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CERAMBYCID BEETLES DEVELOPING ON THE WILLOW, SALIX ALBA IN KÖRTVÉLYES

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Abstract

Survey of Cerambycid beetles developing on willow *(Salix alba)* was taken in the flood plain of Körtvélyes between 1974 and 1980. Determination of the species using *S. alba* as host plant was taken by rearing. Some species developing for more than one year were identified as larvae. In the case of monophagous species and pests, data collected from food plants were sufficient. 25 Cerambycidae developing on *S. alba* were found at Körtvélyes. The majority (84%) of the species developed in fallen branches and twigs. Though xylophagous cerambycids were safe of inundation in their critical larval and pupal stages this protection was not absolute. Especially the species developing in brush-wood for more than one year and the flightless Cerambycidae were often killed by floods (8 and 4%, respectively). *S. alba* plant chemicals can prevent the development of certain species. In consequence, a large, homogenous stand would protect planted forests as well.

Introduction

When founding population, a coleopteran (in our case a cerambycid beetle) in a given territory depends on several interacting factors.

For monophagous species (or nearly monophagous one) the most important factor is the presence of its host plant.

Salix communities were dominant in Csongrád county along the river Tisza — so in Körtvélyes as well — until the river's regulation. The only larger forests in our country — mentioned by M. BÉL (1732b) — were the willows of the Tisza flood plain. Areas near to the sea level, covered by water, supported larde reedbeds. According to his descriptions, in the neighbouring Csanád county the oak forests dominated though they were considered as planted (BÉL 1732a).

In the abovementioned years the valley of the river Maros was mostly covered by forests up to the foothills of Carpathians. This is proved by the 1. military mapping survey taken under the reign of King JOSEPH II (1783—84), and by ZAKARIAS JOHANN Sax's map of 1787.

These maps showed wetlands with a very limited number of trees along the Tisza south of the mouth of the river Kőrös. The same is characteristic for the hydrological- and forestry conditions along the middle and lower course of the Tisza, according to UHERKOVICH's division (1971). In spite of the modifyinf effect to the regulation, the difference between the two territories still exist. While *Salicetum albae-fragilis* and *Salicetum triandrae* communities, together with their different facieses and non-natural consociations, are dominant along the Tisza flood plain in Csongrád county (Timár 1953, Bodrogközy 1966). The same is characteristic for the gallery woods along the Maros up to the 35. river kilometer only.

This homogenous forest stand caused that the question of food plants was worth serious consideration also for oligophagous and polyphagous species. Almost all the entomologists working in Szeged were interested in the modifying effect of the floods originating from two factors: the immigration and the selective factors. In the following only the data of xylophagous components of the entomofauna are to be mentioned.

1. Immigration

(a) species gain by floods

According to Csiki (1906) "a great many species living in the mountains are carried by the floods of rivers Tisza and Maros". Stiller (1926, 1939) also stated that many coleopterans were carried by the floods to our country adding that "these passively imported strangers" could not establish themselves (Stiller 1939).

The possibility of drifting is supported by Erdős (1935) in the case of the river Maros. He hypothesized that the river Tisza had no fundamental importance in this respect, its waterflow being slow and having a long path trhough the lowland where its deposit could be layed. He considered beetles developing in wood to be relatively protected from floods.

As a summary, we can state that each year a great number of coleopterans are drifted by rivers (especially by the Maros) to our county. This can be considered as a special way of immigration. Neither Erdős (1935) nor I have found xylophagous cerambycid beetles in the flood deposits. This is logical for the species able to fly. Fluctuating numbers of *Dorcadion* species were found during the spring floods.

A better possibility of passive immigration can be provided by rafts or floating timbers. Probably this was the way by which *Tetropium castaneum* (L.) reached the mouth of Maros (Vánky—Vellay 1894), though it could not establish itself. Considering the flood plain conditions, even the establishment of some flightless xylophagous cerambycids drifted ashore should be impossible.

(b) species gain by other means

In the valley of the Maros even the possibility of being drifted by water is not a necessary condition.

Its flood plain has a special microclimate (Andó 1969). Some xylophagous species can reach the county via the gallery wood habitat islands. The "green stripe" from the Transsylvanian forests to the valley of Tisza would help them. This way specimens of oligophagous and polyphagous species inhibitants of small branches, twigs and sticks would immigrate.

At Körtvélyes the Kőrös river can increase the numbers transported this way but, unfortunately, there are no data available. Settlements along the rivers may act as importing centres. Many cerambycid beetles are imported by firewood and orchards and vineyards provide also possibility for population foundation. For example, Bodnár (1939) mentioned that *Phytomatodes fasciatus* (Vill.) was abundant near the Tisza at Hódmezővásárhely and the neighbouring orchards.

2. Selection

Though xylophagous longhorned beetles are protected from floods in their critical larval and pupal stages, this protection is not complete. The problem will be discussed under the Results section. The food specialization is of importance at the population level (GILJAROV 1954). The plant chemicals in general, will prevent the development in many phytophagous insect species (JERMY 1972) so it can be stated that the *S. alba* plant chemicals play a selective role. In consequence, a large amd homogenous stand of *S. alba* would protect the neigbouring forests, too.

Material and Method

As a consequence of the bionomics of most Ceramybcidae, the main sampling methods in the faunal inventories is the hand picking. In xylophagous species the examination of trunks and heaps is the most useful collecting method (MEDVEGY 1979).

Especially in brush-wood heaps stored for the purposes of Flood Preventing Service develop many, otherwise rare longhorned beetles. In 1934 Stiller collected a new species *Molorchus salicicola,* probably from these heaps. Describing the bionomics of the species he mentioned (STILLER 1935) that brush-wood haeps were favourite collecting sites. He was the first to mention Cerambycidae developing on *S. alba* at the surroundings of Szeged and these were: *Megopis scabricornis* (SCOP), *Strangalia quadrifasciata* (L.) (STILLER 1926), *Molorchus salicicola* (STILLER) (STILLER 1934, 1935, 1939), *Rhopalus macropus* (GERM.), *Chlytus arietis* (L.) (STILLER 1935).

The final proof concerning the food plants can, with rare exceptions, be obtained by rearing. I carried out rearings in the traditional way.

Under natural circumstances many xylophagous species can be collected only on flowers. Quadrat sampling is useless because of their preference towards certain plant species and sweep netting results are fluctuating both quantitatively and qualitatively. So all the flowering plants must be examined. This way some species not strictly flower-visiting could also be collected. Among these, I have found *Obrium cantharinum* (L.) (6 specimens), *Rhopalopus clavipes* (FABR.) (3 specimens), *R. macropus* (GERM.) (2 specimens) and *Exocentrus punctipennis* (MULS.) (8 specimens) on different flowers. *Aromia moschata* is also often found on flowers but rather as "resting" there than as real flower-visiting species. An interesting phenomenon was observed in *Phymatodes puncticollis* (MULS.) and *Obrium cantharinum.* In cloudy weathers with high air pressure the adults prefer to stay and copulate on different green plants covering the lower parts of the brushwood heaps stored outdoors. In 1975, three brush-wood heaps infected with *Oberea oculata* (L.) were found in New-Szeged. Two small saplings of white poplar grew 5—6 meters from the central heap where I collected almost all the freshly developed, flying adults. The same preference towards the green cover is characteristic for *A. moschata.* Under laboratory circumstances, in choice experiments the same results were obtained.

Sampling of the study site was carried out between 1974 and 1980.

Results

The present paper deals with the data of Cerambycidae developing on *S. alba* reared from samples taken in Körtvélyes or collected there. I compared these data with two other samplings to find whether the abovementioned mechanisms of species range expansion were real ones or not. Data from the Vetyehát flood plain contained beetles collected on willow only while those from the forest belt near the dike around Szeged contained material collected on other tree species because the willow did not occur in the belt (Table 1).

When attepmting to find the host palnt species, rearing should be the final proof.

In some species which develop for more than one year, rearing is too dificult. Here the didentification was performed in their larval stage. For monophagous (or nearly monophagous) species and some pest species rearing was not always necessary. I have found 6 such species in the Körtvélyes samples and considered them as developing on *S. alba* though no proof from rearings was obtained (Table 2).

When considering the importance of cerambycid beetles as forest pests, the exact position where tehir development takes place must be identified. This "niche" does not always coincide with those obtained in other host plants because of the inhibitory effect of the plant chemicals in *S. alba* (Table 3).

Table 1. *The abundance classes for Cerambycidae developing on the willow S. alba at Körtvélyes and at two control sites*

+ + + common   + + fairly abundant   + rare   – lacking

Species	Körtvélyes	Vetyehát flood plain of the Maros	forest belt at the dike round Szeged
Megopis scabricornis (SCOPOLI 1763)	+ +	+ +	+ + +
Leptura livida (FABRICIUS 1776) ssp. *pecta* (K. J. DAN.)	+ + +	+ + +	+ + +
Strangalia quadrifasciata (LINNÉ 1758)	+ +	+ +	+ + +
Gracilia minuta (FABRICIUS 1780)	+	+	+
Obrium cantharinum (LINNÉ 1767)	+ +	+ + +	+
Nathrius brevipennis (MULSANT 1839)	+	+	+
Stenopterus flavicornis (KÜSTER 1846)	+ + +	+ + +	+ + +
Molorchus salicicola (STILLER 1934)	+ + +	+ + +	+
Aromia moschata (LÍNNÉ 1758)	+ + +	+ + +	+ + +
Rhopalopus clavipes (FABRICIUS 1775)	+ + +	+ + +	+
Rhopalopus macropus (GERMAR 1824)	+ + +	+ + +	+ + +
Phymatodes testaceus (LINNÉ 1758)	+ + +	+ + +	+ + +
Phytamodes puncticollis (MULSANT 1862)	+ +	+ + +	–
Phymatodes fasciatus (VILLERS 1789)	+	+	+
Xylotrechus rusticus (LINNÉ 1758)	+ + +	+ + +	+ + +
Chlytus arietis (LINNÉ 1758)	+ + +	+ + +	+ +
Chlorophorus varius (O. F. MÜLLER 1766)	+ + +	+ + +	+ + +
Chlorophorus sartor (FABRICIUS 1781)	+ + +	+ + +	+ + +
Lamia textor (LINNÉ 1758)	+	+	+
Liopus nebulosus (LINNÉ 1758)	+ +	+ +	+ +
Exocentrus punctipennis (MULSANT 1856)	+ + +	+ + +	+ + +
Mesosa nebulosa (FABRICIUS 1781)	+	+	+
Anaesthetis testacea (FABRICIUS 1781)	+ +	+ + +	+
Oberea oculata (LINNÉ 1758)	+ +	+ + +	+
Tetrops praeusta (LINNÉ 1758)	+ + +	+ + +	+ +

Table 2. *Rearing and sampling data for the cerambycid species found at Körtvélyes*

? not known ! new data

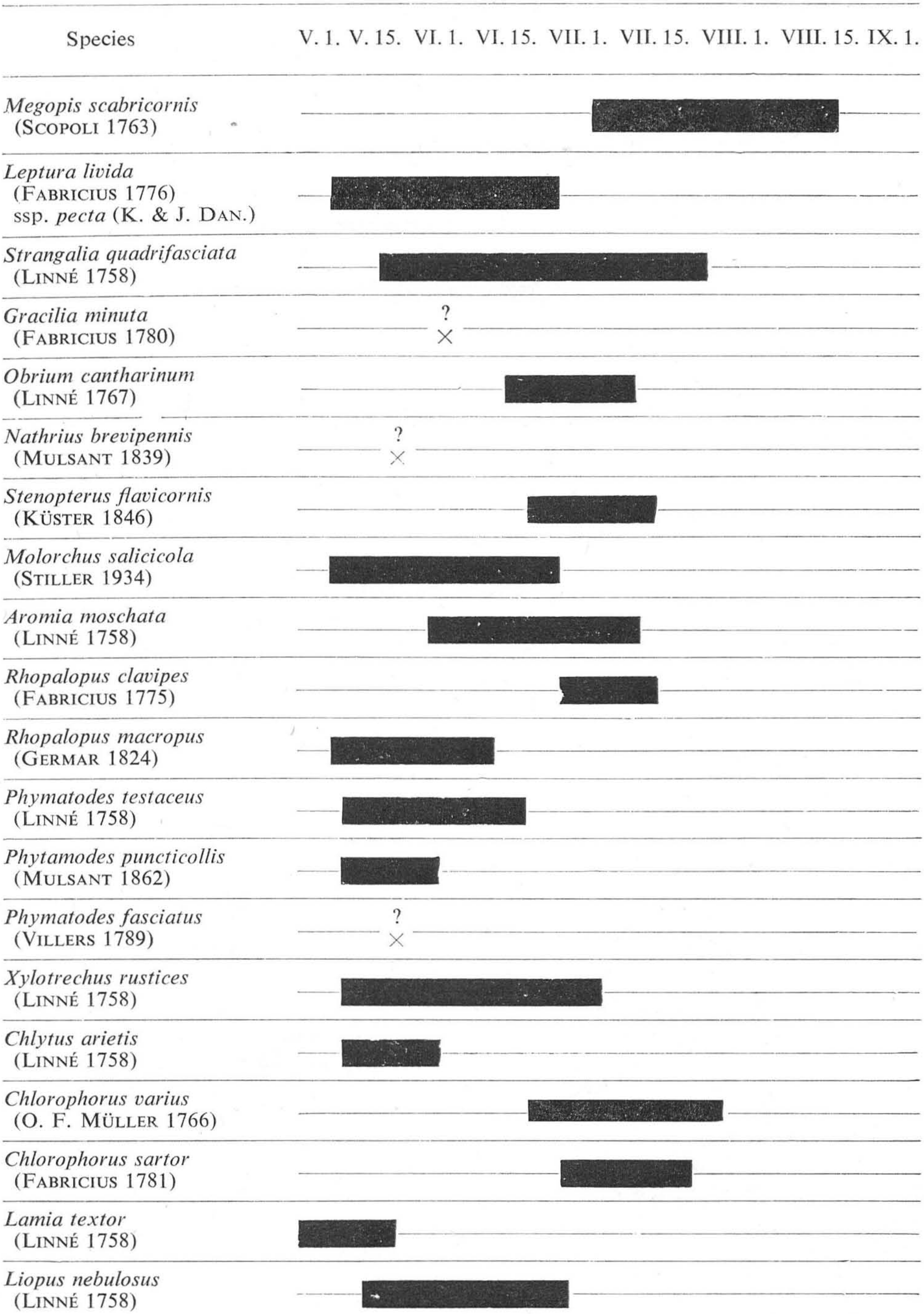
Species	Reared	Identified as larva	Collected from host plant	Attracted to flowers
Megopis scabricornis (SCOPOLI 1763)	–	+	+	–
Leptura livida (FABRICIUS 1776) ssp. *pecta* (K. J. DAN.)	+!	–	–	+
Strangalia quadrifasciata (LINNÉ 1758)	+	–	–	+
Gracilia minuta (FABRICIUS 1780)	–	–	+	?
Obrium cantharinum (LINNÉ 1767)	+	–	+	–
Nathrius brevipennis (MULSANT 1839)	–	–	+	?
Stenopterus flavicornis (KÜSTER 1846)	+!	–	–	+
Molorchus salicicola (STILLER 1934)	+	–	+	–!
Aromia moschata (LINNÉ 1758)	–	–	+	–
Rhopalopus clavipes (FABRICIUS 1775)	+	–	+	–
Rhopalopus macropus (GERMAR 1824)	+!	–	+	–
Phymatodes testaceus (LINNÉ 1758)	+	+	+	–
Phymatodes puncticollis (MULSANT 1862)	+!	–	+!	–!
Phymatodes fasciatus (VILLERS 1789)	+!	–	+	?
Xylotrechus rusticus (LINNÉ 1758)	+	+	+	–
Chlytus arietis (LINNÉ 1758)	+	–	+	+
Chlorophorus varius (O. F. MÜLLER 1766)	+!	–	–	+
Chlorophorus sartor (FABRICIUS 1781)	+!	–	–	+
Lamia textor (LINNÉ 1758)	–	–	+	–
Liopus nebulosus (LINNÉ 1758)	+!	–	+	–
Exocentrus punctipennis (MULSANT 1856)	+!	–	+	–
Mesosa nebulosa (FABRICIUS 1781)	+	–	+	?
Anaesthetis testacea (FABRICIUS 1781)	+	–	+	–
Oberea oculata (LINNÉ 1758)	–	–	+	–
Tetrops praeusta (LINNÉ 1758)	+!	–	+	–

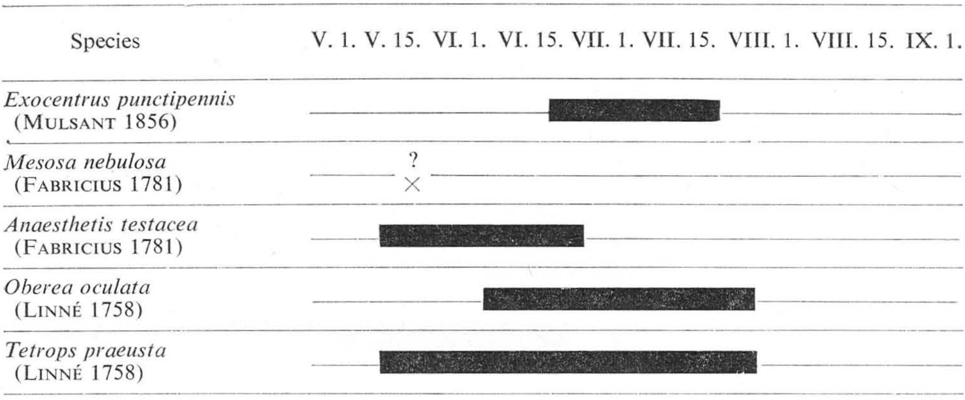
Table 3. *Within-tree sites for cerambycid species in willow*

\+ + trunk (diameter exceeds lo cm) + branch (diameter less than lo cm)
? not known ! new data

Species	In decaying wood	In living tree parts	In brush-wood heaps and trunks stored otu-doors for less than 2 years	In brush-wood and trunks with bark, otu-doors for more than 2 years
Megopis scabricornis (SCOPOLI 1763)	+ +	–	–	–
Leptura livida (FABRICIUS 1776) ssp. *pecta* (K. J. DAN.	–	–	–	+ !
Strangalia quadrifasciata (LINNÉ 1758)	+ +	–	–	–
Gracilia minuta (FABRICIUS 1780)	–	–	?	–
Obrium cantharinum (LINNÉ 1767)	–	–	+	+
Nathrius brevipennis (MULSANT 1839)	–	–	?	–
Stenopterus flavicornis (KÜSTER 1846)	–	–	–	+ !
Molorchus salicicola (STILLER 1934)	–	–	–	+ !
Aromia moschata (LINNÉ 1758)	–	+ +	–	–
Rhopalopus clavipes (FABRICIUS 1775)	–	–	–	+
Rhopalopus macropus (GERMAR 1824)	–	–	–	+
Phymatodes testaceus (LINNÉ 1758)	–	–	+	+ !
Phymatodes puncticollis (MULSANT 1862)	–	–	–	+ !
Phymatodes fasciatus (VILLERS 1789)	–	–	–	+ !
Xylotrechus rusticus (LINNÉ 1758)	–	–	+ +	–
Chlytus arietis (LINNÉ 1758)	–	–	+	–
Chlorophorus varius (O. F. MÜLLER 1766)	–	–	–	+ !
Chlorophorus sartor (FABRICIUS 1781)	–	–	–	+ !
Lamia textor (LINNÉ 1758)	–	+	–	–
Liopus nebulosus (LINNÉ 1758)	–	–	+	+
Exocentrus punctipennis (MULSANT 1856)	–	–	–	+
Mesosa nebulosa (FABRICIUS 1781)	–	–	–	+
Anaesthetis testacea (FABRICIUS 1781)	–	–	+	+
Oberea oculata (LINNÉ 1758)	–	+	–	–
Tetrops praeusta (LINNÉ 1758)	–	–	+	–

Table 4. *The appearance of adults in cerambycid species found at Körtvélyes*





I was able to contruct a model of swarming based on the data of the period 1974—1980. Swarming time of species developing in brush-woods and which were not attracted to flowers was studied observing brush-wood heaps, the only place of their mass appearance. After being exposed to outdoor conditions, the water content of the brush-woods depends on precipitation. The other key factor in development is the effective heat sum (BÁLINT 1957, GYŐRFI 1957) which also depends on the weather. So the actual patterns might be different from the average figure obtained (Table 4).

Data from the literature (PLAVILTSCHIKOV 1936, 1940, 1958, HEYROVSKY 1955, DEMELT 1966, KASZAB 1971) point to the possibility that some other cerambycid species collected at Körtvélyes develop also on *S. alba*. These species are: *Cerambyx scopolii* (FÜESSL.), *Palgionotus arcutatus* (L.), *Saperda carcharias* (L.) and *S. populnea* (L.).

Leptura livida (FABR.) ssp. *pecta* (K. and J. DAN.) and *Chlorophorus varius* (O. F. MÜLL.) are elements of the foreststeppe fauna (GASKÓ 1979).

Discussion

Most cerambycid beetles species developing on *S. alba* use the brush-wood of the willow 16% of all species (4 species) were reated from flood preventing brush-wood heaps stored outdoors for notm more than 2 years; 2 species (8%) were collected here, too, though I did not manage to rear them. 4 species (16%) were equally abundant in fresh and older brush-wood heaps. 11 species (44%) were obtained from bush-wood older than two years still having its bark. The time period during which the rearing lasted was not included in the calculation of the brush-wood age.

Lamia textor (L.), the only flightless cerambycid beetle species of Körtvélyes was very rare. *A. moschata* invaded living trunks. The *Xylotrechus rusticus* (L.) usually developed in freshly cut or still standing but decaying trunks of *S. alba*. Only a few cerambycid species (2 species) developed in dead trunks or decaying woods. Their numbers were also small. Their share in the community was much less than in a usual forest in the southren lowland (i.e. Mezőhegyes or Ásotthalom).

It is worth mentioning than in the case of species assemblages developing in trees of planted flood plain forests, the life form relations were similar. This was interesting as these cerambycid species had no brush-wood habitats safe from floods as their relatives developing on *S. alba*. It should be mentioned, however, that the twigs in question were mostly safe from inundation.

So it can be stated that especially the species developing for more than one year, the species living in trunks and the flightless species suffered most from the inundations. Their suffered semaphoronts could not stand inundation for long because the wood in which they develop had a greater permeability.

The most sensitive were the non-diapauzing larval stages. It was also important that the young larvae of most species developing in the trunk and for more than one year, were usually found in the bark or just under the bark.

The spring flood coinciding with the swarming time or just preceding it restricted the egg-laying. Since 1970 there were no 2—3 year periods during which development could take place undisturbed. Consequently, even species of flood plain were abundant only occasionally (after some years without inundation) and sporadically (near decaying trunks with hihger stems). When trees were available otuside the dikes, flood plain cerambycid populations often invaded them. The opposite was observed after the floods. I have found that *Megopis scabricornis* (SCOP.) was a polyphagous, *Strangalia quadrifasciata* was an oligophagous species even on population level. The effect of high water level could best be demonstrated by the population decrease of *Saperda carcharias* (L.), a species developing in living trees.

Among the rarest species I should mention *Molorchus salicicola* (STILLER) and *Phymatodes puncticollis* (MULS.).

Fig. 1. *Molorchus salicicola* (STILLER) male.

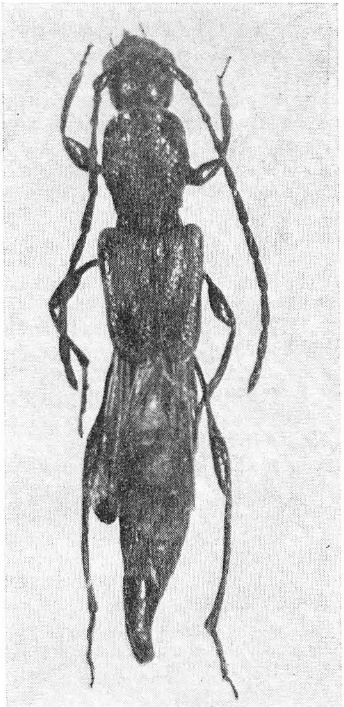


Fig. 2. *Molorchus salicicola* (STILLER) female.

M. salicicola has only been found in the Carpathian Basin. Localities and collectors were: Újszeged, Szeged, Stiller; Bátorliget, KASZAB and SZÉKESSY (1 specimen). I have found the species at Makó, Vetyehát, Szeged-Tápé, Körtvélyes, Mártély, Bokros and Ásotthalom. There was a characteristic sexual dimorphism in the species (on Fig. 1 the male, Fig. 2 the female is shown). *P. puncticollis* had been a parenthetical species before 1974. I found 4 samples collected in the Carpathians and the Carpathian Basin at the Zoological Collection of the Museum of Natural History, Budapest. Their data: Mehádia, collected by PÁVEL; Croatia, WACHSMANN; Ludberg, Apfelbeck; Croatia, Streda. I collected the first greater series of this species in Vetyehát, 5 May 1974 and I have found it at Makó, Körtvélyes, Sasér and Bokros. This ponto-mediterran species should expanding its range; I have found it in some places in great numbers. Otherwise V. STILLER who surveyed brush-wood heaps, stored outdoors, so thoroughly, would have found it

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Salix alba tápnövényű Cerambycidák Körtvélyes szigeten

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Kivonat

A hullámtér jellegű Körtvélyes sziget Salix alba tápnövényű Cerambicidáinak felmérése 1974-től 1980-ig tartott. A tápnövény meghatározásának az alapja a kinevelés volt. Néhány több éves kifejlődésű fajnál az azonosítást célszerűbbnek látszott a lárvák alapján elvégezni. Monofág fajok és kártevők meghatározásánál elegendő adat a tápnövényről való gyűjtés is Körtvélyes-szigeten 25 Salix alba tápnövényű Cerambycida került elő. Ezek zömmel (84%-ban fűzfarőzsében kifejlődő fajok. Jólehet a xilofág cincérek, fejlődésük kritikus lárválás és puppális szakaszában védettek az áradások vizéről, de ez a védelem korántsem tekinthető teljesnek. Különösen az elhalt törzseken élő több éves fejlődésmenetű és az röpképtelen Cerambycidákat szelektálják az áradások (részarányuk 8% illetve 4%).

A Salix alba fitoncidjai bizonyos fajoknak kizáró tényezőt jelentenek. Ezért egy nagyobb kiterjedésű, monoton fajösszetételű Salix alba állomány a telepített egyéb erdőket is védi.

Cerambicidae sa hraniteljki Salix alba na ostrvu Körtvélyes

GASKÓ B.

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Abstrakt

Istraživanja Cerambicidae sa hraniteljki Salix alba na, plavnom ostrvu Körtvélyes, vršena su u periodu 1974—1980 godine. Odredjivanje biljki hraniteljki vršeno je na bazi odgoja. Za nekonko vrsta, čiji razvoj traje više godina, celishodnije je identifikaciju vršiti preko larava. Determiliacija monofaga i štetnih vrsta vršeno je na bazi sakupljanja sa biljki hraniteljki. Sa ostrva Körtvélyes ukupno je prikupljeno 25 vrsta Cerambicidae sa hraniteljki Salix alba. Velika večina njih (84%) se razvija u fašinama vrbe. Iako su ksilofage strižibube u svojim kritišnim stadijumima razvoja larvi i eklozije zaštičene od poplava, ipak je ova zaštita nepotpuna. Poplave vrše selekciju 8% (4%) Cerambicidae koji žive na trupcima, nemaju sposobnost letenje, čiji razvoj traje više godina.

Fitoncidi Salix alba za odredjene vrste Cerambicidae predstavljaju eliminatorni faktor. Usled toga se jedna poveća čista sastojina Salix alba javlja sa svojom zaštitnom ulogom i na druge plantažne šume.

БЕЛАЯ ИВА КАК ИСТОЧНИК ПИЩИ УСАЧЕЙ ОСТРОВА КЕРТВЕЛЬЕШ

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Резюме

Изучение ивы белой как источника пищи усачей, провели на разливной территории острова Кертвельеш, с 1974 года по 1980 г. Основанием для определения этих растений послужили экспериментальные исследования. Идентификацию с отдельными многолетними развимыми видами усачей проводили с личинками. При определении монофагов и вредителей, достаточным явилась их заготовка с пищевого растения. На острове Кертвельеш удалось собрать 25 усачей, питающихся на белой ивы. Основная их масса (84%) относится к видам, которы развиваются в ивовой роще. В целом усачи ксилофаги, в критической, личинковой и кукольной стадиях защищены от наводнений. Однако эта защита далеко неполная. Особенно же у нелетающих усачей, развивающихся на гнилых стволах, что при наводнениях приводит к значительной гибели их (8%, 4%).

Фитанциды белой ивы для отдельных видов усачей являются хорошими стимуляторами развития. В связи с этим, один крупный лес монотипичной с белой ивы, может защитить и другие леса.