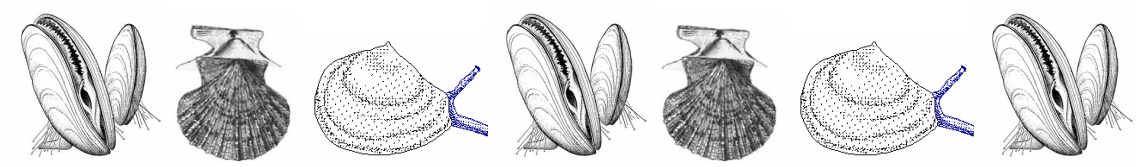
17th INTERNATIONAL BIOLOGY OLYMPIAD
9 - 16 JULY 2006
Río Cuarto – República Argentina

PRACTICAL TEST

2

Animal Anatomy, Ecology and Systematics

Student Code:	



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General remarks about the practical tests

DEAR PRATICIPANS

The practical test are organized in four different laboratories.

Nº 1- Plant Anatomy, Systematics and Physiology

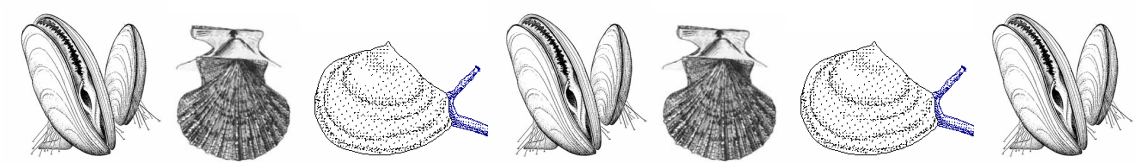
Nº 2- Animal Anatomy, Ecology and Systematics

Nº 3- Biocheminstry

Nº 4- Microbiology

- You have **1 hour** in laboratories Nº 1 and Nº 2.
- You have **1 hour 30 minutes** in laboratories Nº 3 and Nº 4.
- You can score maximum **40 points** in each laboratories, which means a total of 160 points for the practical test.

Good luck !!!!!!!



Practical Test № 2: Animal Anatomy, Ecology and Systematics

Introduction

Bivalves are an important group of molluscs, the second in number of species after gastropoda. Other names for the class include Pelecypoda, and Lamellibranchia. Bivalves include all dorsoventrally compressed mollusc species; they typically have two-part shells dorsally hinged by strong muscles and ligaments. The mantle, which secretes the shell, is the dorsal body wall covering the visceral mass. The mantle cavity is lateral and in most bivalves the gills have a respiratory and digestive function.
Unlike other molluscs, bivalves lack a radula and feature labial palps which carry food from the gills to the mouth.
The head is small and it does not feature specific sensory organs

Task № 1: Bivalve dissection

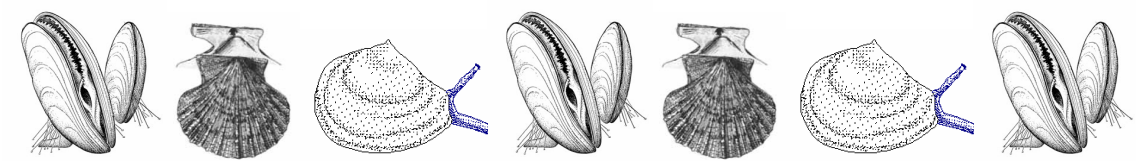
Task № 1 includes part A and part B

The aim is to compare anatomic structures in three marine bivalves.

Materials:

- ✓ Tray containing three samples of marine bivalves numbered 1,2 and 3 (stored in 70% alcohol).
- ✓ 1 dissection table.
- ✓ 1 lancet.
- ✓ 1 tweezers.
- ✓ 10 color pins (3 green, 3 red, 3 blue and 1 yellow).
- ✓ 1 pair of disposable gloves.
- ✓ 1 respirator mask.
- ✓ 1 magnifying glass.

REMARK: BEFORE STARTING THE PRACTICAL TASK, BE SURE TO HAVE ALL THE LISTED MATERIALS, OTHERWISE RAISE YOUR HAND TO CALL THE ASSISTANT.



PART A

Procedure

1- Put on the gloves and respiratory mask.
2- Before starting the dissection, locate the external parts of the bivalve (Figure 1).

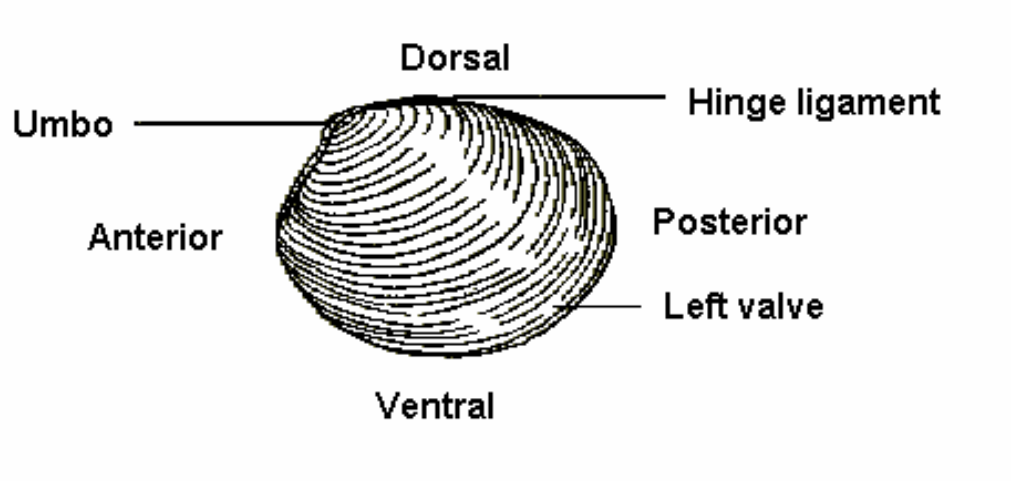


Figure 1

3- The valves are hinged by muscles. In order to identify the internal structure you have to dissedt the bivalve. You must be **very careful** when separating the valves so as not to hurt your hands.

Insert the lancet (Figure 2) and cut ✂, the adductor muscle/s, according to the bivalve.

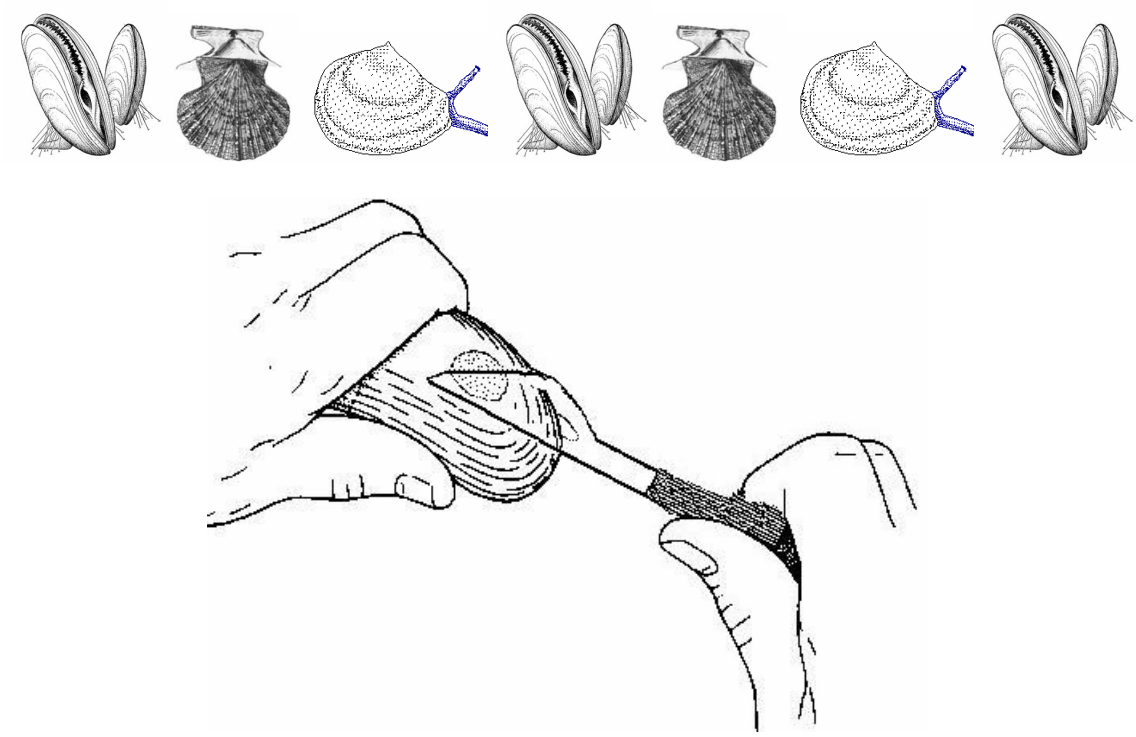


Figure 2

4- In order to separate the valves completely, once the muscle/s is/are cut, you must cut carefully the ligament in the umbo area.

5- Once the three samples are dissected, identify the structures with different color pins.

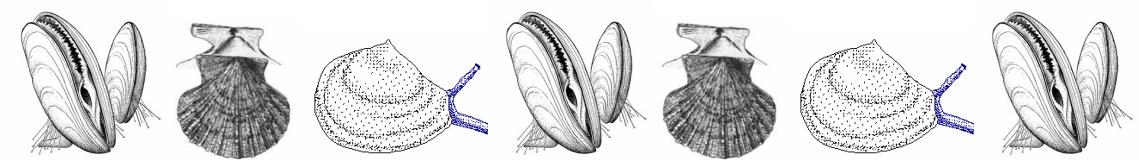
Use 3 pins for each bivalve sample (green, red, blue and yellow) in the following way:

- **green** pin for the **foot**.
- **red** pin for **labial palps**.
- **blue** pin for the **gills**.
- **yellow** pin for the **inhaling siphon**. (Only for bivalve 2)

6- **After finishing the task you must raise your hand. An assistant will check the task. The Practical Test Sheet should be signed by both, you and the assistant**.

Signatures:

Student.:.....**Assistant**:.....



PART B

As you have seen during the dissection, the three bivalves show differences in their muscles.

There exists a muscle classification according to their number and size:

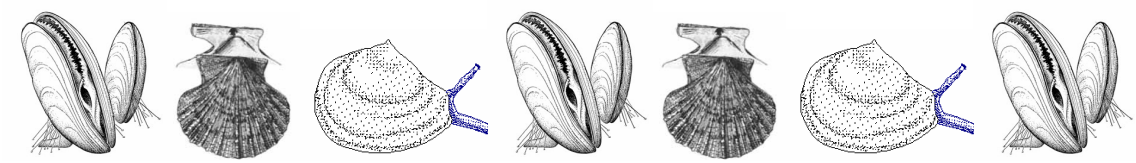
- ✓ Dimyarian isomyarian condition: in which both muscles have similar size.
- ✓ Dimyarian heteromyarian condition: in which both muscles are different in size.
- ✓ Monomyarian condition: Having only one, large adductor muscle to close the valves.

Complete the table by using the codes below.

	Bivalve 1	Bivalve 2	Bivalve 3
Condition	**02**	**01**	**03**

Codes:

01- Dimyarian isomyarian.
02- Dimyarian heteromyarian.
03- Monomyarian.



Task № 2: Bivalve adaptive radiation

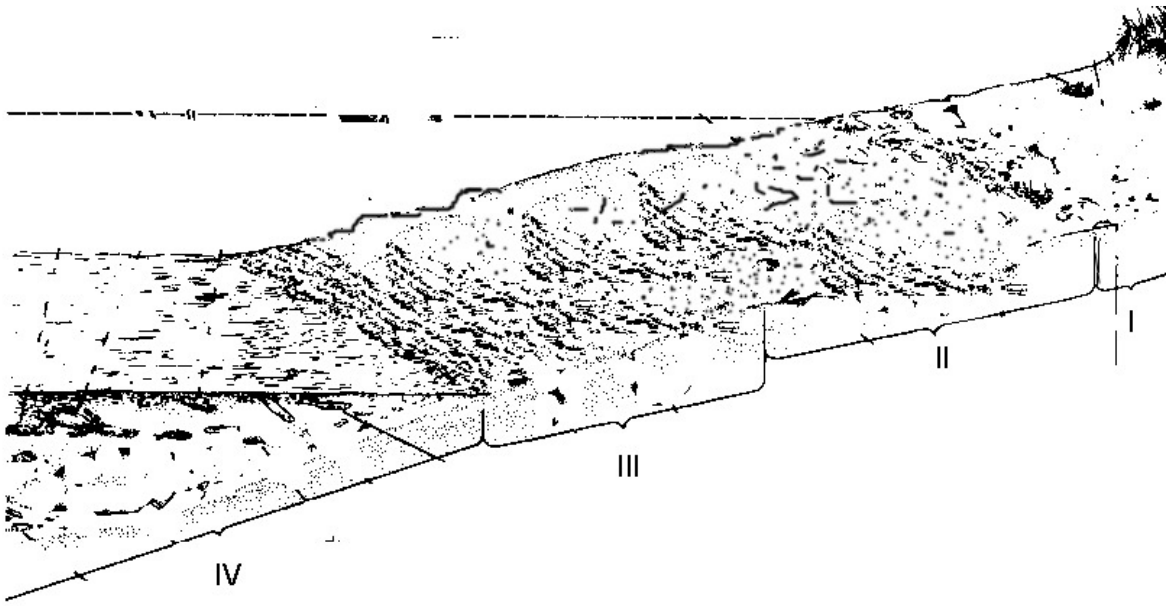
Task № 2 includes parts A, B and C.

Most bivalves are filter feeding molluscs, that is to say, they filter marine water to obtain their food consisting mainly of plankton and suspended organic matter. The evolutionary acquisition of feeding by filtering allowed them to colonize many habitats, thereby giving rise to an important adaptative radiation.

The aims of this part of the test is to determine the habitat of the marine bivalve samples and to identify the exomorphological and anatomophysiological characteristics associated to these habitats.

PART A – Below there are to marine zones, one corresponding to a sandy beach (Figure 1), and the other to a rocky beach (Figure 2).

Figure 1



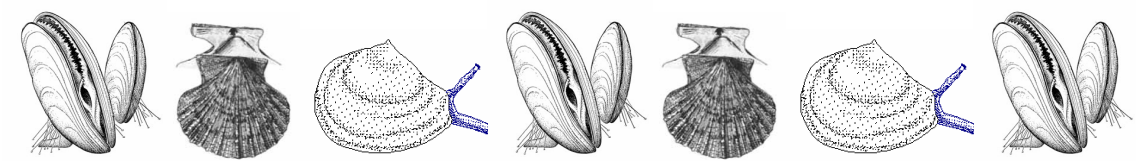
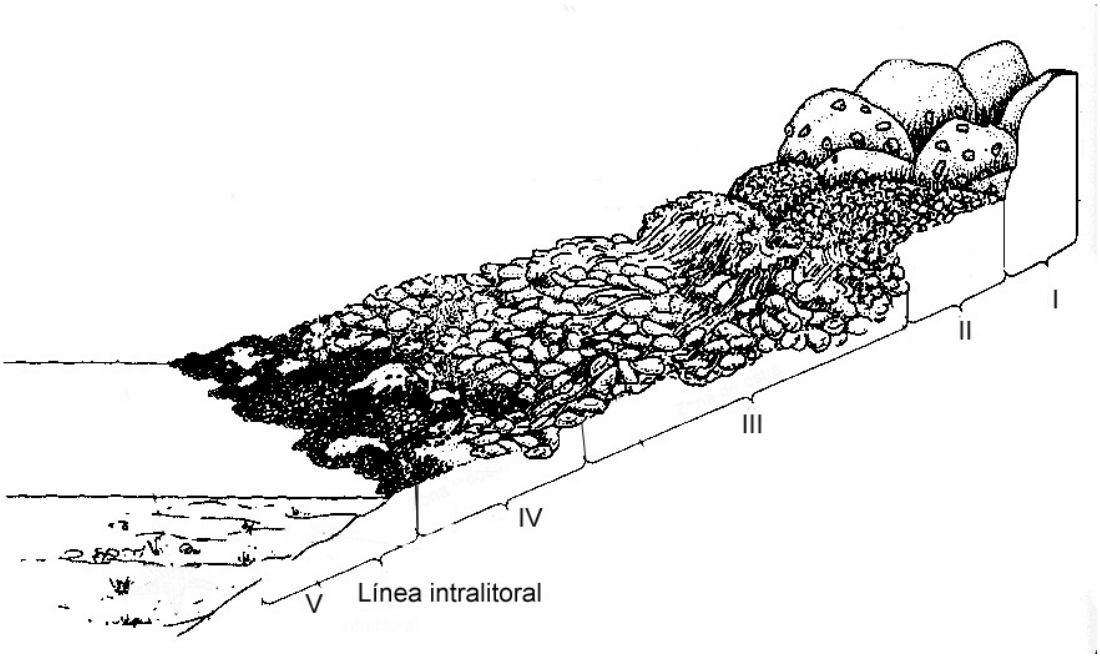


Figure 2

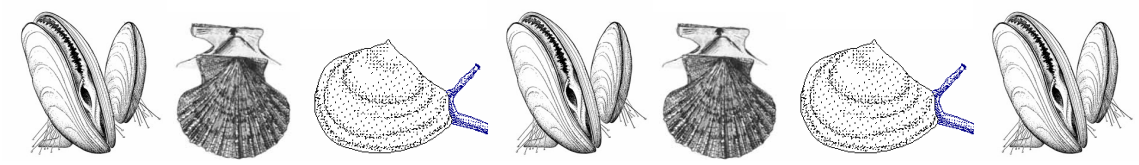


Fill in the corresponding box in each table, indicating the site where the samples given in this practical task can be found.

Codes:

01- Bivalve 1. 02- Bivalve 2. 03- Bivalve 3.

Sandy beach	Zone I	Zone II	Zone III	Zone IV
	02	**02**	**02**	**03**



Rocky beach	Zone I	Zone II	Zone III	Zone IV	Zone V
	01	**01**	**01**	**01**	**03**

PART B - Keeping in mind the zones occupied by bivalves in rocky and sandy beaches, you must determine the category of the given samples by writing an **"X"** in the corresponding box.

	Bivalve 1	Bivalve 2	Bivalve 3
Burrowers in soft substrate INFAUNA		**X**	
Surface dwellers attached to the substrate EPIFAUNA	**X**		
Free swimming			**X**

PART C- A series of characteristics related to the three given bivalves and their habitats is given below. Complete the table by using the answer code.

Answer code:

01- large, burrowing foot

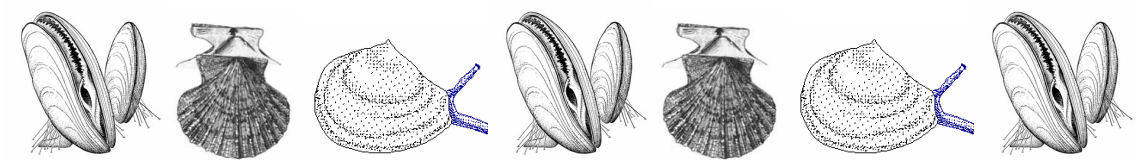
02- reduced, finger-like foot.

03- highly reduced and barely visible foot.

04- no anterior adductor muscle.

05- no siphons.

06- two siphons: incurrent and excurrent (inhaling and exhaling).



07- fringed incurrent siphon.

08- highly developed sensory lobes in the mantle, with tentacles and small ocella.

09- flat lower valve (right)

10- mantle edge with fusion points.

11- byssal threads.

Bivalve 1	Bivalve 2	Bivalve 3
02- 05- 11	**01- 06- 07- 10**	**03- 04- 05- 08- 09**