

## POLLEN OF THE GENUS *KNEMA*\* (MYRISTICACEAE)

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### Abstract

Pollen grains of eight species of the genus *Knema* were studied. Morphologically the pollen grains of this genus are alike. They are medium sized, monosulcate with a reticulate exine.

### Introduction

*Knema* is the third largest genus among the Asian Myristicaceae with 37 species (Sinclair, 1961). The Myristicaceae is a medium sized tropical family with 400 species. The pollen morphology among the angiosperms often furnishes data of considerable taxonomic value, both as to the classification of smaller groups within the family and relationship of family to each other. Wodehouse (1935), Bailey (1949), Erdtman (1952) and Canright (1963) have emphasized the use of palynological data in taxonomic and phylogenetic studies. Apart from the report of Canright (1963) on the pollen of Myristicaceae (which include one species of the genus *Knema*), the pollen of the genus *Knema* has not been investigated.

### Materials and Methods

Pollen specimens of the various species of the genus *Knema* present in the Botany Department of the Miami University, Oxford, Ohio, U.S.A., were used in this study (Table 1). Some specimens were taken from the herbarium sheets while the others were taken from preserved material. Anther lobes were removed from the male flowers and acetolyzed according to the method described by Erdtman (1960). Boiling the pollen grains in 10% KOH for a short period of time before acetolysis helped to restore the grains. Half of the pollen grains were bleached with glacial acetic acid-sodium chlorate-hydrochloric acid solution. The pollen grains were mounted in Sæss glycerine jelly (Brown, 1960) to which 1% aqueous safranin had been added. Some pollen slides were made by crushing the anthers in a drop of Hoyers solution. A minimum of 25 grains were measured for each sample. All measurements were taken from acetolyzed grains. The terminology used here is that suggested by Erdtman (1952).

### Observations

*Knema* pollen grains are sub-prolate (Figure 1, B-C), few are prolate spheroidal (Table 2). In polar view they are circular or semiangular (Figure, 1, B-C). The

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TABLE I. Pollen specimens of *Knema* spp. examined.

Name	Locality	Collector and/or source
<i>K. glomerata</i>	Phillipines	McGregor, 245, US
	Phillipines	Loher, 6714, US
	Phillipines	Elmer, 8957, US
	Phillipines	Ramos, 17590, US
	Phillipines	Reilo, 15421, US
	Phillipines	Conkin, 17441, US
<i>K. korthalsii</i>	Phillipines	Agama, 21605, US
	Borneo	Gibbes, 2803, US
<i>K. latericia</i>	Singapore	Canright, 192
	Singapore	Canright, 928
	Singapore	Canright, 950
	Singapore	Jacobs, 5356, US
	Singapore	Jacobs, 5393, US
<i>K. intermedia</i>	Singapore	Canright, 187
	Singapore	Canright, 198
	Singapore	Canright, 1008
	Sumatra	King, 6146, US
	Sumatra	Beccca, 6887, US
<i>X. laurina</i>	Singapore	Canright, 194
	Singapore	Canright, 200
	Singapore	Canright, 937
	Bogor	Sinclair, 420, US
	Malaya	Kochomman 99355, US
<i>K. communis</i>	Malaya	Canright, 1134, US
<i>K. tomentella</i>	Phillipines	Robinson, 238, US
	Java	Canright, 843
<i>Knema</i> sp.		SAN, 205
		SAN, 206

pollen grains are medium sized (Table 2). The average size of all the specimens examined was 27.3µm (P) X 22.6 µm (E). The largest grains were found in *K. tomentella* (42 µm). In acetolyzed grains there is no opercula or intine. The exine is tectate, the ectexine is thicker than endexine. The sculpturing of the exine is reticulate or pitted (Figure 1, A). The pollen grains are monosulcate with a single elongated furrow (Figure 1, B-C). The furrow runs about the whole length of the grain. In some grains the furrow is very well marked while in others it is only faintly visible. The ectexine at the margin of the aperture is fragmented in many grains (Figure 1.B). A well defined annulus is absent.

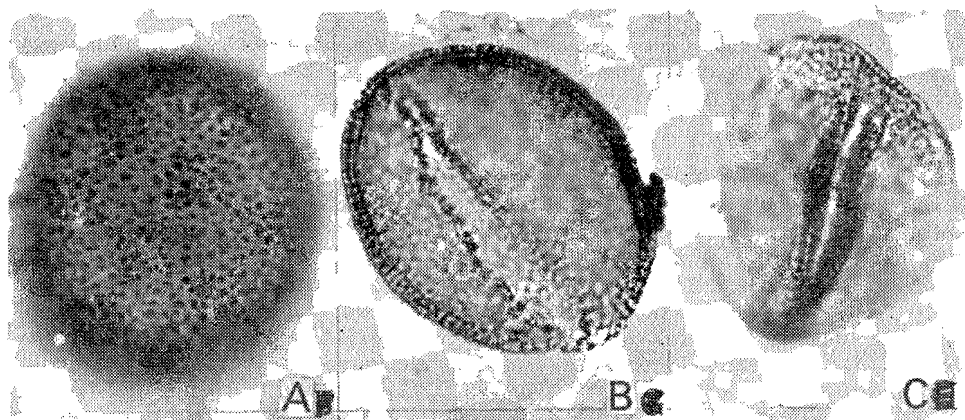


Fig. 1. Photographs showing the pollen characteristics.

- A. *K. intermedia*. Polar view of the pollen grain showing exine characteristics. X1700.  
 B. *K. latericia*. Equatorial view of the pollen grains showing the germinal aperture. X1600.  
 C. *K. tomentella*. Equatorial view showing the elongated furrow. X2000.

TABLE 2. Measurements of Pollen Grains of *Knema*.

Species of <i>Knema</i>	Polar axis mean $\mu\text{m}$	Equatorial axis mean $\mu\text{m}$	100 X P/E	Erdtman's shape classes
<i>K. glomerata</i>	29.3	22.2	131.9	Subprolate
<i>K. korthalsii</i>	24.6	21.4	114.9	Subprolate
<i>K. latericia</i>	30.4	24.3	125.1	Subprolate
<i>K. intermedia</i>	24.0	21.1	113.7	Proplate spheroidal
<i>K. laurina</i>	25.5	22.8	111.8	Prolate spheroidal
<i>K. communis</i>	24.7	21.1	117.0	Subprolate
<i>K. tomentella</i>	33.8	27.6	122.8	Subprolate
<i>K. Spp.</i>	26.3	20.2	130.1	Subprolate

\*All shape and size classes are of Erdtman (1952) p. 16-18.

### Discussion

The pollen grains of the various species of the genus *Knema* exhibit similarities in the type of aperture and exine sculpturing. They are all monosulcate and have reticulate or pitted exine. There are, however, some differences in the size of the grains.

Canright (1963) studied the pollen grains of some of the Myristicaceae, and described the pollen as spheroidal to oblate, monosulcate with a reticulate exine. In *Myristica* he found a ragged sulcoidal structure which was not found in any species of the genus *Knema*. Wodehouse (1937) studied the pollen of the American Myristicaceae. Here the pollens are 21-40  $\mu$ m long, with a single furrow and reticulate exine. Joshi (1946) studied the development of the pollen grains of *Myristica fragrans* and found it to be monosulcate. The above description of the pollens of various genera of Myristicaceae show that they resemble one another in germinal aperture and exine sculpturing.

The monosulcate type of pollen grains found in the various genera of Myristicaceae is also found in other primitive families with Ranalian affinities. On the basis of the structure of the pollen in Myristicaceae, many authors have tried to show the relationship of Myristicaceae with other Ranalian families. Wodehouse (1937) found similarities between the pollen grains of Myristicaceae and the pollen of Lauraceae. Canright (1963) found a relationship between pollen of Myristicaceae and Annonaceae. In the Canellaceae, Wilson (1964) found the pollen grains to be monosulcate with a well defined furrow. There is a striking similarity between the pollen grains of *Knema* and those of the Canellaceae. Trichotomosulcate pollen grains found in the Canellaceae were not observed in this genus.

The constancy of pollen characters in the species of *Knema* examined does not support the grouping of the species into groups or sections proposed by Sinclair (1961). This conclusion will be examined in subsequent papers using evidence from other parts of the plants of the genus *Knema*.

### References

- Bailey, I.W. 1949. Origin of the angiosperms: Need of a broadened outlook. *J. Arnold Arb.*, **30**: 64-70.
- Brown, C.A. 1950. *Palynologica techniques*. Louisiana State University, Baton Rouge, Louisiana.
- Canright, J.E. 1963. Contribution of pollen morphology to the phylogeny of some Ranalian families. *Grana Palynologica*, **4**: 64-72.
- Erdtman G. 1952. Pollen morphology and plant taxonomy, an introduction to palynology. I. Angiosperms. Chronica Botanica Company. Waltham, Massachusetts.
- . 1960. The acetolysis method. A revised description. *Sevensk. Bot. Tidskr.*, **54**: 561-564.
- Joshi, A.C. 1946. A note on the development of pollen of *Myristica fragrans* and the affinities of the family Myristicaceae. *J. Indian Bot. Soc.*, **25**: 139-143.
- Sinclair, J. 1961. The genus *Knema* (Myristicaceae) in Malaysia and outside Malaysia. *Garden Bulletin, Singapore*, **18**: 102-308.
- Wilson, T.K. 1964. The comparative morphology of the Canellaceae. III. Pollen. *Bot. Gaz.*, **125**: 192-197.
- Wodehouse, R.P. 1935. *Pollen grains*. McGraw-Hill, New York.
- . 1937. Pollen. In: Smith, A.C. *The American Myristicaceae*. *Brittonia*, **2**: 397-401.