

Pollen analysis of winter honey samples from Murshidabad District, West Bengal

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Qualitative and quantitative pollen analyses of 25 apiary honey samples (*Apis cerana indica*) and 6 squeezed honey samples (*A. florea*) collected during Nov 1999-Feb 2000 from Murshidabad district, West Bengal were carried out. The majority of the honey samples were found to be unifloral with *Brassica nigra*, *Coriandrum sativum*, *Helianthus annuus*, *Moringa oleifera*, *Zizyphus jujuba* and *Eucalyptus globulus*. Other important reliable sources of nectar for honey bees during winter were also identified.

Key words– Melittopalynology, nectar source, Winter honey, Murshidabad.

INTRODUCTION

MURSHIDABAD district is located between 23°40'N – 24°55'N and 87°50'E – 88°45'E in West Bengal, India (Map 1). Present study is aimed to recognize the major nectar sources and identify the potential areas to encourage the enterprises interested in commercial honey productions in Murshidabad district. Multiplication of bee colonies will also increase yield of agricultural crop and orchard plants as honey bees, the most efficient plant pollinators, restrict their serial visits to the same preferred species as long as its flowering lasts.

Earlier records of honey pollen analysis in West Bengal come from the districts of Darjeeling, Jalpaiguri, West Dinajpur in the north and Midnapur, Kolkata, North and South 24-Parganas in the south of West Bengal (Sen & Banerjee, 1956; Mondal & Mitra, 1980; Ganguly *et al.*, 1984; Malakar *et al.*, 1995; Bera *et al.*, 1997; Kumar, 2000).

MATERIAL AND METHODS

31 honey samples measuring 100 ml each have been collected from different Block and Anchal Panchayat areas of 4 subdivisional zones of Murshidabad district during the period from November 1999–February 2000 (Map 1). Honey samples were both apiary and squeezed honey, the details of which are given in Table 1.

The methodology recommended by International Commission for Bee Botany (Louveaux *et al.*, 1978) was employed for the recovery and analysis of the pollen content from honey samples. The pollen types were placed under 4 frequency classes viz., predominant pollen types (> 45 % of the total pollen complement of nectariferous taxa), secondary pollen types (16-45 %) important minor pollen types (3-15 %) and minor pollen types (3 %). Honey samples were recommended as uniflorals if they contain a predominant pollen type and multifloral otherwise.

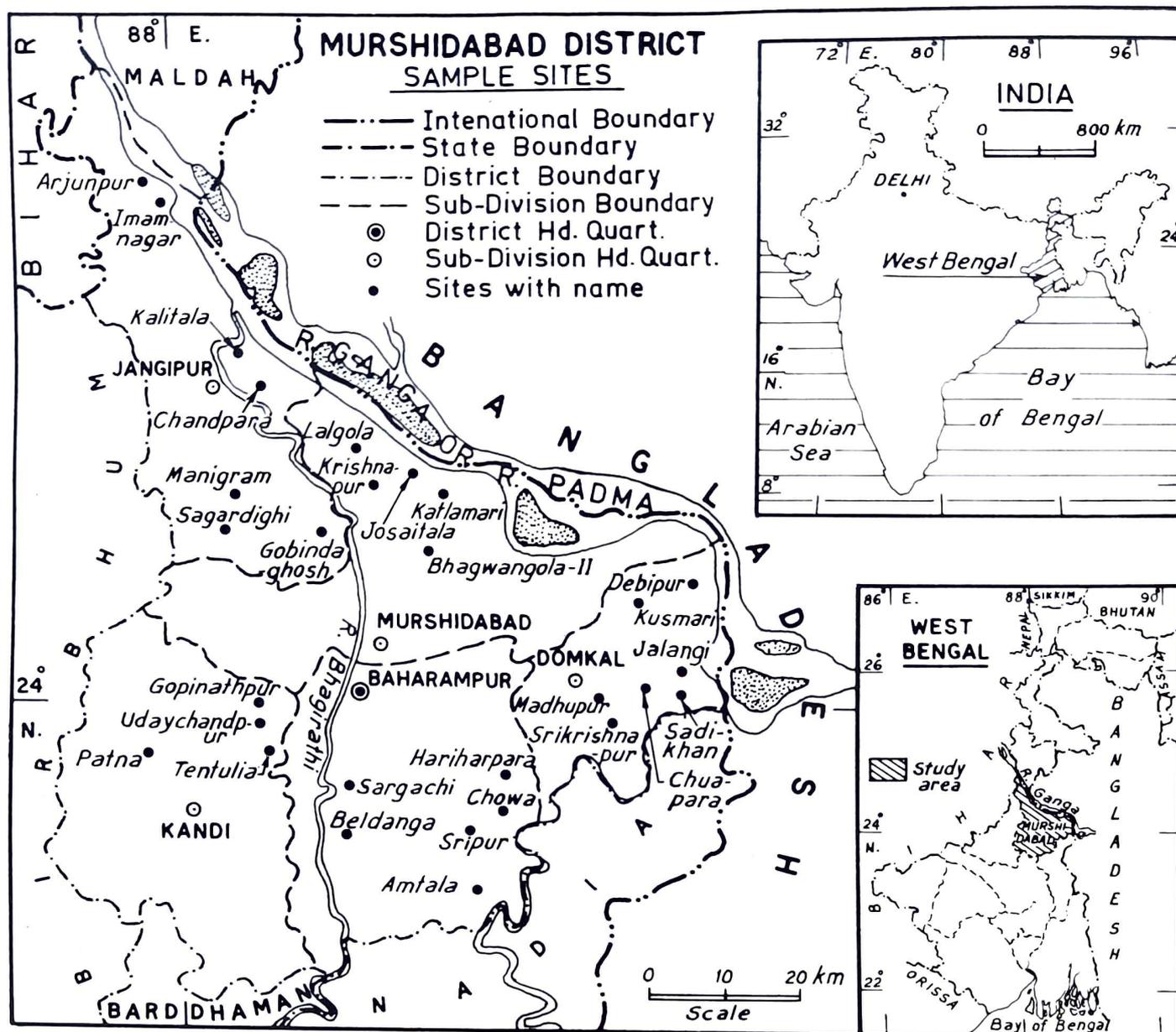
OBSERVATION

Qualitative and quantitative analysis of honey samples from 5 subdivisional zones of Murshidabad district were carried out. Pollen analytical data of each subdivision is as follows (Table 2; Pl. 1; Figs. 1-19):

Domkal subdivision

8 honey samples were collected from this division among which 5 samples are found to be unifloral and the rest 3 multifloral. *Brassica nigra* in three samples (76.50% in DW-1, 80.75% in DW-2, and 61% in DW-3) and *Coriandrum sativum* in two samples (52% in DW-2 and 47% in DW-7) are found to be predominant pollen types. Other important pollen types are *Capsicum frutescens*, *Helianthus annuus*, *Ageratum conyzoides*, *Rungia* sp., *Leucus aspera* and *Phyla nodiflora*.

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Map 1.

PLATE I

(All photomicrograph are magnified x700)

Fig. 1. *Sida* sp.Fig. 2. *Sesamun indicum*Fig. 3. *Bombax malabaricum*Fig. 4. *Pisum sativum*Fig. 5. *Moringa oleifera*Fig. 6. *Clerodendron infortunatum*Fig. 7. *Croton* sp.Fig. 8. *Asteracantha longifolia*Fig. 9. *Ageratum conyzoides*Fig. 10. *Tridax procumbens*Fig. 11. *Helianthus annuus*Fig. 12. *Brassica* sp.Fig. 13. *Citrus* sp.Fig. 14. *Coriandrum sativum*Fig. 15. *Zizyphus jujuba*Fig. 16. *Eucalyptus globulus*Fig. 17. *Leucus* sp.Fig. 18,19. *Mangifera indica*

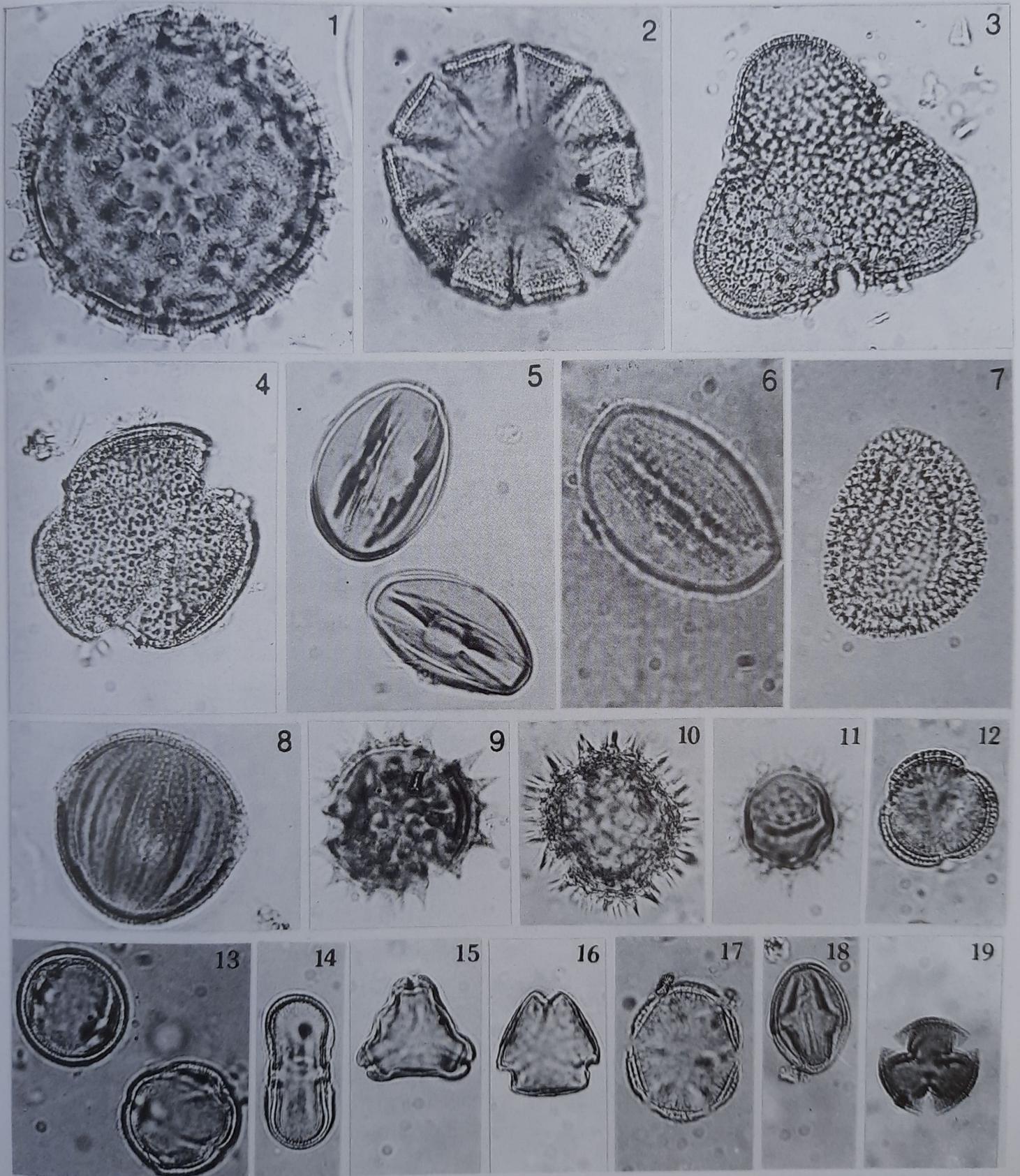


PLATE 1

Table 1. Details of honey samples collected from Murshidabad District

Sample No.	Place of collection	Time of collection	Types of honey	Sub-division
MW (D) - 1	Domkal	Jan	Apiary honey	Domkal
MW (D) - 2	Madhupur	Dec	"	"
MW (D) - 3	Srikrishnapur	Dec	"	"
MW (D) - 4	Jalangi	Jan	"	"
MW (D) - 5	Chuapara	Dec	"	"
MW (D) - 6	Kusmari	Feb	"	"
MW (D) - 7	Sadikhan	Jan	"	"
MW (D) - 8	Debipur	Feb	"	"
MW (B) - 9	Hariharpara	Jan	"	Berhampore
MW (B) - 10	Choana	Jan	"	"
MW (B) - 11	Sripur	Dec	Squeeze d honey	"
MW (B) - 12	Berhampore	Nov	"	"
MW (B) - 13	Amtala	Feb	Apiary honey	"
MW (B) - 14	Bendanga	Feb	"	"
MW (B) - 15	Sargachi	Dec	"	"
MW (M) - 16	Krishnapur	Dec	"	Murshidabad
MW (M) - 17	Lalgola	Jan	"	"
MW (M) - 18	Bhagwan gola-2	Dec	"	"
MW (M) - 19	Kattamari	Jan	"	"
MW (M) - 20	Jasoital	Jan	"	"
MW (K) - 21	Patna	Dec	Squeeze d Apiary	Kandi
MW (K) - 22	Coopinathpur	Jan	do	do
MW (K) - 23	Udaychandpur	Jan	do	do
MW (K) - 24	Tentulia	Feb	Squeeze d	do
MW (J) - 25	Sagardighi	Jan	do	do
MW (J) - 26	Gobinda Ghosh	Dec	do	Jangipur

Berhampore subdivision

7 honey samples were collected from this zone. 6 samples are found to be unifloral. 4 samples are

found to be unifloral with *Brassica nigra* (70% in MW(B)-9, 72.5% in MW(B)-10, 79% in MW(B)-11, and 64% in MW(B)-15) and two with *Coriandrum sativum* (49% in MW(B)-13 and 46% in MW(B)-14). Other significant pollen types from this zone are *Ricinus communis*, *Hemigraphis hirta*, *Pisum sativum*, *Ocimum basilicum*, *Phoenix sylvestris*.

Murshidabad subdivision

Only 5 honey samples were collected from this zone and all the samples were found to be unifloral. *Brassica nigra* formed the predominant pollen types in 4 samples (82% in MW(M)-16, 63% in MW(M)-18, 48% in MW(M)-19, and 66% in MW(M)-20), *Coriandrum sativum* in one sample (46% in MW(M)-17). Other important types are *Sida cordifolia*, *Allium cepa*, *Ageratum conyzoides*, *Polygonum barbatum*, *Evolvulus* sp, *Phoenix sylvestris*, *Croton bonplandianum*, *Adhatoda vasica* and *Tridax procumbens*.

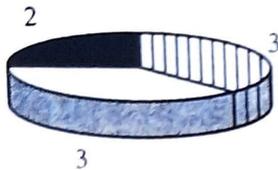
Jangipur subdivision

7 honey samples were collected from Jangipur subdivision among which 5 are found to be unifloral and the rest 2 are multifloral. *Brassica nigra* occurred as predominant pollen type in three samples (69.3% in MW(J)-27, 75.25% in MW(J)-27, and 47.25% in MW(J)-31), and *Helianthus annuus* [52% in MW(J)-29] in one sample each. The other significant pollen types recovered are *Coriandrum sativum*, *Capsicum frutescens*, *Carthamus tinctorius*, *Cleome viscosa*, *Leucase aspera* and *Lathyrus* sp.

Kandi subdivision

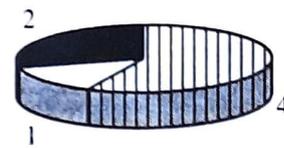
4 honey samples were collected from the Kandi subdivisional zone. Of them 3 samples are recognized as the unifloral. *Brassica nigra* [48% in MW(K)-21], *Eucalyptus globulus* [52% in MW(K)-22] and *Zizyphus jujuba* [69% in MW(K)-23] are predominant pollen taxa recorded. Other significant types are *Coriandrum sativum*, *Phoenix sylvestris*, *Croton bonplandianum*, *Clerodendron infortunatum*, *Cleome viscosa*, *Helianthus annuus*, *Tridax procumbens*, *Ageratum caryocoides*, *Evolvulus* sp.

DOMKAL



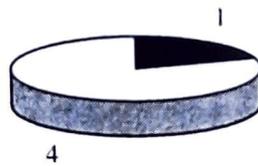
■ Brassica ■ Multifloral ■ Coriandrum

BAHARAMPUR



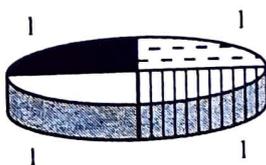
■ Brassica ■ Multifloral ■ Coriandrum

MURSHIDABAD



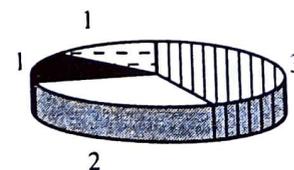
■ Brassica ■ Coriandrum

KANDI



■ Brassica ■ Multifloral ■ Zizyphus ■ Eucalyptus

JANGIPUR



■ Brassica ■ Multifloral ■ Moringa ■ Helianthus

Text fig. 1. Winter honey types of Murshidabad

and *Asteracantha longifolia* (Table 2; Pl.1, Figs. 1-19).

DISCUSSION

In the present study about 80 % of honey samples studied are found to be unifloral. *Brassica nigra* is the chief source of nectar in all the subdivisions of this district. Among 31 honey samples studied 15 samples are recognized as the unifloral with *Brassica*. In some samples frequency of *Brassica* pollen is found to be above 70 %. Other unifloral sources are *Coriandrum sativum*, *Moringa oleifera*, *Zizyphus jujuba*, *Eucalyptus globulus* and *Helianthus annuus* (Text Fig.1).

Majority of the honey samples collected during November-December showed the presence of *Brassica*, *Zizyphus*, *Eucalyptus*, *Phoenix* and *Capsicum* pollen complex. But in the samples collected during January and February the presence of *Brassica*, *Coriandrum*, *Phoenix* and *Moringa* pollen complex have been recorded.

A high frequency of *Brassica nigra* pollen grains are recorded in the samples collected during December and early January followed by gradual decrease in *Brassica* pollen frequency and increase in secondary pollen types, viz., *Coriandrum*, *Phoenix*, *Capsicum*, *Tridax*, although the flowering of *Brassica* lasts up to the early February in the field. Such a sudden change in floral fidelity of bees from *Brassica* to *Coriandrum*, *Phoenix*, *Capsicum*, *Tridax* is quite interesting and needs to be explained. Probably application of insecticides in the *Brassica* field during January might have interfered floral fidelity of honey bees. This is also supported by the statement of local bee keepers who suffer every year losing a large number of bee colonies due to the spraying of insecticides during that period. Necessary administrative steps should be taken to protect the bee keepers in

this respect. It is also striking that the district is familiar for its large number of mango orchards which start blooming from February but mango pollen are rarely encountered in the honey samples although bees are found to visit mango orchard regularly in this period.

Thus, the present melittopalynological investigation of honey samples collected from five subdivisions of Murshidabad district favour the possibility of utilizing rich flora of this District of West Bengal in developing bee keeping enterprises on commercial basis. Agriculture coupled with apiculture may enhance honey production in this district and may create more self employment opportunities for the economically backward classes of this area.

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