

Test mixture contains inactive enzyme precipitated by AcOAc, 0.5 ml. fresh urine, 0.2 ml. 2 %  $\beta$ -glycerophosphate and 1.0 ml. buffer of pH 5.5.

## 16. Studies on the Components of Japanese Toxic Plants. (I)

### On the Toxic Components of *Coriaria Japonica*

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We have isolated from the leaves of *Coriaria japonica* indigeneous to Japan "coriamyrtin"  $C_{15}H_{18}O_5$ , and "tutin"  $C_{15}H_{18}O_6$ , and found that they resemble picrotoxinin, a neurotropic poison obtained from *Anamirta paniculata* of India, in the chemical properties and physiological actions.

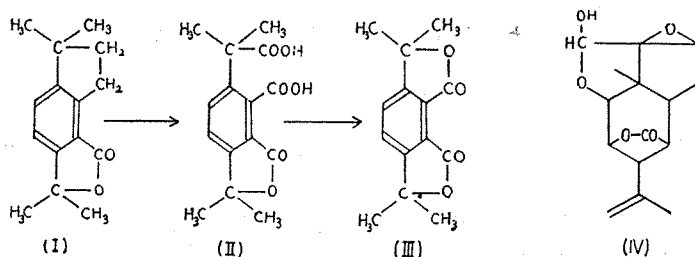
Coriamyrtin was aromatized on boiling with HI and red phosphorus to coriaria-lactone  $C_{15}H_{18}O_2$  (I) which may be considered to retain almost all features of the coriamyrtin skeleton. Oxidation of coriaria-lactone by alkaline solution of permanganate yielded a dicarboxylic acid, coriariaic acid  $C_{15}H_{16}O_6$  (II), which, on further oxidation with acid solution of permanganate, gave a dilactone, coriaria-dilactone  $C_{14}H_{14}O_4$  (III), by decarboxylation of the tertiary carboxylic acid. By the action of  $CH_3MgI$  on benzene-1,2,3,4-tetracarboxylic acid dianhydride coriaria-dilactone was synthesized which showed no depression of mp. with (III), and both produced acetone and phthalic acid by alkali fusion. The mechanism of the reaction from coriaria-lactone to coriaria-dilactone *via* coriariaic acid was ascertained by a model reaction from dimethyl hydritinden to dimethyl phthalide. It was ascertained from the results of experiments that tertiary carboxylic acids having benzene nucleus in the  $\alpha$ -position are generally oxidized by acid solution of permanganate with evolution of carbon dioxide and produce the corresponding tertiary alcohols.

It has been reported by Mercer, Robertson *et. al.* that picrotoxinin is aromatized by HI and red phosphorus to picrotic acid (*J. Chem. Soc.* 1935, 997), which has similar structure to coriaria-lactone.

Besides the similarity of the structures of aromatized derivatives we found that coriamyrtin has several common chemical properties with picrotoxinin. It was known that they have one hydroxyl group from Zerevitinov determination, and one  $>C=CH_2$  group from the combined results of bromination, hydrogenation, and ozonization. They produce monobromo-substituted product when bromine is added to their hot aqueous solution. It may be suspected from ester number that coriamyrtin has one lactone group and picrotoxinin two lactone groups. They reduce Fehling's solution

and ammoniacal silver nitrate solution on heating, and give several similar color tests. Coriamyrtin, when boiled with dilute mineral acid, is converted into an isomer, isocoriamyrtin, which has an aldehyde group and this indicates a possible presence of an acetal group in the former compound. While picrotoxinin is converted into a hydroxycarboxylic acid, picrotoxic acid.

The infrared spectra of these compounds resemble each other and the structure of coriamyrtin is also inferred in the light of infrared spectral data on the coriamyrtin and picrotoxinin family.



Consequently may be considered that the complete structure of coriamyrtin is represented by (IV) which resembles the picrotoxinin formula of H. Conroy (*J. Am. Chem. Soc.* 73, 1889, 1951). On the formula (IV), it is most probable that angular methyl group and —O— of lactone ring in coriamyrtin may rearrange by aromatization reaction.