of Hymenoptera and Nocturnal Lepidoptera collected in Alaska by W.H. Dall, Director of the Scientific Corps of the Western Union Telegraph Company. By A.S. Packard, Jr., M.D., with a list of Neuroptera by P.R. Uhler and Dr. H. Hagen.]
- Riotte, J.C.E. 1992. Annotated list of Ontario Lepidoptera. Roy. Ontario Mus. Misc. Publ. Life Sci.: viii + 208 p., 3 figs., 1 table.
- Rothschild, W. 1910. Catalogue of the Arctiinae [sic] in the Tring Museum, with notes and descriptions of new species. Novit. Zool. 17: 1-85, 113-171.
- Sanders, C.J. 1991. List of the Lepidoptera of Black Sturgeon Lake, northwestern Ontario, and dates of adult occurrence. Great Lakes Entomol. 24: 51-62.
- Saunders, W. 1863. Synopsis of Canadian Arctiidae [sic], including some additional species likely to occur in Canada. Canad. Journal (n.s.) 8 (no. 46): 349-377. [This paper was apparently re-issued in 1863 or 1864 as a separately-paged publication.]
- Seitz, A. 1910. Arctiidae, pp. 43-108 In: Seitz, A., ed., 1909-1912, The Macrolepidoptera of the World. 2: The Palearctic Bombyces and Sphinges. 479 p., 56 pls. Alfred Kernen, Stuttgart.
- Seitz, A. 1918-1925. Arctiidae, pp. 231-497 In: Seitz, A., ed., 1913-1937, The Macrolepidoptera of the World. 6: The American Bombyces and Sphinges. 1,452 p., 109 pls. Alfred Kernen, Stuttgart.
- Stephens, J.F. 1828-1829. Illustrations of British Entomology . . . (Haustellata) 2. 202 p. London: Baldwin and Cradock.
- Watson, A., D.S. Fletcher and I.W.B. Nye. 1980. In: Nye, I.W.B., ed., The Generic Names of Moths of the World, vol. 2. xiv + 228 p. London: British Museum (Natural History).
- Watson, A. and D.T. Goodger. 1986. Catalogue of the Neotropical Tiger-moths. Occ. Pap. Syst. Entomol. 1: 1-71.