

# Artificial Insemination

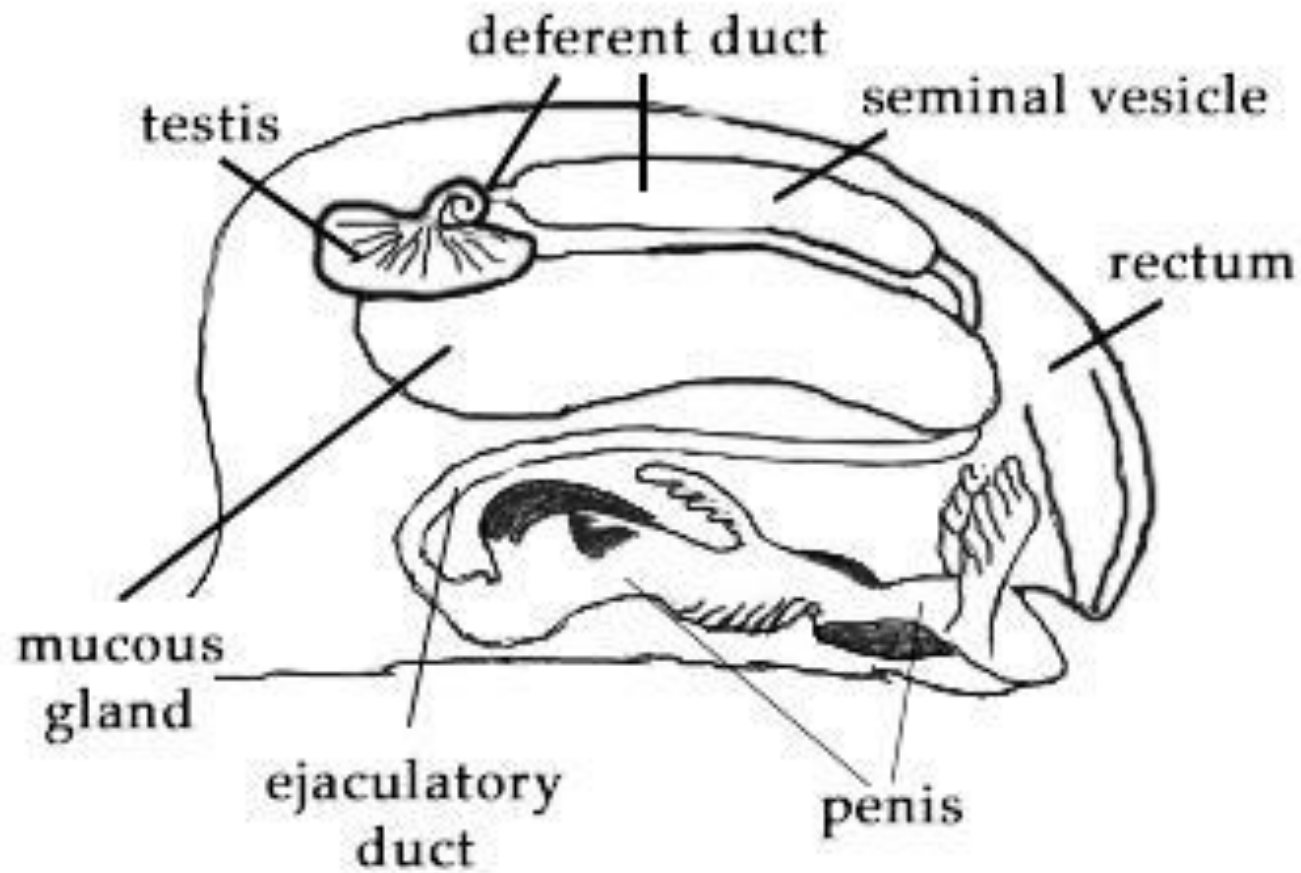
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## Insemination of queen bees

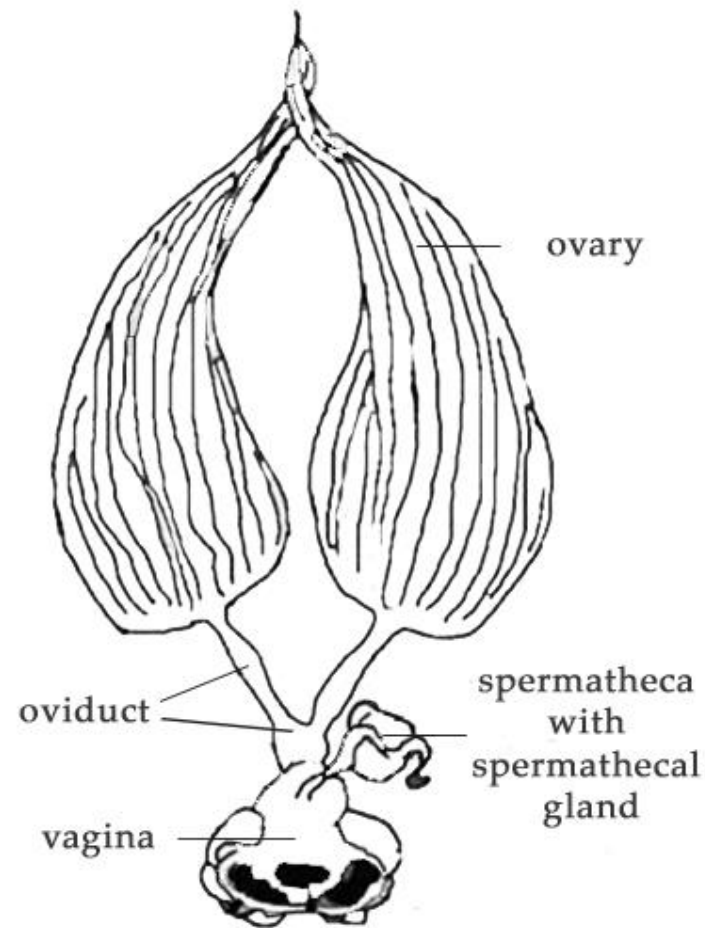




# Anatomy of genitals of bees - Male's genitals



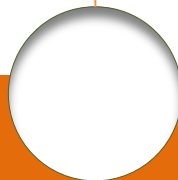
# Anatomy of genitals of bees - Female's genitals





# Description of insemination of queen bees

- We can divide the insemination into two main parts - sampling of sperm from drones and insemination of queen bees itself.
- Technical insemination of queen bees is a method of complete mating control.
- We can use the sperm of selected drones (which is not possible at freely mating queen bees)



# Description of insemination of queen bees

- Queen bees are inseminated at the age of sexual maturity, it means since the 6th day after hatching out, the best time is between the 7 -10th day .
- It is possible to inseminate older queen bees 2 – 3 weeks old, but there is a risk, that overaged queen bees damage or even kill the bees in breeding hives.



# Description of insemination of queen bees

- In the Czech Republic we produce an insemination device developed by ing. Vladimír Veselý in 1961. Since that it has been modified for several times.
- We also produce a device with high capacity adapter, where we can suck in sperm, for example for 10 - 12 queen bees at the same time.



# Description of insemination of queen bees

- At technical insemination the success rate is higher than at freely mating queen bees, where the losses are from 20 to 50 %.





# Sperm sampling at drones

- Sperm sampling is carried out at sexually mature drones, 14 days old are the best. By squeezing their chest and abdomen between a thumb and forefinger we force them to ejaculate.
- It is better to use narcosis in chloroform vapor, especially, if we have drones of different age. Narcosis causes erection only at sexually mature drones.



<http://www.farmapk.cz/clanky/vcely/popis-a-fotograficke-ukazky-z-inseminace.html>

# Sperm sampling at drones

- We induce ejaculation using above-mentioned way.
- We suck in sperm carefully into narrowed capillary (insemination needle) under binocular microscope.
- This operation needs a big skill, because we must sample sperm without admixture of mucus, which can block the needle or it can even cause death of a queen bee.



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# Sperm sampling at drones

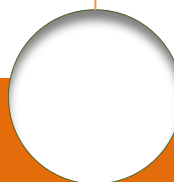
- Some needles are calibrated so we can measure a dose easily.
- The dose is 8 - 10 mm<sup>3</sup> for one queen bee.
- This amount can be sampled approximately from 8 to 15 drones, it depends on cubic capacity of sperm they can give.



<http://www.farmapk.cz/clanky/vcely/popis-a-fotograficke-ukazky-z-inseminace.html>

# Sperm sampling at drones

- At sampling we pay a big attention to hygiene.
- Drones defecate very often and it could cause contamination of sperm or parts of instrument which come into contact with queen bee (holder of queen bee) and especially with her genitals (insemination needle and small hooks to spread queen bee).





# Insemination of queen bees

- All queen bees, which are supposed to be inseminated, should be in little cages hanging in little hives, especially at a bigger amount.
- We take a queen bee into a holder using a pitch, its abdomen should be towards a narrowed opening.



<http://www.farmapk.cz/clanky/vcely/popis-a-fotograficke-ukazky-z-inseminace.html>

# Insemination of queen bees

- We insert a narcotic plug into the opening towards little head, we fix the queen bee with it in the way that from the opposite opening three last abdomens jut out.
- The queen bee is grounded by gaseous CO<sub>2</sub>. It is brought with the narcotic plug.



# Insemination of queen bees

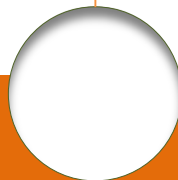
- After immobilization we insert the bee into the holder on insemination instrument so that its abdomen heads obliquely upward to the right in the position on back.
- We spread out the queen bee using ventral (left) and sting (right) little hook under binocular microscope at approximately 15 times magnification .



<https://www.farmarik.cz/p/7700/inseminacni-aparat>

# Insemination of queen bees

- We insert a tip of insemination needle into the queen bee so that we overcome a vaginal valve.
- This operation is the most difficult part of the insemination and it needs a good skill.
- We cannot see inside the vagina so the bee can be easily damaged because the tissue is very soft.
- The slightest damage leads to bleeding to death (hemolymph does not contain blood platelets and so it does not clot) and it is irreversible.





# Insemination of queen bees

- After that we slowly squeeze out the dose of sperm into the queen bee. In the case, that we did not overcome the valve, the sperm runs out during squeezing out.
- After fertilization the queen bee relaxes. The narcosis lasts 2.5 - 3 min. Approximately after 5 minutes the bee is fully awake. After fertilization we give the queen bee back into the little cage and hang it in its little hive.



<http://ovcsvpardubice.blog.cz/0809/proc-se-pouziva-umela-inseminace-vcel>

# Insemination of queen bees

- Next day after insemination it is necessary to carry out the second narcosis, again with CO<sub>2</sub> for 1 - 2 min.
- After the second narcosis we let the queen bees set free by bees from a little “eating up” cage.



# Insemination of queen bees

- The second narcosis is important for the queen bee to start beeing fertile.
- First queen bees start beeing fertile in several days, most of them by 10 days.
- Input openings at breeding little hives must stay latticed up to the start of fertility of the queen bee, best until its taking.



# Bibliography

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