

Niche Overlap Among Certain Oligochaetes of a Tropical Freshwater Habitat

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Abstract

Studies on niche overlap among five dominant freshwater littoral oligochaetes reveal that most abundant species in a community have strongest effect on others and are ecologically close to each other than the rest species. The niche overlap has been suggested not a measure of competition but relevant to the measurement of competition and more correctly the niche overlap values rather denote the extent of co-existence among the species with coincidence in preferences.

Niche overlap, the measures of which have been used to estimate the competition coefficients in Lotkavolterra style competition models (1-3), and the overlap *per se* is variously equated with interspecific competition such as competition occurs whenever niches overlap even to a partial extent (4) and both are inversely related (3), has been a problem in current niche theory. Niche overlap has been studied in detail for saurofauna (3) and to some extent for other higher groups and insects (1-5) but nothing is known about the niche overlap among the macrobenthic fauna of tropical freshwater habitats. The communication deals with the niche overlap among certain dominant oligochaet species and suggests niche overlap to be degree of co-existence with coincidence of preferences among the species rather a direct measure of competition.

Methods

Oligochaetes were sampled along with other macrobenthic fauna following standard method described in detail elsewhere (6). The oligochaetes were sorted out and preserved in the laboratory and their population density per square meter were calculated averaging five samples each consisting of seven replicates. All the samples were taken from the same habitat but

from different points and nearly at the same time.

The methods of Levins (7), Hurlbert (8) alongwith Pianka's (9) modification were adopted to assess the niche overlap values among various interspecific permutations of five dominant species. On the basis of average niche overlap in a pair of interspecific interaction ($\alpha \times (y) \times \alpha y (\times)$) as suggested by Levins (7) an UPGMA dendrogram was drawn following Sneath and Sokal (10) to show the extent of niche overlap.

Results and Discussion

Table 1 gives the results on niche overlap among five dominant species of littoral oligochaetes namely, *Branchiura sowerbyi* (*B. sow.*), *Limnodrilus angustipenis* (*L. ang.*), *Limnodrilus ud ekemianus* (*L. ude.*) and *Aelosoma* sp. (*Aelo.* sp.). It shows that certain species have strong relationships with some other species (higher niche overlap values) although the relationships in opposite direction can be weak. The niche overlap as indicated by Levins approach (Table 1) suggests the most abundant species (*B. sowerbyi* and *Dero* sp.) have strongest effect on others and by the dendrogram of niche overlap (Fig. 1) it's clear that these two species are ecologically near to each other than the rest

Table 1. Niche overlap between pairs of the most abundant oligochaet species. (A) Overlap of species of vertical column over those of horizontal column; (B) overlap of species of horizontal column over vertical column. Species abbreviations similar as text.

	<i>B. sow.</i>	<i>L. ang.</i>	<i>Dero. sp.</i>	<i>L. ude.</i>	<i>Aelo. sp.</i>
(A) Vertical Column Over Horizontal Column					
<i>B. sow.</i>		0.733	0.934	0.559	1.005
<i>L. ang.</i>			0.833	0.566	0.801
<i>Dero. sp.</i>				0.557	0.920
<i>L. ude.</i>					0.367
<i>Aelo. sp.</i>					
(B) Horizontal Column Over Vertical Column					
<i>B. sow.</i>					
<i>L. ang.</i>	0.789				
<i>Dero. sp.</i>	0.979	0.812			
<i>L. ude.</i>	0.469	0.432	0.436		
<i>Aelo. sp.</i>	0.866	0.642	0.757	0.377	

of the species taken into account during the present study. Hence these niche overlap values are not a measure of competition but the values are relevant to the measurement of competition and more correctly these values rather denote of co-existence among the species with coincidence of preference.

Regardless of the extent of niche overlap (which is nearly complete if the value is around one and no overlap when the value is zero), there is no competition in the coexisting species of the community irrespective of the population density and degree of coincidence of preferences if the resources are not in short supply (8). Oligochaetes in particular are found in clumps at the peak of their population numbering in thousands and surviving successfully in the habitat (11). The studies show that the ability of oligochaetes in general and Tubificids and Naidids in particular withstand considerable oxygen depletion in their environ-

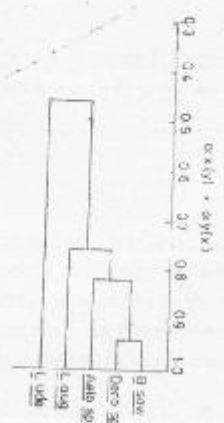


Figure 1. Dendrogram showing the niche overlap between the most abundant five Oligochaet taxa as $\alpha \times (y) \times \alpha y (x)$. Species order coded as given in text.

ment is an essential adaptation to their niche within the community (12). This common adaptation probably becomes one of the reasons to show ecological closeness between *B. sowerbyi* (a tubificid) and *Dero* sp. (a naidid) as is evident by the dendrogram (Fig. 1) based on average niche overlap pointing out the overlapping as a measure of coincidence of preference and extent of co-existence.

Apart from the habitat conditions for which the oligochaet species are adapted, from trophic view point the oligochaet assemblage is devoid of competition too. Studies on the trophic aspects of oligochaetes indicate that competition in the group is avoided by selective digestion of bacteria within the sediment to which the worms eat leading to a degree of collaboration as the feces of one species becomes preferred food for another species (13).

On the basis of the present study it can be concluded that niche overlap cannot always be a measure of competition but also an indication of the extent of co-existence with coincidence of similarity in preference for various resources.

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