

at 2°S extends up to 140 m and its temperature is below 24°C. On an annual cycle the deepest surface mixed layer in the study area⁴ is 80 m with surface temperature well above 25°C. Hence this layer in the thermocline is unlikely to be generated by intense heating of a deep mixed layer followed by mixing in the top column. The unusually large thickness of layer *c* and its presence in a relatively large area suggest that the observed features might not have resulted from double diffusion (the superposition of warmer and saltier water over colder and less saltier water leads to the formation of layers due to differential molecular diffusion of heat and salt) or internal wave breaking as the layers formed due to these mechanisms are usually small (not exceeding 26 m¹). The layering of thermocline in the western equatorial Indian Ocean appears to have been by advective layering, which is one of the least studied phenomena in the sea¹.

Very few subsurface current measurements are available for the western equatorial Indian Ocean for this observational period. Measurements along 55°E in August 1963 revealed a subsurface eastward core beneath a westward⁵ flow near 2°S. However, in June 1975 and 1976 the surface flow was also easterly with a persisting eastward core⁶. Climatological surface current charts show an eastward flow⁷ but synoptic scale meanders are common in this area⁵. Although it is difficult to infer the nature of surface and subsurface currents with the present data, the unusually thick layer *c* in the thermocline suggest currents moving in opposite directions in the upper 150 m water column. Layering in the thermocline due to advection is postulated² and subsequently verified from observations. Federov¹ observed that the isothermal steps in the thermocline coincide with maximum values of vertical current shear in a depth slab where currents move in opposite directions. The hydrodynamic instability caused by large vertical shears leads to the creation of mixed layers. Thus layers in the thermocline might have been generated by currents moving in opposite directions and resulting strong vertical shears.

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DISTRIBUTION OF POTASSIUM AND CHLORIDE IONS DURING POLLEN-PISTIL INTERACTION IN MAIZE

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MANY aspects of the function of mineral ions in the pollen-pistil interaction of higher plants remain to be elucidated. There is a well-proven requirement of boron and calcium ions for pollen germination and tube growth of many species¹. Heslop-Harrison² showed by cytochemical techniques and energy dispersive X-ray analysis that the stigmas of grasses contain a small quantity of calcium but are rich in potassium. The most likely function of potassium in the stigma is a major component of the osmoticum which maintains turgidity of the stigma over the period of flower opening. The accumulation of potassium and chloride could contribute about 60% of the osmolarity of the expressed sap from mature, turgid stigmas of the grass *Pennisetum americanum* L. (Leeke)³. However, the distribution of these ions in different zones of the pistil following pollination has not been studied. In the present communication, this aspect was investigated during pollen-pistil interaction in maize.

Unpollinated and pollinated silks were harvested as required from plants of the field-grown maize, *Zea mays* L. cv. J 1034. Potassium and chloride ions were located histochemically^{4,5}. The observations were made on pollen, unpollinated silks and on three regions of the pollinated silks, viz. apical, middle and the basal.

*The mature pollen grains of maize showed an intense histochemical reaction for potassium distributed uniformly throughout the cytoplasm and the

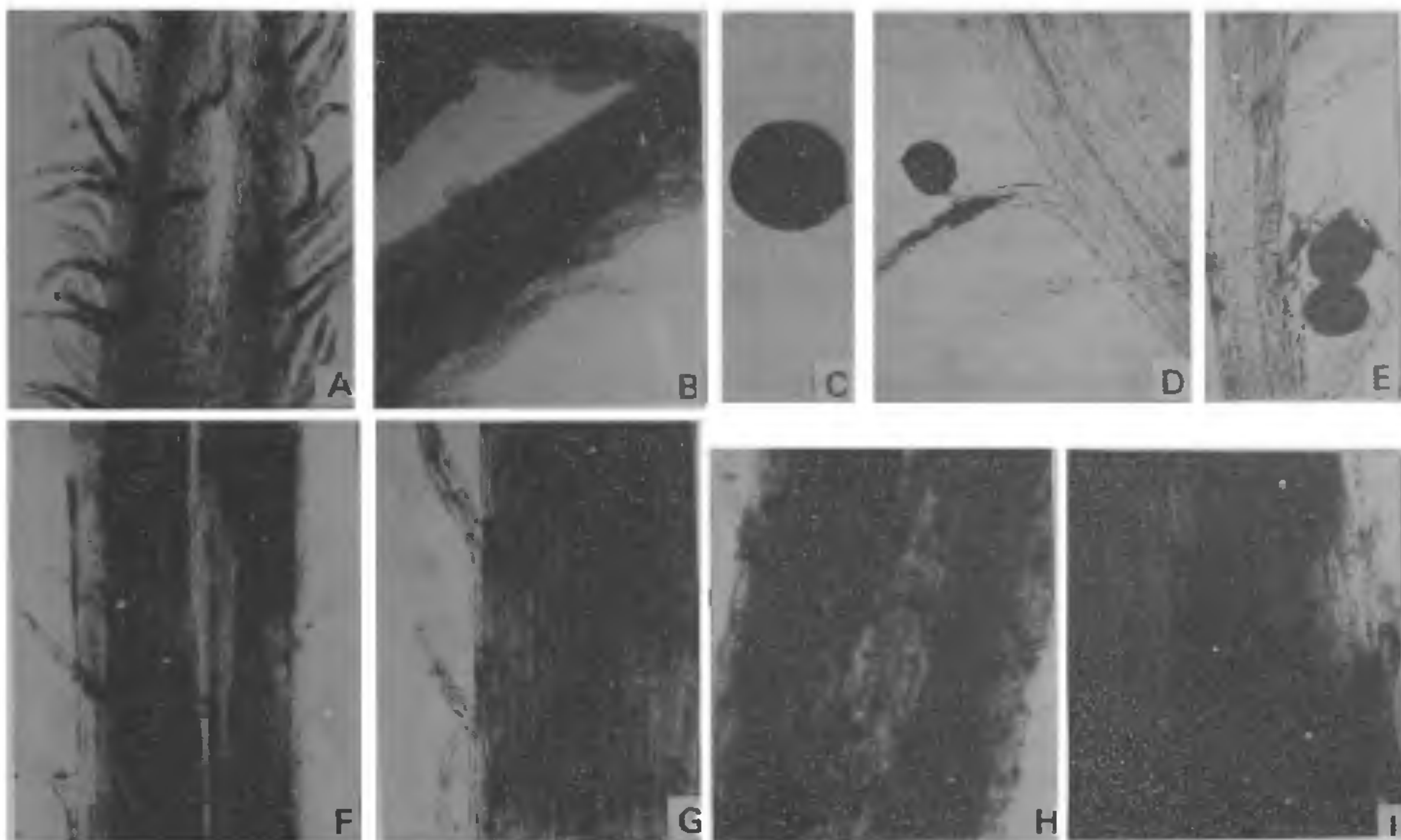


Figure 1A-I. Distribution of potassium and chloride ions in the pollen and silk of maize. A, B. Unpollinated stigmatic tissues showing localization of potassium A, and chloride B, C. Maize pollen showing an intense reaction for potassium, D, E. Upon pollination, the germinating pollen leak out some of the potassium while the silks show no accumulation. F, G, H, I. The middle and the basal portions of the pollinated silks show a gradient of increasing concentration of potassium F, H and chloride G, I, respectively.

wall (figure 1C). Keeping in view the comparatively high moisture content of maize pollen at the time of release from anthers, it is likely that high concentrations of potassium inhibit the metabolic processes necessary for germination.

The pollen-receiving trichomes as well as transmitting tracts of unpollinated maize silks were also rich in potassium and chloride (figure 1A, B). Similar observations have been made earlier in the stigmatic cells of grasses^{2,3}. In nature the maize silks are exerted into a quite desiccating atmosphere during the pollen capture and thus a large accumulation of potassium and chloride could play an important part in maintaining the turgidity of receptive trichomes by osmotic adjustment. Once pollination has taken place, the turgidity of these trichomes is lost and the cells in the vicinity of pollinated trichomes and along the pollen tube pathway show no accumulation of potassium and chloride (figure 1D, E), which diffuse down the style establishing a gradient of increasing concentration (figure 1F-I). Thus, a strong tip-to-base ionic gradient of potassium and chloride is established

ahead of pollen tubes in maize silks and this gradient may be a guiding mechanism for the growth of pollen tubes towards the ovary.

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