delicate sheath which may not easily be perceptible at times. Hormogone formation is the common mode of propagation. The formation of hormogone is generally by the death of one or more cells of the trichome or by the special biconvex separating discs. In the family Oscillariaceae any portion of the trichome may get detached and start behaving as hormogone¹.

In the present communication, the effect of pH in the hormogone formation in a species of Oscillatoria was studied in some detail.

The plants of Oscillatoria were collected from a freshwater permanent tank of our Department, during October–November 1983. A number of slides of this material were prepared in the pond water (pH 6.9) and observed in the living state under light microscope. No change in the morphology of the trichomes could be observed for 30 min.

Subsequently three slides prepared in double-distilled water again showed no change in the morphology of the trichomes.

When the slides were prepared in tap water (pH = 7.9) a quick breaking of the trichomes into typical hormogones occurred (after 2–5 min.) in a zig-zag fashion (figures 1–3). The experiment was repeated for several days and similar results were obtained.

The plants of Oscillatoria were finally identified as O. chlorina Kuetz ex Gomont¹ with the following dimensions: length of the cells, 3.7–8.0 µm; breadth of the cell, 3.5–4.0 µm.

The common mode of hormogone formation is either by the death of one or more intercalary cells or by the formation of biconvex intercalary separating discs. In this case, such structures were altogether lacking and only the sudden and spontaneous breaking of trichomes in a zig-zag fashion was observed. Possibly the abstricting of trichomes would have been facilitated by the higher pH of the tap water, (7.9) as compared to that of pond water (6.9) while the pH of glass double-distilled water was 7.1.

To ensure the phenomenon of breaking of trichome and hormogone formation, different buffers were also prepared and it was observed that high pH was responsible for the breaking up of the trichomes into hormogones.

Gonzalves and Kamat² described a new method of hormogone formation in Aulosira implexa Born et Flah var crassa Dixit. They observed a break in sheath on one side followed by fragmentation of trichome as a possible method in the formation of hormogone. Perhaps the breaking of sheath would have been possible due to change in pH, which could have been overlooked.

17 May 1985; Revised 30 May 1986


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**STRUCTURE AND HISTOCHEMISTRY OF RAPHIDE IDIOBLASTS IN APOSTASIA WALLICHII (R. Br)**

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The genus Apostasia comprises six species of terrestrial herbs distributed in India, Malaysia and Australia and reveals unusual floral structures that separate it from other orchids¹. Apostasia belongs to the diandrae and meagre information is available on its histological and embryological details². In A. wallichii the leaves are linear to lanceolate, inflorescence a panicle, bracts subulate and flowers yellowish-white in hue. The perianth consists of two whorls—the first
whorl of three sepalas and the second of three petals.

The fixed buds and flowers of *A. wallichii* were kindly sent by Dr S. N. Hedge, Orchidologist, Forest Department, O.R.D.C., Tipi, Bhalukpong, Assam. The material was dehydrated and embedded in glycolmethacrylate3. Two microns thick sections were cut using glass knives fitted to a specially-designed adaptor fixed to an A. O. Spencer rotary microtome. This adaptor was designed and made at the Delhi University workshop and has adjustable knobs for knife angle adjustment and screws for proper positioning of the knife. Sections were stained for localization of insoluble polysaccharides3 and total proteins3. To check the specificity of insoluble polysaccharides, the slides were not treated with periodic acid but passed directly to Schiff’s reagent. No colour reaction was observed in control preparations. For the total proteins, the slides were pretreated with 4% pepsin in 0.02 N HCl for 24 hr; washed and treated with protease at 37°C for 24 hr. After staining with *Coomassie* blue no colour appeared in the sections.

A few cells of the perianth lobes show deposits that occur as sheath-like bundles of long and acicular crystals that are usually referred to as raphide-idioblasts (figure 3). The term idioblast, originally devised by Sachs, is used even today in the same sense in developmental plant anatomy4. A presumptive idioblast cell is distinct from the adjacent parenchymatous cells both in exomorphic and histochemical details. There is no intercellular connections between idioblast cell and adjacent parenchymatous cells. The idioblast cell contains copious amount of cytoplasmic and nuclear proteins (figure 1) and poor polysaccharide contents (figure 5). An idioblast initial cell possess densely-stained nucleus and nucleolus (figure 1). Many small vacuoles that appear in the cytoplasm fuse to form a large central vacuole (figure 2, arrow) which pushes both the cytoplasm and the nucleus to a peripheral position (figure 2). A few proteinaceous granules are also seen in the peripheral position (figure 3). At maturity, the idioblast cells enlarge three or four times (figure 4) and show deposition of long, acicular, needle-shaped crystals in the central vacuole (figure 4). In transsection these crystals appear honeycomb-like and are besieged by a copious, PAS positive matrix (figure 5).

Such inert crystalline deposits commonly occur in the vegetative and reproductive parts of the orchids4. A mature raphide idioblast has a bundle of raphide crystals surrounded by a polysaccharide matrix and is generally considered as excretory products in plants. Although the exact release of idioblast crystals has not been observed it is probable that the swelling of surrounding polysaccharide matrix breaks the idioblast wall and forces the release of the crystals as seen in the members of the Araceae5. The ontogeny of raphide idioblast in *A. wallichii* reveals that the differentiation of a parenchymatous cell into an idioblast cell is controlled by the nucleus whereas the shape of the crystals deposited is governed by the cell cytoplasm.

One of us (VG) is thankful to the CSIR, New Delhi for a fellowship.

**Figures 1–5.** Developmental stages of idioblast cell in *Apostasia wallichii* R. Br. 1. Transverse section of perianth lobe showing idioblast initial (× 455). 2. Portion of perianth lobe showing vacuole formation in idioblast cell. Nucleus is located toward the periphery (× 115). 3. An idioblast cell revealing dissolution of matrix and formation of crystal deposits (× 455). 4. A mature idioblast cell with long, acicular raphide crystals (× 690). 5. An idioblast cell showing PAS positive matrix (× 455). (figures 1–4 stained for proteins and figure 5 stained for insoluble polysaccharides. cr, crystal; ic, idioblast initial cell; m, polysaccharide matrix; n, nucleus; v, vacuole).
Fungi Associated with the Roots of Herbaceous Plants

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Most of the herbaceous plants are known to possess vesicular-arbuscular mycorrhiza in roots with few exceptions. Roots sometimes also have some structures belonging to parasitic fungi like Polymyxa, Ligniera and Olpidium etc. The present investigation is a part of the survey on VAM being conducted in this laboratory. During these studies we have found some other fungi associated with the roots in addition to VAM which is described here. The present note is one the fungi associated with the roots of Sorghum bicolor (PC-9) and Eclipta alba.

The plants of jowar, S. bicolor var PC-9 were raised in the departmental beds whereas E. alba was growing as a common weed. The root samples were collected at regular intervals and washed with water to separate the soil and the water thus collected was wet-sieved and decanted for counting VAM fungal spores. The washed roots were then cleared and stained, and subsequently examined.

The stained roots of jowar showed the presence of zoosporangia or cysts intercellularly or intracellularly during the vegetative growth of jowar (figure 1 B, C). The cysts were of various shapes and sizes often forming elongated chains in the root cortex. These cysts were brown to brownish black in colour. The fungus attained coiled and looped configurations within the root matrix. These cysts were identified to be those of Olpidium brassicae. Prior to flowering the roots were heavily colonized by indigenous VAM fungi viz Glomus fasciculatum and Glomus fuesianum.

In plants with established VAM association, it was observed that the incidence of Olpidium brassicae declined considerably. However in E. alba, the cysts of O. brassicae were formed abundantly in root cortex at all the stages of growth along with VAM association.

Financial assistance given by CSIR is duly acknowledged.

3 February 1986