Table 1 *Growth characteristics of H. valentiae*

Light min.	B. Peni. (4000 ppm)		Chloramhenicol (2000 ppm)		Streptomycin (2000 ppm)	
	Hypnea	BGA	*Hypnea*	BGA	*Hypnea*	BGA
30	+++	+++	+++	+	+++	+
60	++	++	+++	–	+++	–
90	+	+	++	–	++	–
120	–	–	+	–	+	–
150	–	–	–	–	–	–

BGA = Blue-green algae; +++ = Better growth; ++ = Poor growth; + = Stunted growth; – = Lethal.

chloramphenicol, streptomycin (5, 10, 50, 100, 500 and 1000 ppm) and benzyl penicillin (5, 10, 50, 100, 500, 1000, 2000 and 3000 ppm) were added to the basal medium. The inoculum consisted of 2 apical bits (each of 1 cm length) of *H. valentiae* in 10 ml of the medium. The plant bits inoculated in 1000 ppm chloramphenicol and streptomycin and 3000 ppm benzyl penicillin were bleached within a week and in the remaining concentrations they showed growth. At the end of the 20th day the alga showed decreased fresh weight in all concentrations when compared to control (without antibiotic) (figure 1).

Macroscopic red algae have been recently studied[6,7] under laboratory conditions and it is essential to eliminate the contaminating micro-organisms. Diatoms and blue-green algal contaminants were eliminated by treating the algae with GeO_2 and antibiotics respectively[3,4]. We found that blue-green algal contaminants of *H. valentiae* were removed by treating with antibiotics like chloramphenicol and streptomycin. On the other hand benzyl penicillin was not effective. However the medium amended with antibiotics affected plant growth.

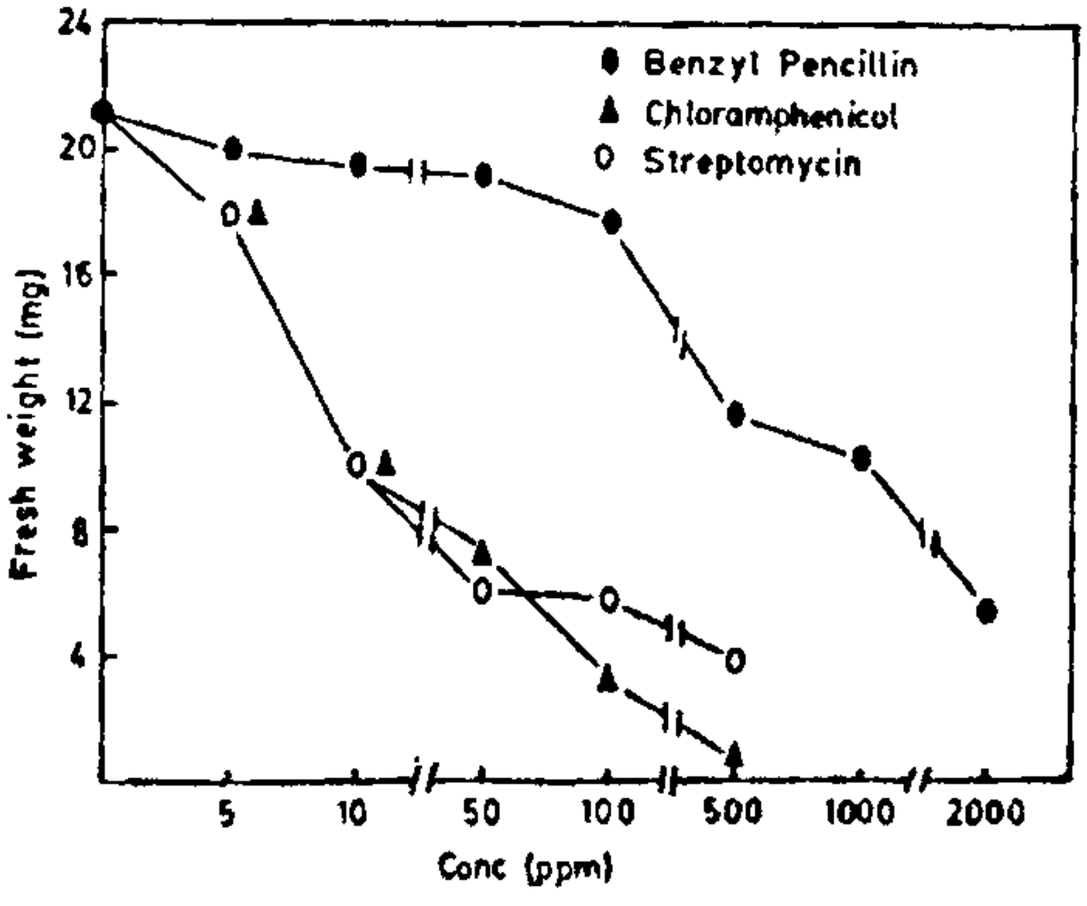

Figure 1. Fresh weight of *H. valentiae* at different concentrations of antibiotics (symbol on the axis represents control).

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NEW RUSTS FROM MANNANUR FOREST, ANDHRA PRADESH, INDIA

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MANNANUR forest is located in Achampet Taluk of Mahabubnagar District, Andhra Pradesh and lies between latitudes 16 and 16' 45' and longitude 78' and 79' 15'. River Krishna forms the southern and eastern boundary and river Dindi flows on the north eastern side. Mannanur forest is a tropical dry deciduous forest.

During a survey of the Mannanur forest for rust infected specimens, the present author collected four new rusts and their account is presented in this paper.

Caeoma scopariae Niranjan Rao sp. nov.

Spermogoniis ignotis. Aeciis hypophyllis, aggregatus subepidermalibus, erumpentibus, cupulatus, flavidus; aeciosporis catenulatus, 18–32.5 × 11–21.5 μm, globosis, ovoideis vel ellipsoideis, membrana 1.5–2 μm crassa, hyalino, verrucosa.

Holotypus: In foliis vivis *Scoparia dulcis* L. India, 11–11–1981. K. N. Rao. HCIO 36257.

Spermogonia not known. Aecia on stems and leaves, hypophyllous, borne in groups, subepidermal erumpent, pulverulent, cupulate, yellowish or orange in colour; aeciospores borne in chains 18–32.5 × 11–21.5 μm, globoid, ovoid and ellipsoid, wall 1.5–2 μm thick, hyaline, densely verrucose; peridium lacking.

Holotype: On the living leaves of *Scoparia dulcis* L. India, 11–11–1981, K. N. Rao. HCIO 36257.

The infected material showed aecial stage only. Aecia on stems and leaves, ellipsoid aeciospores with densely verrucose walls and absence of peridium are the distinct characters of this rust fungus.

Uredo cassiae Niranjan Rao sp. nov.

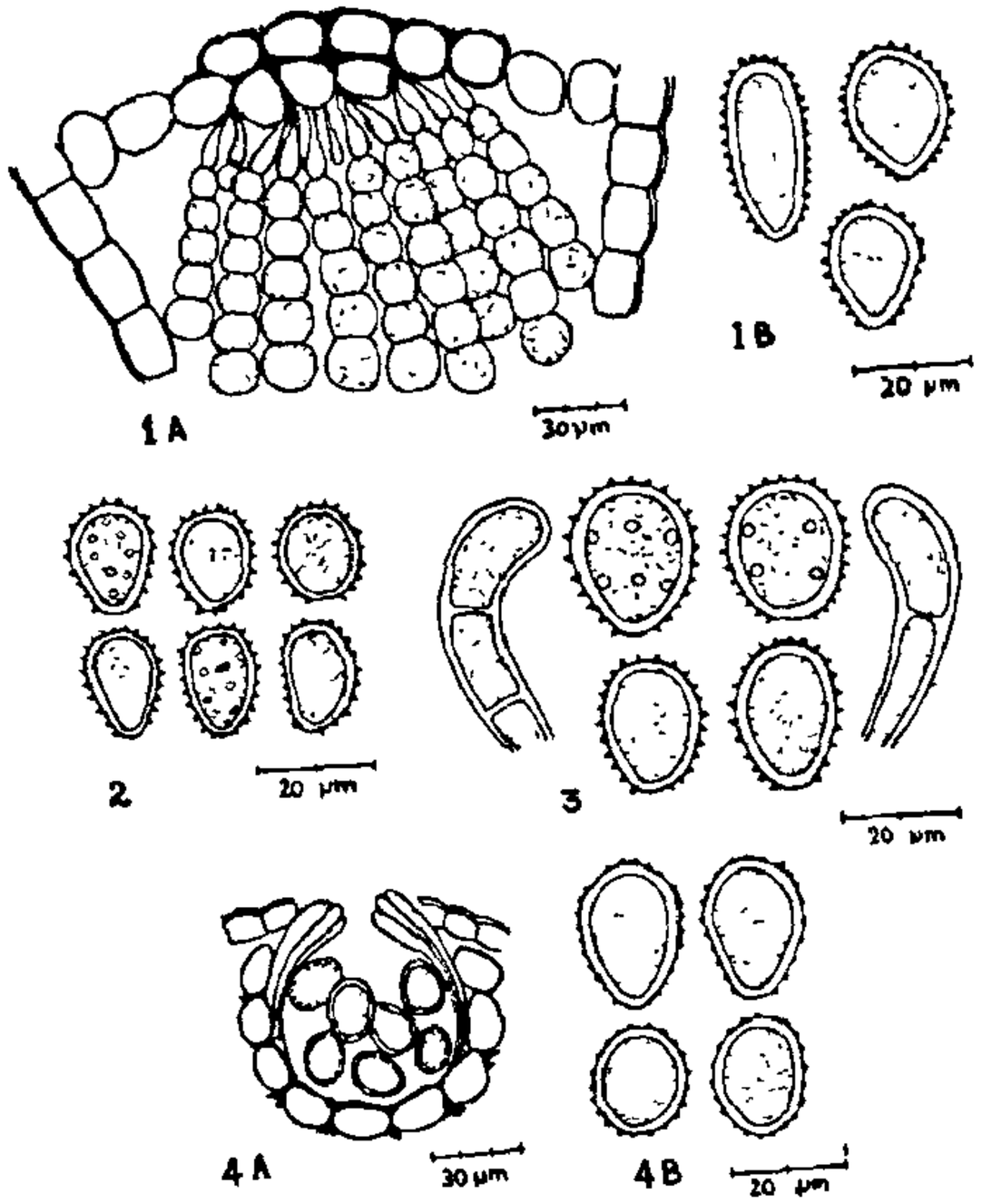
Urediniis amphigenis, sparsis, 0.5 mm diametro, subepidermalibus, erumpentibus, pulverulentis, cinnamomeo brunneis; urediniosporis 14.5–21.5 × 10.5–14.5 μm, globosus vel ovoideis, membrana 1.5–2 μm crassa, cinnamomeo-brunneis, echinulata; poris germinationis 6–8, sparsis.

Holotypus: In foliis vivis *Cassia occidentalis* L., India, 10–11–1981, K. N. Rao. HCIO 36258.

Uredinia amphigenous, scattered, round, 0.5 mm in diameter, subepidermal, erumpent, pulverulent, cinnamon brown; urediniospores 14.5–21.5 × 10.5–14.5 μm, globoid to ovoid, wall 1.5–2 μm thick, cinnamon brown, echinulate; germpores 6–8, scattered.

Holotype: On the living leaves of *Cassisa occidentalis* L., India, 10–11–1981, K. N. Rao, HCIO 36258.

From India there are three reports of rust fungi parasitizing on the genus *Cassia*. Sydow and Butler[1] reported *Aecidium cassiae* Bres., on *Cassia tora* L., Mundkur and Thirumalachar[2] described *Ravenelia berkeleyi* on *Cassia absus* L. Recently presence of a *Uredo* sp., without any formal description is reported by Rangaswami *et al*[3]. The present rust differs from the uredinispores of *R. berkeleyi*, in having subepidermal uredinia in contrast to subcuticular origin in former species.



Figures 1–4. **1.** *Caeoma scopariae*, A. Vertical section of aecium with aeciospores. B. Aeciospores; **2.** *Uredo cassiae*, Urediniospores; **3.** *Uredo mannanurensis*, urediniospores with paraphyses; **4.** *Uredo ochnae*, A. vertical section of leaf showing the urediniospores in locule. B. urediniospores.

Uredo mannanurensis Niranjan Rao sp. nov.

Urediniis hypophyllis, sparsis, minutis, subepidermalibus, erumpentibus, pulverulentis, rufo–brunneis, paraphysatus; paraphysibus numerosis, incurvatus, auranteo-brunneis; urediniosporis 14.5–25 × 14.5–21.5 μm, globosus, vel ellipsodieis, membrana 1–1.5 μm crassa, flavidus, echinulata; poris germinationis 4–6, sparsis.

Holotypus: In foliis vivis *Cordia* sp., India, 12–1–1981, K. N. Rao, HCIO 36259.

Uredinia hypophyllous, scattered, minute, round, subepidermal, erumpent, pulverulent, reddish-brown with abundant incurved, septate, orange brown paraphyses; urediniospores 14.5–25 × 14.5–21.5 μm globoid to ovoid, wall 1–1.5 μm thick, yellowish, echinulate; germpores 4–6 scattered.

Holotype: On the living leaves of *Cordia* sp., India, 12–1–1981, K. N. Rao. HCIO 36259.

So far only 3 anamorphic rusts are known to parasitize the species of *Cordia*. These are *Aecidium brasiliensis* Diet., *A. poonensis* Sathe, and *A. Walayarensis* Ramakr., T. S. and Sund. *A. brasiliensis*, was proved as the aecial stage of *Uromyces setariae–italicae* Yoshino.

Uredo ochnae Niranjan Rao sp. nov.

Urediniis hypophyllis, sparsis, minutis, subepidermalibus, locularis, erumpentibus, cinnamomeo-brunneis, paraphysatus; paraphysibus periphericus, incurvatus, brunneolus; urediniosporis 18–28.5 × 14.5–21.5 μm, ovoideis vel ellipsoideis, membrana 1.5 μm crassa, hyalina, echinulata; poris germinationis equatorialibus, 3 vel 4.

Holotypus: In foliis vivis *Ochna lanceolata* Spr., India, 10–11–1981, K. N. Rao, HCIO 36260.

Uredinia hypophyllous, scattered, minute, round, subepidermal, borne in-locules, erumpent, light cinnamon brown, paraphysate; paraphyses peripheral, incurved, brownish; urediniospores 18–28.5 × 14.5–21.5 μm, ovoid or ellipsoid, wall 1.5 μm thck, hyaline, echinulate; germpores 3–4 equatorial.

Holotype: On the living leaves of *Ochna lanceolata* Spr., India, 10–11–1981, K. N. Rao HCIO 36260.

So far no rust species have been reported on *Ochna*. The present species represents by uredinia only, uredinia borne in locules. This character keeps it apart from other uredinial stages of rusts reported on the members of Teliaceae.

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METHYL ISOCYANATE AND FERN GAMETOPHYTE

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From the unending reports, both political and scientific on the effects of methyl isocyanate (MIC) gas on biological objects, it has now become abundantly clear that MIC could be carcinogenic as well as mutagenic. While the former property is apparent by mortality, the latter may constitute some interesting departures from the normal form and structure of the organism affected by MIC. In this context a few fern leaves dried up due to exposure to MIC gas leaked from Union Carbide Factory on the fateful day of 2nd December 1984 were collected from the private garden of a resident doctor working at Indian Railways in Bhopal. The spores from these leaves were tapped out and later cultured in the laboratory in culture room at 24 ± 2°C under continuous white fluorescent illumination on nutritive agar gel plates[1]. The spores thus prepared eventually germinated and gave rise to some aberrant gametophytes which are recorded (figures 2-5). A couple of plants belonging to the same species also happened to grow in the botanical garden of this university which served as control for comparison purposes (figure 1).

Most control spores of *Thelypteris augescens* (Link) Munz and Johnston germinated within 4 days, showing 90% germinability. Normally bilobed mature prothallus is produced in 31 days whereupon antheridia initiated in about a week's time and thereafter these prothalli turned bisexual in another 7 days. The MIC affected spores, however, showed delayed germination, in 8 days, with less germinability (41%). The length of protonema, cell number and chlorophyll contents decreased in comparable stages of control prothalli. The lengths of rhizoids were also affected and these showed septation, chlorophyllousness and spiralization. The young and old protonema showed excess branching and no sex organs ever appeared on them whereas sporophytes regularly initiated, after sexual union on control prothalli in 52 days of germination.

It is noteworthy that the aberrations noted above showed some kind of similarity with those induced by mutagenic agents such as benomyl[2], maleic hydrazide[3,4] and colchicine[5]. On the basis of such observations on mutagenesis it appears that MIC