

The Chemical Compounds of Beeswax from *Apis* Species

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At present, eight species of *Apis* are recognised. All of them construct their nests with beeswax. Beeswax is a complex mixture of chemical compounds, mainly monoester, diester, free fatty acids, etc. This study was undertaken to examine whether there is a difference in the chemical compounds of beeswax among *Apis* species.

Method

Wax samples from the following species were investigated: *A. mellifera* L. (29 samples from different regions of Europe, Nepal and Africa), *A. cerana* (six samples from Nepal and Thailand), *A. florea* (four samples from Thailand), *A. dorsata* (four samples from Nepal, India and Thailand) and *A. laboriosa* (one sample, a mixture of many colonies, from Nepal). Chemical analysis was made using high temperature gas chromatography (HTGC) and HTGC-mass spectrometry.

Results and Discussion

Results are shown in Figs. 1 and 2. The bee species investigated can be easily identified by the wax they produce. The types of chemical compounds are more or less the same in all bee species. Elution patterns of monoester, diester, hydroxy-monoester and hydroxy-diester show characteristic profiles (Fig. 1). The results confirm the phylogenic differences between the species investigated.

Taxonomically, it is still not clarified if *A. dorsata* Fabricius, 1798 and *A. laboriosa* Smith, 1871 are separate species. No differences in the elution profiles of components with higher molecular weights were observed but these species can be distinguished by alkene fractions. The wax of *A. dorsata* shows a significantly lower content of alkenes compared to wax of *A. laboriosa* (Fig. 2).

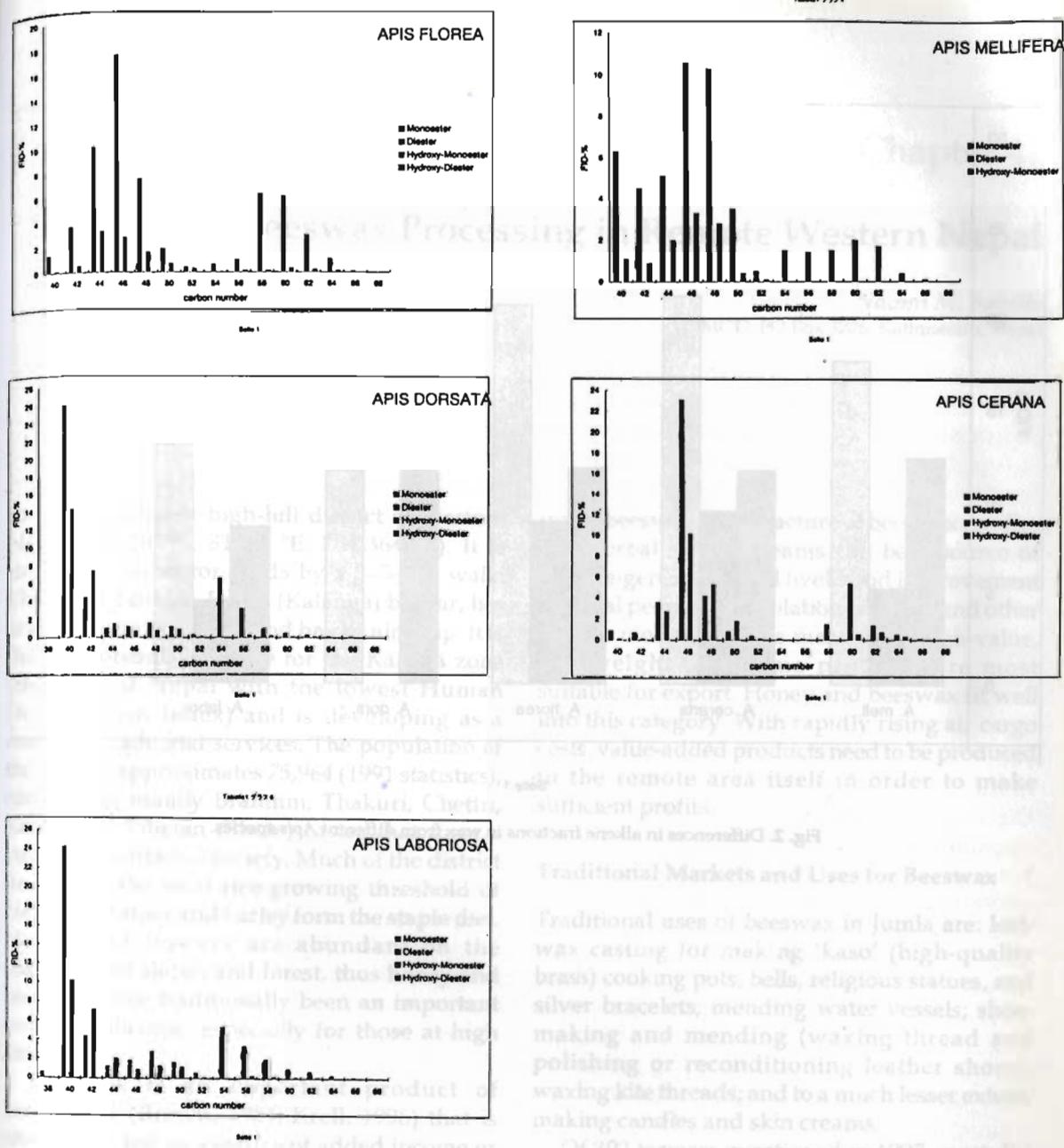
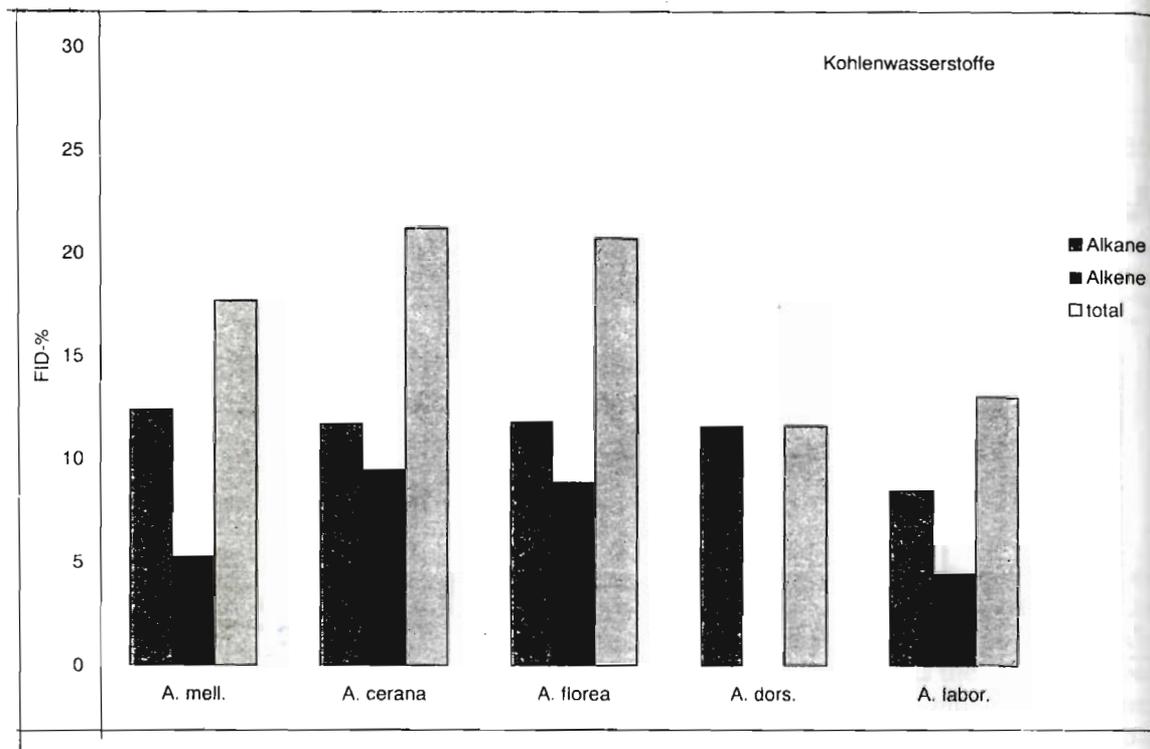


Fig. 1. The Chemical compounds isolated from bees wax of *Apis* species

Traditional Markets and Uses for Beeswax

Traditional uses of beeswax in India are: casting for metal (high-quality brass) cooking pots, bells, religious statues, and silver bracelets; mending water vessels; shoe making and mending (waxing thread and polishing or reconditioning leather shoes); waxing kite threads; and to a much lesser extent, making candles and skin creams.

Of 302 farmers questioned in 1997, most did not trade it in a barter system with low-caste (Kami and Sunar) people who use it for lost wax casting of iron and gold respectively. The usual price is 1:7 weight for weight with metal items. The metal varies. 80 farmers



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Fig. 2. Differences in alkene fractions in wax from different *Apis* species.