



# Marine Scotland Science

## Fish Age Determination Procedures: Anglerfish

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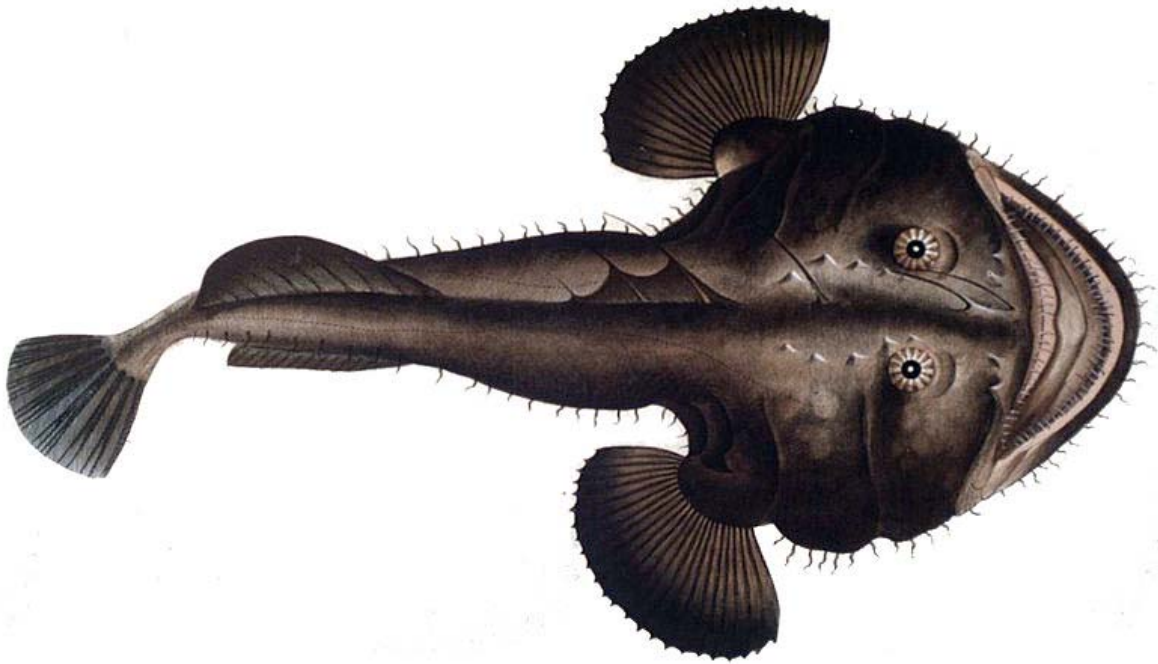


FISH AGE DETERMINATION PROCEDURES  
2: ANGLER FISH

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This manual is intended to be used in conjunction with training at the microscope

In order to undertake stock assessments for use in fisheries management, a knowledge of fish age/stage is required. Although there is a general relationship in most species between age and size, It is difficult to determine the age of a species by simple measurements of body length or weight. Fisheries scientists, therefore, are required to determine fish age using alternate measures. The most common method is observing the growth rings in hard, bony structures of the fish the ear bones (otolith), scales, spines etc .

This manual describes the procedures employed by Marine Scotland Science for the aging of the Angler fish (*Lophius* spp)

### **Collecting anglerfish otoliths**

The principal is similar to gadoids (see Henderson 2017) except that the fish is laid on the board upside down and the incision made in to the auditory capsule from underneath. The otoliths are faintly visible through the bone and are extracted by inserting the point of a knife blade and twisting it. The otolith can then be extracted on the point of the blade or, if missed, by using forceps. Great care should be taken to prevent external damage when carrying out this procedure, as Anglerfish is a very high value species.

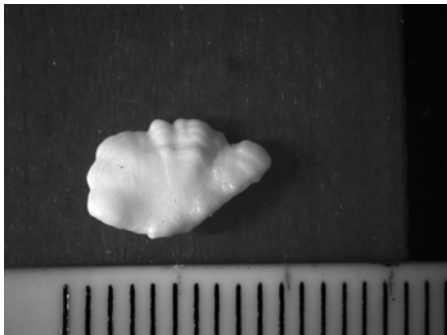


Figure 1. Angler fish in January; scale in millimetres.

The otoliths (Fig 1) are collected in small paper envelopes. Following checking of sampling paperwork, they are transferred to individual “Treff” microtubes containing plain tap water for storage. Experience has shown that allowing the otoliths to dry out results in problems in subsequent age estimation, as older (larger) individuals do not respond well to a period of rehydration, and the first three annual rings in particular can be difficult to discern. In addition, long term storage in water can lead to the otoliths breaking down and the surface becoming “chalky”, perhaps due to acid digestion.

### **Preparing anglerfish otoliths**

The otoliths will be supplied to the reader in racks of individual plastic tubes, along with the packets in which they were collected. Each tube will bear the length of the fish written upon it, and the tubes will be in sequential order, by category, as originally sampled. This is necessary to retain parity with the original sampling sheet and allow correct entry of age data in the Fisheries Management Database, (FMD). Each rack will be labelled with the

sampling area and date. Otoliths are transferred to a black plastic tray for reading, as described in the chapter on interpretation.

### **Reading anglerfish otoliths**

Anglerfish otoliths are read in a shallow plastic tray constructed for the purpose (Fig 2). Since the otoliths are stored in individual tubes of water from the point of collection, they are ready for reading and can be transferred to the black tray. Transfer five otoliths from their individual tubes, and position them with their distal surface uppermost and the dorsal edge towards the left. Fill the tray with sufficient water to completely immerse the otoliths. Position the tray on the microscope stage and adjust the bench lamp to direct its beam on to the surface of the well in the tray (Fig 3).



Figure 2. Bespoke plastic tray used for reading anglerfish and megrim otoliths.



Figure 3. Angler otoliths ready for reading.

Quite a steep angle is required to illuminate the otolith surface properly and a blue filter removes the yellow cast from the bulb and improves clarity. Under a total magnification of  $\times 10$ , a series of opaque and translucent consecutive rings should be apparent. Higher magnifications should be avoided as they may reveal the presence of secondary features and lead to confusion.

Anglerfish otoliths are problematic due to the otoliths tendency to thicken as it grows. In old fish it may prove very difficult to discern the ring structure, particularly of the growth relating to the early years of the fishes life. Considerable manipulation of the otolith may be required in order to distinguish the rings and several counts, along differing axis, may need to be made before an age estimate is derived.

The age estimate is achieved by counting the translucent rings, as viewed under the microscope. An example is provided in the image below but the otoliths will seldom be as clear as this one appears to be (Fig 4).

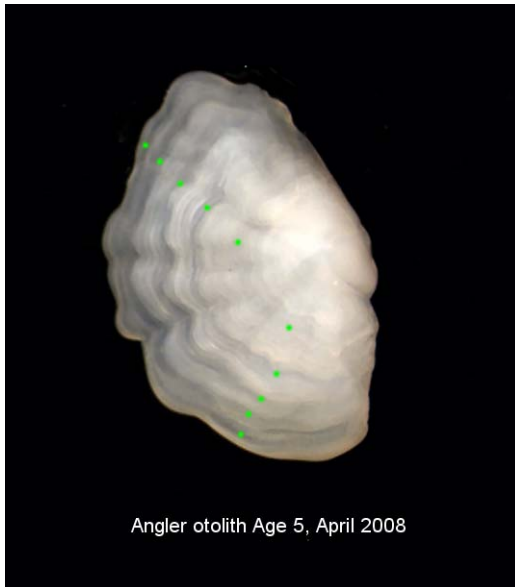


Figure 4. Photograph of an anglerfish otolith, showing the counted translucent zones by marking them with a green dot. Caught in April 2008, aged 5.

The procedure has not been validated as there remains considerable discussion over whether the otolith, or the illicia is more suitable for age estimation. What is interpreted as the first annual ring on the otolith is believed by illicia readers to represent a settlement ring where the fish changes from a pelagic to a demersal life history. However this does not explain the sometimes significant difference in age estimates derived from the two structures, when collected from the same fish. Agreement between readers of whole otoliths tends to be poor and further work is considered necessary. Attempts to improve readability by staining the otoliths, and by breaking and burning the broken edge, have proven unsatisfactory and were abandoned.

As the otoliths are read, the ages derived from them should be recorded on the original packets. The ages are then transferred directly from the packets in to the FMD, by the reader. The otoliths are discarded as they deteriorate in storage and become unreadable.

#### References

Henderson, G. (2018) FISH AGE DETERMINATION PROCEDURES  
1: GADOIDS. Marine Scotland Science, Aberdeen



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