A Preliminary Checklist of the Moths of Butler County, Ohio[1]

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ABSTRACT. **Using a combination of blacklight, mercury vapor light, and sugar bait sampling techniques, we collected moths over a 2-yr period in Butler County, OH, and compiled a list of 392 species. Seventy-eight percent (305) of these species were found to be new county records. A checklist is provided as a baseline catalogue of the moths of Butler County, OH. An analysis of historical county records revealed a bias towards large or colorful species. Although many species we collected are considered common, several infrequently encountered species were discovered. Our effort suggests that biological surveys in fragmented landscapes may reveal unexpected biological diversity.**

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INTRODUCTION

The Lepidoptera are one of the most diverse groups of terrestrial insects. More than 11,250 species of butterflies and moths are believed to occur within North America, north of Mexico (Hodges and others 1983). In addition to their high species diversity, Lepidoptera also have enormous functional importance within ecosystems. Most caterpillars are herbivorous and thus have key roles in terrestrial food webs (Price 1997). As adults, Lepidoptera play important and occasionally specialized roles as pollinators, facilitating pollen dispersal across moderate to large distances (Samways 1995). Some species, however may damage or destroy cultivated plants or stored grains, contributing to considerable annual economic losses.

In contrast to similarly hyperdiverse insect orders (for example, Diptera, Hymenoptera), Lepidoptera are collected and studied by a large groups of enthusiasts, which facilitates data acquisition and information exchange. Despite this popularity, the Lepidoptera of Butler County, OH (particularly moths) have been poorly described. For example, Rings and others (1992) provided only 32 records of noctuid moths from Butler County in their compilation of that family's state-wide biogeography. Furthermore, occurrence data for species of small-bodied moths are sparse for Butler County (for example, members of the superfamilies Gelechioidea, Pyraloidea, Tortricoidea, Yponomeutoidea, Tineioidea, and Incurvarioidea). Land conversion for agricultural and urban development continues to threaten populations of Lepidoptera, and future local extinctions are likely (Samways 1995). However, in the absence of a baseline diversity assessment, documentation of species loss or functional impairment is impossible.

The implementation of any biological monitoring or conservation initiative requires the acquisition of baseline diversity data (Noss and Cooperrider 1994). Characterization of regional biodiversity should involve a species inventory, and the data generated from this endeavor are appropriate for establishing conservation priorities and generating monitoring protocols (Longino and Colwell 1998). Inventory data can also be used to answer ecological questions concerning spatial and temporal patterns in species distribution, diversity, abundance, and life history traits (for example, Leps and others 1998; Thomas 1991; Spitzer and others 1984; Rajmanek and Spitzer 1982). Perhaps the most publicly accessible use for inventory data is the creation of a species checklist for an area, which is an underused tool for the long term monitoring of animal and plant biodiversity (Droege and others 1998; Shapiro 1998).

Many checklists of Lepidoptera exist for Ohio on a state-wide or county basis (see Rings and others 1991, 1992; Iftner and others 1992), and these efforts have substantially improved our knowledge of Ohio's Lepidoptera. This paper presents a more regionally focused effort for Butler County, OH. The purpose of this paper is to synthesize two years of research into a baseline biodiversity assessment for the moths of Butler County.

METHODS AND MATERIALS

Moths were collected in 1997 and 1998 from three principal localities, the Ecology Research Center (ERC), Bachelor Reserve (both part of the Miami University Natural Areas system; 39°30'25"N; 84°44'43"W), and a secondary-growth woodlot near Hamilton, OH (39°23'58"N; 84°33'41"W). All three sites are located in Butler County, OH (Fig. 1). The ERC (68 ha; T5N R1E S13-14) consists of a mixture of secondary-growth forest, hedgerows, and old field interspersed with soybean fields and mowed grassy areas (principally *Festuca* spp.). Forested habitats support a high diversity of hardwoods, with sugar maple (*Acer saccharum*) and American beech (*Fagus grandifolia*) as dominant species, and hedgerows are dominated by bush honeysuckle (*Lonicera maackii*), locust (*Robinia pseudoacacia* and *Gleditsia triacanthos*), and osage orange (*Maclura pomifera*). Old fields contain a mixture of perennial grasses (for example, *Poa* spp.; *Bromus japonica.*) and coarse forbs, (for example, *Solidago* spp.). The ERC also has several small ponds and streams which support marginal vegetation such as sedges (*Cyperus* spp.) and rushes (for example, *Juncus* spp.).

Bachelor Reserve (268 ha; T5N R1E S24) is a mid-successional forest dominated by sugar maple (*Acer*

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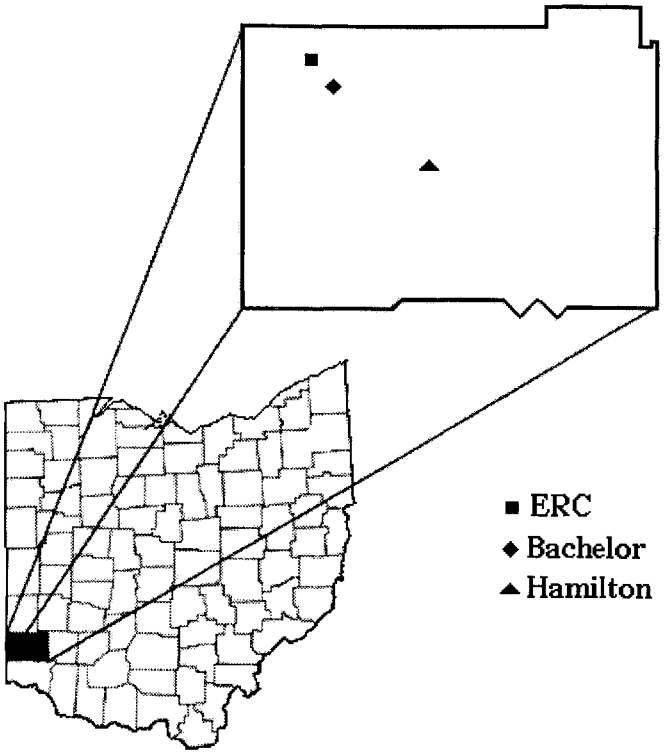

FIGURE 1. Sites included in our preliminary survey of the moths of Butler County, OH (shown in black). Three sites were sampled: the Miami University's Ecology Research Center (■ = sugar bait sampling, blacklight and mercury vapor light sheet stations), Miami University's Bachelor Reserve (◆ = 12-V blacklight traps), and a secondary-growth woodlot near Hamilton, OH (▲ = blacklight and mercury vapor light sheet stations).

saccharum), American beech (*Fagus grandifolia*), and white ash (*Fraxinus americanus*). The diversity of hardwood species in this natural area is relatively high, and species of *Quercus*, *Populus*, *Prunus*, *Carya*, and *Ulmus* are were also present and frequently encountered. As part of another study, a series of study plots were established along an edge-to-interior gradient within the forest. Thus, moths collected from Bachelor Reserve were likely sampled from three distinct habitats: the forest interior, the surrounding field-pond matrix, and the forest-field interface. The third study site, located near the city of Hamilton (0.5 ha; T4N R2E S14), was similar to Bachelor Reserve in terms of plant community types represented and plant species diversity.

Moths were collected at the ERC using a combination of methods. We used sheet stations with mercury vapor and UV lights as a primary sampling technique. These stations were erected proximal to existing buildings for general collecting, or we transported stations to specific habitat patches for more concentrated sampling efforts. Sheet stations were operated approximately once a week from May to September 1997 and from April to October 1998. During 1998, we also collected moths biweekly using sugar baiting transects along a trail in a more mature hardwood forest stand at the ERC (5.8 ha, T5N R1E S13 SW1/4). Sheet stations were the sole sampling protocol used at the Hamilton site.

Universal blacklight traps (12-watt, BioQuip Products; powered with lawnmower batteries) were operated in Bachelor Reserve. Traps were placed on platforms 2 m above the ground in plots located along field-edge to forest-interior transects to capture as many moth species as possible. Each sampling night a single trap was placed at each of three distances from the edge: 0.0 m, 50 m, and 100 m. Traps were operated every other night from mid-June to early September regardless of weather conditions or moon phase. Hours of operation spanned 8:00 PM to 6:00 AM. Moths were dispatched inside the traps with ethyl acetate. In addition to this structured trapping protocol, we collected moths with 12-watt blacklight traps in other woodlots, old fields, and riparian zones throughout Butler County. Collected specimens were frozen in the lab until they could be properly spread, dissected if required, and identified. Specimens requiring particular expertise for identification were forwarded to taxonomic authorities.

We used a chi-square analysis to compare the representation of species from our surveys with previously recognized Butler County records from the Ohio Lepidopterists database. Expected values for each family were calculated using the overall number of new county records divided by the total number of species collected (305/392). This assumed the proportion of new county records was equal among families. As recommended by Piegorsch and Bailer (1997), only families represented by at least five species were included in this analysis.

A checklist of all the species we collected was prepared by indexing species according to their family and Hodges checklist number (Hodges and others 1983). Nomenclature follows Hodges and others (1983); however, we have included taxonomic changes or revisions to species names where appropriate (for example, Ferguson 1993; LaFontaine 1998). Using the classification of Lepidoptera according to Heppner (1998), we include the Crambinae as a subfamily of the Pyralidae. Furthermore, in the text below, we retain the distinction between macrolepidoptera and microlepidoptera (after McDunnough 1938, 1939) as informal groupings of moth superfamilies. For the present checklist, macrolepidoptera include all species within the superfamilies Drepanoidea, Geometroidea, Bombycoidea, Sphingoidea, and Noctuoidea; microlepidoptera encompass the remaining taxa.

RESULTS

Over a 2-yr period we collected 12 250 moths representing 392 species (Appendix I). By referencing the state-wide Lepidoptera database maintained by the Ohio Lepidopterists, we determined that 305 species (78%) in our checklist are new Butler County records. The majority of species are thought to be widely distributed throughout the state. The most common species of macro-moths found during the 2-yr study were: *Halysidota tesselaris* (Arctiidae), *Protolampra brunneicollis* (Noctuidae), *Plathypena scabra* (Noctuidae), *Mellilla xanthometata* (Geometridae), and *Palpita magniferalis* (Pyralidae). Some species discovered in Butler County, however have more restricted ranges or are considered relatively elusive. For example, we collected *Ozarba aeria* (Noctuidae), which was previously

known from only three Ohio counties. We also documented the spread of the European species, *Noctua pronuba* (Noctuidae), into Butler County. This survey failed to produce any new Ohio state records.

Representatives from 29 moth families were collected during the study (Table 1). The six most frequently collected families comprised roughly 80% of our species list. From our checklist, the family Noctuidae contained the most species (42%), followed by the Geometridae (13%), Pyralidae (8%), Arctiidae (6%), Sphingidae (6%), and Notodontidae (5%). Eleven families, mostly microlepidoptera, were represented by only a single species. Although microlepidoptera (for example, Gelechiidae, Tortricidae: Cochylini, Olethreutidae, Oecophoridae) were underrepresented in this checklist, virtually all of our species were new county records. Even within a well-studied family, such as the Pyralidae, most of our species were unreported from Butler County.

Comparing proportional representation of county records within families from our data set and historical collection records revealed a significant difference (χ^2 = 35.00, df = 11, P <0.005; Table 2). The pattern of county records we observed was not regularly distributed among all families we collected. Rather, the majority of the moth species previously reported from Butler County were from the large-bodied and generally colorful families such as the Saturniidae (χ^2 = 9.37, df = 1, P <0.001), Sphingidae (χ^2 = 9.35, df = 1, P <0.001), Notodontidae (χ^2 = 4.76, df = 1, P <0.05), and Arctiidae (χ^2 = 3.53, df = 1, P <0.05; Table 2). The majority of our county records were for species that were either small in body size, cryptic in coloration, or a combination of both.

TABLE 1

Examination of the number of moths species collected over a two year period by family, and the percentage of species within a family that are new Butler County records. Noctuid moths were the most frequently encountered. While underrepresented in our checklist, virtually all of the microlepidoptera (after McDunnough 1938, 1939) collected during this study were county records.

Family	No. of Species	% of Species	No. Butler Co. Records	% Butler Co. Records
Apatelodidae	2	0.5	0	0.00
Arctiidae	23	5.9	9	39.1
Cosmopterigidae	1	0.3	1	100
Cossidae	1	0.3	0	0.00
Crambidae	5	1.3	5	100
Drepanidae	1	0.3	1	100
Epipelmidae	1	0.3	1	100
Epipyropidae	1	0.3	1	100
Gelechiidae	2	0.5	2	100
Geometridae	52	13.3	49	94.2
Lasiocampidae	4	1.0	1	25
Limacodidae	11	2.8	11	100
Lymantriidae	2	0.5	1	50
Megalopygidae	1	0.3	1	100
Noctuidae	165	42.1	148	89.7
Nodontidae	20	5.1	7	35.0
Oecophoridae	5	1.3	5	100
Olethreutidae	9	2.3	9	100
Psychidae	1	0.3	1	100
Pyralidae	30	7.7	28	93.3
Saturniidae	12	3.1	0	0.00
Sessidae	1	0.3	1	100
Sphingidae	23	5.9	5	21.7
Thyatiridae	1	0.3	1	100
Thyrididae	1	0.3	1	100
Tineidae	3	0.8	3	100
Tortricidae	11	2.8	11	100
Yponmeutidae	2	0.5	1	50
Zygaenidae	1	0.3	1	100

TABLE 2

Chi-square analysis of expected number of county records for moth species within selected families (n ≥5 species) assuming similar historical sampling intensity and methods. Families with larger, more colorful species were previously recorded from Butler County (χ^2 = 35.00, df = 11, P <0.005), whereas families with small or drab species were not recorded.

Family	No. of Species Collected	Expected Co. Records	Observed Co. Records	χ^2 Value
Arctiidae	23	18.0	9	3.53 *
Crambidae	5	3.9	5	0.31
Geometridae	52	40.6	49	1.73
Limacodidae	11	8.6	11	0.68
Noctuidae	165	128.9	148	2.84 *
Nodontidae	20	15.6	7	4.76 *
Oecophoridae	5	3.9	5	0.31
Olethreutidae	9	7.0	9	0.55
Pyralidae	30	23.4	28	0.89
Saturniidae	12	9.4	0	9.37 **
Sphingidae	23	18.0	5	9.35 **
Tortricidae	11	8.6	11	0.68

* P <0.05, ** P <0.001

DISCUSSION

This study has significantly contributed to our knowledge of moth distribution regionally and within the state of Ohio. We established the residency of a variety of common species in Butler County, and discovered populations of potentially rare species (for example, *Vaxi critica*, *Polygrammodes langdonalis*, *Spragueia apicalis apicella*, and *Glena cribrataria*) as well as exotic species (for example, *Noctua pronuba* and *Ostrinia nubilalis*). Often exotic species have been implicated in the disruption of ecological function (Price 1997). Further, even when introduced species appear ecologically benign, their dominance of regional biota degrades the uniqueness of natural biodiversity (Summerville 1998). Our 305 county records represents an initial step towards eliminating a significant information gap for Butler County. This checklist, however, is far from complete. We have shifted our focus to describing the microlepidoptera, and we are also extending our survey efforts to include species such

as the winter moths (*Lithophane* spp., *Eupsilia*, spp., *Pyreferra* spp.) and univoltine species with early or late flight periods (for example, *Papaipema* spp.). Additionally, we plan to structure our survey efforts to include eastern portions of the county, which were undersampled in the current study.

Although we did not record any new state records, transition zones for three vegetation associations, the beech-maple, the mixed mesophytic, and the western mesophytic, occur near Butler County (Greller 1988). Furthermore, Butler County lies along the Wisconsonian glacial fall-line (Iftner and others 1992). This diversity of vegetative and physiographic characteristics may support high biological diversity. A portion of this diversity may be attributed to previously unrecorded populations occurring on the edge of their species' range. Some species, especially non-vagile taxa, may not disperse outside of these transition zones. Therefore, it is not unreasonable to expect the discovery of species novel to Ohio in Butler County.

Our collection techniques of sheets, traps, and sugaring were biased in the species attracted. Not all moth species are attracted to ultraviolet (UV) light; non-phototactic species are probably underrepresented in our survey. For instance, only one species within the Sesiidae is known to be attracted to ultraviolet light, *Synanthedon acerni*; this was the only species we collected from this family. Further, sugaring tends to only attract species that feed on fermenting sap (for example, *Amphipyra* spp., *Lithophane* spp., and *Catocala* spp.). The most significant sampling bias of this study was the requirement for attended collection at sheet stations and sugar lines. Often it is tempting to collect the larger and more colorful species. This may explain the predominance of Saturniidae and Sphingidae in historical county records. Our light-traps collected indiscriminately and therefore captured a wide range of microlepidoptera and drab species that tend to be overlooked using these other techniques. Moth biodiversity is concentrated within families characterized by small body size and cryptic coloration. Emphasis on collecting large or colorful species prevents accurate estimation of species richness at any scale.

Checklists can provide reliable information on changes in species composition of a locality or region over time (Droege and others 1998). As habitat fragmentation and land use changes continue, it is increasingly important to establish a baseline understanding of species diversity at a practical scale (that is, the county). Previously published inventories for Lepidoptera have focused on moderate to large-sized parks and wildlife refuges within Ohio (Rings and Metzler 1989; Rings and others 1991; Rings and Metzler 1992). While these efforts have greatly contributed to area management plans and state-wide conservation initiatives, exclusive focus on habitats already afforded protection neglects patches of quality habitat not included in current reserves. Indeed, we should adjust our focus toward inventories in habitat fragments not included in current protection schemes as a measure of the gaps in our conservation planning (Noss and Cooperrider 1994). Species in unprotected areas face the most immediate risk of local extinction as a result of habitat loss. Future inventories and surveys should focus on these shrinking habitats given the extraordinary pace at which humans are altering the landscape.

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Appendix I

A preliminary checklist of the moths of Butler County, OH.

HODGE #	FAMILY	SPECIES NAME	Butler County Record
319	Tineidae	*Kearfottia albifasciella* Fern. 1904	x
340		*Acrolophus arcanella* Clem. 1859	x
373		*Acrolophus popeanella* Clem 1859	x
457	Psychidae	*Thyridopteryx ephemeraeformis* Haw. 1803	x
957	Oecophoridae	*Psilocorsis reflexella* Clem. 1860	x
992		*Ethmia zelleriella* Cham. 1878	x
1011		*Antaeotricha schlaegeri* Zell. 1854	x
1019		*Antaenotricha humilis* Zell. 1855	x
1046		*Callima argenticintella* Clem. 1860	x
1509	Cosmopterigidae	*Stagmatophora wyattella* B. & Bsk 1920	x
1986	Gelechiidae	*Gnorimoschema gallaesolidaginis* Riley 1869	x
2281		*Dichromeris ligullela* Hbn. 1818	x
2401	Yponomeutidae	*Atteva punctella* Cram. 1781	
2420		*Yponomeuta multipunctella* Clem. 1860	x
2554	Sesiidae	*Synanthedon acerni* Clem. 1860	x
2693	Cossidae	*Prionoxystus robiniae* Peck 1818	
2738	Olethreutidae	*Endothenia hebesana* Wlk. 1863	x
2774		*Olethreutes monetiferana* Riley 1881	x
2788		*Olethreutes inornatana* Clem. 1860	x
2937		*Phaneta parmatana* Clem. 1860	x
3116		*Eucosma dorsisignatana* Clem. 1860	x
3116.1		*Eucosma similiana* Clem. 1860	x
3142		*Eucosma cataclystiana* Wlk. 1863	x
3219		*Sonia canadana* Mc.D 1925	x
3230		*Proteoteras aesculana* Riley 1881	x
3594	Tortricidae	*Pandemis limitata* Rob. 1869	x
3597		*Argyrotaenia velutinana* Wlk. 1863	x
3624		*Argyrotaenia alisellana* Rob. 1869	x
3633		*Choristoneura parallela* Rob. 1869	x
3635		*Choristoneura rosaceana* Harr. 1841	x
3684		*Clepsis clemensiana* Fern. 1879	x
3686		*Clepsis melaleucana* Wlk. 1863	x
3695		*Sparganothis sulfereana* Clem. 1860	x
3732		*Platynota flavedana* Clem. 1860	x
3740		*Platynota idaeusalis* Wlk 1959	x
3747		*Coelostathma discopunctana* Clem. 1860	x
4624	Zygaenidae	*Harrisina americana* Guer. 1829	x
4644	Megalopygidae	*Lagoa crispata* Pack. 1864	x
4652	Limacodidae	*Tortricidia testacea* Pack. 1864	x
4665		*Lithacodes fasciola* H.-S. 1854	x
4667		*Apoda y-inversum* Pack. 1864	x
4669		*Apoda biguttata* Pack. 1864	x
4671		*Prolimacodes badia* Hbn. 1822	x
4677		*Phobetron pithecium* J. E. Smith 1797	x
4679		*Natada nasoni* Grt. 1876	x
4681		*Isa textula* H.-S. 1854	x
4685		*Adoneta spinuloides* H.-S. 1854	x
4697		*Euclea delphinii* Bdv. 1832	x
4700		*Sibine stimulea* Clem. 1860	x
4701	Epipyropidae	*Fulgoraecia exigua* Hy. Edwards 1883	x
4774	Pyralidae	*Petrophila bifascialis* Rob 1869	x
4794		*Eustixia pupula* Hbn. 1823	x
4870		*Glaphyria sequistrialis* Hbn. 1823	x

APPENDIX I (*Cont.*)

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HODGE #	FAMILY	SPECIES NAME	Butler County Record
4889		*Dicymolomia julianalis* Wlk. 1859	x
4949		*Ostrinia nubilalis* Hbn. 1796	x
4950		*Fumibotys fumalis* Gn. 1854	x
4980		*Helvibotys helvialis* Wlk. 1859	x
5040		*Pyrausta bicoloris* Gn. 1854	x
5071		*Pyrausta acrionalis* Wlk. 1859	x
5079		*Udea rubigalis* Gn. 1854	x
5156		*Nomophila nearctica* Mun. 1973	x
5159		*Desmia funeralis* Hbn. 1796	x
5160		*Desmia maculalis* Westwood 1831	x
5169		*Hymenia perspectalis* Hbn. 1796	x
5226		*Palpita magniferalis* Wlk. 1861	x
5228		*Polygrammodes flavidalis* Gn. 1854	x
5229		*Polygrammodes langdonalis* Grt. 1877	x
5233		*Compacta capitalis* Grt. 1881	x
5241		*Pantographa limata* Grt. 1867	x
5277		*Herpetogramma thestealis* Wlk. 1859	x
5292		*Conchylodes ovulalis* Gn. 1854	x
5362		*Crambus agitatellus* Clem. 1860	x
5403		*Agriphila vulgivagella* Clem. 1860	x
5413		*Pediasia trisecta* Wlk. 1856	x
5420		*Microcrambus elegans* Clem. 1860	x
5466		*Vaxi critica* Fbs. 1820	x
5518		*Aglossa cuprina* Zell 1872	x
5524		*Hypsopygia costalis* F. 1775	x
5533		*Herculia olinalis* Gn. 1854	x
5556		*Tosale oviplagalis* Wlk. 1866	x
5566		*Arta statalis* Grt. 1875	x
5577		*Epipaschia superatalis* Clem. 1860	
5606		*Tetralopha asperatella* Clem. 1860	
5797		*Nephopterix virgitella* Clem. 1860	x
6053		*Peoria approximella* Wlk. 1866	
6078	Thyrididae	*Dysodia oculatana* Clem. 1860	x
6237	Thyatiridae	*Pseudothyatira cymatophoroides* Gn. 1852	x
6255	Drepanidae	*Oreta rosea* Wlk. 1855	x
6261	Geometridae	*Heliomata cycladata* Grt. & R. 1866	x
6322		*Mellilla xanthometata* Wlk. 1862	x
6331		*Semiothisa promiscuata* Fgn. 1974	x
6386		*Semiothisa ocellinata* Gn. 1857	x
6443		*Glenaria texanaria* Hulst 1888	x
6449		*Glena cribritaria* Gn. 1857	x
6588		*Iridopsis larvaria* Gn. 1857	x
6590		*Anavitrinella pampinaria* Gn. 1857	x
6597		*Ectropis crepuscularia* Dns. 1775	x
6620		*Melanolophia canadaria* Gn. 1857	x
6640		*Biston betularia* L. 1758	x
6654		*Hypagyrtis unipunctata* Haw. 1809	x
6667		*Lomographa vestaliata* Gn. 1857	x
6720		*Lytrosis unitaria* H.-S 1854	x
6726		*Euchlaena obtusaria* Hbn. 1809-13	x
6729		*Euchlaena johnsonaria* Fitch 1869	x
6733		*Euchlaena amoenaria* Gn. 1857	x
6740		*Xanthotype urticaria* Swett 1918	x
6753		*Pero honestaria* Wlk. 1860	x
6754		*Pero hubneroria* Gn. 1857	x
6796		*Campaea perlata* Gn. 1857	x
6797		*Ennomos magnaria* Gn. 1857	x
6820		*Metanema determinata* Wlk. 1866	x

APPENDIX I (*Cont.*)

A preliminary checklist of the moths of Butler County, OH.

HODGE #	FAMILY	SPECIES NAME	Butler County Record
6826		*Metarranthis hypochraria* H.-S 1854	x
6838		*Probole amicaria* H.-S. 1855	x
6841		*Plagodis kuetzingi* Grt. 1876	x
6842		*Plagodis phlogosaria* Gn. 1857	x
6843		*Plagodis fervidaria* H.-S. 1854	x
6844		*Plagodis alcoolaria* Gn. 1857	x
6885		*Besma quercivoraria* Gn. 1857	x
6912		*Sicya macularia* Harr. 1850	x
6941		*Eusarca confusaria* Hbn. 1813	x
6963		*Tetracis crocallata* Gn. 1857	
6966		*Eutrapela clemataria* J. E. Smith 1797	x
6974		*Patalene olyzonaria* Wlk. 1860	x
6982		*Prochoerodes transversata* Dru. 1770	
6987		*Antepione thisoaria* Gn. 1857	x
7009		*Nematocampa resistaria* Haw. 1809	x
7053		*Dichorda iridaria* Gn. 1857	x
7058		*Synchlora aerata* F. 1798	
7071		*Chlorochlamys chloroleucaria* Gn. 1857	x
7146		*Haematopis grataria* F. 1798	x
7159		*Scopula limboundata* Haw. 1809	x
7196		*Eulithis diversilineata* Hbn. 1813	x
7292		*Hydria prunivorata* Fagen 1955	x
7390		*Xanthorhoe lacustrata* Gn. 1857	x
7414		*Orthonama obstipata* F. 1794	x
7419		*Hydrelia lucata* Gn. 1857	x
7430		*Trichodezia albovittata* Gn. 1857	x
7440		*Eubaphe mendica* Wlk. 1854	x
7647		*Heterophleps triguttaria* H.-S. 1854	x
7648		*Dyspteris abortivaria* H.-S. 1855	x
7653	Epiplemidae	*Calledapteryx dryopterata* Grt. 1868	x
7663	Apatelodidae	*Apatelodes torrefacta* J. E. Smith 1797	
7665		*Olceclostera angelica* Grt. 1864	
7670	Lasiocampidae	*Tolype velleda* Stoll 1791	
7674		*Tolype notialis* Franc. 1973	x
7685		*Heteropacha rileyana* Cram. 1874	
7687		*Phyllodesma americana* Harr. 1841	
7704	Saturniidae	*Eacles imperialis* Dru. 1773	
7706		*Citheronia regalis* F. 1793	x
7709		*Sphingicampa bicolor* Harr. 1841	
7712		*Sphingicampa bisecta* Lint. 1879	
7715		*Dryocampa rubicunda* F. 1793	
7723		*Anisota virginiensis* Dru. 1773	x
7746		*Automeris io* F. 1775	
7757		*Antheraea polyphemus* Cram. 1776	
7758		*Actias luna* L. 1758	
7764		*Callosamia promethea* Dru. 1773	
7765		*Callosamia angulifera* Maasson 1873	
7767		*Hyalophora cecropia* L. 1758	
7775	Sphingidae	*Manduca sexta* L. 1763	
7776		*Manduca quinquemaculata* Haw. 1803	
7783		*Manduca jasminearum* Guer. 1829-1831	x
7786		*Ceratomia amyntor* Geyer 1835	
7787		*Ceratomia undulosa* Wlk. 1856	
7789		*Ceratomia catalpae* Bdv. 1875	
7790		*Ceratomia hageni* Grt. 1874	
7793		*Paratraea plebeja* F. 1777	
7802		*Sphinx chersis* Hbn. 1823	x

APPENDIX 1 (*Cont.*)

A preliminary checklist of the moths of Butler County, OH.

HODGE #	FAMILY	SPECIES NAME	Butler County Record
7807		*Sphinx canadensis* Bdv. 1875	x
7808		*Sphinx franckii* Neum. 1893	x
7821		*Smerinthus jamaicensis* Dru. 1773	
7824		*Paonias excaecatus* J. E. Smith 1797	
7825		*Paonias myops* J. E. Smith 1797	
7827		*Laothoe juglandis* J. E. Smith 1797	
7853		*Hemaris thysbe* F. 1775	
7855		*Hemaris diffinis* Bdv. 1836	
7859		*Eumorpha pandorus* Hbn. 1821	
7870		*Sphecodina abbottii* Swainson 1821	
7871		*Deidamia inscripta* Harr. 1839	
7885		*Darapsa myron* Cram. 1780	
7886		*Darapsa pholus* Cram. 1776	
7894		*Hyles lineata* F. 1775	x
7895	Notodontidae	*Clostera albosigma* Fitch 1856	x
7904		*Datana drexelii* Hy. Edw. 1884	x
7906		*Datana contracta* Wlk. 1855	x
7907		*Datana integerrima* Grt. & Rob. 1866	
7915		*Nadata gibbosa* J. E. Smith 1797	
7919		*Peridea basitriens* Wlk. 1855	
7920		*Peridea angulosa* J. E. Smith 1797	
7929		*Nerice bidentata* Wlk. 1855	
7931		*Gluphisia septentrionis* Wlk. 1855	
7936		*Furcula borealis* Guer. 1832	
7951		*Symmerista albifrons* J. E. Smith 1797	x
7957		*Dasylophia anguina* J. E. Smith 1797	
7974		*Misogada unicolor* Pack. 1864	
7975		*Macrurocampa marthesia* Cram. 1780	
7983		*Heterocampa obliqua* Pack. 1864	x
7985		*Heterocampa subrotata* Harv. 1874	
7990		*Heterocampa umbrata* Wlk. 1855	x
7995		*Heterocampa biundata* Wlk. 1855	
8010		*Schizura concinna* J. E. Smith 1797	x
8012		*Oligocentria semirufescens* Wlk. 1865	
8045.1	Arctiidae	*Crambidia pallida* Pack 1864	x
8090		*Hypoprepia fucosa* Hbn. 1827-1831	
8098		*Clemensia albata* Pack. 1864	x
8107		*Haploa clymene* Brown 1776	
8110		*Haploa contigua* Wlk. 1855	x
8111		*Haploa lecontei* Guer-Meneville 1832	
8121		*Holomelina aurantiaca* Hbn. 1827	x
8129		*Pyrrharctia isabella* J. E. Smith 1797	
8131		*Estigmene acrea* Drury 1773	
8137		*Spilosoma virginica* F. 1798	
8140		*Hyphantria cunea* Drury 1773	
8146		*Ecpantheria scribonia* Stoll 1790	
8157		*Phragmatobia lineata* Newman & Donahue 1966	x
8169		*Apantesis phalerata* Harr. 1841	
8196		*Grammia parthenice* Kby. 1837	x
8197		*Grammia virgo* L. 1758	x
8203		*Halysidota tessellaris* J. E. Smith 1797	
8211		*Lophocampa caryae* Harr. 1841	
8214		*Lophocampa maculata* Harr. 1841	x
8230		*Cycnia tenera* Hbn. 1818	
8238		*Euchaetes egle* Drury 1773	
8262		*Ctenucha virginica* Esp. 1794	x
8267		*Cisseps fulvicollis* Hbn. 1818	
8296	Lymantriidae	*Dasychira basiflava* Pack. 1864	x

APPENDIX I (*Cont.*)

A preliminary checklist of the moths of Butler County, OH.

HODGE #	FAMILY	SPECIES NAME	Butler County Record
8316		*Orgyia leucostigma* J. E. Smith 1797	
8322	Noctuidae	*Idia americalis* Gn. 1854	x
8323		*Idia aemula* Hbn. 1813	x
8334		*Idia lubricalis* Geyer 1832	x
8338		*Phalaenophana pyramusalis* Wlk. 1859	x
8347		*Zanclognatha obscuripennis* Grt. 1872	x
8357		*Macrochilo absorptalis* Wlk. 1859	x
8360		*Macrochilo orciferalis* Wlk. 1959	x
8364		*Phalaenostola larentioides* Grt. 1873	x
8380		*Renia nemoralis* Barnes & McDunnogh 1918	x
8397		*Palthis angulalis* Hbn. 1796	x
8398		*Palthis asopialis* Gn. 1854	x
8421		*Hypenodes fractilinea* Smith 1908	x
8440		*Nigetia formosalis* Wlk. 1866	x
8442		*Bomolocha baltimoralis* Gn. 1854	x
8445		*Bomolocha abalienalis* Wlk. 1859	x
8447		*Bomolocha madefactalis* Gn. 1854	x
8465		*Plathypena scabra* F. 1798	x
8493		*Isogona tenuis* Grt. 1872	x
8514		*Scolecocampa liburna* Geyer 1837	x
8545		*Anomis erosa* Hbn. 1821	x
8587		*Panopoda rufimargo* Hbn. 1818	x
8588		*Panopoda carneicosta* Gn. 1852	x
8641		*Synedoida grandirena* Haw. 1809	x
8689		*Zale lunata* Dru. 1773	
8692		*Zale galbanata* Morr. 1876	x
8697		*Zale minerea* Gn. 1852	x
8717		*Zale horrida* Hbn. 1818	x
8719		*Euparthenos nubilis* Hbn. 1823	
8721		*Allotria elonympha* Hbn. 1828	x
8738		*Caenurgina crassiuscula* Haw. 1809	
8739		*Caenurgina erechtea* Cram. 1780	
8745		*Mocis texana* Morr. 1875	x
8769		*Spiloloma lunilinea* Grt. 1873	x
8770		*Catocala innubens* Gn. 1852	x
8771		*Catocala piatrix* Grt. 1864	x
8778		*Catocala habilis* Grt. 1872	x
8779		*Catocala serena* W. H. Edwards 1864	x
8782		*Catocala flebilis* Grt. 1872	x
8783		*Catocala angusi* Grt. 1876	x
8784		*Catocala obscura* Strecker 1874	x
8788		*Catocala retecta* Grt. 1872	x
8792		*Catocala vidua* J. E. Smith 1797	
8793		*Catocala maestosa* Hulst 1884	x
8796		*Catocala nebulosa* W. H. Edwards 1864	
8797		*Catocala subnata* Grt. 1864	x
8798		*Catocala neogama* J. E. Smith 1797	
8801		*Catocala ilia* Cram. 1776	x
8803		*Catocala relicta* Wlk. 1858	x
8834		*Catocala amatrix* Hbn. 1813	x
8857		*Catocala ultronia* Hbn. 1823	x
8858		*Catocala crataegi* Saunders 1876	x
8864		*Catocala grynea* Cram. 1780	x
8871		*Catocala dulciola* Grt. 1881	x
8874		*Catocala minuta* W. H. Edwards 1864	x
8878		*Catocala amica* Hbn. 1818	
8887		*Trichoplusia ni* Hbn. 1803	x
8890		*Pseudoplusia includens* Wlk. 1858	x

APPENDIX I (*Cont.*)

A preliminary checklist of the moths of Butler County, OH.

HODGE #	FAMILY	SPECIES NAME	Butler County Record
8897		*Diachrysia balluca* Geyer 1832	x
8898		*Allagrapha aerea* Hbn. 1803	x
8904		*Chrysanympha formosa* Grt. 1865	x
8905		*Eosphoropteryx thyatyroides* Gn. 1852	x
8907		*Autographa biloba* Stephens 1830	x
8908		*Autographa precationis* Gn. 1852	
8924		*Anagrapha falcifera* Kirby 1837	
8957		*Paectes oculatrix* Gn. 1852	x
8968		*Eutelia pulcherrima* Grt. 1865	x
8970		*Baileya opthalmica* Gn. 1852	x
8973		*Baileya australis* Grt. 1881	x
8983.2		*Meganola spodia* Franc. 1985	x
9030		*Ozarba aeria* Grt. 1881	x
9044		*Thioptera nigrofimbria* Gn. 1852	x
9047		*Lithacodia muscosula* Gn. 1852	x
9051		*Lithacodia musta* Grt. & Rob. 1868	x
9053		*Lithacodia carneola* Gn. 1852	x
9057		*Homophoberia apicosa* Haworth 1809	x
9062		*Cerma cerintha* Treitschke 1826	x
9065		*Leuconycta diphteroides* Gn. 1852	x
9095		*Tarachidia erastriodes* Gn. 1852	x
9127		*Spragueia leo* Gn. 1852	x
9131a		*Spragueia apicalis apicella* Grt. 1872	x
9189		*Charadra deridens* Gn. 1852	x
9193		*Raphia frater* Grt. 1864	x
9200		*Acronicta americana* Harris 1841	x
9227		*Acronicta laetifica* J. E. Smith 1897	x
9236		*Acronicta morula* Grt. & Rob. 1868	x
9237		*Acronicta interrupta* Gn. 1852	x
9241.1		*Acronicta heitzmani* Covell and Metzler 1992	x
9254		*Acronicta afflicta* Grt. 1864	x
9272		*Acronicta oblinita* J. E. Smith 1797	x
9280		*Simyra henrici* Grt. 1873	x
9281		*Agriopodes fallax* H.-S. 1854	x
9285		*Polygrammate hebraeicum* Hbn. 1818	x
9299		*Eudryas unio* Hbn. 1831	x
9301		*Eudryas grata* F. 1793	
9309		*Psychomorpha epimenis* Dru. 1782	x
9332		*Apamea vulgaris* Grt. & Rob. 1866	x
9364		*Apamea sordens* Hufnagel 1766	x
9367		*Apamea dubitans* Wlk. 1856	x
9373		*Agroperina helva* Grt. 1875	x
9404		*Oligia modica* Gn. 1852	x
9454		*Amphipoea velata* Wlk. 1865	x
9471		*Papaipema arctivorens* Hampson 1910	x
9495		*Papaipema furcata* Smith 1899	x
9496		*Papaipema nebris* Gn. 1852	x
9505		*Papaipema cerussata* Grt. 1864	x
9545		*Euplexia benesimilis* McDunnough 1922	x
9560		*Dypterygia rozmoni* Berio 1974	x
9578		*Hyppa xylinoides* Gn. 1852	x
9619		*Phosphila miselioides* Gn. 1852	x
9638		*Amphipyra pyramidoides* Gn. 1852	x
9661		*Crambodes talidiformis* Gn. 1852	x
9666		*Spodoptera frugiperda* J. E. Smith 1797	x
9669		*Spodoptera ornithogalli* Gn. 1852	x
9678		*Elaphria versicolor* Grt. 1875	x
9684		*Elaphria grata* Hbn. 1818	x

APPENDIX I (*Cont.*)

A preliminary checklist of the moths of Butler County, OH.

HODGE #	FAMILY	SPECIES NAME	Butler County Record
9688		*Galgula partita* Gn. 1852	x
9690		*Platysenta videns* Gn. 1852	x
9696		*Condica vecors* Gn. 1852	x
9696		*Platysenta vecors* Gn. 1852	x
9720		*Ogdoconta cinereola* Gn. 1852	x
9725		*Stiriodes obtusa* H.-S. 1854	x
9754		*Plagiomimicus pityochromus* Grt. 1873	x
9781		*Basiodes pepita* Gn. 1852	x
9887		*Lithophane bethunei* Grt. & Rob. 1868	x
9936		*Eupsilia morrisoni* Grt. 1874	x
9943		*Metaxaglaea inulta* Grt. 1874	x
9957		*Sunira bicolorago* Gn. 1852	x
9961		*Anathix ralla* Grt. & Rob. 1868	x
10012		*Psaphida electilis* Morr. 1875	x
10059		*Homohadena badistriga* Grt. 1872	x
10200		*Cucullia asteroides* Gn. 1852	
10202		*Cucullia convexipennis* Grt. & Rob. 1868	x
10292		*Melanchra adjuncta* Gn. 1852	
10293		*Melanchra picta* Harris 1841	x
10397		*Lacinipolia renigera* Stephens 1829	x
10414		*Lacinipolia implicata* McDunnough 1937	x
10431		*Faronta diffusa* Wlk. 1856	x
10438		*Pseudaletia unipuncta* Haw. 1809	x
10459		*Leucania inermis* Forbes 1936	x
10462		*Leucania pseudargyria* Gn. 1852	x
10521.1		*Morrisonia latex* Gn. 1852	x
10578		*Pseudorthodes vecors* Gn. 1852	x
10648		*Agrotis gladiaria* Morr. 1874	x
10663		*Agrotis ipsilon* Hufnagel 1766	x
10670		*Feltia jaculifera* Gn. 1852	
10676		*Feltia herilis* Grt. 1873	x
10891		*Ochropleura implecta* Lafontaine 1998	x
10901		*Euagrotis lubricans* Gn. 1852	x
10919		*Diarsia jucunda* Wlk. 1857	x
10926		*Spaelotis clandestina* Harr. 1862	x
10942.1		*Xestia dolosa* Franc. 1980	x
10943		*Xestia normaniana* Grt. 1874	x
10944		*Xestia smithii* Snellen 1896	x
10950		*Pseudohermonassa bicarnea* Gn. 1852	x
10998		*Choephora fungorum* Grt. & Rob. 1868	
11006		*Protolampra brunneicolis* Grt. 1865	x
11029		*Abagrotis alternata* Grt. 1864	
11045		*Abagrotis anchocelioides* Gn. 1852	x
11063		*Pyrrhia umbra* Hufn. 1766	x
11068		*Helicoverpa zea* Boddie 1850	
11128		*Schinia arcigera* Gn. 1852	x
11135		*Schinia rivulosa* Gn. 1852	x
11149		*Schinia trifascia* Hbn. 1818	x
NA		*Noctua pronuba* L. 1758	x