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TWO POISONOUS PLANTS, *HUANG-T'ENG* AND *TSAI-CHUNG-YAO* AND THEIR IDENTIFICATION

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Recently we received two poisonous plants known under the name of *Huang-t'eng* (黃藤) and *Ts'ai-ch'ung-yao* (菜蟲藥) from the Institute of Legal Medicine, Ministry of Justice, for chemical investigation. The former was collected in Hunan and the latter in Chekiang. They are not botanically identified, but are said to be very toxic and have given rise to many reported fatal cases of poisoning They are in the form of stems and roots and are reddish yellow in colour As their general appearance and coloration are very similar to *Lei-kung-t'eng,* Tripterygium Wilfordii, Hook, which we investigated some time ago (1), we tried to isolate from them the characteristic red coloring matter, tripterine and the carbohydrate, dulcitol, the results being found in both cases to be positive. Consequently the three poisonous plants, *Huang-t'eng, Ts'ai-ch'ung-yao* and *Lei-kung-t'eng* only differ from each other in name, but really are the same plant, at least they belong to the same family

We also took this opportunity to investigate further the red colouring matter, tripterine, by recrystallising it from acetone Tripterine, as reported previously, (1) crystallises from ether with the addition of petroleum ether, in red cubic crystals, melting at 195°C and having a molecular formula of $C_{25}H_{37}O_3$ When crystallised from acetone, it formed stout needles with a melting point of 219°C and an empirical formula corresponding to $C_{25}H_{\cdot\cdot}O_4$ The fact that these needle-crystals could be easily changed back to its cubic form with a melting point

of 195° by recrystallising from ether and that the presence of acetone in the molecule could be detected by steam distillation, give the suggestion that the substance so obtained may simply be an acetone additional compound of tripterine, but its empirical formula given above does not agree with such a compound which should have a formula: $C_{25}H_{37}O_3$ CH_3CO CH_3 or $C_{28}H_{43}O_4$. A further investigation of this acetone crystallised compound will be carried out.

EXPERIMENTAL

(1) *Isolation of Tripterine* $C_{25}H_{37}O_3$. Two hundred (200) grammes of the reddish bark obtained by peeling the roots and stems of either *Huang-t'eng* or *Ts'ai-ch'ung-yao* were finely powdered and extracted with ordinary petroleum ether in a Soxhlet apparatus by warming over water-bath for a day. A reddish crystalline deposit separated out on standing and on concentrating the petroleum ether solution The deposit was collected, redissolved in ether and the ethereal solution filtered to separate any insoluble impurities present. To the ethereal solution there was added a sufficient quantity of petroleum ether. Tripterine crystallised out in red cubic crystals melting at 195°. When mixed with tripterine isolated from *Lei-kung-t'eng,* its melting point remained unchanged. Its identity with tripterine was further confimed by the following analysis:—

0.0502 g. sub. gave 0.1435 g CO_2 and 0.0435 g H_2O

C = 77.96; H = 9.61

Calculated for tripterine $C_{25}H_{37}O_3$; C = 77.92; H = 9.61

(2) *Crystallisation of tripterine from acetone.* When an acetone solution of pure tripterine was concentrated with the addition of a few drops of water, deep red stout needles separated out on cooling. These crystals, when crystallised pure from acetone, melted at 219°C instead of 195°C as described above and have an empirical formula corresponding to $C_{25}H_{34}O_4$ according to the following analysis:

0.0522 g sub. gave 0.1447 g CO_2 and 0.0400 g H_2O

C = 75 61; H = 8.58

Calculated for $C_{25}H_{31}O_1$, C = 75 38; H = 8 54

Its molecular weight was determined by Rast method.

0 0210 g sub. in 0 2065 g camphor gave a depression in m p. of 10°C; Mol. Wt. = 406 7

Calculated for $C_{25}H_{34}O_4$, Mol. Wt. = 398

The presence of acetone in the molecule was determined by Lieben's iodoform test.—

0.30 gram substance was distilled with 20 cc of water in a small distilling flask over free flame and the steam distillate collected. When a crystal of iodine and a few drops of dilute KOH solution were added to the aqueous distillate, a yellowish white precipitate of iodoform separated out at once, melting at 119°C. When mixed with pure iodoform, its melting point remained unchanged. When the acetone crystallised compound was recrystallised from ether with the addition of petroleum ether, tripterine in the form of red cubic crystals with a melting point at 195°C was again obtained.

(3) *Isolation of dulcitol,* $CH_2OH\,(CHOH)_4\,CH_2OH$. One hundred and fifty (150) grammes of *Huang-t'eng* or *Ts'ai-ch'ung-yao,* from which the reddish barks has been peeled off, were reduced to a coarse powder and boiled with 80 per cent alcohol for 4 hours. The alcoholic solution was concentrated to a small volume and poured into an excess of water After being allowed to stand for the night, the aqueous solution was filtered from any insoluble precipitate and concentrated to a small volume on the water bath when dulcitol crystallised out in monoclinic prisms. When recrystallised pure from dilute alcohol, it melted at 188°C and was identical in all respects to dulcitol obtained previously from *Lei-kung-t'eng.* The yield came to about 2 3 grams in each sample.

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LITERATURE

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