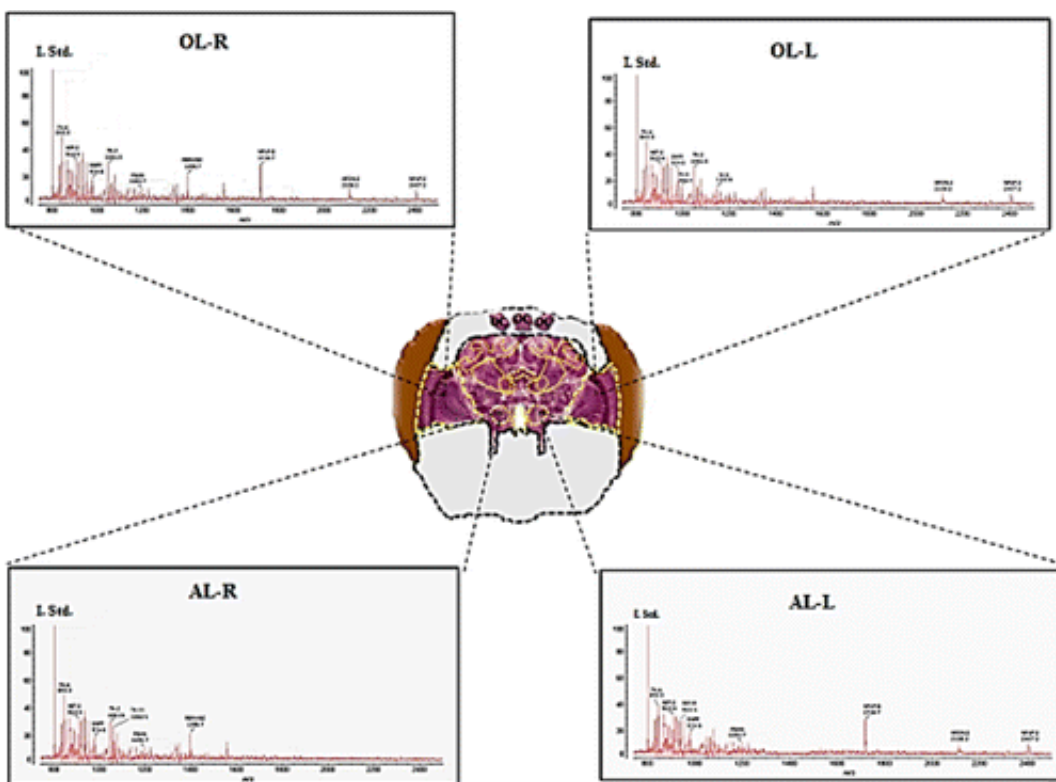


Scientists link honeybees' changing roles throughout their lives to brain chemistry

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Scientists have been linking an increasing range of behaviors and inclinations from monogamy to addiction to animals', including humans', underlying biology. To that growing list, they're adding division of labor—at least in killer bees. A report published in ACS' *Journal of Proteome Research* presents new data that link the amounts of certain

neuropeptides in these notorious bees' brains with their jobs inside and outside the hive.

Mario Sergio Palma and colleagues explain that dividing tasks among individuals in a group is a key development in [social behavior](#) among Hymenoptera insects, which include bees, ants, sawflies and wasps. One of the starkest examples of this division of labor is the development of "castes," which, through nutrition and hormones, results in long-lived queens that lay all the thousands of eggs in a colony and barren workers that forage for food and protect the hive. Bee researchers had already observed that honeybees, including Africanized *Apis mellifera*, better known as "killer" bees, divide tasks by age. As workers get older, their roles change from nursing and cleaning the hive to guarding and foraging. Palma's team wanted to see whether peptides in the brain were associated with the bees' shifting duties.

They found that the amounts of two substances varied by time and location in the brains of the honeybees in a way that mirrored the timing of their changing roles. "Thus, these [neuropeptides](#) appear to have some functions in the honeybee brain that are specifically related to the age-related division of labor," the scientists conclude.

More information: "MALDI Imaging Analysis of Neuropeptides in the Africanized Honeybee (*Apis mellifera*) Brain: Effect of Ontogeny" *J. Proteome Res.*, Article ASAP. [DOI: 10.1021/pr500224b](https://doi.org/10.1021/pr500224b)

Abstract

The occurrence and spatial distribution of the neuropeptides AmTRP-5 and AST-1 in the honeybee brain were monitored via MALDI spectral imaging according to the ontogeny of Africanized *Apis mellifera*. The levels of these peptides increased in the brains of 0–15 day old honeybees, and this increase was accompanied by an increase in the number of in-hive activities performed by the nurse bees, followed by a

decrease in the period from 15 to 25 days of age, in which the workers began to perform activities outside the nest (guarding and foraging). The results obtained in the present investigation suggest that AmTRP-5 acts in the upper region of both pedunculi of young workers, possibly regulating the cell cleaning and brood capping activities. Meanwhile, the localized occurrence of AmTRP-5 and AST-1 in the antennal lobes, subesophageal ganglion, upper region of the medulla, both lobula, and α - and β -lobes of both brain hemispheres in 20 to 25 day old workers suggest that the action of both neuropeptides in these regions may be related to their localized actions in these regions, regulating foraging and guarding activities. Thus, these neuropeptides appear to have some functions in the honeybee brain that are specifically related to the age-related division of labor.

Provided by American Chemical Society

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