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REPRODUCTIVE ISOLATION BY DIFFERENT TIME OF DRONE FLIGHT BETWEEN *APIS CERANA* FABRICIUS, 1793 AND *APIS VECHTI* (MAA, 1953)

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SUMMARY

In Sri Lanka the three honeybee species *Apis florea, Apis cerana* and *Apis dorsata* are found in the same biotope. The daily periods of drone flight were found to be specific (KOENIGER and WIJAYAGUNASEKERA, 1976). According to RUTTNER (1988) this behavioral isolation is a more complete separation than the reproductive barrier between *A. mellifera* and *A. cerana.*

The three honeybees, *A. cerana, A. vechti* and *A. dorsata* are naturally distributed in the same habitat. We compared the time of drone flight between these honeybees in Sabah (North East Borneo).

MATERIAL AND METHODS

The observations were carried out from Feb. 16 to Feb. 18 in Tenom, Sabah, Malaysia. Nine colonies of *A. vechti* were inspected. But only one colony (No. G 21) contained several drones. We observed this colony from 10.00 h to 19.00 h during two days (Feb. 16, Feb. 17). All drones leaving and returning to the colony were counted. The number of flights were noted in 15 minutes intervals.

In *A. cerana* we had three colonies with drones which were watched on three days (Feb. 16, Feb. 17, Feb. 18) from 11.00 h to 19.00 h.

We found two *A. dorsata* colonies with drones. Both colonies were built in a palm tree at a height of 7 meters. The distance between the observer and the colonies was 5 meters. The drones were clearly recognized by their specific shape against the sky. Workers have a tipped abdomen and the end of the

drone's abdomen is blunt. Further drones have a distinct flight sound much louder than the flight noise of workers. Both colonies were observed on Feb. 17 and Feb. 18.

RESULTS AND DISCUSSION

The drone flight of *A. cerana* occurred between 13.45 h and 15.30 h. We observed 258 flights. The drones of *A. vechti* started their flight activity at 16.15 h. That was 45 minutes after the last drone of *A. cerana* had returned. We counted 205 drone flights of *A. vechti.* The activity ceased at 18.15 h. At this time *A. dorsata* drones started their flight activity. They began with a sudden start of more than 250 drones and it ended abruptly at 19.00 h when the latest drones returned to the comb. In *A. dorsata* we estimated the number of flights to be 1730.

In fig. 1 the percentage of the drone flights per 15 minutes is plotted. It clearly shows the complete separation between *A. cerana* and *A. vechti.* The small overlap between. *A dorsata* and *A vechti* does not imply a possibility of interspecific copulations.

Our observations showed that the latest drones of *vechti* were returning while the first drones of *dorsata* started.

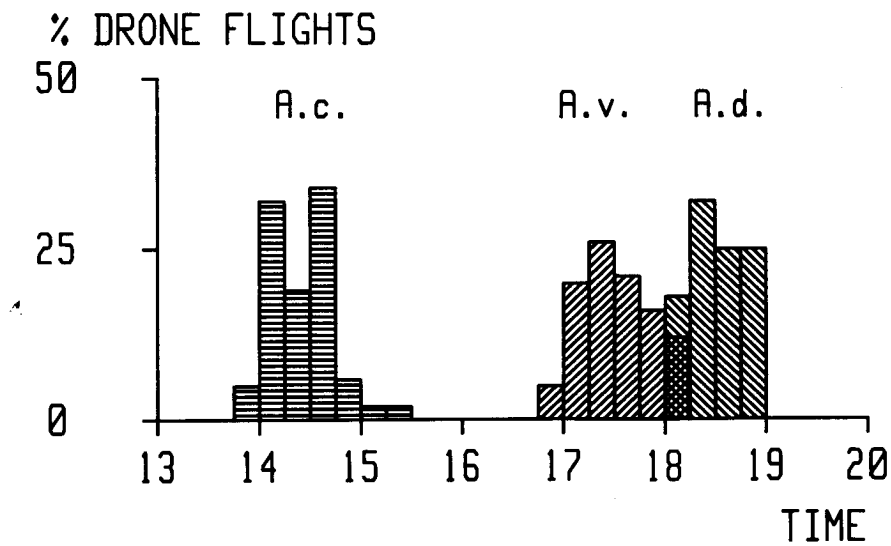

FIG. 1. — *Time of drone flight of* Apis cerana *(A.c.)* Apis vechti *(A.v.) and* Apis dorsata *(A.d.).*

The specific times of drone flights described here give evidence of a complete reproductive isolation. Therefore, *Apis cerana* and *Apis vechti* must be ranked systematically as well separated species.

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RÉSUMÉ

ISOLEMENT REPRODUCTIF ENTRE *APIS CERANA* FABRICIUS, 1793 ET *APIS VECHTI (MAA, 1953) DÛ À L'HEURE DIFFÉRENTE DE VOL DES MÂLES*

Les mâles d'*Apis vechti* sortent pour leur vol nuptial entre 16 h 45 et 18 h 15. Les autres espèces présentes dans la région, *Apis cerana* et *Apis dorsata,* ont leur vol nuptial à des heures totalement différentes. On peut ainsi prouver l'existence d'un isolement reproductif et par conséquent reconnaître *Apis vechti* en tant qu'espèce propre.

ZUSAMMENFASSUNG

REPRODUKTIVE ISOLATION ZWISCHEN *APIS VECHTI* UND *APIS CERANA* DURCH UNTERSCHIEDLICHE DROHNENFLUGZEIT

Die Drohnen von *Apis vechti* fliegen zwischen 16.45 h und 18.15 h auf Paarungsflug. Die im gleichen Gebiet vorkommenden anderen Arten *Apis cerana* und *Apis dorsata* haben deutlich verschiedene Paarungsflugzeiten. Auf diese Weise konnte eine reproduktive Abgrenzung und damit der systematische Status einer eigenen Art für *Apis vechti* nachgewiesen werden.

LITERATURE

KOENIGER N., WIJAYAGUNASEKERA H.N.P., 1976. — Time of drone flight in the three Asiatic honeybee species (*Apis cerana, Apis florea, Apis dorsata*). *J. Apic. Res.*, **15** (2), 67-71.

RUTTNER F., 1988. — *Biogeography and taxonomy of honeybees.* Springer Verlag, Berlin, 284 p.