

the pad-like valve mentioned for the first time, (9) the extension of the spiral valve at its distal end into two cup-shaped valves instead of one, (10) the guarding of the systemo-carotid and the pulmo-cutaneous passages each by a pair of valves; thus the synangium containing four and not three valves, (11) the joint origin of the systemo-carotid arches, and (12) extension of the synangium into a short but distinct region, the *geminaangium*, and the disposition of the arches.

The 'classical hypothesis' and the 'complete mixture' theory do not hold good on the basis of the above anatomical facts and the conclusion drawn is, that the systemic and the carotid arches receive the same stream from the left auricle, and if at all, there is some mixture, it is small, and this is so, perhaps when the right stream is followed by the left, which takes a longer route through the central cavity.

Further work is in progress and a detailed study will be published elsewhere soon.

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Pilani, August 7, 1954.

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#### CONSTITUTION OF CORCHORIN, A BITTER PRINCIPLE OF JUTE SEEDS

Tsuno<sup>1</sup> first reported the occurrence of a bitter principle, corchorin, in jute seeds (*Corchorus capsularis*, L.) but it was Sen<sup>2</sup> who isolated it from the alcoholic extract of the seeds in white prisms, m.p. 174-75° C., having an intense bitter taste and properties characteristic of the digitalis group of saponins.<sup>3</sup> According to him, corchorin has the molecular formula,  $C_{22}H_{36}O_8$  and when hydrolysed with acid, yields glucose and corchogenin,  $C_{16}H_{26}O_3$ , m.p. 112-14° C. Soliman and Saleh<sup>4</sup> also isolated corchorin from jute seeds as rhombic prisms, m.p. 175-77° C. (dec.) but they were unable to hydrolyse corchorin with 2 per cent. sulphuric acid or with "varying concentration of hydrogen chloride in dilute alcohol". They assigned to it the formula,  $C_{23}H_{32}O_6$  with 0.5 H<sub>2</sub>O as water of crystallisation and showed it to be identical with strophanthidin.

For this investigation, corchorin was obtained by a simplified method. Finely powdered jute seeds in batches of 500 g. were extracted with rectified spirit (95 per cent. ethanol). Alcohol was then completely removed under reduced pressure, and the residue digested with boiling

water and filtered. From the filtrate corchorin was isolated following Sen's lead acetate method, and crystallised from methyl alcohol as prisms, m.p. 177-78° C. (dec.). Corchorin, thus obtained, contained no water of crystallisation. When hydrolysed with acid, it yielded a mole of glucose (estimated by Benedict's method) and corchogenin,  $C_{17}H_{22}O_3$ . [Found: C, 73.9; H, 8.1; Mol. wt. (cryoscopic, acetic acid) 276.4 and (Rast) 273.1.  $C_{17}H_{22}O_3$  requires C, 74.5; H, 8.0 per cent., Mol. wt. 274.] In view of the conflicting observations mentioned above, as regards hydrolysis of corchorin, experiments were carried out independently by two of us (A. A. and A. K.) with corchorin isolated from various samples of jute seeds (both *C. capsularis* and *C. olitorius*). The procedure adopted for hydrolysis was as follows:

To corchorin (1.2 g.), dissolved in about 50 ml. absolute alcohol, was added 2 ml. sulphuric acid (S.G. 1.836) and heated over steam-bath for four hours with reflux condenser. The resulting mixture was then concentrated to about 15 ml. and left overnight after diluting with 10 ml. water, when yellow amorphous corchogenin separated out. After treatment of its alcoholic solution with activated charcoal, corchogenin was finally crystallised from a mixture of ether and ethanol as prisms, which shrank at 84-85° C. and melted at 115-16° C. To the acid solution, left after separation of corchogenin, was added an excess of barium carbonate, the mixture boiled for a few minutes and filtered. The filtrate was extracted several times with chloroform to remove trace of corchogenin. When the filtrate was concentrated, there remained a syrupy liquid, which was converted into osazone, m.p. 204-05° C., benzoate, m.p. 179-80° C. and benzimidazole, m.p. 212-14° C. (dec.). The melting points of these derivatives were un-depressed by admixture with authentic specimens prepared from D-glucose.

In the light of these experiments, we find it difficult to accept the view that corchorin does not contain a sugar moiety and that it is identical with strophanthidin.

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