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ON NICHE SEPARATION AMONG CERTAIN FRESHWATER OLIGOCHAETES

M.P. Sinha, Ratna Sinha, N. Saxena and E.A. Khan
Department of Zoology, Ranchi University, Ranchi - 834008, India.

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ABSTRACT: Niche separation among different permutations of seven dominant species of freshwater oligochaet has been calculated and discussed with reference to niche overlap, resource diversification and species richness in the habitat.

Key words : Niche separation, competition, coexistence, niche overlap, resource diversification.

Mac Arthur's (1972) measures of the numbers of potential competitors have been taken by Pianka (1975) as neighbors in space niche - a function that increases more or less geometrically with the number of subdivided niche dimension, and further the formers idea of mean competition co-efficient has been preferably considered as the mean niche overlap. Obviously then the niche overlap denotes the extent of competition among the species of the community taken into account. The niche separation is relation among species in opposite direction to competition. Hence niche separation can be said associated with species riches in the community. The niche separation thus becomes an important aspect to determine the interspecific competition and extent of coexistence of species in the community. As the review of literature reveals that only a few workers (Mac Arthur, 1965; Levins, 1968; Pianka, 1974, 1975; Hurlbert, 1978) have taken interest on such an important field related with niche concept and virtually no such work has been taken up on tropical freshwater oligochaetes, the present communication deals with some aspect of niche separation for the first time among freshwater littoral oligochaetes.

MATERIALS AND METHODS

Oligochaetes were sampled alongwith other macrobenthic fauna following standard methods described in detail else where (Sinha *et al.*, 1989). The oligochaetes were sorted out and preserved in the laboratory and their population density was calculated per square meter 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 (1968); Hurlbert (1978) along with Pianka's (1975) modification were adopted to calculate the niche separation values from the calculated population density data among all possible interspecific permutations of seven dominant oligochaet species.

RESULTS AND DISCUSSION

Out of fourteen species of littoral freshwater oligochaetes encountered during the period of investigation (Table-1) only seven dominant species were considered for the present study of niche separation. Species composition, maxima and minima of population density as well as the percentage of frequency of occurrence of oligochaetes have been summarized in the first table. The data on niche separation among seven dominant species namely *Branchiura sowerbyi (B. sow.), Limnodrilus udekemianus (L. ude.), Dero sp., Aelosoma sp. (Aelo. sp.), Tubifex tubifex (T. tub.), Dero pectinata (D. pec.), and Limnodrilus angustipenis (L. ang.)* of oligochaetes have been summarized in Table-2 (A and B) which clearly reflect that for some species the separation values are in negative terms such as between *B. sowerbyi and L. angustipenis; L. udekemianus and T. tubifex; Dero sp. and L. angustipenis*; the former species and *Aelosoma* sp. as well as *D. pectinata* and also between *L. angustipenis and D. pectinata* while for remaining interactions the separation values show considerable variation ranging from lowest value 0.019 to a highest value 0.770. The negative values suggest that the realized niche in case of these species are completely overlapped by the similar niche portions of interacting species. Similarly higher separation values depict the lower overlapping condition and thereby lower extent of interspecific competition (Mac Arthur, 1972). Hence the higher niche separation values thus obtained may be taken as quantification of higher level of coexistence of species in the community and the lower separation values as the high competitive interaction.

It is interesting to note that in a pair of interacting species having niche separation value in negative, one species is considerably high in population density as well as in frequency of occurrence which indicates that the species capable of overlapping the realized niche of other species have better chances of furtherance and ultimately survival.

In the present study the niche separation values obtained are usually low (less than 0.5) excepting a few cases such as 0.770 between *L. udekemianus and Aelosoma* sp.; 0.517 between *L. angustipenis and D. pectinata* and 0.510 between *T. tubifex* and *Aelosoma* sp. community with lesser niche separation values among the component species, as has been recorded during the present study, is considered to support high species richness in comparison to one with greater separation because more species utilize each type of resources (Pianka, 1974) which also comes true with oligochaetes and also because a community with greater niche overlap which is just the opposite direction of niche separation has been reported to support more species than one with lower overlap (Pianka, 1975). The lower values of niche separation show that the niche of one species includes the niche of other species and according to Miller (1967) both such species (niche including and included species) are favoured in the more optimal parts of the joint fundamental niche. Contrary to low niche separation values high separation values indicate restricted realized niche of the species leading to lesser adaptability to environmental variation (Colwell and Fuentes, 1975).

The opportunity of ecological diversification of component species of a community has been found to be directly related to the diversification of resources (Mac Arthur,

Table 1 : Species composition and period of minimum and maximum occurrence of oligochaetes.

Family/Taxon	Max.No./Month	Min.No./Abs/Month		% F.O.**
TUBIFICIDAE				
Branchiura sowerbyi	885 Aug.'86	89	Nov.'86	100.00
Branchiordrilus hortensis	178 Jul.'86	Abs.	in Dec. '85 and Sep. '86	7
Tubifex tubifex	194 Jul. '86	Abs.	in Dec. '85 and Sep. '86	83.33
Auledrilus americanus	25 JUl. '86	Abs.	in all months	8.33
Limnodrilus udekemianus	233 Jul. '86	Abs.	in Jan., Mar, Apr. and Jun. '86	66.66
L. angustipenis	279 Jul. '86	Abs.	in Feb. and Sept. '86	83.33
L. claparedianus	177 Mar. '86	Abs.	in all months expt. Jul. '86.	16.66
L. hoffmeisteri	14 Mr. '86	Abs.	in all months expt. May '86 and Jul.	25.00
AELOSOMATIDAE				
Aelosoma sp.	789 Jul. '86	Abs.	in Oct. '85	91.66
NAIDIDAE				
Chaetoqaster sp.	130 Jul. '86	Abs.	in Nov. '85, Jan., Apr., and Sep. '86	58.33
Dero pectinata	140 Oct. '85	Abs.	in all months expt. Jan., May and Jul. '86	33.33
Dero sp.	352 Jul. '86	Abs.	in Oct. '85	91.66
Pristina sp.	29 Jan. '86	Abs.	in all months expt. Apr. and Jul. '86	25.00
Bratislavia bilongata	08 Apr. '86	Abs.	in all months expt. in Jan. '86	16.66

** F.O. = Frequency of occurrence in the year round samples.

1965; 1972). Thus communities with fewer diversified resources will support fewer number of species than most of great variety of resource. Hence low niche separation values can be taken as an indicator of high resource diversity corresponding to smaller overall niche space. On the basis of the present data which embodies maximum values less than 0.5, the habitat from where the oligochaet were sampled, can be said to have moderate diversification of resources required by oligochaet population.

Table 2 : Niche separation between pairs of the most abundant oligochaet species A. Separation of the species of vertical column from those of horizontal column b. The same of horizontal column from vertical column. Species abbreviations similar as text.

	B. sow.	*L.ude.*	*Dere.* sp.	*T. tub.*	*L. ang.*	*Aelo.sp.*	*D.pec.*
A.							
B. sow.		0.233	0.047	0.232	(-)0.036	0.019	0.177
L.ude.			0.231	(-)0.005	0.295	0.770	0.253
Dero sp.				0.267	(-)0.032	(-)0.030	(-)0.29
T.tub.					0.234	0.429	0.243
L. ang.						0.166	0.100
D. pec.							0.122
B.							
B. sow.							
L. ude.	0.185						
Dero. sp.	0.020	0.256					
T. tub.	0.264	0.028	0.316				
L.ang.	0.246	0.517	0.269	0.419			
Aelo. sp.	0.193	0.449	0.176	0.510	0.057		
D.pec.	0.292	0.395	0.139	0.321	(-)0.064	0.083	

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