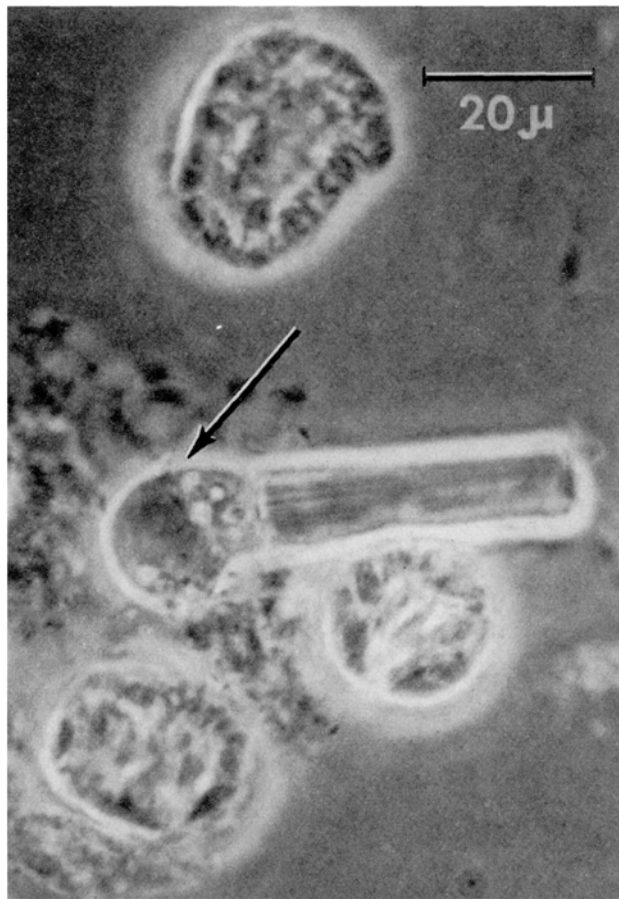


a



b

a and b. Photomicrographs showing the rod outer segments from a frog's retina.

a) Elongated rod outer segments indicating the band-like structure which resulted from the loose separation of discs in the rod outer segments.
b) Round-shaped rod outer segments and a single rod cell in which a smooth sheath of the outer segment and a nucleus (indicated by an arrow) are seen. The length of the inner segments of the single rod cell appeared to be relatively short. Photomicrographs were taken from a 16-day culture.

investigate whether there are action potentials in relation to light stimuli. Further microspectrophotometric measurements on visual pigments in the single photoreceptor cell are being carried out.

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Résumé

Des fragments de rétine et des cellules visuelles isolées de la grenouille *Rana pipiens* ont été cultivés dans la chambre de Rose. Bien qu'une dégénérescence morphologique des segments extérieurs des cellules visuelles ait été observée pendant la culture, le pouvoir de réfraction normal et la présence du pigment visuel ont été constatés dans ces segments, les segments intérieurs avec leurs noyaux étant conservés. Mais, l'intensité du pigment visuel a été plus faible que dans la rétine fraîche. Ces résultats montrent que la cellule individuelle du photorécepteur se prête à l'étude physiologique *in vitro*.

Genetic Nature of Self-Incompatibility in Annual Chrysanthemum

Studies on the genetics of self-incompatibility in various plants have proved to be of considerable interest for several aspects of gene action. An important discovery in recent years has been that in some members of the family compositae, the incompatibility alleles show a sporophytic determination of their behaviour in one parent and gametophytic in the other^{1,2}. Additional evidence suggesting that the incompatibility genes in this family do not conform to an easily predictable system with regard to their dominance relationships, has been presented by CROWE³ on the basis of her observations on *Cosmos*. In view of these findings, it is of interest to undertake further investigations on the breeding systems of other members of this group. In the present brief report, evidence relating to the genetic nature of self-incompatibility in *Chrysanthemum carinatum* ($2n = 18$) is presented.

¹ D. U. GERSTEL, *Genetics* 35, 482 (1950).

² H. B. HUGHES and E. B. BABCOCK, *Genetics* 35, 570 (1950).

³ L. K. CROWE, *Heredity* 8, 1 (1954).

During the course of an experiment involving mutation studies on the variety Single Yellow of annual chrysanthemum, a large number of plants were found on selfing to be completely sterile. Seven of them which formed the progeny of a cross, attempted primarily to study the inheritance of a radiation induced character, were intercrossed in all possible combinations. Their crossability relationships indicated four intra-sterile groups, having 2, 2, 1, and 2 plants respectively. The inter-group compatibility of these plants is indicated in the following Table.

♀ \ ♂	Group I	Group II	Group III	Group IV
Group I . . .	—	—	+	+
Group II . . .	—	—	+	+
Group III . . .	—	+	—	—
Group IV . . .	+	+	—	—
+ Compatible. — Incompatible.				

The above observations show that not all the groups are inter-fertile. Groups I and II, for instance, show inter-sterility both ways and a similar behaviour is shown by Groups III and IV. Groups I and II also show inter-sterility but in one direction only. These features of the results obviously cannot be explained on the basis of the gametophytic determination of incompatibility genes as in *Nicotiana*. They appear however to be quite similar to those reported for other members of Compositae; and, of the two genetic mechanisms proposed for this group, the one by GERSTEL¹, and by HUGHES and BABCOCK² suggesting sporophytic control of pollen reaction, accounts for them.

According to the scheme put forward by GERSTEL, the multiple alleles of the gene R determine the mating system. Assuming for the two parental plants involved in the present cross, the genetic constitutions of R₁R₂ and R₃R₄, the four groups of plants expected in the progeny are R₁R₃, R₁R₄, R₂R₃, and R₂R₄ respectively. These genotypes for the four intra-sterile groups observed in the progeny are entirely consistent with their intercrossability relationships if it is supposed that the genes show independent action in the style, and the two alleles of the male parent, on the basis of their dominance relation, determine the reaction of the pollen. From the results it is possible to deduce the dominance of R₁ over R₄ and of R₂ over both R₃ and R₄. R₁ and R₃ show no mutual interaction, in other words, they show equal dominance as is indicated by the inter-sterility of group II with I (R₁R₄ × R₁R₃) and of group III with I (R₂R₃ × R₁R₃). In the absence of parent progeny crosses, the interaction of R₁ with R₂ and of R₃ with R₄ could not be determined. Special techniques are being employed to achieve such crosses.

The above interpretation of the results shows that self-incompatibility in annual chrysanthemum can be explained on the basis of the scheme postulated for *Parthenium argentatum* and *Crepis foetida*, and differs from that in *Cosmos* in which dominance between alleles has been demonstrated to occur both in the pollen and the style. This would suggest that the Composite scheme developed from observations on the first two plants is probably more typical of the family.

We are grateful to Dr. B. P. PAL and Dr. A. B. JOSHI for their kind interest in this work and encouragement during its progress.

H. K. JAIN and S. B. GUPTA

Botany Division, Indian Agricultural Research Institute, New Delhi, September 3, 1959.

Zusammenfassung

Es werden Beweise für die sporophytische Determinierung der Selbst-Inkompatibilität von *Chrysanthemum carinatum* erbracht. Die Resultate weisen auch darauf hin, dass die Inkompatibilitäts-Allele im Pollen Dominanz zeigen, während sie im Griffel unabhängig sind. Der Inkompatibilitäts-Typus in dieser Pflanze stimmt mit jenem von *Parthenium* und *Crepis* überein, weicht aber von dem bei *Cosmos* gefundenen ab. Es wird angenommen, dass das Schema, wie es bei den erstgenannten Gattungen nachgewiesen wurde, typisch ist für die Familie der Kompositen.

The Mechanism of External Pancreatic Secretion

In the external secretion of the pancreas of dogs, the concentration of bicarbonate increases and that of chloride decreases with increasing rates of secretion^{1,2}. The sum total is almost constant and the secretion is always isotonic with the extracellular fluid³. Experimental data are represented in Figure 1.

Since, at high rates of secretion, actual values of bicarbonate of 152 meq/l were observed, whereas in plasma the maximal bicarbonate concentration is about 30 meq/l, it seems that we are dealing in the primary, active secretion with an isotonic fluid, containing bicarbonate as the sole anion, associated chiefly with sodium². This secretion is then modified as it passes through the ductal system.

The fact that with decreasing flow Cl⁻ concentration increases and HCO₃⁻ decreases, approaching blood plasma levels, may be explained by either of the following hypotheses: (a) the bicarbonate secretion of the glandular cells is mixed on its way with a plasma ultrafiltrate³, or (b) the

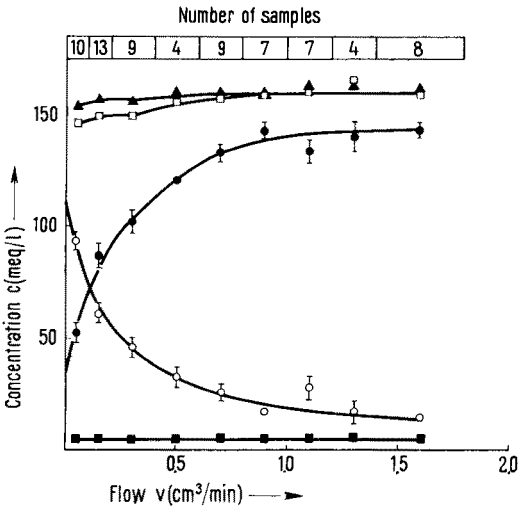


Fig. 1. Average concentration of bicarbonate (●), chloride (○), sodium (▲), potassium (■), and sum of anions (□) at various rates of external pancreatic secretion. The vertical lines show the standard deviation of the mean.

¹ F. BRO-RASMUSSEN, S. KILLMANN, and J. S. THAYSEN, Acta phys. scand. 37, 97 (1956).
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³ R. K. LIM, S. M. LING, A. C. LIN, and I. C. YUAN, Chinese J. Physiol. 10, 475 (1936). – F. HOLLANDER and D. BIRNBAUM, Trans. N. Y. Acad. Sci. 15, 56 (1952).