friable endosperm callus and its continuity with the parent endosperm *in situ*; note the extent of the ruptured testa and the level of shoot apex (arrow), ×, 20. Figs. 6, 7. L.s. seed in 2 parts 14 days after culture on MS + 2, 4–D 10^{-5} M. In Fig. 6 the result of meristematic activity of the endos perm at and above the level of shoot apex is evident by the radial files of endosperm tissue flaring out from the seed. Fig. 7. Shows the remaining part of the same seed; compare with Figs. 1 and 2, Fig. 6, × 22, Fig. 7, × 18. Figs. 8, 9. Filamentous embryoids isolated from endosperm callus 68 and 71 days after seed culture; Fig. 8, × 179, Fig. 9, × 93. Figs. 10, 11. Mitosis in an isolated cell and in a filament, Fig. 10, × 105, Fig. 11, × 351. Fig. 12. Globular embryoid in wholemount of endosperm callus, × 297.

visible. The callus continued to be friable even 60 days after culture. It presented fewer single cells but an increased number of filamentous structures (Figs. 8, 9) which resembled the early stages of embryogeny of this species *in vivo*[3]. Mitoses were observed in both—densely cytoplasmic single cells and filamentous embryoids (Figs. 10, 11). Although the chromosome number could not easily be determined, counts made from the dividing single cells and filaments showed it to be nearly the triploid number characteristic of the endosperm tissue ($n = 6$ for *Nigella damascena*[4]). Embryoid formation occurred in 100% seed cultures in which the endosperm had callused. In ageing cultures the embryoids differentiated copiously and some reached the globular stage (Fig. 12). Although a given population of single cells could not be kept under continuous observation, the close cytological similarity between embryoids and densely cytoplasmic single cells, and the incidence of mitoses in the latter strongly indicate that the embryoids are of single cell origin.

Reports of successful endosperm culture are sporadic; of 21 species so far studied organogenesis has been achieved in 9 taxa (6 parasitic and 3 autotrophic), and embryoid differentiation in only 3 taxa—*Nigella* (present work), *Ricinus*[5] and *Croton*[6]. Interestingly, in all these 3 taxa the embryoids differentiated up to globular stage only. In view of the rare differentiation of endosperm embryoids, that such embryoids have been obtained in 100% callused cultures and in so copious a quantity in *Nigella damascena* are significant. Further investigations must be directed to examine what makes the endosperm more recalcitrant than other tissues to organogenesis in general and to embryoid differentiation in particular.

We thank the Council of Scientific and Industrial Research, New Delhi, for a research fellowship to one us (MS). We express our sincere appreciation to Professor H. Y. Mohan Ram, for facilities, and to Dr. M. R. Vijayaraghavan, for photography.

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Delhi 110 007, *June* 3, 1975.

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BACTERIAL BLIGHT OF 'FOUR-O'CLOCK'—A NEW DISEASE IN INDIA

A SEVERE blight disease was observed to be prevalent on bushes of 'four-O'clock' (*Mirabilis jalapa* L.) during monsoon months of 1970 and 1971, in Simla (1800–2100 m.a.s.l.) and Almora (1500–1650 m.a.s.l.), respectively. In nature, the disease was manifested as foliar spotting and blighting. The spots were brown to dark brown, circular or irregular and measured about 0·1–0·5 cm in diameter. The blight symptoms appeared as marginal necrosis on leaves, extended inward rapidly along the veins under favourable weather conditions (Fig. 1). Severely blighted leaves were shed-off.

Fig. 1. Symptoms of bacterial blight on *Mirabilis jalapa* leaves.

In advance cases the stem was also invaded through petiole of blighted leaves, turned brown and shrank in girth. Ultimately, plants were destroyed completely.

Microscopic examination of affected plant parts suggested bacterial etiology of the disease. In repeated isolations, a yellow pigmented bacterium, growing as circular, raised, smooth, convex, glistening and butyrous colonies with entire margins on NA, was obtained. Typical symptoms of the disease were reproduced on young healthy host plants within 15 days by spray-inoculating an aqueous suspension of the bacterium.

The phytopathogenic organism was Gram-negative, rod-shaped, mostly single, capsulated, non-sporing, non-acid fast and motile with single polar flagellum. The biochemical and physiological characteristics of the bacterium were: strictly aerobic; utilized glucose oxidatively; gelatin liquefied; starch and aesculin hydrolysed; lypolytic with Tween-80; produced ammonia, hydrogen sulphide and catalase but not urease, tyrosinase and oxidase; nitrate reduction, indole production, Voges-Proskauer and methyl red tests were negative; asparagine was not utilized as a sole source of carbon and nitrogen; growth inhibited by 5% salt in broth, milk peptonized without coagulation; litmus not reduced; produced acid without gas from arabinose, ribose, xylose, fructose, galactose, glucose, mannose, maltose, sucrose, malibiose, trehlose, dextrin, glycogen, starch, glycerol, mannitol but not from rhamnose, lactose, sorbose, raffinose, inulin, erythritol; sorbitol, dulcitol, salicin, α-methyl-D-glucoside and meso-inositol; utilized sodium salts of acetic, citric, lactic, propionic and succinic acids but not of benzoic acid.

The cultural, morphological and physiological properties of the phytopathogenic organism suggested that the bacterium belongs to the genus *Xanthomonas*.

Host range studies revealed that the xanthomonad was capable of infecting *Cyamopsis tetragonoloba, Phaseolus lunatus, P. vulgaris* and *Vicia faba*. The susceptibility of *V. faba* was exceptionally more than other hosts. It was also observed that *X. phaseoli*, incitant of common blight of beans, could not infect *M. jalapa*.

Though the pathogen could infect a few leguminous hosts, it obviously differed from *X. cyamopsidis* Patel, Dhande and Kulkarni[2,3], *X. phaseoli* (Smith) Dowson[4] and *X. vignicola* Burk[1], in host range and some physiological properties. The incitant of the bacterial blight of 'four-O'clock' is, therefore, identified as a new species and the binomial *Xanthomonas mirabilis* sp. nov. is proposed.

The disease is a new record to science. The extent to which *X. mirabilis* would be threatening the leguminous crops in temperate regions in India needs to be investigated.

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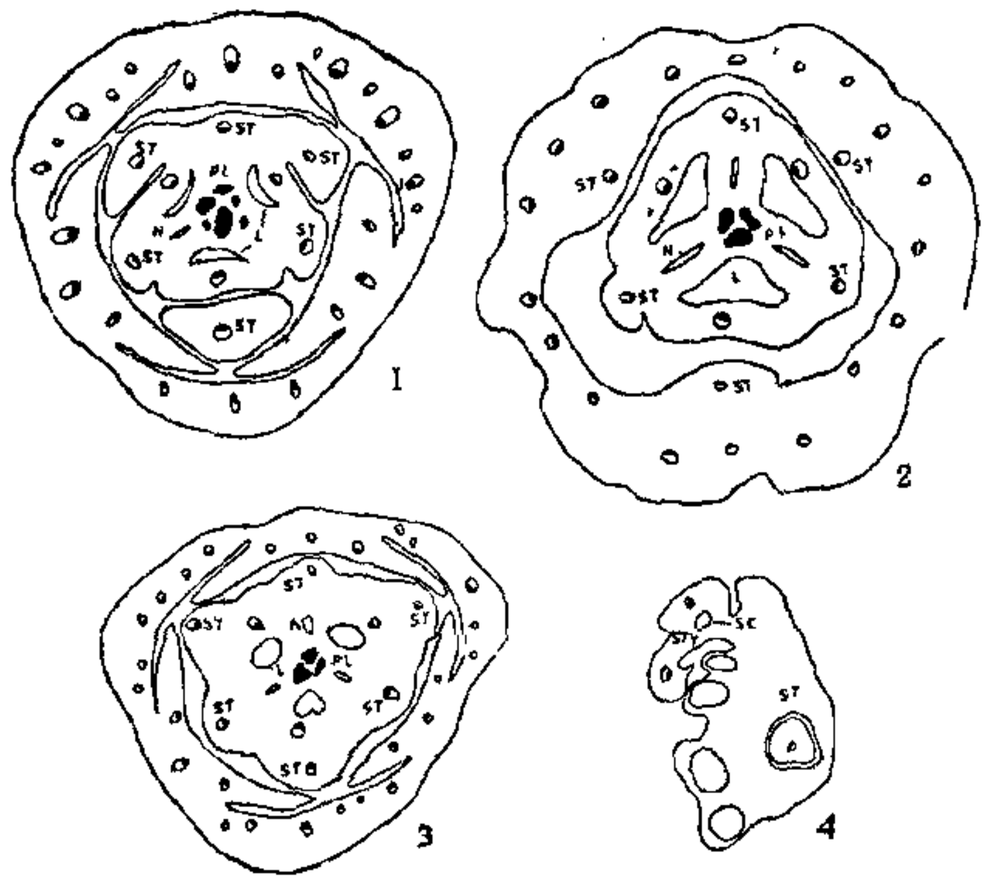
AN INCIPIENT GYNOSTEMIUM IN THE ALOINEAE (LILIACEAE)

DURING a study on the floral anatomy and morphology of the Liliaceae, an interesting case of fusion of the bases of some stamens with the ovary was observed in *Aloe barbadensis* Mill. To confirm this, a number of species of *Aloe* and also the related genera, *Haworthia* and *Gasteria*, were studied.

The number of stamens in all the species is six and these are arranged in two alternating whorls of three each. In *A. barbadensis*, four to five stamens are united with the base of the ovary for a short length (Fig. 1). In *Haworthia limifolia* Marloth.,



FIGS. 1–4. Fig. 1. *Aloe barbadensis*. Fig. 2. *Haworthia limifolia*. Fig. 3. *Gasteria trigona*? Fig. 4. *Aloe barbadensis*, a stamen united with the *style* (*L*, loculus; *N*, septal nectary; *PL*, placental bundles. *S.C.*, stylar canal; *ST*, stamen or a staminal strand; *Sty*, style).