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photography and stereoscopic (3D) recording of the heating behaviour have been successfully applied and are shown on the poster, in addition to the presentation of real-time 3D footage of this little known behaviour.

Usage of brood gaps for incubation of sealed brood in honeybee colonies

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The presence of small numbers of open cells (gaps) scattered across the sealed brood area is a common appearance even in healthy and well-fed honeybee colonies. These gaps may be empty, contain eggs or young brood or temporary food stores; the latter ones are regularly depleted over night (Camazine 1991). Honeybees readily use these gaps for thermoregulation by depositing water droplets for cooling the hive (Martin and Lindauer 1966) and by producing heat with their thorax muscles for up to 45 minutes during long time visits to these open cells when brood incubation is necessary (this work). Heating occurs in open brood cells as well as in empty cells which share common cell walls with up to 6 neighbouring sealed brood cells. Heat transfer through the comb may be detected up to 3 cells away from the visited open cell and on the opposite side of the comb. A special computer software ("CombUse 2.0") for precise assessment of the number and spatial distribution of gaps and sealed cells (N=112843) was engineered. Here we show that brood incubation by cell visitors is not limited by the small number of gaps. If both sides of a comb are considered and with only 4 to 10% gaps present in the sealed area, 88 to 99 % of the sealed brood cells are within the radius-of-influence of long-time visitors in these open cells. If small numbers of gaps are present and used for brood incubation, honeybee colonies may save 17-32% of the time per brood cell which has to be spent on this task in comparison to the time which is required on completely sealed areas without any gaps.

A life history trait, the rate of behavioral development correlates with biogeography of honey bee races

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The rate of worker behavioral development underlies allocation to different jobs such as foraging vs. brood care. We have measured the rate of behavioral development in a co-fostering design in three experimental colonies each with focal bees from three races; *Apis mellifera carnica*, *A. m. caucasica*, and *A. m. syriaca* from Turkey. In this design the proportion of bees from each race in the experimental colony are compared to their proportion in the first 50 bees to start foraging. The race of bees that is overrepresented in the sample of first foragers is identified to be faster developing. Each experiment represented genetically distinct colonies of each race. The slowest of the three races in all experiments was the most northern bee *A.m. caucasica*. The