

CCLIX.—*The Constitution of Gentisin.*

By JUNZO SHINODA.

GENTISIN was first isolated from gentian root by Henry and Caventou (*J. Pharm. Chim.*, 1821, 178) and was subsequently examined by Baumert (*Annalen*, 1847, 62, 106) and by Hlasiwetz and Habermann (*ibid.*, 1875, 175, 63; 1876, 180, 343). The investigations of Kostanecki and his co-workers have proved that gentisin is the monomethyl ether of gentisein, which is 1 : 3 : 7-

trihydroxyxanthone and was synthesised by Kostanecki and Tambor (*Monatsh.*, 1894, **15**, 1) by condensation of phloroglucinol and quinolcarboxylic acid. An attempt of these investigators to obtain 1 : 3-dihydroxy-7-methoxyxanthone along similar lines was unsuccessful (*Monatsh.*, 1895, **16**, 920). Kostanecki, however, showed that gentisein on methylation yields gentisin and that gentisin yields only a monomethyl ether. This excludes the possibility that gentisin is 3 : 7-dihydroxy-1-methoxyxanthone and this substance must therefore be 1 : 3-dihydroxy-7-methoxyxanthone (I) or 1 : 7-dihydroxy-3-methoxyxanthone (II).



From the behaviour of bisazobenzene-gentisin, Perkin (J., 1898, **73**, 1028) has indicated that gentisin should be represented by the formula (II), and the present author now confirms this conclusion, since the compound (I) described in this communication is quite different from gentisin. The methyl group of gentisin is thus in a position similar to that which it occupies in rhamnetin and rhamnazin. The synthesis of (I) has been effected by an application of the Hoesch reaction following the similar preparation of 1 : 3-dihydroxyxanthone by Nishikawa and Robinson (J., 1922, **121**, 839).

#### EXPERIMENTAL.

*2-Hydroxy-5-methoxybenzaldoxime*, obtained in the usual manner from 2-hydroxy-5-methoxybenzaldehyde, crystallised from water in colourless, prismatic needles, m. p. 118° (Found : C, 57.4; H, 5.8.  $C_8H_9O_3N$  requires C, 57.4; H, 5.4%). *2-Hydroxy-5-methoxybenzonitrile*, obtained on treatment of the oxime with boiling acetic anhydride for 3 hours and subsequent hydrolysis with 10% sodium hydroxide solution, crystallised from water in colourless needles, m. p. 136° (Found : C, 64.0, 64.5; H, 5.0, 4.7.  $C_8H_7O_2N$  requires C, 64.4; H, 4.7%).

*1 : 3-Dihydroxy-7-methoxyxanthonimine Hydrochloride*.—A mixture of 2-hydroxy-5-methoxybenzonitrile (5 g.), anhydrous phloroglucinol (4 g.), zinc chloride (5 g.), and dry ether (30 c.c.) was saturated with hydrogen chloride with frequent shaking. After a few hours, yellow crystals separated, but later these gave place to a deep yellow solution and then to orange crystals. After 10 days, water was added and the insoluble material (A) collected. The filtrate was extracted with ether and then concentrated; on cooling, yellow crystals (B) separated (Found : HCl, 12.1.  $C_{14}H_{12}O_4NCl$  requires HCl, 12.4%). The properties of (A) and (B) are very similar; both

are very sparingly soluble in most organic solvents and dissolve in concentrated sulphuric acid to a yellow solution which exhibits green fluorescence. The solution in aqueous alkalis is yellow.

1 : 3-Dihydroxy-7-methoxyxanthone (I).—The ketimine hydrochloride was hydrolysed by means of boiling aqueous sodium hydroxide (until ammonia was no longer evolved) and the *isogentisin* was then precipitated by the addition of dilute sulphuric acid as a gelatinous mass that became crystalline when the liquid was boiled. The substance crystallised from aqueous alcohol in elongated, yellow plates, m. p. 241° (Found : C, 64.8; H, 4.3.  $C_{14}H_{10}O_5$  requires C, 65.1; H, 3.9%).

The yellow solution in concentrated sulphuric acid exhibits green fluorescence, and ferric chloride added to an alcoholic solution develops a greenish-black coloration. The substance does not reduce an ammoniacal silver nitrate solution. A distinction from gentisin is that when an alkaline solution is agitated with sodium amalgam it becomes, like gentisein, blood-red; gentisin gives a deep green coloration under these conditions. On acetylation, a *derivative*, m. p. 211—212°, was obtained.

The *isogentisin* was demethylated by means of boiling hydriodic acid; the gentisein obtained crystallised from methyl alcohol in orange-yellow needles, m. p. 318° with darkening from 310°. The substance had the properties attributed to it by Kostanecki and on acetylation gave the triacetyl derivative; this crystallised from acetic acid in white, silky needles which, alone or mixed with a specimen obtained by Kostanecki's method (*Monatsh.*, 1891, 12, 205), melted at 226°.

PHARMACEUTICAL INSTITUTE, TOKUSHIMA TECHNICAL COLLEGE,  
JAPAN. [Received, July 11th, 1927.]

---