THE GLYCOSIDIC COMPONENTS OF THE FLOWERS OF BUTEA FRONDOSA

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The flowers of Butea frondosa find use in fairly large quantities even at the present time. In the course of a detailed study of the chemical composition it has been found necessary to separate the different types of components carefully. By an initial extraction with petrol the flower wax was isolated and its chemical composition was described.1 The de-fatted material was extracted with alcohol and by subsequent treatment of the concentrated extract with water and ether, butin and butein were isolated.2 Continuing the work it has now been possible to obtain butrin in a high state of purity and in high yield without the difficulty that is experienced when employing the method of the previous workers.3 This is obviously due to the removal of interfering impurities in the earlier stages.

Hydrolysis of this glucoside with dilute sulphuric acid has been stated to yield the flavanone, butin. Similar statements have been made regarding other flavanone glycosides such as naringin, hesperidin, etc. Carefully purified butrin has now been hydrolysed with dilute sulphuric acid and the product examined using the method that has been already described for the separation of the two isomeric compounds, the flavanone and the chalkone. As the result it is noticed that along with butin which is the major part some quantity of butein is also produced. Since particular care has been taken to employ a pure sample of butrin which is free from chalkone derivatives, the formation of butein during the hydrolysis is definite. This conclusion is further supported by other (unpublished) results relating to this group of compounds. It therefore becomes necessary to look for two isomeric products whenever flavanone glycosides are subjected to hydrolysis with acids.

Further in the course of this work two colourless crystalline compounds have also been isolated one of which is a phytosterolin and the other an unidentified heteroside. They were obtained in very small amounts. The former yields on hydrolysis a phytosterol, C_{28}H_{40}O and glucose. The heteroside has the formula C_{29}H_{40}O_{10} and yields on hydrolysis glucose and an aglucone melting at 220°. Both the heteroside and its aglucone do not give
the usual colour reactions of flavanones or chalkones. Further work on these glucosides is in progress.

Experimental

The dry flower powder was extracted first with petroleum ether and subsequently with alcohol as already described. The concentrate of the alcoholic extract was poured into a large excess of water and the orange yellow solution was repeatedly extracted with small quantities of ether to remove the aglucones. The extracts were separated (A) and preserved for examination. The aqueous solution (2 litres from 3 kg. of the flowers) was allowed to stand saturated with ether. In the course of a few days a pale yellow solid separated out in the form of thin flakes (B). It did not give any of the colour reactions of flavanones or chalkones and it is described later in this paper. After the separation of the above solid the solution was again allowed to stand with the addition of some more ether in order to keep it saturated. In the course of a week about 1.5% yield of butrin separated out in a crystalline condition. More was obtained on longer standing and on concentrating the solution at the ordinary temperature and subsequently saturating it with ether. The solid was pale yellow in colour and contained a small amount of mineral matter. It was further purified by one re-crystallisation from hot rectified spirits when it was obtained as colourless long needles melting at 194-95° (decomp.). When crystallised from water however, the crystals take the form of aggregates of micaceous plates. Though the yield of crude butrin obtained by the method of Lal and Dutt is considerably high (about 2.5%), after passing through the several stages of purification the yield of the pure product becomes less than 0.4%. The glycoside is fairly soluble in water and when impure its solubility is markedly high. The highly soluble impure sample has been said to contain metallic salts of the pigment. But there seems to be no definite support for this view and all data point towards the colloidal condition of the substances as the cause of solubility (compare Seshadri). The presence of a little mineral matter is nothing unusual in crude substances isolated from plant materials.

Butrin (1.2 g.) was treated with 7% aqueous sulphuric acid (50 c.c.) and the mixture boiled for about 2 hours. The clear solution deposited on cooling a brown precipitate in a crystalline condition. After filtering and washing with water it gave reactions for butin, a green colour with alcoholic ferric chloride and violet colour with magnesium and alcoholic hydrochloric acid. Close examination of the solid indicated that it was a mixture. A small quantity of more highly coloured crystals could be picked out and these gave tests for butein. Complete separation was however effected using boiling water (20 c.c.) and filtering hot. The less soluble portion on the filter was