

## INSIDE JEB

## Young male orchid bees produce the most alluring fragrances to attract females



Orchid bees (*Euglossini*) clustered around an artificial scent source in Costa Rica. Photo credit: Thomas Eltz.

The world's great perfumers go wild for exotic scents. From sandalwood and jasmine to ambergris and frankincense, the palette of aromas that they blend extends across the globe. But perfume-concocting orchid bees plunder local aromas from their tropical forest homes to mix alluring fragrances that attract a mate, visiting fruit, rotten wood and even faeces, in addition to their eponymous orchids. Secreting scent-absorbing oil onto aromatic surfaces, the bees then transfer the now scented oils to pouches on their hind limbs, travelling far and wide to create the most attractive blend; 'they essentially create pheromones directly from environmental sources', says Jonas Henske, from Ruhr-Universität Bochum, Germany. Explaining that the scents could convey different information about the bees that created them, from their age to their cognitive ability, Henske adds, 'we had no idea how perfumes develop over [their] lifetime'. So, he and Thomas Eltz (Ruhr-Universität Bochum) decided to investigate whether older, more experienced bees communicate their success at having survived to a great

age, and therefore their suitability as a mate, to females through more complex perfumes than younger, less experienced bees.

At La Gamba Research Station, Costa Rica, Henske began the painstaking task of luring male *Euglossa imperialis* orchid bees to the garden, where he assessed their age and attached a tiny plastic tag with unique identification number to each bee before sealing the insects' right leg pouches with glue – to trap the scent blend unaltered – before releasing the bee to concoct more perfume in its left leg pouch. Then Henske had to cross his fingers and hope that some of the 1318 bees that he had tagged would return, so he could recapture them to find out whether the aromatic components of the perfume in their left leg pouch were different from the blend that they had produced when younger. After 5 months of diligently monitoring the bees in the research station's garden, Henske successfully recaptured more than 30% of the initially tagged insects (424) – an astonishingly high recapture rate – with

almost half returning within 5 days, while 51 were at large collecting perfume for more than 12 days.

Back in Germany, Henske analysed the composition of the perfume gathered in each bee's leg pouches, recording 209 different aromatic compounds, ranging from the most abundant 1,8-cineole, which smells like eucalyptus oil, to tobacco-smelling zingerone in vanishingly small quantities. However, when Henske analysed the quality and quantity of the bees' perfumes as they aged, the younger bees produced larger quantities of more sophisticated perfumes, in contrast to the older bees, whose perfume-harvesting powers seemed to have waned; the blends in the left leg pouch became less sophisticated as they grew older.

So, the complex perfumes produced by male *E. imperialis* possibly convey that younger, smarter bees – with more acute senses of smell for collecting the best scent components – create the best perfumes and make the most attractive mates; in contrast to older males that have proved their strength by surviving longer, but can no longer blend the most alluring fragrances. And younger bees may simply be more efficient at collecting the ingredients that comprise a winning perfume, while older bees may have lost their buzz. Whatever message the bees' perfumes may convey, it's not a given that the oldest and wisest males will smell the best.

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