MEET OUR PRIME POLLINATORS

Bees do far more than just make honey. Globally, the 25,000 or so bee species play a crucial part in crop production and in promoting biodiversity. By **Julie Gould**.

TYPES OF BEE

The honeybee (Apis mellifera) is the most widely studied bee, yet the approximately 10 species of honeybee comprise less than 0.05% of all known bee species.

Apidae family: 5,811 species

Includes honeybees, bumblebees, stingless bees, orchid bees, carpenter bees and many cuckoo bees.

Halictidae: 4.401 species

Includes many primitively social species as well as sweat bees, which suck perspiration from the skin of humans and animals.

Megachilidae: 4,111 specie

Solitary bees, including leaf-cutter and mason bees (the females of which collect pollen with their abdomen instead of their legs).

50

Bee hotspots

Andrenidae: 2,952 species

Mining bees that are particularly common in temperate climates.

Colletidae: 2,595 species

Mining and cavity-nesting bees, including plasterer and yellow-faced bees.

Melittidae: 201 species

A small family of mining bees, most of which visit particular flowers.

Stenotritidae: 21 species

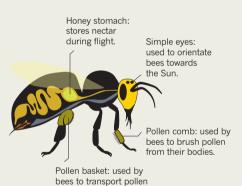
A small family of mining bees endemic to Australia

5,000

Estimated number of unknown, undescribed bee species. The total number of species is thought to be about 25,000.

BIOLOGY

Bees, a major group in the order Hymenoptera, evolved from wasps and have adapted to take advantage of the energy available from feeding on pollen and nectar.



up to 39 mm long.

30

The smallest known bee is the Australian Quasihesma bee, which is only 1.8 mm long.

The largest known bee:

females of the Indonesian

Chalicodoma pluto can be

Mediterranean basin

Greater Cape region

At least 645 different

found here, including

species of bee are

many of the most

primitive species.

This is a particularly rich area for bees. Spain alone has more than 1,000 species.

In many species, males often have more colouration on their face than do females, but there is little difference on the rest of their bodies.

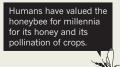
> ◆ A species of the stingless vulture bee (Trigona hyalinata) is almost all black.

◀ The North American Agapostemon splendens is green and blue.

Male valley carpenter bees (Xylocopa varipuncta), found in North America, are bright yellow all over.

DISTRIBUTION

Six global hotspots, all of which have a Mediterranean-style climate, are home to the greatest variety of bee species.



Bee-lite zones

Only a few bee species live in the tropics because the climate does not support the flora on which bees forage. Despite a wealth of flowers, bees are rare in the Arctic. Antarctica is the only region

in which there are no bees

West coast of the United States

California contains many climatic and floral zones, which are home to nearly 2,000 species from many different families.

Chile 183 species have

been described in the climatically Mediterranean areas of Chile, and 176 species in the deserts.

Central Asia

Kazakhstan, Uzbekistan, Kyrgyzstan, Turkmenistan and Tajikistan have 1,924 recorded species, but the total is thought to be much higher.

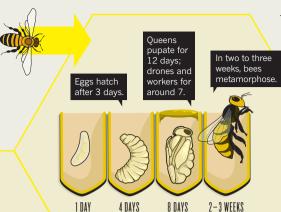
Southern Australia

1,647 bees have been described here, but 300–400 bee species remain unnamed.

SOURCE: M KUHLMANN/NATURAL HISTORY MUSEUM, LONDON

FROM THE BEGINNING ...

For their first few days, all larvae feed on royal jelly (a substance made in glands on the heads of worker bees). Future queens continue to be fed royal jelly; worker bees and drones consume bee bread, which is a mixture of honey, pollen and water.



The number of eggs laid per lifetime varies from eight (or fewer) for some solitary species to more than one million for queens of some social species.

> Honeybees are social insects with defined castes: workers (sterile females), drones (fertile males) and queens (fertile females).



DEATH



In a colony, 1-2% of honeybees specialize in removing dead bees, which keeps the colony clean and healthy within the enclosed nests.

The age of the oldest reported honeybees.

The decrease²

honeybee

and 2005.

colonies in

central Europe

between 1985

The proportion

over a 120-year

period to 2010

in Chicago,

Illinois3.

of wild bee species

that became extinct

in domesticated

HATCHING

Young bees emerge every year during the spring.



BEE LIFE STORY

The domesticated honeybee is the archetypal bee. Here, we outline the honeybee's life history and highlight some other species of wild bee.

Pollen is produced on the anther and transfers to bees bees and pollinators.

Bright

petal

colours

attract

other

Bees rub pollen from other flowers onto the female part of the flower to facilitate reproduction.

Some plants have oil-producing glands called elaiophores, and specialized bees have evolved to collect oil instead of pollen.

DECLINE

Reliable data are scarce - but they point to a bleak future for many bees worldwide.



The global increase in agriculture that depends on animal 300% pollination in the past 50 years¹.

The decrease in

domesticated honevbee colonies between 1947 and 2005 in the United States².

US\$70 billion The estimated global economic value of bee pollination to agriculture per year4

Honeybee workers live on average for three to six weeks between spring and summer. Queen bees can live for up to five years. hibernating through the winters.

NESTING

Hives are not the only homes for bees.



Some species build hives that are suspended, for example on tree branches or gutters. Other wild honeybee species build nests in hollow spaces such as holes in fallen logs.

Cuckoo bees behave in the same way as cuckoo birds and put their eggs into the nests of other bees.



FORAGING Flowers are the main source of food for bees.

Most species of bee are vegetarian. Bees rely on pollen for protein, and on nectar for sugar.

Some bees, such as the Macropis, collect oils from the plants to line the cells in their nests and make food for the larvae. Adult bees rarely ingest the oils.

Three species of the stingless Trigona, which live in South America, obtain protein from rotting meat.

Mining bees lay eggs in underground tunnels that they dig themselves. At the end of each tunnel is a cell in which the eggs are laid. Each cell hosts one egg, but some species have nests containing up to 60 cells.

> Mining-bee cell

References: 1. Aizen, M. A. & Harder, L. D. Curr. Biol. 19, 915–918 (2009); 2. Potts, S. G. et al. Trends Ecol. Evol. 25, 345–353 (2010); 3. Burkle, L. A., Marlin, J. C. & Knight, T. M. Science 339, 1611–1615 (2013); 4. Kuhlmann, M. S. Afr. J. Bot. 75, 726–738 (2009).