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Title

Some meristic characters of Lake Winnipeg Ciscoes,
Leucichthys spp.

Author

J. J. Keleher

Central Fisheries Research Station

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INTRODUCTION

Teleostean species and subspecies often differ in meristic characters. In a taxonomic study of the Lake Winnipeg ciscoes, Leucichthys spp. meristic as well as morphometrical data have been collected.

The ciscoes occurring in Lake Winnipeg appear to represent 4 species (Dymond and Pritchard, 1930; Keleher, 1950). Consideration of their meristic characters seems warranted since data for 849 specimens identified as L. zenithicus, L. nigrispinnis, and L. nipigon are available. L. tullibee has not been included in this discussion owing to the small number of specimens collected.

MATERIALS AND METHODS

Meristic characters were collected from the specimens used in a previous study (Keleher, *ibid*). Locality records, collection dates and size of specimens may be found in that paper.

The meristic characters considered here are the number of dorsal and anal fin rays, number of branchiostegal rays and the number of vertebrae. Procedure for counting fin rays followed Dymond (1926). The total and abdominal vertebral count includes the hypural plate.

Frequency distributions of the characters and their arithmetic means and variances are presented. To ascertain if the sample (i. e. species) variances were homogeneous, Bartlett's test (Snedecor, 1946, p. 251) was used. The method of testing the difference of character means between species was consequent upon the

outcome of this test. Where the variances were considered not different, an ordinary "t" test was performed. Where the variances were found heterogeneous a modified "t" test (Snedecor, *ibid*, p. 84) was used.

Either type of "t" test was made in groups of three, i. e. zenithicus sample vs. nigripinnis sample, nigripinnis vs. nipigon and nipigon vs. zenithicus. Professor McCreary of the University of Manitoba stated that the probability values given in Snedecor (*ibid*, p. 65) are slightly low when the "t" test is used in the above manner. Allowance was made when judging the significance of any tests.

The basic data were obtained by combining all available material without evaluating the possible variation arising from the specimens being of various ages and year classes and collected in different localities. This was done because it was felt that interspecific differences would overshadow any intraspecific variation.

RESULTS

Tables I and II record for the three species the frequency distribution, mean and variance of each character. For each character the variates of the three species overlap. Thus between species there is complete intergradation of the variates and statistical tests are necessary to decide if the interspecific differences are real.

The total vertebral count was the only character showing no significant differences of means or variances between species.

It was concluded that Lake Winnipeg zenithicus, nigripinnis and nipigon do not differ in the total number of vertebrae. The vertebral count may be restricted to abdominal vertebrae. This character showed heterogeneous variance. In addition in two tests the means differ significantly: zenithicus vs. nigripinnis, nigripinnis vs. nipigon. The differences in average number of abdominal vertebrae were of a low order. The greatest difference between means was 0.41. The zenithicus vs. nipigon comparison was not significant.

One other character, the dorsal ray count, showed heterogeneous variance. The differences of means between species were not significant.

Homogeneous variance and significantly different means were noted in the branchiostegal and anal ray characters. Each test of means involving branchiostegals was highly significant, but it is again to be realized that the differences were slight. The greatest difference, 0.61, was between the zenithicus and nipigon samples. It was concluded that three species of Lake Winnipeg ciscoes have distinctive average branchiostegal counts. In the test of average anal fin rays one comparison failed to yield a significant difference. The "t" test for zenithicus vs. nigripinnis was significant; for zenithicus vs. nipigon, highly significant. With respect to average number of anal fin rays it was concluded that zenithicus differs from both nigripinnis and nipigon but the last two named species are not different.

Factors such as year classes, age groups and localities have been ignored in the present analysis. The mixture of year classes, age groups and localities may be obscuring the interspecific mean differences tabulated in Table. III. Before an analysis of these factors can be undertaken, more data must be obtained.

SUMMARY

Five meristic characters of Lake Winnipeg ciscoes, L. zenithicus, L. nigripinnis and L. nipigon have been compared. Method of comparison was the testing of the interspecific differences of the mean and variance of each character.

The three species were found not to differ in the total number of vertebrae. All species differed in average number of branchiostegal rays and zenithicus had a different average number of anal rays from nigripinnis and nipigon.

In both dorsal rays and abdominal vertebrae the three species lacked a common variance. In the first mentioned character the means of the species did not differ while in the latter character a significant difference was evident. Explanation for the differences in variances is not presently available.

Analysis of intraspecific factors such as age groups, year classes and localities must wait until more data are collected.

Differences of certain meristic characters between Lake Winnipeg ciscoes are so slight that these characters cannot be used in identification. Some appear to be taxonomic characters but are of no diagnostic value.

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LITERATURE CITED

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Table. 1. Meristic characters of Lake Winnipeg ciscoes, *Leucichthys* spp.

Ray Count	Dorsal Fin			Anal Fin			Branchiostegal		
	<i>senithicus</i>	<i>nigripinnis</i>	<i>nipigon</i>	<i>senithicus</i>	<i>nigripinnis</i>	<i>nipigon</i>	<i>senithicus</i>	<i>nigripinnis</i>	<i>nipigon</i>
6							4	1	1
7							35	5	35
8	1						267	57	120
9	35	3	5	1	1		184	89	24
10	247	38	52	14	7		13	10	1
11	201	89	107	138	27	35		1	
12	17	32	17	281	87	105			
13	3	1		65	41	38			
14				5	1	3			
15		1							
Totals	504	164	181	504	164	181	503	163	181
Mean	10.405	10.963	10.752	11.813	11.994	12.050	8.332	8.644	8.939
Variance	.621	.624	.432	.538	.669	.470	.461	.490	.368

Table. II. Vertebral counts of Lake Winnipeg ciscoes, *Leucichthys* spp.

Number	Total count			Number	Abdominal count		
	<i>zenithicus</i>	<i>nigrispinnis</i>	<i>nigron</i>		<i>zenithicus</i>	<i>nigrispinnis</i>	<i>nigron</i>
50				24			
51	1	1		25	1		1
52	2	2		26	-	2	
53			2	27	1	4	2
54	6	2	4	28	8	2	7
55	21	5	10	29	25	20	18
56	58	22	21	30	133	48	31
57	125	35	38	31	156	49	64
58	164	36	49	32	131	26	43
59	92	29	35	33	35	9	14
60	25	18	17	34	6	1	
61	6	11	4	35	1		
62		1		36			
				37		1	
Totals	500	162	180		499	162	180
Mean	57.626	57.636	57.696		30.995	30.586	30.828
Variance	1.882	3.321	2.504		1.466	2.107	1.830

Table III. Significance of means for meristic characters of Lake Winnipeg ciscoes, Leucichthys spp.

	Dorsal Rays	Anal Rays	Branchiostegals	Total Vertebrae	Abdominal Vertebrae
<u>zenithicus</u> vs. <u>nigripinnis</u>	Nil	*	**	Nil	**
<u>zenithicus</u> vs. <u>nipigon</u>	Nil	**	**	Nil	Nil
<u>nigripinnis</u> vs. <u>nipigon</u>	Nil	Nil	**	Nil	*

Note: Nil signifies not significant, * significant and ** highly significant.

