conductivity meter (Systronics, Ahmedabad). The flasks containing the samples were shaken on the horizontal shaker with 120 strokes min. The experiment was repeated thrice.

The results obtained with grains and leaf tissues are depicted in figure 1. The loss of ions from seeds treated with HDT was considerably higher than from the seeds treated with GDW. The increase in loss was maximum after 2 hr and it was twice greater than the controls. The leaf tissues did not show any loss of ions.

Loss of a few electrolytes from susceptible oat seeds treated with HV-toxin was observed[8]. In the present study electrolyte leakage was detected from seeds but not from leaves. In nature, the pathogen infects only earheads particularly the ovaries, and not leaves. This correlation suggests that permeability alterations may be involved in ergot pathogenesis. The results also indicate the possibility of existence of toxic metabolites in honeydew oozing from infected earheads. These metabolites may trigger permeability alterations which may constitute some of the very early changes in cell biochemistry under attack.

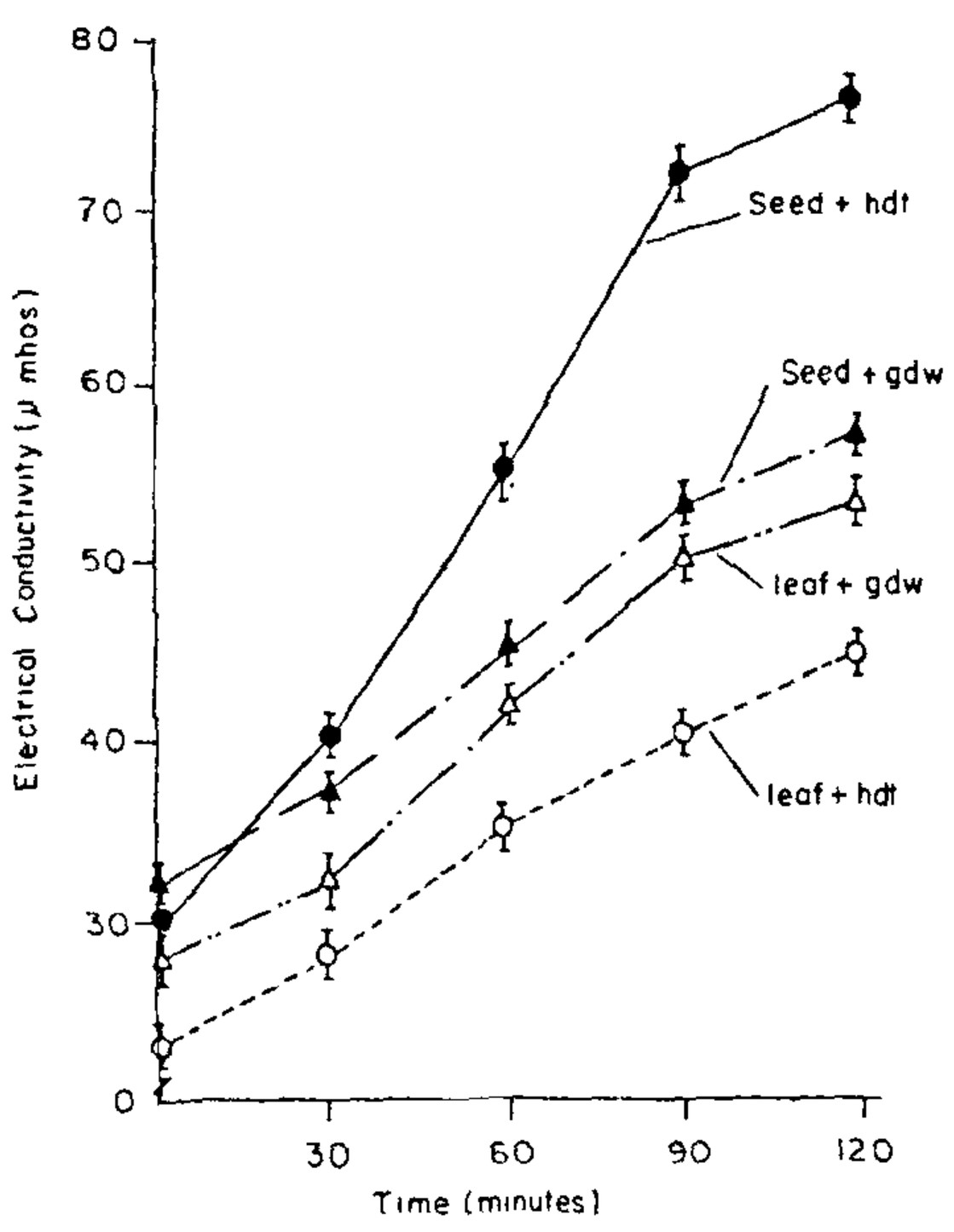

Figure 1. Loss of electrolytes from seeds and leaf tissues treated with honey dew toxins (HDT) and glass distilled water (GDW).

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COMMENSAL LUMINOUS BACTERIA OF THE COELENTERATE, *PTEROEIDES* SP.

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STUDIES on the association of luminous bacteria with lower invertebrates is scanty. During a survey of the commensal microflora of marine invertebrates, the authors isolated bright light emitting luminous colonies from the coelenterate *Pteroeides* sp. collected from trawls operating at a depth of 20 meters along PortoNovo coast (Lat. 11° 29'N, Long. 79° 46'E). The luminous microflora were collected by swabbing the surface of live *Pteroeides* using sterile cotton swabs; transferring them to sterile sea water and plating the washings into petriplates containing SWC (Sea water complete) agar medium. The coelomic fluid of the animal was also collected under sterile conditions by cutting open the peduncle of the animal and plating it as before. Surface samples of water and samples of sediment adhered to the trawl were also collected and plated and all the samples were incubated at 28 ± 2°C for 24 hr. The water, sediment and the organism were subjected to microbiological tests. The schemes of Nealson[1] and Baumann *et al.*[2] were followed for identification and nomenclature of the isolates respectively. The results are given in table 1.

Twenty five isolates were screened from the animal's body surface, coelomic fluid, environmental water and

Table 1 *Luminous bacterial density of Pteroeides sp.*

Site of sampling	Total CFU	Luminous CFU
Autozooids and peduncle	$88.7 \times 10^3/cm^2$	$7.6 \times 10^3/cm^2$
Coelomic fluid	$80.6 \times 10^3/ml$	$10.1 \times 10^3/ml$

CFU: Colony forming units

sediment and all of them were *Vibrio harveyi*. Although species of luminous bacteria such as *V. harveyi*, *V. fischeri* and *Photobacterium phosphoreum* was encountered in the gut of fish[3], interestingly enough only *V. harveyi* was recorded in *Pteroeides* sp. The fact that the luminous *Vibrio* (formerly *Beneckea*) species are nutritionally versatile than other luminous microbes[4] may account for such a distribution of this species in the biotic and abiotic environments. The occurrence of luminous microflora in the coelomic fluid of *Pteroeides* sp is interesting, since a well defined gut is absent in these organisms. Further, the body fluids of most of the invertebrates were reported to possess antimicrobial factors[5]. Hence the survival of *V. harveyi* within the gastrovascular cavity of this species is an interesting phenomenon.

It is probable that the luminous bacteria of the environmental water might have gained access into the gastro-vascular cavity of the animal since the fluid is renewed periodically by exchange with the external medium.

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THE "OPENING OUT" PROCESS IN ROOT MERISTEMS—A NEW TYPE

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THE apical organisation of roots with reference to ontogenetic reorganisation has been extensively studied[1-3]. This investigation on *Trigonella foenum-graecum* L was undertaken to obtain additional information on ontogenetic changes in apical organisation and activity. The radicular apex was dissected from mature seeds and subsequent samples were taken at 24 hr intervals from germinating seeds for the first seven days after seed wetting. The root apices were fixed, processed, sectioned longitudinally at 5 μ and stained with safranin-light green[4].

The radicular apex shows a closed type of organisation having three superposed tiers of initials at the root pole, one each aligned with the central cylinder, cortex and columella and separate initials for the epidermis-peripheral part of the rootcap. An analysis of the cell complexes helps to distinguish the central columella and peripheral region in the rootcap. The columella initials are just distal to the cortical initials and about 3–4 cells wide in median longisection. The peripheral region has cells in oblique files curving from the flanks towards the columella and arising by *Kappe* divisions from the rootcap-epidermis initials.

The cortical initials form a single tier or plate of 4–5 cells across just distal to the initials for the central cylinder as seen in medial longisections. The cells at the periphery of this plate show *Körper* divisions and the proximal derivatives form the cortex. A group of almost isodiametric cells (at the root pole) proximal to the cortical initials represents the central cylinder initials. Proximally the central cylinder differentiates from daughter cells resulting from *Körper* divisions of these initials (figure 1).

In the 2, 3, 4, 5 and 6-day old root apices a gradual process of "opening out" of the cortex and stele towards the rootcap is observed. This process results in the formation of a secondary columella and a stele-cortical-columella complex. The secondary columella results from transverse divisions of the cortical initials at the central region and oblique and transverse divisions of the cortical initials and their immediate derivatives at the pericolumnar region The former type of divisions gives rise to that part of the secondary columella which pushes the primary columella distally. The latter type of divisions results in cell configur-