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Physical Sciences Section

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STUDIES IN HARMINE SERIES OF ALKALOIDS

Part I. Derivatives of Tetrahydroharmine

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As part of studies in structure activity relationship in β -carboline bases, a series of N-substituted and benzene ring substituted derivatives of tetrahydroharmine have been prepared in high yields and characterised through chemical and spectral studies.

**SOME REACTIONS OF 3-CYANO-4-P-CHLOROPHENYL-6-[1'-(2'-METHOXY
NAPHTHALENYL)]-2-THIOPYRIDONE AND 2-METHYL-(b)-2-[α -B-METHOXY
NAPHTHALENYL]-4-P-CHLOROPHENYL-3', 4'-DIHYDROPYRIDYL]
AZACHROMONE**

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(Received October 27, 1980)

Reactions of 3-cyano-4-P-chlorophenyl-6-[1'-(2'-methoxy naphthalenyl)]-2-thiopyridone (2) with alkylating agents, acrylonitrile and formaldehyde in the presence of appropriate amine have been investigated. Thus treatment of 3-cyano-2-thiopyridone 2 with ethyl iodide and/or chloroacetic acid gave the corresponding S-alkylated derivatives 3a and 3b respectively. Reaction of 2 with acrylonitrile gave compound 3c. Hydrolysis of 3c with sodium hydroxide gave compound 4. Oxidation of 3a with KMnO_4 in the presence of sulphuric acid gave sulphone derivative 5.

Thione 2 underwent Mannich reaction to give compounds 6a and 6b. 2-Methyl azachromone (7) condensed with phthalic anhydride in the presence of fused sodium acetate to give phthalide derivative (8). Heating 8 with aniline gave 7 and N-phenyl phthalimide. Hydrolysis of 8 with NaOH gave phthalic acid and compound 9; Refluxing 8 with alcoholic CH_3ONa gave compound 10. The aim of the present investigation is to synthesise some new pyridine derivatives. Their antimicrobial action was also studied.

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SYNTHESIS OF ANISIC ACID--AND ANISOLE--SULFONYLAMINO ACID DERIVATIVES

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(Received January 1, 1980)

Synthesis of some 2-methoxy-5-carboxybenzene sulfonylamino acids and 4-methoxybenzene sulfonylamino acids and some of their corresponding methyl esters, hydrazides and dipeptide derivatives (Table 1, Compounds 2-21 and Table 2, Compounds 22-43) are described. Compounds (16-19 and 36-39) were found to be active against a number of microorganisms.

ION-EXCHANGE EQUILIBRIA OF Ca(II), Mg(II), Co(II), Ni(II), Cu(II), AND Co(II), Ni(II) /Cu(II) EXCHANGE ON LEWATITE S-100 CATION-EXCHANGE

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(Received July 9, 1980)

The exchange systems $\text{Ca}^{2+} - \text{H}^+$, $\text{Mg}^{2+} - \text{H}^+$, $\text{Co}^{2+} - \text{H}^+$, $\text{Ni}^{2+} - \text{H}^+$, $\text{Cu}^{2+} - \text{H}^+$ and $\text{Ni}^{2+} - \text{Cu}^{2+}$ were studied using Lewatite S-100 at 25° and ionic strengths of 0.025, 0.05, 0.1, 0.3 and 0.5M. Activity corrections were made by method of graphical integration for the ions in the aqueous solution phase to obtain the true exchange-equilibrium constant. The resulting selectivity coefficients increase with ionic strength of the medium and follow the sequence $\text{Ca(II)} > \text{Mg(II)} > \text{Co(II)} > \text{Ni(II)} > \text{Cu(II)}$.

This order is found to correlate well with the order of hydrated ionic radii. The above sequence for Co^{2+} and Ni^{2+} is reversed at ionic strengths of 0.25 and 0.05 M. The characteristic maximum water uptake of the resin in such ionic forms decrease with the increase in the values of selectivity coefficient.

CHROMATOGRAPHY ON DEAE-CELLULOSE AND ELECTROPHORESIS IN POLYACRYLAMIDE GEL OF PROTEIN FRACTIONS FROM LENTILS SEEDS

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(Received July 19, 1981)

Total salt soluble protein extract of lentils seeds was fractionated with different concentrations of ammonium sulphate. Fractions were analysed by chromatography on DEAE-cellulose and electrophoresis in polyacrylamide gel. Seeds contained a highly complicated heterogeneous system of individual proteins. Fraction 0-30 was enriched with minor protein components and nucleic acids. Fraction precipitated with ammonium sulphate of below 60 % concentration was enriched with primary and secondary globulins. Fraction 60-100 was dominated by vicilin and legumin.

**ARRHENIUS PARAMETERS AND TRANSITION STATE THEORY FUNCTIONS
FOR THE RECEMISATION OF 8, 8'-BIS (PROPOXYMETHYL)-1,1'-BINAPHTHYL**

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(Received November 11, 1980)

Optically active 8,8'-bis(Propoxymethyl)1,1'-binaphthyl has been synthesised and Arrhenius Parameters and Transition State Theory functions for racemisation have been calculated from measurement of velocity constants for racemisation; a comparision is made with other optically active 8,8'- and 2,2'-di-substituted 1,1'-binaphthyls investigated previously [1-6].

Short Communication

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PRELIMINARY STUDIES ON HYPOGLYCEMIC ACTIVITY OF *ANTICHARIS GLANDULOSA*

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Biological Sciences Section

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CHANGES IN THE ELECTROPHORETIC PATTERNS OF WATER SOLUBLE PROTEINS OF FISH AND SHRIMP DURING STORAGE

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(Received January 12, 1981)

Changes that occur in the electrophoretic protein patterns of thirteen marine fish and two shrimp species during ice and frozen storage were studied using polyacrylamide gel electrophoresis. Difference in the electrophoretic mobility of proteins was attributed to different rates or mechanisms of protein denaturation. It may also be due to the addition and/or loss of small molecules. Merits of polyacrylamide gel electrophoresis technique as an index of spoilage during various stages of ice storage are discussed.

**EFFECT OF ENDOTOXIN OF *BACILLUS THURINGIENSIS* ON FECUNDITY AND
LONGEVITY OF ADULT BOLLWORM, *HELIOTHIS ARMIGERIA* (Hubn)**

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and

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(Received February 25, 1981)

This paper presents in detail a comparative account of oviposition results of *Heliothis armigera* (Hubn) adults treated, in larval stage with 10 and 20 µg conc of *Bacillus thuringiensis*-δ-endotoxin spore complexes of HD-1-S-1971 and native strain No. Bt-145. The pre-oviposition period of adults treated* with 10 and 20 µg conc of toxin of HD-1-S-1971 and 10 µg conc of toxin of Bt-145 reduced. The fecundity and longevity of adults treated with 10 and 20 µg conc of spore-δ-endotoxin complexes of Bt-145 and 10 µg conc of HD-1-S-1971 reduced significantly. All oviposition experiments were carried out at temperature ranging from 77°-97°F. This paper also includes the description of lamp glass mating-oviposition cage.

MICRONUTRIENT CONCENTRATIONS IN CORN AND A COMPARISON OF THE VARIOUS EXTRACTANTS FOR SOIL Zn AND Cu

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Leaf survey for micronutrient levels in corn indicated no deficiency of Zn, Cu, Fe and Mn in the various soils despite the latter, having found responsive to the micronutrient fertilization in wheat, expected to be deficient in the different micronutrients.

Corn (var: Neelum) was grown for 33 days with 10 ppm of Zn and Cu in pots containing 4.5 kg each of the 23 soils taken from those areas to know their response and suitability of some extractants for measuring available Zn and Cu in soils. Dry weight results showed that corn was not that much responsive to Cu as to Zn. Concentration of Zn in plants, grown without Zn, ranged from 13–15 ppm which increased to 2 to 3 times with Zn application while that of Cu, with or without Cu application, varied from 8–14 ppm falling within the adequate range (4–20 ppm) of Cu. Both showed a depressive effect on the uptake of each other.

From Zn and Cu contents extracted by various extractants, the soils were generally noticed low in Zn but not in Cu. Correlation studied between soil Zn extracted by various extractants and plant Zn uptake was highly significant ($r=0.76-0.88$) and that between soil Cu and plant Cu uptake was very poor. Soil available-Zn and plant dry weights had non-significant negative correlation.

Technology Section

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HEAT EXCHANGE PROCESSES AT THE WATER SURFACE IN THE EASTERN IRISH SEA

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In the Eastern Irish Sea the increase in heat content of the water column was calculated from mid February (considered to be time of temperature minimum) to the time of the summer cruise, from the temperature profiles of the STD stations. It is found that the increase in heat content was predominantly due to the heat balance between Ocean and atmosphere. The values of approximately $3.5 \times 10^4 \text{ cal cm}^{-2}$ for the deeper water in the south-west of the area in 1975 are similar to the values given by Pingree (1975) for the heat stored in the water column from mid March to mid September in the Celtic Sea and in the western approaches to the English Channel. The higher values of $4.5 \times 10^4 \text{ cal cm}^{-2}$ shown between the North-East corner of the Isle of Man and the mouth of Solway Firth is comparable with Pingree's value of $5.0 \times 10^4 \text{ cal cm}^{-2}$ found in the Hurd deep area of the English Channel.

RELEASE OF SALICYLIC ACID FROM OINTMENT AND CREAM BASES

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(Received October 2, 1980)

A large number of ointment and cream formulations, with emulsion, absorption and oleaginous bases have been prepared incorporating salicylic acid as the active component. The release of salicylic acid from these bases has been estimated which lies in the following order: emulsion > absorption > oleaginous bases. The effect of different concentrations of some non-ionic surfactants on diffusion of salicylic acid from hydrophilic ointments has also been studied.