able, to a large extent, to represent the various features observed by the geologists, and to bring out a picture of the basement relief. The basin has been shown as a separate and distinct unit from the rest of the area indicating the extended boundaries. The major eastern boundary fault propounded by King has found its representation on the anomaly map. Results of further analysis of the data and the quantitative studies made, have also broadly conformed to the general qualitative interpretation obtained herein.

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SOME PHYSICOCHEMICAL PROPERTIES OF N-BENZENESULPHONYL L(--)-HISTIDINE AND RELATED LIGANDS

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ABSTRACT

The syntheses of N-benzenesulphonyl L(--)-histidine (R<sup>6</sup> H<sub>2</sub>), α-benzenesulphonamido β-2-benzimidazolyl L(--)-n-propionic acid (R<sup>5</sup> H<sub>2</sub>) have been reported and the UV and IR spectral data recorded. Preparation of α-benzenesulphonamido γ-2-benzimidazolyl L(+) n-butyric acid (R<sup>5</sup> H<sub>2</sub>) has also been described. Ir data show that these compounds exist as zwitterions.

EXPERIMENTAL

N-Benzenesulphonyl L(--)-Histidine (R<sup>6</sup> H<sub>2</sub>)—L(--)-Histidine was allowed to react with benzenesulphonyl chloride in the presence of warm alkali. The reaction product was treated with norit, filtered and acidified with warm acetic acid (pH ~ 3), when shining crystals of R<sup>6</sup> H<sub>2</sub> separated. It was recrystallized from hot water, m.p. 267° d. slightly soluble in water, ethanol; soluble in DMF, DMSO, etc. (Found : Eq. Wt. 296.5 C<sub>12</sub>H<sub>19</sub>O<sub>4</sub>N<sub>3</sub>S requires Eq. Wt. 295.0). UV spectrum λ<sub>max</sub> 285 nm (log ε 3.71), 274 nm (3.78), 267 nm (3.81) and 215 nm (4.01).

α-Benzenesulphonamido β-2-benzimidazolyl L(--)-n-propionic acid (R<sup>5</sup> H<sub>2</sub>)—N-Benzenesulphonyl L(--)-aspartic acid (0.11 mole) and α-phenylene-
diamine (0.2 mole) in 60 ml 4N hydrochloric acid were gently boiled under reflux for 4 h. After cooling the pH of the solution was adjusted to ~ 9 first with NaOH and finally with NH₄OH. The compound separated was collected by filtration and found to be 2-" (benzenesulphonamido) ethylene dibenzimidazole. By adjusting the pH of the filtrate to about 3 with acetic acid, a white crystalline compound is separated. The compound was dissolved in dilute ammonia and recrystallised from warm aqueous DMSO. White shining crystals were obtained, m.p. 226° d, slightly soluble in water and ethanol but highly soluble in DMF, DMSO, etc. (Found : C, 52.30; H, 4.80; N, 11.60; C₁₅H₁₅O₄N₃S, H₂O requires C, 52.89; H, 4.68; N, 11.57%). UV spectrum λ_max^OH 280 nm (log ε 3.70), 275 nm (3.81), 243 nm (3.76) and 223 nm (3.93). If to the filtrate after separation of 2-" (benzenesulphonamido) ethylene dibenzimidazole, 40 ml of ethanol were added and then acidified by acetic acid, shining white crystals were obtained, m.p. 198° d. It is soluble in water, ethanol, DMF, DMSO, etc. (Found : C, 58.20; H, 5.20; N, 15.30. C₂₂H₂₃O₄N₅S requires C, 58.28; H, 5.88; N, 15.45%). UV spectrum λ_max^H₂O 277 nm (log ε 4.88), 271 nm (4.87) and 226-227 nm (5.08).

α-Benzenesulphonamido γ-2-benzimidazolyl L(+) n-butyric acid (R^+ H₂).—This compound is a monobenzimidazole derivative of N-benzenesulphonamido L(+) glutamic acid and was prepared following the method reported in our previous communication. An equimolecular mixture of α-phenylenediamine and monopotassium salt of N-benzenesulphonamido L(+) glutamic acid (0.04 mole each) in 45 ml 4N HCl was boiled under reflux for 4 h. The pH of the cooled solution was adjusted to ~ 9 first with NaOH and finally with NH₄OH and filtered. On acidification of the filtrate (pH ~ 4) by acetic acid, a white crystalline compound separated. It was recrystallised from warm aqueous DMSO, m.p. 236° d, slightly soluble in water, ethanol, highly soluble in DMF, DMSO, etc. (Found : Eq. Wt., 358.0; C, 57.03; H, 4.91; N, 11.73. C₁₇H₁₇O₄N₃S requires Eq. Wt., 359.0; C, 56.82; H, 4.73; N, 11.69%). UV spectrum λ_max^KBr 281 nm (log ε 3.72), 275 nm (3.77) and 235-236 nm (3.72).

UV spectra were measured with a PYE UNICAM spectrophotometer. IR spectra were obtained with a BECKMAN 1R-20 spectrophotometer in KBr discs. The pk values were determined using BECKMAN pH meter at constant ionic strength (μ = 0.5) at 31 ± 1°. Melting points recorded were uncorrected.

DISCUSSION

Analytical data indicate that the compound C₁₅H₁₅O₄N₃S is a monobenzimidazole derivative of N-benzenesulphonamido L(+) aspartic acid which may be represented by any one of the two alternative ways (1 a) or (1 b) (Fig. 1). Comparing the pk_a OH (2.48) of C₁₅H₁₅O₄N₃S with that for the starting material N-benzenesulphonamido L(+) aspartic acid (pk_a = 2.84, pk_a = 4.41) and pk benzimidazolium ion (5.60) with that for some known compounds, it is obvious that this compound is actually (1 a). The compound C₂₂H₂₃O₄N₅S is a salt of R^+ H₂ and α-phenylenediamine.

Electronic spectra of the compounds show a number of peaks in the uv region, which are
ISOLATION AND CHARACTERISATION OF ANTHOCYANIN PIGMENT FROM PHOSPHORUS-DEFICIENT MAIZE PLANTS

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ABSTRACT

Phosphorus-deficiency in maize (Zea mays var. Ganga-5) resulted in the accumulation of anthocyanin pigment in leaves. The accumulating pigment was extracted in methanol–HCl (99:1) and a part of it was hydrolyzed to separate the aglycone (anthocyanidin) and the sugar moiety. The purified anthocyanin pigment and its aglycone were subjected to chromatographic and spectroscopic analyses and the pigment was identified as cyanidin-3-glycoside, a monoside. Sugar moiety was identified as rhamnose. On the basis of these studies, the accumulating pigment was characterized as cyanidin-3-rhamnoside.

INTRODUCTION

Identification of anthocyanin pigment in maize has so far been accomplished only in the aleurone layer of seeds† and the anthers of Pr strains‡. But no information is available on the identity of the pigment accumulating in the leaves of phosphorus-deficient maize. It was, therefore, decided to undertake the identification of the accumulating pigment.

EXPERIMENTAL

Phosphorus-deficiency was developed in maize (Zea mays var. Ganga-5) plants, grown by sand

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