INVERTEBRATES · MOLLUSCS

Snails of Zimbabwe

Giant land snails, freshwater and land species, the operculum, and the left- and right-handed twist of the shell.

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> Snails are easy to walk past, but they tell stories about evolution, the seasons and even guest safety. This note covers what a snail is, how to read its shell, the trapdoor some carry on their foot, Africa's giant land snails, and the species you're likely to meet in Zimbabwe.

01 What is a snail?

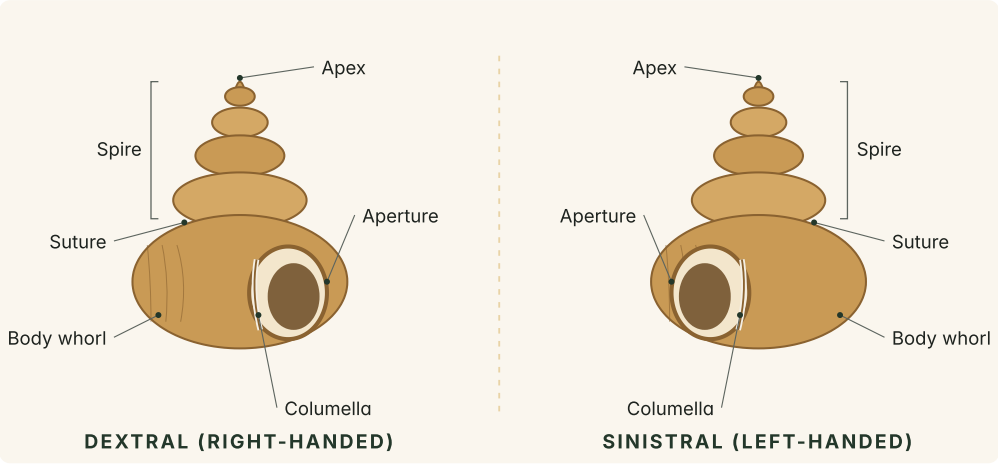
- Snails are **gastropods** ("stomach-foot"), the largest class of molluscs, with roughly 70,000 or more species on land, in fresh water and in the sea.
- A snail has a **muscular foot** for gliding on a layer of mucus, a **head** with tentacles, a **visceral mass** (the organs) inside the shell, and a **mantle** that secretes the shell.
- They feed with a **radula** — a ribbon covered in thousands of microscopic teeth that rasps food.
- During development the body twists 180° (**torsion**), so the gut loops round and the anus ends up above the head.
- Land snails in the big "stylommatophoran" group have **two pairs of tentacles**, with eyes on the tips of the upper pair. Freshwater air-breathers (e.g. *Bulinus*) have one pair, with eyes at the base.

TWO BROAD GROUPS

	PULMONATES (AIR-BREATHERS)	OPERCULATES (GILL-BREATHERS & RELATIVES)
Breathing	A lung formed from the mantle cavity; its opening is the **pneumostome**	Mostly gills (apple snails have both a gill and a lung)
Operculum	**None** in adults. They seal the shell with a temporary **epiphragm** instead	**Present** — a permanent "trapdoor" on the foot
Sexes	**Hermaphrodites** (both sexes in one animal)	Usually **separate sexes**; some reproduce without males
Zimbabwe examples	Giant land snails, *Bulinus*, *Biomphalaria*, *Radix*, *Physella*, garden snail	*Lanistes* apple snail, *Bellamya*, *Melanoides*, *Tarebia*

02 The shell

The shell is made mostly of **calcium carbonate** (aragonite), laid down by the mantle on a protein framework, with a thin outer skin called the **periostracum**. It grows at the lip of the aperture, adding whorl upon whorl around a central pillar, the **columella**. The first tiny embryonic whorls at the apex are the **protoconch**. Snails need calcium from soil, rock, plants and old shells to build it.



Shell held apex up, aperture facing you. A dextral shell opens on the right; a sinistral shell is its mirror image and opens on the left.

Apex	The oldest, pointed tip.
Spire	All the whorls above the last one.
Body whorl	The last and largest whorl, holding most of the body.
Suture	The line where one whorl meets the next.
Aperture	The opening; its edge is the **lip**.
Umbilicus	A hollow at the base of the columella in some species.
Planispiral	Shells that coil flat like a ram's horn (e.g. *Biomphalaria*, *Gyraulus*).

03 Dextral or sinistral? The twist of the shell

HOW TO TELL

METHOD 1

Apex up, opening facing you

Opening on the **right** = **dextral** (right-handed).
Opening on the **left** = **sinistral** (left-handed).

METHOD 2

Look down on the apex

Whorls widen **clockwise** from the tip = dextral.
Anticlockwise = sinistral.

Coiling is a fixed property of the shell, like a screw thread — turning the shell over does not change it.

KEY FACTS

- **Over 90% of snail species are dextral.** Most families are entirely one way or the other; a few species naturally contain both forms.
- **The body is coiled too.** In a dextral snail the genital and breathing openings are on the right; in a sinistral snail they are on the left.

- **Mismatched snails struggle to mate.** Because their genital openings are on opposite sides, a dextral and a sinistral snail of the same species find mating difficult. A single gene change can therefore start to split a population into two species.
- **Mother decides.** Coiling is set very early, at the first cell divisions of the egg, and follows a **maternal effect**: the direction depends on the mother's genes, not the offspring's own. In the pond snail *Lymnaea* it is controlled by a **formin gene**; sinistral snails carry a non-working copy.
- **Snakes and handedness.** Asian slug-eating snakes (*Pareas*) have more teeth on one side of the jaw, specialised for pulling dextral snails out of their shells — sinistral snails often escape.
- **Rare mutants.** An occasional sinistral individual turns up in a normally dextral species. In 2016–17 "Jeremy", a left-coiled garden snail in the UK, made headlines when scientists searched for a mate for him.

ZIMBABWE EXAMPLES

COILING	SPECIES IN ZIMBABWE
Dextral	Giant land snails (Achatinidae), garden snail *Cornu aspersum*, *Radix natalensis*, *Pseudosuccinea columella*, *Melanoides tuberculata*, *Tarebia granifera*, *Bellamya capillata*
Sinistral	*Bulinus* species (bilharzia hosts), *Physella acuta* (bladder snail)
Looks sinistral, body dextral (hyperstrophic)	*Lanistes ovum* apple snail — the shell appears left-handed, but the animal inside is right-handed. This is called **hyperstrophy** or "ultradextral" coiling.
Planispiral (flat)	*Biomphalaria pfeifferi*, *Gyraulus*, *Ceratophallus* — the shell is flat, but the body is sinistral (openings on the left)

04 The operculum

The **operculum** (Latin for "little lid") is a trapdoor attached to the upper back of the foot. When the snail withdraws, the foot folds in last and the operculum seals the aperture neatly.

STRUCTURE

- Made of **conchiolin**, a tough horn-like protein (**corneous** — yellow-brown and slightly flexible), sometimes strengthened with calcium (**calcareous**). *Lanistes* apple snails, unusually, calcify the inner side of their operculum during life.
- It grows at its edge, leaving growth lines that spread from a starting point, the **nucleus**.
- Its shape matches the aperture exactly, so it is useful for identification.

MAIN TYPES



Spiral opercula shown as seen from outside on a dextral shell — the spiral turns the opposite way to the shell.

TYPE	GROWTH PATTERN	EXAMPLES
Concentric	Growth rings around a nucleus, like tree rings	Apple snails (*Lanistes*, *Pila*), *Bellamya*
Paucispiral	A spiral of only a few turns	*Melanoides*, *Tarebia*
Multispiral	A tight spiral of many turns	Many land operculates and some sea snails
Claw-like (unguiculate)	Narrow, curved, nucleus at one end	Some sea snails, e.g. conchs, whelks

OPERCULUM AND COILING

A **spiral operculum turns in the opposite direction to the shell**. Seen from outside, a dextral shell carries a sinistral (anticlockwise) operculum, and a sinistral shell a dextral one — it fits like a screw cap turning the other way.

WHAT IT IS FOR

- **Preventing drying out** — freshwater snails can seal themselves in and survive in mud when pans and pools dry up in the dry season. Apple snails can survive months buried this way.
- **Defence** against predators such as birds, fish, crabs and predatory beetle larvae.
- In some sea snails (e.g. conchs) it is used as a lever for "jumping".

WHO HAS ONE?

YES

Most sea snails, operculate freshwater snails (apple snails, *Bellamya*, *Melanoides*, *Tarebia*), and a few land-snail families (e.g. *Tropidophora*, Pomatiidae, in southern and eastern Africa).

NO

Almost all pulmonates — giant land snails, garden snails, *Bulinus*, *Biomphalaria*, *Radix*, *Physella*. Slugs have no external shell at all.

OPERCULUM VS EPIPHRAGM

	OPERCULUM	EPIPHRAGM
What it is	A permanent plate grown on the foot	A temporary seal of dried mucus, often hardened with calcium
Growth lines	Yes — grows with the snail	No — smooth and uniform
When used	Every time the snail withdraws	During aestivation (dry season) or hibernation
Who	Operculates (e.g. *Lanistes*, *Melanoides*)	Pulmonates (e.g. giant land snails)
Afterwards	Stays attached to the foot	Discarded when the snail becomes active again

05 Giant land snails (Achatinidae)

Giant African land snails belong to the family **Achatinidae**, native only to Africa south of the Sahara. They include the largest land snails in the world. All are **dextral**, all are pulmonates with **no operculum**, and many have a **truncated columella** — the columella ends abruptly, as if cut off, at the base of the aperture.

SPECIES	RANGE	SIZE & NOTES
Achatina achatina Giant Tiger Land Snail	West Africa (coastal belt)	Largest land snail: usually about 18 cm; wild record around 30 cm. Boldly striped shell.
Lissachatina fulica Giant East African Snail	Native to coastal East Africa; now invasive across the tropics	Usually 5–10 cm, up to 20 cm. Narrow conical shell. One of the world's 100 worst invasive species.
Lissachatina immaculata	South-eastern Africa	Usually 12–15 cm. A southern African giant; has become invasive in southern China.
Archachatina marginata Banana Rasp Snail	West and Central Africa	Large, heavy shell up to about 20 cm; widely farmed for food.
Metachatina kraussi Brown-lipped Agate Snail	South Africa (KwaZulu-Natal)	Largest South African species; shell up to about 16 cm.
Burtoa nilotica	East and Central Africa; recorded in Zimbabwe	A large, thick-shelled achatinid of savanna woodland.

BIOLOGY

- **Hermaphrodites:** each snail has male and female organs. Two snails usually mate and both can lay eggs; sperm can be stored for months.
- **Eggs:** hard, calcified, pea-sized eggs laid in soil. *L. fulica* lays clutches of 100–400 eggs (about 200 on average), up to around 1,200 eggs a year.
- **Lifespan:** typically about 5–6 years, up to around 9 years.
- **Diet:** herbivores and detritivores — decaying leaves, fungi, fruit and hundreds of kinds of plants. They also rasp bones, limestone and old shells for calcium.
- **Aestivation:** in the dry season they bury themselves or wedge into crevices, seal the aperture with an epiphragm and slow their metabolism until the rains return. That is why they appear in large numbers after the first good rains in Zimbabwe.
- Mostly **nocturnal**, and active on damp, overcast days.

HEALTH & SAFETY

Giant land snails can carry the **rat lungworm** parasite (*Angiostrongylus cantonensis*), which can cause a form of meningitis in people. **Wash hands after handling snails** and never eat them raw or undercooked. Moving giant snails outside their native range is illegal in many countries because of the damage invasive populations cause to crops.

06 Snails of Zimbabwe

Zimbabwe has a mix of native species and a growing number of introduced ones. These are the main species recorded in the country.

FRESHWATER SNAILS

SPECIES	COILING	OPERCULUM	NOTES
Bulinus globosus	Sinistral	No	Main host of urinary bilharzia (*Schistosoma haematobium*); also carries cattle schistosomes
Bulinus truncatus*, *B. forskalii*, *B. tropicus	Sinistral	No	Related bilharzia and livestock-parasite hosts
Biomphalaria pfeifferi	Planispiral (body sinistral)	No	Host of intestinal bilharzia (*S. mansoni*)
Radix natalensis	Dextral	No	Host of liver fluke (*Fasciola*) in livestock
***Lanistes ovum* (apple snail)**	Hyperstrophic: looks sinistral	Yes — concentric, calcified inside	Large freshwater snail of rivers, dams and pans; separate sexes
Bellamya capillata	Dextral	Yes — concentric	A live-bearer (viviparous): young are born fully formed
Melanoides tuberculata	Dextral, tall and pointed	Yes — paucispiral	Mostly reproduces without males; widespread
Gyraulus*, *Ceratophallus natalensis	Planispiral	No	Small ram's-horn snails
***Tarebia granifera* – introduced**	Dextral	Yes	South-east Asian; first confirmed to species level in Zimbabwe in a 2024 study, now abundant in the Chiredzi area
***Physella acuta* – introduced**	Sinistral	No	North American bladder snail; very widespread
***Pseudosuccinea columella* – introduced**	Dextral	No	North American; also a liver-fluke host
***Planorbella duryi* – introduced**	Planispiral	No	North American ram's-horn snail

LAND SNAILS AND SEMI-SLUGS

SPECIES	NOTES
Giant land snails (*Burtoa nilotica*, *Achatina* spp.)	Dextral, no operculum; emerge after the rains
Gymnarion chirindicus* and *G. vumbae	Semi-slugs named after Chirinda Forest and the Vumba, in the Eastern Highlands
Tayloria gwandaensis	Named after Gwanda in Matabeleland South

SPECIES	NOTES
Succinea africana	Amber snail with a thin, glassy shell; lives near water
Xerocerastus burchelli, *Rhachistia*, *Rachis*, *Opeas*	Small, often elongated snails of trees, leaf litter and grass
Gulella and other streptaxids	Tiny carnivorous snails that hunt other snails; widespread in southern Africa
Cornu aspersum (garden snail) – introduced	European; a pest in gardens
Cochlicopa lubrica – introduced	Small, glossy European snail

07 Snails and health: bilharzia

- **Bilharzia** (schistosomiasis) is caused by blood flukes that spend part of their life cycle in freshwater snails.
- Infected snails release larvae called **cercariae** into the water. The cercariae burrow through human skin within minutes.
- **Urinary bilharzia** (*S. haematobium*) is carried by *Bulinus* snails; **intestinal bilharzia** (*S. mansoni*) by *Biomphalaria*.
- The risk is highest in **still or slow water with water plants** — dams, pans, irrigation canals and the edges of slow rivers. A 2024 study still found *S. mansoni* in snails after six rounds of mass deworming in Zimbabwe.
- **Liver flukes** (*Fasciola*), which mainly affect cattle, goats and sheep, are carried by *Radix* and *Pseudosuccinea*.

GUEST BRIEFING TIP

Advise guests **not to swim or wade in dams, pans or slow rivers**. Fast-flowing, clear water is lower risk but not risk-free. Anyone exposed should be tested about **6–8 weeks later**; treatment is simple and effective.

08 Snails in the ecosystem

RECYCLERS

They break down dead plant material and return nutrients to the soil.

CALCIUM SOURCE

Empty shells are eaten or gnawed by rodents, tortoises and birds — especially breeding females that need calcium for eggshells.

SNAIL PREDATORS

The **African Openbill** has a gap between its bill halves, used to hold apple snails and prise them open. Hamerkops, Southern Ground Hornbills, mongooses, fish and firefly larvae also eat snails. The snail-eating cichlid *Sargochromis codringtonii* (green happy) has been studied as a natural control of bilharzia snails.

CANNIBALS & RAIN SIGNS

Cannibal snails such as *Gulella* prey on other snails. Mass emergence after the first rains is one of the signs of the start of the wet season in the bush.

09 Quick identification guide

IF YOU SEE…	THINK…
A huge land snail (10 cm+), striped or streaked brown shell	Giant land snail (Achatinidae)
A white, papery seal over the opening of a land snail	Epiphragm — the snail is aestivating
A round, brown "lid" with rings, closing a big water snail	Apple snail (*Lanistes*) with its concentric operculum
A small water snail opening on the left, no lid	*Bulinus* or *Physella* — possible bilharzia host (*Bulinus*)
A flat, coiled water snail like a ram's horn	*Biomphalaria* (bilharzia host) or *Gyraulus*
A tall, pointed, spire-shaped water snail with a lid	*Melanoides* or *Tarebia*
Broken apple-snail shells on the bank	Possibly an African Openbill feeding site

Key takeaways

1. Hold a shell apex up, opening facing you: opening on the right = **dextral**, on the left = **sinistral**. Over 90% of snails are dextral.
2. Coiling is set by the **mother's genes**, and snails with opposite coils have trouble mating.
3. The **operculum** is a permanent trapdoor on the foot of operculate snails; a spiral operculum turns the opposite way to its shell. Pulmonates have no operculum and use a temporary **epiphragm** instead.
4. **Giant land snails** (Achatinidae) are African, dextral, hermaphrodite and operculum-free; they aestivate through the dry season.
5. In Zimbabwe, sinistral *Bulinus* and flat *Biomphalaria* carry **bilharzia**; several introduced species are spreading.

SOURCES

One Health monitoring reveals invasive freshwater snail species… in Zimbabwe, *Parasites & Vectors*, 2024 (PMC11110352) · Snail chirality: the unwinding, *Current Biology* (2016) · Apple Snail website (applesnail.net) on *Lanistes* shell and operculum · Invasive Species Specialist Group / UK Non-Native Species Secretariat factsheets on *Lissachatina fulica* · Wikipedia articles on the operculum, Achatinidae, *Achatina achatina*, *Lissachatina immaculata*, *Lanistes ovum* and the list of non-marine molluscs of Zimbabwe · DeWetsWild on southern African giant land snails.

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