

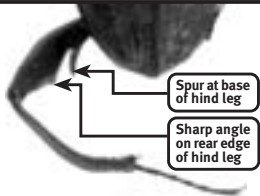



## Ball-rolling species


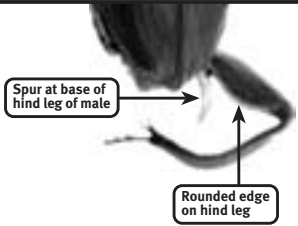

***Sisyphus spinipes*** | day flier

- long, thin middle and hind legs
- entirely brown to matt black-coloured body
- males have a dark-coloured spur at the base of the hind femur, which is small in minor males, and a sharp angle on the rear edge of the hind leg

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***Sisyphus rubrus*** | day flier

- light brown to light yellow-brown body (smaller and lighter-coloured than *S. spinipes*)
- long, thin middle and hind legs that are usually paler in colour than the body
- males have a large, pale-coloured spur at the base of the hind leg, which is small in minor males (and not present in females)
- rounded rear edge on hind leg of male

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## Other support information and references

### These resources will be helpful both to teachers and students

Department of Natural Resources 1998, *Support for natural resource management education 1998–9*, Scientific Publishing, Brisbane.

Forge, K 1993a, *Pasture Watch Classroom Activities*, Department of Primary Industries, Queensland, Brisbane.

—1993b, *Pasture Watch Field Activities*, Department of Primary Industries, Queensland, Brisbane.

Tyndale-Biscoe, M 1990, *Common Dung Beetles in pastures of south-eastern Australia*, CSIRO Division of Entomology, Australia. (For enquires or orders, phone the CSIRO Bookshop on 02 6246 4001.)



### Web sites

*Department of Primary Industries*  
 <[www.dpi.qld.gov.au](http://www.dpi.qld.gov.au)>

A search on 'dung beetles' will find a number of articles on this site with information on the Queensland Dung Beetle Project.

*ABC Online*

<[www.abc.net.au/science/k2/trek/default.htm](http://www.abc.net.au/science/k2/trek/default.htm)>

Visit the Karl Trek page, which has a number of activities and interesting facts about dung beetles. See October and November 1997 entries for more details.

*National Dung Beetle Program* (site under development)  
 <[www.dungbeetle.uwa.edu.au](http://www.dungbeetle.uwa.edu.au)>

### Contacts

Contact local landholders and landcare groups near you that might like to be involved in 'Dungbusters'. A listing of landcare and catchment management groups can be found on the Queensland Landcare web site at <[www.landcareqld.org.au](http://www.landcareqld.org.au)>.



## Suggested activities

- 1 Why are farms important?
- 2 Where did all the dung beetles come from?
- 3 Effects of dung beetle activity on the environment
- 4 Sampling dung beetles
- 5 Identification of common introduced dung beetles
- 6 Making a dung beetle farm
- 7 Getting to know your dung beetles
- 8 Dung beetles and plant growth
- 9 Photosequence of dung dispersal
- 10 Debate: 'Introduced dung beetles are good for Queensland's environment'
- 11 Local area study
- 12 Where to from here?

## Life and Living

2.3 Students make links between different features of the environment and the specific needs of living things.

# 1 Why are farms important?

## Focus

Investigating, understanding

## Aims

- To help students to understand why we have farms
- To introduce students to:
  - the concept of natural resource trends
  - the social and economic context and value of farms.

## Materials

- Butcher's paper
- Pens

## Sequence | 30 minutes

1. As a class, discuss farming in Australia and how much land is used for farming.
2. Ask students to break into groups of 3–4 and record their answers to the following questions on the butcher's paper provided. (Some suggested answers are included.)
  - What are farms and what types do we have in Queensland? *Cattle, sheep, pigs, crops, dairy.*
  - Why do we have farms? *So we can have food to eat, products to make clothes, and to provide jobs.*
  - Who needs them? *Everybody.*
  - What do we get from farms? *Food, leather, wool, cotton, jobs.*
  - Do you think farms are important? Why/why not?
  - What problems can affect farms? *Drought, flood, pests.*
  - What problems are farmers currently facing?
3. Ask students to report back to the class on their findings. Discuss the differences in their ideas.

## Background notes

*The Original CSIRO Dung Beetle Project (1966–86)*

European settlement has permanently altered the nature of the Australian landscape. Key changes have included partial or total clearing of vegetated areas, and the introduction of pasture plants, undesirable plants, cattle, and other domestic animals. Cattle are quite unlike our native marsupials, particularly in their grazing patterns and in the type of dung they produce. A large proportion of the annual dry matter production of a pasture is consumed by cattle and converted into dung, increasing the need for efficient recycling of their faecal nutrients.

Australia has unique dung beetles. These evolved with our marsupials, which usually produce relatively dry and fibrous dung pellets. With some exceptions, these native insects are not adapted to using cattle dung effectively, nor to colonising it effectively in cleared open habitats. Consequently, prior to the introduction of exotic dung beetles, cattle dung in most areas of Australia was not dispersed (i.e. buried and/or shredded) to any notable extent, except in a few areas where certain native beetles were able to have an impact. This has given rise to various problems, with the main ones being that:

- cattle dung is the only breeding medium for the introduced buffalo fly, and is a major breeding site for the native bush fly and four species of *Culicoides* biting midges—some of which are known vectors of diseases such as ephemeral fever
- dung fouls pasture, obstructing plant growth and promoting rank, unpalatable growth around the edge of dung pats
- plant nutrients are immobilised in undecomposed dung pats, retarding the recycling process
- there is some loss of nitrogen to the atmosphere from unburied dung.

On the other continents (Africa, India and Europe) diverse dung beetle faunas evolved at the same time as large ruminants<sup>1</sup>. As these insects could use the dung for feeding and breeding, much of it was buried or dispersed during the growing season. There is considerable specialisation among these beetles as to dung preference, time of activity and reproductive strategy. There are also clearly recognisable functional groups: ball-rollers, large and small; tunnelling beetles of all sizes; and several other types.

Dr George Bornemissza of the CSIRO Division of Entomology noted that cattle arrived in Australia without dung beetles adapted to bovine<sup>2</sup> dung. Recalling that, in his native Hungary, it was commonplace to see dung beetles removing quantities of dung from cattle pats, he proposed that dung beetles be imported into Australia to disperse cattle dung and thereby reduce the problems associated with unburied dung.

(Source: Queensland Dung Beetle Project Training Notes 2002)

1. Any of various hoofed, even-toed, usually horned mammals of the suborder Ruminantia, characterised by the chewing of cud—such as cattle, sheep, goats and deer.
2. Of the ox family, comprising hollow horned ruminants—such as cattle.

## Time, Continuity and Change

3.4 Students organise information about the causes and effects of specific historical events.

## 2 Where did all the dung beetles come from?

### Focus

Understanding

### Aims

To help students to understand why foreign dung beetles were introduced to Australia as a sustainable natural resource management option.

### Materials

- Resource sheet 1—*Dung beetles arrive in Australia*.

### Sequence | 30 minutes

1. Ask students to think about:
  - what Australia would have looked like before 1788 and the arrival of the First Fleet (i.e. before land clearing and the introduction of exotic plants and animals)
  - where farms are located.
2. Ask students to read resource sheet 1—*Dung beetles arrive in Australia*.
3. Ask students to think about what the consequences would be for Australia's natural environment if cattle dung were not dispersed by dung beetles—for example, what would our countryside look like?
4. Record a number of the words that students use to describe this scene.
5. Discuss how having a lot of undispersed cattle dung in pastures could affect our environment, and us.
6. Discuss water quality problems associated with run-off.