

hydrogen chloride, phosphoryl chloride, zinc chloride in presence of hydrogen chloride, phosphoric acid, and sodium ethoxide<sup>3</sup>

It has now been found that anhydrous aluminium chloride acts as an efficient condensing agent for the condensation of  $\beta$  ketonic esters with phenols, the condensation being effected in ether solution<sup>4</sup> in which aluminium chloride readily dissolves, or in nitrobenzene solution

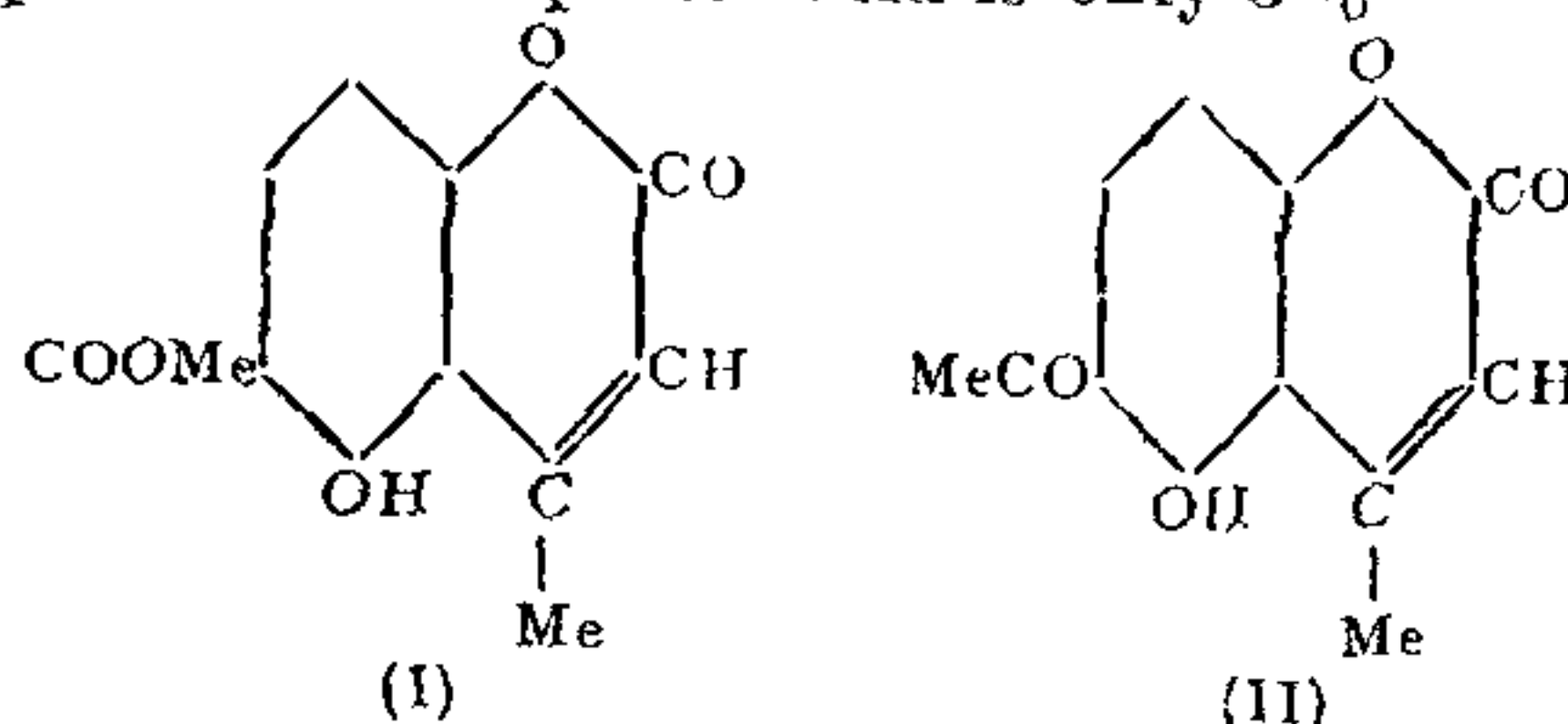
Some of the interesting results which have been so far obtained are the following —

1 Methyl  $\beta$  resorcyate on condensation with ethyl acetoacetate by the new method affords mainly methyl 5 hydroxy 4 methyl coumarin 6 carboxylate (I), m p 185–186° in good yield, from which by hydrolysis and subsequent decarboxylation 4 methyl 5 hydroxy coumarin, m p 263° was obtained. Condensation with sulphuric acid gives methyl 4 methyl 7 hydroxy coumarin 6 carboxylate,<sup>5</sup> m p 212–214°. The facile formation of 5 hydroxy coumarin derivatives in this and subsequent cases by the new method is of unique interest, as 5 hydroxy coumarin derivatives, which otherwise cannot be obtained or can be only obtained with great difficulty, can be readily prepared. Limaye<sup>6</sup> has recently reported the formation of 5 hydroxy 4 methyl coumarin in a minute yield as a by-product in the Kostanecki acetylation of 2 acetyl resorcinol

2 Resacetophenone condenses with ethyl-acetoacetate similarly to methyl  $\beta$  resorcyate, the product obtained in high yield being 4 methyl 5 hydroxy 6 acetyl-coumarin, m p 165° (II). The constitution of (II) has been established and confirmed by its synthesis by the Fries transformation of 4 methyl 5 acetoxy coumarin. The observation of Aggarwal and Dutt<sup>7</sup> that 4 methyl 7 hydroxy 6 acetyl coumarin, m p 147°, is formed with concentrated sulphuric acid or sodium ethoxide as condensing agent could not be confirmed, only unchanged resacetophenone, m p 144°, being obtained in both the cases

3 The condensation of some simple phenols gives in most cases the same product as those with sulphuric acid. In many cases, the yields are better by the new method than those with sulphuric acid, the most remarkable example being the condensation of phenol and ethyl acetoacetate which gives a yield of 30–40% of 4 methyl coumarin, the reported yield of the coumarin in

literature for the same condensation in presence of sulphuric acid is only 3%



A detailed account of the above investigation will shortly be published elsewhere. Further work, including other condensations of phenols and substituted phenols with  $\beta$  ketonic esters in general is under progress

S M SETHNA  
N M SHAH  
R C SHAH

Royal Institute of Science,  
Bombay

Karnatak College, Dharwar  
Ismail College, Andheri, Bombay  
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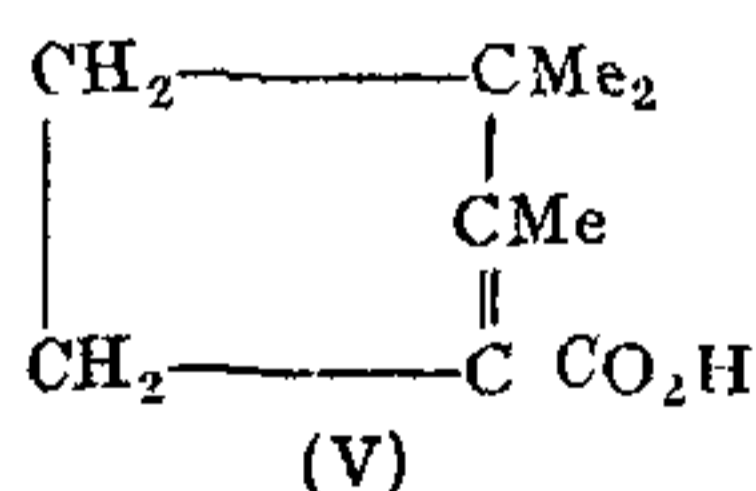
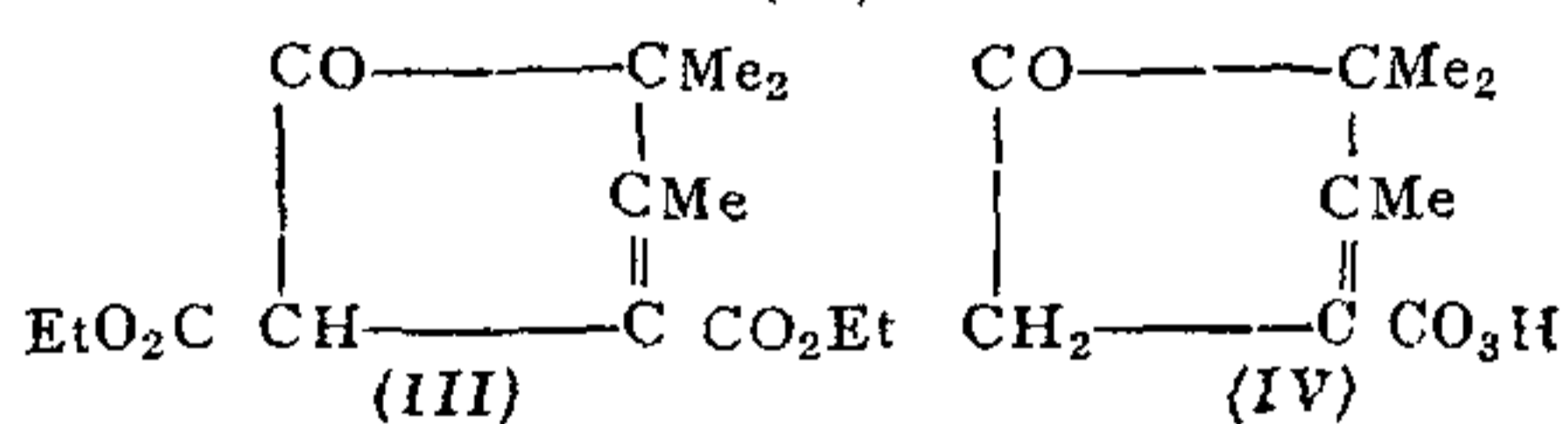
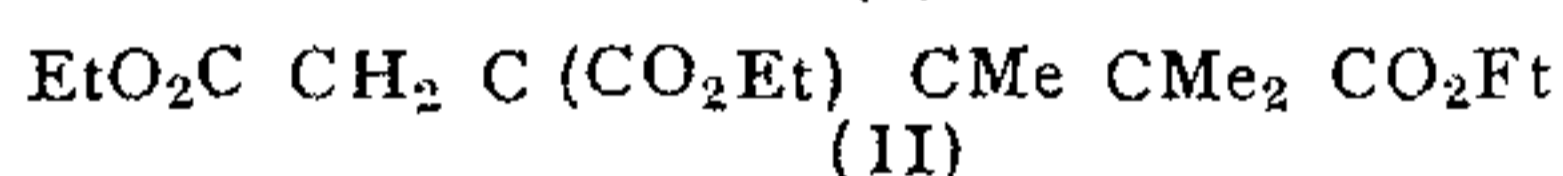
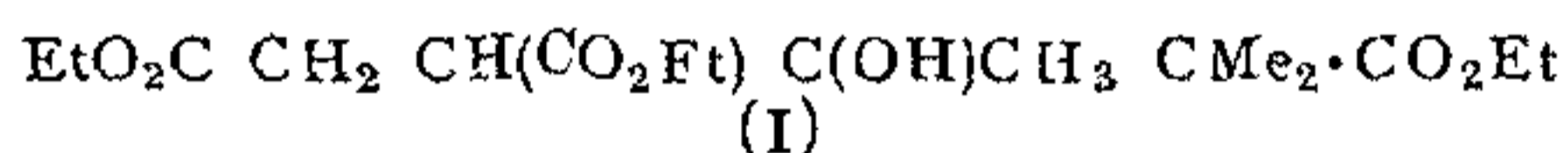
- <sup>1</sup> Pechmann and Duisberg *Ber* 1883 16 2119  
<sup>2</sup> Petschek and Simonis *ibid* 1913 46, 2015  
<sup>3</sup> Naik, Desai and Desai 1929 6, 801, Chakravarti  
*J Ind Chem Soc* 1935 12, 536 Appel *J*, 1935 1031  
<sup>4</sup> Shah *Curr Sci* 1934 157  
<sup>5</sup> Shah and Sethna *Int Sci Cong Abt* 1937, 21  
<sup>6</sup> *Rasayanam* 1936, 45  
<sup>7</sup> *J Ind Chem Soc* 1937 14, 109  
<sup>8</sup> Clayton, *J* 1908 2018

### A Direct Synthesis of Dihydro-isolauro-nolic- and isolauro-nolic Acids

ETHYL isolauronolate was first isolated by Walker<sup>1</sup> amongst the products of electrolysis of sodium salt of  $\alpha$  ethyl hydrogen camphorate. The free acid (V) has been prepared (i) by the action of aluminium chloride on camphoric anhydride,<sup>2</sup> (ii) by distillation of sulphocamphylic acid in superheated steam,<sup>3</sup> and (iii) by treating  $\alpha$  campholytic acid with dilute sulphuric acid. Its formation from the above camphor derivatives involves a peculiar molecular rearrangement

Although Blanc<sup>4</sup> synthesised isolauro-nolic acid starting from  $\alpha\alpha$  dimethyladipic acid via isolaurolene and dihydro isolauro-nolic acid, involving the addition of a  $\text{COCH}_3$  group which permits its occupying an alternative position, it was considered desirable to effect a direct synthesis of this acid

Ethyl dimethyl acetocetate reacts with ethyl  $\alpha$  bromosuccinate in presence of zinc to give a mixture of ethyl  $\alpha$   $\alpha$   $\beta$  trimethyl  $\beta$  hydroxy  $\beta$  carbethoxy adipate (I) (acid m p 165–66°) and ethyl  $\alpha$   $\alpha$   $\beta$  trimethyl  $\gamma$  carbethoxy  $\beta$  butylene  $\alpha$   $\delta$  dicarboxylate (II). The mixture gives the latter ester (II), b p 155–62°/5 mm, acid m p 239–40°, trianilide, m p 235°, anilide anil, m p 212°) on treatment with PBr<sub>3</sub> and undergoes cyclisation with sodium to form among other products ethyl 1 1 2 trimethyl  $\Delta^2$ -cyclopentene-5-one-3 4-dicarboxylate (III), b p 125–28°/3 mm. This ester is soluble in alkali, gives violet coloration with alcoholic FeCl<sub>3</sub>, and does not react with semicarbazide or hydroxylamine, thus pointing to an enolic structure. On hydrolysis it forms an unstable ketonic acid, which loses carbon dioxide on treatment with hydrochloric acid forming 1 1 2 trimethyl  $\Delta^2$  cyclopentene 5 one 3 carboxylic acid (IV), m p 186–87°, (oxime, m p 139–40°, semicarbazone, m p 225°). This on Clemmensen's reduction was expected to give isolaurolic acid (V), but during the reaction, the ethylenic linkage was also reduced, forming mainly dihydro isolaurolic acid (b p 110–15°/20 mm) from which isolaurolic acid has been obtained by methods already known



P C GUHA  
K S SUBRAHMANYAN

Department of Organic Chemistry,  
Indian Institute of Science,  
Bangalore,  
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### On the Use of "Current Bedding" in the Interpretation of Tectonics

IN recent years, the value of current bedding in determining the top and bottom of beds, and in fixing the chronological order of deposition, has been increasingly recognised, especially when dealing with highly disturbed and unfossiliferous strata. In curved current bedding, the top of the foreset beds is concave upward. The foreset beds meet the topset beds in an angle or in an abrupt curve, while they merge with the bottomset beds in a broader curve, that is, the current bedding is sharply truncated by overlying layers, while it comes in contact with the underlying layers by a tangential curve. This characteristic property of current bedding has recently been used with very great success by E B Bailey,<sup>1</sup> Th Vogt,<sup>2</sup> and A Allison,<sup>3</sup> in unravelling the complicated structure of the Highland Schists of Scotland.

During the month of April, while examining the southern portions of the Chitaldrug Schist Belt near Dodguni, the writer came across extensive outcrops of quartzite which are very beautifully current bedded and ripple marked. These quartzite beds were traced from near Dodguni for a distance of over four miles northwards, and the phenomenon of current bedding was seen throughout.

From the evidence of the directions of the dips, B Jayaram<sup>4</sup> stated in 1919 that the main body of the schists in this area had been thrown into an anticlinal fold. The writer's examination of this region indicates that the rocks in this portion of the Schist Belt have been folded such that the beds generally dip away from the fold axis, and that the fold pitches in a north north west direction. From this, it does not, however, follow at once, that the fold is a true anticline. It may be—in Bailey's terminology an antiform. To decide which of these two types of folds is seen here, it is necessary to find out whether the succession of beds noticed in this area is normal or reversed. The presence of quartzites showing well marked current bedding with truncated tops and asymptotic bases, naturally led the writer to use this technique for determining the order of succession of beds. Accordingly, detailed observations were made at a number of points, and the direction in which the beds presented a younger aspect, was carefully recorded (*vide* Map).

<sup>1</sup> Walker *JCS* 1893 **63**, 504

<sup>2</sup> Perkin, *ibid*, 1903, **83**, 854. Blanc, *Cr* 1896 **123**, 746

<sup>3</sup> Koenigs and Hoerlin *Ber*, 1893, **26**, 813

<sup>4</sup> Blanc, *Cr*, 1906, **142**, 1085