

RECORDS ON THE MATING OF THE QUEEN



WITH DRONES IN THE AIR IN THE YEARS 1763 - 1776 FROM SLOVENIA

Introduction

Mating means the sexual union of the queen and drones during a mating flight. Many researchers have studied the mating of queens and often concluded that this happens in the hive when the drone touches the queen. No one saw the mating. In Janša's book "Abhandlung vom Schwärmen der Bienen" (1771), special attention was paid to the description of queens mating with drones in the air (see § 63). This record in his book was even considered a mistake, and in order to prove it, they announced a prize of 20

oz. 30 ducats to the one who will confirm that the queen is already mated in the hive. Even before Janša, mating of queens with drones in the air, (which is an original Slovene discovery), were known to Gorenjska (Carniolan) beekeepers and other Slovene beekeepers who wrote about it. In the essay we will present this chronologically with the records known so far (manuscripts and publications) in the years 1763 - 1776 from Slovenia.

Records:

1. Scopoli: The first on mating of a queen with a drones in the air – 1763

Scopoli (1763), published the book *Entomologia Carniolica* in latin. *Apis Mellifica* (honeybee) is described under number 811 (pages 303-304). Scopoli wrote about the queen: "... it is surrounded by several drones; she flies away, flying in the air she becomes fertilized...". This is the first record in the world that drones in the air mate a queen.

2. Glavar: Vorschlag Beantwortung zur Verbesserung der Bienenzucht in den Kaysl. Königl. Erbländern - "Answer" – 1. 7. 1768

Peter Pavel Glavar (1768) wrote manuscript: *Vorschlag Beantwortung zur Verbesserung der Bienenzucht in den Kaysl. Königl. Erbländern* in german (Proposal Reply for the improvement of beekeeping in the Kaysl. Royal Hereditary Lands), short "Answer", which is the first professional description of beekeeping in Carniola. He also mentions that queens are mated outside the hive in the air.

30. Chapter: Young queens fly out for pollination: "*It should be noted that the young queen of those hives which have swarmed, as well as of the second and third swarms, will fly out for pollination in a few days between 12 noon and 2 pm*".

3. Furlan: Practische Binen Oeconomie - 1768/1771 (?)

The Archives of the Republic of Slovenia contain an extensive manuscript in Gothic and German (65 pages) with beekeeping content - title: *Praktische Binenoeconomie...* (Practical Beekeeping...). The author of the manuscript is probably beekeeper priest Matej Furlan.

Chapter Six: On the Fertilization and Multiplication of Bees: "... Here, however, I intend to talk about the queen in the second or third swarm, which is by no means yet fertile, and

therefore incapable of laying eggs. After we put it in the hive with a swarm, such a queen flies out of the hive on the third day and drones after it. However, as it rises into the air, also drones rise behind it, attacking the queen and performing fertilization. Due to the mating instinct, a ball is made and it often happens that they all fall to the ground together with the queen, whereby the most skillful drone gets the game, which I once saw to my great surprise".

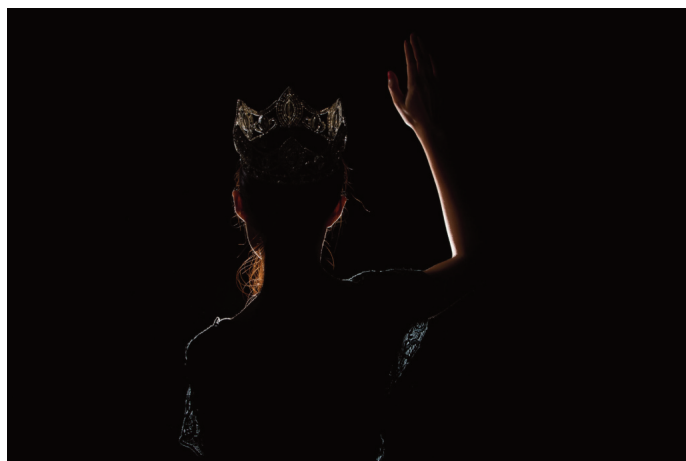
4. Humel: Queen mating with drone in the air - 1769, 1771, 1773

Humel informed in writing (1771) the Carniolan Agricultural Society about his observations (1769). Slovenian beekeepers Matej Furlan and Peter Pavel Glavar have been asked for an assessment and opinion. Later the Carniolan Agricultural Society acquainted Hummel's record with the Beekeeping society in Oberlausitz (Upper Lusatia), attached a positive assessment of Glavar and Furlan, and emphasized that these new findings about queen mating were worthy of attention. The Society first reported on Humel's observation of queen bees in 1769 with a short note in 1772 and 1773, mentioning "Peter Paul Glovar and Matthai Furlani." The Huml's whole article was published by the Beekeeping Society in Upper Lusatia in 1773 with the title: "Physische Erfahrung, dass der Weisel wirklich von den Drohnen ausser den Bienenstock befruchtet werde, von Anton Humel, Stadtchirurg in Laybach im Herzogthum Crayn, der Societät gesandt" (Physical experience that the queen bee is really fertilised by the drones outside the hive, sent to the Society by Anton Humel, town surgeon in Laybach in the Caniola). At that time there was still speculation about the method of fertilization of the queen. This article was a big surprise for the world beekeeping professional public.

4.1. Huml's letter – 25. 9. 1771

Summary:

"...Humel, a city surgeon from Ljubljana and an amateur beekeeper, explains in the introduction that it is still unresolved whether the drones fertilize the queen or not. Because of this he paid particular attention to bees' behavior at his apiary. In June 1769, he noticed in the second swarm the next day that the bees were agitated, that the queen was on the alighting board and then the queen flew into the air. She returned half an hour



later and immediately entered the hive, where about 40 bees followed her. He saw this for the first time after five years of beekeeping, and asked experienced beekeepers, of whom there are many here in the country. They said that they had known this for a long time. It was always a good sign if the queen flew out so early and came home with a white sign on its abdomen. Humel noticed this in the new second swarm and even more so in subsequent swarms and subsequent years. The priest Matej Furlan, who was an experienced and famous beekeeper, explained to him that his observations are not new because he has noticed this many times during his twenty-two years of beekeeping. He also recounted that he saw two times a ball of drones falling in front of the apiary to the ground, and when he examined it, he always found in the middle a queen that was joined to the drone. Humel concludes that it is now explained that the queen is mated with drones in the air and encourages other beekeepers to pay attention to this phenomenon to make themselves sure. He especially advises those who have doubts about this..."

4.2. Glavar's assessment of Huml's letter – 25. 11. 1771

Summary:

»... Glavar says from the very beginning that Huml's work deserves all the recognition, because experienced beekeepers from Gorenjska also told him about the queen's flying with drones in the air and that he saw it several times. Therefore, there can be no more doubt about that. After

laying, the queen no longer allows reunion with drones and, except with the swarm, no longer flies out of the hive and remains fertile for the whole life. At the end, he concludes with a recommendation to the agricultural company that, if it deems it worthwhile, he should send this letter to the beekeeping society in Oberlausitz with a recommendation to publish Huml's record in his beekeeping publication..."

4.3. Schirach, III. Queen mating with drones in the hive - 1773

Summary:

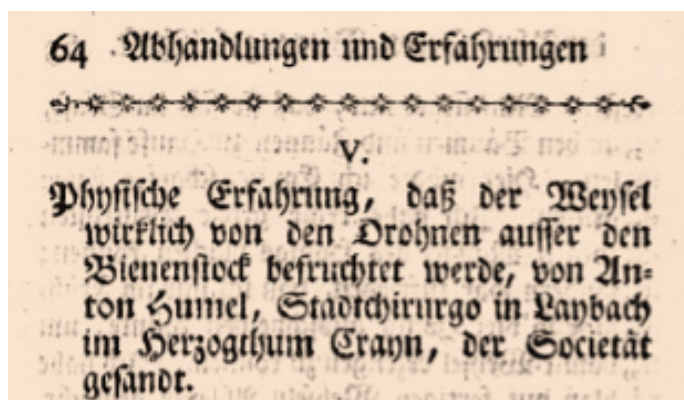
"...Reaumur has never seen mating a queen with drones in a hive. Perhaps now in this unexplained matter three Austrian connoisseurs of bees are discovering a new view.

The Carniolan Imperial Royal Society for Agriculture and Useful Skills communicated these new findings to us as worthy of attention. Mr. Glovar and Mr. Fourlang (Furlan), both venerable priests from Carniola, and Mr. Humel, a city surgeon from Ljubljana confirmed for many years about the mating of the queen outside the hive during the so-called noon fertilization dance. This was most clearly confirmed during the swarming. The queens returned with a white thread on their abdomen and the drones were found free around the young queen or in the grass. We welcomed this report. "

4.4. Humel Publication: Physische Erfahrung, dass der Weyssel wirklich von den Drohnen ausser den Bienenstock befruchtet werde (1773).

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Title of the publication of Huml's essay – *Gemeinnützige Arbeiten...*, 1773, p. 64

Title translation:

"Physical experience that the queen is really fertilised by the drones outside the hive; from Anton Humel, a city surgeon in Ljubljana in Carniola, who sent it to the Society."

5. Publication in the *Wochentliches Kundschaftblatt des Herzogthum Krain* – 1775

The publication of the abbreviated article *"Praktische Eröffnung eines Binnen Liebhabers, dass Weiser wirklich von Drohnen ausser den Binnenstock befruchtet werde. (Practical revelation of an inland lover that queen is really fertilised by drones except the inland hive)"* - is without mentioning the author in the *Wochentliches Kundschaftblatt des Herzogthum Krain* (1775).

Title translation:

A message from practice that the queen is mated by drones out of the hive.

6. Scopoli: *Dissertatio de Apibus* - 1770

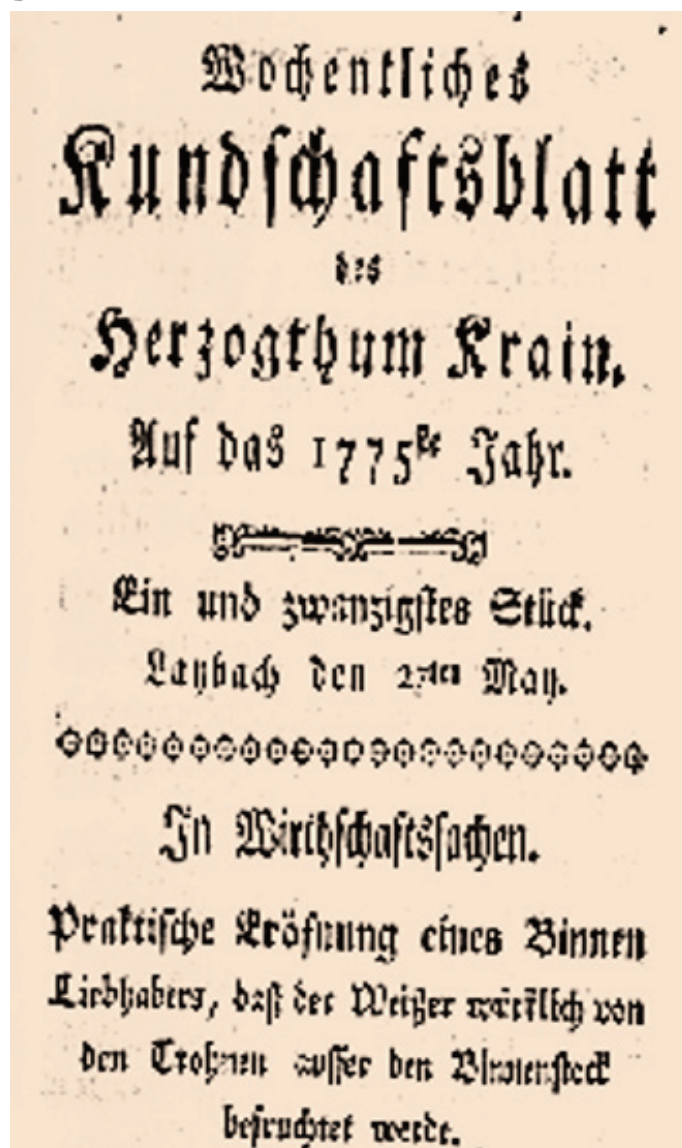
In 1770, in the *Annus historico naturalis*, Scopoli included in the first chapter the work *Dissertatio de Apibus* (Dissertation on Bees) written in Latin.

The tenth observation states:

"...The purpose of the swarming out is considered by some people as a mating, while others argue that asexuals (worker bees) do not build honeycombs before the queen has brought some thin thread into the hive."

7. Janša: *Abhandlung vom Schwärmen der Bienen* - 1771 and *Vollständige Lehre von der Bienenzucht* – 1775.

- General information about the queen's mating with drones in the air in Janša's time.



Wochentliches Kundschaftsblatt des Herzogtum Krain, 1775, p. 321

In Janša's time, there was still speculation about the queen's mating. Most thought it was happening in the hive but no one had seen it yet. Janša's publication in both books, and especially in the first, that the queen is mated with drones in the air, aroused much interest and opposition among beekeeping experts. Most mistakenly attributed to Janša that this was his discovery. However, it is not. Even before the publication of Janša's first book in 1771, in the beekeeping literature, where Carniolan (Slovenian) beekeeping is described or presented, this is written in the publications: Scopoli (1763) and (1770), Glavar (1768), Humel (1771) and Furlan (1768-1771 (?)). Here are also described the signs of fertilization of the queen, which are visible at her return

- a white thread on her backside. Janša's discovery related to the queen's flying in the air is that several drones fertilize the queen. There is also a living oral testimony that Gorenjska (Carniolan) beekeepers knew from their many years of beekeeping experience that the drones fertilize the queen in the air.

7.1. Janša's first book: Treatise on the Swarming of Bees – 1771. & 63 (page 85)

"...Mating flight of the queen depends on the weather and honey flow... on the third or fourth day after birth... On a beautiful day, between nine in the morning and three or four in the afternoon, the queen arrives with accompanied of bees and drones from the hive. On the alighting board it is looking in all directions for a while to remember the hive; then rises into the air. It flies in circles in front of the hive for a while and then rises into the air. When it returns from the mating flight, it does not enter immediately the hive, but flies some time in front of it. On this occasion, attention should be paid to the following signs, by which we recognize that the queen has pollinated. If the back of the queen where the bees have a sting, is open or if something white, similar to a thin thread, hangs from the back and looks as if the back is broken, then the queen has certainly been mated..."

7.2. Janša's second book: Complete Teaching of Beekeeping - 1775 & 8 (page 8)

"...Drones are male; their only task is to mate the queen. At the time of swarming, on a beautiful, warm day, each unfertilized queen is accompanied by many drones and bees into the air, where the drones fertilize her..."

IX. Chapter: On Queen mating (pages 51 – 55)

& 51: Mating time; & 52: Fertilization; & 53: Mating signs; & 54: The benefit of cognition; & 55: Age of the queen for mating.

8. Peter Pavel Glavar: Pogovor o čebelnih rojev (A Conversation on Bee Swarms) – 1776

Glavar (1776) writes about the mating of queens in XXXI. and XXXII. chapter - paragraphs 349-361.

357 paragraph (page 53):

"When the queen flew in the company of some bees and drones from the hive, drones descend from the hive behind her one after the other and a few shots far from the apiary fly to-

gether over a beautiful plain and there in the air they fly here and there with a great murmur. The drones are pressing harder and harder against the queen, taking it in the middle and sticking together, so that they fall to the ground several times in the form of a ball... «

Conclusions

The presented records on the mating of queens with drones in the air testify that these are original Slovenian contributions to the biology of the honey bee. Undoubtedly, Scopoli, who learned this from the stories of old Gorenjska beekeepers, was the first in the world to write about it in the Carniolan entomology (1763). The famous beekeeper Huber discovered this in 1788. It took quite a few decades for this to be accepted even by the greatest skeptics.

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