

Entomologists discover first instance of intact neurons without nucleus - in fairy wasps

December 1 2011, by Bob Yirka

Fairy wasps are really tiny; so tiny, they can barely be seen with the naked eye. They're so tiny that they're the smallest organism when shown on a slide alongside an amoeba and a Paramecium. And because of this, a group of researchers from Moscow State University began wondering how a neurological system in such a tiny insect could work at all. As it turns out, as they describe in their paper published in *Science Direct*, the fairy wasp (*M.mymaripenne*), the third smallest of all insects, has a lot of neurons without any nucleus.

A cell's nucleus is of course, usually pretty important, it's where the DNA is generally stored after all. It's also usually the part of the cell that runs things, like causing a replenishment of proteins to keep cells alive, etc. This of course got the researchers to wondering how an insect could survive if most of its [neurons](#) had no nucleus.

The secret, the team writes, lies in the fact that the insect is so small, that neurons (with nuclei intact) that develop during the pupa stage apparently make enough protein to last the full five days of its adulthood, so, not needing them any longer, all but a few hundred of the nuclei are destroyed by bursting, making the cell smaller and saving room for other more important cells. The team notes that this is the first recorded instance of neurons existing in the wild without benefit of nuclei.

The team also found that the fairy wasp has one of the smallest nervous systems around, with just 7,400 neurons, but can still fly, search for food and figure out where to lay its eggs; which is inside the eggs of another tiny insect, the thrips, which itself is no bigger than a millimeter in length. It manages this feat by cramming virtually all of its nervous system into just its head, hence the need for downsizing the number of neurons and reducing cell size wherever possible.

The fairy wasp also has other adaptations that allow it to survive in its small state. It has a reduced wing surface for example which means wings that amount to little more than bare strands as opposed to the rather broad based flappers other larger insects sport, just enough to allow it to coast along with moving air.

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