Subtilisin; CPA—Carboxypeptidase A: LDH—Lactate dehydrogenase.

It is seen from Fig. 1 that about 45% of the total number of residues in a protein are having regular conformations of α-helices or β-strands. A straight line corresponding to this value of 45% has been drawn in the figure to show how closely the rule is followed. A tentative explanation for this remarkable tendency in the folding of protein molecules may be given as follows: The regular conformations of α-helices and β-strands have considerably low energy-values[6], enhancing their probability of occurrence in protein molecules. But, while forming a globular shape in the acqueous medium the residues have to take up conformations other than α-helices and β-strands and remarkably enough, the percentage composition of these non-regular conformations is almost a constant (55%).

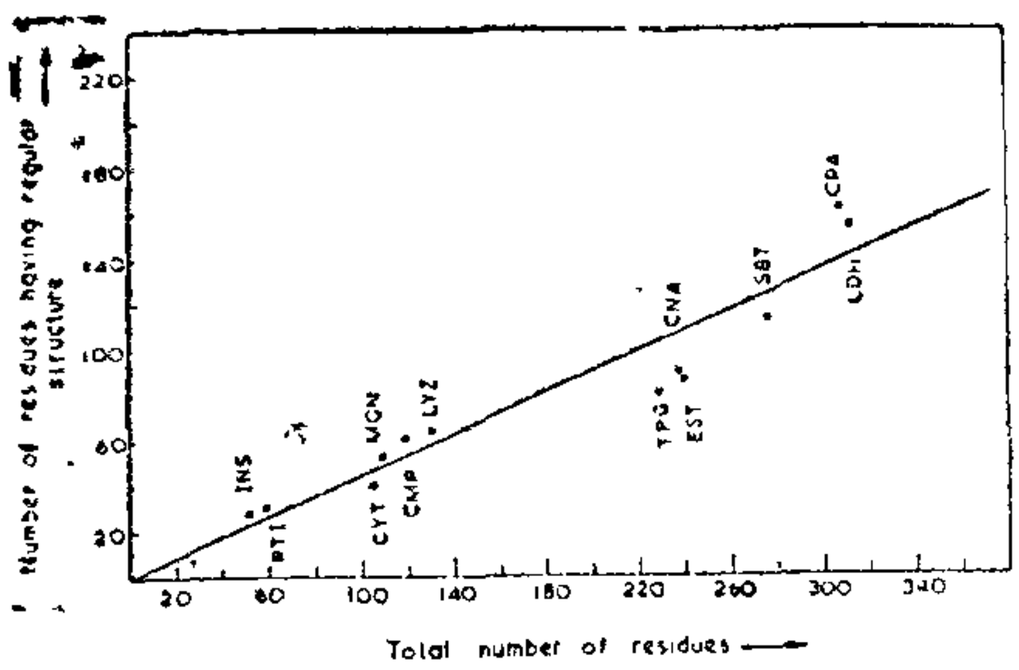

FIG. 1. The plot of number of residues in regular conformations *versus* the total number of residues, in various proteins. For details see text.

Of course there are a few exceptions, like myoglobin[7] which has about 80% of the residues forming a special nonpolar packet for the heme group and triose phosphate isomerase which has a $(\beta\alpha)_8$ barrel[8] consisting of 55% of α-helical residues and 22% of β-strands (a total of about 80% of residues in regular conformations). Further studies in these lines are in progress.

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SOME REACTIONS OF 3, 4-DICHLORO-COUMARINS

IN an earlier communication, we have described the syntheses of some 3, 4-dichlorocoumarins[1] by the reaction of hexachloropropene with phenolic compounds.

The present work reports some of the reactions of these halogenated coumarins.

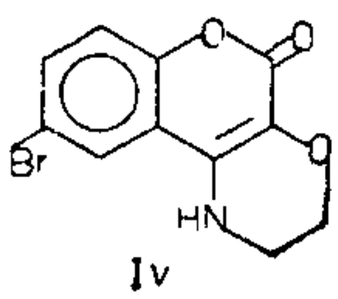
The condensation of 6, 7-dimethyl-3, 4-dichlorocoumarin[1] (I) was effected with piperidine, morpholine, diethylamine and N-methylpiperizine by boiling them in alcoholic solution to yield the respective 4-amino derivatives (m.p. 174°; 167–168°; 145° and 152–153° respectively). The latter were tested at the Central Drug Research Institute, Lucknow, but none of them showed any appreciable antibacterial activity.

Also, (I) on condensation with ethanolamine in refluxing methanol gave 3-chloro-4-(2-hydroxyethylamino)-6, 7-dimethyl-coumarin as a colourless crystalline solid, m.p. 212–214° (yield 50%). Attempts to cyclise it to an oxazine derivative were futile. However, 6-bromo-3, 4-dichlorocoumarin[2] (II) with ethanolamine gave 3-chloro-4-(2-hydroxyethylamino)-6-bromocoumarin (III), (m.p. 198–199°, yield 40%), which was cyclised in the presence of sodium hydride to yield 9-bromo-3, 4-dihydro [1]-benzopyrano-[3, 4-*b*] [1, 4] oxazin-5-[1H]-one (IV), crystallised from acetic acid in pale brown plates, m.p. 295–296°.

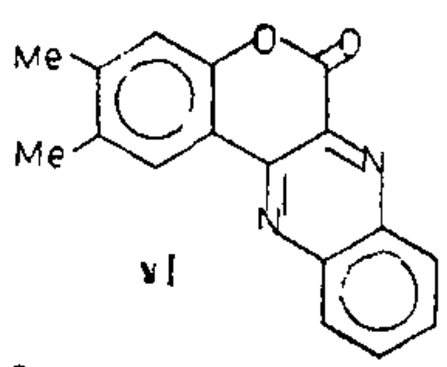
The coumarin (I) was also condensed with *o*-phenylenediamine in N-methylpyrrolidone to yield 3-chloro-4-(*o*-amino-anilino)-6, 7-dimethylcoumarin (V) (m.p. 213–215°) which was cyclised by heating the latter with pyridine and MnO_2 to give 2, 3-dimethyl-6H-[1] benzopyrano (3, 4-*b*) quinoxalin-6-one (VI) crystallised from glacial acetic acid in yellow plates, m.p. 265°.

It was observed that dichlorocoumarins having groups with –I effect such as chlroine, bromine, etc., in the benzene ring reacted with Grignard reagents easily, whereas electron donating substituents present in the dichlorocoumarin derivatives hindered the formation of 3-chloroflavones. Thus, it was observed that (I) did not react with phenyl magnesium bromide, even under different experimental conditions. However, (II) reacted with this reagent to afford 3-chloro-6-bromoflavone in 40% yield. The structure (VII) assigned toit was consistent with spectral data showing a keto band in the i.r. at 1680 cm^{-1} and $M^+ = 335$.

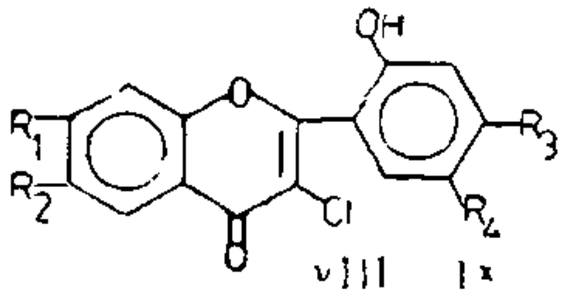
Wihle working on 3-chloroflavones, our attention was drawn to a recent publication by Gerg *et al.*,[3] who have described the synthesis of 3-chloroflavones which are the key intermediates in the preparation of some physiologically active compounds. Some 3-chloroflavone derivatives synthesised earlier by us pertaining to our work are described here.



Iv



vI



vIII IX

VIII: $R_1 = R_2 = R_3 = R_4 =$ Me.
IX: $R_1 = R_3 =$ H; $R_2 = R_4 =$ Br.

3, 4-Dimethylphenol (0·01 mole), anhydrous aluminium chloride (0·011 mole) and hexachloropropene (0·01 mole) in carbon disulphide were reacted in the usual manner. The chloroaluminium salt (prepared from 0·01 mole, 3, 4-dimethyl phenol and 0·011 mole anhydrous aluminium chloride in carbon disulphide) was added to the above solution and the mixture stirred for 24 hr. The solvent was removed under reduced pressure and the dark tarry mass was decomposed with ice and dilute sulphuric acid. The brown residue was filtered and triturated with methanol ard again filtered. The filtrate on concentration gave a colourless compound which on repeated crystallisations from benzene-petrol ether (40-60°) yielded the pure sarnple which was found to be 6, 7-dimethyl-3, 4-dichlorocoumarin (*I*), (confirmed by mixed m.p. with authentic sample). The residue on repeated crystallisations from benzene-acetone gave a pink compound (TLC single spot) which showed molecular ion peak M^+ at 329 indicating the molecular formula to be $C_{19}H_{17}O_3Cl$. The i.r. spectrum showed a bard at 1680 cm^{-1} ( ) C = 0) in addition to the usual aromatic bands at 1600, 1500 and 900 cm^{-1}. From the above data, the compound was assigned the structure 3-chloro-6, 7, 4′, 5′-tetramethyl-2′-hydroxyflavone (VIII).

Similarly, *p*-bromophenol gave 6-bromo-3, 4-dichlorocoumarin (II) (confirmed by mixed m.p. with the authentic sample) and 3-chloro-6, 5′-dibromo-2′-hydroxyflavone (IX). They were separated by the fractional crystallisations. The i.r. spectrum of the flavone showned the ketonic band at 1680 cm^{-1} while the mass spectrum showed molecular ion peak M^+ and 431, confirming the assigned structure.

All the compounds gave satisfactory elemental analyses.

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PHOTOCYCLIZATION OF 2-PHENYLAZOPYRIDINE : FORMATION OF 4-PYRIDO [*c*] CINNOLINE

PHOTOCHEMICAL cyclodehydrogenation of azobenzene (I) to benzo [*c*] cinnoline (II) occurs on irradiation of azobenzene in presence of proton acids[1] or in presence of Lewis acids[2,3]. As this reaction is of technological importance in connection with the photochemical fading of azo-dyes[4], it was thought of interest to examine similar reactions in the case of 2-phenylazopyridine (*III*). *This communication describes the* results of the irradiations of 2-phenylazopyridine under different conditions. The formation of the photocyclized product, 4-pyrido [*c*] cinnoline (IV), accounts for the fading observed in all these cases.

2-Phenylazopyridine was prepared by the condensation of 2-aminopyridine with freshly sublimed nitrosobenzene in presence of pyridine and sodium hydroxide[5].

When a very dilute solution of 2-phenylazopyridine (0·0001 M) in petroleum ether was exposed to sunlight, a gradual bleaching of the colour of the solution from deep red to pale yellow was observed. The reaction was followed spectrophotometrically by the reduction in the intensity of the peak at 450 nm and appearance