Honeybees Build Their Comb Cells without Measuring the Angles

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How honeybees accomplish the construction of their delicate combs was repeatedly examined by many investigators. Precise mechanisms are however still not clear. The shape honeybees need is a diameter-fixed column which has a hemispherical bottom although the shape of the real cell is a hexagonal prism. The diameters of the cells are clearly divided into two groups: 6.2~6.4mm and 5.2~5.4mm. The queen bee determines which eggs are to be laid, male or female from this size difference. The thicknesses of the walls of the cells (sidewall: 0.07mm, bottom: 0.14mm) are much thinner than the diameter of the cells. It causes "the angle" obvious in the cells with the naked eyes. If honeybees reduce the walls after building the cells, the diameter and size of the cells are changed. Therefore, in order to keep both the distinction between male and female and the thickness of the walls, honeybees have only one way to make the walls thin from the beginning. Honeybees' behavior and burr combs were observed. They built combs with large numbers, working from both sides. First, the diameter of the bottom was decided. Next, honeybees extend the thin sidewalls while keeping the diameter of the cell. "The angle" was immediately seen with the naked eyes after the completion of the bottom. It was thus proved that honeybees built their combs without measuring the angles of cell walls.

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