Door Snails (Clausiliidae)

The picture shows the fascinating diversity of the genus *Alopia* (Alopiinae, Clausiliidae).

Introduction

Clausiliidae are a family of pulmonate landsnails (Stylommatophora) with sinistral, turreted shells with interior wall-folds which are developed as a closing apparatus. This so-called clausilial apparatus = CA which is in the two lowermost whorls of the adult shell comprises the clausilium, a plate attached to the columella by a flexible stalk, and folds on the inner and outer wall of the shell (parietal and columellar lamellae, palatal plicae). The clausilium closes the lumen of the shell when the animal retreats and is pushed out of the way when the animal extends to be active.

Clausiliidae are mainly distributed in Europe, East Asia and South America. The range comprises the zoogeographic regions of western Palaearctic (one group extending to eastern Ethiopian), Oriental without peninsular India and part of eastern Palaearctic, and northern and western Neotropical.

Fossil Clausiliidae are known since the Upper Cretaceous and traced through the Tertiary and Quaternary

Clausiliidae are a speciose family. The currently recognized taxa numbers are as follows: 9 living and 2 extinct subfamilies, 155 living and 29 extinct genera, 1278 living and 156 extinct species.

Synprosphyma basilissa (Boettger & Schmacker)

Collecting

For collecting Clausiliidae, only a hand rake to scrape through leaves, dead wood and stones and a pair of tweezers to take up the specimens is needed. None of the species is so small that it would be necessary to sieve. The locality of each sample should not be too much extended, neither horizontally nor vertically. The amount of collected specimens should not be too high to avoid endangering the species; less, if the species is already rare; more, if there are vast amounts of specimens and more is needed for certain purposes (exchange, quantitative examinations).

Collect only living specimens and well-preserved shells, badly preserved ones and fragments only if needed for quantitative examinations. Badly preserved material renders determination and examination difficult! The collected material should be kept in special collecting containers which should be dry and permeable to air.

Never simply throw collected material into alcohol! Alcohol kills the animal immediately, which can lead either to the dead animal (with the dirt sticking to it) obstructing the body whorl or to a strong mucus secretion which then covers and blocks the clausilial apparatus, so the material is useless for later examination. Also, this may be cruelty to animals!

After collecting, the following data should be written down: locality in relation to a place that can be found on usual maps, if possible with geographic coordinates (use GPS), altitude above sea level (if more than 1000 m), date of collection, name of collector; furthermore, to get ecological data, type of ground (type of rock), exposition (if locality on a slope), vegetation (especially trees), accompanying snail fauna.

On longer excursions, number the localities and write them down in a carefully kept list. The number of locality will stay with the sample all through the following preparation work until the final labelling.

The collected material should be brought home or to the laboratory unsorted; only after dividing it into species and counting the specimens it should be decided how many specimens to put into the shell collection and how many into the animal collection preserved in alcohol.

The material should be packed tightly with cotton to avoid damage during the transport. It should also be kept dry and cool. Never exhibit material to direct sunlight since the animals

become active with moisture and warmth, so they will die sooner or later, leading to the complications explained above.

Preparing

Until preparation, the material is kept dry (but not too long, few weeks at the most!). After the division into shell respectively animal collection, it should be cleaned of greater amounts of dirt and faeces, which are present especially if collected during rainy weather. Cleaning facilitates later examination and avoids growth of fungi in the shell collection.

The material destined for the shell collection is kept dry until the animals have retired deeply into their shell. Then each sample is put into a sieve, shortly plunged into hot water to kill the animals and put into 96% alcohol (spiritus) for dehydration. After several hours in the alcohol, they are kept in containers permeable to air to dry for several weeks. Only after complete dehydration of the animal, the samples should be put into closed containers. If the dehydration is not complete, decay sets in which leads to bothering smell.

Never throw living animals destined for the shell collection in alcohol to kill them! Never kill them by oven heat! Both methods can result in the body whorl being obstructed and the clausilial apparatus being covered with mucus. Never put living animals in the shell collection! All those methods cause unnecessary cruelty to animals.

The material destined for the animal collection is treated as follows: let animals come out and creep in a moist chamber, after some time plunge them in water so they stretch (but not until drowning!), then put them into a sieve and pour boiling water over them so the animals die instantly, then keep them in 70% alcohol.

After one day (not later!) open the uppermost whorls with a sting (to avoid mazeration of parts of the visceral sac), put the material in fresh alcohol and finally in the animal collection.

Labels for the animal collection have to resist water and alcohol (pencil, Indian ink, laser print).

If animals or parts of animals (e.g. foot) are destined for DNA examinations, keep them in 96% alcohol and send them to the respective institutions as soon as possible.

Killing the animals by drowning them in water is not commendable since the animal swells up too much and often retires into the shell when brought into alcohol afterwards.

Never throw living animals destined for the animal collection into alcohol! The animal will contract so much that it can hardly be used for anatomical examination. Also, this may be cruelty to animals!

Do not use spiritus for preservation since it hardens the animal too much. Do not use formalin either as it hardens the animal and dissolves the shell, apart from the harmful influence on the human handling it.

References

International Commission on Zoological Nomenclature (1999): International Code of Zoological Nomenclature. Fourth Edition (English text): 126 pp.; London.

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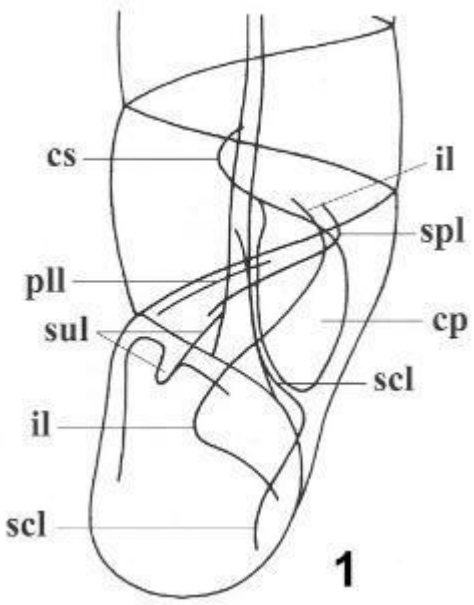
Terms

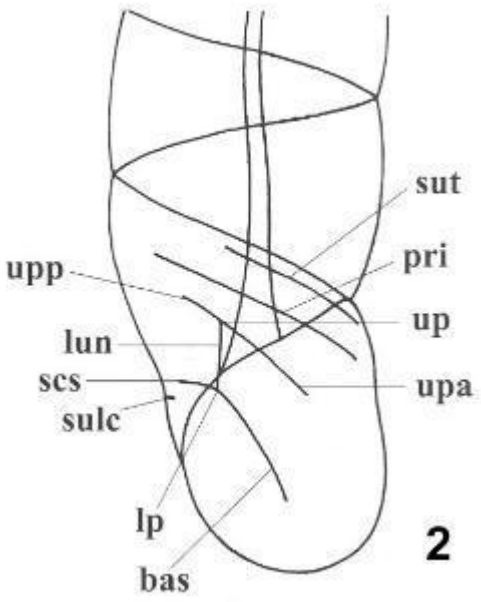
Clausilial apparatus

The clausilial apparatus (clausiliar) which presents many characters of taxonomic importance consists of the following parts:

1. Plicae of the parieto-columellar side = lamellae:
superior lamella (parietalis, **sul**)
and spiral lamella (spiralis, **spl**)
inferior lamella (columellaris, **il**),
subcolumellar lamella
(subcolumellaris, **scl**)
clausilium, consisting of stalk (**cs**)
and plate (**cp**).
The space between superior lamella
and inferior lamella is named interlamellar.
Near to the suture a parallel lamella
(parallelis, **pll**) is often present.



2. Plicae of the palatal side = plicae (in the strict sense):
principal plica (principalis, **pri**),
palatal plicae (lunellar):
upper palatal plica (**up**), if lunella present, with anterior part (**upa**) and posterior part (**upp**),
middle palatal plicae resp. lunella (**lun**),
lower palatal plica (**lp**), if lunella present, with anterior part (basalis, **bas**) and posterior part (subclaustralis, **scs**),
lowest palatal plica (sulcalis, **sulc**).
If subclaustralis and sulcalis are fused or indistinguishable only the term posterior lower palatal plica should be used.
Near to the suture a sutural plica (suturalis, **sut**) is often present.
The callous thickening of the palatal wall behind the peristome is named palatal callus.



End genitalia of Clausiliidae (plesiomorphic state, schematized)

Abbreviations:

1. Hermaphrodite duct + talon (FPSC):
fc = fertilization chamber, **hd** = hermaphrodite duct, **rs** = receptaculum seminis, **vs** = vesicula seminalis.

2. Spermoviduct:
ad = allospermiduct, **adg** = gland of allospermiduct, **ag** = albumen gland, **od** = oviduct, **odg** = gland of oviduct, **pr** = prostate, **sd** = spermiduct.

3. Female copulatory organs:
bb = bursa of bursa copulatrix, **db** = diverticulum of bursa copulatrix, **fod** = free oviduct, **pb** = pedunculus of bursa copulatrix, **v** = vagina.

4. Male copulatory organs:
ep = epiphallus, **fl** = flagellum, **p** = penis, **pc** = penial caecum, **rp** = penial retractor, **sg** = gland of stimulatory organ, **spa** = papilla of stimulatory organ, **ss** = sheath of stimulatory organ, **vd** = vas deferens.

5. Genital atrium:
at = atrium.