observed and there is an increase in the number of polyploid cells accompanied by changes in the physiological patterns of the cell, it is felt that such changes could be well exploited in following up the differentiating pattern of these polyploid cells in culture, so as to obtain better variation and desirable characters.

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NON-SELECTIVE INHIBITION OF POLLEN GERMINATION BY STIGMATIC EXUDATES OF *CHLOROPHYTUM* AND *DIPCADI* SPECIES (LILIACEAE)

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FERRARI and Wallace[1] suggested that water soluble substances in the stigmatic fluid of cabbage selectively inhibited self but not cross pollen. Other reports[2] also indicated the involvement of stigmatic surface compounds in the suppression of germination of self pollen. By contrast, stigmatic exudates of three members of Liliaceae we examined were characterised by indiscriminate inhibition, *i.e.* inhibition of self, cross and alien pollen. The nature of the inhibitory components of the stigmatic exudates of these plants was studied by chromatography and spectrophotometry and a summary of the preliminary results is presented in this report.

Stigmas of two species of *Chlorophytum*, *C. malabaricum* and *C. elatum variegatum* and an yet unidentified species of *Dipcadi* do not support germination of pollen from any source. In addition, stigmatic exudates or even 20 sec extracts of the stigmas of these species can induce *in vitro* and *in vivo* inhibition of development of otherwise normal pollen.

Induction of *in vitro* inhibition was tested on the pollens of four fertile species of *Chlorophytum* tabulated in table 1. In standard 10% sucrose culture solutions of Brewbaker and Kwack[3], pollen grains of all these fertile species recorded a germination rate of around 90%. Stigmatic extracts or exudates of the sterile species, when added to the culture solution in the ratio of 1:1, reduced the pollen germination of various fertile species examined here by a margin of 40–50%.

Table 1 *Inhibitory effects of stigmatic exudates of sterile* C. *malabaricum on in vivo germination of viable pollen of different species of Chlorophytum.*

Species	% of germination Control*	Trial*	% of inhibition
C. heyneanum	61.7	40.5	21.2
C. tuberosum	68.1	50.3	17.8
C. elatum	65 3	48.3	17.0
C. attenuatum	61.6	42.9	18.7

* Average of counts from ten stigmas.

These *in vitro* studies were supplemented by tests on the effect of exudates of sterile species, especially of *C. malabaricum*, on pollen inhibition *in vivo*. The stigmas of the fertile *C. heyneanum* were suitable for these tests since they supported pollen germination of all related species although intraspecific pollinations rarely led to fruit set. Fertile *C. heyneanum* stigmas were treated as follows. Forty stigmas of this species were dipped in the exudates of sterile *C. malabaricum* for 1 hr. Pollen grains of the four fertile species listed in table 1 were separately collected and pollens of each species were dusted on to ten of these treated stigmas. Normal *in vivo* germination was only around 60% and treated stigmas of four species showed a reduction in the range of 17–21%. Considering that the natural variation in

in vivo germination is only of the order of 1 % the level of inhibition recorded on treated stigmas is significant. The results are summarised in table 1.

The exudates were analysed to determine the chemical nature of the inhibitory components. Two-way chromatography revealed that the stigmatic exudates of the sterile species were characterised by two spots not present in the chromatograms of the fertile species. Responses of these unique spots to various location reagents indicated that they were flavonoids. When eluates of these spots were substituted for the exudates, they induced suppression of pollen germination nearly equal to that of the exudates themselves both *in vivo* and *in vitro*. Spectrophotometric profiles of the eluates revealed bands I and II and other characteristics associated with flavonoids.

These findings focus attention on two points. The total inhibition discussed here is different from the selective suppression of self pollen germination associated with incompatibility. Also, as against the prevailing view of the involvement of stigmatic proteins in inhibition responses, present studies indicate that at least in the sterile species examined, flavonoids are apparently responsible for pollen germination inhibition. An earlier report[4] mentioned the stimulatory and inhibitory properties of the flavonoids in pollen wall deposits but the study did not attempt an analysis of stigmatic exudate. Stigmatic flavonoids have been identified[5], but this is the first time their role in germination control receives attention.

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NEW RUSTS ON THE *GENUS POPULUS*

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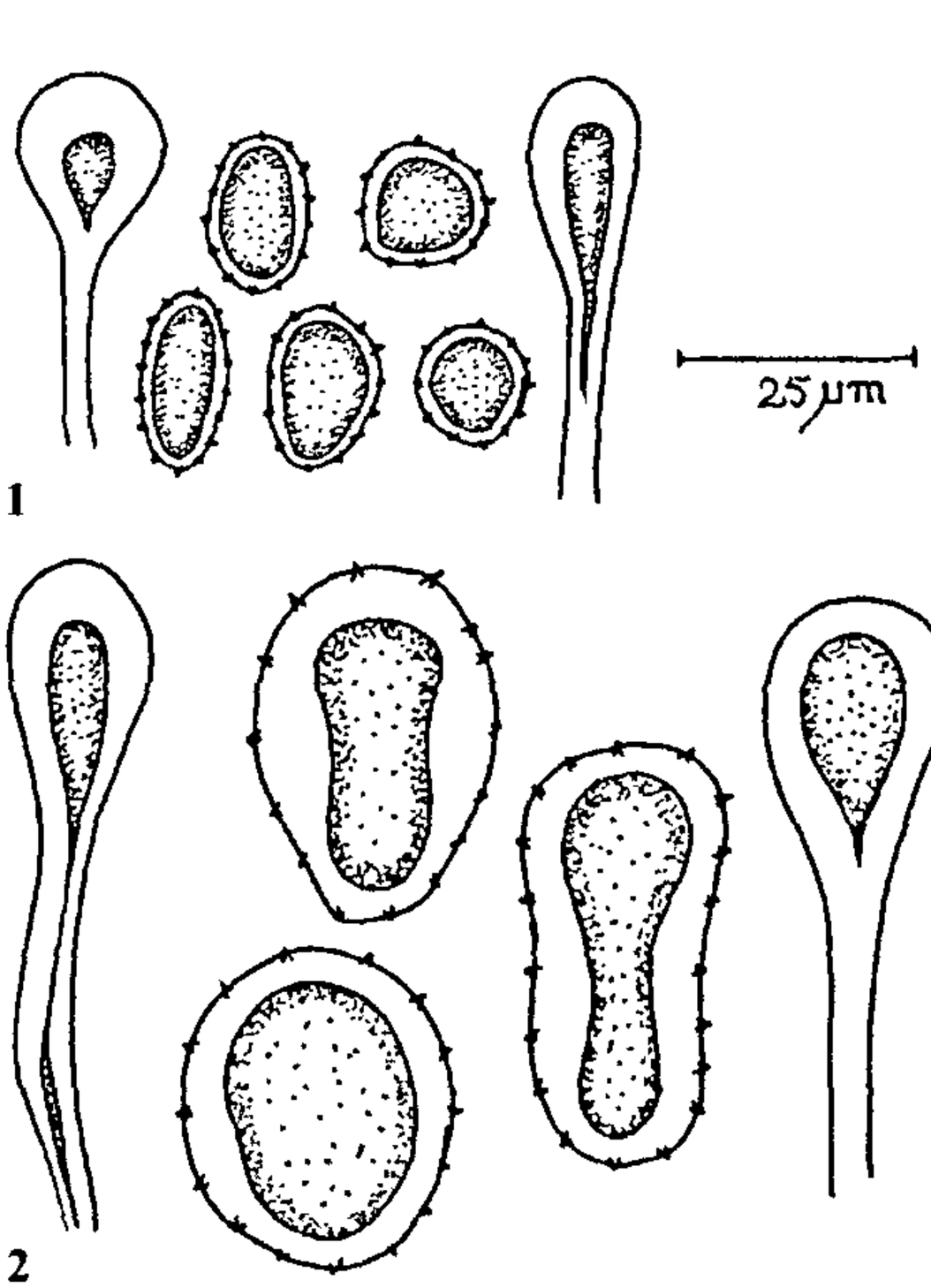
CASTAGNE[1] erected the genus *Melampsora* in 1843. Most of the species reported so far parasitize the host genera *Populus* and *Salix* of the family Salicaceae. However, a few are known to infect members of other families *viz.*, Apocynaceae, Asclepiadaceae, Bignoniaceae, Euphorbiaceae, Guttiferae, Linaceae, Saxifragaceae and Scrophulariaceae.

Recently the authors had the opportunity of critically examining more than a thousand specimens of *Melampsora* obtained from 25 International Herbaria. From their study, particularly those on *Populus* they have come across two new rusts; their account is presented in this paper.

Uredo theumenii Bagyanarayana and Ramachar sp. nov. (figure 1) Pycnia et aecia ignota.
Uredinis minutis, hypophyllis, sparsus, subepidermalibus, erumpentis, pulverulentis, 0.3 mm, pallide



Figures 1 & 2. Camera lucida drawings of **1.** *Uredo theumenii* Urediniospores with paraphyses and **2.** *Uredo zillerii* Urediniospores with paraphyses.