

THIS FILE COPY MUST BE RETURNED

Not for publication

TO: INFORMATION SECTION  
NORTHERN FOREST RESEARCH CENTRE  
5320 - 122 STREET  
EDMONTON, ALBERTA  
T6H 3S5



**LIFE HISTORIES OF SAPERDA CONCOLOR LEC.  
AND SAPERDA POPULNEA MOESTA LEC.  
IN MANITOBA AND SASKATCHEWAN  
(COLEOPTERA: CERAMBYCIDAE)**

by  
H. R. Wong, B. B. McLeod  
and J. C. E. Melvin

**FOREST RESEARCH LABORATORY  
WINNIPEG, MANITOBA  
INTERNAL REPORT MS-34**

**DEPARTMENT OF FORESTRY  
JUNE, 1966**

LIFE HISTORIES of Saperda concolor Lec. and Saperda populnea moesta Lec.  
in Manitoba and Saskatchewan. (Coleoptera: Cerambycidae)

H.R. Wong B.B. McLeod J.C.E. Melvin

INTRODUCTION

The close resemblance of Saperda concolor Lec. and S. populnea moesta Lec. in the adult (Felt and Joutel, 1904) and larval (Craighead, 1923) stages may have contributed to reports that both species attack poplars and willows. A study of insect-produced galls by Wong and McLeod (1965) in Manitoba and Saskatchewan revealed that both species are apparently host-specific in this region. The former was recorded mainly from Salix spp. and only rarely from reproduction Populus tremuloides Michx.; the latter mainly from Populus balsamifera L. and never from Salix spp. Further differences between these two species were noted in the life history and the galls they produce.

METHODS

Seasonal development and gall formation were noted by caging fresh oviposition scars of each species in the field. Information on larval activity, parasites and predators were obtained by collecting galls in the fall, which formed around oviposition scars made by each species the previous year. The galls were removed from the trees in late fall and stored in poly bags at 34°C in the laboratory. They were taken from cold storage after three months and placed in separate rearing jars for adult emergence.

Saperda concolor Lec.

LIFE HISTORY AND DAMAGE

The female gouges U-shaped egg scars (about 5 mm by 3 mm) with her mandibles in the smooth bark of willow stems or branches that are three or more years old, (Fig. 2). A single creamy-white egg (averaging 3.2 mm by 0.8 mm) is forced up under the damaged bark through a hole at the base of the scar. Single or more than six egg scars are rare, three being the average number present around a stem.

The larvae hatch in about two weeks and feed on the outer sapwood and inner bark tissues before entering the heartwood. The larval gallery running parallel to the wood grain may extend above or below the egg scar for about two inches by the end of the first season. The larva passes the winter behind a fibrous plug, which may be constructed at any point along the gallery. The plug is ejected next spring through an enlarged hole under the egg scar. The frass and debris produced by the larva in enlarging and extending the gallery are discarded in the same manner. The larva over-winters the second year behind another fibrous plug constructed in the autumn in a pupal cell close to the bark. Pupation occurs the following spring and the newly formed adult chews its way out through a round hole in the wood.

Radial growth of the stem is present only in areas where oviposition and early larval feeding have not destroyed the cambium. The gall produced is one with alternating ridges and depressions (Fig. 3), measuring up to four inches in length and frequently twice the diameter of the stem. In heavily infested stems the galls are contiguous and the individual ones are not readily discernible (Fig. 4). Infested stems are weakened and subject to wind breakage (Fig. 5). Damage to the stem may also occur by woodpeckers searching for larvae in the galls.

#### HOST AND DISTRIBUTION

Although S. concolor has been referred to as the poplar-gall Saperda by Craighead (1949), it prefers willow and will only occasionally attack reproduction trembling aspen in Manitoba and Saskatchewan. This species has been reared from galls on the following: Salix amygdoloides Anderess., Salix hebbiana Sarg., Salix discolor Mulh., Salix humulis March., Salix interior Rowlee., Salix petiolaris Smith, and Salix petiolaris var. rosmarinoides Anderess. Schneid. It has been collected throughout the range of trembling aspen and willow in the two provinces (Fig. 1).

#### MORTALITY FACTORS

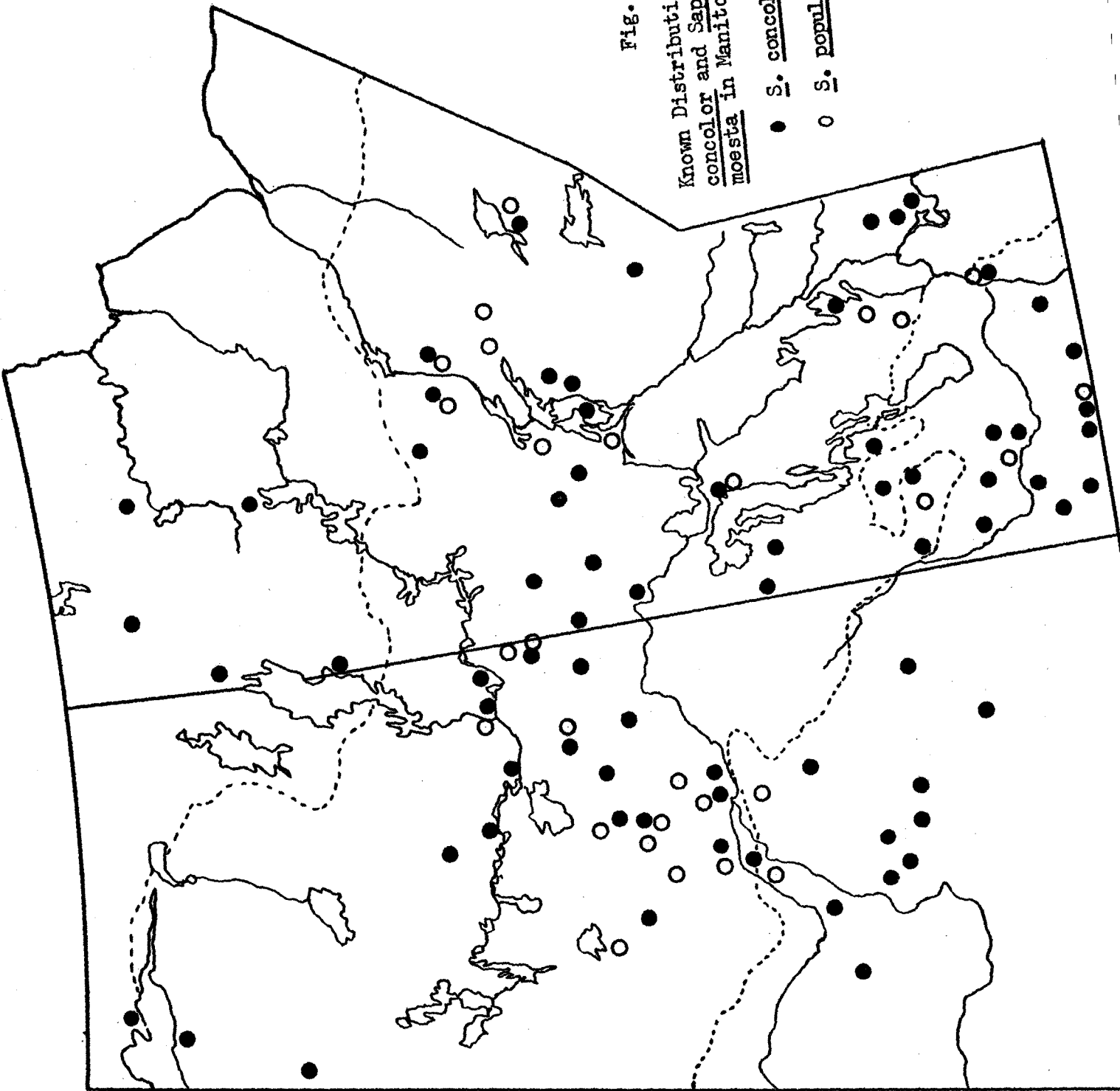
The following ten species of parasites have been reared from the larvae of S. concolor:

<u>ORDER</u>	<u>FAMILY</u>	<u>SPECIES</u>
Hymenoptera	Ichneumonidae	<u>Cubucephalus contactus</u> Tow. & Gupta
		<u>Cubucephalus prolixus</u> Tow.
		<u>Dolichomitus messor perlongus</u> (Gr.)
		<u>Dolichomitus populneus</u> (Ratz.)
		<u>Dolichomitus</u> sp. nr. <u>messor</u> (Gr.)
		<u>Xylophrurus bicolor bicolor</u> (Cush.)
	Braconidae	<u>Bracon</u> n. sp.
		<u>Meteorus</u> n. sp.
		<u>Meteorus tibialis</u> Mues.
Diptera	Oдиниidae	<u>Odinia boletina</u> (Zett.)

Fig. 1

Known Distribution of Saperda  
concolor and Saperda populnea  
moesta in Manitoba and Saskatchewan.

- S. concolor
- S. populnea moesta



Avian predation of the larvae of S. concolor is common throughout Manitoba and Saskatchewan. A woodpecker, tentatively identified as the black-backed three-toed woodpecker, Picoides arcticus (Buckner per comm.) appears to be the principal predator.

The dissection of mature galls collected at random indicate heavy mortality of first year larvae, with less than a third of the original population apparently surviving (Table I). Avian predation was most evident during the winter of the second year.

#### ASSOCIATED INSECTS

A number of insects were associated with the galls of this insect. Larvae of the clear wing moth, Synanthedon bolteri (Ny. and Edwards) were observed occasionally feeding on the cambium and outer sapwood. Both one- and two-year-old galls of S. concolor were infested with S. bolteri, which completes its life history in one year. The larva of the clear wing moth however, was never observed in the same egg scar as the beetle larva.

Several species of sawflies and spiders were found overwintering in the empty galls. The weakened and dead stems killed by S. concolor were infested by the following beetles: Hyperplatys aspersa (Say), Pogonocherus parvulus Lec., Sacium lugubre Lec., and Laemophloeus adustus Lec.

#### Saperia populnea moesta Lec.

#### LIFE HISTORY AND DAMAGE

Although the adults of S. populnea moesta emerge about a week earlier than S. concolor, the life histories of the two species are similar (Table II). Oviposition is on open-growing reproduction balsam poplar. The female selects the smooth bark of one-, two-, and occasionally three-year old stems or branches to make a single U-shaped egg scar with her mandibles. A single egg is forced up under the damaged bark through a small hole at the base of the scar (Fig. 6). The young larva feeds initially on the cambium before entering the heartwood. It proceeds for a short distance into the heartwood before reversing its direction, generally downward, following the grain of the wood to a point just beyond the egg scar.

The gall produced is slightly flattened in shape, about 30 mm long and about 12 mm wide. The formation of the gall alters the original shape of the egg scar from a U-shape appearance to one with a narrow slit at a slight angle to the main axis. Unlike S. concolor, all larval activity of S. populnea moesta is confined within the gall (Fig. 7). Windbreakage of the stem or branch about the gall of this species is greater due to smaller twigs attacked.









TABLE I

Dissections of mature galls of S. concolor and S. populnea moesta collected at random in the late fall of the second year.

Species	No. of galls dissected	No. of egg scars	No. of living larvae	MORTALITY				Miscellaneous
				Egg Stage	No. of diseased larvae	No. of larvae parasitized	No. of larvae killed by avian predation	
<u>Saperda concolor</u>	158	461	145	119	77	35	20	65
<u>Saperda populnea moesta</u>	168	168	47	45	24	10	14	28

TABLE II

Seasonal Cycle of S. concolor and S. moesta

	May	June	July	Aug	Sept	May	June	July	Aug	Sept	May	June	July	Aug	Sept
Egg															
Larva															
Pupa															
Adult															



S. concolor



S. moesta

## MORTALITY FACTORS

The following eight species of parasites were recovered from larvae of S. populnea moesta:

<u>ORDER</u>	<u>FAMILY</u>	<u>SPECIES</u>
Hymenoptera	Ichneumonidae	<u>Dolichomitus messor perlongus</u> (Cr.)
		<u>Dolichomitus populneus</u> (Ratz.)
		<u>Exeristes</u> sp.
		<u>Xylophrurus bicolor bicolor</u> (Cush.)
	Braconidae	<u>Bracon</u> n. sp.
Diptera	Odiinidae	<u>Odiinia boletina</u> (Zett.)
	Tachinidae	<u>Eutheresia</u> sp. <u>Lixophaga plumbea</u> Ald.

A small woodpecker, tentatively identified as the downy woodpecker, Dendrocopus pubescens, (Buckner per comm.) appears to be the main avian predator. The greatest predation appears to be on mature larvae during the winter. Only galls covered by snow were observed to be relatively free of predation. Mortality to first year larvae, like the preceding species is likewise high (Table I).

## ASSOCIATED INSECTS

Only spiders have been observed to date in the abandoned galleries of this species.

## DISCUSSION

In addition to the similarity in the life history, these two borers share the following parasites: Odiinia boletina (Zett.), Dolichomitus messor perlongus (Cr.), Dolichomitus populneus (Ratz.), Xylophrurus bicolor bicolor (Cush.) and Bracon n. sp. These two borers can be separated in the field by Table III:



## REFERENCES

- Felt, E.P. and L.H. Joutel. 1904. Monograph of the Genus Saperda. New York Museum. 74:1-86.
- Craighead, F.C. 1923. North American Cerambycid Larvae. A Classification and the Biology of North American Cerambycid Larvae. Canada Dept. Agr. Ent. Branch Bul 27, 238 pp.
- Wong, H.R. and B.B. McLeod. 1965. Two Species of Gall-Producing Saperda in Manitoba and Saskatchewan. Bi-Monthly Progress Report. Canada Dept. of Forestry. 21(6):3.



Fig. 2



Fig. 5

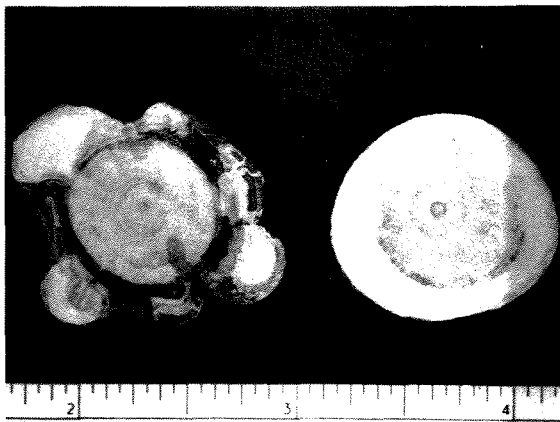


Fig. 3



Fig. 6

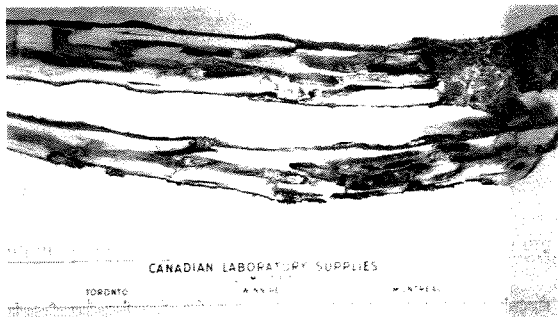


Fig. 4

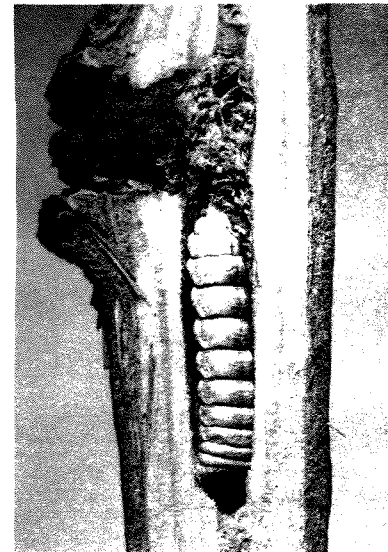


Fig. 7