

VARIATION IN THE CAUDAL SKELETON OF
ETHEOSTOMA NIGRUM RAFINESQUE (OSTEICHTHYS:PERCIDAE).

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ABSTRACT

23 Etheostoma nigrum nigrum Rafinesque, 34 intergrades and 17 E. n. eulepis (Hubbs and Greene) were cleared and stained. E. nigrum has the Type F caudal fin. Three patterns of fusion of the hypural bones were found. No significant difference was found between the frequency of fusion between subspecies. Number of branched caudal rays varied greatly within each subspecies. Because of its variation, caudal structure does not seem taxonomically useful at this level.

INTRODUCTION

Schlueter and Thomerson (1971) reported on the variation of the caudal skeleton of Etheostoma caeruleum Storer, but failed to mention if the caudal fins varied between local populations or as a result of hybridization with other species. This paper examines the variation in caudal fins of the Central Johnny Darter, Etheostoma nigrum nigrum Rafinesque and, the Scaly Johnny Darter, E. n. eulepis (Hubbs and Greene). Underhill (1963) suggests that the subspecies rank of E. n. eulepis be discarded. Collette and Knapp (1966, p.18) agreed with Underhill, stating the elevation to subspecies rank does not aid in understanding the complex distributional pattern. Hubbs (1961, p.15) cites E. n. eulepis and E. n. nigrum as an apparent dramatic illustration of the force that resists swamping, as well as the power of the ecological potential. My investigation was sparked by the possibility of finding new evidence for understanding this complex problem.

MATERIALS AND METHODS

Specimens were preserved in 10% formalin, later washed in running tap water and transferred to 40% isopropanol. Darters were identified to subspecific level (Hubbs and Lagler, 1964). If any of the three areas of the nape, cheeks and breast of a fish were sparsely squamated (area covered by scales less than 50%) or naked, then the fish was assigned to the intergrade group.

All 74 specimens were collected in Northern Illinois in 1973. De Kalb Co.: Indian Creek, bridge on Chicago Rd.: Sept. 7, (4 E. n.

nigrum:5/1 five intergrades one of which had fused hypurals:0 E. n. eulepis). Sept. 11, (7:19/2:4). De Kalb Co.: Somanauk Creek, 180 m south of bridge on Pratt Rd.: Sept. 7, (0:1:1). De Kalb Co.: Owens Creek, bridge on Hwy. 72: Sept. 19, (1:3/1:2/1). De Kalb Co.: Coon Creek, bridge on Hwy. 72: Sept. 19, (4/2:2:3). Oct. 5, (7/1:1:6/3). Jo Daviess Co.: Apple River, bridge on Farm Rd., 0.1 mi. south of Hanover on Hwy. 84: Sept. 29, (0:3/1:1).

Instead of severing the fish at the caudal peduncle, as did Schluter and Thomerson (1971), the entire fish was cleared and stained, using a technique modified from Taylor (1967), Davis and Gore (1936), and Hollister (1934). Numbering of the hypurals follows Lundberg and Baskin (1969).

RESULTS

Of the 74 specimens examined, 62 showed no hypural fusion (83.8%), 3 of the 23 E. n. nigrum showed hypural fusion (13.0%), 5 of the 34 intergrades had fused hypurals (14.7%), 4 of the 17 E. n. eulepis had fused hypurals (23.5%). The G statistic (Zar, 1974) for the log-likelihood ratio goodness of fit test was calculated for the frequencies of fusion of the hypurals according to subspecies as $G=0.83873$, degrees of freedom=2, $0.50 < P < 0.75$. The null hypothesis, H_0 : The frequency of fusion of hypural plates as independent of subspecies., was accepted.

Etheostoma nigrum has the Type F caudal fin of Lundberg and Baskin (1969,p.15). Three patterns of fusion of the hypural bones were found: fused hypurals 1-2 (6 fish), 3-4 (5) and P-1-2 (1) (see Figure 1).

Branched caudal rays for subspecies and intergrades all had a mode of 14. Specimens of E. n. nigrum had: branched rays 13 (4 fish), 14 (15), 15 (4). Intergrade specimens had: 12 (1), 13 (4), 14 (23), 15 (4), 16 (1), 17 (1). Specimens of E. n. eulepis had: 12 (1), 13 (2), 14 (8), 15 (3), 16 (3).

DISCUSSION

Only three types of hypural fusion were found for E. nigrum as compared to the 9 types found for E. caeruleum by Schluter and Thomerson (1971). The greater variation found for E. caeruleum is based on a larger sample size (491 specimens). Radiographs of the caudal fins of this species would be of only limited value. Often it is impossible to tell from a cleared and stained specimen if fusion has occurred until manipulating the hypurals with forceps. The higher frequency of fusion of the hypural plates of the eulepis form was found to be insignificant for my sample. Since there is no significant difference of fusion between subspecies, and because each specimen is essentially destroyed by the clearing and staining process, hypural fusion as a character for separation of subspecies seems nonproductive.

The number of branched caudal rays was highly variable with no discernible differences between subspecies.

CONCLUSIONS

No significant difference in fusion of hypural plates was found for subspecies of E. nigrum. E. nigrum has the Type F caudal fin. Branched caudal rays vary greatly within each subspecies.

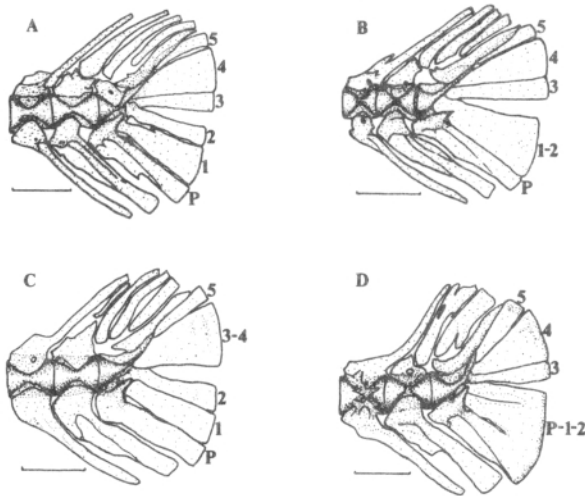


Fig. 1. Caudal skeletons of Etheostoma nigrum: A. Normal configuration of 41.38 mm E. n. eulepis, P=parhypural, 1-5=hypurals, scale 1.0 mm; B. Fused hypurals (1-2) of 36.71 mm intergrade; C. Fused hypurals (3-4) of 43.23 mm E. n. eulepis; D. Fused parhypural and hypurals (P-1-2) of 49.13 mm intergrade.

ACKNOWLEDGEMENTS

I wish to thank Dr. Darrell Lynch and Dr. Malcolm Jollie for the critical review of this paper and Dr. Jerrold Zar for help with the biostatistics. Jane K. Glaser offered expert advice in the preparation of Fig. 1. I also wish to thank William S. Vinikour and Richard V. Anderson for their help in field collections and I-heng Chung for typing the final copy.

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Contribution No. 535 from the Department of Biological Sciences, Northern Illinois University.