

Six new Dracula ants from Madagascar: Minor workers become queens in *Mystrium*

March 31 2014



This image shows a living *Mystrium* species. Credit: Brian Fisher

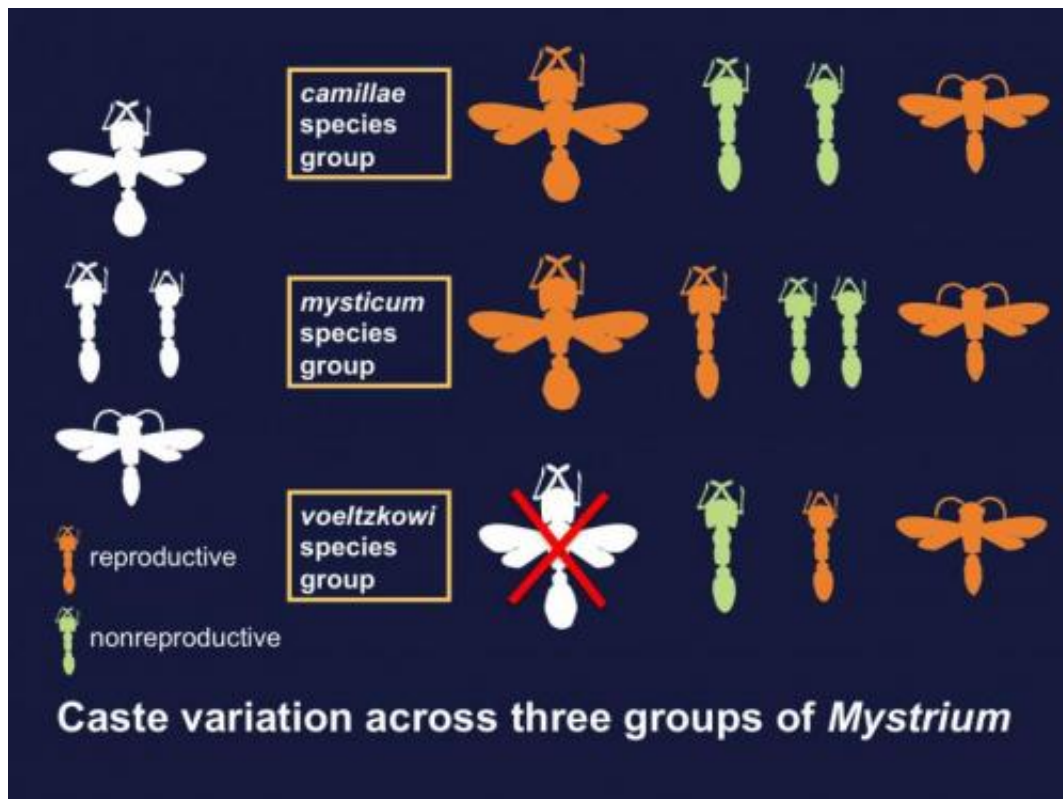
Six new species of Dracula ants from the Malagasy region have been discovered by scientists at the California Academy of Sciences. The discoveries, by postdoctoral fellow Masashi Yoshimura from Japan and curator of entomology Brian L. Fisher, represent a completely new twist in the typically rigid caste system of ants, where anatomy is typically destiny. The study was published in the open access journal *ZooKeys*.

"The genus *Mystrium* is the most mysterious group within the bizarre Dracula [ants](#)," said Yoshimura.

Mystrium species have unique features such as long, spatulate mandibles that snap together (Gronenberg et al. 1998); wingless queens that in some undetermined species are even smaller than workers (Molet et al. 2007); and large, wingless individuals intermediate between workers and queens, which behave like queens (Molet et al. 2012).

"*Mystrium* was a difficult group to identify because of the remarkable variation within each species." Yoshimura said.

"Our team has explored Madagascar and its surrounding islands for 20 years and collected thousands of specimens to solve the mysteries of *Mystrium*," said Fisher, an expert on Malagasy ants.

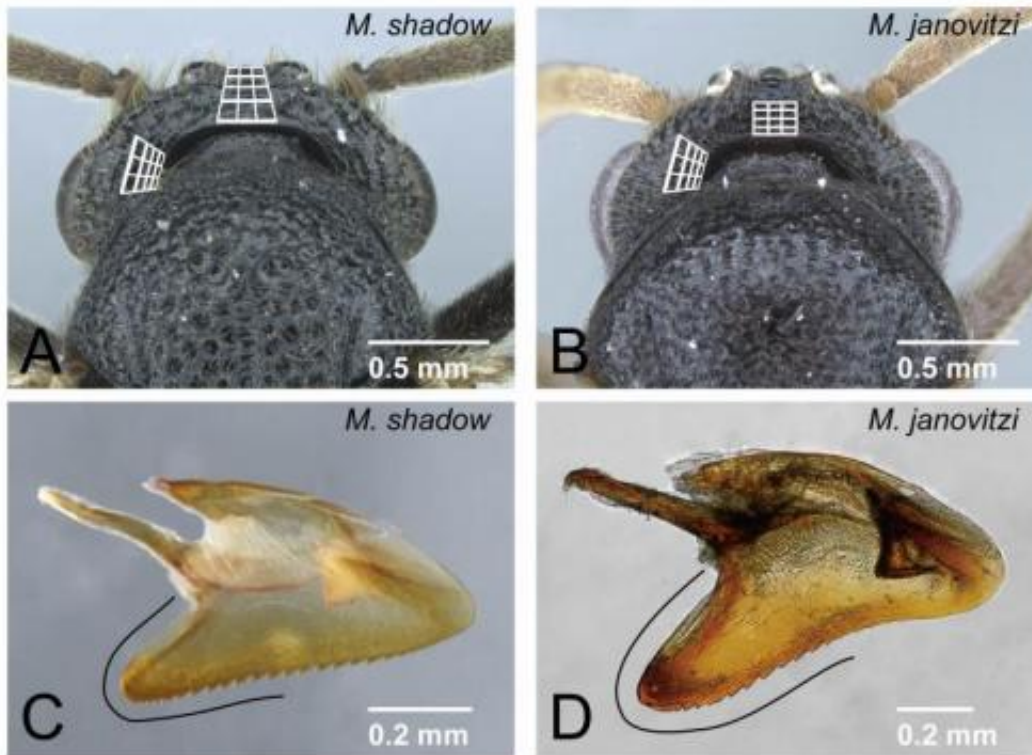


Different pattern of 'reproductive castes' can be seen in a single genus *Mystrium*.
Credit: Dr. Masashi Yoshimura

Fisher explained why *Mystrium* poses such a fiendish problem *Mystrium* to taxonomists, who identify new and different species. "*Mystrium* has three different styles in reproduction within a single genus, and the role of an individual in a colony is not always obvious by its appearance. Ants that look similar may be minor workers in one species but queens in another species." This makes classifying the Dracula ants extremely difficult, he said.

"The discovery of the division of females into major and minor forms were the key to solving this complicated puzzle," explained Yoshimura. "We found that all species in *Mystrium* share a common original components consisting of male, usual large queen, and major and minor workers. Furthermore, the major or minor workers develop as reproductives in some species and even take over queen's position. They are revolutionaries finding in the anatomy-is-destiny world of ants! Taxonomists usually compare the anatomy of ants of the same caste to find differences between species. But in the case of the genus *Mystrium*, we need to compare individuals from the same original phenotype, not on the their current functional role (caste)," he said.

The authors have reclassified all species into three subgroups based on the reproductive styles, and developed a new taxonomic framework for this complicated group featuring innovative pictorial keys to the species. The illustrations include color photographs showing every hair in focus (produced using a computer-assisted method called [auto-montage](#)), and drawings for all castes. The paper looks more like a picture book than your average scientific treatise. "I learned drawing techniques from Japanese manga," Yoshimura says.



This is a pictorial key combining full-focused color images and drawing. Credit: AntWeb and Dr. Masashi Yoshimura

"To name three of the [species](#) we chose words that evoke the air of mystery around this genus, calling them [Mystrium labyrinth](#), [Mystrium mirror](#), and [Mystrium shadow](#)." Yoshimura said.

More information: Yoshimura M, Fisher BL (2014) A revision of the ant genus *Mystrium* in the Malagasy region with description of six new species and remarks on *Amblyopone* and *Stigmatomma* (Hymenoptera, Formicidae, Amblyoponinae). *ZooKeys* 394: 1-99. [DOI: 10.3897/zookeys.394.6446](https://doi.org/10.3897/zookeys.394.6446)

Additional:

Gronenberg W, Hölldobler B, Alpert GD (1998) Jaws that snap: control of mandible movements in the ant *Myrmica*. *J Insect Physiol* 44: 241-253. doi: [dx.doi.org/10.1016/S0022-1910\(97\)00145-5](https://doi.org/10.1016/S0022-1910(97)00145-5)

Molet M, Peeters C, Fisher BL (2007) Winged queens replaced by reproductives smaller than workers in *Myrmica* ants. *Naturwissenschaften* 94: 280-287. doi: [dx.doi.org/10.1007/s00114-006-0190-2](https://doi.org/10.1007/s00114-006-0190-2)

Molet M, Wheeler DE, Peeters C (2012) Evolution of Novel Mosaic Castes in Ants: Modularity, Phenotypic Plasticity, and Colonial Buffering. *Am Nat* 180: 328-341. www.jstor.org/stable/10.1086/667368

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