Orthoptera of Relict Prairie Fragments in Greene County, Indiana[1]

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The occurrence of areas of edaphic prairie in the vicinity of Worthington, Switz City, and Lyons in Greene County, Indiana, has been recognized by botanists for many years, but no detailed studies of the flora of the remaining fragments have yet been published. The area has been so greatly modified by agriculture, road building, and other human activities in recent years that little can now be done. The relict fragments with which the present study is concerned lie along the right-of-way of the old Vincennes and Indianapolis Railroad, a branch of the Pennsylvania system, between Worthington and Switz City. They have been partly preserved through the coincidence of the right-of-ways of the railroad and Indiana Highway 67. The strips of prairie thus remaining have been repeatedly cleared, burned, and otherwise mistreated, but apparently never broken by plow.

Dr. Paul Weatherwax of Indiana University, who resided in the area during his boyhood, tells us that the early residents recognized the distinction of the prairie areas along Lattas Creek and around Worthington, and referred to them as "the prairies." Buffalo formerly ranged into the region, probably feeding in the rich pastures along the streams, and were hunted west of Worthington in historic times. The agricultural use of the marshes and related grasslands was largely confined to grazing until about the middle of the last century, when like the rest of the world's native grasslands, they began to give way to the moldboard plow.

Ecologically, the prairie fragments in Greene County can be considered part of the Eastern Post-Climax Faciation of the Tall-Grass Prairie (2). They are similar to the *Andropogon furcatus-Silphium terebinthinaceum* Prairie of Braun (1) in part, but some areas on more sloping ground include grasses and herbs characteristic of drier regions. The climate of the region is definitely not a grassland climate, and the original development of prairie areas and their persistence must be considered due to edaphic conditions. In this regard, Tharp and Mann (6) say of the Clyde clay and the Clyde sandy loam which were never forested: "Before artificial drainage was introduced the surface of these areas was more or less flooded during the spring months, but usually dry during the summer and fall. Bluestem and other varieties of prairie grass, as well as those peculiar to wet locations, grew luxuriantly and for many years furnished excellent grazing."

The fragments selected for a study of the Orthoptera lie along Indiana Highway 67 northeast of Switz City in T-7-N, R-6-W, Sec. 12,

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and T-7-N, R-5-W, Sec. 6. They represent several distinct facies of "associations" dominated by *Andropogon furcatus*, the big bluestem. The largest area in T-7-N, R-6-W, Sec. 12, lies entirely on the Clyde clay and supports a luxuriant growth of *Silphium terebinthinaceum* and some *S. laciniatum*. The smaller fragments are on mixtures of Miami silt loam, Waverly silt loam, Bloomfield sandy loam, and the Clyde silt loam. On all of these *Silphium* is lacking and in places *Andropogon furcatus* and *Panicum virgatum* are essentially the only grasses.

Plants found in all four of the stands studied are: *Andropogon furcatus, Panicum virgatum, Sorghastrum nutans, Helianthus grosseserratus, Aster* spp., and *Solidago* spp.

Other plants identified from one or more of the stands include:

GRASSES: *Andropogon scoparius, Bromus sp., Eragrostis pectinacea, E. spectabilis, Muhlenbergia sp., Panicum spp., Paspalum stramineum, Poa pratensis, Spartina pectinata, Triodia flava.* LEGUMES: *Baptsia leucantha, Cassia fasciculata, Desmodium* sp., *Lespedeza* sp., *Melilotus alba.* COMPOSITES: *Achillea millefolium, Ambrosia elatior, A. trifida, Aster novae-angliae, Brauneria* sp., *Cirsium discolor, Helianthus mollis, H. strumosus, Lactuca scariola, Rudbeckia hirta, Solidago canadensis, Vernonia altissima.* OTHERS: *Acalypha rhomboidea, Apocynum* sp., *Carex* spp., *Convolvus* sp., *Daucus carota, Euphorbia corollata Fragaria* sp., *Hypericum* sp., *Oxalis* sp., *Potentilla simplex, Potentilla* sp., *Pycnanthemum* sp. SMALL TREE OR SHRUBS IN OR NEAR EDGES OF STANDS: *Ceanthous amtricanus, Cornus stolonifera, Quercus imbricaria, Q. palustris, Q. velutina, Rhus glabra, Rubus* sp., *Sassafras albidum.*

A comparison of two of the fragments on the basis of 20 count quadrats (meter squares) gives a frequency index community coefficient or FICC (5) of 0.44 between a stand on Clyde clay and another on mixed Miami silt loam, Waverly silt loam, and Bloomfield sandy loam. This is roughly in agreement with the fact that the Clyde clay was not originally forested while the other soils supported forest which has been cleared and subsequently invaded by grassland. A similar comparison of stands in the old field and forest ecotone near Scott's Pond at Bloomington (3) gives an FICC of 0.61. Pooling of all quadrats from Greene County and comparison with those from the Scott's Pond area in Monroe County gives an FICC of only 0.20. These comparisons, although only rough approximations made on far too few quadrats, suggest that the plant associations of the original prairie relicts were quite distinct from those of old fields in southern Indiana. Most of the overlap seems to be due to the introduction of weeds and similar ubiquitous plants. A more detailed study of the prairie fragments, together with an attempt at historical reconstruction of their former extent, would be of considerable interest.

Orthoptera were collected from four patches of prairie and modified grasslands along the railroad right-of-way in October of 1953, 1954, and 1955. A visit to the area in June of 1955 did not reveal any additions to the list of species. An attempt was made to confine the collections to the center of patches where *Andropogon furcatus* was abundant. Wet

areas and shrubby zones were avoided as was the berm of the highway and the railroad embankment. The species taken are listed in the accompanying table together with the actual numbers taken in each of the three years.

Orthoptera Taken in Prairie Fragments in Greene County, Indiana

ACRIDIDAE:	Oct 3, 1953	Oct. 2, 1954	Oct. 1, 1955
Syrbula admirabilis	4	—	—
Arphia sulphurea	1(Juv.)	—	—
Arphia xanthoptera	2	—	1
Chortophaga viridifasciata	—	2(Juv.)	1(Juv.)
Encoptolophus sordidus sordidus	4	6	11
Hippiscus rugosus	—	—	1
Dissosteira carolina	2	1	2
Schistocerca americana americana	1	—	—
Schistocerca alutacea	7	7	26
Melanoplus differentialis differentialis	4	5	24(1Juv.)
Melanoplus femur-rubrum femur-rubrum	40	14	15
Melanoplus mexicanus mexicanus	2	9	2
TETTIGONIIDAE:			
Scudderia texensis	1	—	—
Scudderia furcata furcata	2	2	—
Orchelimum vulgare	2	—	—
Conocephalus fasciatus fasciatus	2	4(1Juv.)	2
Conocephalus brevipennis	1	—	—
Conocephalus strictus	1	5	—
GRYLLIDAE:			
Acheta assimilis	—	2	1
Oecanthus nigricornis quadripunctatus	2	—	2
Oecanthus nigricornis nigricornis	1	3	6
Hapithus agitator agitator	1	—	—

All of the Orthoptera taken in the prairie fragments in Greene County, with the exception of *Hapithus a. agitator*, are commonly found in grassland. The frequency of occurrence and abundance of any one form depends upon community conditions. Thus *Melanoplus d. differ-*

entialis is partial to the more moist area where *Ambrosia trifida* grows (4). *Scudderia f. furcata, Orchelimum vulgare, Conocephalus f. fasciatus* and *C. brevipennis* are found in greatest abundance in low, marshy areas, but can and do occur in less moist environments. *Dissosteira carolina* prefers grassland with open, bare areas and was noted to be most abundant in such areas along the railroad and the mowed highway berm. *Oecanthus nigricornis quadripunctatus* requires herbaceous annuals within which the females oviposit and females of *Oecanthus n. nigricornis* select shrubby plants with woody outer layers surrounding the central pith. *Hapithus a. agitator* is partial to shrubby, weedy thickets.

As presently known, the Orthoptera taken by us are wide ranging in distribution. In all cases, the known range of each form extends far beyond the limits of the Grassland Biome as outlined by Carpenter (2). None of these species can be considered as an indicator of prairie conditions.

Carpenter (2) lists, as either Influents of his Eastern Faciation of the Tall-Grass Prairie Association or as Binding Influents of the Tall-Grass Prairie Association, all of the forms collected in the Switz City prarie fragments with the exception of *Arphia xanthoptera, Schistocerca americana, S. alutacea, Scudderia f. furcata, Orchelimum vulgare, Conocephalus f. fasciatus, C. brevipennis* and *Hapithus a. agitator*. Influents and Binding Influents were considered by Carpenter to be the more influential animals in the biotic make-up of prairie communities. Failure to list a given species did not imply that it was not a member of a community. Carpenter's lists contain species which we did not collect on the Green County Prairie strips. These are *Opeia obscura, Orphulella speciosa, Ageneotettix deorum, Melanoplus bivittatus, M. packardi, M. confusus*, and *Neoconocephalus ensiger*. *Opeia obscura* and *Melanoplus packardi* are inhabitants of the Great Plains, and do not occur, even as relicts, east of Iowa. *Ageneotettix deorum* is found on sandy soils and hence does not occur on the Switz City prairie strips owing to the heavier soils found there. The remaining four species may well occur in small numbers. The time of collecting and duration of sampling probably account for their not being taken.

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Summary

A preliminary study of plants associated with relict prairie fragments in Greene County, Indiana, shows that these areas have associations of species distinct from those of old fields in southern Indiana. A high proportion of the Orthoptera found also occur in similar prairies to the west. Mowing, burning, drainage, and deforestation of the surrounding area do not seem to have modified the communities more than

possibly to have changed the size of populations. No species of Orthoptera were taken which might not have been present before the advent of agriculture.

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