

6. Mabry, T. J., Markham, K. R. and Thomas, M. B., *The Systematic Identification of Flavonoids*, Springer Verlag, N.Y., 1970, pp. 155 and 308.
7. Subramanian, S. S. and Nair, A. G. R., *Phytochem.*, 1972, 11, 440.
8. Farkas, L., Nogradi, M., Sudarsanam, V. and Herz, W., *J. Org. Chem.*, 1966, 31, 3229.
9. Banerji, A., Chadha, M. S. and Malsbet, U. G., *Phytochem.*, 1969, 8, 511.
10. Gupta, G. S. and Behari, M., *J. Indian Chem. Soc.*, 1973, 50, 367.
11. Herz, W., Bhat, S. V., Crawford, H., Wagner, H., Maurer, G. and Farkas, L., *Phytochem.*, 1972, 11, 371.

AEROPALYNOLOGICAL STUDIES OF BANGALORE CITY

Part I. Pollen Morphology of *Parthenium hysterophorus* Linn.

SHRIPAD N. AGASHE AND PRATHIBHA VINAY

Department of Botany, Central College, Bangalore University, Bangalore 560001

BANGALORE CITY, known for its salubrious climate almost throughout the year, is often referred as the air-conditioned City of India. However, the atmosphere of the City is full of pollen pollutants. This fact has great bearing on the different types of pollen allergies, much prevalent in this City.

A comprehensive research scheme has been undertaken by the authors to tackle the pollen allergy problem from palynological point of view. As a prerequisite to this research project, construction of pollen flora based on the collection of pollen from plants growing in the City has been undertaken.

Of late several reports have been published on allergic manifestations of the recently introduced notorious weed, commonly referred to as Congress Weed or White Top, and botanically known as *Parthenium hysterophorus* Linn. It has been further reported that the food grains imported into India from U.S.A. and Canada were contaminated with the seeds of this weed¹⁻⁸. Several methods of eradication of this fast spreading weed, have been suggested recently by Vartak⁹ and Jayachandra⁴.

Parthenium hysterophorus Linn., a member of the family Compositae, is known to produce pollen abundantly. The toxic effects of the pollen grains of this weed with reference to allergies have been reported by Wodehouse¹¹, Shivpuri *et al.*⁵⁻⁷. The flowers of this weed known to be amphiphilous. The prevalence of these pollen grains in the atmosphere has been reported by the Aeropalynological work carried on by Shivpuri *et al.*⁷ at Delhi and the same has been confirmed by us at Bangalore.

The pollen grains of *P. hysterophorus* were studied by using the standard palynological techniques of Erdtman²⁻³ and were found to be very interesting morphologically. Literature indicated that detailed pollen morphology of this weed has not been worked out. Hence the diagnosis of the pollen grains of this weed has been presented here.

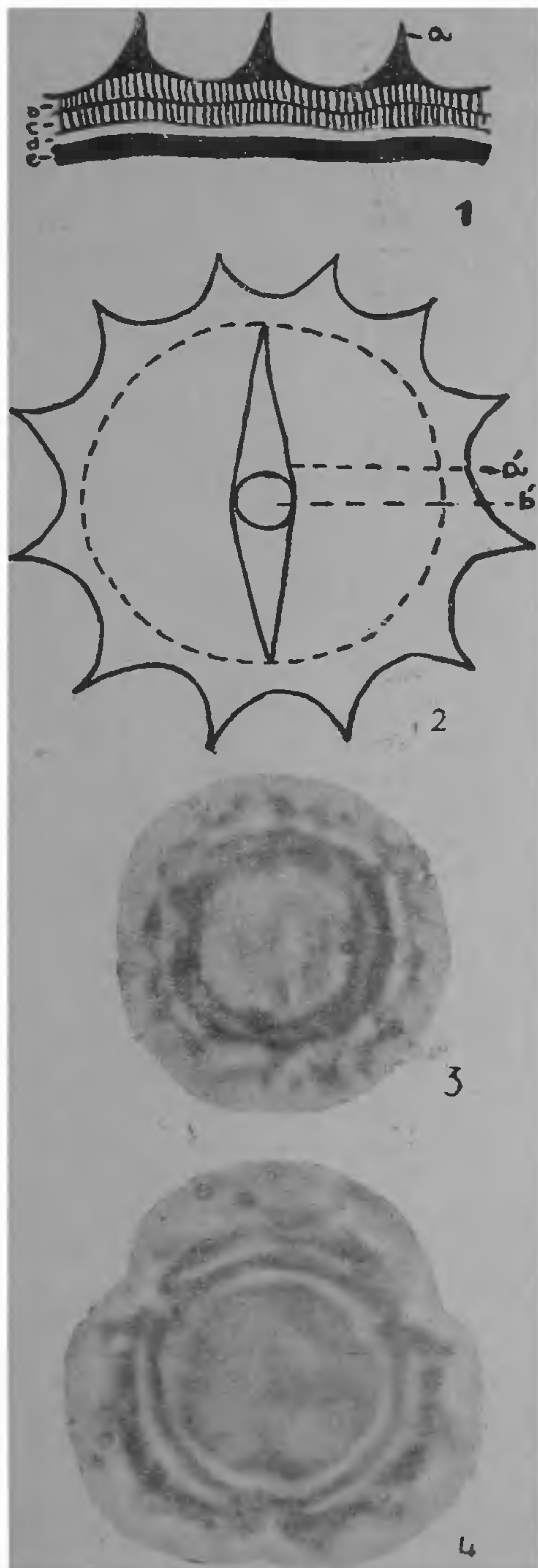
Pollen diagnosis of P. hysterophorus Linn.
(Figs. 1-4)

Pollen grains 3-colporate (peritreme), oblatespheroidal ($16 \times 17 \mu$). Apocolpium diameter about 3.5μ . Colpi ($10 \times 2 \mu$) tenuimarginate, with tapering ends, membrane smooth.

Ora circular (diameter about 2μ). Exine (spinules included) about 4.4μ thick. Sexine about 3μ thick, pectectate suprategillate, provided with pointed spinules. Tegillum undulating, differentiated into supra and infrategillar layers, each less than 0.5μ high, supporting the tegillum of each layer. Spinules about 2μ high with pointed solid apices, base about 2.2μ wide made up of slender rod like elements. Nexine as it seems, consists of a homogeneous layer, inner margin smooth. There appears to be a thin distinct region about less than 0.5μ wide between the baculate layer and the nexine.

Discussion and Summary.—The family Compositae is referred to as a Eurypalynous family because of the great variety of pollen types found in its members. As far as pollen morphology of *P. hysterophorus* is concerned, except Wodehouse's¹⁰ casual reference, no detailed description is available in the literature surveyed so far. Taking into consideration the pollen characters, Wodehouse^{10,11} supports the view expressed by Bentham and Hooker (1873) who state that phylogenetically Ambrosieae (ragweed tribe) shows a close relationship with the tribe Helianthae through Melampodinae, a sub tribe of Helianthae including *Parthenium* and *Parthenice*.

Considering the views expressed by Wodehouse and our observations of the pollen morphology of *P. hysterophorus* in which the grains are typically 3-colporate, oblatespheroidal, spinulose, a characteristic feature of the majority of the members of Helianthae (Sunflower tribe) and the *Ambrosieae*, it can be concluded that the tribes Helianthae and



FIGS. 1-4. Pollen grains of *Parthenium hysterophorus* Linn. Fig. 1. Diagrammatic representation of the exine stratification; (a) Spinule, (b) supporting bacula of the suprategillum, (c) supporting bacula of infrategillum, (d) thin region inbetween the baculate layer and the nexine, (e) nexine. Fig. 2. Diagrammatic representation of the pollen

grain in equatorial view showing the colporate aperture *a'*, Colpus; *b'*, Pore. Fig. 3. Photomicrograph of the equatorial view showing the aperture and the spinules, $\times 2125$. Fig. 4. Photomicrograph of the polar view, $\times 2,687$.

Ambrosieae are closely related through Melampodinae including *Parthenice* and *Parthenium*.

Similarly the presence of a thin distinct region inbetween the nexine and the baculate layer as shown by Raj⁶ in the pollen grains of *Helianthus annuus* Linn. is also noticed by us in the pollen grains of *P. hysterophorus*. Wodehouse¹⁰ while comparing the grains of *Parthenice mollis* and *Parthenium* states that they are tricolpate with long furrows reaching almost from pole to pole. However, in the illustration of *Parthenice mollis* given by him, a clear colporate condition is seen.

The present investigation has brought forth a clear idea of the pollen morphology of the weed *P. hysterophorus*, which according to Shivpuri and Kartar Singh⁷ is known to cause skin allergies. However, further work is needed to find out the representation of pollen grains of *P. hysterophorus* in the atmosphere and the different types of allergies caused by them. It is planned to undertake the abovementioned work in the second phase of our research project.

We are thankful to the C.S.I.R., New Delhi, for the award of a Senior Research Fellowship to the Junior author of this paper. We are also thankful to Prof. M. Nagaraj, Head of the Department of Botany, Central College, Bangalore University, Bangalore, for providing facilities to work out the present research project.

1. Chandras, G. S. and Vartak, V. D., *Pans*, 1970, 16, 212.
2. Erdtman, G., *Pollen Morphology and Plant Taxonomy. Angiosperms*, 1952, Stockholm and Waltham, Mass, U.S.A.
3. Erdtman, G., *Sv. Bot Tidskr.*, 1960, 54, 561.
4. Jayachandra, *Curr. Sci.*, 1971, 40 (21), 568.
5. Kartar Singh and Shivpuri, *Ind. J. Med. Res.*, 1971, 59, 1397.
6. Raj, B., *Jour. of Os. Univ. Sci.*, 1965, Vol. 1, 1, 2.
7. Shivpuri, D. N. and Kartar Singh, *Ind. J. Med. Res.*, 1971, 59, 1411.
8. Vaid, K. M. and Naithani, H. B., *Indian Forester*, 1970, 96, 791.
9. Vartak, V. D. *Indian Fmg.*, 1968, 18, 23.
10. Wodehouse, R. P., *Pollen Grains*, New York and London, 1935.
11. —, *Hay Fever Plants*, New York, 1971.