

Investigation of the number and types of venation anomalies in honey bee fore wings

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INTRODUCTION & AIM

Since Kozhevnikov's work, different types of traits have been used in research on bee morphometry. In recent years, the feature "Wing shape" used in "geometric morphometry" has been added to them. The front wing of a bee ranks first in terms of the number of measurements and indexes that can be obtained from this organ.

Wing venation is used in the taxonomy of insects such as ants (Perfilieva K.S., 2010), honey bees (Porporato M., et al., 2014, Eligül H., et al., 2017), and others. Accounting for venation anomalies can be successfully done in population monitoring (Muzlanov Y.A., 2002).

Anomalies in the venation of insect wings can be caused by various causes: genetic, abiotic, man-made or pathogens. Thus, Zhu X. et al. (2018) found that the low temperature of the development of the printed brood (within 1-4 days after sealing) contributes to the appearance of venation anomalies. Pupae of honey bees (*Apis mellifera*) infected with deformed wing virus develop into adults with various morphological deformations, including wings, similar morphological changes have been described in bumblebees (*Bombus terrestris*, *Bombus pascuorum*) (Genersch E., et al., 2006).

Many authors have studied natural venation anomalies in honey bees. Their various types and localizations have been described (Porporato M., et al., 2014, Eligül H., et al., 2017, Mazeed A.M.M., 2011). Thus, Mazeed A.M.M. (2011) showed that the frequency of unusual veins in Carnica bees is higher than in Egyptian bees, and also linked the breed affiliation and a certain type of anomaly, he also found that the left and right front wings of Egyptian bees are more homogeneous than those of Carnica bees. Porporato M. et al. (2014) found that the most frequently observed anomalies in bees (*A. m. mellifera*, *A. m. ligustica*, *A. m. carnica* and hybrids) were areas of veins of various lengths protruding from standard veins. The most common anomaly in the populations of Turkish honey bees from the Black Sea region is located in the posterior quarter of the outer surface of the transverse vein 2rs-m, and in honey bees from the Aegean region – the aRs2 anomaly, other anomalies on the wing veins are rare (Eligül H. et al., 2017).

The purpose of the work: to create and replenish a database on the types and frequency of occurrence of wing venation anomalies. When measuring the exterior features on the wings of honey bees, anomalies of their venation occur, as a result, such wings are most often rejected. To solve the problem of the frequency of such anomalies, it is necessary to analyze images of the front wings of honey bees.

METHOD

The work on accounting for anomalies in the venation of the fore wings was performed in the laboratory of the FSBSI "FBRC" by viewing images containing the fore wings (left and right) of honey bees and registering these anomalies in a specially designed form.

RESULTS & DISCUSSION

Based on the analysis of the literature, the types of venation anomalies of the fore wings of honey bees were identified (22 types in total) and a letter of the Latin alphabet was assigned to each type. By analyzing the obtained wing images, we have identified 17 types of anomalies, of which 6 are not described in the literature. Photographs of the found anomalies were taken, which are shown in the figure.

Type of anomaly	The number of anomalies (%) of their total number	Type of anomaly	The number of anomalies (%) of their total number
a	9,66	k	0,17
b	1,19	l	6,95
c	15,90	nn	0,17
d	0,34	r	0,34
e	0,68	s	1,36
f	1,69	t	0,17
g	0,51	u	2,20
j	57,60	v	1,02

Table. Distribution of the frequency of wing venation anomalies in honey bees.

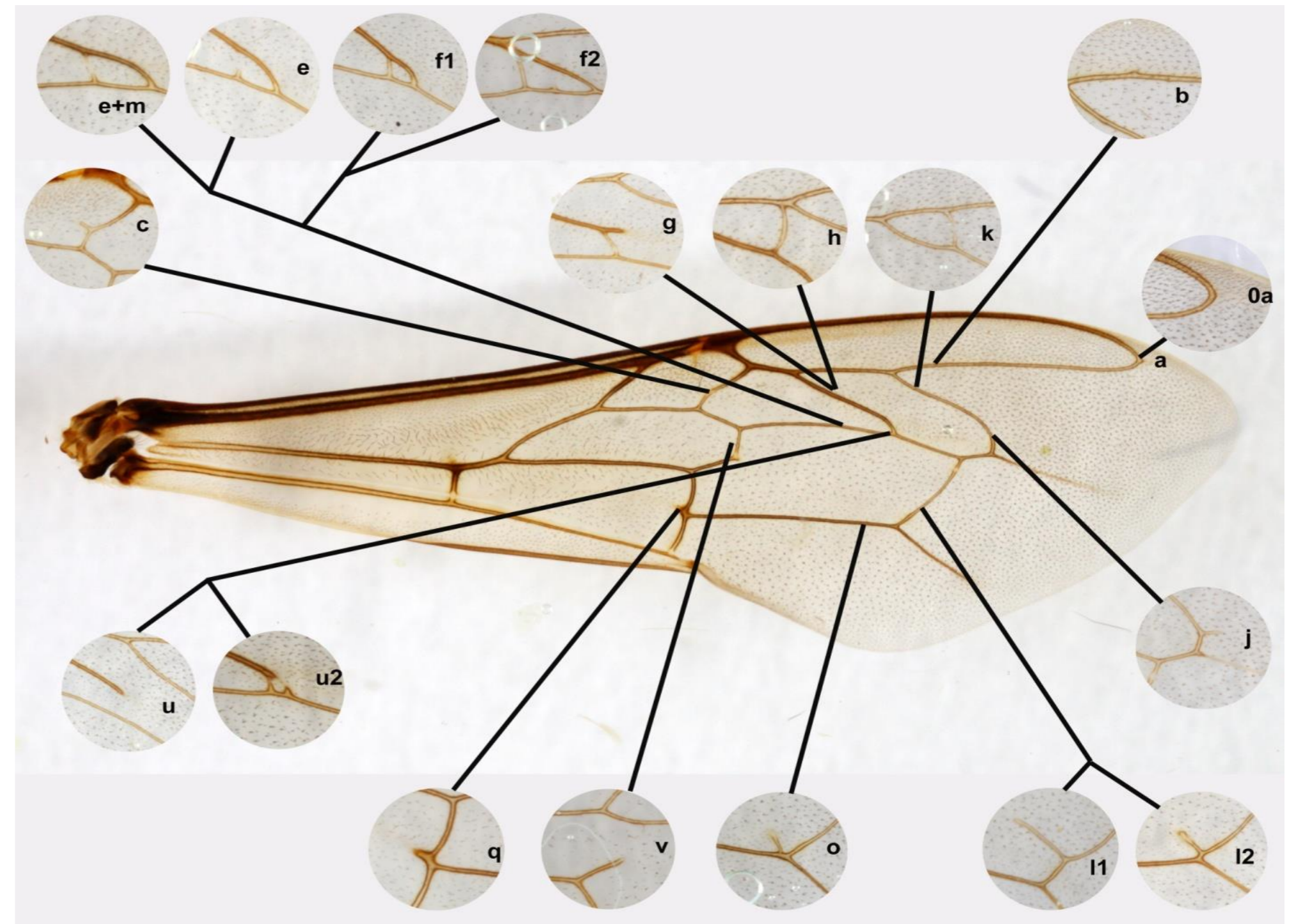


Figure. Wing venation anomalies and their localization

A total of 2,240 pairs of front wings were analyzed, of which 794 pairs had at least one anomaly. The frequency of occurrence of anomalies of venation of the front wings is shown in the table. The most common types of anomalies were "c" and "j". The average number of anomalies per bee was 0.41 ± 0.034 , with fluctuations from 0.05 to 1.32 and a coefficient of variation of 61.4%.

CONCLUSION

The frequencies of the occurrence of different types of wing venation anomalies were established, of which type "j"—57.6% and type "c"—15.9% were the most common. The average number of anomalies per bee was 0.41 ± 0.034 . In total, 6 types of anomalies not described in the literature were determined.

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FUTURE WORK / REFERENCES

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