ECOLOGICAL DISTRIBUTION OF ACRIDIDAE IN CENTRAL OKLAHOMA*

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This report is a summary of some of the results of studies dealing with biotic communities in central Oklahoma during 1938 and 1939. Only the data dealing with the Acrididae are included here. Complete reports are being published elsewhere.

It is of practical importance for the ecologist and the entomologist to know the correlation between various habitats and the distribution of species of insects. From the standpoint of community ecology, grasshoppers constitute an important component of the fauna, since they have a direct influence on the plant life and provide food for other animals of the community. They constitute an important link in the transformation of plant tissues into animal material usable by other animals.

In this study, quantitative collections and field observations were made of the grasshoppers in a number of different habitats. The data are summarized in Table 1, which is largely self explanatory. Well recognized communities are named from the dominant plants. Others are given a descriptive name.

Climax situations yield a larger number of species but a smaller number of specimens than disturbed areas or seral stages. Overgrazed pastures in this region often show a type of vegetation similar to that of the short grass plains farther west and also an assemblage of grasshoppers of western affinities. At the same time many of the eastern species found in the mixed-grass prairie survive in overgrazed areas and these, in addition to geophilous species which increase in number, cause an increase both in species and specimens from such areas. In 1938, from normal, undisturbed prairie, there were taken 25 species and 549 specimens, from overgrazed areas, 35 species and 1746 specimens. Midseral stages in succession showed a much higher number of specimens than either pioneer communities on abandoned, eroded land or climax prairie. From pioneer stages were taken 14 species and 327 specimens, from midseral communities 22 species and 814 specimens and as was mentioned above, 25 species and 549 specimens from the native prairie. Bunch-grass sand-prairie yielded the largest number of specimens of any of the stations in 1938, 18 species and 2154 specimens being taken there.

Some species of grasshoppers are governed in their distribution by the character of the soil surface, that is, whether exposed or covered by vegetation, and the physical character of the soil, that is, whether loam, fine sand, coarse sand or clay. Other species are associated with certain species of plants and are distributed in accordance with these plants. Still others are limited in their distribution by a combination of the factors mentioned. Difference in plant communities under the same climatic conditions is usually due to edaphic factors. As is illustrated in Table 1, most species are associated with specific types of plant associations although they may be present in small numbers in other communities. The work of Vestal (1913) on the local distribution of grasshoppers in rela-

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tion to plant associations showed that certain species are more restricted in range of habitats than are others. He found that no two plant associations had identical grasshopper assemblages and that no two grasshoppers have identical habitat preferences.

Isely (1937) studied the seasonal succession and soil relations of northeastern Texas acridians and found that in certain instances succession is determined by specific food plants but chiefly is determined by interrelations resulting from vegetation cover and climate. In other words grasshoppers are a part of the biotic community in which they occur and their presence is due to factors of the habitat.

Weese (1939), Smith (1940), and Coyner (1939) have shown that when overgrazing has eliminated the taller components of the mixed-grass prairie, short grasses become dominant and that species of acridians characteristic of the short-grass plains to the west invade and become important. Geophilous species also increase in abundance because of the increase in the total amount of exposed soil surface.

Smith (1940) traced biotic succession on abandoned, eroded farmland and found that *Melanoplus differentialis* was the most important acridian in pioneer communities, *M. confusus*, *Mermiria maculipennis* and *Hippiscus rugosa* in midseral stages and *Syrbula admirabilis*, *M. confusus* and *M. packardii* in the mixed-grass prairie climax community.

The seasonal succession of most acridians found in the prairie region of central Oklahoma was followed by Acker (1939) who also made observations on the ecological distribution of the various species.

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TABLE 1

Ecological distribution of the various species of Acrididae in central Oklahoma.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Psoloessa texana (Scudder)	3	2	1											
Dichromorpha viridis (Scudder)	3	2	1											
Schistocerca damnifica Saussure	3													
Schistocerca americana (Drury)	2	2	1		1	3	1	2	1					
Arphia xanthoptera (Burmeister)	3	2	2	1	1		2							
Acrolophitis hirtipes (Say)	3	2	2	2		2	1	2						
Chortophaga viridifasciata (De Geer)	3	1	1	1		1	3							
Hippiscus rugosus (Scudder)	1		2	1	2	1	3		1					3
Pardalophora saussurei (Scudder)	1	1	2	3	2	1	2	1	3					1
Arphia simplex Scudder	1	2	3	1	1	1	1	1	2					2
Melanoplus f.r. femur rubrum (De Geer)	3	2	2	1										
Melanoplus keeleri (Thomas)	3													
Melanoplus confusus Scudder	2	2	2	3	2	2	3	3	2					1
Melanoplus packardii Scudder	1	2	2	3	3	2	2	2					1	
Melanoplus foedus fluviatilis Bruner		2	2	1	1	1	3							
Melanoplus bivittatus (Say)		1	1	3	2	1	2	2	1				2	
Melanoplus ponderosus (Scudder)			3	2	2									
Melanoplus bispinosus Scudder			1	1	1									
Melanoplus mexicanus (Saussure)			1	1	3									
Melanoplus angustipennis impiger Scudder			3	1		1	3	1	1					
Melanoplus regalis (Dodge)			1	3	2									
Melanoplus differentialis (Thomas)				1			1	2	1		1		3	1
Amphitornus c. coloradus (Thomas)		2	3	2	2									
Leprus wheeleri (Thomas)			2	1										
Hesperotettix viridis pratensis Scudder		2	2			1	2							
Hesperotettix speciosus (Scudder)		1	1	1	1	3	3	1					2	1
Hesperotettix v. viridis (Thomas)		1	2	3	2	1	2							1
Opeia o. obscura (Thomas)		3	2	1										3
Boopedon gracile Rehn		2	2	3	2									
Orphulella speciosa Scudder		2	2	3	2	1	2							2
Syrbula admirabilis (Uhler)		2	2	3	2	2	2	1	1					3
Mermiria maculipennis Bruner		2	3	2	2	2	2	1	2					1
Agenotettix d. deorum (Scudder)		1	2	3	2	1	2	1						2
Eritettix simplex (Scudder)		2	2											
Dissosteira carolina (Linnaeus)			1	2									1	
Dissosteira longipennis (Thomas)				2									1	
Philibostroma quadrimaculatum (Thomas)		1	2	3	3									
Brachystola magna (Girard)			2	3										
Spharagemon equale (Say)			3	1	3	1	2	2	2					
Spharagemon collare (Scudder)			2	3	2	2	2	2	3					
Hadrotettix trifasciatus (Say)			1	3	2	1	2	2						
Arphia conspersa Scudder				3	2	1	3							
Trimerotropis p. pallidipennis (Burmeister)				2	1									
Trachyrhachis kiowa fuscilabris (Thomas)				2						3				
Schistocerca lineata Scudder						1	2		2	3				
Schistocerca obscura (Fabricius)													2	
Leptysma marginicollis (Serville)												3		
Paratettix cucullatus (Burmeister)													3	

(A) Savannah (Quercus-Hickoria-Andropogon association), (B) Mid-grass prairie (*Andropogon scoparius-Boutelova curtipendula* association), (C) Mixed-grass prairie (*A. scoparius- B. curtipendula-B. hirsuta*-Buchloe association), (D) Over-grazed pastures (*B. hirsuta*-Buchloe-Amphiachyris), (E) Short-grass prairie (*B. hirsuta*-Buchloe), (F) Subclimax prairie (Andropogon consocies), (G) Seral stages on eroded soil (Aristida associes), (H) Pioneer stages on eroded soil (Mixed-weed associes), (I) Bunch-grass Sand-prairie (Panicum-Andropogon association) (J) Sandy flood plains (Tamarix-Salix associes), (K) Sedge flats, (L) Water's edge, (M) Pioneer stage on uneroded soil, (N) Bermuda grass sod.