staining schedule after pretreatment and fixation in 1/4th saturated paradichlorobenzene solution and acetic-ethanol (1:3) mixture respectively.

In the present investigation, six different species have been studied of which two are with $2n = 24$, one with $2n = 26$ and three with $2n = 28$ chromosomes (table 1 and figures 2-7). Chromosomes are, in general, medium to short in length and nucleolar chromosomes are slightly longer as compared to the centromeric ones (figure 1). The chromosomes can be distinguished into four types according to the number of constrictions and the nature of centromeres (figure 1). The detailed karyotype analysis shows a gross morphological similarity in the complements, though cryptic structural details distinguish one species from the other. In addition to interspecific difference in chromosome number, intraspecific variation has also been recorded. However, in spite of their difference in somatic chromosome number, all these species have more or less equal amount of 4C nuclear DNA. Intraspecific variations have been recorded in all these species, excepting C. insignis. Such intraspecific variation indicates that the species are interrelated being derivatives from each other. The clonal propagation might have contributed to the origin of new genotypes through chromosomal mosaicism in the somatic tissue. Detailed analysis, however, indicates minute difference in karyotypes between species, suggesting the importance of structural alteration of chromosomes in evolution.

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STIGMA AND STYLE IN CHEIRANTHUS

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POLLEN tubes grow through the stigma and style and reach the embryo sac and effect fertilization. Studies on histological and cytological details of these structures are important in understanding the reproductive biology of angiosperms. Research efforts in this regard on members of the family Cruciferae are very few. The growth of pollen tube through stigmatic papillae and stylar transmitting tissue has been studied in Brassica nigra and Diplotaxis tenuifolia. A more recent study deals with the structure of stigmatic papillae of Raphanus and pollen tube growth through them. This paper presents structural and cytological details of the stigma and style in Cheiranthus × kewensis, a plant of ornamental value.

For histology, pistils were fixed in 10% acq. acrolein for 24 hr at 0°C, followed by dehydration, infiltration and embedding according to Feder and O'Brien. Sections were cut at a thickness of 2-4 μ with glass knives on a Spencer AO microtome. The sections were stained with periodic acid-Schiff's (PAS reagent) and counterstained with aniline blue. Non-specific esterases and acid phosphatases were localized on the stigma surface at various stages of development. The former were localized using α-naphthyl acetate as the substrate in a coupling reaction with fast blue B. For acid phosphatases, α-naphthyl acid phosphate was used as a substrate with fast garnet GBC as the coupler. Control stigmas were incubated without the substrate.

A mature pistil is about 1 cm long with a short style (2 mm long). The stigma is bi-lobed and dry-papillate type, characteristic of the Cruciferae. The papillae extend down the style along the central groove. Structurally, the stigma is divisible into two parts: the outer papillar surface and an inner stigmatic tissue which is continuous with the transmitting tissue in the style (figure 1). The papillae are elongated, thin-walled and unicellular. Their tips are slightly curved and swollen. The nucleus in each papilla remains at the base, surrounded by scanty cytoplasm whereas the tip is highly vacuolated (figure 3) as also reported in Raphanus. The surface of papilla is covered by a thin cuticle. The stigmatic tissue has thick-walled cells and small
Figures 1–6. 1–4. Anatomy of mature stigma and style. PAS-Aniline blue staining. 1. L. S. portion of style and stigma showing stigmatic papillae (p), stigmatic tissue (st) and transmitting tissue (tt) (× 375). 2. T. S. style showing stomata (s) and trichomes (t) on the epidermis, outer (oc) and inner (ic) zones of cortex, vascular bundles (v) and a solid core of transmitting tissue (× 375). 3. Stigmatic papillae showing nuclei at the base and vacuoles above (× 600). 4. Portion of transmitting tissue in longisection; note the densely cytoplasmic nature of cells (× 600). 5–6. Whole mount preparations of mature stigmas following localization of stigmasurface enzymes. 5. An enlarged view of part of stigma following localization of non-specific esterases. A distinct, continuous pellicle (pe) can be seen (× 1500). 6. A magnified view of part of stigma following localization of acid phosphatases. Localized reaction can be seen in the uniformly distributed loci (arrow) (× 1500).
intercellular spaces filled with a PAS positive substance.

Both non-specific esterases and acid-phosphatases have been localized on the stigmatic surface. As reported for other taxa, esterases are present in the form of a layer, corresponding to the pellicle (figure 5). In young stigmas (4 or 5 days before anthesis), the pellicle is very thin but becomes thick in mature stigmas. The esterase test gives valuable information regarding receptivity of the stigmas because the reaction product is seen only at functional sites. Acid phosphatases were negligible in stigmas 4 or 5 days before anthesis. Low activity could be seen in stigmas 2–3 days before anthesis which increased at maturity (figure 6). Acid phosphatases have also been reported in Petunia, Linum and in a few legumes. The specific role of acid phosphatases, however, is not yet clearly understood.

The style is green and solid. A hollow style in Cruciferae has been reported in only one variety of Brassica campestris. The stylar epidermis bears stomata and trichomes, and is covered by a cuticle. The cortex occupies the largest area of the style and is clearly divided into an outer zone and an inner zone. The cells of the outer zone are round and loosely arranged and contain abundant starch grains, whereas those of the inner zone are polygonal and compact with very few starch grains. The two vascular bundles, traversing the inner zone of the cortex, are highly branched and extend up to the stigma (figure 2). The stylar cortex encloses a single narrow, compact strand of transmitting tissue of thick-walled, densely cytoplasmic cells with small intercellular spaces filled with PAS positive substance (figures 2 and 4). It is through this substance that the pollen tubes traverse and probably derive their nutrition.

Dark green coloration, presence of stomata on the epidermis and resemblance of the outer zone of cortex with spongy parenchyma of a leaf indicate that the style is a highly photosynthetic structure. The style persists even in the fruit.

Sporophytic self-incompatibility is widespread among Cruciferae and understandably this aspect has been studied more extensively than the basic aspects such as those reported here. Fundamental studies provide a better understanding of pollen-pistil interaction and incompatibility mechanism. With this work a beginning has been made and it is hoped that similar investigations will be carried out in other taxa.

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OXYGEN UTILIZATION BY DEVELOPMENTAL STAGES OF CARP EGGS

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Investigations on the respiratory metabolism of the eggs of freshwater fishes have mostly been reported from the temperate region. However, studies on this aspect of fish eggs from the Indian subcontinent are rather limited. Oxygen consumption of different developmental stages of eggs and hatchlings has been studied in Hilsa ilisha. In