

Identifying liver fluke snails

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Introduction

In NSW, about 20 million sheep and 2 million cattle graze pastures where liver fluke (*Fasciola hepatica*) commonly occurs. Liver fluke is widespread across eastern NSW, where average rainfall is about 600 mm or more a year. Specifically, it occurs on the tablelands and nearby slopes, and the north and south coasts. It is also found in irrigation areas further west, where the annual rainfall may only be 400 mm, but is supplemented by regular irrigation.

During its life cycle, liver fluke must develop in a particular type of small freshwater snail.

In Australia, the most important intermediate host is the indigenous freshwater snail, *Austropeplea (Lymnaea) tomentosa*.

These introduced snails are found in coastal NSW and can act as intermediate hosts for liver fluke:

- *Pseudosuccinea columella*. Original name: *Lymnaea columella*. Common name: "striated pond snail". Origin: North America.
- *Radix viridis*, also known as *Austropeplea viridis*. Original name: *Lymnaea viridis* ('green pond snail'). Origin: the Pacific area. (Ponder and others (2016) refer to this snail as *Radix viridis*, stating that it has incorrectly been placed in *Austropeplea*, but also indicate that the taxonomic position of this species is not clear).

Liver infection only occurs where these snails – acting as intermediate hosts – are found.

Finding liver fluke snails

Liver fluke snails live in the mud or on plants in shallow water at the edge of springs, small creeks, dam inflows and outflows, irrigation channels, poorly drained drainage channels or in water troughs. They are small and sometimes difficult to find.

The kind of habitat in which the snail is found often gives clues as to which type it is. For example, *Austropeplea (Lymnaea) tomentosa* prefers trickling creeks flowing from hillside springs and soaks (black bogs), and is only rarely found in dams, water troughs or large creeks. It can, however, be found in dam overflows after heavy rain, or within spring-fed dam inflows and outflows.

Pseudosuccinea (Lymnaea) columella is found in deeper creeks and dams, and can also survive in stagnant bodies of water.

Radix (Lymnaea) viridis is a versatile snail, and is found in slightly deeper creeks and channels, as well as in areas preferred by *Austropeplea tomentosa*.

Another lymnaeid snail, *Austropeplea (Lymnaea) lessoni*, is often found on plants and floating on the surface of deeper water, such as stagnant pools and irrigation ditches. *This snail does not transmit liver fluke.*

Identifying freshwater snails

To examine snails, pick them up with your fingers or scoop them up in a kitchen strainer. Most of the snails look alike to an untrained observer. Use the following guide (text and Table 1 below) to identify which type it is.

Adult size

The shell of mature freshwater snails varies from about 5 mm long for the small types to about 25 mm for the largest.

Direction of the spiral

Most freshwater snails have a cone-shaped spiral shell, and the direction of the spiral is a useful identification feature. To determine the direction of the spiral (or twist) of the shell, place the snail on the palm of your hand with its opening downwards and the point of the shell towards you. Looking at the pointed end, the direction of the spiral is determined by going around the shell from the point (or apex) to the large end. The shells of snails transmitting liver fluke twist in a clockwise direction ('dextral', i.e. coiled to the right), while the most common freshwater snails (buliniform type – *Physa*, *Physastra*, *Isidorella*, and *Glyptophysa*) have anti-clockwise spiralled shells ('sinistral', i.e. coiled to the left).

Opening of the snail

Lay the snail down with the opening facing you and the apex away from you. The opening of fluke snails is on the right-hand side, while the opening of buliniform-type snails is on the left.

Tentacles

All snails have tentacles on the front of the head-foot. The head-foot is that part of the snail exposed out of the shell. When the snail is moving, you can see the tentacles on the front of the head-foot. In most freshwater snails, these are long and similar to those of the common garden snail. However, the two tentacles of fluke snails are flat, triangular, ear-like structures. You can see the tentacles most easily in sunlight when the snail is underwater on the mud, or placed in water on a white tray.

Operculum

In some snails (so-called operculate snails) a bony, trapdoor-like structure (operculum) covers the opening of the shell when the head-foot is withdrawn inside. Liver fluke snails do not have an operculum.

Colour

Although the colour of the snail and its shell is a useful feature, it can vary for the same type of snail from different localities. Liver fluke snail bodies are light grey or black, whereas the buliniform types are usually reddish or grey.

About different snail types

Austropeplea (Lymnaea) tomentosa (the liver fluke snail)

This is the common intermediate host snail for the liver fluke in Australia and New Zealand. The shell has three or four whorls. In NSW, it is found in springs and small creeks on the tablelands, western slopes and coast, as well as in irrigation areas. It has limited distribution in other eastern states of Australia.

Figure 1. *Austropeplea (Lymnaea) tomentosa*. Note the ear-like tentacles.

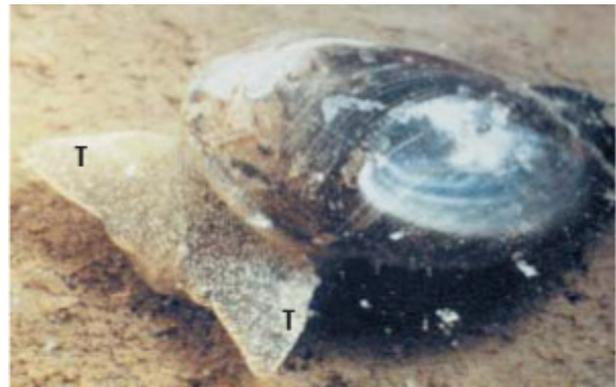


Figure 2. *Austropeplea (Lymnaea) tomentosa* shell 4–12 mm long. Note the size in relation to the match head.



Radix viridis, also known as *Austropeplea (Lymnaea) viridis*

This snail is similar to *Austropeplea (Lymnaea) tomentosa*, but the shell is longer and has four to five whorls. An introduced species from the Pacific Islands, it is the intermediate host of liver fluke in Papua New Guinea, and now also in Australia.

Pseudosuccinea (Lymnaea) columella

This snail is also similar to *Austropeplea (Lymnaea) tomentosa*, but has a longer shell with grid-like striations, hence the common name, "striated pond snail". It is a North American snail that has been introduced into Australia and New Zealand through the trade in aquarium plants. It

is found in coastal NSW and some tablelands areas. It can also transmit liver fluke, and could alter the pattern of liver fluke disease if it spreads to grazing areas.

Figure 3. *Radix viridis* (aka *Austropeplea (Lymnaea) viridis*). Introduced from the Pacific Islands. Shell 4–12 mm long. This snail can also transmit liver fluke.



Figure 4. *Pseudosuccinea (Lymnaea) columella*. Introduced from North America, this snail can also transmit liver fluke and is found in coastal NSW and some Tablelands areas. Shell 8–20 mm long.



Austropeplea (Lymnaea) lessoni

Austropeplea (Lymnaea) lessoni is similar to the fluke snails, but has a large, round shell up to 25 mm long. It is often found on plants and floating on the surface of deeper water, such as stagnant pools and irrigation ditches. *These snails do not transmit liver fluke.*

Figure 5. *Austropeplea (Lymnaea) lessoni*. Note the rounder thin large shell. Shell 10–25 mm long.



Succinea

This is a land snail normally found in moist areas, but sometimes present in freshwater habitats. Its shell is superficially similar to those of the fluke snails, but the body differs in that it has thin tentacles like a garden snail. *These snails do not transmit liver fluke.*

Gabbia

Gabbia is a common freshwater snail with an operculum. It has long, thin tentacles and is found in the outer Sydney area and some tablelands areas. *These snails do not transmit liver fluke.*

Physa, Physastra

Also known as buliniform type snails, *Physa* and *Physastra* are most often found in large numbers in small creeks, dams, water troughs, etc., in all areas. They are 'left-handed' or 'sinistral' snails. *These species do not transmit liver fluke.*

Planorbin (Planorbinae)

Planorbins are small, flat, coiled snails, commonly attached to waterweeds in dams, lagoons, small creeks, and in temporary habitats in small depressions (melon holes). They transmit stomach fluke, a small, conical fluke found in sheep and cattle. Stomach fluke is less important than liver fluke, and rarely causes serious disease in NSW, except in the irrigation districts and on the north and south coasts.

Figure 6. *Helicorbis australiensis*. This is a planorbid snail and an intermediate host for stomach fluke. Shell is 4 mm long.

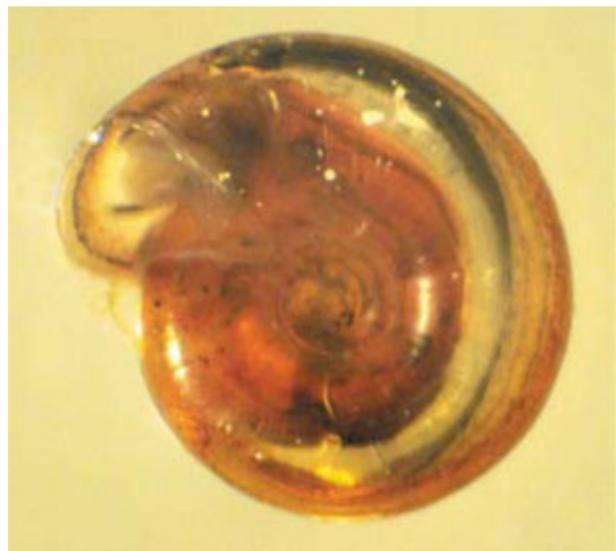


Table 1. Key to common freshwater snails in Australia

Snail type	Direction of spiral of shell	Operculum	Tentacles	Length of shell of adult snail (mm)	Comments
<i>Austropeplea (Lymnaea) tomentosa</i> *	Clockwise	Absent	Flat, triangular	4-12	Foot grey to yellowish and well extended out of shell. Shell with 3–4 whorls.
<i>Radix (Lymnaea) viridis</i> *	Clockwise	Absent	Flat, triangular	4-12	Shell with 4-5 whorls.
<i>Pseudosuccinea (Lymnaea) columella</i> *	Clockwise	Absent	Flat, triangular	8-20	Foot black, shell elongated, with grid-like striations.
<i>Austropeplea (Lymnaea) lessoni</i>	Clockwise	Absent	Flat, triangular	10-25	Round, fragile shell (papershell snail)
<i>Succinea</i>	Clockwise	Absent	Thin, blunt-like	5-10	Land snail, sometimes garden snail, found in or near freshwater habitats.
<i>Gabbia</i>	Clockwise	Present	Long, thin	4	
Buliniform snails	Anticlockwise	Absent	Long, thin	5-10	<i>Glyptophysa</i> , <i>Physastra</i> , <i>Isidorella</i> or the introduced <i>Physa</i> .
Planorbin snails#	Flat, anticlockwise	Absent	Long, thin	2-4	<i>Gyraulus</i> in temporary ponds. <i>Helicorbis</i> in dams, at the edges.

* Transmits liver fluke.

Transmits stomach fluke.

I've identified liver fluke snails - what next?

First of all, check to see that liver fluke is present by using WormTest (faecal worm egg count test; ask for the fluke egg count option) or the liver fluke ELISA (blood test for liver fluke antibodies), or the coproantigen ELISA (faecal fluke antigen test).

Having confirmed the presence of liver fluke on your farm, you can implement a control program. Dosing sheep and cattle with suitable anthelmintics is the main method of treating liver fluke disease. However, this treatment should be combined with improved drainage, to limit the number of fluke snails and reduce grazing of 'flukey' areas. A strategic drenching program is essential for effective control (see Boray (2007, revised 2017), Liver fluke disease in sheep and cattle. NSW DPI Primefact 446).

Controlling fluke snails is usually difficult, because of their high reproductive rate and ability to burrow into the mud and survive dry weather. However, reducing the size of the wet areas suitable for snail growth and limiting the grazing of snail infected areas can be

worthwhile. Ways to do this include draining swampy areas and building dams in or below springs, to reduce the area of shallow water favoured by the fluke snail.

On many properties, only small sections of paddocks have habitats suitable for snails. Cattle, and especially sheep, are more inclined to graze these swampy areas during droughts. For good control in these situations, fence off the swampy area and pipe water to water troughs. Infections of sheep and cattle with larval fluke on pasture often peak in autumn and early winter (about February to June), so limit grazing 'flukey' areas at this time of the year if possible.

Fluke control should be integrated with the control of other internal parasites. For example, a fluke drench in early winter might also coincide with a drench for roundworms. You might also have a grazing management strategy to help control liver fluke as well as roundworms.

Freshwater aquariums

Many of the snails described in this Primefact are commonly found in freshwater aquariums, such as those used for tropical fish, goldfish

and aquatic plants. It is likely that exotic snails (such as *Pseudosuccinea* (*Lymnaea*) *columella* and *Radix* (*Lymnaea*) *viridis*) have entered Australia as contaminants of aquatic plants or fish, and may be spread within the country by this means. Therefore, please DO NOT empty the family fish tank in the local creek— rather, discard the contents on dry land.

Submitting snails for identification

The NSW DPI State Veterinary Diagnostic Laboratory may help with positive identification of snails (Call Customer Service: 1800 675 623).

To do this, collect up to 20 snails and put them in a small plastic or glass container filled with water and aquatic plants from the collection site. If the laboratory will not receive them within two days, preserve with a little formalin or alcohol.

State Veterinary Diagnostic Laboratory,
Elizabeth Macarthur Agricultural Institute.
Postal address: Private Bag 4008, Narellan
NSW 2567. Delivery address: Woodbridge
Road, Menangle NSW 2568.

Notes

Austropeplea taxonomy

Ponder and others (2016) say that ‘until recently, a large number of available names for these Australian lymnaeids (eg. Iredale 1943, 1944) were lumped as *Austropeplea tomentosa* (e.g., Boray & McMichael, 1961), a name based on a New Zealand species. Recent studies have shown that *A. tomentosa* is very different from the Australian taxa (Puslednik et al. 2009). However, unlike Puslednik et al. (2009), we tentatively recognise three species in SE Australia, based on differences in anatomy and molecules.’

‘This genus is in need of revision and the species concepts we have used have not been rigorously tested. There are no clear cut shell characters that allow separation. The current situation is clearly far from satisfactory and can only be resolved by additional molecular and morphological studies involving dense sampling.’

‘Buliniform’?

This appears (no definition found) to be a description of snails that look like *Bulinus*

genus snails, which are small tropical freshwater sinistral snails, aquatic gastropod molluscs, in the family Planorbidae, the so-called ‘ramshorn snails’. The *Bulinus* genus is medically important because several species of *Bulinus* function as intermediate hosts for the schistosomiasis blood fluke.

References / more information

Boray JC, 2007. Liver fluke disease in sheep and cattle. Primefact 446 (February 2007; revised 2017), NSW Department of Primary Industries. Retrieval from <http://www.dpi.nsw.gov.au/agriculture/livestock/sheep/health/internal/liverfluke-disease-sheep-cattle>

Lloyd J, 2007. Stomach fluke (paramphistomes) in ruminants. NSW DPI Primefact 452.

Love S, 2017. Liver fluke – a review. NSW DPI Primefact 813.

Ponder WF, Hallan A, Shea M and Clark SA, 2016. Australian Freshwater Molluscs. http://keys.lucidcentral.org/keys/v3/freshwater_molluscs/

For more information on liver fluke snails or liver fluke disease, contact your Local Land Services veterinarian, private veterinarian, or local NSW Department of Primary Industries office.

Also see:

NSW DPI website
<http://www.dpi.nsw.gov.au/content/agriculture/livestock/health>

ParaBoss including WormBoss
<http://www.wormboss.com.au>

Acknowledgments

This Primefact is a revision of the 2007 Primefact produced by Lloyd, Boray and Campbell. In turn the 2007 Primefact was one of a number of editions of PrimeFacts and Agfacts (Agfact A0.9.61) that were largely based on the article by Dr Noel Campbell published in the *Agricultural Gazette of NSW*, Vol. 88, No. 4, August, 1977. The revisions here are relatively minor and include an update in the names of various snails.

For updates go to
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