



What's in your dung?

A guide to dung beetle species in the Northern Agricultural Region WA.



**DUNG
BEETLE**

Ecosystem Engineers



REGIONAL GUIDE

**Northern Agricultural
Region WA**

Northern Agricultural Region WA

Dung beetle species that are commonly found in the region.

Introduced



*Bubas
bison*



*Euoniticellus
intermedius*

Tunneler



*Euoniticellus
pallipes*

Tunneler



*Onitis
alexis*

Tunneler



*Onitis
aygulus*

Tunneler



*Onitis
caffer*

Tunneler



*Onthophagus
taurus*

Tunneler

Natives



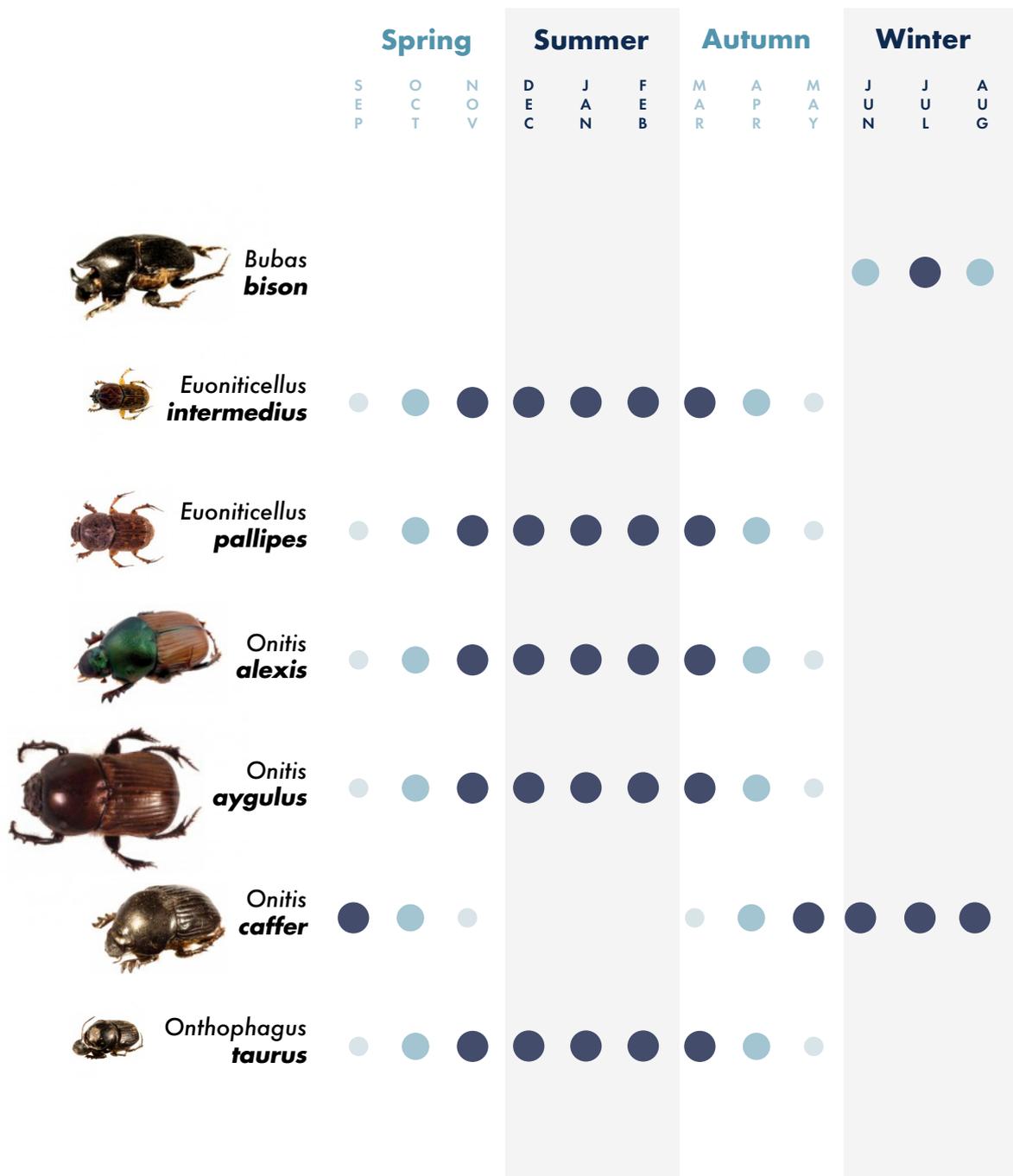
*Onthophagus
ferox*

Note: Over 500 species of native dung beetles exist in Australia, however only 350 species have been fully identified at this time.

This guide is limited to four species you may find in your region.

Seasonal activity

When dung beetles are most likely to be found in dung (in your region)



Bubas bison



Tunneler

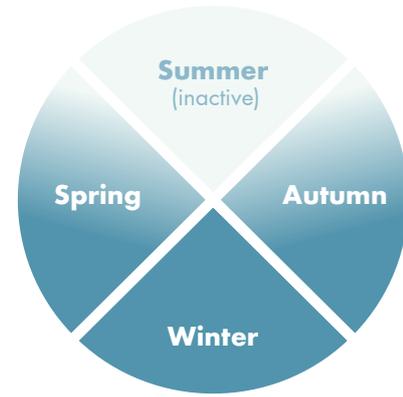
Colour shiny black

Horns horn on each side of head and horn on pronotum (male); distinct ridge on head between eyes and on pronotum (female)

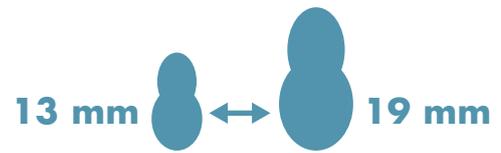
Flight time dusk and dawn

Distribution WA, SA, VIC, southern NSW

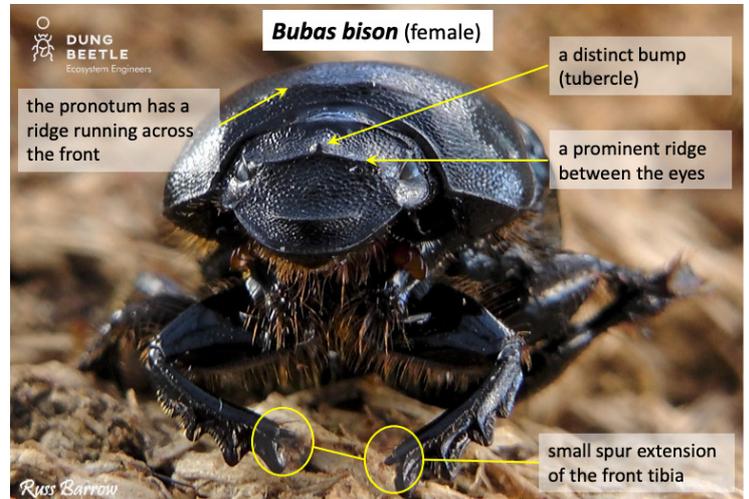
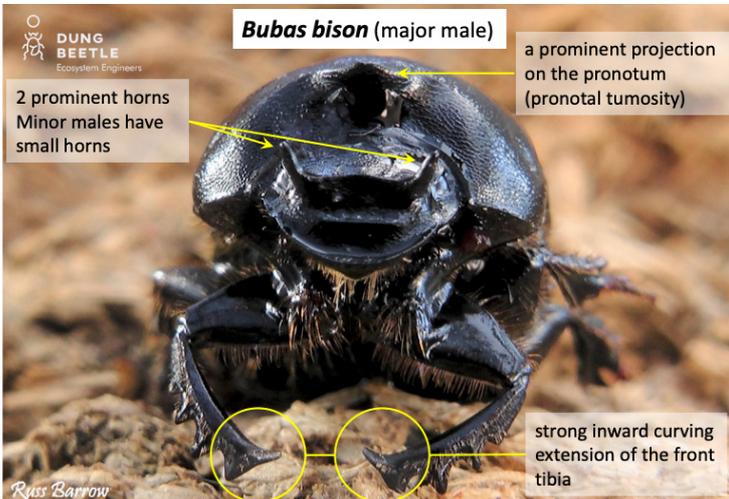
Seasonal activity



Active Inactive



Burrowing depth
20 – 65 cm



Euoniticellus intermedius



Tunneler

Colour yellow–brown, with diamond pattern on pronotum

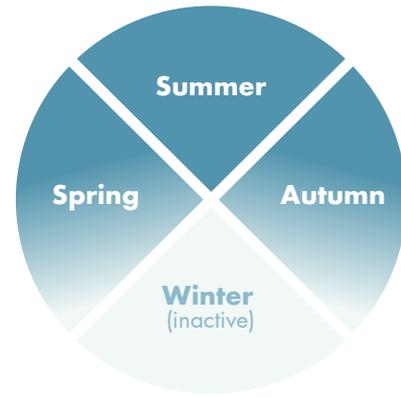
Horns males have a blunt horn in middle of head; females have a ridge between the eyes

Flight time day

Distribution throughout Australia except very dry and southernmost regions

Similar Species similar to other species of *Euoniticellus*, but the distinctive markings on pronotum differentiate it from other species.

Seasonal activity

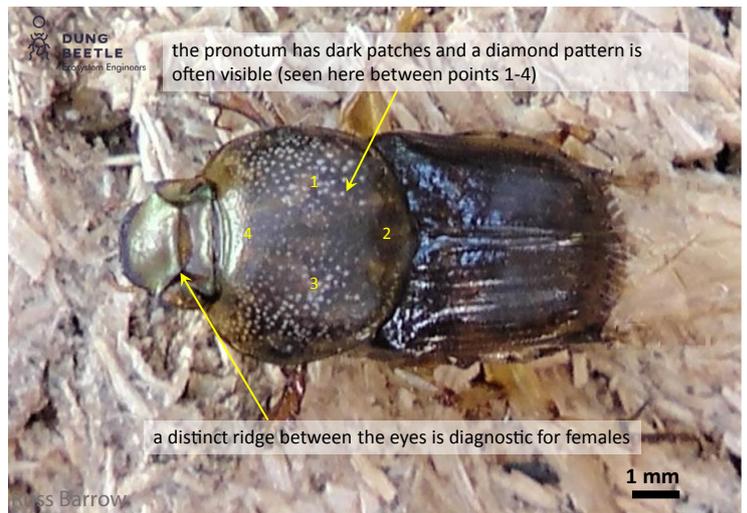
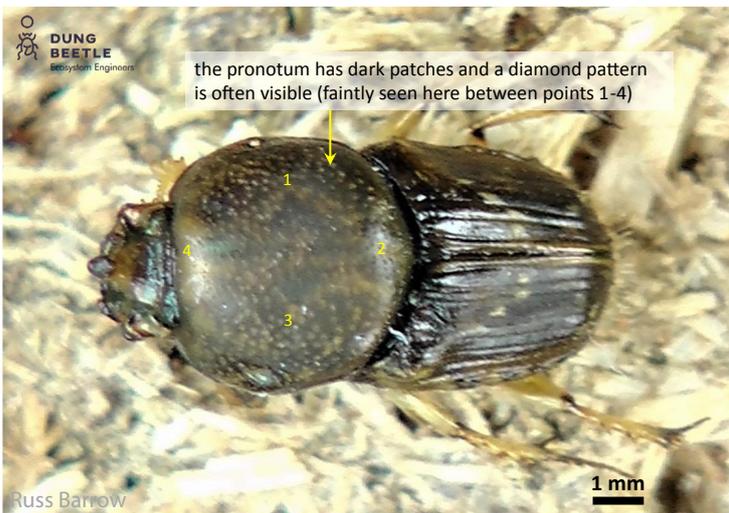
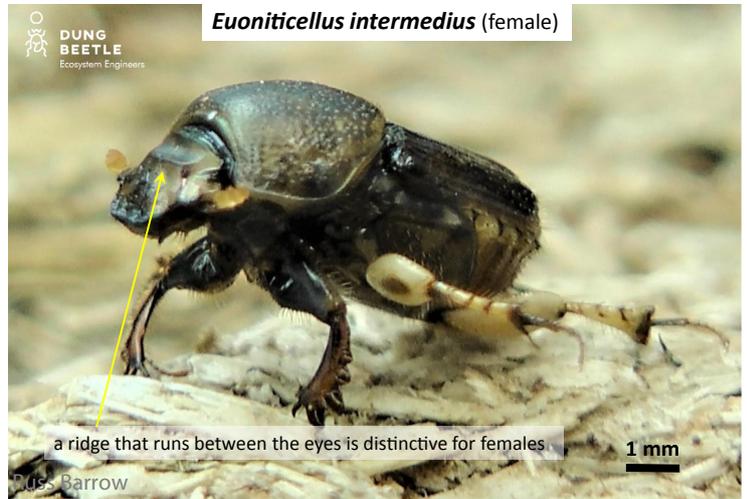
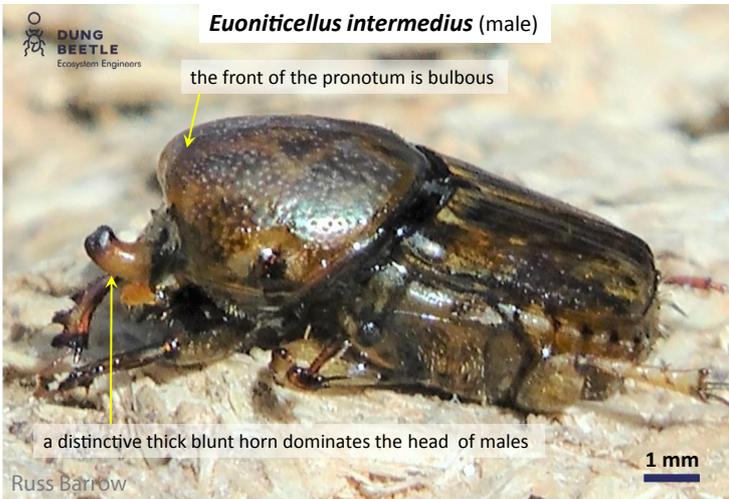


■ Active □ Inactive

7 mm ↔ 9 mm

Burrowing depth

11 – 19 cm



Euoniticellus pallipes



Tunneler

Colour light to medium brown with speckling over pronotum and wing covers. 2–3 pairs of dark patches in centre of pronotum

Horns none; arched ridge between eyes in males, small ridge in females

Flight time day

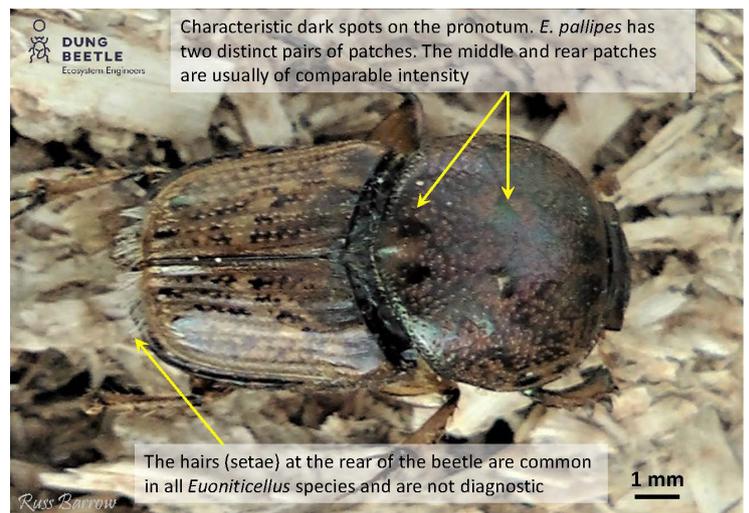
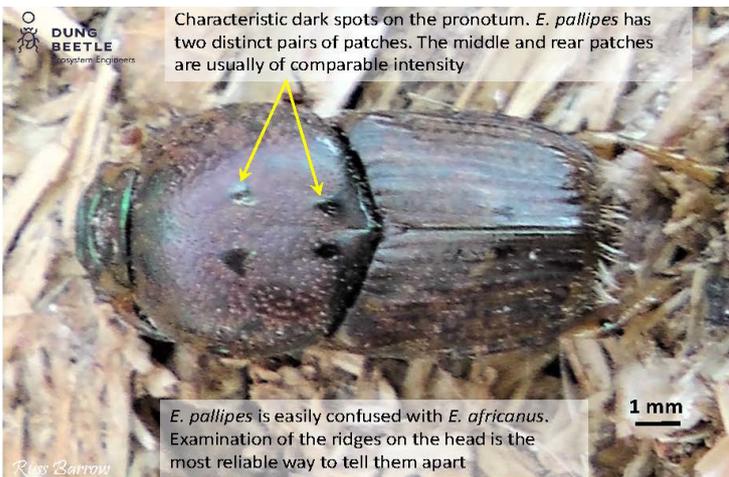
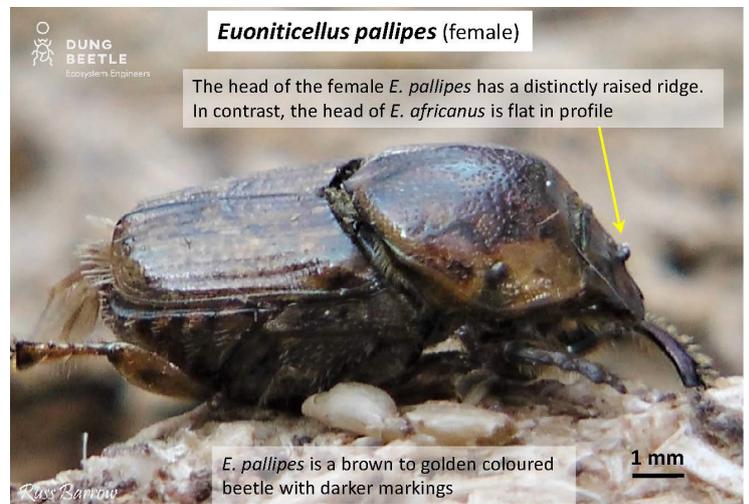
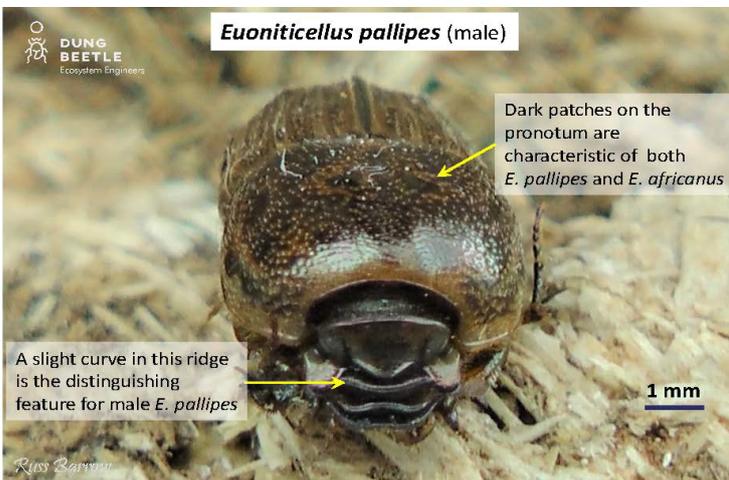
Distribution WA, SA, VIC, NSW

Similar Species *E. pallipes* female has a small ridge between eyes, but *E. africanus* female has none. *E. pallipes* male has shallowly arched ridge between eyes, which is strongly curved in male *E. africanus*.

Seasonal activity



■ Active □ Inactive



Onitis alexis



Tunneler

Colour green/coppery pronotum, light brown wing covers

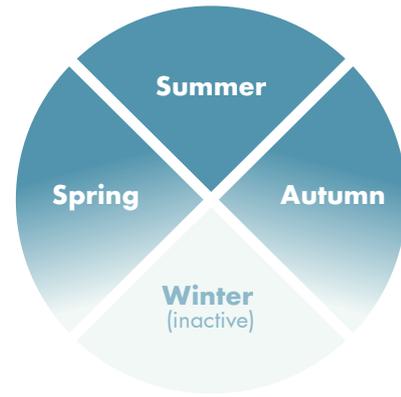
Horns both sexes have a ridge midway between eyes and front of head; female has distinct bump at back of head

Flight time dusk and dawn

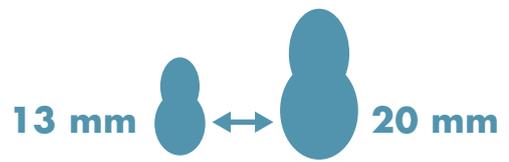
Distribution all of Australia except TAS

Similar Species *Onitis aygulus* is larger and has an unequal double spur on hind femur of male (single spur in *O. alexis*).

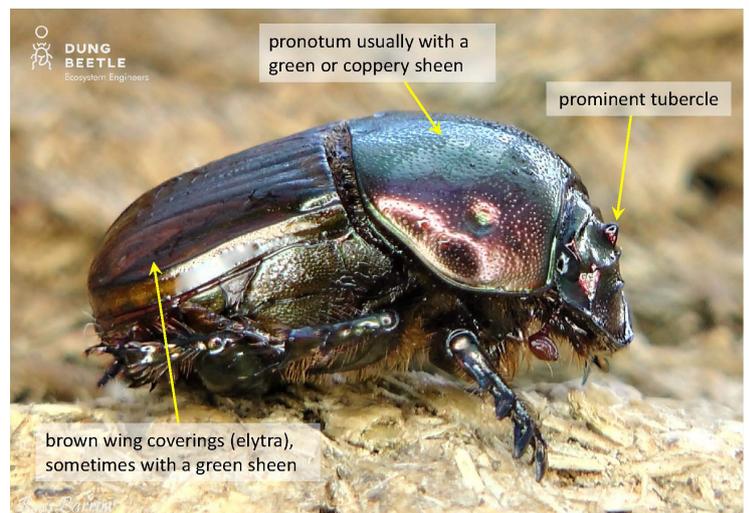
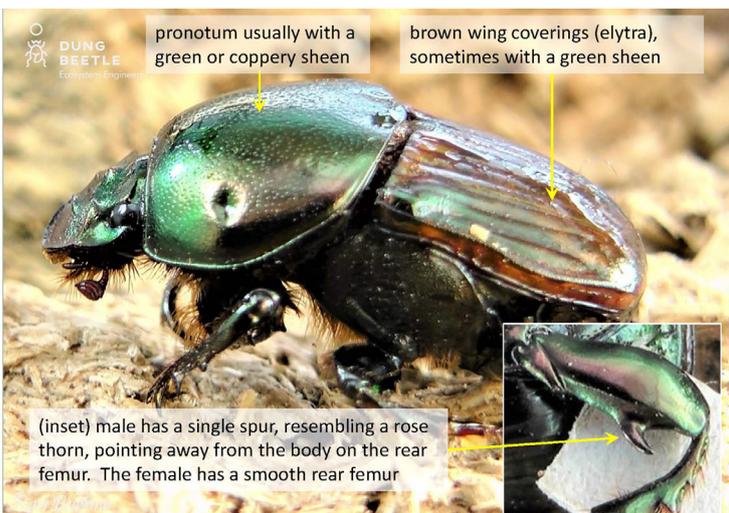
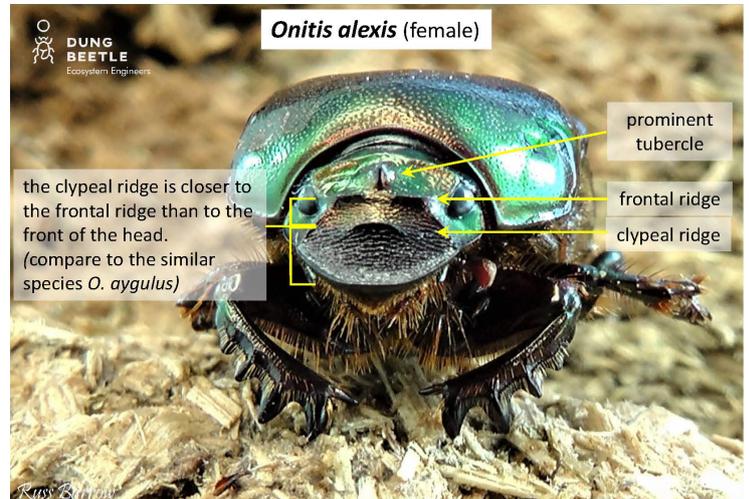
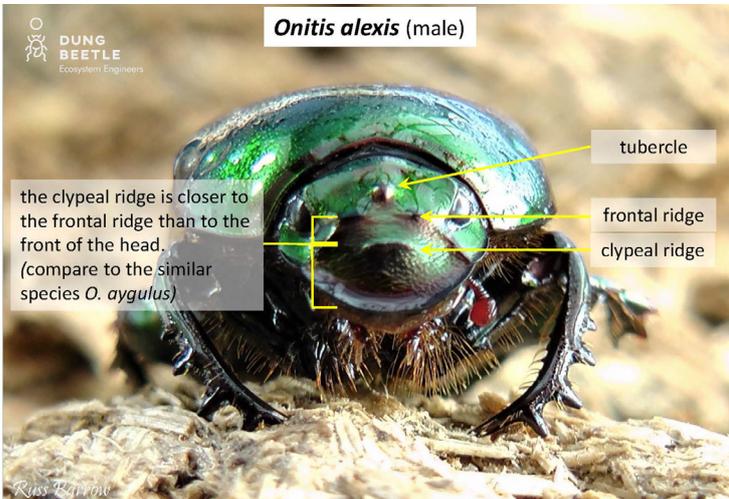
Seasonal activity



■ Active □ Inactive



Burrowing depth
20 – 65 cm



Onitis aygulus



Tunneler

Colour dark brown pronotum with coppery or green sheen, light brown wing covers

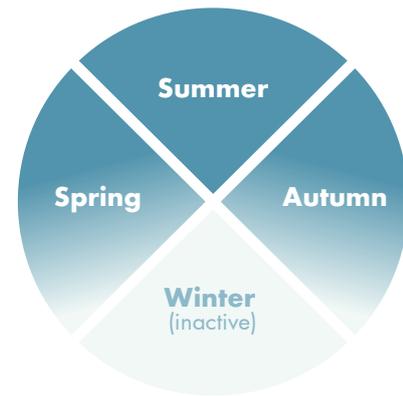
Horns female has distinct bump at back of head and a ridge close to front of head

Flight time dusk and dawn

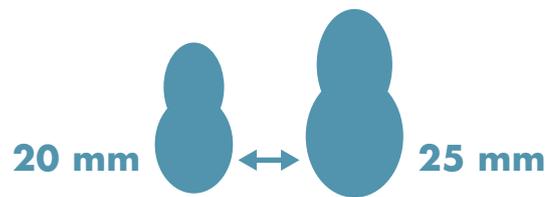
Distribution WA, SA, VIC, NSW

Similar Species *Onitis alexis* is similar but smaller and has a single curved spur on hind femur of male (unequal double spur in *O. aygulus*).

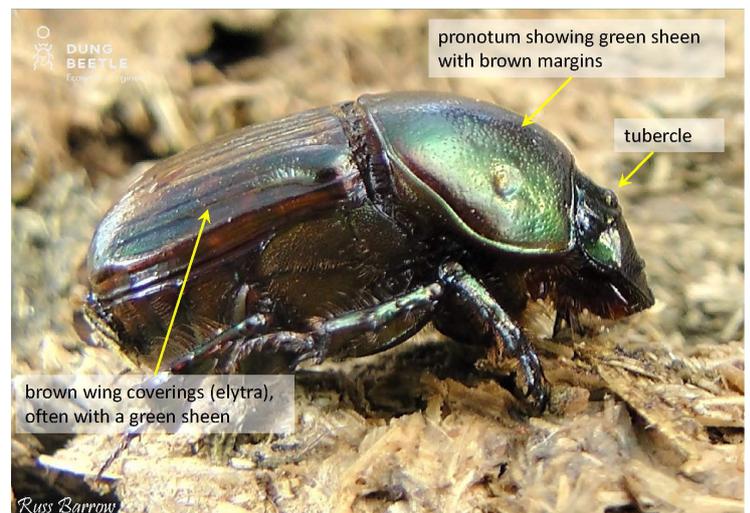
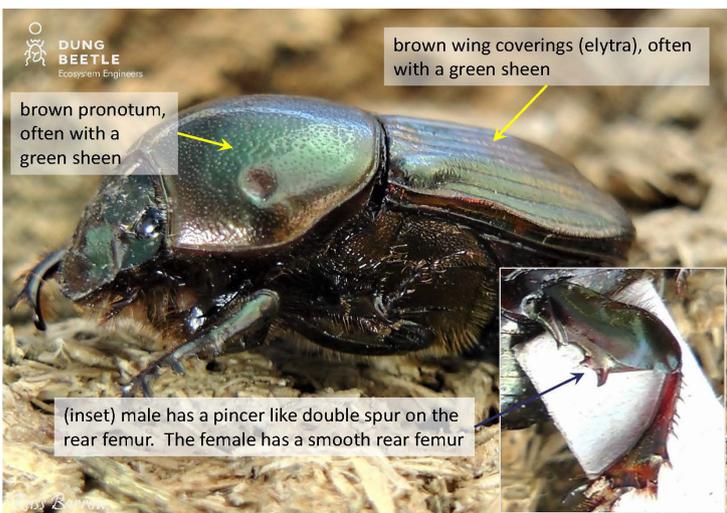
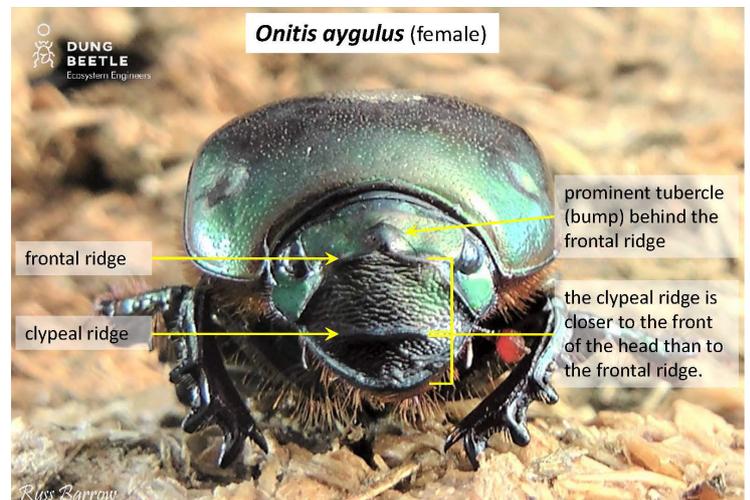
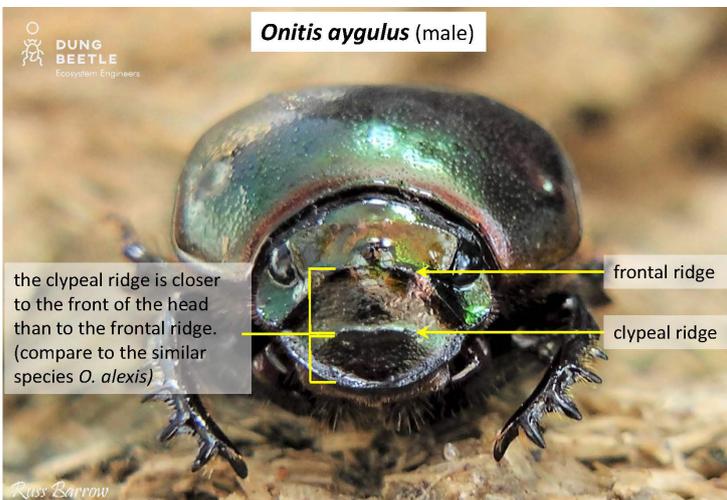
Seasonal activity



■ Active □ Inactive



Burrowing depth
5 – 16 cm



Onthophagus taurus



Tunneler

Colour shiny black

Horns males have long, curved horns; females have none

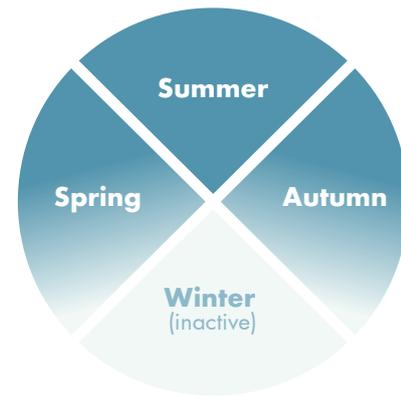
Flight time day

Minor minor males have very short horns extending upward from back of head

Distribution WA, SA, VIC, TAS, NSW

Similar Species female *O. binodis* are similar to female *O. taurus*, but *O. taurus* females are shinier and the front of the pronotum is rounded, not lobed.

Seasonal activity

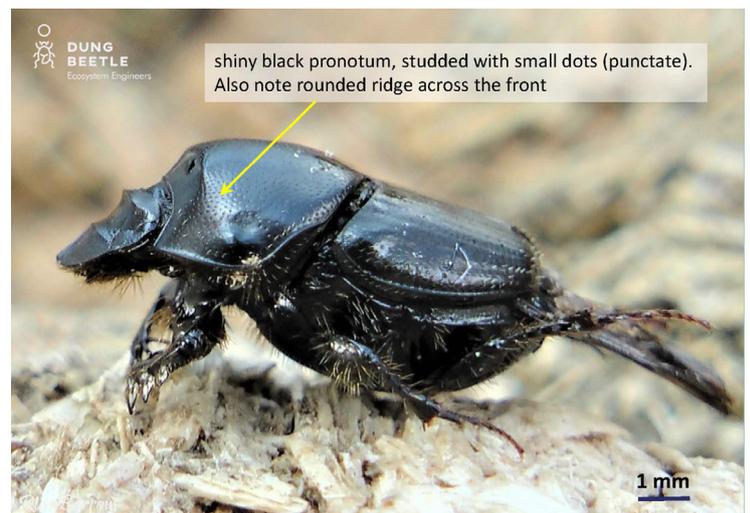
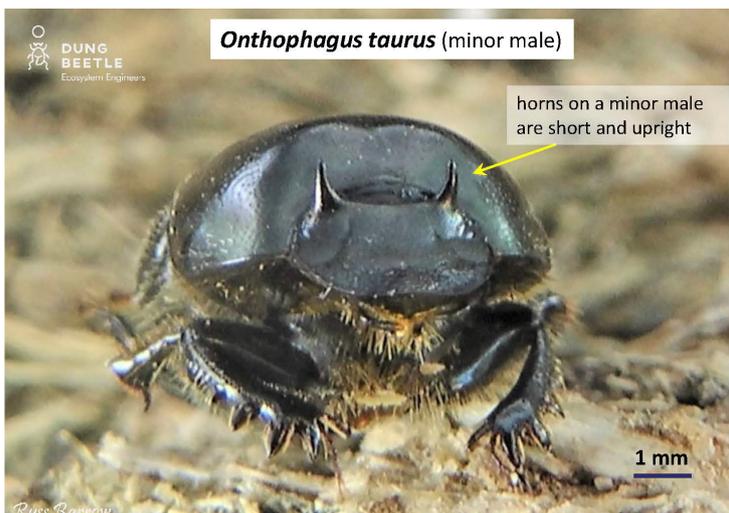
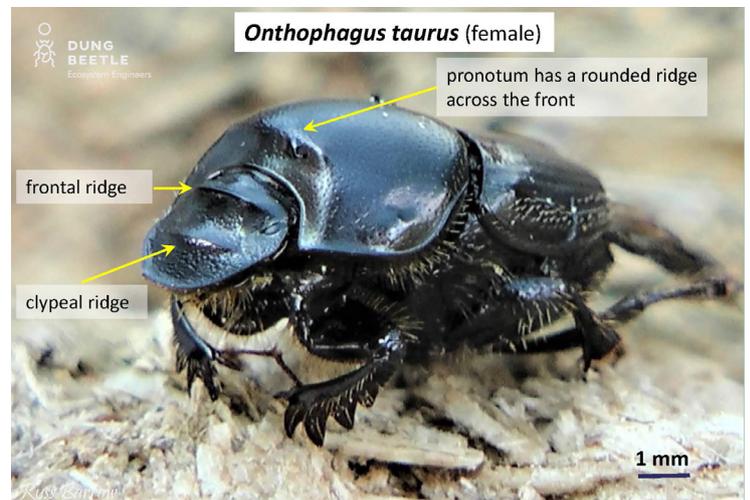
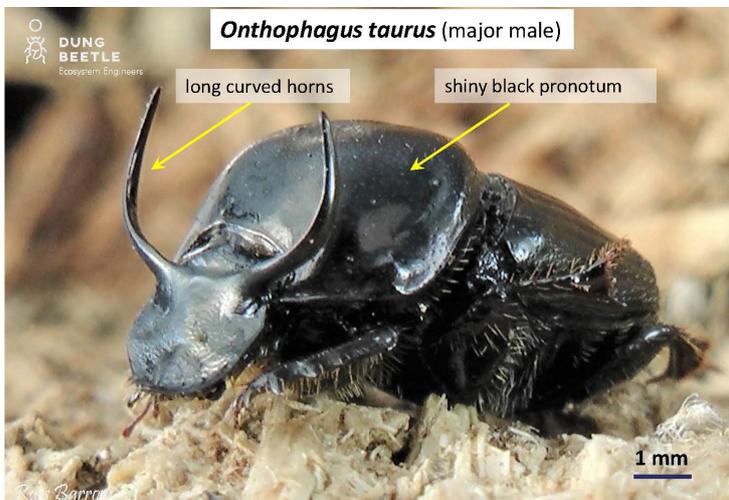


■ Active □ Inactive

8 mm ↔ 10 mm

Burrowing depth

8 – 13 cm



Onitis caffer

Tunneler

Colour shiny black, with pronotum early as long as wing covers

Horns none, but males have serrations on hind femur

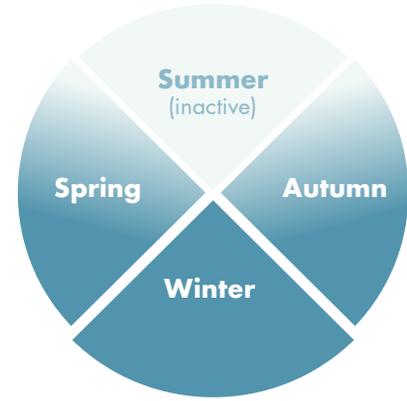
Flight time dusk and dawn

Yearly Activity autumn-early winter. A winter rainfall strain may become active again in spring.

Distribution WA, NSW, southeast QLD

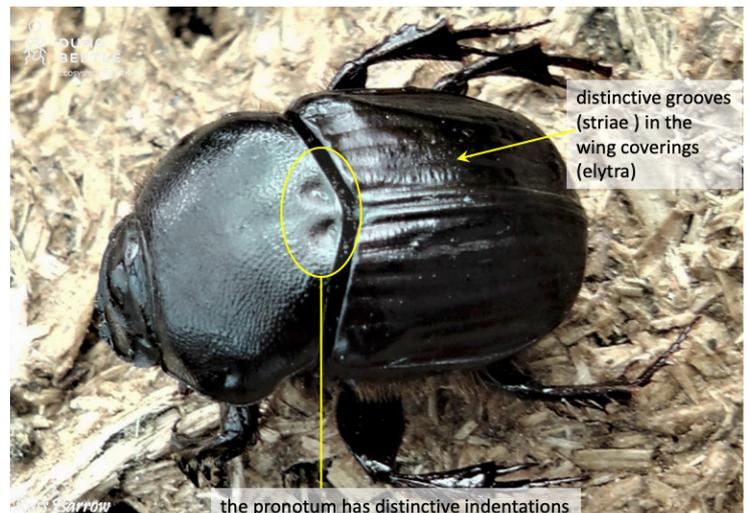
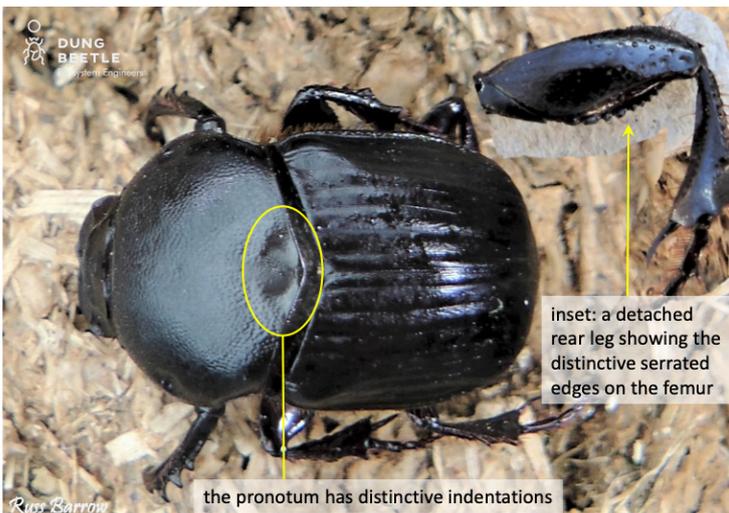
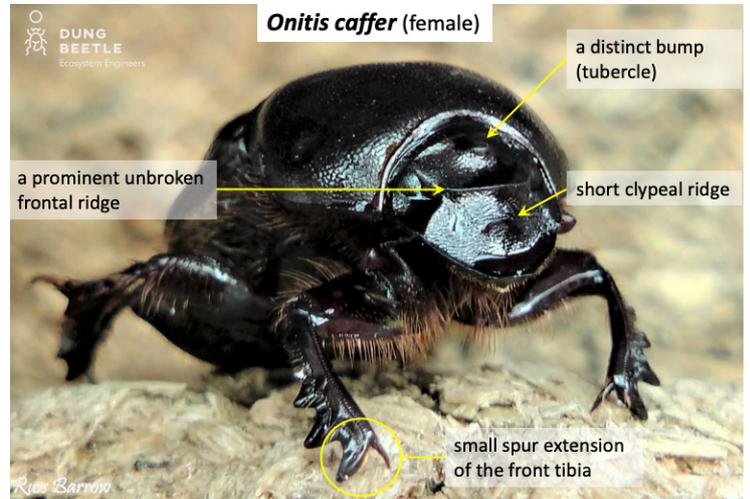
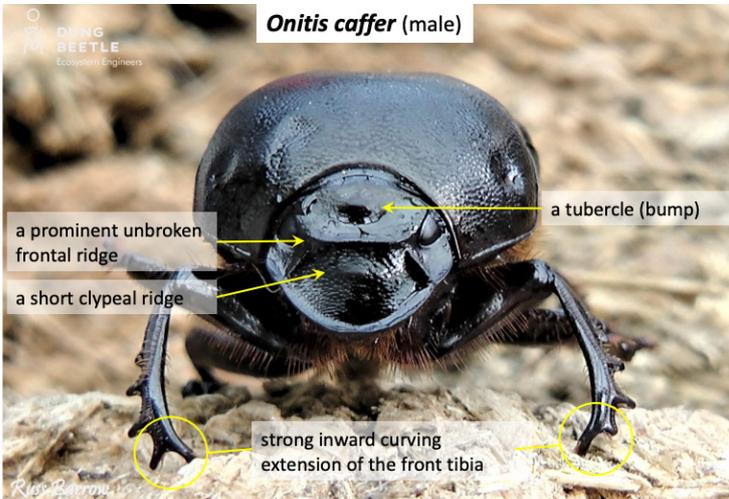
Similar Species Black colour and stocky shape of *O. caffer* is different from related species. Also, serrations on hind leg of male are unique; related species have one or two spurs on hind leg.

Seasonal activity

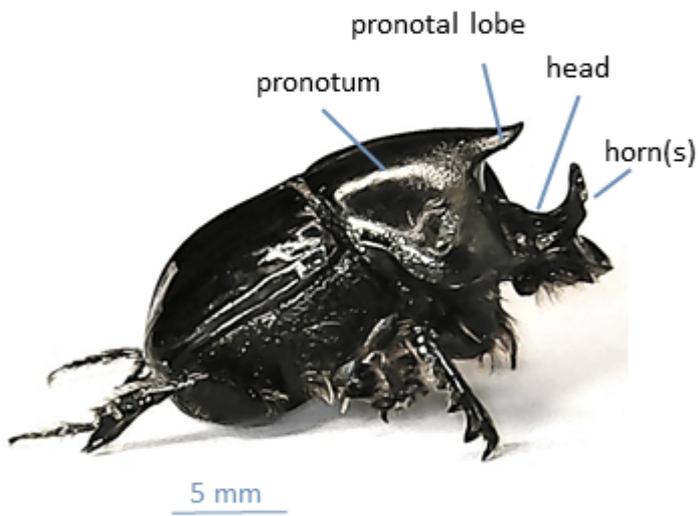


Active Inactive

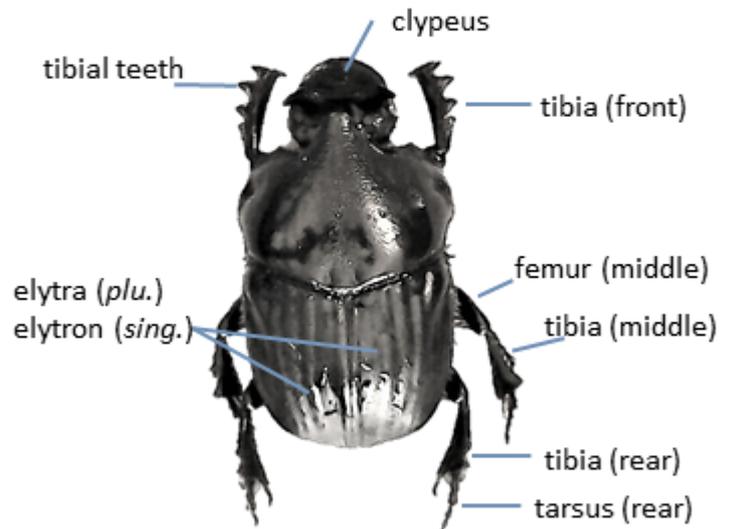
15 mm  ↔  20 mm



Beetle anatomy



Lateral (side) view

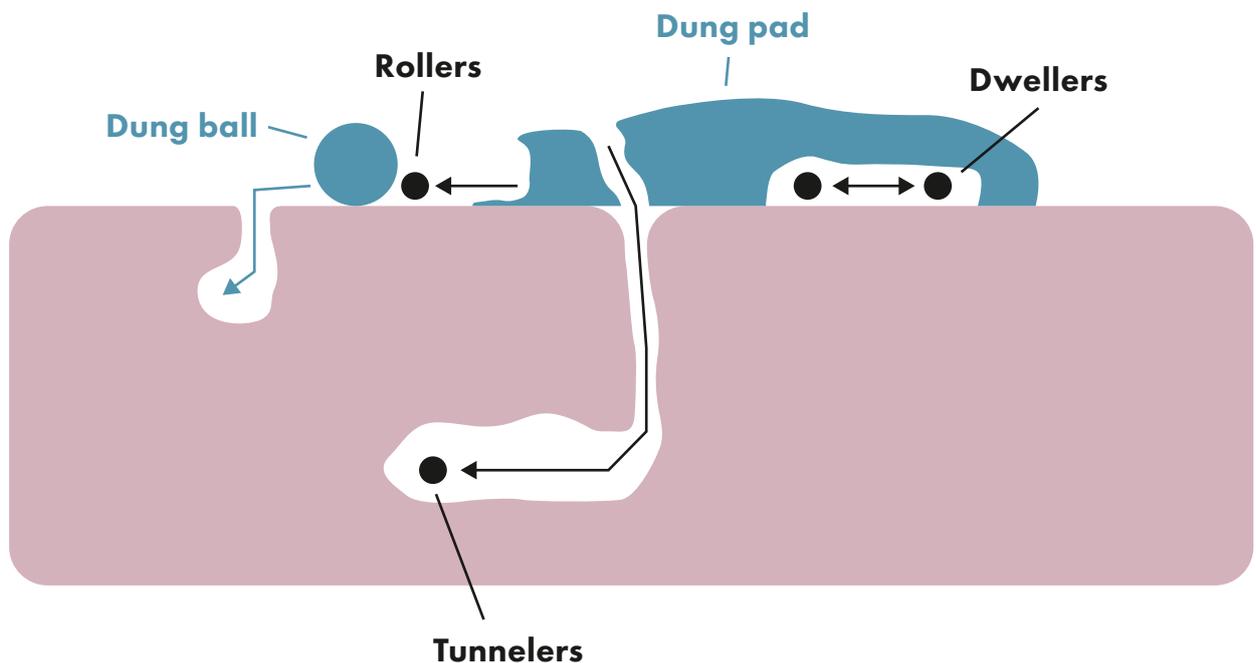


Dorsal (top) view

Nesting strategy

Dung beetles belong to one of three functional groups depending on nesting strategy.

- 1) Tunnelers
- 2) Dwellers
- 3) Rollers



What beetles are on your property?

Trapping beetles for identification

The key benefits of knowing which dung beetle species you have on your property:

- Self-assess which species you already have present on your property
- Understand which beetles you should acquire by identifying the seasonal gaps you need to fill
- Recognise periods of peak beetle activity. This knowledge can guide your decision on when to avoid drenching, and potentially harming your dung beetle population



Above: Pitfall trap



Above: Flotation sampling



VIDEO: How to trap dung beetles

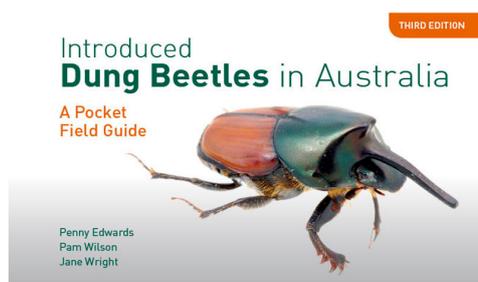
- Basic trap and flotation sampling
- Using a pitfall trap

Which species is this?

Identifying dung beetle species

Identifying a species

Identifying a beetle species from a few specimens can be difficult. To assist, please refer to handbooks and pocket guides available. Be aware that environmental conditions and lifecycle stage can impact appearance of individuals.

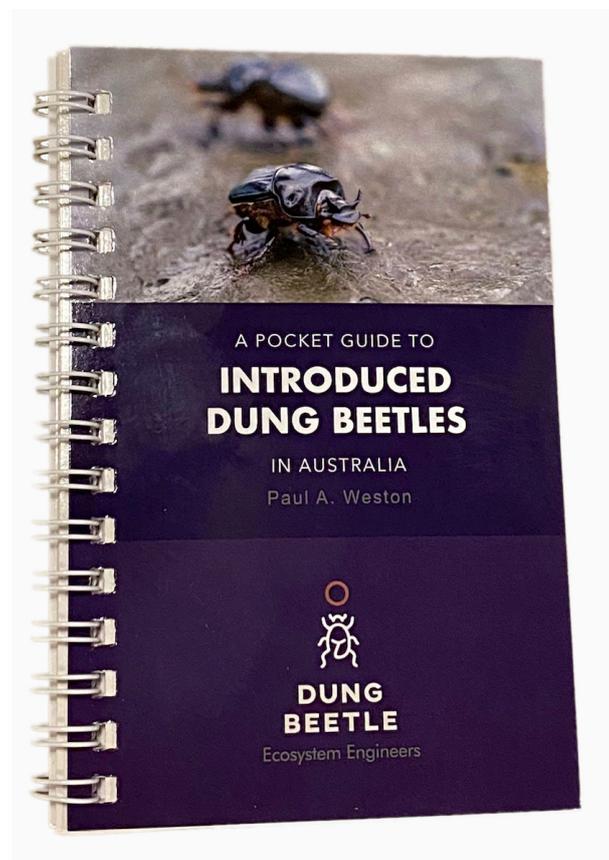


Introduced Dung Beetles in Australia – a pocket field guide

Authors: Penny Edwards, Pam Wilson and Jane Wright

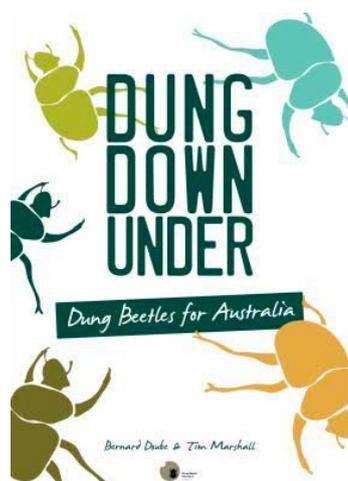
Buy online

www.publish.csiro.au/book/7207



Contact the DBEE team to request a pocket guide

EMAIL: dungbeetle@csu.edu.au



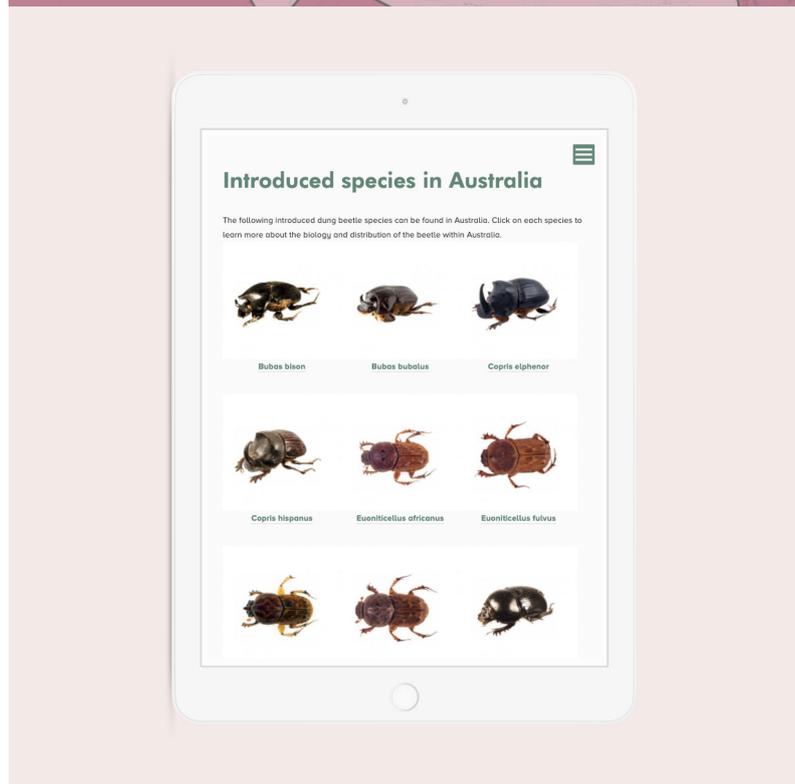
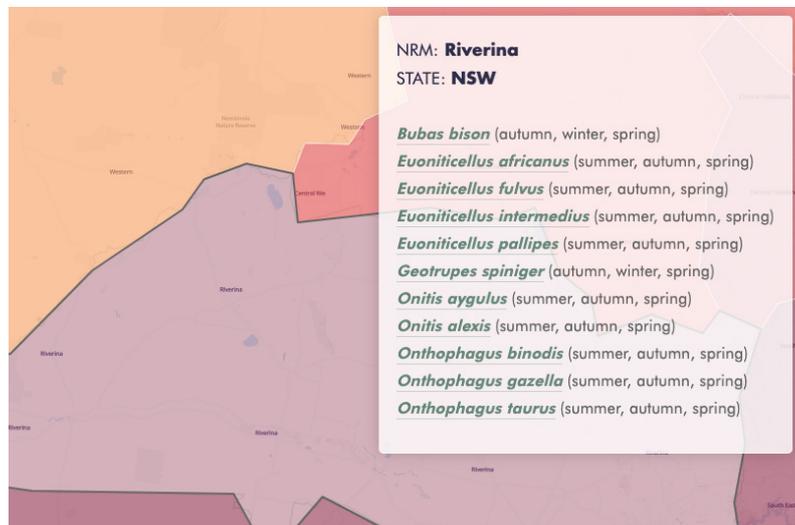
Dung Down Under – dung beetles for Australia

Authors: Bernard Doube and Tim Marshall

Buy online

www.dungbeetlesolutions.com.au

Interactive maps and tools



Online visual identification guide.

Don't have our handy pocket ID guide? You can access identification information for the introduced dung beetle species directly from our website, including tips on key anatomical features to look out for when determining what species you have on your property.



← **WEBSITE: Species near you**

- Interactive map listing species by NRM region
- Photos and identification information for introduced species

Getting more beetles

Introducing new beetles to your property

Successful beetle introduction can take time and requires appropriate management strategies.



VIDEO: Do you need more dung beetles on your property?



Selecting the right beetle species for your property

Refer to the dung beetle monitoring and mapping site to see which beetles are currently in your region (select link to refer reader). It is important to select beetles which are well adapted to your regional conditions.



WEBSITE: Find a supplier

– List of commercial dung beetle suppliers in Australia

www.dungbeetles.com.au

Nurseries and release

Give your dung beetles a great start in life with an on-farm nursery.

- Maintain beetle health with regular feeds of fresh dung
- Keep predators away from the dung beetles using the enclosure
- Maximise the reproductive population

Creating a nursery is simple.

- Create a timber box (we suggest a size of around W 900mm x D 900mm x H 200mm)
- Use a hinged lid for easy access for monitoring and use shade-cloth (ventilated material) for the lid surface area.
- Dig the box in approximately 10cm into the ground to reduce the likelihood of beetles tunneling in and out of the nursery.



VIDEO: How to make a nursery and release dung beetles on your property

Nursery field notes

1. Dung Preparation:

1.1 Collect fresh dung, the fresher the better, and place it in a bucket with a lid. The lid will prevent unwanted insects from entering.

1.2 If the dung is dry add some water to make it sloppy. For sheep dung let the pellets absorb water to become moist. The sheep dung should easily break apart.

1.3 Store the dung for at least 3 days before use in closed bucket. It can be kept next to your nursery in the sun. The heat will destroy any insects that were in the dung and prevent competition with the beetles you placed in your nursery. It is also convenient to collect dung just once a week and have it sitting next to your nursery.

2. Feeding:

2.1 Feeding should occur once or twice a week, spread across the week if feeding multiple times. You will recognise when the beetles are using the dung as it will take on a dry shredded appearance as the beetles suck out the moisture and take solid material beneath the surface to make brood balls.

2.2 Start by placing a dung pat in the front left corner and over time working your way to the back (see Figure 1).

2.3 How much? - This will depend on how many beetles you have in a nursery and how hungry they are. We use a container that holds about 1 L of dung (a plastic takeaway container or cut a milk carton). For 100 beetles start by giving them 1 x 1 kg.

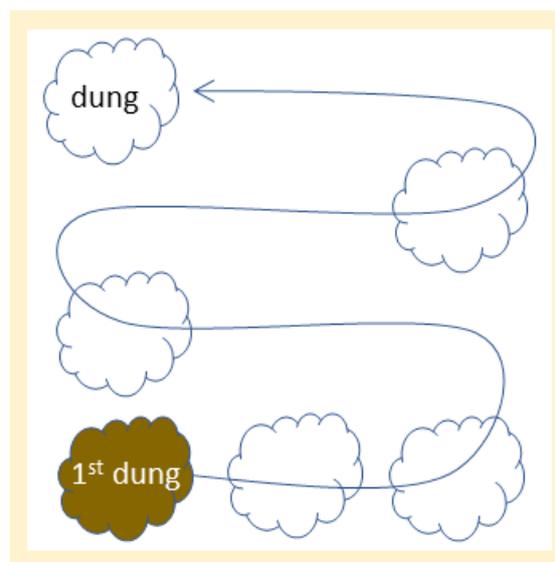


Figure 1: Feeding pattern in nursery

3. Removing Dung:

3.1 If the beetles are feeding well there will not be a lot of dung to remove. After dung has been in the nursery for about 2 weeks it can be removed. Gather the dung and place it in a bucket of water. Any beetles that were in it will float to the surface and should be placed back in the nursery. However, there should not be many beetles in old dung.

4. Removing Plant Growth:

4.1 You can cut grass and weeds as they grow. Don't pull them as deep roots might disturb brood balls. This is not critical, but overgrowth of plants will make finding/observing beetles difficult.

Trapping beetles in nursery

There are two reasons why you would want to trap beetles in your nursery.

To determine how well:

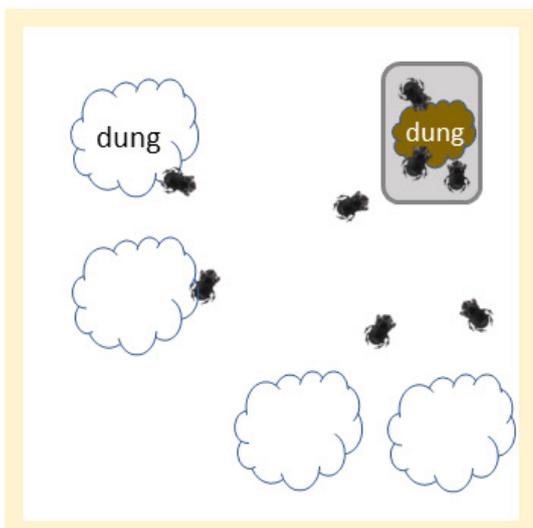
- the beetles survived winter
- they have bred through spring.

1. Check how well beetles emerge from winter:

1.1 In early spring set a small container into the ground inside the nursery and place some dung in the bottom. It is best to do this in the evening or early morning when the beetles are less active.

1.2 After 24 hours* check the container to see if it contains any beetles (record data and number caught). Any beetles captured can be returned to the main nursery.

1.3 Repeat this process once a week over the next few weeks and each time record the date and the number of beetles captured.



2. Check how well the beetles bred in spring:

2.1 The beetles that emerged in spring will have bred and we can expect new beetles to emerge after around 8-12 weeks (the time will vary).

2.2 In mid December set a small container into the ground inside the nursery and place some dung in the bottom (as you did in spring). Check the container after 24 hours* and return any trapped beetles to the nursery (record the date and how many beetles were caught).

2.3 Repeat this process once a week over the next few weeks and each time record the date and the number of beetles captured. Send the information to us.

* 24 hours is not a magical time. You may choose 36 hours or 48 hours. However, it is important the time is the same for each assessment so you can compare the number of beetles trapped and determine peak emergence.

3. Releasing beetles from your nursery:

Ideally your beetles will have bred prolifically and can be released from December – January. For example a nursery that started with 100 beetles would ideally produce between 500-1000 beetles.

3.1 Trap and collect 100 beetles (assume roughly equal numbers of each sex) and set them aside.

3.2 Carefully lift the nursery and establish it in a new location (adjacent on fresh ground is fine). Place the 100 beetles you set aside in the new nursery and start the process again. Beetles still emerging from the old nursery location are free.

Farm management considerations

Introducing beetles

- When introducing dung beetles to your property, it is critical that beetles have an appropriate food source, fresh dung.
- When introducing dung beetles to your property for the first time using an on-farm nursery, fresh dung must be available while beetles are active. The nursery should protect against predators.
- When introducing dung beetles for the first time in a field site, consider a minimum of 50-500 per introduction site. Greater numbers are likely to increase success rates.
- Consider multiple introduction sites if you wish to populate a property with existing livestock.

Drenching livestock

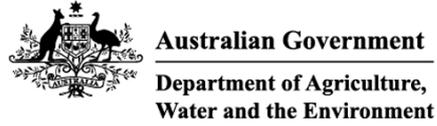
- Consider drenching after you perform fecal egg counts to determine if you need to drench.
- Consider drenching when beetles are not actively working your dung pads.

Soil tillage

- Beetle establishment can be impacted by soil tillage. Performing deep harrowing or seeding resulting in deep soil disruption may adversely impact dung beetles below ground.



This project is supported by Meat & Livestock Australia, through funding from the Australian Government Department of Agriculture and Water Resources as part of its Rural R&D for Profit programme.



DUNG BEETLE
Ecosystem Engineers

www.dungbeetles.com.au