Thus substituting the values of N_0, M_0, R_{0t}, N_{0t}, M_t, and rearranging equation (21) we have,

$$\frac{C}{C_{0t}} = P\left[\frac{(N_u - H_u)\,r}{G_2 + KrC_{0t}t} + \frac{(M_u - H_u)}{G_2 + KC_{0t}t} + \frac{(r+1)\,H_u}{G_2 + (r+1)\,KC_{0t}t} + \sum_{i=1}^{i=c} \frac{A_i}{G_2 + KA_iC_{0t}t} + \sum_{i=c+1}^{i=N} \frac{r \cdot N_i}{G_2 + KrN_iC_{0t}t} + \sum_{i=c+1}^{i=M} \frac{M_i}{G_2 + KM_iC_{0t}t}\right] \quad (22)$$

where

$$A_i = (r \cdot N_i + M_i).$$

This is the equation that describes hybridization, and it is easy to see that reassociation is a special case of hybridization, as equation (22) reduces to eqution (8) when the two DNA type is equal in all respects.

Discussion

The utility of these equations depends on whether the unknown parameters are computable or not. In case of equation (8), the unknowns (Repetition Class and Frequency) can be computed using non-linear least square fit method[3], or by "trial linearizing method" (unpublished result). Evaluation of the unknown parameters of equation (22) cannot however be easily done if we are working with two unknown species. However if on the other hand the repeated class and frequency of the two species are known then H_u and c remain only the two unknowns. For the evaluation of c the simplest method would be to put $c = 0, 1, 2, \ldots N$ and see which of the values of c fits best into equation (22) at various C_0t values. This is facilitated by the fact that reassociation of unique sequences occur when the reassociation of repeated sequence is more or less complete. Thus while evaluating c we can take the first three terms of equation (22) as constants and equal to $P(r \cdot N_u + M_u)/G_2$. For evaluation of H_u we use late C_0t values where the last three terms equal zero.

Utilizing these C_0t values, evaluation of H_u is simply straightforward. From the experimenters point of view, r is a vital parameter. In fact this is the only parameter that can be judiciously varied to give different degrees of resolution in the analysis of sequence homology among various species. Optimum values of r depends on the ratio of genome size of the two species. Detailed analysis of equation (22) with respect to r, corresponding to various degrees of homology among species, will be published elsewhere.

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ANTIMICROBIAL PROPERTIES OF THE ESSENTIAL OIL OF *VATERIA INDICA*

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Vateria indica Linn (Syn. *V. malabarica* and *Chloroxylon dupada*) belongs to the natural order *Dipterocarpaceae*. It is distributed in the forests of Western Ghats of India from North Kanara to Tarvancore and Tirunelveli at elevations up to 4000'[1]. Various parts of the plant are used for curing different ailments[2,3]. The oleo-resin is used as an incense in paints, varnishes and in ointments. It is also used as stimulant, dressing for carbuncles and other ulcerations. In the present investigations the study of the antimicrobial activity of the essential oil extracted from the oleo-resin has been undertaken.

The oleo-resin when extracted by water and steam distillation has yielded a yellowish brown coloured essential oil in 1·5% yield. For the determination of antibacterial activity the "Oxoid Nutrient Broth" was used for making the inoculum and the media was prepared by adding 2% agar to the "Oxoid Nutrient Broth". For the determination of antifungal activity "Saboraud's Broth" was used for making the inoculum and the media was prepared by adding 2% agar to the "Saboraud's Broth". For determining the antimicrobial activity paper disc diffusion method of Maruzzella and Henry[4] was used.

The bacteria tested are—*Bacillus anthraces*, *Bacillus subtilis*, *Corynebacterium pyogenes*, *Escherichia coli*, *Haemophillus influenzae*, *Klebsiella pneumoniae*, *Pasteurella* sp., *Proteus vulgaris*, *Pseudomonas aeruginosa*, *Salmonella pullorum*, *Salmonella newport*, *Salmonella richmond*, *Salmonella stanley*, *Salmonella typhimurium*, *Staphylococcus aureus* and *Streptococcus agalactiae*.

The fungi tested are—*Aspergillus flavous*, *Aspergillus fumigatus*, *Aspergillus niger*, *Candida albicans*, *Fusarium* sp., *Penicillium digitatum* and *Rhizophus stolonifera*.

The sterile discs (6 mm in diameter) prepared from the discs of very pure and highly absorbant paper for the assay of penicillin and other substances[5] have been used. The discs dipped in the essential oil were placed over the seeded medium and incubated for 36 hours in the case of bacteria and 72 hours in the case of fungi. The experiment was performed in duplicate and the average zones of inhibition have been recorded. The activity of the oil was also tested in different concentrations. The dilutions of the oil were prepared in ethylene glycol, which has no antimicrobial property. The experiment was also performed with standard antibacterial and antifungal substances, *i.e.*, 0·5% actidione and 0·5% hamycin respectively. The activities of the oil are compared with standard substances.

The results show that the oil is more active than the corresponding reference in controlling the growth of *B. subtilis*, *P. aeruginosa*, *S. newport*, *S. richmond*, *A. niger* and *C. albicans* and similar activity against *S. pullorum* and *Fusarium* sp. The oil has almost the same actvity as that of the reference in inhibting the growth of *B. anthraces*, *E. coli*, *S. typhimurium*, *A. flavous* and *P. digitatum*. The oil has not shown any activity in controlling the growth of *C. pyogenes* and *Pasteurella* sp. Against the rest of the organisms the oil has shown some activity but less than the references. The results also show that the oil is active even at a concentration of 1% against some organisms.

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BIDENTATE-BRIDGED HEXAMETHYLENE-TETRAMINE COMPLEXES WITH MERCURY(II) CHLORIDE, BROMIDE AND CYANIDE

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HEXAMETHYLENETETRAMINE (Hmta), a heterocyclic system having three fused rings in the chair configuration with four-bridge-head nitrogen atoms, is known to form complexes with metal salts[1–3] as well as with halogens[4,5]. However, there is no report on the complexes of mercury(II) salts with this ligand. The present study on the preparation and i.r. spectral features down to 200 cm^{-1} on the coordination compounds formed by the interaction of mercury(II) chloride, bromide and cyanide with Hmta has been undertaken to elucidate the mode of bonding of Hmta, of the halogen/cyanide groups and the tentative stereochemistries of the complexes.

Mercury(II) chloride, bromide and cyanide complexes of Hmta were prepared by mixing together the respective mercury(II) salts and an excess of Hmta solution in ethanol. The complexes precipitated or crystallized immediately were suction-filtered, washed with ethanol and dried. Stoichiometries of the complexes isolated were established by standard analytical methods and satisfactory analytical data were obtained.

Hg(Hmta) Cl_2 : m.p. 212° C; Hg(Hmta) Br_2 : m.p. 200° C; Hg(Hmta) $(CN)_2$: m.p. 205° C.

Conductivity measurements were made on freshly prepared $\sim 10^{-3}$ M solutions in DMF at 25° C using a Philips conductivity bridge Model PR 9500. I.r. spectra of Hmta and its complexes were recorded as nujol mulls on a Perkin-Elmer 621 spectrophotometer.

Hmta formed 1 : 1 complexes with all the mercury (II) salts. The complexes investigated are insoluble in methanol and ethanol but soluble in DMF. Molar conductances of $\sim 10^{-1}$ M solutions in DMF indicate that they behave as non-electrolytes ($\Lambda = \sim 2$–7 $ohms^{-1}$ cm^2 $mole^{-1}$). Insobluility of these complexes in molten camphor precluded molecular weight measurements. No absorption bands were observed which could be attributed to water or ethanol in any of these spectra thus establishing that these complexes were free from coordinated or lattice water/ethanol.

Hmta is a potentially tetradentate ligand and the chemical and steric equivalence of the four nitrogen atoms has been demonstrated by various physicochemical metyods[6,7]. It may thus act as a mono-, bi-, tri- or tetra-dentate ligand. Molecular models

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