tracheids or by both. However, in *Trifolium dubium* loops are also formed by the extension and subsequent fusion of the bundle sheaths between (a) two nearby veins (figure 1 at arrow), (b) a vein and a vein-ending of a closeby vein (figure 2) and (c) a tracheid and a vein (figure 3 at arrow). At times a schizogenous intercellular space is formed in the bundle sheath or its extension (figure 4 at arrow) so that such a structure may simulate a loop. Rarely, the vein-ending is connected to the vein by the bundle sheath extension forming a loop, and simultaneously the schiozogenous interecullular space is also developed in the extended bundle sheath resulting in two adjacent unequal loops (figure 5).

There is experimental evidence to show that the bundle sheath extensions share in the extravascular translocation of the blade[5,6]. The parenchymatous bundle sheath extensions in this species probably perform the same function as they connect the vein-endings or tracheids with veins in the form of loops.

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1. Hickey, L. J., *Am. J. Bot.*, 1973, **60**, 17.
2. Sehgal, L. and Paliwal, G. S., *Bot. J. Linn. Soc.* 1974, **68**, 173.
3. Patel, J. D. and Shah, J. J., *Proc. Indian Acad. Sci.*, 1974, **B80**, 197.
4. Inamdar, J. A. and Murthy, G. S. R., *Flora*, 1978, **167**, 125.
5. Wylie, R. B., *Am. J. Bot.*, 1943, **30**, 278.
6. Armacost, R. R., *Proc. Iowa Acad. Sci.*, 1944, **51**, 157.

ULTRASOUND-INDUCED CYTOLOGICAL EFFECTS ON A GREEN ALGA, *OEDOGONIUM VIRCEBURGENSE* HIRN.

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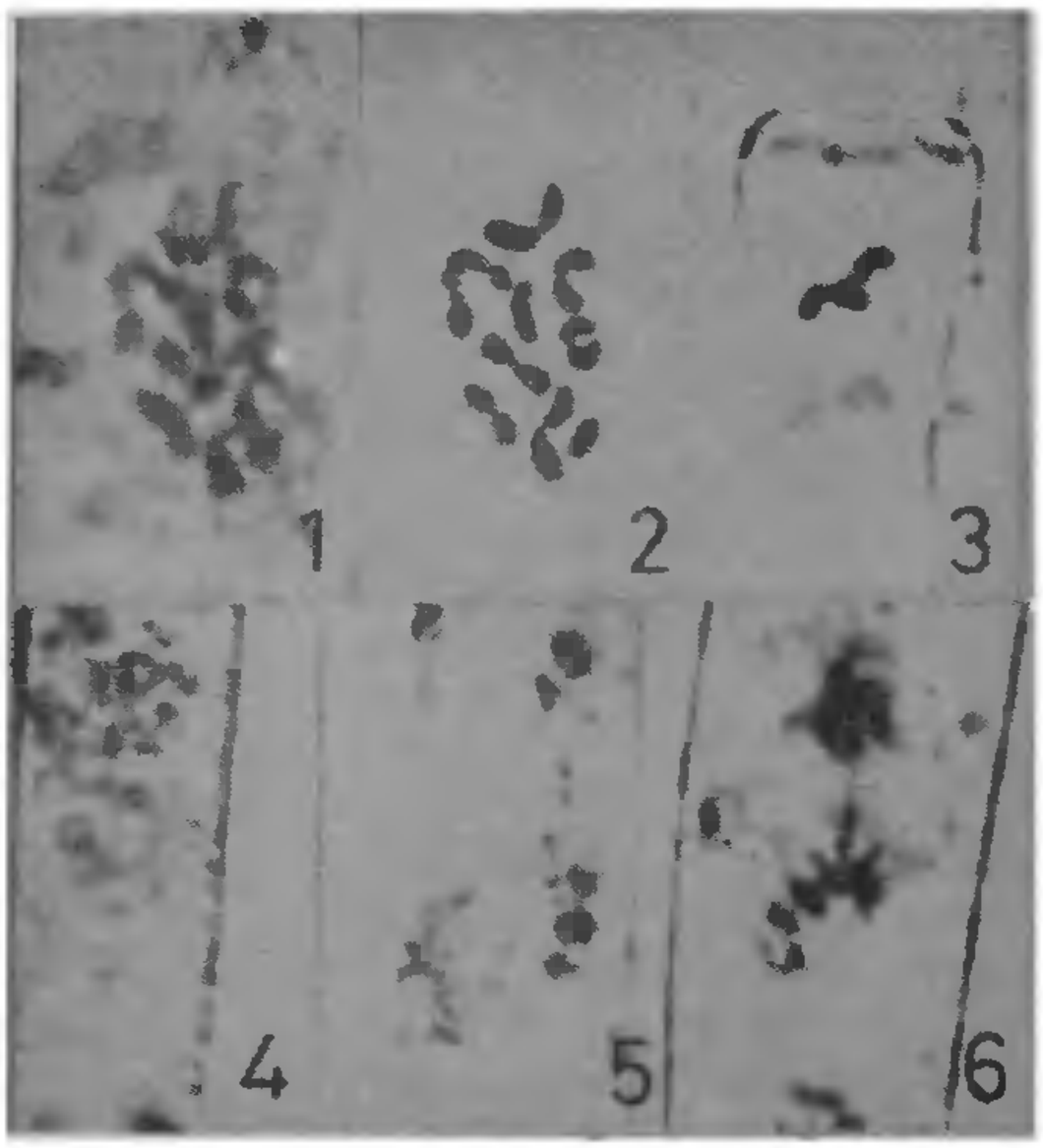
ULTRASONIC waves, having frequencies higher than 20,000 cycles/sec cause mutations like other ionizing and non-ionizing radiations. The effects of ultrasound have been extensively studied on higher plants, *Drosophila* and human lymphocytes, whereas those on the cytology of green algae are practically negligible. The only study on this aspect was reported on two green algae, *Rhizoclonium hieroglyphicum* (Ag.) Kuetz. and *Oedogonium gunnii* Wittr.[1] The present investigation deals with the effects of ultrasonic waves on the cytology of *Oedogonium virceburgense* (Oedogoniales).

The cultures were grown in Godward's medium[2] fortified with 8% soil-extract and maintained in a thermostatically controlled culture chamber (22 ± 1°C), illuminated 16 hr daily with C 2500 lux intensity. The actively growing filaments of the alga were treated with ultrasonic waves by the method, given earlier[1] for 15, 30, 45 and 60 min. Materials were fixed in a mixture of absolute alcohol and glacial acetic acid (3:1) and stained[3].

The karyotype of *O. virceburgense* consisted of $n = 9$, the chromosome size ranging from 1.4–3.4 μm in length at metaphase. Stickiness and clumping of chromosomes were observed with lower as well as higher exposures of ultrasound. Chromosome breakage was observed at metaphase showing 1–2 fragments with 15 and 30 min and 1–3 fragments with higher exposures. These broken chromosomal-fragments were seen in very close vicinity of their respective chromosomes rendering their photography, a very difficult task. Anaphase bridges were generally constituted by single long and very thin strands. Laggards and formation of ring chromosomes were seen only with 45 and 60 min exposures, while micronuclei were noticed with all the exposures. Pycnotic nuclei, vacuolization and degeneration of nuclei were also frequently observed.



Figures 1–6. 1. Control metaphase plate showing $n = 9$ chromosomes. **2.** Drawing of figure 1. **3.** Clumping of chromosomes. **4.** Ring chromosomes. **5.** Laggards. **6.** Anaphase bridge. (All figures × 1800)

The chromosomal aberrations scored was 6.36% with 15 min exposure and 21.25% with 60 min exposure in fixations made after 24 hr of irradiation.

The present results support the study of Sarma and Agrawal[1] on *R. hieroglyphicum* and *O. gunnii*. In all the three green algae, *O. gunnii* proved to be more sensitive to ultrasonic waves, showing 31.84% chromosomal aberrations at the highest dose of 60 min, *R. hieroglyphicum* showing 25.64% chromosomal aberrations was found more resistant that *O. gunnii* but sensitive in comparison to *O. virceburgense*, showing 21.25% of chromosomal aberrations. Thus, *O. virceburgense* proved to be more resistant in showing chromosomal aberrations than *O. gunnii* and *R. hieroglyphicum*. This may be attributed to the smallest chromosome size of *O. virceburgense*, providing comparatively less area for the action of ultrasonic waves.

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1. Sarma, Y. S. R. K. and Agrawal, S. B., *The Nucleus*, 1981, **24**, 75.
2. Godward, M. B. E., *New Phytol.*, 1942, **41**, 293.
3. Godward, M. B. E., *Nature (London)*, 1948, **161**, 203.

A NEW LEAF SPOT DISEASE OF MAIZE FROM KUMAON, HIMALAYAS

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DURING the survey of diseases on maize (*Zea mays* L.) a severe leaf spot disease was observed at Vivekananda Laboratory experimental farm, Hawalbagh (Almora). The disease made its appearance as small chlorotic spots with a light-coloured halo and 0.3 to 0.5 cm in diam. The diseased portions of the leaf were sterilized in 0.1% mercuric chloride solution and planted on potato dextrose agar medium in sterilized Petridishes. It was identified as *Curvularia lunata* var. *aeria* (Wäkker) boedijn (*Cochliobolus lunatus*) Nelson and Haasis) by comparing the characteristics with the type description in literature[1-3]. Finally, the pathogen was confirmed from CMI, Kew, England (IMI NO. 263048a).

A perusal of literature[4-7] indicates that the disease is prevalent only in the warm tropical part (Jobner, Rajasthan) of the country. The present investigation, therefore, reveals the existence of the pathogen in temperate Himalayan region of India.

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1. Barnett, H. C., *Illustrated genera of imperfect fungi*, (second edition), Burgress Publishing Co., Minnesota., 1960.
2. Ellis, M. B., *Dematiaceous Hyphomycetes*, CMI, Kew, Surrey, England, 1971.
3. Subramanian, C. V., *Hyphomycetes*, ICAR, New Delhi, 1971.
4. Bilgrami, K. S., Jamaluddin and Rizwi, M. A., *Fungi of India*, Part I, Today and Tomorrow's Printers and Publishers, New Delhi, 1979.
5. Mukerji, K. G. and Juneja, R. C., *Fungi of India*, (1962–72), Emkay Publications, Delhi, 1974.
6. Payak, M. M. and Sharma, R. C., *An inventory and bibliography of maize diseases in India*, IARI, New Delhi, 1980.
7. Sarbhoy, A. K., Varshney, J. L. and Agarwal, D. K., *Fungi of India*, 1971–76, Navyug Traders, New Delhi, 1980.

OCCURRENCE OF URSOLIC ACID IN EUCALYPTUS LEAVES

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NO chemical work seems to have done on the eucalyptus species, and this is taken up for investigation in this paper. The leaves of *E. alba*, *E. crebra*, *E. grandis*, *E. melanophloia*, *E. microtheca*, *E. rudis*, *E. staigeriana*, *E. tesselaris* and *E. torelliana* were extracted with petroleum ether, acetone and alcohol respectively. Acetone extracts on column chromatogrphy over silica gel yielded compounds A (minor), B (major) and some minor components.

Compound A was identified as 5-hydroxy-4', 7-dimethoxy-6, 8-dimethyl flavone (Eucalyptin)[1] by NMR, IR and by direct comparison with an authentic sample.

Compound B crystallised from $CHCl_3$-MeOH as needles m.p. 286 88°, $[\alpha]_D$ + 69° ($CHCl_3$) and gave + ive L.B. test (Pink → Blue). Acetate, m.p. 245–46°, $[\alpha]_D$ + 58° ($CHCl_3$). It was identified as Ursolic acid[2] by IR, NMR and by direct comparison with an authentic sample.