**Anatomy**

1 Typical insect anatomy. Head, thorax, abdomen. Wings and legs attached to thorax. Thorax is all muscles.

2 2 pairs of wings which look like one because they have tiny hooks that latch on when needed. The leading edge has 2 strong veins with marginals and submarginal that again help identification.

3 Hairy hind legs. Closeup of leg hairs that carries pollen. If they are highly branched then it collects very fine grain pollen and simpler hairs for coarser pollen. Technical term for a pollen basket is called corbicula. Some bees carry pollen on their abdomen and legs with scopa – which is dense mass of branched hairs. They do this cool thing where they move all their legs across their body downwards to move all the pollen from their face down to their hind legs.

4 Head - there are 3 round objects on forehead above eyes known as ocelli or simple eyes, which are receptive to light. Apparently for bee orienting itself to the horizon. Compound eyes and antennae which have 3 parts. Lots of lines on the face known as sutures and divide up the face.

5 Mandibles are important for classification and identification. Proboscis is basically the straw they use to suck nectar.

6 They have sticky pads between their claws which is why they can climb glass.

7 Sexes. Males have one more antenna, so they have 13 (segments) and females 12. Males don't have a stingers because they have genitals. Only female bees sting. Females have a scopa which is a set of hairs to collect pollen.

8 Male bee has a genital capsule with 4 appendages at the end and they also have plates for classification. Males usually have more markings than females. Females bees without a scopa would carry it in their honey stomach by swallowing it.

9 Some males stick to females after mating to make sure nobody else mates.

10 The stinger is inside the abdomen and it has a fascinating way of going deeper even after it’s left the body.

11 [See](https://www.beeculture.com/wp-content/uploads/2022/06/Erwin4.gif) this animation, the Muscles keep moving the blades and also pumps the gland sac and venom.

- Brood cells are water proof they make a secretion from the gland in the abdomen and sometimes thorax.

**13 The Bee Dance/Waggle** - They do the location dance. The waggle dance. They use the sun, gravity and landmarks to navigate. They'll offer recruiting bees a sample to know what to look for.

**Types**

*14 Workers*

- Worker bees maintain the temperature of the hive at 33.9c all year round.

- In winter worker bees can live up to 6 months but in summer only 6 weeks as they work themselves to death. Which is why you find some on the ground. If the bee dies in a hive the bees will grab it and take it as far as it can.

*15 Drone*

- Drones can't be born of small cells that make most of the hive. 10% of the combs are for drone bees. So she can deposit an unfertilised egg in the drone cell for it to be fertilised by the drone while she fertilises the smaller cells.

- Males are known as drones and their eyes meet on top of their head.

*16 Queen*

- The queen bee is the largest honeybee in the hive. She can lay 2000 eggs per day and can live 3-6 years.

- Queen bee keeps the social order and emits pheromones from her feet.

- The queen does one mating with the drones but it will last her a lifetime. She produces eggs for a lifetime. That's how much sperm she can store and can produce a fertilised or unfertilised egg.

- If things are good there will be a population explosion. Half of them will take off with the old queen after she's laid some eggs in the queen cells. Specially constructed by workers, roughly 20 of the queen cells only taking 14 days to hatch. She'll lose weight to take off with half the worker bees. Then the 20 virgin queens fight to death stinging each other to death. When the new swarm will just be anywhere, people tend to freak out about this but bees are at their best temperament when swarming. Remember you can just contact your local bee keeper or find a facebook group for relocators. While the swarm is sitting on a branch the worker bees are looking for a new home. They do the direction dance and the more vigorous the dance the better the location. The bees will even fly through the swarm to steer them in the right direction. (How do they even find this out!?).

17 They also do this cool thing called a shimmering wave as a defence mechanism to make them look bigger.

18 The queen produces lots of daughters who are sterile and they are the workers. Bees are an offshoot of wasps. So one of the wasps evolved from being predatory to collecting pollen and nectar as food for the larvae (Paras note: It went vegan). Just like how termites are the vegetarian version of ants.

**Other types**

*19 Leaf cutter bees*

- Leaf cutters cut circular pieces and oblong. Making barrels, lay eggs and make more. So they all become adults in the cell and come out of the hole. Unfortunately that means a lot of the times the one put inside first comes out last.

*20 Blue banded bee*

Are better at vibrating the pollen out of certain shaped flowers.

*21 Dawson bees*

- Dawson’s burrowing bee rivals the size of bumblebee. When they smell a virgin female’s pheromones all the males gather near the entrance and the biggest one commended the hole. The smaller ones will try later.

22 There is a video of the brutal mating frenzy that ends in death of so many it looks like a massacre. Whites are females, browns are males.

*23 Stingless bees*

Have sterile queens and the aboriginals used to collect their honey as the bees stored them in pots made of propolis instead of hive cells.

*24 Cuckoo bees*
Lay their egg in the nest/burrow of another. They are parasitic bees. It breaks into other bees nests and lay their eggs in theirs.

*25 Masked bees*

Have bee breath because they have sacks behind their mandible. Have a lemony scent and has the same component of lemon essence. Ants hate this smell.

*26 Burrowing bee*

- Ground bees burrow into the ground and have various types of ground nests. Ground digging bees did not evolved to get big digging front legs, they use their mandibles. If you see a nice neat round volcano shape on the ground it's most likely a bee nest.

27 They can go down meters and at the end is a chamber which becomes a brood cell. They fill it with food and lay an egg on it and then seal the cell.

- Later they evolved to make cells end to end instead of sealing it kind of like the leaf cutter bees.

*Solitary bee*

Are efficient pollinators, they are less aggressive and do not produce honey or wax. They also rarely have stingers.

**5 families of bees (I will not try to pronounce the names)**

*28 - Short-tongued bees are*

1. Colletidae

2. Stenotritidae

3. Halictidae

*- Long-tongued bees are*

4. Megachilidae

5. Apidae

**Products**

*Honey/Pollen*

29 Even as honey it's still viscous but the bees produce a draft in the hive, usually inwards and upwards evaporating the moisture which you can smell.

- It's not called honey until it's in the hive. It starts out as nectar in the flower and quite viscous. Bees suck it up in the morning and add an enzyme called invertase which will invert the sugars to glucose and fructose. Nectar and pollen mixed is called honey.

- Honey is the carbohydrate for the babies and pollen is the protein. They need both.

30 - Honey is packed in the hives. Pollen is collected by them brushing their legs on the pollen and then brush and pack them on their back legs (pollen baskets or corbicula). They'll offload that and stuff it in the cell. The pollen grain has a very hard outer shell so they add enzyme and honey and ferment it in the comb for better digestion and nutrition. The cells with pollen are brightly coloured and slight glaze/glossy look. This is fermeting and bees have been doing it forever.

31 - The wild flower season is valuable in spring. They get a lot of pollens, lipids, fatty acids, etc. which help them and their health. Within 3 week period the honey will be a different flavour with the change in flowers.

32 - Medicinal honey. Manuka honey is the best from New Zealand (also known as manuka myrtle, New Zealand teatree, broom tea-tree, or just tea tree, is a species of flowering plant in the myrtle family native to Australia and New Zealand.) Few species are in Western Australia. It is a sterile healing medium for burns victims and injuries not responding to antiseptic creams. Honeys are tested and rated at how good they are. Similar honeys are Jarrah, red gum, black butt and karri honey.

33 - Fake honey (separate link)! Fake honey has made it's way to Australia and sold as real Australian honey. Honey is ultra filtered to remove it's identity then mixed with another honey and looks and tastes like it but has foreign content. Australia is fortunate to get the real stuff and you are able to contact the company to find out more.

- If you see an insect carrying pollen it’s a bee. Some swallow the pollen though.

*Wax/Propolis*

34 - All bees also gather propolis which is from nodes and internodes of plants. It is a sticky substance which is also packed on the back legs. They collect this to plug up holes to keep water and ants out and as an antiseptic since the temp is about 34 degrees which promotes mould.

35 It takes 12 hrs for one bee to make 8 flakes from it's abdomen, It takes approximately 500,000 scales to make 1lb of wax. This special gland converts sugar from the honey into a waxy substance and deposits flakes of the substance on the abdomen.

Hive

36 - They create spouts facing downwards to get in and out of the hive so when it rains it doesn't get flooded.

- Don't stand in front of a hive because they think you're coming for the honey.

37 - Don't use the smoker excessively as they'll go into the honey stores thinking there is a fire. Over-smoking makes them dizzy and half-asphyxiated.

38 - There are different types of hives and the one that I love is the Kenyan top bar hive mostly because I’m from Kenya.

39 Others are the Langstroth, warre, flow, golden,

40 I really want the indoor one

41 and there is a guy on youtube called Advoko makes who made a contactless beehive from giant waterbottles.

42 Flow hive got a lot of attention recently. One expert said `It's a great idea in a nutshell but commercially it's too hard to manage as the honey hardens and doesn't 'flow'.

43 - Bee hotels are great especially if you’re close to bushland. You can make your ow and Good for leaf cutter and solitary bees.

Fun Facts

44 - In Australia when it gets very hot, the nectar in some flowers ferments and turns into alcohol. Bees that get drunk from the nectar are not allowed back in the hive. Guard bees keep them out to prevent them from making the nectar into alcoholic honey.

45 – Bees will suffocate intruders like hornets by piling up on them and overheating them.

- A hive of honeybees will fly the equivalent of three orbits around the earth to collect 1 kg of honey.

- They can recognise when food is scarce and throw the drone bees out.

- People relocate hives to pollinate almond trees (100% bee pollinated only), etc. It's very big business.

46 - Australia is very fortunate to be disease free especially safe from verroa mite infestation. Bees can become seriously sick if they come in contact with certain spores.

47 - Different reasons for bees disappearing elsewhere. Hedgerows in UK reduced, chemicals and other things that are reasons for colony collapse disorder (CCD). Bunnings have stopped Yates Confidor pesticide. We need to start taking notice. It's not just spraying it as the plants take it up through the roots too. Bees collect this cocktail of poison and USA has started to find glyphosate in their honey.

- Some bees are nearly hairless.

- Honey bees are not as good as natives at pollinating.

48 - Bee grubs have no legs and no eyes since it's in a protected environment. Just mouth parts to eat the food. They eat the food and pass it out in one mass after eating. Shed skin, turn into pupa. Pupa is like an adult without colour. Eventually shedding skin and producing adult. After which there is no further growth.

49 - Some flies mistaken for bees are drone fly and hover flies. And then there are bee flies. There are some bees that mimic wasps.