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Ecology of the Cerambycidae (Coleoptera) of the Huron Mountains in Northern Michigan

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ECOLOGY OF THE CERAMBYCIDAE (COLEOPTERA) OF THE HURON MOUNTAINS IN NORTHERN MICHIGAN

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ABSTRACT

Eighty-nine species of Cerambycidae were collected during a five-year survey of the woodboring beetle fauna of the Huron Mountains in Marquette County, Michigan. Host plants were determined for 51 species. Observations were made of species abundance and phenology, and the blossoms visited by anthophilous cerambycids.

The Huron Mountains area comprises approximately 13,000 ha of forested land in northern Marquette County in the Upper Peninsula of Michigan. More than 7000 ha are privately owned by the Huron Mountain Club, including a designated, 2200 ha, Nature Research Area. The variety of habitats combines with differences in the nature and extent of prior disturbance to produce an exceptional diversity of forest communities, making the area particularly valuable for studies of forest insects. The principal objective of this investigation was to survey the cerambycid fauna of the region and observe their host-plant associations and phenology.

STUDY AREA

The study area defined for the survey included township T52N, R28W; the north half of T51N, R28W; Sec. 30–31, T52N, R27W; Sec. 6–7 and 18, T51N, R27W; Sec. 13–14, 23–26, and 35–36, T52N, R29W; and Sec. 1–2 and 11–14, T51N, R29W, all in Marquette County, Michigan. The northern boundary of the area, the Lake Superior shoreline, is paralleled by a 1–3-km-wide plain of glacial lake bed and beach ridges. The Huron Mountains dominate the remainder, with some peaks reaching about 300 m above the level of Lake Superior. A third-order stream system, the Salmon-Trout River, forms a small flood plain at the east edge of the study area.

Most of the study area supports stands of mixed northern hardwoods dominated by *Acer saccharum* Marsh., *Tsuga canadensis* (L.) Carr., and *Betula alleghaniensis* Britton. *Pinus strobus* L., *Pinus resinosa* Aiton, *Picea glauca* (Moench) A. Voss, *Abies balsamea* (L.) Miller, *Acer rubrum* L., *Quercus rubra* L., *Tilia americana* L., and *Ostrya virginiana* (Miller) K. Koch are common throughout. A range of stand types can be found, including nearly exclusive growths of *Acer saccharum* and pure stands of *Tsuga canadensis*. Stands dominated by *Quercus rubra, Pinus strobus*, and *P. resinosa* typically occur on the tops and south and west slopes of the mountains, along the north shorelines of inland lakes, and on the glacial lake-bed and beach ridges. The flood-plain growth is dominated by *Thuja occidentalis* L., *Fraxinus pennsylvanica* Marsh., and *Alnus rugosa* (Duroi) Sprengel. Although the Huron Mountains are best known for their extensive

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stands of virtually undisturbed old growth, much of the area is subject to periodic selective cutting. Timber harvesting remains a significant form of recent disturbance in some parts of the region.

More complete descriptions of the plant communities of the Huron Mountains have been provided by Wells and Thompson (1976). Historical records of logging and other disturbance are maintained by the Huron Mountain Club.

METHODS

The survey was conducted for 18 weeks during the summers of 1981–1985. Species diversity was surveyed with traditional sampling methods for cerambycids, including diurnal and nocturnal inspection or beating of suitable host plants and operation of UV light traps and Malaise traps. Appropriate blossoms were inspected for anthophilous species and beach drift along Lake Superior was checked. About 200 bolts and branches of *Pinus strobus, Pinus resinosa, Picea glauca, Abies balsamea, Quercus rubra*, and *Tilia americana* were cut, placed in locations frequented by cerambycids, and inspected for adults attracted to them. After the field season these host materials were collected and enclosed for rearing studies. Host-plant associations, a primary objective of the study, were established through rearing, repeated collections from suitable host species, or collections from previously recorded hosts. Phenology of the cerambycid community was observed by scheduling field work to cover the principal adult activity period from mid-June through mid-August.

RESULTS

Eighty-nine species of cerambycids were collected in the study area, bringing to 93 the total known from the Huron Mountains. Two species were new state records and 10 more had not previously been reported from the Upper Peninsula. Host-plant associations were established for 51 species of borers utilizing 16 host species (Table 1).

The most productive observations were made by diurnal inspection of host materials. Collections from blossoms and in Malaise traps were also numerous although less informative. Nocturnal collecting and UV light traps were generally unsuccessful; air temperature typically dropped below 15°C after sundown. Because suitable enclosures for rearing were not available in the study area, infested bolts and branches were transported to southwestern Michigan and placed in screen cages there. The amount of host material sampled was thus limited and the emergence dates could not be used in determining the adult activity period in the Huron Mountains.

The following annotated list presents, for each species, an estimate of abundance, the adult activity period, and established host-plant associations or probable host plants if known. Associations confirmed by rearing are indicated by (R). Flower records are given for anthophilous species, and new state or Upper Peninsula (UP) records are noted. Four species recorded by Andrews (1929) from the Huron Mountains but not observed during this study have been included in the list. Abundance of each species has been estimated by the following criteria:

Common— regularly and easily collected or observed each summer;
Frequent—usually but irregularly found and then only a few individuals;
Occasional—seldom collected or observed;
Rare—known in the study area from only one or a very few collections or observations.

CERAMBYCIDAE OF THE HURON MOUNTAINS

Acmaeops proteus Kirby. Common, late June to early August. Hosts: *Picea glauca, Pinus resinosa, Pinus strobus.*

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Acmaeopsoides rufula (Haldeman). Rare, mid-June and early July. Probable host: *Picea* (Gosling and Gosling 1977). Flower records: *Heracleum maximum* Bartram, *Prunus virginiana* L.. *Thalictrum dasycarpum* Fisch. & Ave-Lall.

Aegomorphus modestus (Gyllenhal). Occasional, early and mid-July. Hosts: *Malus pumila* Miller. *Tilia americana* (R).

Amniscus macula (Say). Frequent, late July and early August. Hosts: *Quercus rubra, Tilia americana* (R).

Amniscus sexguttata (Say). Frequent, July. Hosts: *Picea glauca, Pinus strobus.*

Anastrangalia sanguinea (LeConte). Frequent, late June and early July. Probable host: *Pinus* (Linsley & Chemsak 1976). Flower records: *Cornus rugosa* Lam., *Heracleum maximum, Thalictrum dasycarpum.*

Anelaphus parallelus (Newman). Frequent, early July. Host: *Quercus rubra* (R). New UP record. The Huron Mountain population does not have the single brood with a two-year life cycle typical of this species in the Lower Peninsula of Michigan (Gosling 1978). Freshly pruned twigs were found in 1981, 1983, and 1984, and adults were present in 1984 and 1985. There seems to be more than one brood but I could not determine if there is also a difference in the length of the life cycle.

Anelaphus villosus (Fabricius). Rare, late July. Probable hosts: *Acer, Quercus, Tilia* (Gosling 1984).

Anthophylax attenuatus (Haldeman). Rare, late June and early July. Host: *Acer saccharum.*

Anthophylax cyaneus (Haldeman). Occasional, mid-June to late July. Probable hosts: *Acer, Betula* (Linsley & Chemsak 1972).

Arhopalus foveicollis (Haldeman). Recorded by A. W. Andrews. Host: *Pinus* (Andrews 1929).

Asemum striatum (L.). Common, mid-June to mid-July. Hosts: *Picea glauca, Pinus resinosa (R), P. strobus.*

Bellamira scalaris (Say). Rare, late July and early August. Collected by M. and A. O'Brien. Probable hosts: *Acer, Betula* (Linsley & Chemsak 1976).

Brachyleptura champlaini Casey. Common, mid-July to mid-August. Probable host: *Pinus* (Gosling 1985). Flower records: *Cicuta bulbifera* L., *Daucus carota* L., *Eupatorium perfoliatum* L., *Heracleum maximum, Sorbaria sorbifolia* (L.) A. Br., *Spiraea alba* Duroi, *Thalictrum dasycarpum.*

Brachyleptura rubrica (Say). Common, early July to early August. Probable host: *Quercus* (Linsley & Chemsak 1976). Flower records: *Heracleum maximum, Spiraea alba, Thalictrum dasycarpum.*

Callidium schotti Schaeffer. Rare, late June. Host: *Pinus resinosa.* New state record.

Calimoxys sanguinicollis sanguinicollis (Olivier). Common, mid-June to mid-July. Host unknown. Flower records: *Cornus rugosa, Heracleum maximum, Prunus virginiana, Sorbus aucuparia* L., *Thalictrum dasycarpum, Viburnum dentatum* L.

Calloides nobilis nobilis (Harris). Recorded by A. W. Andrews. Host: *Quercus rubra* (Andrews 1929).

Centrodera decolorata (Harris). Rare, late June and early July. Probable hosts: *Acer, Quercus* (Linsley & Chemsak 1972).

Charisalia americana (Haldeman). Rare, early and mid-July. Host unknown.

Clytus ruricola (Olivier). Common, late June through July. Host: *Malus pumila.* Flower records: *Asclepias syriaca* L., *Daucus carota, Heracleum maximum, Sambucus canadensis* L., *Spiraea alba, Thalictrum dasycarpum, Viburnum dentatum.*

Cosmosalia chrysocoma (Kirby). Common, late June to mid-July. Probable hosts: *Picea, Pinus, Populus* (Linsley & Chemsak 1976). Flower records: *Heracleum maximum, Rubus allegheniensis* Porter, *Rosa* sp., *Solidago* sp. *Sorbaria sorbifolia, Spiraea alba, Thalictrun dasycarpum.*

Cyrtophorus verrucosus (Olivier). Common, mid-June to early July. Host: *Malus pumila.* Flower records: *Acer spicatum* Lam., *Cornus rugosa, Heracleum maximum, Prunus virginiana, Thalictrum dasycarpum.*

Desmocerus palliatus (Forster). Occasional, early July. Host: *Sambucus pubens* Michx.

Encyclops caerulea (Say). Occasional, late June and early July. Probable hosts: *Acer, Quercus* (Linsley & Chemsak 1972). Flower records: *Heracleum maximum, Thalictrum dasycarpum.*

Eupogonius subarmatus (LeConte). Occasional, July and early August. Host: *Tilia americana* (R). New UP record.

Evodinus monticola monticola (Randall). Common, late June to mid-July. Host: *Pinus resinosa.* Andrews (1929) recorded this species from *Pinus banksiana* Lamb. Flower records: *Cornus rugosa, Heracleum maximum, Prunus virginiana, Rubus parviflorus* Nutt., *Spiraea alba, Thalictrum dasycarpum, Viburnum dentatum.*

Gaurotes cyanipennis (Say). Common, late June to mid-August. Probable hosts: *Quercus, Betula* (Linsley & Chemsak 1972). Flower records: *Heracleum maximum, Rosa* sp., *Spiraea alba, Thalictrum dasycarpum.* Andrews (1929) recorded this species from *Viburnum.*

Grammoptera subargentata (Kirby). Rare, late June. Probable hosts: *Populus, Quercus* (Linsley & Chemsak 1976). Flower records: *Cornus rugosa, Prunus virginiana.* This species is usually common in northern Michigan.

Graphisurus fasciatus (DeGeer). Frequent, July and early August. Hosts: *Acer saccharum, Quercus rubra, Tilia americana.*

Hyperplatys aspersa (Say). Common, July. Host: *Malus pumila.*

Hyperplatys maculata Haldeman. Common, July and early August. Host: *Tilia americana* (R). New UP record.

Idiopidonia pedalis (LeConte). Frequent, early July. Host unknown. Flower records: *Heracleum maximum, Thalictrum dasycarpum.*

Judolia montivagans montivagans (Couper). Frequent, late June and early July. Probable hosts: *Picea, Pinus, Populus* (Linsley & Chemsak 1976). Flower records: *Heracleum maximum, Prunus virginiana, Rubus parviflorus, Thalictrum dasycarpum.*

Leptura plebeja. Randall. Frequent, July and early August. Host: *Pinus strobus.* Flower records: *Cornus rugosa, Daucus carota, Heracleum maximum, Spiraea alba, Thalictrum dasycarpum.*

Leptura subhamata Randall. Frequent, late July and early August. Host: *Tsuga canadensis.* Flower records: *Daucus carota, Spiraea alba.*

Lepturges symmetricus (Haldeman). Occasional, July and early August. Host: *Tilia americana* (R).

Lepturopsis biforis (Newman). Frequent, mid-July to early August. Probable hosts: *Pinus, Populus, Tsuga* (Linsley & Chemsak 1976).

Microclytus compressicollis (LaPorte & Gory). Frequent, mid-June. Host unknown. Flower record: *Prunus virginiana.*

Microgoes oculatus (LeConte). Occasional, late June to early August. Hosts: *Fraxinus americana* L., *Quercus rubra, Tilia americana.*

Molorchus bimaculatus bimaculatus Say. Common, mid-June to early July. Probable hosts: *Acer* (Gosling 1984), *Quercus* (Linsley 1963), *Ulmus* (M. Deyrup, in litt.). Flower records: *Cornus rugosa, Heracleum maximum, Prunus virginiana, Sambucus pubens, Thalictrum dasycarpum, Viburnum dentatum.*

Monochamus marmorator Kirby. Rare, July (?). Host: *Abies balsamea* (R).

Monochamus notatus (Drury). Frequent, July and early August. Hosts: *Picea glauca* (R), *Pinus resinosa, P. strobus* (R).

Monochamus scutellatus scutellatus (Say). Common, mid-June to early August. Hosts: *Abies balsamea (R), Picea glauca (R), Pinus resinosa, P. strobus* (R). Andrews (1929) recorded *Pinus banksiana* as a host for this species.

Neacanthocinus pusillus (Kirby). Frequent, late June to early August. Hosts: *Pinus resinosa (R), P. strobus.*

Neoalosterna capitata (Newman). Frequent, late June and early July. Host: *Betula alleghaniensis.* Flower records: *Heracleum maximum, Prunus virginiana, Rosa* sp., *Rubus allegheniensis, Thalictrum dasycarpum, Viburnum dentatum.*

Neoclytus acuminatus acuminatus (Fabricius). Rare, early July. Host: *Quercus rubra.*

Neoclytus muricatulus muricatulus (Kirby). Rare, July. Host: *Abies balsamea.*

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Oberea tripunctata (Swederus). Frequent, late June to early August. Probable hosts: *Alnus, Cornus, Viburnum* (Knull 1946).

Oplosia nubila (LeConte). Frequent, late June through July. Host: *Tilia americana* (R).

Orthosoma brunneum (Forster). Recorded by A. W. Andrews. Hosts: *Picea, Pinus* (Andrews 1929).

Parandra (Neandra) brunnea brunnea (Fabricius). Recorded by A. W. Andrews (1929). Probable hosts: *Acer, Quercus* (Linsley 1962).

Phymatodes aereus (Newman). Rare, late June and early July. Probable host: *Quercus* (Linsley 1964). New UP record.

Phymatodes dimidiatus (Kirby). Rare, early and mid-July. Host: *Pinus resinosa*.

Phymatodes testaceus (L.). Rare, July (?). Host: *Quercus rubra* (R).

Physocnemum brevilineum (Say). Frequent, late June through July. Host: *Ulmus americana* L. A dwindling population survives in the dying host trees at Ives Lake.

Pidonia ruficollis (Say). Common, mid-June through mid-July. Probable hosts: *Betula, Tilia* (Linsley & Chemsak 1976), *Populus* (Gardiner 1970). Flower records: *Acer spicatum, Aralia nudicaulis* L., *Chrysanthemum leucanthemum* L., *Cornus rugosa, Heracleum maximum, Rubus alleghaniensis, Rubus strigosus* Michaux., *R. parviflorus, Smilacina racemosa* (L.) Desf., *Thalictrum dasycarpum, Viburnum lentago* L.

Pogonocherus (Eupogonocherus) mixtus Haldeman. Frequent, July and early August. Host: *Pinus strobus*.

Pogonocherus (Eupogonocherus) parvulus LeConte. Rare, early July. Probable host: *Salix* (Linsley & Chemsak 1984). New UP record.

Pogonocherus (Pogonocherus) penicillatus LeConte. Occasional, late June through July. Host: *Picea glauca*.

Pronocera collaris collaris (Kirby). Rare, late July. Host: *Pinus strobus*.

Purpuricenus humeralis (Fabricius). Rare, late July and early August. Host: *Quercus rubra*. New UP record.

Pygoleptura nigrella nigrella (Say). Occasional, late June to early August. Hosts: *Picea glauca, Pinus resinosa*.

Rhagium inquisitor (L.). Common, mid-June to early July. Hosts: *Picea glauca, Pinus resinosa, P. strobus*.

Ropalopus sanguinicollis (Horn). Rare, early July. Probable host: *Prunus* (Linsley 1964). New state record.

Sachalinobia rugipennis rugipennis (Newman). Rare, early July. Probable hosts: *Picea, Pinus* (Linsley & Chemsak 1972).

Saperda candida Fabricius. Rare, early July. Host: *Amelanchier* sp. Collected by N. Wells.

Saperda concolor unicolor Felt & Joutel. Rare, early July. Host: *Salix* sp. (Andrews 1929).

Saperda lateralis Fabricius. Rare, early July. Host: *Sambucus pubens*. New UP record.

Saperda obliqua Say. Rare, July. Probable hosts: *Alnus, Betula* (Knull 1946).

Saperda tridentata Olivier. Frequent, late June to mid-July. Host: *Ulmus americana*.

Saperda vestita Say. Frequent, late June through July. Host: *Tilia americana* (R).

Spondylis upiformis Mannerheim. Rare, early July. Probable host: *Pinus* (Linsley 1962).

Stenocorus vittiger (Randall). Frequent, late June and early July. host unknown. Flower records: *Acer spicatum, Cornus rugosa, Heracleum maximum, Thalictrum dasycarpum, Viburnum dentatum, V. lentago*.

Sternidius alpha misellus LeConte. Rare, late June. Host: *Quercus rubra*. New UP record.

Stictoleptura canadensis canadensis (Olivier). Frequent, late July to mid-August. Hosts: *Picea glauca, Pinus strobus*. Andrews (1929) recorded *Tsuga canadensis* as a host for this species. Flower records: *Daucus carota, Eupatorium maculatum* L., *Spiraea alba*.

Strangalepta abbreviata (Germar). Common, late June through July. Probable hosts: *Acer, Betula, Picea, Pinus* (Linsley & Chemsak 1976). Flower records: *Chrysanthemum leucanthemum, Heracleum maximum, Rubus parviflorus, Spiraea alba, Thalictrum dasycarpum*.

Strangalepta pubera (Say). Common, late June to mid-July. Probable hosts: *Acer* (Gosling 1984), *Pinus, Ulmus* (Linsley & Chemsak 1976). Flower records: *Cornus rugosa, Heracleum maximum, Rosa* sp., *Rubus allegheniensis. R. strigosus, R. parviflorus, Spiraea alba, Thalictrum dasycarpum.*

Tetropium cinnamopterum parvulum Casey. Occasional, late June to late July. Hosts: *Picea glauca, Pinus resinosa, P. strobus.*

Tetropium schwarzianum Casey. Rare, late June to late July. Hosts: *Pinus resinosa, P. strobus.*

Trachysida aspera brevifrons (Howden). Occasional, mid-June to early July. Probable hosts: *Abies, Picea* (Linsley & Chemsak 1976). Flower records: *Cornus rugosa, Heracleum maximum, Thalictrum dasycarpum.*

Trachysida mutabilis (Newman). Common, mid-June to late July. Host: *Betula alleghaniensis.* Flower records: *Acer spicatum, Chrysanthemum leucanthemum, Cornus rugosa, Heracleum maximum, Prunus virginiana, Spiraea alba, Thalictrum dasycarpum.*

Trigonarthris minnesotana (Casey). Common, late June to early August. Host: *Salix nigra* Marsh. Flower records: *Acer spicatum, Asclepias syriaca, Chrysanthemum leucanthemum, Daucus carota, Heracleum maximum, Rosa* sp., *Rubus parviflorus, Sambucus canadensis, Sorbaria sorbifolia, Spiraea alba, Thalictrum dasycarpum.*

Trigonarthris proxima (Say). Common, late June to early August. Host: *Ulmus americana.* Flower records: *Asclepias syriaca, Daucus carota, Heracleum maximum, Sambucus canadensis, Sorbaria sorbifolia, Spiraea alba, Thalictrum dasycarpum.* Andrews (1929) collected this species from *Rubus strigosus* and *Viburnum* sp.

Typocerus sparsus LeConte. Occasional, late July and early August. Probable host: *Pinus* (Linsley & Chemsak 1976). Flower record: *Spiraea alba.*

Typocerus velutinus velutinus (Olivier). Common, mid-July to mid-August. Probable hosts: *Betula, Populus, Quercus* (Linsley & Chemsak 1976). Flower records: *Apocynum androsaemifolium* L., *Asclepias syriaca, Cirsium arvense* (L.) Scop., *Daucus carota, Eupatorium perfoliatum, Rosa* sp., *Solidago* sp., *Sorbaria sorbifolia, Spiraea alba.*

Urgleptes querci (Fitch). Common, July. Hosts: *Acer saccharum, Malus pumila, Quercus rubra, Tilia americana.* New UP record.

Urgleptes signatus (LeConte). Rare, July. Host: *Quercus rubra.* New UP record.

Xestoleptura tibialis (LeConte). Frequent, late June through July. Host: *Pinus strobus.* Flower records: *Heracleum maximum, Spiraea alba, Thalictrum dasycarpum.* Andrews (1929) collected this species from *Cornus stolonifera* Michaux and *Viburnum* sp.

Xylotrechus annosus annosus (Say). Rare, late June. Probable hosts: *Populus, Salix* (Linsley 1964).

Xylotrechus colonus (Fabricius). Frequent, late June to late July. Hosts: *Betula alleghaniensis, Quercus rubra* (R), *Ulmus americana.*

Xylotrechus quadrimaculatus (Haldeman). Rare, early July. Probable hosts: *Alnus, Betula* (Linsley 1964).

Xylotrechus undulatus (Say). Frequent, late June to early August. Hosts: *Abies balsamea, Picea glauca, Pinus strobus, Tsuga canadensis.*

DISCUSSION

The cerambycid community of the Huron Mountains is diverse, but only about 20 species seem to be abundant and nearly half of these are pine borers. This presumably reflects the quality of the study area as cerambycid habitat.

The forest cover in the Huron Mountains is nearly unbroken and almost totally comprised of mature stands. Selective cutting in some areas has been the only significant disturbance for several decades. Consequently, there are only a few, small stands dominated by early succession trees such as *Populus* spp., and the cerambycids usually found in such communities are relatively uncommon or absent. Openings in the forest are sparse; the only extensive cleared area is along the southeast shore of Ives Lake.

Table 1. Host plants from the Huron Mountains and cerambycid species associated with them. (A) = reported by Andrews (1929).

Host plant	Associated cerambycidae	
Abies balsamea	*Monochamus marmorator*	*Neoclytus m. muricatulus*
	M. s. scutellatus	*Xylotrechus undulatus*
Acer saccharum	*Anthophylax attenuatus*	*Urgleptes querci*
	Graphisurus fasciatus	
***Amelanchier* sp.**	*Saperda candida*	
Betula alleghaniensis	*Neoalosterna capitata*	*Xylotrechus colonus*
	Trachysida mutabilis	
Fraxinus americana	*Microgoes oculatus*	
Malus pumila	*Aegomorphus modestus*	*Hyperplatys aspersa*
	Clytus ruricola	*Urgleptes querci*
	Cyrtophorus verucosus	
Picea glauca	*Acmaeops proteus*	*Pygoleptura n. nigrella*
	Amniscus sexguttata	*Rhagium inquisitor*
	Asemum striatum	*Stictoleptura c. canadensis*
	Monochamus notatus	*Tetropium cinnamopterum parvulum*
	M. s. scutellatus	
	Pogonocherus penicillatus	*Xylotrechus undulatus*
Pinus banksiana	*Evodinus m. monticola* (A)	*Monochamus s. scutellatus* (A)
Pinus resinosa	*Acmaeops proteus*	*Phymatodes dimidiatus*
	Asemum striatum	*Pygoleptura n. nigrella*
	Callidium schotti	*Rhagium inquisitor*
	Evodinus m. monticola	*Tetropium cinnamopterum parvulum*
	Monochamus notatus	
	M. s. scutellatus	*T. schwarzianum*
	Neacanthocinus pusillus	
Pinus strobus	*Acmaeops proteus*	*Pronocera c. collaris*
	Amniscus sexguttata	*Rhagium inquisitor*
	Asemum striatum	*Stictoleptura c. canadensis*
	Leptura plebeja	*Tetropium cinnamopterum parvulum*
	Monochamus notatus	
	M. s. scutellatus	*T. schwarzianum*
	Neacanthocinus pusillus	*Xestoleptura tibialis*
	Pogonocherus mixtus	*Xylotrechus undulatus*
Quercus rubra	*Amniscus macula*	*Phymatodes testaceus*
	Anelaphus parallelus	*Purpuricenus humeralis*
	Calloides n. nobilis (A)	*Sternidius alpha misellus*
	Graphisurus fasciatus	*Urgleptes querci*
	Microgoes oculatus	*U. signatus*
	Neoclytus a. acuminatus	*Xylotrechus colonus*
Salix nigra	*Trigonarthris minnesotana*	
Sambucus pubens	*Desmocerus palliatus*	*Saperda lateralis*
Tilia americana	*Aegomorphus modestus*	*Lepturges symmetricus*
	Amniscus macula	*Microgoes oculatus*
	Eupogonius subarmatus	*Oplosia nubila*
	Graphisurus fasciatus	*Saperda vestita*
	Hyperplatys maculata	*Urgleptes querci*
Tsuga canadensis	*Leptura subhamata*	*Xylotrechus undulatus*
	Stictoleptura c. canadensis (A)	
Ulmus americana	*Physocnemum brevilineum*	*Trigonarthris proxima*
	Saperda tridentata	*Xylotrechus colonus*

Flowering shrubs and forbs are rare except in the few clearings, the four small bogs, and along the lake shores and stream banks. Anthophilous cerambycids thus have a limited selection of blossoms available and must utilize plants they seldom visit in other areas. Difficulty in finding pollen of suitable nutritional quality may limit the fecundity of some of these borers.

Tsuga canadensis, Acer saccharum, and *Betula alleghaniensis* are by far the most abundant tree species in the study area. Although these are known cerambycid host plants, they seem to be preferred by only a few species. Many more cerambycid species are associated with hosts such as *Pinus strobus, Pinus resinosa, Quercus rubra,* and *Tilia americana* (Table 1). Further, where comparisons could be made, the latter host species seem to support larger borer populations. *Urgleptes querci,* for example, is abundant on dead branches of *Tilia,* but only rarely found on *Acer. Xylotrechus colonus* is more commonly found associated with *Quercus* than *Betula,* and both *Xylotrechus undulatus* and *Stictoleptura c. canadensis* are encountered more frequently on *Pinus* or *Picea* than on *Tsuga.* Thus the major sources of potential host material in the Huron Mountains are trees that are used but not preferred by some borers and not acceptable at all to many others. Most cerambycids rely on host species that, although found throughout the area, are generally present as irregularly dispersed individuals and common in only a few stands if at all. Although the Huron Mountains support impressive forests, much of the study area is of limited value as habitat for cerambycids. The diversity of the fauna reflects similar diversity in the forest communities; the seemingly small borer populations suggest difficulty in obtaining the resources they require.

PHENOLOGY

Observations on the phenology of the cerambycid community were limited to the period from mid-June to mid-August. Occasional adults are present in early June but activity is sporadic; daily air-temperature maximums in the area do not average 20°C until mid-June. By mid-August all the cerambycid populations seem to have passed their peak adult-activity period.

Based on the 48 species regarded as common or frequent in the study area, the cerambycid adult populations can be grouped in three cohorts with regard to their phenology:

I. early season species emerging in mid-June and present until late June (e.g., *Microclytus compressicollis*) or early July (e.g., *Rhagium inquisitor*);
II. mid-season species emerging in late-June and early July and present until mid-July (e.g., *Stenocorus vittiger*), or late July or early August (e.g., *Monochamus notatus*);
III. late-season species emerging in mid-July (e.g., *Lepturopsis biforis*) or late July (e.g., *Typocerus sparsus*) and present until mid-August or later.

The mid-season cohort is by far the largest, including 33 (69%) of the 48 species; late-season is the smallest with only six (12%) species.

Year-to-year variation in weather only seems to affect this pattern with regard to the activity of the early-season species. By the end of June, and the emergence of the mid-season cohort, differences between an "early" or "late" season are not evident. The proximity of Lake Superior influences the phenology of flowering plants in the study area; e.g., *Prunus virginiana* and *Cornus rugosa* growing 1 km from the lake shore may bloom 5–10 days later than the same species growing 1 km farther inland. What effect this phenomenon has on the cerambycid populations was not determined.

BIOGEOGRAPHY

The Huron Mountains provide an opportunity for studies of numerous plant and animal species at the extreme limits of their distributions, and there are several such cerambycid

populations. Some (e.g., *Spondylis upiformis*) are western or Rocky Mountain species that reach their easternmost limits in the Upper Peninsula; others (e.g., *Sachalinobia r. rugipennis*) are at the western extreme of their range. The two new state records from this study, *Ropalopus sanguinicollis* and *Callidium schotti*, are eastern species of this latter type. New records for the Upper Peninsula provided northward extensions of the known ranges of several species previously regarded as limited to the Southern Lower Peninsula of Michigan. Other, boreal species here reach their southernmost distribution limits.

The populations of these borers at their range-extremes are typically low density, and it is tempting to regard some of them as potentially locally endangered species. Undoubtedly some of these populations would be sensitive to disturbance, but only one apparently endangered cerambycid species was noted in the area. *Physocnemum brevilineum* has the unusual habit, for a cerambycid, of breeding in the bark of living American elm, *Ulmus americana*, and only mature trees have sufficiently thick bark for the purpose. Before the recent arrival of Dutch elm disease in the area, elm was a dominant hardwood species in the floodplain forest, and there was also a large stand of mature elms south of Ives Lake. All the mature trees on the floodplain have died and only a half-dozen of those at Ives Lake remain alive. The surviving large trees, however, still support a population of *P. brevilineum*. Observations on trees dying during the course of this investigation indicated that the borers can continue to utilize elms only until the bark begins to loosen, a year or two after their death. Most of the surviving trees already show signs of disease and it seems likely the remaining microhabitat required by *P. brevilineum* will soon be further reduced or eliminated altogether. Undoubtedly this borer was locally common here until recently, but its continued survival seems in doubt. The other cerambycid species dependent upon elm as a host plant are probably not so severely threatened as they can utilize the younger trees which persist in the area.

Opportunities for ecological investigations in relatively undisturbed forest communities are rare in the Great Lakes region. The Huron Mountain Wildlife Foundation, through its operation of the Ives Lake Research Center, provides an ideal situation for such research. Further studies of forest insects to be conducted in the Huron Mountains will undoubtedly add to the knowledge of the cerambycid community obtained through this survey.

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LITERATURE CITED

Andrews, A. W. 1929. List of some of the insects found at Huron Mountain. pp. 116–152 *in* B. H. Christy (ed.). The book of Huron Mountain. Lakeside Press, Chicago.

Gardiner, L. M. 1970. Biological notes on some Nearctic Lepturinae (Coleoptera: Cerambycidae). Pan-Pacific Entomol. 46:284–288.

Gosling, D. C. L. 1978. Observations on the biology of the oak twig pruner, *Elaphidionoides parallelus*, (Coleoptera: Cerambycidae) in Michigan. Great Lakes Entomol. 11:1–10.

_____. 1984. Cerambycid host plants in a southwestern Michigan woodland (Coleoptera: Cerambycidae). Great Lakes Entomol. 17:69–78.

_____. 1985. Host plant for *Brachyleptura champlaini* (Coleoptera: Cerambycidae). Great Lakes Entomol. 18:169.

Gosling, D. C. L., and N. M. Gosling. 1977. An annotated list of the Cerambycidae of Michigan (Coleoptera) Part II, the subfamilies Lepturinae and Lamiinae. Great Lakes Entomol. 10:1–37.

Knull, Josef N. 1946. The long-horned beetles of Ohio (Coleoptera: Cerambycidae). Ohio Biol. Surv. Bull. 39. 7:133–354.

Linsley, E. Gorton. 1962. The Cerambycidae of North America Part II. Taxonomy and classification of the Parandrinae, Prioninae, Spondylinae, and Aseminae. Univ. California Publ. Entomol. 19:1–102.

_____. 1963. The Cerambycidae of North America Part IV. Taxonomy and classification of the subfamily Cerambycinae, tribes Elaphidionini through Rhinotragini. Univ. California Publ. Entomol. 21:1–165.

_____. 1964. The Cerambycidae of North America Part V. Taxonomy and classification of the subfamily Cerambycinae, tribes Callichromini through Ancylocerini. Univ. California Publ. Entomol. 22:1–197.

Linsley, E. Gorton, and John A. Chemsak. 1972. Cerambycidae of North America Part VI, No. 1. Taxonomy and classification of the subfamily Lepturinae. Univ. California Publ. Entomol. 69:1–138.

_____. 1976. Cerambycidae of North America Part VI, No. 2: Taxonomy and classification of the subfamily Lepturinae. Univ. California Publ. Entomol. 80:1–186.

_____. 1984. The Cerambycidae of North America, Part VII, No. 1: Taxonomy and classification of the subfamily Lamiinae, tribes Parmenini through Acanthoderini. Univ. California Publ. Entomol. 102:1–258.

Wells, James R., and Paul W. Thompson. [1976]. Vegetation and flora of the Huron Mountains. Occas. Papers Huron. Mt. Wildlife Found. 3:1–59.