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PALYNOLOGICAL STUDIES OF SOME GENERA FROM BRASSICACEAE

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ABSTRACT

Pollen morphology of 11 genera belonging to the family Brassicaceae was studied by light microscope. The pollen grains are 3-4 colpate. The shape of pollens are prolate, spheroidal to prolate or subprolate, exine of the pollen grains generally reticulate-granulate.

Key words: Palynological study, pollen garains, Brassicaceae

INTRODUCTION

Brassicaceae is a large family comprising of 3000 species distributed in 350 genera in temperate part of the world with maximum diversity in Mediterranean region which has served as point of origin of weeds and cultigens of the family. In Pakistan, 92 genera and 250 species are reported (Jafri, 1973). The Brassicaceae also include many important forage crops such as *B. campesteris, B. napus, B. oleracea*. This family is the source of oil seed (Collza, Oil seed rape) and fodder crops in addition to ornamentals such as Cherianthus (wallflower), *Labularia maritime* (sweat alysson) and *Hesperis* (rocket). Heywood (1978); Keil and Walters (1988); Chiguriaeva (1973), examined the pollen morphology of the family Brassicaceae in relation to taxonomy. Javed and Naqshi (1975) also utilized pollen data in the classification of the family Brassicaceae. Lahham and Al-Essawi (1987) examined the pollen morphology of the family Brassicaceae from Jordan. Pollen morphology of the family Brassicaceae has been examined by Erdtman (1963); Sharma and Nair (1973) and Carter *et al.*, (1975) and Khan (2003, 2004) examined pollen morphology of the genus *Allyssum*, *Arabidopsis* and *Thlaspi* Moore and Webb (1978). Present investigation is based on the pollen morphology of 12 taxa representing 11 genera of the family Brassicaceae by light microscope.

MATERIALS AND METHOD

Pollen samples were obtained from Karachi University Herbarium (KUH) or collected from the field Jamshoro, Sindh. The list of voucher specimen is deposited in (KUH). The pollen grains were prepared for light microscope (LM) by the standard methods in unstained glycerine jelly and observation were made with a Nikon type-2 microscope, under E-40 and oil immersion (E-100, 1.25) using 10 x eye piece.

The measurements are based on 15-20 readings from each specimen. Pollen diameter, polar axis (p) and equatorial diameter (E), aperture size, apocolpium, mesocolpium in diameter and exine thickness were measured. The terminology used for pollen description has been borrowed from Erdtman (1952), Faegri and Iversen (1964), Kremp (1965), Clark (1977); Walker and Doyle (1975).

General pollen description

1. *Clypeola* Linn. (Fig. 1A-D)

Pollen grains, subangular, oblate spheriodal to subprolate, small size, polar axis 16-17 μm, equatorial diameter 16-24 μm, mesocolpia 16.5-22 μm in diameter, 3-colpate, colpi 16.5 x 1.1 μm long, exine 2.2-4.4 μm thicks semitected reticulate, tenuimarginate, sexine much thicker than nexine.

Species included: *C. aspera* (Grauer) Turrill *C. jonthlaspi* Linn.

Key to the species

1 + Pollen grains subprolate ..... *Clypeola aspera*
- Pollen grains oblate spheroidal ..... *Clypeola jonthlaspi*

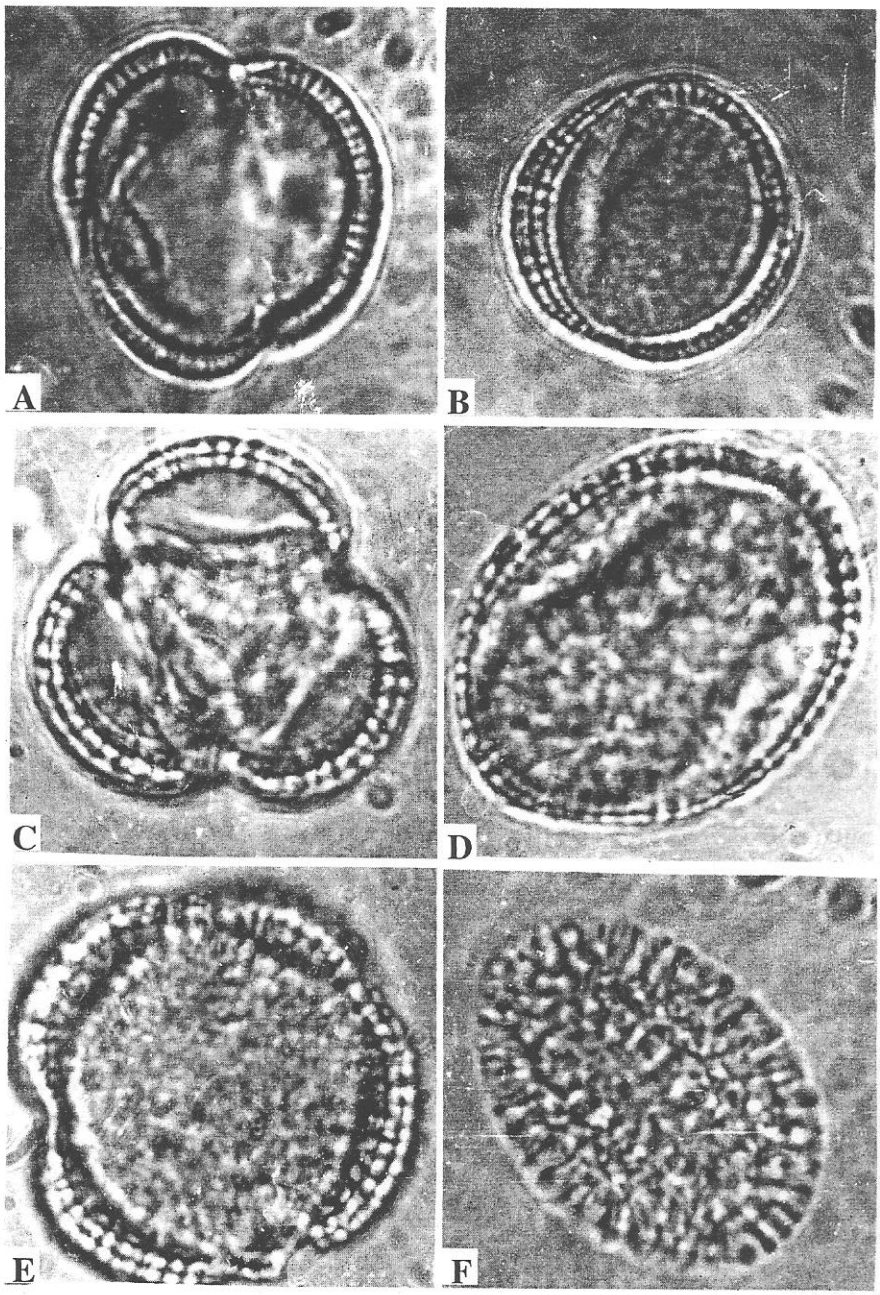

Fig. 1. Light micrograph of the pollens of *Clypeola aspera*. A. Polar view, B. Equatorial view, *C. jonthlaspi*, C. Polar view, D. Equatorial view, *Dilophia salsa*. E. Polar view, F. Equatorial view.

2. *Dilophia* Thoms (Fig. 1E-F)

Pollen grains, inter-subangular, subprolate, medium size, polar axis 24(31)28 μm, equatorial diameter 20(29)31 μm, mesocolpia 16 μm in diameter. 3-4 colpate, colpi 15.5 x 2.2 μm exine 2.2-3.3 μm thick, tectum reticulate sexine much thicker then nexine.

Species included: *Dilophia salsa* Thoms

3. *Drabopsis* Koch. (Fig. 2A-B)

Pollen grains inter-subangular, isopolar, prolate, rather small. Polar axis 25(28)30 μm, equatorial diameter 17(18)19 μm, mesocolpia 14.3 μm, apocolpia absent, 3-colpate syncolpate, colpi 24.2 x 2.2 μm long, exine 3.3 μm thick, tectum reticulate, sexine more or less as thick as nexine.

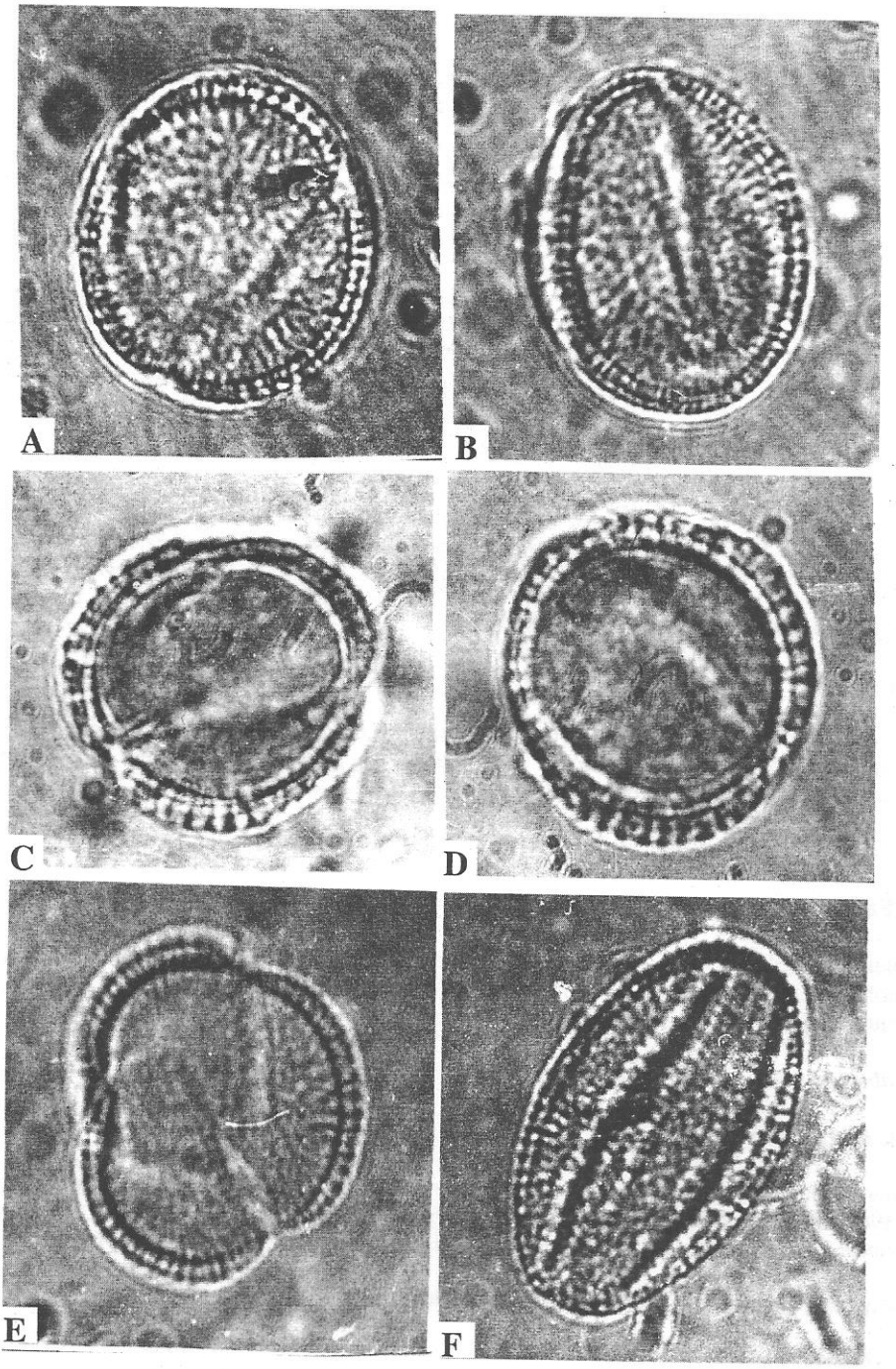

Fig. 2. Light micrograph of the pollens of *Drabopsis verna*. A. Polar view, B. Equatorial view, *Fortuynia bungei*, C. Polar view, D. Equatorial view, *Hymenolobus prochmbins*. E. Polar view, F. Equatorial view.

Species included: *Drabopsis verna* Koch

4. *Fortuynia* Shuttle (Fig. 2C-D)

Pollen grains, inter-subangular spheriodal small size, polar axis 24(25)27 μm equatorial diameter 21(22)23 μm, mesocolpia 20 μm in diameter, 3-colpate, colpi 19.6 x 2.2 μm long, exine 1.1-3.3 μm, tectum reticulate, sexine more less as thick as nexine.

Species included: *Fortuynia bungei* Boiss

5. *Hymenolobus* Nutt. ex. Torr. & Gray (Fig. 2E-F)

Pollen grains inter-subangular subprolate, small size, polar axis 20(28)24 μm, equatorial diameter 16(17)18 μm, mesocolpia 13.4 μm in diameter. 3-colpate, colpi 14.3 x 2.2 μm long, exine 1.5-2.2 μm, tectum reticulate, semitected.

Species included: *Hymenolobus procumbens* (L.) Nutt. ex. Schutz.

6. *Hesperis* Linn. (Fig. 3A-B)

Pollen grains inter-subangular subprolate, small size, polar axis 17(18)20 μm, equatorial in diameter 11(18)20 μm, mesocolpia 15.4 μm in diameter, apocolpia 3.3 μm, 3-colpate, colpi 14.3 x 1.1 μm long, exine 1.1-3.3 μm, tectum reticulate, sexine more or less as thick a nexine.

Species included: *Hesperis matronalis* Linn.

7. *Lignariella* Baehni. (Fig. 3C-D)

Pollen grains subangular, isopolar, prolate, medium size, polar axis 37(40)44 μm, equatorial diameter 23(24)25 μm, mesocolpia 22 μm in diameter apocolpia absent. 3-colpate, colpi 29 x 2.2 μm long, exine 3.3-4.4 μm thick, tectum reticulate, sexine more or less as thick a nexine.

Species included: *Lignariella obscura* (Dunn) Jafri

8. *Leptaleum* DC (Fig. 3E-F)

Pollen grains inter-subangular, prolate speriodal to prolate, small size, polar axis 19(20)21 μm, equatorial diameter 17(18)20 μm, mesocolpia 12.1 μm in diameter apocolpia 2.2 μm in diameter. 3-colpate, colpi 17 x 1.1 μm long, exine 2.2 μm, thick, tectum granulated, sexine more or less as thick as nexine.

Species included: *Leptaleum filifolum* (Wild.) DC.

9. *Lobularia* Linn. (Fig. 4A-B)

Pollen grains inter-subangular prolate, isopolar, small size, polar axis 17.6(20)22 μm, equatorial diameter 11(14)17 μm, mesocolpia 11 μm in diameter apocolpia absent. 3-colpate, colpi 10 x 1.1 μm long, exine 3.3 μm thick, semitected, tectum reticulate, sexine much thicker than nexine.

Species included: *Labularia maritima* (L.) Desv.

10. *Megacarpaea* DC (Fig. 4C-D)

Pollen grains inter-subangular isopolar, circular, prolate spheriodal, medium size, polar axis 13(35)40 μm, equatorial diameter 19(29)36 μm, mesocolpia 21 μm in diameter apocolpia 2.2 μm in diameter. 3-colpate, colpi 25 x 2.2 μm long, exine 2.2-4.4 μm thick, crassimarginate, tectum reticulate, sexine much thicker than nexine.

Species included: *Magacurpaea polyandira* (Benth.) Meniocus Desv.

11. *Moricandia* DC. (Fig. 4E-F)

Pollen grains isopolar, circular, prolate spheriodal, small size, polar axis 19(19)20 μm, equatorial diameter 17(18)19 μm, mesocolpia 13.2 μm in diameter apocolpia 5.5 μm in diameter. 3-colpate, colpi 16 x 2.2 μm long, exine 1.1-3.3 μm thick, semitected, tectum reticulate, tenuimarginate, sexine more or less as thick a nexine.

Species included: *Moricandia sinaica* (Boiss) Boiss.

Comments

Apple Al-Shehbez (2002); Khalick (2002) and Perveen *et al*., (2004) have described the pollen morphology of different genera of the Brassicaceae. Erdtman (1966) also has described pollen of the about 35 genera of the family, suggesting that the Brassicaceae is stenopalynous family. Erdtman (1963) divided the species of Brassicaceae into two groups on the basis of exine thickness.

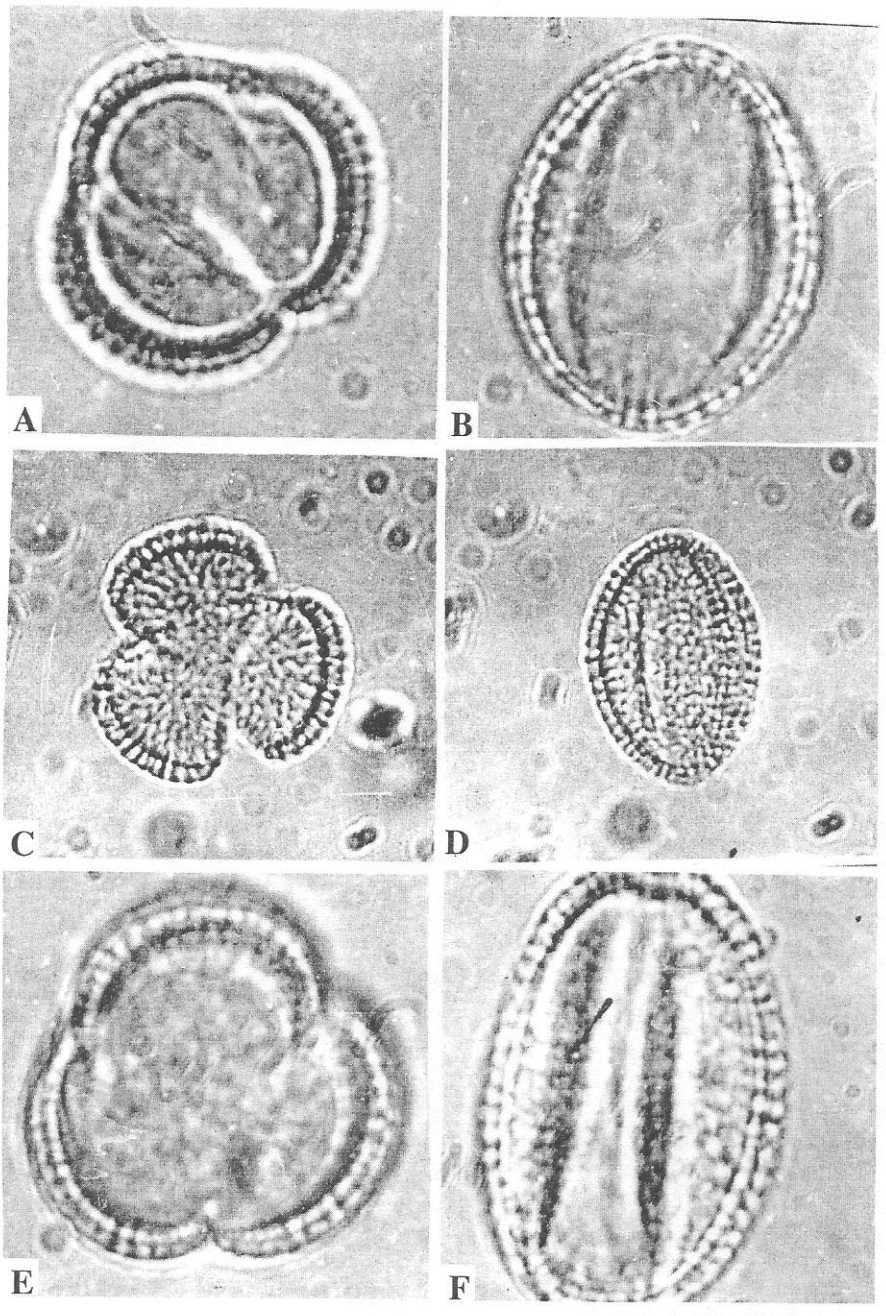

Fig. 3. Light micrograph of the pollens of *Lobularia maritima*. A. Polar view, B. Equatorial view, *Megacarpaea polyandira*, C. Polar view, D. Equatorial view, *Moricandia sinaica*. E. Polar view, F. Equatorial view.

Comments

Brassicaceae is stenopalynous family (Perveen *et al.*, 2004). Pollen grains are generally prolate to subprolate or prolate spheriodal rarely oblate spheriodal. 3-colpate often 4-8 colpate and 10-colpate in few genera. Appal and Al-Shehbaz (2003) also reported tricolpate reticulate pollen in the family Brassicaceae, Erdtman (1963) divided the species of Brassicaceae into two pollen types on the bases of exine thickness. Moore and Webb (1987) reported and classified the family in tricolpate with reticulate pollen. Khalik (2002) divided the family into three pollen types. However in this family 3-4 colpate syncolpate pollen grains are common (Khan, 2003, 2004).

The present investigation is based on 13 species and 11 genera. Pollen grains are generally isopolar, 3-4-colpate reticulate tectum show considerable variation in number of aperture and shape of pollen. However on the basis of number of aperture, two distinct types of pollen type and recognized. On as 3-colpate and 4-colpate aperture types.

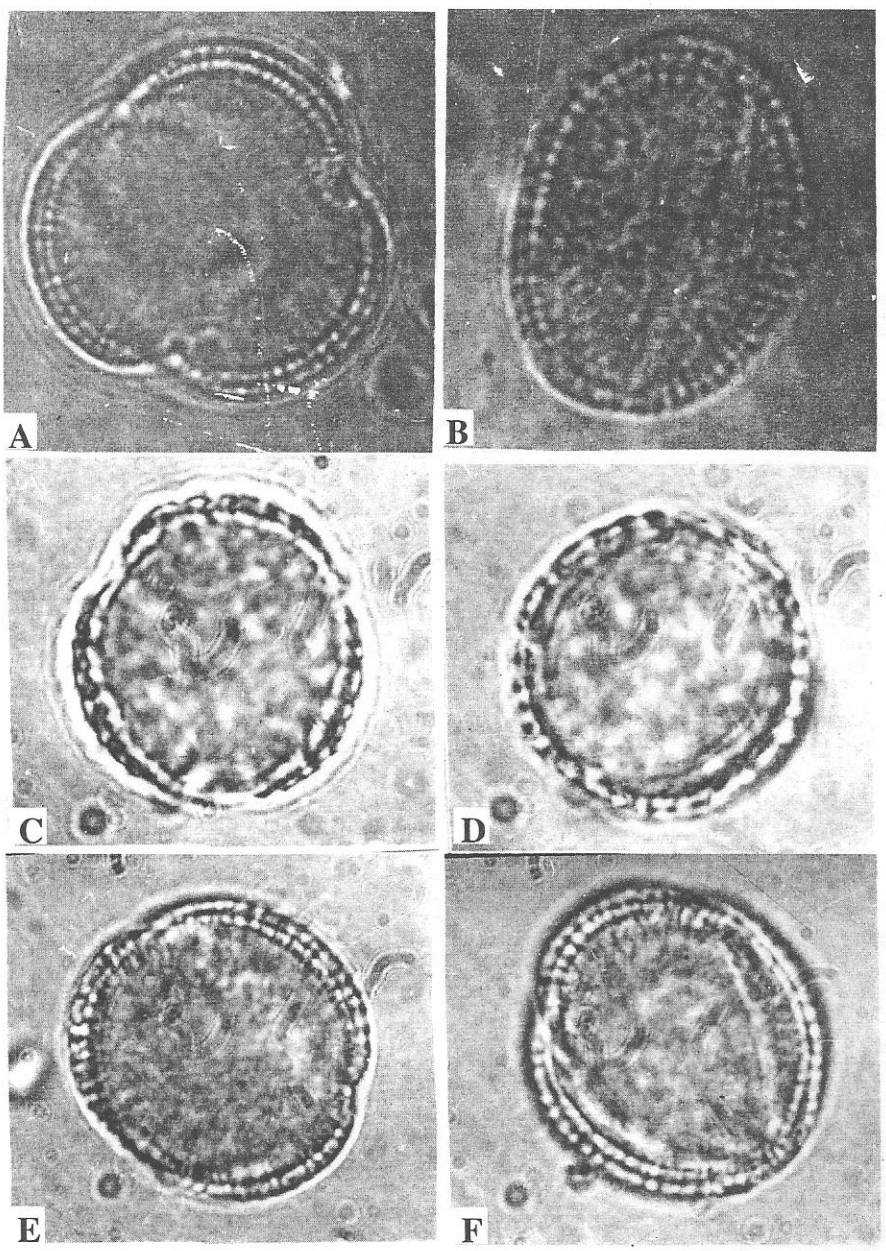

Fig. 4. Light micrograph of the pollens of *Hesperis matronalis*. A. Polar view, B. Equatorial view, *Lignariella obssura*, C. Polar view, D. Equatorial view, *Lepateum filifolium*. E. Polar view, F. Equatorial view.

Type I pollen is easily distinguished by having the 4-colpate. Two genera are included in this type *Dilophia salsa. Drabopsis*, *Verna* each representing single species (see to the generic description). The type-II 9 genera are included *Clypeola* aspera *C. jonthlaspi, Fortuynia bungei, Hymenolobus procumbens, Hesperis matronalis, Lobularia maritima, Megaearpaea Polyandra, Leptaleum filifolium, Lignariella, Moricandia sinica*, which have 3-colpate pollen grains.

These genera are further delimited into three group. Group-A: have three genera, *Draopsis verna, Lobulania monitima, Lignariella obscura*, each representing single species (see to the generic description) which having prolate shape pollen. The group-B: includes 4 genera *Moricandia sinaica, Megacarpea polyandra, Lepetalum filifolium Fortuynia bungei* by having prolate spheroidal pollen shape, while the rest of four genera included III group whereas *Hesperis matronalis, Dilophia salsa, Hymenolobus procambens, Clypeola jonthlaspi* having subprolate pollen shape.

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