Hannah Michie

RES Student Award 2014 – Bee-haviour in the Rainforest

'What did you see in the rainforest?' my little sister asked excitedly, expecting a story about being chased through the foliage by a hungry jaguar.

'Do you want to know the best thing I saw?'

Her face lit up with excitement.

'It was a bee.'

She scrunched up her nose. 'How can a bee be exciting?'

'The bees I caught, I could hold between my fingers.'

'Didn't they sting you?'

In fact it is only female bees which are capable of using their sting as a defence mechanism. This is because the sting comes from an ovipositor, the organ female bees' use for laying their eggs. But these were not just male bees.

'Not these bees,' I smiled

'What did it feel like?'

'Like a tiny finger massager.'

Bees make a buzzing noise because their wings beat the air and create wind vibrations. The characteristic buzz is also associated with bumblebees as they shake the middle of their bodies in order to attach the pollen from flowers.

'They don't sound as exciting as jaguars. I bet they didn't have black and yellow spots.'

'No, but they were blue and green coloured!'

Out of the four orchid bee types known to be present in Cusuco National Park, Honduras, where I was researching, only one genus, *Eulaema*, are typically black and yellow striped whilst *Euglossa*, *Eurifesea* and *Exaerate*[1], are all a fantastic metallic blue and green.

'Many insects, and animals, are brightly coloured to deter other animals from eating them. This is called aposematic colouration.'

'They aren't bumblebees, are they?'

'There is a very specific way in which different species are named according to their Kingdom, Phylum, Class, Order, Family, Genus and Species. I remember this by simply thinking that this is how we are Keeping Precious Creatures Organised For Grumpy Scientists!'

She laughed.

'The most common species I collected was *Euglossa imperialis*.'

'Do they still make honey?'

As with many bee species, *Euglossa imperialis* do have corbiculae, pollen baskets, on their back legs which are little hollows surrounded by hairs in which pollen is collected. They live in mud nests, typically underground, and therefore have no need to support a hive or queen[2].

'I'm afraid they don't.'

'How did you catch them? You could just leave out bait for a jaguar!'

'These bees are actually attracted by different scents.'

Orchid bees are attracted to certain species of orchids which excrete strong fragrances. This is a type of mutualistic behaviour as both species benefit from the interaction[3] – the bees receive pollen and the pollinarium from the orchid are dispersed.

'We set up cotton wool buds hanging from overhead branches soaked in different strong scents. These included eucalyptol and vanilla extract and once the bees were hovering beside the bud, the bees were caught in nets.'

'Do the bees still live together, in hives?'

'No, they like to live alone.'

Unlike *Meliponini*, another tribe of stingless bee, which are typically eusocial, *Euglossini* are actually solitary insects[4].

She seemed disappointed by this.

'Jaguars also live alone,' I added.

'How do they ever find a mate?'

'That can be quite difficult as some orchid flower physically mimic a female bee in order to attract the male to the flower!'

There is ongoing research into why male bees specifically are attracted to fragrances more than females. Curiously, they are also strongly drawn to non-nectar bearing flowers. One hypothesis is that these fragrant substances are actually converted into sex pheromones, behaviour altering chemicals, which then heighten the bee's ability to attract females. Additionally there is the increasingly common belief that these fragrances are stored in a structure on the hind legs of the bee which are then released when in the presence of a female [5]. Either way male bees participate in lek behaviour.

'Male bees put on a display to attract females. Many species attract mates in this way.'

'Do they hunt like jaguars?'

'Well they still eat nectar, so don't kill to eat, but out of jealousy and competition, females demonstrate kleptoparasitic behaviour[6] which means that they kill the eggs and larvae from other orchid bee species!'

'Why are you so interested in these bees?'

‘When I was in Honduras, there were lots of different species of plants and animals, including jaguars,’ I teased. ‘But we know an awful lot about these bigger mammals. Every day we discover new species of organisms, including bees, and I want to add to this area of knowledge[7]. Who knows how useful they may be in the future?’

‘Will I ever get to see one of these bees?’

‘Unfortunately, *Euglossini* are only found in the Neotropics – just like jaguars! So unless you go to South America then, unfortunately, you won’t.’

‘They might not be as big as jaguars, but your green bees sound pretty amazing!’

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[3] Mullins, A., 2013 Featured Creatures – Entomology and Nematology, University of Florida
[4] Zimmermann, Y., Roubik, D.W., Quezada-Euan, J.J.G, Paxton, R.J and Eltz, T 2009 Single mating in orchid bees (Euglossa, Apinae): implications for mate choice and social evolution, Insectes Sociaux 56: 214-249
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[7] Engel, M.S 2009 A new species of the bee genus Caenaugochlora from Honduras, Transactions of the Kansa Academy of Science, vol. 112, p 159-163