



WALNUT

Insects and Diseases



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A PRELIMINARY REPORT ON THE BIONOMICS OF FULGOROIDEA ON BLACK WALNUT
 WITH EMPHASIS ON ANORMENIS SEPTENTRIONALIS
 (SPINOLA) (HOMOPTERA)

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ABSTRACT:--Preliminary findings from a study of the bionomics of Fulgoroidea occurring on black walnut are presented, including a generalized life cycle for Anormenis septentrionalis.

Nixon and McPherson (1977) reported collecting 15 fulgoroid species on black walnut in southern Illinois, 11 of which were noted feeding (Table 1). However, the impact of these species on walnut was not determined. The purpose of the present study is to determine if the above-mentioned fulgoroids are reproducing on black walnut, or are incidental feeders.

During 1976, 1977, and spring 1978, collection trips were made primarily to the following walnut plantations in southern Illinois: U.S. Forest Service Tree Improvement Center (T9S R2W S25), Indian Creek Walnut Plantation (T10S R1W S25), and a plantation located near the Swine Center on the SIU-C campus (T9S R1W S31). Other plantations visited included the Union County Tree Farm Walnut Plantation (T12S R2W S8) and a private plantation in Okawville (T1S R5W S13). More complete descriptions of these plantations are given by Nixon and McPherson (1977).

Table 1.--A list of the Fulgoroids collected from black walnut trees in southern Illinois (Nixon 1976)

Family/ species	Feeding observations
Cixiidae	
<u>Cixius</u> sp.	
<u>Haplaxius pictifrons</u> (Stal)	
<u>Oliarus</u> sp.	
Delphacidae	
<u>Liburniella ornata</u> (Stal)	X
Derbidae	
<u>Anotia bonnetti</u> Kirby	X
<u>Apache degeerii</u> (Kirby)	X
<u>Cedusa kedusa</u> McAtee	X
<u>Syntames uhleri</u> (Ball)	X
Flatidae	
<u>Anormenis septentrionalis</u> (Spinola)	X
<u>Metcalfa pruinosa</u> (Say)	X
<u>Ormenoides venusta</u> (Melichar)	X
Acanaloniidae	
<u>Acanalonia bivittata</u> (Say)	X
<u>Acanalonia conica</u> (Say)	X
Issidae	
<u>Thionia bullata</u> (Say)	
<u>Thionia simplex</u> (Germar)	X

Fulgoroids collected as adults, thus far, include: Liburniella ornata (Stal), Anormenis septentrionalis (Spinola), Metcalfa pruinosa (Say), Ormenoides venusta (Melichar), Cedusa kedusa McAtee, and Acanalonia bivittata (Say). Only 2 species, M. pruinosa and A. septentrionalis have also been collected as immatures, suggesting that the remaining 4 species are incidental feeders.

M. pruinosa appears to be univoltine. Nymphs have been collected on black walnut from 9 to 19 July, adults from 5 to 18 September. Eggs have not been found, but probably represent the overwintering stage. Data from other southern Illinois host plants are more complete and also indicate that this species is univoltine.

A. septentrionalis has proven to be the most common fulgoroid on black walnut in southern Illinois and has been found to breed on this host plant as well as others. The rest of this report concentrates on this species.

FOLIAR AND SHOOT PROBLEMS

A. septentrionalis occurs over much of the eastern U.S. (Metcalf 1923, Van Duzee 1923, Swain 1948). It has been collected in Connecticut, New York, New Jersey, Maryland, District of Columbia, Pennsylvania, Virginia, North Carolina, South Carolina, Georgia, Florida, Mississippi, Tennessee, Ohio, Indiana, Illinois, Iowa, Kansas and Arizona (see Metcalf 1957) and is common throughout its range (Southwick 1892, Swain 1948). Walden (1922) noted high populations in 1921 in Connecticut.

A. septentrionalis has been noted feeding on shrubs and woody vines (Swain 1948), especially on shoots and midribs of leaves (Comstock 1940), and collected from over 30 species of plants (Table 2). It has been implicated in foliage damage to Cornus asperifolia (of authors not Michaux) (= Cornus drummondii Meyer) (Swezey 1903) and was thought to be involved in the transmission of blueberry stunt disease until this was disproven by Tomlinson et al. (1950).

A. septentrionalis breeds on many shrubs and vines (Dozier 1928). The eggs have been found in several woody plants (Table 3) and the ovipositional damage has been described (Hoffmann 1942). Laboratory reared animals during the present study have laid eggs in the fleshy tissue of snap beans (Phaseolus vulgaris L.).

The first report of an association of A. septentrionalis with black walnut in southern Illinois was by Nixon and McPherson (1977) who found eggs, nymphs and adults on this host plant. During the course of the present study, black walnut twigs containing A. septentrionalis eggs have been found at the following southern Illinois locations: The La Rue-Pine Hills Ecological Area, Thompson Woods on the SIU-C campus, a private walnut plantation in Okawville, and the U.S. Forest Service Tree Improvement Center, SIU-C.

The following generalized life cycle information for A. septentrionalis includes data from black walnut and other host plants (see SWW/JEM, Table 2). The eggs are laid in the fall (earliest collection date, 5 September), overwinter, and hatch in spring. They are inserted into twig tissue in one or more rows. A typical row has a zipper-like appearance with the eggs forming a ridge on the surface of the twig (Figure 1). A search for eggs in black walnut twigs at the Tree Improvement Center during fall 1977 resulted in 316 in 16 different twigs (mean number of eggs per cluster \pm 1 S.E. = 19.75 \pm 2.44). The eggs were found within localized areas of the plantation (Figure 2).

First instars (Figure 3A) have been found from 23 May to 1 June; second instars (Figure 3B), 25 May to 6 June; third instars (Figure 3C), 25 May to 6 June; fourth instars (Figure 3D), 26 May to 30 June; fifth instars (Figure 3E), 8 June to 29 July; and adults (Figure 4), 23 June to 28 October.

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Table 3.--A list of the oviposition sites of Anormenis septentrionalis

Common name	Scientific name	References
Hickory	<u>Carya</u> sp.	Dozier 1928
Black walnut	<u>Juglans nigra</u> L.	Nixon & McPherson 1977 SWW/JEM ¹
Sweetgum	<u>Liquidambar styraciflua</u> L.	Dozier 1928
Black cherry	<u>Prunus serotina</u> Ehrhart	SWW/JEM
Oak	<u>Quercus</u> sp.	Dozier 1928
American elm	<u>Ulmus americana</u> L.	Hoffmann 1942
Redbud	<u>Cercis canadensis</u> L.	SWW/JEM

¹ SWW/JEM = this study

Table 2.--A list of the plant associations of Anormenis septentrionalis

Common name	Scientific name	Stage ¹	Feeding	References
Maple	<u>Acer</u> sp.			Heaton 1934
Silver maple	<u>Acer saccharinum</u> L.	A	X	SWW/JEM ²
Black alder	<u>Alnus glutinosa</u> (L.)		X	Dozier 1928
			X	Osborn 1938
Crossvine	<u>Bignonia capreolata</u> L.		X	Dozier 1928
Pignut hickory	<u>Carya glabra</u> (Miller)	A	X	SWW/JEM
Pecan	<u>Carya illinoensis</u> (Wangenheim)		X	Dozier 1928
Climbing bittersweet	<u>Celastrus scandens</u> L.	N	X	Swezey 1903
			X	Dozier 1928
			X	Osborn 1938
Redbud	<u>Cercis canadensis</u> L.	A	X	SWW/JEM
Roughleaf dogwood	<u>Cornus drummondi</u> Meyer	N	X	Swezey 1903
Flowering dogwood	<u>Cornus florida</u> L.	A	X	SWW/JEM
Dogwood	<u>Cornus</u> sp.		X	Dozier 1928
			X	Osborn 1938
Hawthorn	<u>Crataegus</u> sp.	N	X	Swezey 1903
			X	Dozier 1928
			X	Osborn 1938
American beech	<u>Fagus grandifolia</u> Ehrhart			SWW/JEM
Ash	<u>Fraxinus</u> sp.			Heaton 1934
Honey locust	<u>Gleditsia triacanthos</u> L.			Heaton 1934
Black walnut	<u>Juglans nigra</u> L.	N	X	Nixon & McPherson 1977
		A	X	SWW/JEM
Sweetgum	<u>Liquidambar styraciflua</u> L.	A	X	SWW/JEM
				Dozier 1928
Yellow sweet clover	<u>Melilotus officinalis</u> (L.)	N	X	SWW/JEM
Red mulberry	<u>Morus rubra</u> L.	N	X	SWW/JEM
Hophornbeam	<u>Ostrya virginiana</u> (Miller)	A	X	SWW/JEM
Pokeweed	<u>Phytolacca americana</u> L.			Dozier 1920
American sycamore	<u>Platanus occidentalis</u> L.			Heaton 1934
				SWW/JEM
Black cherry	<u>Prunus serotina</u> Ehrhart	N	X	SWW/JEM
		A	X	SWW/JEM
Plum	<u>Prunus</u> sp.	N	X	Swezey 1903
			X	Dozier 1928
			X	Osborn 1938
Red oak	<u>Quercus rubra</u> L.	N	X	Swezey 1903
			X	Dozier 1928
			X	Osborn 1938
Willow	<u>Salix</u> sp.			Heaton 1934
American elm	<u>Ulmus americana</u> L.			Gibson 1973
Slippery elm	<u>Ulmus rubra</u> Muhlenberg	N	X	SWW/JEM
		A	X	SWW/JEM
Elm	<u>Ulmus</u> sp.			Heaton 1934
Blueberry	<u>Vaccinium</u> sp.	A	X	Tomlinson et al. 1950
Verbisina	<u>Verbisina</u>			SWW/JEM
Grape	<u>Vitis</u> sp.	N	X	Swezey 1903
			X	Wirtner 1905
			X	Dozier 1928
			X	Heaton 1934
			X	Osborn 1938
				Comstock 1940
Prickly ash	<u>Xanthoxylum americanum</u> Miller	N	X	Swezey 1903
			X	Dozier 1928
			X	Osborn 1938
Corn	<u>Zea mays</u> L.			Heaton 1934

¹ A = Adult, N = Nymph² SWW/JEM = this study

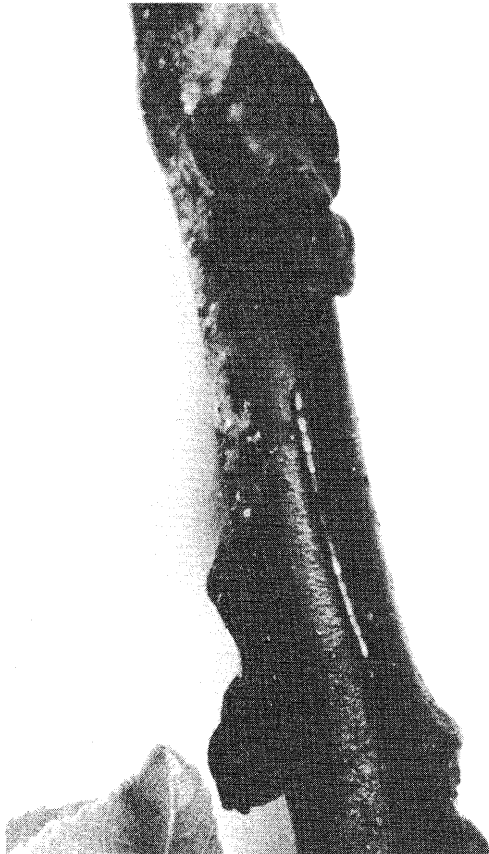


Figure 1.--Eggs of *A. septentrionalis* inserted in a black walnut twig.

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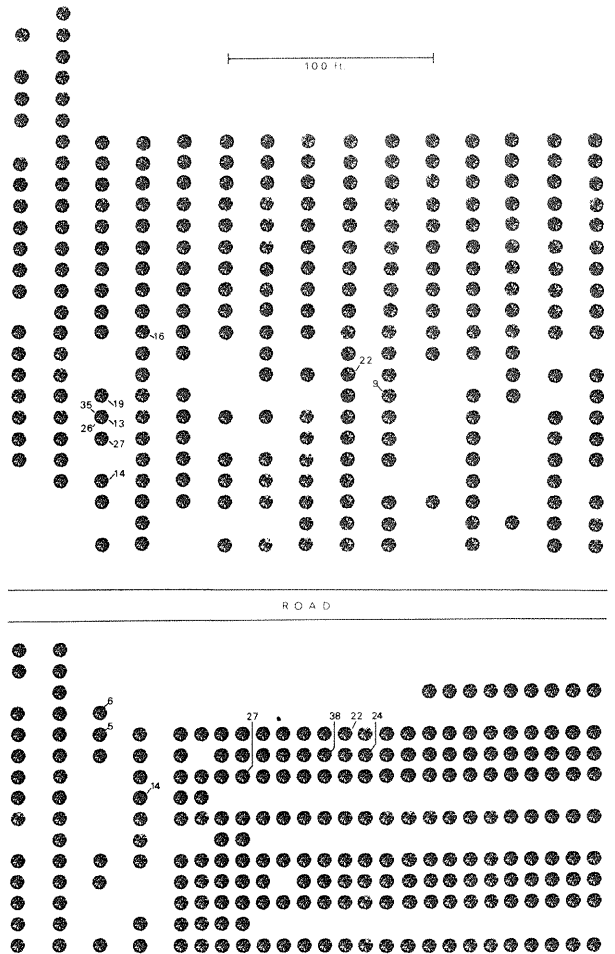


Figure 2.--Distribution of *A. septentrionalis* ovipositional sites at the U.S. Forest Service Tree Improvement Center Walnut Plantation, SIU-C. Numbers indicate the number of eggs in a twig.

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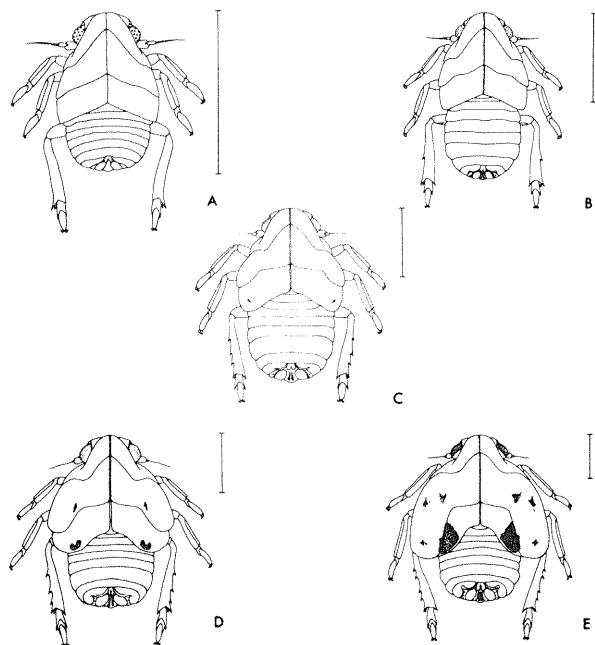


Figure 3.--Immature stages of *A. septentrionalis*.
A, first instar; B, second instar; C, third instar; D, fourth instar; E, fifth instar.
Line equals 1.0 mm.

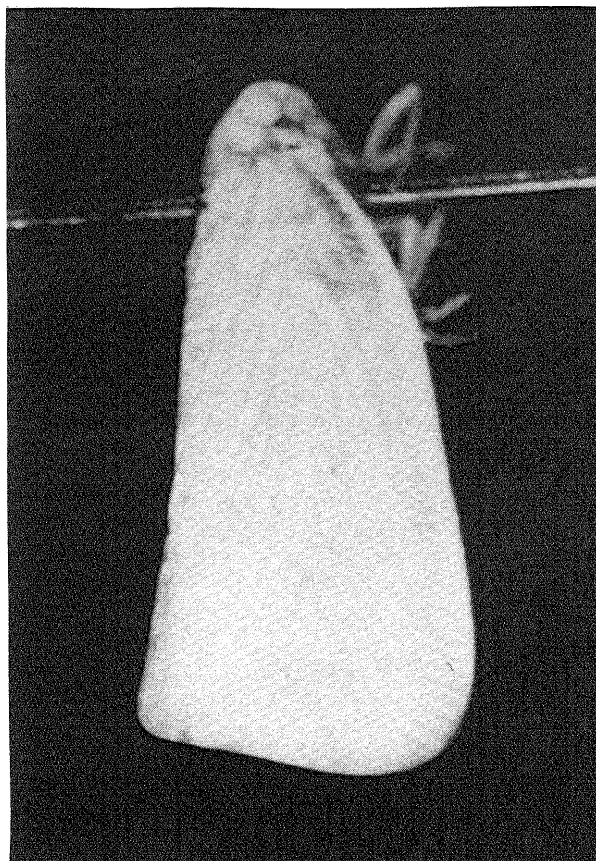


Figure 4.--Adult *A. septentrionalis*.

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FOLIAR AND SHOOT PROBLEMS

GROUP DISCUSSION

- Kuntz: Have you determined that these chocolate brown lesions, either on the leaves or the twigs, are a result of the activities of these insects?
- S. Wilson: No, I haven't to date. We have tagged twigs in the field in which there have been eggs, and we will follow them this year. Of all the ones that were tagged last year only one twig failed to leaf out and there may have been other causes.

Schlesinger: Do they lay their eggs in last year's wood?

Wilson: No, I have observed eggs only in the current year's growth. Oviposition damage from previous years is evident on the twigs, but I've found fresh eggs on the current year's growth only.