

at present able to pursue our work, we here give our interpretation of the results of Marker and Plambeck in the light of our study of the 2:3 dihydroxy-*trans* decalins.

The non-precipitability of this 2:3-dihydroxy cholestane of Marker and Plambeck with digitonin is taken by us to be due to its C₃ hydroxyl group possessing the *epi* (α -) configuration,* a view also expressed by the American authors as a possibility. The other possibility that the presence of the adjacent C₂ hydroxyl group in the above compound may interfere with the formation of the additive compound with digitonin⁷ does not appear to be plausible because it has been found by Rosenheim⁸ and also by Marker (personal communications to the author) that the presence of the additional hydroxyl grouping at C₄ in cholesterol, cholestanol, sitosterol and stigmasterol does not influence their digitonin precipitability. It is thus to be expected that two of the 2:3-dihydroxycholestanes should precipitate with digitonin.

We assign the *trans*-configuration to the hydroxyl groups of the 2:3-dihydroxyl cholestane of Marker and Plambeck for the reasons: (i) the oxidation of the cyclic double bond with hydrogen peroxide (in the absence of osmium tetroxide) and the hydrolysis of the cyclic oxide yield the same *trans* glycol³ as for example in the preparation of 3:5:6-trihydroxy cholestane (m.p. 231°) from cholesterol¹⁰ and (ii) if the hydroxyl groups are in the alternative *cis* position (with the C₃ hydroxyl group being of the *epi* form), by analogy with the behaviour of the *cis* 2:3-dihydroxy *trans* decalin (m.p. 128), the compound should isomerise on treatment with acetic anhydride,[†] which has not been observed.

* We now consider the non-precipitability of gitogenin and digitogenin with digitonin as being due to the *epi* configuration of the C₃ hydroxyl groups.⁷ This view appears to be compatible with the concept of Lettré⁹ of the formation of additive compounds of the sterols.

† It also appears that the C₂ and C₃ hydroxyl groups in gitogenin and digitogenin are in the *trans* positions for the same reasons as in the case of 2:3 dihydroxy-cholestane now considered.

It can be seen from the space model of 2:3-dihydroxy cholestane that in the *trans* form, the C₃-hydroxyl group, now fixed to be of the *epi* configuration, is in the *trans* position to the C₁₀-methyl group. This leads to the conclusion that in the digitonin precipitable steroids, the C₃-hydroxyl group occupies the *cis* position with reference to the C₁₀ methyl group; only the two inferences drawn above by analogy have to be checked experimentally to make this proof more rigorous.

K. GANAPATHI.

Haffkine Institute,
Parel, Bombay,
July 29, 1939.

¹ Ruzicka, Furter and Goldberg, *Helv. Chim. Acta.* 1938, **21**, 498.

Cf. also *ibid.*, 1933, **16**, 327; 1934, **17**, 1395, 1407; 1935, **18**, 61.

Vavon and Jakubowicz, *Bull. Soc. Chim.*, 1933, **53**, 581. Lettré, *Ber.*, 1935, **68**, 766.

Miescher and Fischer, *Helv. Chim. Acta.*, 1938, **21**, 336. *Chem. & Ind.*, 1939, **58**, 113.

² Cf. however, Cook, *Annual Rep. Chem. Soc. London*, 1926, **33**, 341.

³ *Ber.*, 1939, **72**, 1381.

Cf. *J. Indian Chem. Soc.*, 1938, **15**, 407.

⁴ Mauthner, *Monats.*, 1909, **30**, 643.

⁵ Stiller and Rosenheim, *J. Chem. Soc.*, 1938, 353.

⁶ *J. Amer. Chem. Soc.*, 1939, **61**, 1332.

⁷ Tschesche and Hagedorn, *Ber.*, 1935, **68**, 2248.

⁸ Rosenheim and Starling, *J. Chem. Soc.*, 1937, 378.

⁹ *Annalen*, 1932, **495**, 41.

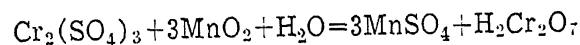
¹⁰ Westphalen, *Ber.*, 1915, **48**, 1064.

Pickard and Yates, *J. Chem. Soc.*, 1908, **93**, 1678.

Crigee, *Ber.*, 1932, **65**, 1770.

Heterogeneous Reaction between Chromic Sulphate and Manganese Dioxide

It has been found that when a solution of chromium sulphate is shaken with solid manganese dioxide, dichromate ions are formed in the solution. The reaction takes place as



The above mode of reaction has been established by estimating the amounts of dichromate ions and manganese sulphate formed and the amount of chromium sulphate used up in the reaction. It has been found that (i) the gram

molecules of the dichromate ions formed in the reaction are equal to those of the chromium sulphate used up and (ii) the ratio of the gram molecules of manganese sulphate to that of dichromate formed is very nearly equal to 3.

The reaction takes place fairly rapidly in the beginning but slows down later. The rate of the reaction increases on increasing (i) the mass of manganese dioxide, (ii) the concentration of chromium sulphate and (iii) the temperature, but it decreases when coarser particles are used and the pH of the chromium sulphate solution is decreased. The rate becomes very rapid when manganese dioxide in the colloidal state is used.

On plotting the values of $K_m = 2.3/t \log a/a - x$, against $v = x/t$, straight lines are obtained which intersect the axis of v on the negative side. These results indicate that the mechanism of the reaction under investigation is probably the same or similar to the catalytic decomposition of nitrous oxide on the surface of platinum catalyst studied by Hinshelwood and Prichard.¹ It has also been found that straight lines drawn for reactions, carried out with solutions of chromium sulphate of the same concentration and manganese dioxide of particles of different sizes, determined roughly by the mesh of the sieves used, are coincident. These observations show that both b and k in the equation²

$$v = \left(a + \frac{1}{b}\right) K_m - \frac{k}{b}$$

are constant, as required by the theory.

Detailed results are being communicated for publication elsewhere.

MATA PRASAD.
M. A. NAQVI.
V. N. SHETGIRI.

Chemical Laboratories,
Royal Institute of Science,
Bombay,
July 7, 1939.

¹ *J.C.S.*, 1925, 127, 327.

² Hinshelwood, *loc. cit.*

Effect of β -Indolyl 3-Acetic Acid and Phenyl Acetic Acid on the Growth of Some Members of the Family *Saprolegniaceae*

It was first shown by Neils Nielson that under certain conditions of culture, a growth substance is formed by *Rhizopus suinus* and *Absidia ramosa* which influences cell-elongation in *Avena*. Later on, it was found that besides these two fungi a number of others also produced growth-substance. As shown by Kogl and Kostermans¹ this substance is β -Indolyl acetic acid which can also be isolated from urine (Kogl, Haagen Smit and Erxleben). It is a decomposition product of tryptophane. The physiological effects of β -Indolyl acetic acid on higher plants are about the same as those of auxin, but there are certain differences which may be due to the fact that it does not become oxidised so easily. It accelerates and retards cell-elongation in coleoptiles and roots, initiates growth in secondary meristematic tissues as well as formation of callus and roots and causes inhibition of bud-development. Crocker, Zimmermann, Hitchcock and Wilcoxon working at the Boyce Thomson Institute, have in recent years, shown that 32 different substances in all especially aromatic acids and esters are able to bring about a series of effects similar to those which are also brought by auxin and β -Indolyl acetic acid.

With a few exceptions, very little work has been done so far on the effect of various growth substances on the filamentous fungi. Leonian^{2,3} has shown that there are produced by corn roots and certain unicellular algæ substances of the nature of auxins which promote growth and reproduction of *Phytophthora cactorum* when added to ordinary nutrient media. Leonian and Lilly⁴ tested about one hundred fungi with regard to the effect of β -Indolyl acetic acid (hetero-auxin) on their growth and came to the conclusion that the higher concentrations of this substance proved toxic and the lower ones failed to induce any stimulation. Wolf⁵ studied the effect of α -naphthelene acetic acid on the growth of *Saprolegnia ferax* and *Achlya bisexualis* and found that a definite