

ENERGY DISPERSIVE X-RAY MICROANALYSIS (EDX) OF SCALE OF SCHISTURA MONTANUS (MCCLELLAND, 1838)

R. K. NEGI* AND SHEETAL MAMGAIN

Department of Zoology and Environmental Science,
Gurukula Kangri University, Harwar - 249 404, (UK)
E-mail: negi_gkv@rediffmail.com

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*Corresponding
author

ABSTRACT

The scale of *Schistura montanus* (McClelland) was found to be oval in shape. The scale contains nine minerals, viz. Ca, P, Na, Si, Mg, S, Cl, Al and O. The percentage composition of Ca was reported maximum followed by phosphorus, Na, Si and Mg.

INTRODUCTION

Various hard parts of fishes such as scales, otoliths and vertebrae etc. have been employed successfully for the classification (Lagler, 1956), identification (Tandon and Chaudhary, 1983), age determination (Chugunova, 1963) growth studies and as pollution indicators (Johal and Dua, 1995). Scales are considered to be calcified structures with constant number on the body of the fish. There exists a straight line relationship between the total fish length and the scale radius (Jayaram, 1999). In the Indian hill streams, the members of the family Balitoridae, subfamily Nemacheilinae and genus *Schistura* McClelland which includes the loaches, inhabiting unpolluted and clear waters, play a significant role in maintaining the ecological balance of the hill streams and act as natural scavengers as they scrap the algal matter present on the stones as their food. Moreover, because of their unique coloration and stone surface scrapping habit, almost all the species of the genus *Schistura* McClelland are considered to be excellent aquarium fishes (Johal *et al.*, 1994). Information regarding the mineral composition of the scale of the fish under report is lacking. Hence attempt has been made to determine the mineral composition of the scale for the first time in this fish species.

MATERIALS AND METHODS

Adult specimens of *Schistura montanus* (McClelland) (syn. *Nemacheilus kangrae* Menon (Jayaram, 1999) were collected from the river Tons (78°04', 6.07"EL, 30°26' 16.5"NL, altitude 1565 msl) of Dehradun district of Uttarakhand state during June 2010 using scoop and hand nets. The embedded scales

were gently removed with the help of sharp blade and fine forceps from the posterior side of the body between the dorsal fin and lateral line. Scales were cleaned manually using the fine brush and rinsed in triple distilled water. The cleaned scales were mounted on metallic stub with double stick tape, coated with 100 Å thick layer of carbon coating unit. The carbon coated scales were viewed under vacuum in Scanning Electron Microscope (Carl Zeiss EVO 40 EP) at an accelerating voltage of 20 KV at the low probe current. The energy dispersive X-ray detector (Bruker AXS X Flash detector 4010) has been used for the analysis of minerals on the scale, and elements were calculated by using Quantax 200 software.

RESULTS AND DISCUSSION

The scale of *Schistura montanus* (McClelland) was found to be oval in shape. The scale contains nine minerals, viz. Ca (24.91%), P (18.53%), Na (4.39%), Si (5.30%), Mg (2.81%), S (1.38%), Cl (0.77%), Al (0.82%) and O₂ (40.09%) (Table 1). The percentage composition of Ca was reported maximum followed by phosphorus, Na, Si and Mg. The higher concentration of oxygen is due to the presence of oxides of above mentioned elements. The low percentage of elements may be due to the very small scale size (7.5 mm). Tandon and Johal (1993) and Johal *et al.*, (1994) have reported four minerals viz. Ca, P, Al and Fe from the different regions of scales of *Tor putitora*, and *Danio devario* and *Amblypharyngodon microlepis* respectively while, Van Oosten (1957) described Ca, Mg and P as major mineral constituents of the scales of *Cyprinus carpio* and *Labeo* along with traces of Na and S. A perusal of literature has revealed that maximum four minerals were reported by previous works on different fish species while

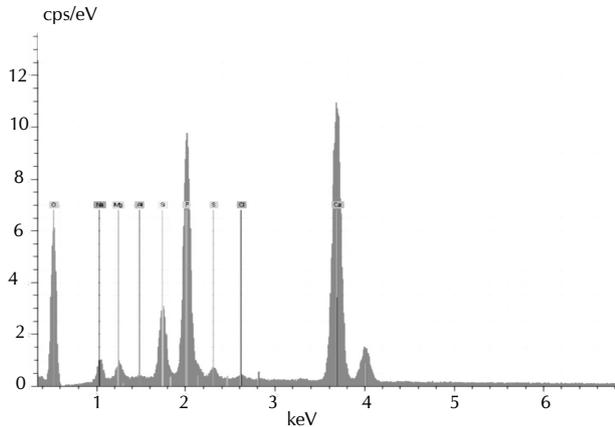


Figure 1: Peak values of different elements in the scale of *Schistura montanus* (McClelland)

nine minerals were reported from the scale under report. This may be due to the bottom dwelling habit of the fish leading to the maximum deposition of the minerals thus making it an excellent 'bio-indicators' of pollution for future investigations in various water bodies.

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Table 1: Mineral composition (weight percent) of scale of hillstream loach *Schistura montanus*

S.No	Minerals	Weight percent
1	Sodium	4.39
2	Magnesium	2.81
3	Aluminum	0.82
4	Silicon	5.30
5	Phosphorus	19.53
6	Sulfur	1.38
7	Chlorine	0.77
8	Calcium	24.91
9	Oxygen	40.09

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