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Calanoid Copepods from the Forest to Prairie Transition in the Itasca Park Region of Minnesota

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Calanoid Copepods from the Forest to Prairie Transition in the Itasca Park Region of Minnesota[1]

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Abstract. Calanoid copepods found in a summer survey of northwestern Minnesota lakes and ponds were: *Epischura lacustris, Diaptomus oregonensis, D. leptopus, D. sakatchewanensis, D. nudus,* and *D. siciloides.* Some diaptomid species correlated with vegetational type. *E. lacustris, D. oregonensis, D. saskatchewanensis* were characteristic of pine hardwood and mesic deciduous forest regions while *D. nudus* and *D. siciloides* were characteristic of Oak-Savanna and prairie regions. *D. leptopus* was characteristic in shallow water habitats and occurred on both sides of the transitional area.

Calanoid copepods are conspicuous and often abundant members of the zooplankton community. The diaptomidae are confined to freshwater and show evidence of recent speciation with many of the species confined to small geographical areas (Pennak, 1953).

Not much has been reported on the diaptomid fauna of northwest Minnesota. *Diaptomus oregonensis* has been reported from the Lake Itasca region occurring in Deming Lake (Spencer, 1959) and Mary Lake (Comita and Comita, 1957) and from the Chippewa National Forest region (Reif, 1940). *Diaptomus siciloides* has been reported from Severson Lake in the Detroit Lakes region (Comita and Comita, 1957).

The flora of northwestern Minnesota is characterized by a transition from the pine-hardwood forests of the east central part of the state to the prairie region further west. The vegetation of the forest to prairie transition in the Lake Itasca area has been categorized by Buell and Facey (1960). McAndrews (1966) studied pollen in bottom cores from ponds and lakes in the area to determine the post-glacial history of the region.

METHODS

To determine the copepod fauna of the pine-hardwood region, several lakes and ponds within Itasca Park and its immediate region were visited. Zooplankton was obtained by casting a #25 plankton net from the shore. The samples were preserved with formalin and returned to the Itasca Biology Station where the copepods were dissected and permanent slides were made using

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CMC-S mounting medium. Identifications were made according to Wilson (1959).

The plankton collected from the shore would be expected to contain mostly littoral forms but some of the limnetic species may occur in shallow water. However it would have increased the probability of obtaining representatives of all diaptomid species present if deep water samples could have been obtained.

Results

A total of 38 ponds and lakes were visited between July 13 and August 19, 1969. Of these 29 contained calanoid copepods and the adult males necessary for identification were found in 23. Table 1 shows the locations of the 23 bodies of water from which identifications were made and Table 2 lists species identified in each. The ponds and lakes were arranged by vegetational types going from

Table 1. Location of ponds and lakes which contained calanoid copepods included in the forest to prairie transition.

Vegetation type Name	Township North	Range West	Section Number	County
PINE-HARDWOOD				
Paine Lake	143	34	21	Hubbard
Lower LaSalle	145	35	31	Hubbard
Mary Lake	143	35	19	Hubbard
West Twin Lake	143	35	39	Hubbard
Josephine Lake	143	35	31	Hubbard
Pond, HW 31-W	143	35	20	Hubbard
Pond, HW 31-E	143	35	20	Hubbard
Spencer's Pond	144	36	35	Clearwater
Elk Lake	143	36	22	Clearwater
Pond, by Beaver Lake	143	36	17	Clearwater
Pond, HW113-S	142	36	10	Becker
Two Island Lake	142	36	7	Becker
Pond	143	37	12	Clearwater
Bad Medicine	142	37	4	Becker
MESIC DECIDUOUS FOREST				
Pine Lake	140	39	30	Becker
Tamarac Lake	140	40	25	Becker
OAK-SAVANNA				
Pond	145	40	33	Mahnomen
Pond	145	40	31	Mahnomen
Terhell Pond	143	40	18	Mahnomen
2nd Horse Pond	143	41	22	Mahnomen
Chandlers Pond	143	41	23	Mahnomen
Sullivan Lake	143	41	20	Mahnomen
PRAIRIE				
Mahnomen Prairie	143	42	33	Mahnomen

Table 2. Calanoid Copepods collected.

Body of Water	date	*Epischura lacustris*	*D. oregonensis*	*D. saskatchewanensis*	*D. leptopus*	*D. nudus*	*D. sicilioides*
PINE-HARDWOOD REGION							
Paine Lake	7/30/69	X	X				
Lower LaSalle	8/19/69	X	X				
Mary Lake	7/23/69		X				
West Twin	7/23/69		X				
Josephine	7/23/69			X			
Pond, HW31-W	7/30/69			X	X		
Pond, HW31-E	7/30/69				X		
Spencers Pond	7/30/69			X	X		
Elk Lake	7/23/69		X				
Pond by Beaver Lake	7/23/69				X		
Pond, HW113-S	7/23/69				X		
Two Island Lake	8/ 2/69		X				
Pond	8/ 2/69				X		
Bad Medicine	8/ 9/69					X	
MESIC DECIDUOUS FOREST							
Pine Lake	8/15/69		X				
Tamarac Lake	8/15/69		X				
OAK-SAVANNA REGION							
Pond	8/15/69					X	
Pond	8/15/69						X
Terhell Pond	8/15/69				X		
2nd Horse Pond	8/15/69						X
Chandlers Pond	8/ 8/69					X	
Sullivan Lake	8/ 8/69				X	X	X
PRAIRIE REGION							
Mahnomen Prairie	8/ 8/69				X	X	

east to west within each type.

The pine-hardwood forest extends into Mahnomen County to approximately Section 18, T 143N, R 40W. West of this is a narrow band of mesic deciduous forest, followed by oak-savanna and then prairie (Buell and Facey, 1960; McAndrews, 1966). Terhell pond and Bad Medicine Lake were studied by McAndrews. It was difficult to locate ponds which were surrounded only by mesic forest or prairie.

The pine-hardwood area was characterized by the presence of *Epischura lacustris* and *Diaptomus oregonensis* in the deeper lakes. *D. leptopus* and *D. saskatchewanensis* were found in the smaller lakes and ponds. *Diaptomus nudus* occurred in Bad Medicine Lake which is on the western edge of the pine region.

Two lakes were sampled in the mesic deciduous forest area with *D. oregonensis* being the only diaptomid found.

Six ponds were sampled in the oak-savanna area. McAndrews included Terhell pond in the mesic deciduous forest area but since the pond's drainage included pastureland in this survey it was placed in the oak-savanna. The oak-savanna ponds were characterized by the presence of *D. leptopus, D. nudus,* and *D. siciloides.*

Only one permanent pond was found in what could be considered true prairie. It contained *D. leptopus* and *D. nudus.* Table 3 presents a summary of the number of times that a species occurred within each vegetational type.

Discussion and Summary

From the collections made it appeared that *D. leptopus* was characteristic of shallow water habitats in all regions sampled. Its distribution is given as the entire northern part of the continent (Wilson, 1959).

Table 3. Occurrence of the different calanoid species in each vegetational type, July-August, 1969.

	Hardwoods Pine	Deciduous Mesic	Savanna Oak	Prairie
Number of lakes and ponds	14	2	6	1
Epischura lacustris	2			
D. oregonensis	6	2		
D. saskatchewanensis	3			
D. leptopus	6		2	1
D. nudus	1		3	1
D. siciloides			3	

D. oregonensis was found only in lakes in the pine-hardwood and mesic deciduous forest regions. Its absence further west may be due to its preference for lakes (Wilson, 1959) rather than to geographical distribution.

Diaptomus saskatchewanensis was found in only the pine-hardwood area but since it apparently occurs further West (Wilson, 1958) one would expect to find it in the western part of Minnesota.

D. nudus and *D. siciloides* appear to be very closely related. They vary only slightly in structure. With one exception, they oc-

curred only in the oak-savanna, and prairie regions. *D. nudus* is a northern form which extends into Minnesota from the northwest while *D. siciloides* is found over most of the continent with the exception of the extreme north and east (Wilson, 1959). *D. siciloides* is especially common in the grassland areas of Kansas (Armitage,1961) and Oklahoma (Kingsbury, 1965). Reif (1940) listed *D. siciloides* as being characteristic of the prairie region of southwestern Minnesota. It is likely that the occurrence of both of these forms in the Itasca region is an overlapping of the two ranges.

Epischura lacustris occurred in only two lakes. Wilson (1959) described its distribution as northeastern extending west to Minnesota and the northwest territories. Since it is also characteristic of deep lakes its absence from the remaining lakes may be due to this preference or because the range does not extend further west.

In summary, it would appear that the calanoid copepods are represented by different species in the forest and in the prairie ponds and lakes. The forms found in the mesic deciduous forest were the same as those occurring in the pine-hardwood areas. The species present in the oak-savanna region were the same as those in the prairie region. The distribution of *Diaptomus leptopus* seemed to be controlled within all vegetation types by its preference for ponds and shallow water.

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