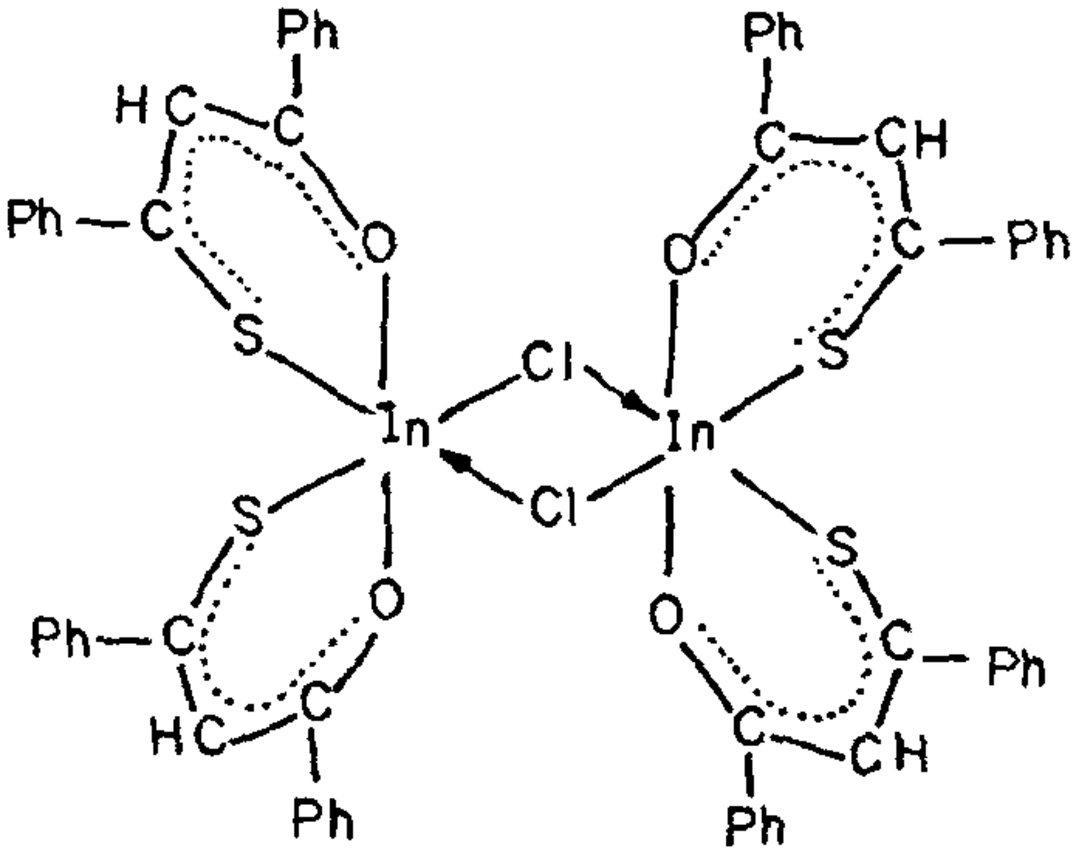
complexes with ligands having thiophenyl group (Ph–C(S)–), but our attempts to prepare complexes with ligands having thiomethyl group (Me–C(S)–) failed. Their IR spectra in addition to the three characteristic bands mentioned above, show bands at 530–503 cm^{-1} and 460–435 cm^{-1} assignable to Ge–O and Ge–S[10] stretching modes respectively. Also the band at 290–270 cm^{-1} is assigned to Ge–Cl asymmetrical stretching mode. Similarly dichloro *bis*(monothiodibenzoylmethanato) tin(IV) complex exhibit bands at ~ 440 cm^{-1} and ~ 300 cm^{-1} and have been assigned to Sn–O stretching and Sn–Cl asymmetrical stretching modes respectively. In Sn(II) complexes absorption due to ν(Sn–Cl) mode is absent. The intense band at ~ 370 cm^{-1} arises due to ν(Sn–S) absorption in all the Sn(II) and Sn(IV) complexes. A single signal in the PMR spectrum of $GeCl_2$ $(PhCSCHCOMe)_2$ due to CH_3–C(O) group is observed.

Indium *tris*(monothio-β-diketonato) complexes appeared to be octahedral. Reaction of $InCl_3$ with the ligands in 1:1 or 1:2 molar ratio ended up with *bis*-product only which is found to be dimeric. Presumably the dimeric structure involves chlorine bridges as shown below. Absorption due to ν(In–Cl) mode is observed at ~ 315 cm^{-1} which is consistent with the position reported for $InX_2(acac)L\ EtOH$[13]. The absorption at ~ 370 cm^{-1} present in the ligand becomes very intense. A band observed at 420 cm^{-1} can be assigned to ν(In–O) mode[13].

The dipole moments of these complexes are being studied which could throw light on the clustering behaviour of sulphur atom on the coordination sites of the proposed structure.



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OCCURRENCE OF GROWTH RINGS ON THE HARD PARTS OF *SCHIZOTHORAX CURVIFRONS* HECKEL.

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A GOOD deal of literature is on record for decoding the age by the study of hard parts *viz* scales, opercula, otoliths and vertebrae from India[1–7] but such studies have been extremely limited on Kashmir fishes[8–9]. There is no record of utilizing hard parts for the determination of age and growth of *Schizothorax*

curvifrons which forms an important commercial food fishery among the endemic fish fauna of Kashmir valley. During the present investigations on the eco-biological studies of *S. curvifrons*, it was established with certainty that the hard parts *viz* vertebrae, otoliths and opercular bones could be used for aging the species. However, the scalimetric method used for the determination of the growth had to be discarded for some practical difficulties.

The material for the present studies was procured from river Jhelum between July 1980 and June 1982. The vertebrae and the otoliths were viewed through a compound microscope and the distances for all the intermediate as well as the marginal rings from the centrum and nuclear region were measured with the help of an ocular micrometer. In the case of opercular bones, the measurements were taken directly with the help of a fine plastic scale. The photographs of vertebrae and opercular bones were taken by a photo-enlarger using the bones as negatives[7]. The photo-micrographs of otoliths were taken by Olympus photographic camera. Figures 1–3 depict the rings formed in vertebrae, otolith and operculum of the same fish.

A high degree of correlation was recorded between the growth of the fish length and hard parts when a straight line was fitted by the use of least squares method between the two parameters (figure 4). An alternating periodicity of slow (dark, thin, transluscent or hyaline) and fast (broad, white and opaque) growing zones in all the hard parts were observed. The opaque broad layers of calcium carbonate secreted during the period of rapid growth (summer-autumn) were bordered by transluscent layers during less growth period (winter). Two such zones were considered one growth

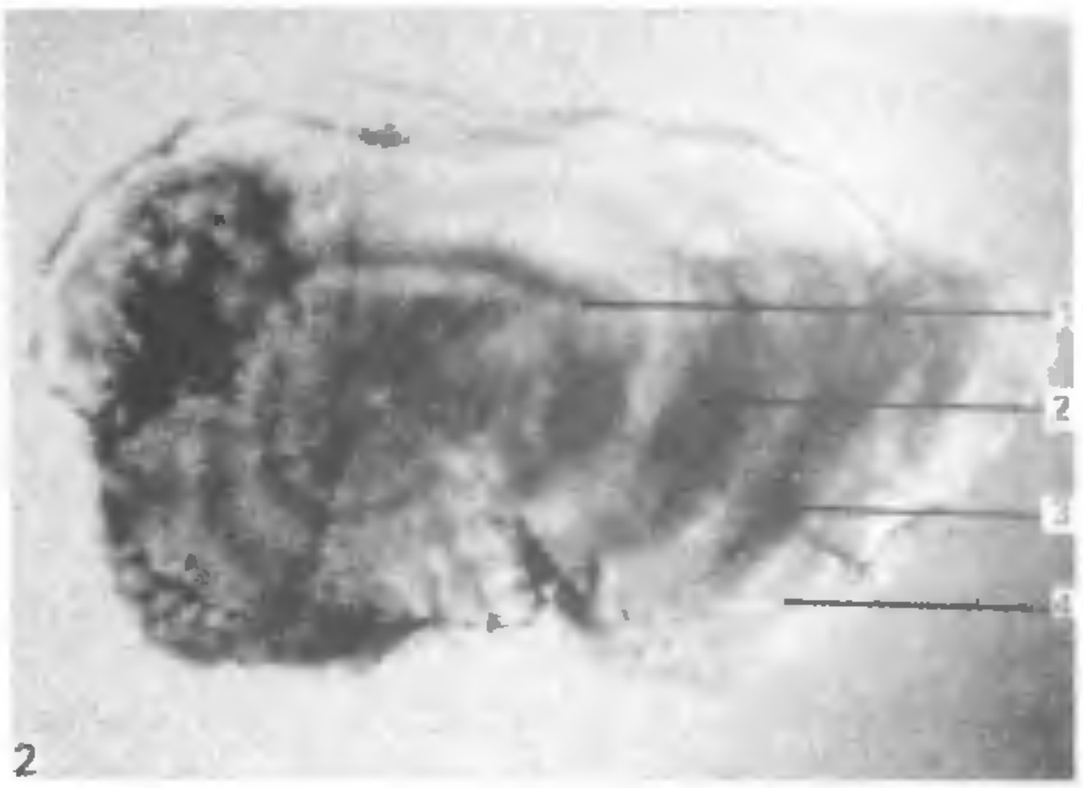

Figure 2. Otolith of *S. curvifrons* showing four rings.

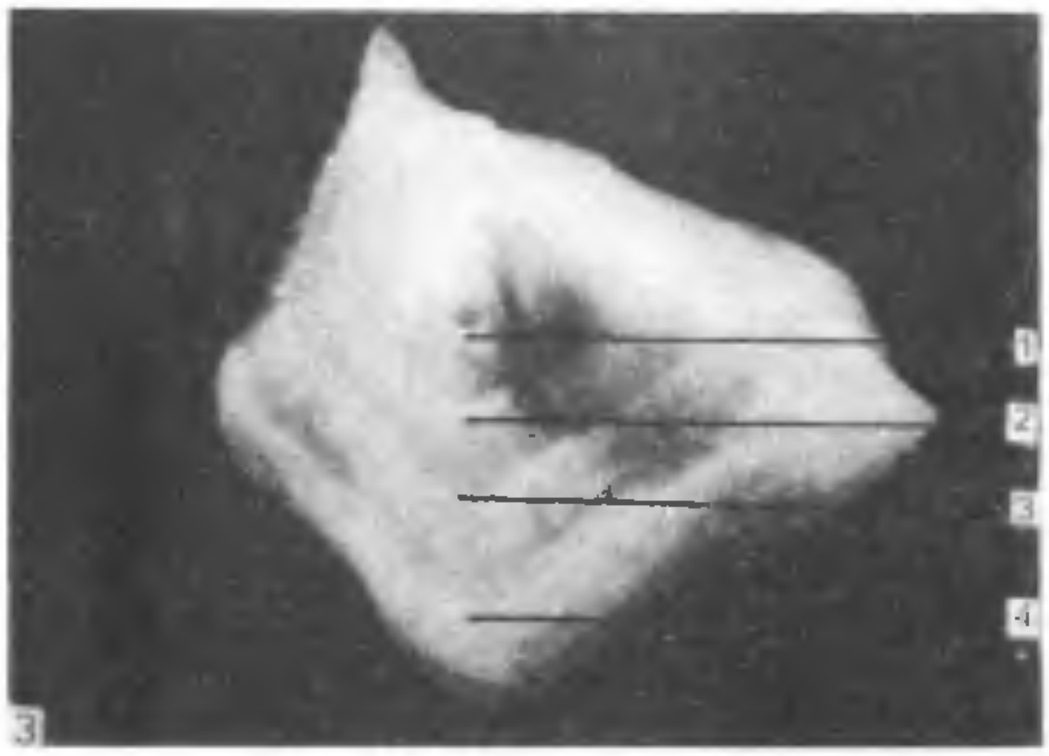

Figure 3. Operculum of *S. curvifrons* showing four rings.

Figure 1. Vertebrae of *S. curvifrons* showing four rings.

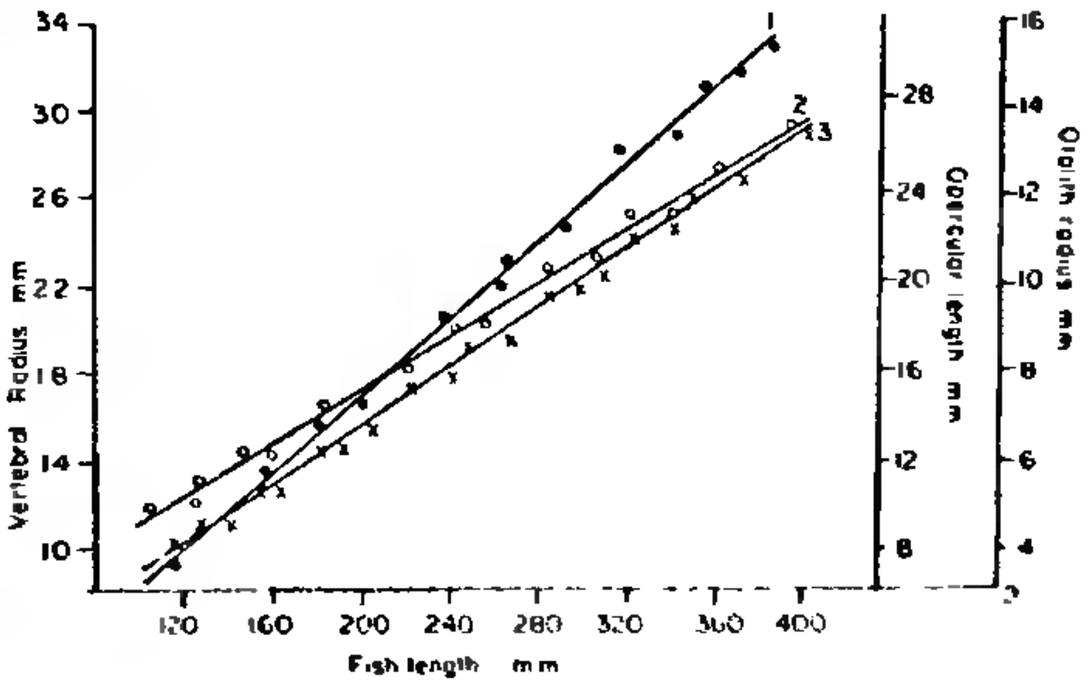

Figure 4. Relationships between (1) fish length/otoliths, (2) fish length/vertebrae and (3) fish length/opercular bones.

ring in *S. curvifrons* during the year. Qasim[10] generalised such findings for other temperate fish species as well.

The vertebrae from 1–6 years of fish age had the average radii of 11.1 mm, 15.4 mm, 19.3 mm, 24.2 mm, 29.0 mm and 32.7 mm while the respective average radii of the otoliths measured 4.3 mm, 5.9 mm, 7.6 mm, 8.9 mm, 10.3 mm and 14.5 mm. The lengths of opercular bones were 8.7 mm, 12.9 mm, 16.1 mm, 20.3 mm, 23.1 mm and 24.3 mm in the individuals of age groups of 1–6 years. The margins of various hard parts in the present fish captured during different months of the year were examined carefully and it was observed that the periodic markings on these parts were laid annually. However, the higher percentages of completed marginal rings were discerned during winter months (as high as 88.31%).

The lengths attained by *S. curvifrons* as worked out by back calculations were estimated to be 130.5 mm, 193.1 mm, 251.5 mm, 306.5 mm, 361.9 mm and 404.7 mm in case of vertebrae; 132.3 mm, 193.5 mm, 261.8 mm, 312.9 mm, 380.1 mm and 399.5 mm in case of otoliths whereas 136.1 mm, 190.7 mm, 249.4 mm, 301.2 mm, 373.4 mm and 408.7 mm in case of opercula during 1–6 years of fish age. Not much of significant variations were observed when the age was worked out through the studies on different hard parts. These methods gave a good validity of age and growth in *S. curvifrons* based on high correlation between the growth parts and the growth of entire body, formation of markings on hard parts annually and by comparison of observed and back calculated lengths of the fish.

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SOIL FUNGI ANTAGONISTIC TO PLANT PATHOGENS

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BEING a heterogenous ecosystem, soil harbours a variety of microorganisms. It is generally recognized that antagonistic interactions of microorganisms constitute an important limiting factor for survival of plant pathogens in the soil. Many workers[1,2] have reported antagonistic action of soil microorganisms on plant pathogens as also the possibility of their use in controlling plant diseases[3].

While screening many soil fungi for their antagonistic action against some plant pathogenic fungi, the authors came across *Trichoderma viride*, *Aspergillus flavus* and another species of *Aspergillus* to be antagonistic to *Sclerotium rolfsii*, *Pestalotia magniferae* and *Colletotrichum gloeosporioides*.

Spore suspension of antagonistic fungi was evenly spread in the petri plates containing potato dextrose agar medium. The plates were then inoculated with pathogenic fungi in the form of sclerotia in the case of *S. rolfsii* and mycelial mat on agar discs in the case of *P. mangiferae* and *C. gloeosporioides*. The plates were incubated for 7 days at room temperature (28 ± 1°C) and the growth of pathogens was observed.

All the three soil fungi except one showed antagonism to the pathogens but they varied in the degree of their antagonism.

Figure 1 shows that *S. rolfsii*, *P. mangiferae* and *C. gloeosporioides* in the control plates numbered 1, 2 and 3 respectively have grown profusely while the growth of the same in the presence of *T. viride* (A), *A. flavus* (B) has been suppressed markedly. Sclerotia did not germinate in the presence of these two fungi. It is interesting to note that there is not only a profuse growth of *S. rolfsii* but formation of numerous sclerotia in the presence of another species of *Aspergillus* (C) though it is antagonistic to some extent to *P. mangiferae* and *C. gloeosporioides*.

Pot culture studies with unsterile soil also indicated