

This document is dedicated to school teachers who would like to use the different teaching aids (panels, videos, aquariums, exhibits) present in the "Pavillon des Expositions Permanentes" of "La Cité de la Mer", to illustrate a course about sea life.

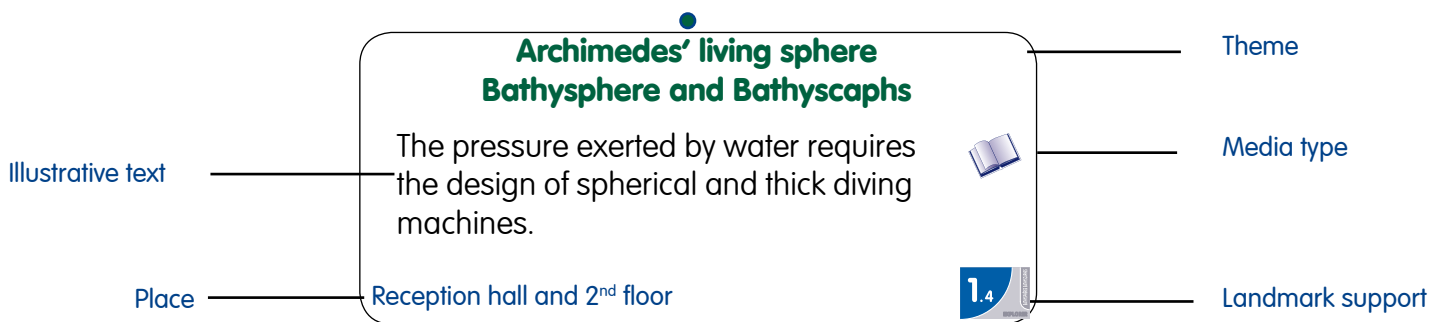
Five main themes are considered:

- > **Unity and diversity of living organisms**
- > **Adaptation of human beings (to an aquatic environment)**
- > **Functions of living organisms**
- > **Adaptation of living organisms being (to the marine environment)**
- > **Sense organs**

The different areas of the exhibition are numbered: the itinerary shows the main teaching aids of the exhibition concerning these 5 themes and also their landmarks.

Some help and advice to prepare the visit could be obtained for free, by contacting the teachers who work with the educational service of "La Cité de la Mer".

How can this itinerary be used?



CAPTIONS:

Aquariums (Tank : B1 à B17)

Panels

Interactive screens

Videos

Scale models

Show cases



UNITY AND DIVERSITY OF LIVING ORGANISMS

LIVING ORGANISMS LEAVE TRACKS

Myths and Legends

Notion of evolution of living organisms
Jaws, fossils, bones...
Fossil of a nautilus



↳ 2nd floor



Aquariums

Notion of evolution of living organisms
Living nautilus



↳ 2nd floor



DIVERSITY OF THE AQUARIUM SPECIES

Aquariums

Tahitian fish, nautilus, ribbon eels, jellyfish,
cardinal fish, sea horses...



↳ 2nd floor



Aquariums

Cerianthes, clown anemone-fish, smooth-
hounds, horse shoe crabs, stone fish, rays...



↳ 2nd floor



Strange fish

Panels, pictures and slide shows

↳ 2nd floor



Aquariums

Groupers, seabass, spotted ratfish...



↳ Downstairs



ADAPTATION OF HUMAN BEINGS TO THE AQUATIC ENVIRONMENT

EVOLUTION OF TECHNIQUES AND HUMAN PENETRATION UNDERWATER

First steps

From bell... to diving-suit
The beginnings of « heavy feet »



↳ 1st floor

Exhibitions access

« The pioneers »

The evolution of techniques allowed the human penetration underwater.



↳ 2nd floor



Air pump for divers

↳ 2nd floor



Next to the tank

First steps

Lethbridge barrel, shoes of hard-Helmet diving equipment, actual autonomous diving suits



↳ 2nd floor



Living in saturation

« Working at a great depth »
Abysal station Henri-Germain Delauze



↳ Downstairs

Next to the tanks

DIVING EQUIPMENTS

Man turns into a fish

Evocation of the « mousquemers » (Cousteau, Taillez and Dumas) and evocation of the invention of diving regulator which announces the era of autonomous diving



↳ 2nd floor



Breathing underwater

Breathing equipments (air regulator, snorkel, diving cylinder), underwater vision (diving mask), diver mobility (swim fins and buoyancy compensators)



↳ 2nd floor



Diving with gas mixtures

Micro with a « Donald Duck » effect
Existence of different breathing gas mixture (oxygen/nitrogen, oxygen/hydrogen) and effects of the oxygen/helium mixture on the vocal cords, with voice distortion



↳ 2nd floor



Two months underwater

The air production on board of a submarine
Principle of oxygen candles



↳ Downstairs



THE MAIN FUNCTIONS OF THE LIVING ORGANISMS

LOCOMOTION IN AN AQUATIC ENVIRONMENT

Different techniques of locomotion

Jellyfish swim by pulsation, ribbon eel by undulation, sea horses by vibrating their dorsal fin, nautilus by ballast or water reactor, cardinal fish by leaning on their pectorals fins, crustaceans by walking.



↳ 2nd floor



Born to glide through water

Adaptation for swimming: hydrodynamic shape, skeleton, scales, the fastest fish...



↳ 2nd floor



Incredible rowers !

Three types of swimming: speed specialist, strong swimming or manoeuvring fish



↳ 2nd floor



Very strange swimmers indeed...

Special swimming behaviour: flight of the ray, walking of the mudskipper, flying fish...



↳ 2nd floor



Inventors Club

Description of the jet propulsion of cuttlefish and squids



Jet propulsion of nautilus



↳ 2nd floor



Ballasts, floats and parachutes

Different techniques to stabilize in the deep: comparison between the ballast system of a nautilus and a submarine, swim bladder...



↳ 2nd floor



BREATHING IN AN AQUATIC ENVIRONMENT

The ray

Observation of breathing movements Presence of branchial slits which characterize the cartilaginous fish



↳ 1st floor



The grouper

Observation of the opercula of grouper and other bony fish



↳ Downstairs



ADAPTATION OF LIVING ORGANISMS TO THE AQUATIC ENVIRONMENT

ADAPTING TO SUBSTRATE

Aquarium

Maze of corals, water transparency, Tahitian fish



↳ 2nd floor

B1

Camouflage

Ribbon eels: cavities
Sea horses: seaweeds
Jellyfish Aurelia: floating along in the water
Lobster/ spider: rocks
Stone fish : rocks
Rays/Octopus: sandy seabed



↳ 2nd floor and 1st floor



ADAPTING TO THE PHYSICAL LAWS

Abyssal Aquarium

↳ 2nd floor, 1st floor and downstairs



B1

Diets at all levels

Physical laws condition some life forms and lead to the species' grade separation.



↳ 1st floor

Next to the B8

« Oases »

Discovery of the black smokers and their fauna

↳ 1st floor



M

6.2

« A freezing desert »

With high pressure, night and low temperatures, the abyssal plains seem to be hostile.

↳ 1st floor



6.1

Lights in the night

Light absorption in the sea with respect to depth

↳ 1st floor and downstairs



B1

Deep water fish

« New resources »
Slideshow « Deep water fish »
Spotted ratfish



↳ 1st floor and downstairs



SENSE ORGANS

Ribbon eels

Nostrils (larger nostril surface for a better sense of smell)



↳ 2nd floor

B₃

Cerianthes

Their sense of smell is very keen. It allows them to detect their preys and the sexual maturity of the other individuals.



↳ 1st floor

B₉

Octopus

Importance of prominent eyes (excellent eyesight, essential for hunting and camouflage)



↳ 1st floor

B₁₄

Sharks, Rays

The sense of smell of sharks and rays is exceptionally keen.



↳ 1st floor

B₁₃

The grouper

The lateral line and the inner ear of fish are useful to detect sounds, movements of fellow creatures in a shoal and obstacles...



↳ Downstairs

B₁₇

Shrimps

Importance of the antennas (sense of smell and taste cells)



↳ 2nd floor and 1st floor

B₃

B₄

B₉

Sharks, Rays

The Ampullae of Lorenzini
Electrolocation



↳ 1st floor

9.1

B₁₂

B₁₃

Extrasenses alien to us

Lateral line of fish
Shark electrolocation
Dolphin echolocation



↳ 1st floor

9.1