

J. Woyke : Sex of Cape brood : 22 June

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Subject: Sex of Cape brood

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SEX OF BROOD ORIGINATING FROM CAPE QUEENS AND LAYING WORKERS

It is generally accepted that drones develop from unfertilised eggs laid by *Apis mellifera capensis* queens, and workers from eggs deposited by Cape laying workers. Normally, drone brood is not found in worker comb cells within worker brood originating from Cape laying workers. However, it is known that some workers develop from unfertilised eggs of *A. mellifera* queens. Therefore, it was interesting to investigate whether workers develop also from unfertilised eggs deposited by Cape queens, and whether drones are produced by Cape laying workers.

At first survival of Cape drone larvae in drone and worker cells was compared. Virgin Cape queens were treated with CO₂. They were clipped and marked and introduced into small bee colonies in hives with queen excluders on the entrances. Combs with worker and drone cells were supplied. After eggs were deposited, place of cells containing eggs was recorded by method described by Woyke (1976). The combs were now transferred into queenless colony with queen cells. Survival of eggs and larvae was recorded daily.

Sex of brood produced by uninseminated Cape queens was investigated in drone comb. Combs containing eggs were selected. Position of cells with eggs was determined. Next, those combs were introduced into queenless colonies with queen cells. After the cells were sealed, sex of brood was determined upon the appearance of the lid; flat - workers, cupola - drones. Shortly before emerging, brood combs were put into isolators and placed into incubator at 34 °C. Sex of emerged bees was determined.

Sex of brood produced by Cape laying workers was also investigated in drone combs. Combs with sealed brood were selected. Sex of brood was determined upon the appearance of the lids. The sex was verified on adults emerged in isolators in an incubator.

Results presented in tab 1. show that 70% of drone brood originating from uninseminated Cape queen survived in drone cells till the time of sealing. However, only 20% survived 4 days after

hatching, in worker cells. None survived beyond 6th day, and consequently none was sealed. Some of drone larvae in worker cells were dipped in larval food, before they were eaten by worker bees. It looked like worker cells were too small for Cape drones. This result explains why drone brood produced by Cape laying workers is not found among sealed brood in worker cells. Worker comb should not be used to detect drone brood produced by virgin queens or by laying workers.

Table 1. Survival of brood from unseminated *A. m. capensis* queen in drone and worker comb cells.

No eggs	%	survival	in	subsequent	days	after	hatching	
	1	2	3	4	5	6	7	8
In drone cells								
177	92	89	86	84	82	76	72	70
In worker cells								
144	81	72	58	20	3	0	0	0

Results presented in tab. 2 show, that 2 - 15% of worker brood was found in drone cells among brood produced by different unseminated Cape queens.

Table 2. Sex of brood from unseminated *A. m. capensis* queens in drone cells.

Queen No	No eggs	% workers
32	300	7.7
152	170	7.6
497	431	2.1
518	412	14.8

Results presented in tab. 3 show, that 3 - 9% of drone brood was found in drone cells among brood produced by Cape laying workers.

Table 3. Sex of brood from Cape laying workers in drone cells.

Colony No	No sealed cells	% drones
1	193	6.2
3	163	5.5
3	23	8.7
2	251	2.8

Thus, results presented above show that except arrhenotoky, also thelytoky occurs in offspring of unineseminated Cape queens. The results show also, that except thelytoky also arrhenotoky occurs in offspring of Cape laying workers.

It is interesting to note that drones of European bees can be reared in worker cells. Such drone brood is scattered and the emerging drones are smaller than those reared in drone cells. However, such drones are sexually valid, and queens inseminated with their semen produce normal worker brood. In Cape bee, drones do not develop in worker cells, or perhaps their percentage is much lower than that of haploid eggs present in such cells.

It would be interesting to know from beekeepers working with Cape bee, whether drone brood originating from CLW is produced in worker cells, and how it is in the hybrid bees?