

Workshop title

The Fish Scales and Otolith Morphology and its Use in the Identification Process

Purpose

Skills, knowledge, experience, information, etc.. provided to the participants

Background

Otoliths are complex polycrystalline structures composed of calcium carbonate (approximately 96%) and trace elements immersed in a protein matrix. These structures are located in the inner ear of fishes and have a role in hearing and maintenance of equilibrium. They are enclosed in three end-organs of the inner ear in teleost fishes. The saccular otolith (Sagitta) is the largest, at least in most teleost families.

The use of otoliths could provide a proper tool for the identification of fish species. They are often found in the stomach content of various organisms as well as in fossil sediments, thus being a very useful tool for taxonomic, ecological and paleontological studies.

In the addition to the surface morphology of the otolith, their morphometry has been widely used to identify species of other families. Otoliths morphology and morphometry were used for assessing taxonomy and diversity in fossil and extant of several species. Otolith morphometry has also been used for the identification of fish stocks and the simultaneous use of morphometry and morphology has been employed for the study of ecological patterns in fish.

The use of scale morphology and squamation for fish classification, also known as lepidology, can be traced back to the time of Agassiz (1833–1843) who apparently was the first to use fish scales for taxonomy. The importance of scale morphology in systematic studies increased dramatically during the late nineteenth century and the first half of the twentieth century with the great advances in light microscopy. Later, scale morphology became more important in fish systematics and phylogeny after the introduction and development of scanning electron microscopy.

The aim of the workshop

The results of this workshop will serve the following aims:

1. To define the morphology of the scales and otolith of the fishes in general and those of the Arabian Gulf area in particular.
2. To use the morphology of the scales and otolith to show the ontogeny in the shape of these structures.
3. To study the morphometry of the scales and otolith in order to use it in the population identification of the species and stock assessment.
4. To study the asymmetry phenomena in the scale's and otolith's measurements in order to assess the degree of the pollution in the studied area.
5. To compare the shape of the scales and otolith of the similar species might be available from other countries.

Workshop objectives

The information and skills that the participants will adopt through the workshop will put them in a position to use these skills and apply to the fish species in any area or country in the future. In addition to the ichthyologists, fish taxonomists and biologists, the technique that the participants will gain is important for geologists and paleontologists. Several otolith specimens usually retrieved from geological strata and from paleontological sites and in many cases these otoliths remain unidentified. The skills will be offer in the present workshop will enable participants to solve this problem.

In general, the participants might collaborate in a large project/s to produce atlases on the morphology of the scales and otolith for different geographical regions of the world. In doing so, they will add a substantial knowledge on these structures to the science library.

Topics and subjects to be covered in the course

Two main topics will be covered in the present workshop:

1. Morphology of the surface of the fish scales.
2. Morphology of the surface of the fish otolith.

Training methods

Lectures, practical sessions, case studies, group discussions, etc..

The workshop will contain the following sessions:

1. Lectures about the practical work
2. Practical sessions include extracting otolith and scales from different fish species. Also, to prepare the scales and otolith for examination.
3. Participants will be grouped to do the practical work

Participants

(People who are expected to attend the course and their minimum academic qualifications)

Participants might have a minimum university degree or an experienced technicians.

Prerequisites

(Requirements of the course participants, if any)

Except for the specializations of ichthyology, biology, fisheries, palaeontology and archaeology, there is no other prerequisites can be apply.

Workshop Date, Duration & Timings

The date will be decided later after arrival in Turkey. The instructor is fully open to negotiate the time frame of the workshop.

General important information and requirements

Practical sessions on scale morphology include:

1. Scale sampling from different fish body regions (fish of different length groups should be used).
2. Clearing and staining of the scales.
3. Mounting stained scales on microscopic slides.
4. Demonstration of the ultra-structure of the scales using scanning electron microscopy SEM images to show the fine structures of the scale (optional).
5. Determination of the species characteristics using scale morphology.

Practical sessions on otolith morphology include:

1. Otolith extraction from different fish species of different length groups.
2. Cleaning and drying otolith.
3. Microscopic examination of the otolith.
 - a. Demonstration of the ultra-structure of the otolith using scanning electron microscopy images to show the fine structures.
4. Determination of the species identity using otolith morphology.

Technical staffs

1. Two to three technical staffs are needed to assist in the workshop daily process.
2. They are responsible for:
 - A. To assist in scale removal, scale cleaning, scale staining and scale mounting.
 - B. To assist in otolith extraction and cleaning.
 - C. To organize the working areas in the laboratory before and after practical sessions.
 - D. To bring fresh fish samples from market.

Workshop text

A text is needed to hand over to the participants at the start of the workshop. It includes:

1. Introduction to the workshop.

2. Theoretical materials like lectures. Practical materials like theoretical parts of practical, scale and otolith images showing types and parts.
3. Special forms to fill in by the participants recording the Characters of the scale and otolith.
4. Copy samples of publishes papers on scale and otolith morphology for reference.

Workshop circular

It should be in Turkish and English Languages and should include:

1. Name of the workshop
2. Aims.
3. Duration of the workshop
4. Information about the use of scale and otolith morphology.
5. Scale and otolith images.
6. Name of operation panel.
7. Contact detail.