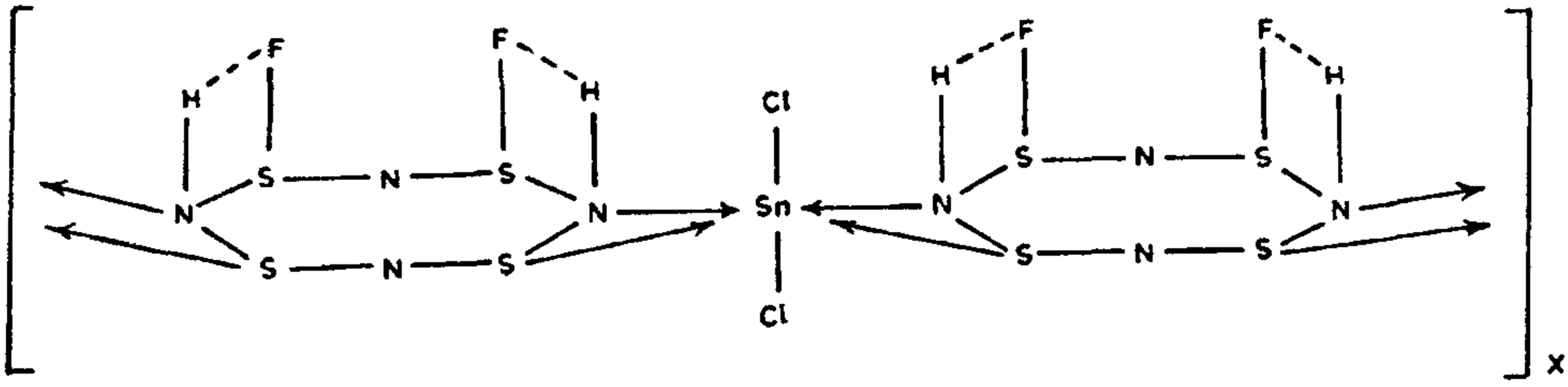

Figure 1. Proposed structure of $[S_4N_4H_2F_2SnCl_2]_x$ (where X = 4.21).

13.12; H, 0.49; F, 9.22; Sn, 28.89; Cl, 17.23. Thus the molecular formula of the complex is assumed to be $[S_4N_4H_2F_2SnCl_2]_{4.21}$.

The IR spectrum of the complex shows strong bands at 840 and 990 cm^{-1} for the two S–N bonds possessing a co-ordinated S atom. The vibrations 1020 and 1060 cm^{-1} correspond to the two S–N bonds with a co-ordinated N atom. The frequencies 1120 and 1230 cm^{-1} correspond to the two N–S–F groups in the complex. The vibration 1360–1660, 3100–3400(b) cm^{-1} indicates the presence of S–N–H group. The latter band, 3100–3400(b) cm^{-1}, is broad, indicating hydrogen bonding in the complex. Thus $S_4N_4H_2F_2$ acts as a tetradentate chelating agent, co-ordinating through S and N of TTADHF cyclic ring, and a polymeric complex is formed (figure 1).

The electronic spectrum shows two peaks, at 26,315 (ν_1) and 40,816 (ν_2) cm^{-1}; the former is due to $p\pi \rightarrow d\pi$ transition and the latter indicates charge transfer. Presence of charge transfer is also supported by the value $\nu_2/\nu_1 = 1.55$ $(1 \sim 2)$. The computed values for oscillator strength (f, 1.38×10^{-5}), energy gap (ΔE, 1.79 eV) and conductivity (λ_a, 2.9×10^{-11} mho.cm^{-1}) suggest the spin-allowed Laporte forbidden transition and semiconductive nature of the complex.

The EPR spectrum of the complex shows a narrow peak of high intensity, and other peaks are blurred, indicating the presence of unpaired electrons. The narrowness of the main peak and blurring of the other peaks also suggest the transfer of electrons from S and N atoms of TTADHF to Sn atom of $SnCl_2$. This implies a co-ordinate bond and polymerization of the $S_4N_4H_2F_2SnCl_2$ unit to a tetramer, with quadridentate bridging of each unit through the Sn atom. The values of magnetic moment μ_{eff}, 1.72 BM, and magnetic susceptibility χ_A, 1.86×10^{-3}, confirm the presence of unpaired electron, indicating hydrogen bonding, semiconductivity and paramagnetism in the complex. The values of $g_\parallel$ (1.981), $g_\perp$ (1.985) and A_H (66 gauss), which indicate empty shell and electron transfer, also support the co-ordination. The lower value of spin orbital coupling constant (λ_5 25.97 cm^{-1}) indicates slight spin orbital coupling.

Since the structure of TTADHF has been reported, the geometrical array of the complex, which is a tetradentate co-ordinated tetramer, may be proposed to be as shown in figure 1.

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BENTHIC FORAMINIFERA AS BATHYMETRIC INDICATORS

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STUDIES on benthic foraminiferal distributions in continental margin sediments of some parts of the world have been carried out by several workers[1–4]. Bathymetric distribution of foraminifera in the continental margin of Visakhapatnam, east coast of India (17°43′ N, 83°15′ E), has been reported earlier[5].

Table 1 *Bathymetric distribution and frequency of occurrence of Bulimina and Uvigerina*

	Occurrence	
Species	Depth range	Frequency
B. affinis	Outer shelf–upper slope	Common
B. gibba	20 m–Outer shelf	Common
B. marginata	20 m–Outer shelf	Common
B. marginata biserialis	Outer shelf–upper slope	Rare–common
B. striata var. *mexicana*	Upper slope	Common
B. subornata	Upper slope	Abundant
Neouvigerina porrecta	Outer shelf	Common
U. bifurcata	Middle shelf–outer shelf	Common–abundant
U. hispidocostata	Outer shelf	Common
U. peregrina	Middle shelf–outer shelf	Common–abundant
U. pigmaea	Outer shelf	Common
U. proboscidea	20 m–Middle shelf	Rare–common
U. schwageri	Upper slope	Very abundant

The distributions of *Bulimina* and *Uvigerina* in this area are described here.

In the Visakhapatnam continental margin sediments, *Bulimina* is represented by six species and *Uvigerina* by seven species. Their bathymetric distribution and frequency of occurrence are shown in table 1. *Uvigerina schwageri*, *Bulimina subornata* and *B. striata mexicana* are typical of the upper continental slope biofacies. They are less ornamented than the other species of these genera that occur in the continental shelf. *U. peregrina* and *U. bifurcata* increase in abundance from the inner to the outer shelf.

These forms of *Bulimina* and *Uvigerina* are known to occur in the subcrop Miocene sediments in the Krishna–Godavari basin, which have been proved to be hydrocarbon-bearing. Their bathymetric distribution (shown in table 1) will help in distinguishing the inner shelf, outer shelf and upper bathyal environments from one another in the Tertiary sedimentary basins along the east coast of India.

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SHEATH BLIGHT OF RAGI

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RAGI (*Eleusine coracana* Gaertn.) is an important minor millet grown in several parts of India. A severe sheath blight was observed during October 1987 in some of the ragi plants grown in the Crop

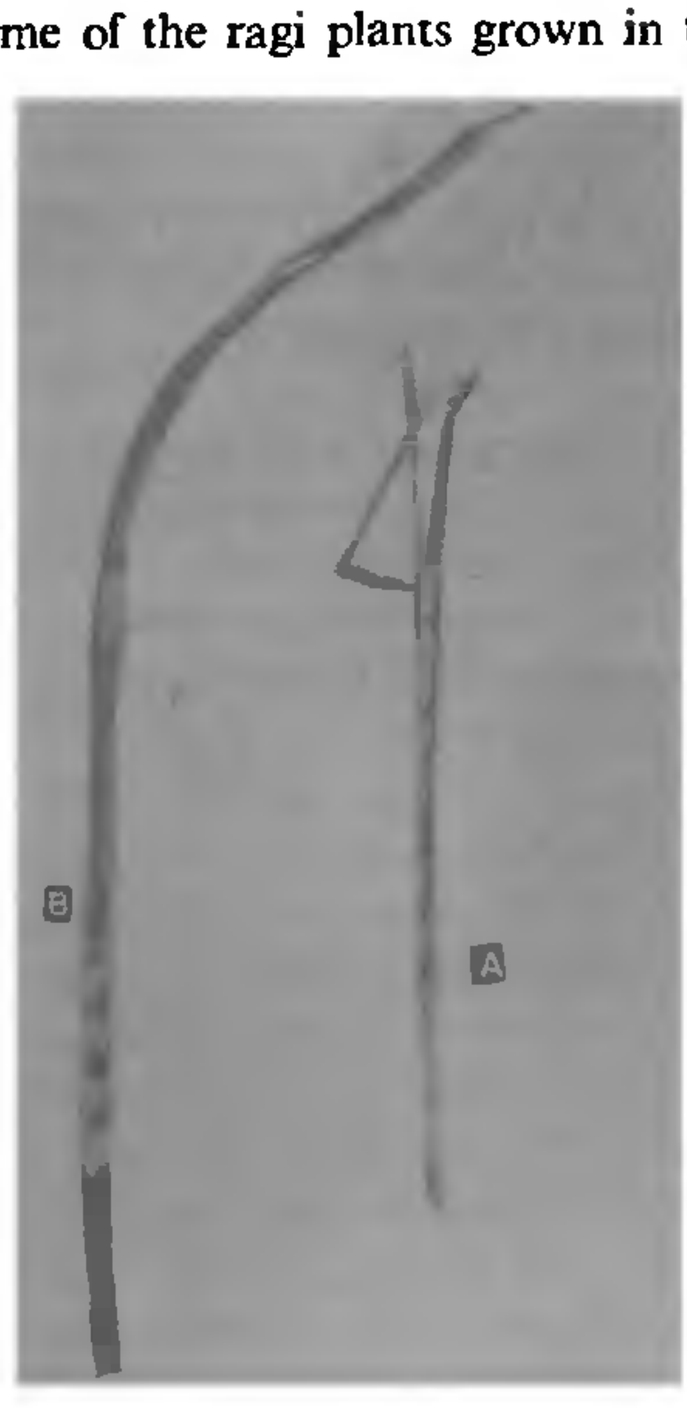

Figure 1. Sheath blight symptoms on ragi. **A**, On sheath; **B**, On leaf.