

A BIT ABOUT BEETLES IN BRISBANE

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WHAT ARE BEETLES?

Beetles are one of those familiar groups of insects which we all encounter regularly. The special feature that makes them beetles is the fact that their flying wings are folded up under a couple of armoured wing-covers (called elytra) when they are not using them. This protects the delicate wings from damage while the beetle goes about rough and tough activities like burrowing in the ground or boring into wood or biting your fingers. Most beetles are powerful, hard-bodied, compact creatures. They often have a smooth body surface that may be brightly coloured. Entomologists classify all beetles in one big group called the COLEOPTERA.

HOW MANY BEETLES?

Beetles are famous for having more different kinds (species) than any other group of land animals on earth. We haven't counted them all yet but there are probably more than a million kinds altogether with perhaps 60,000 different species in Australia alone. There are probably 1000 different beetles right here in Brisbane. Most of the ones we are familiar with are fairly large but the vast majority are very small, less than 3-4 millimetres in length. That's why we have difficulty working out how many kinds there are.

HOW DO BEETLES BREED?

The beetles we see are the full-formed adult stage of the life cycle. These mate and lay eggs. Like other advanced insects, the eggs of beetles hatch out to a larval stage which is quite different to the adult. In butterflies we call the larva a "caterpillar", but for beetles we usually call them "grubs". Grubs are the feeding stage of the lifecycle and they usually live completely immersed in their particular food. You'll find lots in your compost heap, others bore inside wood, others live in your garden soil eating roots, some live in dung, and so on. When the grub is full grown it changes to a pupa (chrysalis) and later an adult beetle hatches out.....and so the cycle goes on.

WHY SO MANY BEETLES?

There are many reasons why beetles have become so diverse and successful on earth. Some of these are:

1. Being able to fly is a fantastic advantage that insects share with relatively few other kinds of animals. Beetles have added to this advantage by finding a way of protecting their wings when they are not using them.
2. Insects are very vulnerable to drying out. They prevent this by having a waxy waterproof film on their surface. Beetles are extra waterproof because they have a very thick outer skeleton, and they also have their breathing holes under their wing covers, so they don't lose moisture when breathing. Thus they can survive well in dry places, like deserts.
3. The thick external skeleton of beetles is formed into strong plates which lock together to make a strong box. This makes beetles very crush-proof and gives them great power to resist attack and also to burrow into hard substrates.

CLASSIFYING BEETLES

Classifying and naming of this vast number of beetles is a very complex business. To simplify things, we can think of beetles as divided into two big groups: the more primitive ones are called the ADEPHAGA, and a much bigger group of more advanced species is called the POLYPHAGA. Each of these groups is divided into smaller groups called Families. In Australia

there are about 10 families of ADEPHAGA and more than a hundred families of POLYPHAGA. The names of families are always spelled with a Latin ending " ...idae". Many families have common names. For example, the **Family Buprestidae** contains the beautiful species we call "Jewel Beetles". Each family has lots of species and they have scientific names that we always spell in italics, and some of them have common names. For example, on Cook's voyage in 1770 they collected a beautiful, iridescent green beetle at Botany Bay. Its scientific name is *Chrysolopus spectabilis* and its common name is the Botany Bay Diamond Weevil. It's also common in Brisbane.

A BIT OF CHAT ABOUT BRISBANE BEETLES

In this section we'll discuss a few of the kinds of beetles we see in Brisbane. First we'll deal with the primitive ADEPHAGA and then those further up the evolutionary tree in the POLYPHAGA. Where there are common names we will use them together with the proper family names.

THE LOWLY BEETLES - ADEPHAGA

Ground Beetles (Family Carabidae)

These is the biggest group of the primitive beetles. They are super-active beetles with prominent jaws at the front. They mostly come out at night and they are fierce predators on other insects. One brown and orange species is called the bombardier beetles (*Pheropsophus verticalis*) because it makes a smelly puff of chemical smoke from its rear when attacked. In the rainforests are several greenish species of *Pamborus*. Their short curved jaws are specialised to grip slippery prey such as snails and earthworms, which they hunt on drizzly nights. Tiger beetles (*Distipsidera*) are fast-running, long-legged species with enormous, fearsome jaws. They run after ants in the daytime on smooth-barked gum trees in Brisbane parks.

Whirligig Beetles (Family Gyrinidae)

These aquatic beetles swim in circles and zigzags on the surface of still pools, hunting for insects that have fallen in. They have two eyes on each side of their head, one for looking below the water and the other to see above.

Predatory Diving Beetles (Family Dytiscids)

These have strong swimming legs and hunt their prey beneath the water surface. They carry a bubble of air beneath their wing covers to breathe, and often bob to the surface to replenish it.

THE ADVANCED BEETLES - POLYPHAGA

Fireflies (Family Lampyridae)

Fireflies, despite their name, are actually small soft-bodied beetles. Males fly back and forth above the ground just after dusk, flashing a light from their abdomen. They have enormous eyes and are on the lookout for females on the ground who flash in reply. There are several species in the Brisbane area. One is known from mangroves along the river bank, and displays in early spring. The grubs of fireflies feed on small snails which they find among the leaf litter.

Lycid Beetles (Family Lycidae)

These are soft-bodied, sluggish, orange and black beetles with many species in Australia. When handled, they produce a milky fluid that tastes nasty, so birds spit them out quickly. Many other Australian beetles mimic their colour patterns so that birds will think they taste nasty, too. A common Brisbane species is *Porrostoma rhipidium*, orange with a black thorax. They hatch in big numbers in spring from segmented, flat grubs which live in the leaf litter.

Jewel Beetles (Family Buprestidae)

Australia is famous for its jewel beetles and there are hundreds of species. They are elongate in shape and have exquisite, metallic colours...greens, reds, blues and yellows. They feed on nectar of flowering plants, especially *Leptospermum*, and many species of *Castiarina* can be found in early summer. The grubs have broad, flat, front ends and bore beneath the bark of trees and shrubs.

Ladybirds (Family Coccinellidae)

These well-known, small, circular, convex, striped and spotted beetles are mostly useful predators on aphids and scale insects. A few dull, spotted species of *Henosepilachna* do feed on plants related to pumpkins and potatoes, and can be garden pests. One curious species, *Eleis galbula*, feeds on sooty moulds.

Scarab Beetles (Superfamily Scarabaeoidea)

Several families are lumped together in an enormous group of beetles, known by the general name of "scarabs". They all have unusual antennae which have several flattened "leaves" attached to the end of a short stalk. On the inside surface of these leaves are many, minute smelling organs. When the leaves are opened wide the beetle can detect smelly food far away, and they can triangulate its direction by spreading both antennae. Their food can be fungi, carrion, dung, humus, decaying wood or plant roots. Scarabs are strong burrowers and, when they do, their antennae fold flat to protect their delicate sense organs. The grubs of scarabs are also very distinctive and are called "curl grubs" because they curve in a half circle. The next seven families and subfamilies are all scarabs.

Christmas Beetles (Subfamily Rutelinae)

About six species of these beautiful gold or green beetles occur in Brisbane and they are familiar at house lights in mid-summer. The golden ones are usually either *Anoplognathus porosus* or *Anoplognathus boisduvali*. The beetles feed on leaves of gum trees, while their grubs live in the soil and feed on plant roots.

Rhinoceros Beetles (Subfamily Dynastinae)

These earn their name because the males often have spectacular horns on their front end which they use for fighting over females. The common, large, black, squeaking, two-horned species in Brisbane is *Xylotrupes ulysses*. The giant, fat grubs found in compost heaps in Brisbane belong to it. The adults form mating aggregations on Poinciana trees. One or two particular trees in a suburb may become the focus of attraction for hundreds of beetles. The males use their horns to try to lever rival males off branches. The three-horned rhinoceros beetle (*Haploscapanes australicus*) is larger than those with two horns and is quite rare.

Flower chafers (Subfamily Cetoniinae)

These flat-backed, streamlined scarabs are very strong fliers and come to flowering trees. Other beetles have to lift their hard wing covers before they can unfold their flying wings, but flower chafers can quickly slip their flying wings out for action without moving their wing covers. The common fiddle beetle (*Eupoecila australasiae*) is so-named because the enamelled pattern of green lines on its back is violin-shaped. Another common backyard beetle is the larger yellow and brown Cowboy Beetle, *Diaphonia dorsalis*. Both have grubs which feed in compost heaps. They are much straighter than other scarab larvae and wriggle along on their backs.

Dung beetles (Subfamily Scarabaeinae)

These are the ultimate at using their antennae to find the smelliest of all foods - dung. They bury it in an underground nest burrow as food for their grubs. Eggs are laid into prepared balls of dung. The grubs hollow out the ball, pupate inside the shell and eventually hatch out as a new adult. The commonest species in Brisbane, often burying dog droppings, is *Onthophagus dandalu*. It is a

brilliant gold colour and the male has a prominent horn on the front end. One unusual species is *Onthophagus parvus*. It has special claws which enable it to hang on to the fur near the anus of wallabies, so that it can get the dung when it is fresh.

Stag beetles (Family Lucanidae)

These are highly recognizable scarabs because the males usually have large jaws. Stag beetle grubs breed in rotten wood, often buried stumps in Brisbane back yards. The Golden Stag (*Lamprima latreillei*) is metallic green, gold or purple in colour. It is active by day and comes to flowering pittosporum and similar plants. *Rhyssonotus nebulosus*, is a dappled, brown and black species that can be found when turning rotten logs.

Bess beetles (Family Passalidae)

These all have the same appearance....large, shiny black, parallel-sided beetles with deep parallel grooves in their wing covers. They live in family groups in chambers inside rotten logs. Their food is the chewed up rotten wood. The grubs feed in their early stages on the part-digested wood in the droppings of their parents. They communicate with the adults by making a squeaking noise with their special hind legs.

Tenebrionid or darkling beetles (Family Tenebrionidae)

A great variety of hard-bodied, mostly dark-coloured beetles belong in this family. Almost all of them are associated with dead and decaying plant material, especially rotten wood. Their grubs are cylindrical creatures we call wireworms or mealworms. Under bark of dead logs can be found large black species with strongly pitted wing covers (*Hypaulax*). A distinctive type are the pie-dish beetles (*Pterohelaeus*) with their flattened body surrounded by a wide, flattened margin which makes it hard for predators to reach their legs.

PHYTOPHAGA - THE PLANT FEEDING FAMILIES

The remaining families all belong to a major group known as the **Phytophaga** (literally "plant eaters") which primarily feed on plants. They all share a similar type of tarsus (their feet) with some wide segments and then a very tiny second-last segment. The three main groups of beetles which belong here are the leaf beetles, the weevils and the longicorns, each with thousands of different species.

Longicorn beetles (Family Cerambycidae)

These attractive beetles have long antennae, often longer than the whole body of the animal. This is particularly so for the males. Their legless grubs feed inside wood and most species are quite specific about the type of plant they breed in. The largest beetle in Australia, *Batocera wallacei*, is an enormous longicorn from Cape York which breeds in fig trees. A smaller species, *Batocera boisduvali*, occurs in figs on the outskirts of Brisbane. A common large species in Brisbane is *Agrianome spinicollis*, a large khaki species which often breeds in rot holes of poinciana trees. The females of some longicorn beetles are known to ringbark branches of garden trees, then lay their eggs in bite marks in the section above the ringbarking.. This action cuts off the chemical defenses of the plant and the grubs then grow in the stem above the ringbarking. The grubs of species of *Phoracantha* are pests of eucalypt timber, and it is common to have large adult beetles hatch out indoors from house timber, years after the house was built.

Weevils (Family Curculionidae)

Weevils are beetles with "noses". The nose is more properly called a "rostrum" and is a cylindrical extension of the front of the head with the jaws at the end. The eyes are located above the rostrum and the antennae are attached to its side. Some weevils have the ability to fold their rostrum out of

the way, into a groove between their front legs, when they aren't using it. On some weevils the rostrum can be longer than the rest of the beetle. Weevils use their rostrum for boring into hard plant material like wood and seeds and the female lay her eggs inside the hole. Their legless grubs bore inside the chosen substrate.

A well-known weevil is the Botany Bay Diamond Weevil (*Chrysolopus spectabilis*). It was collected on Cook's first voyage in 1770 and was named by Fabricius in 1774, making it the first beetle named from Australia. It is common in Brisbane and feed on wattle trees. The Giant Pine Weevil (*Eurhamphus fasciculatus*) reaches 60mm in length and is Australia's largest weevil. It breeds only in Hoop Pines and its shaggy surface camouflages it well on the rough bark on that tree.

Most weevil larvae bore into timber, but one special Australian group (*Gonipterus*) has slug-like larvae which feed externally on the leaves of eucalypts, somewhat like caterpillars. They cover themselves with faeces as a disguise. Some of these species are being used for the control of Eucalypts that have become feral in other countries.

Leaf Beetles (Family Chrysomelidae)

This is an enormous group with numerous colourful species which mostly feed on the leaves of plants and rejoice in the common name of "leaf beetles". Most of them are very fussy about the particular plants they feed on.

Leaf beetles are divided into about 6 sub-families, of which the **Chrysomelinae** is by far the most numerous. Hundreds of kinds feed on eucalypts and acacias and it appears that the beetles and plants have evolved together, most species of the plants having their own "personal" species of leaf beetle. The commonest are *Paropsis* and its relatives. They all have a distinctive circular, highly-convex shape. Many of them have exquisite colours, but unfortunately they often fade rapidly in dead specimens. The females lay batches of eggs, often arranged around a twig. These hatch to grubs which feed in groups on leaves. When disturbed they defend themselves as a group by simultaneously regurgitating smelly fluid. The adults usually hibernate during winter, often under loose bark of the host tree, then emerge in spring to lay eggs and start a new generation. Other familiar beetles in the same subfamily include the green and red *Lamprolina* on pittosporum and bursaria, the gleaming, dimpled, green *Johannica* on wonga vines, the yellow and blue spotted *Phyllocharis* on clerodendrum and the yellow-spotted *Chalcolampra* on vitex.

The more soft-bodied **Galerucinae** includes the fig beetle, *Poneridia australis*, which feeds on native sandpaper figs but is even happier to devour the leaves of commercial figs. It lays batches of pale yellow eggs under the leaves and these hatch to families of hungry black grubs which line up along the edge of leaves as they feed. A native species that feeds naturally on the native elm, *Celtis paniculata*, is the dark reddish brown *Menippus cynicus*. It was formerly rare and only recorded once or twice south of Gympie. But in recent years it has arrived in Brisbane to find a wonderful, sub-tropical paradise, full of the pestiferous Chinese Elms (*Celtis sinensis*), and has started going to town on them. Let's hope it stays.

The subfamily **Hispinae** includes interesting beetles with their antennae inserted very close together and their heads facing backwards beneath their bodies. There are two basic sorts. Tortoise beetles are circular and flattened, with the outside edge of their body extended so it covers their head and legs from attack by predators. A common one is *Aspidomorpha deusta* which feeds on leaves of the beach convolvulus, *Ipomea pes-caprae*. Its grub is typical of the group and has a forked appendage on its tail which collects its shed skins and faecal pellets. It flexes these over its back as camouflage. The other type of Hispinae are the "true hispines" which are usually flattened, elongate beetles which live in the axils of leaves of monocot plants. For example, the prickly little black *Hispellinus* lives on grasses while the smooth pale *Euryspa* lives on sedges like gahnia. Most unusual is *Aproidea balyi* which is common around Brisbane on the twining wombat vine, *Eustrephus latifolius*. The adults resemble small green grasshoppers while the larvae look like

caterpillars with a long black tail. When they pupate they hang down on the withered skin of the larva and mimic the flower buds of the plant. Two species of these true hispines have been brought to Australia to attack lantana and are well established around Brisbane. Both have larvae which burrow inside the lantana leaves.

The Subfamily **Criocerinae** has only a few species and the most familiar is the shiny yellow and brown orchid beetle, *Stethopachys formosa*, which feeds on the flowers and leaves of orchids. The grubs are slug-like creatures which feed in a group and cover themselves with their faeces for camouflage and protection. When they pupate they produce a shelter for the whole group made of a secretion which dries out to closely resemble polystyrene.