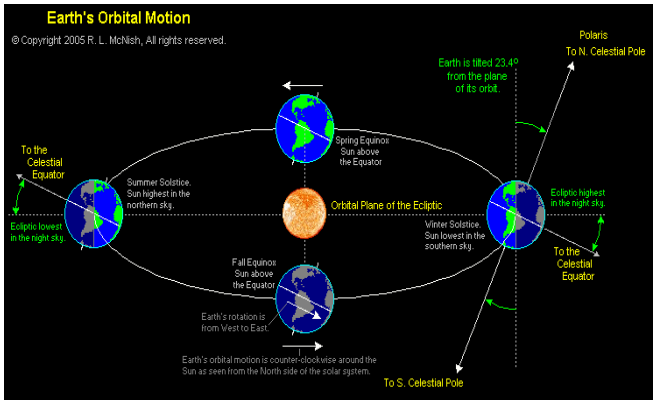
drone

Fall can seem a sad time of year for the observant amateur beekeeper mistakenly empathizing with the fate of the hundred or so *male* bees in a hive of 30,000, not recognizing that the *entire colony* itself is the *relevant individual* – the *superorganism*. The relevant mind is the *hive-mind*. That's right, our use of *social-group language metaphors* such as "queen" **...** and considering the separate moving bodies in a bee colony as true individuals can lead to confusion and misunderstanding.

Earth's tilted axis means that the shortening days of fall foretell what is about to come**:** longer nights and cold days and the flowerless fields of winter. Knowledge of this cycle is deeply imbedded in the genetic memory of the hive-mind.



. [from earth sciencetips]

Gathering and storing pollen and collecting nectar to process into honey has consumed the colony's activity all spring and summer, but that is drawing to a close. Time to prepare for the months to come, of long weeks inside in the darkness of the hive, using honey stores to keep warm throughout the winter, ready to burst forth with emerging brood when late winter turns again into early spring and flowers return in a sudden rush.

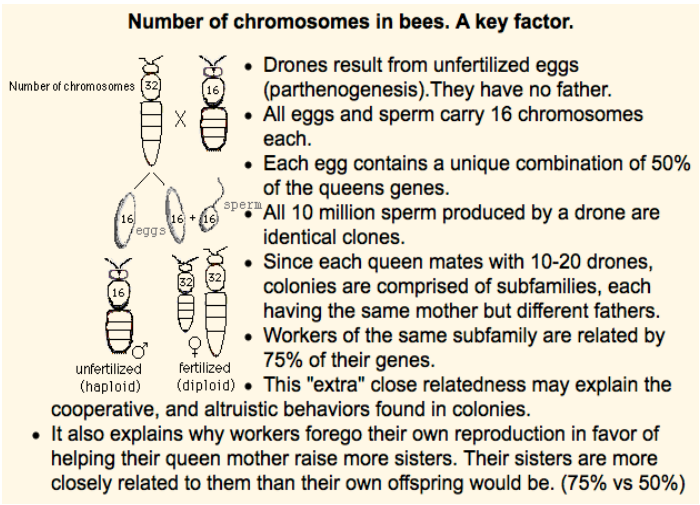
For the drones, however, fall signals the cruel calculus of the hive. As the male reproductive units of the colony, needed to share the colony's genetic message with virgin queens of other hives in spring and summer, their status as seasonal workers - easily replaced when spring returns - means that they are simply a resource burden for the fall and winter hive. Drones are ejected from the hive in the fall and forbidden reentry. They die.

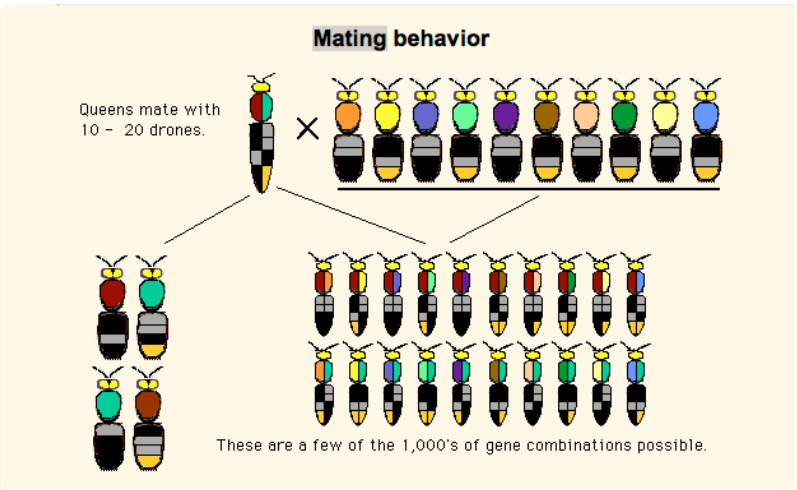
A closer look at the drone reveals even more about its unique status and biological fitness to do what it does. To begin with, the knowledgeable beekeeper can tell at a glance who's who on a comb surface crawling with hundreds of bees **...** the drones are noticeably stouter, slightly larger, with much bigger eyes. With the courage of conviction, a drone can be plucked from the comb with bare fingers and clasped in the hand - no chance of a sting**:** the drone has a penis instead of a stinger.

Its difference begins at its beginning. Inside a "drone brood cell" that workers have fashioned on the wax comb, a remarkable process starts when the queen lays an egg containing a zygote which, though never fertilized by combination of egg with sperm, *begins to divide and differentiate into a bee* **...** *parthenogenesis*, they call it. (The linguist will see the Greek root "*parthenos*" - virgin - as in *Parthenon,* Παρθενών, the Acropolis temple built in 440 B.C., in honor of *Athena the VIrgin*.) Having only half the chromosomes of its sister bees, the drone larva is *haploid* - 16 chromosomes instead of

the usual 32 - and it will develop into a male. [Rather than simply lacking a second copy of the X chromosome (the *XX, XY system* that determines gender in most animals, including humans), honeybee sex determination follows this more drastic pattern: *diploid = female*, *haploid = male*.]

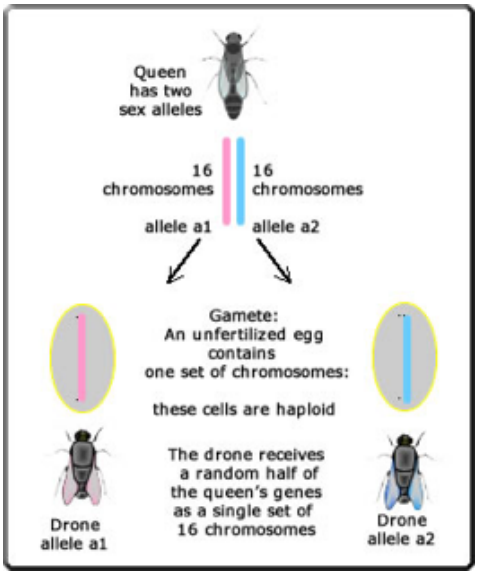
Of course, this all comes as a surprise to students of biology, who thought they understood all there was to know about the *reduction in chromosome number* during *meiosis*, which occurs during formation of male (and female) gametes. Restoration of diploid chromosome number occurs with gamete conjugation and zygote formation. Subsequent *mitotic* cell division and differentiation during development of the embryo strictly maintains diploid chromosome number in somatic cells of the adult.

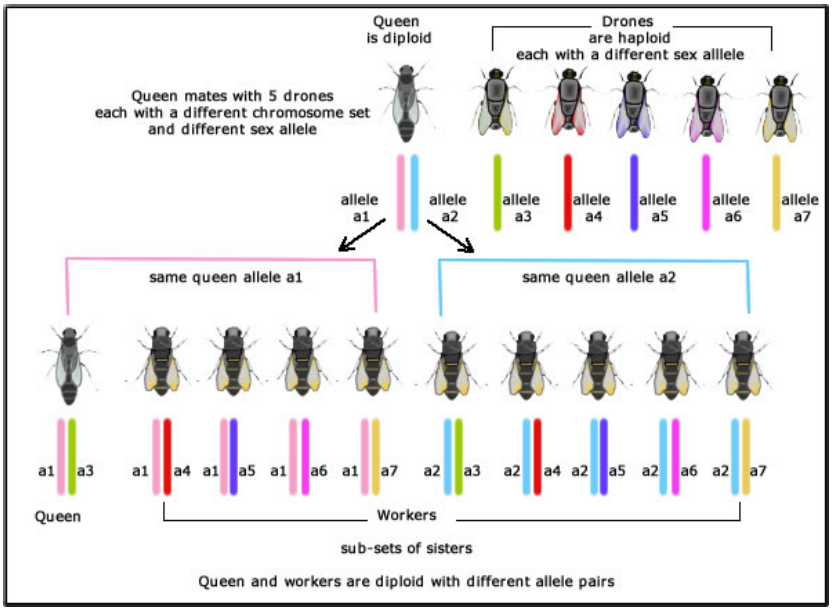




[from Glenn Apiaries]

The adult male honeybee, the drone, follows a different path, however. Spermatogenesis in the haploid drone is unusual, since no reduction in chromosome number is needed. An interesting result of this is that the *10 million* sperm produced by each drone are *clones* – all genetically identical.





[from Killowen.com]

* additional images and references at **imagessays.com -> drone**