In the highly organized colonies of bees, wasps and ants, the queen has a monopoly on breeding; workers do not reproduce when a fertile queen is present. Just how she accomplishes that has been something of a mystery. Previous studies have shown that queens use chemical signals to keep workers sterile, but the few chemicals identified so far did not appear to be related to one another.

Now, an international team of researchers has identified chemicals known as pheromones that are specific to queen wasps, bumblebees and desert ants that keep workers sterile while in their presence. These same chemicals, long-chained saturated hydrocarbons, have been used by insects to signal fertility for up to 150 million years, the researchers say.

The pheromones work by inhibiting the development of ovaries in worker insects, or preventing the workers from laying eggs if their ovaries do develop. Still, “the exact physiological pathways involved are not really known,” said Annette Van Oystaeyen, a biologist at the University of Leuven in Belgium and a lead author of the study, which was published in the journal Science.

Dr. Van Oystaeyen and her colleagues identified the hydrocarbons by studying the outer skeletons of several insects. Seeing that the queen of each species overproduced certain chemicals, the researchers then
administered the chemicals to workers in the absence of a queen. Those insects remained sterile, while workers separated from their queen and not given the chemicals regenerated their ability to reproduce.

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