



Where I work Ehab Abouheif

Photographed for *Nature* by
Owen Egan.

The ant on my screen here belongs to the species *Pheidole absurda*, so named because their heads are so absurdly large relative to their bodies. These ants have been central to some of my team's major discoveries.

As an evolutionary developmental biologist, I focus on how genes that control body development give rise to animals' diversity of form. With ants, you get such diversity within a species. An ant egg can develop into a queen or a worker, depending on cues such as nutrition. Queens can live for decades; they have fully functional wings and lay millions of eggs. Workers live for three months, have no wings and lay few eggs. Then there are the soldiers, such as the one on screen, and 'supersoldiers', which defend the nest. The same genes produce dramatically different outcomes.

Although the soldiers don't have wings, as larvae they transiently develop tiny wing buds. When we removed these in our *Pheidole* soldiers, their heads and bodies didn't grow so large. We showed that such rudiments were co-opted during ant

evolution to send signals to the head and body during development to control size, producing supersoldier, regular soldier or worker ants. In all animals, including humans, rudiments and vestiges appear and disappear during development, and we hope that research will uncover whether these have a function in creatures other than ants.

Using this microscope we learnt that a hormone dose could activate development of supersoldiers in *Pheidole* species that do not naturally produce ants of this size.

The next step is to understand the behaviour of intermediate-sized ants: are they more like soldiers or workers? *Pheidole* ants are mostly found in the southern United States, and with the Canadian border closed because of COVID-19, I have no idea when we'll be able to get more. A lot of this work might grind to a halt if we lose the fragile colonies in our laboratory.

Ehab Abouheif is an evolutionary developmental biologist at McGill University in Montreal, Canada. **Interview by James Mitchell Crow.**