AGE DETERMINATION AND THE HYPOTHESIS OF ANNUAL DOUBLE CYCLE OF GROWTH IN SARDINELLA AURITA

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Abstract :

Age determination of fish from the number of annual checks laid down in hard parts of body, notably on scales, otoliths and operculars bones, is well established. It is necessary to show for each species studied that such checks are annual or that they are periodic in occurrence. First observations of scales of S. aurita seem to show two annual cycles of growth. This phenomenon would be explained by the existence of the minor upwelling and the major upwelling which are two good periods for the development. Nevertheless, more than 18 months of scales observations are necessary to reject or to accept this hypothesis of annual double cycle of growth.

Résumé :

La détermination de l'age des poissons selon le nombre de marques déposées sur les pièces dures du corps, notamment les écailles, les otolithes, les os operculaires est bien connue. Toutefois il est nécéssaire d'établir la périodicité, annuelle ou saisonnière du dépôt de telles marques. Les premières observations d'écailles de S.aurita semblent montre l'existence de deux cycles annuels de croissance. Ce phénomène s'expliquerait par l'existence des upwelling mineur et majeur qui constituent deux périodes favorables à la croissance. Néanmmoins plus de 18 mois d'observation sur les écailles seront nécéssaires pour rejeter ou accepter cette hypothèse d'un double cycle annuel de croissance.

Age determination of fishes uses hard parts of body like otoliths, scales and opercular bones which show the number of years by marking annual checks.

In temperate zones, it is easy to verify it because of the season's features which are well separated :

* during autumn and winter, waters are very cold and ecological conditions are difficult to be supported by the animals. This event is shown by a slowing up or a stoppage of the growth. With a binocular observation, this event is seen on the hard parts by an opaque zone.

** during the spring or the summer, the temperature of the water and the ecological factors are favourable to the development. The aquatic environment is full of food and fishes grow again. On the hard parts, growth is expressed by the hyaline zone.

So, in temperate waters, annual checks laid down in those hard parts are obvious. For a given fish, it is easy to say (for example) : 1 check = 1 winter = 1 year old. On figure 1a (in Girardin et Quignard, 1985), we can easily say that this fish is seven years old because there are seven checks.

In tropical waters, it is sometime difficult to make such conclusions, particularly with pelagic fishes like Sardinella aurita Some of its scales had been observed in April (one month after the minor upwelling) and in August (during the major upwelling). Preliminary results which have been seen are :

** The last check on the scale is near the side with the scale of April (Fig. 1b) . It is the contrary with the one of August (Figure 1 c) where the last check is far from the side.

** On the other hand, on the whole scale, wide rings alternate with the thin one. This would mean that at each season of upwelling, there is an activity of growth and the duration of each upwelling can be seen one the scale by unequal width of the rings.

This event could mean that, for Sardinella aurita, there is a double cycle of growth induced by each one of the upwellings.

The other lesson we can draw with this preliminary sight is that, every upwelling having its spawning period, it can be possible to discriminate the cohort of minor upwelling to the one of major upwelling only by seeing the width of the first ring laid down in the scale. That is to say if the focus and the ring are clearly identified on the scale, it can be possible to separate fishes born during or just before the minor upwelling to those of the major upwelling : it is a way of research which needs to be clarified with the future studies.

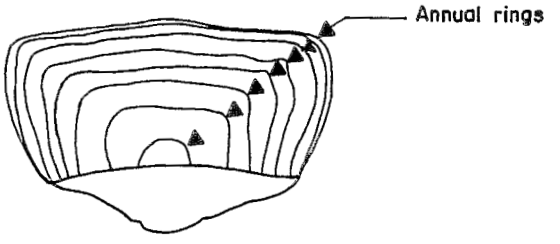
REFERENCE

Girardin M. Quignard J.P., 1985. - Croissance de *Pagellus erythrinus* (Pisces : Téléostéen, Sparidae) dans le golfe de Lion. **Cybium, 9 (4)** : 359-374.

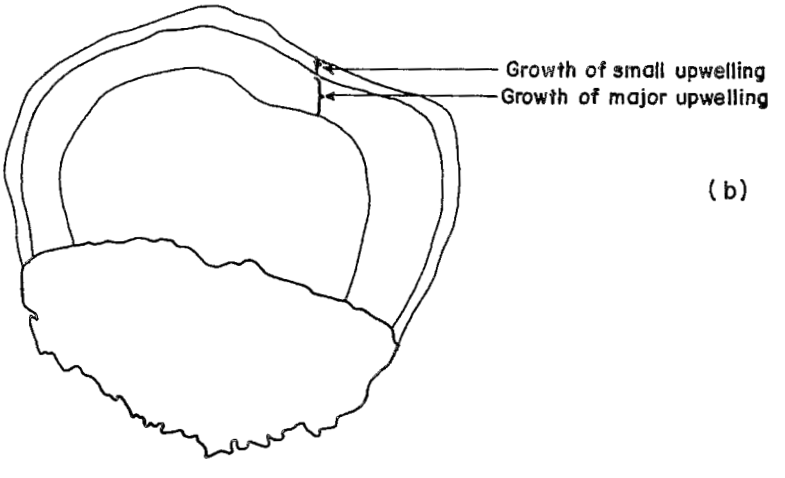
Figure 1 : **(a)** Scale of Pagellus erythrinus captured in Golfe du Lion (temperate waters): annual rings are shown by arrows.

(b) Scale of Sardinella aurita captured in April at end of minor upwelling. Size: 209 mm.

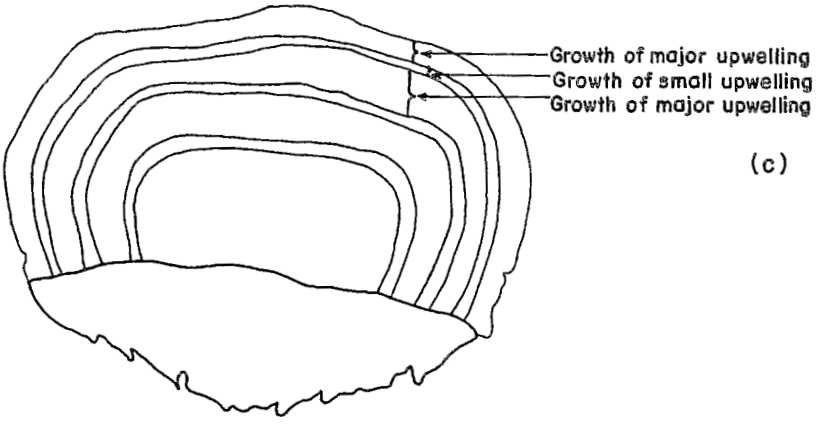
(c) Scale of S. aurita captured in August during the major upwelling. Size: 247mm


Annual rings

(a)


Growth of small upwelling
Growth of major upwelling

(b)


Growth of major upwelling
Growth of small upwelling
Growth of major upwelling

(c)