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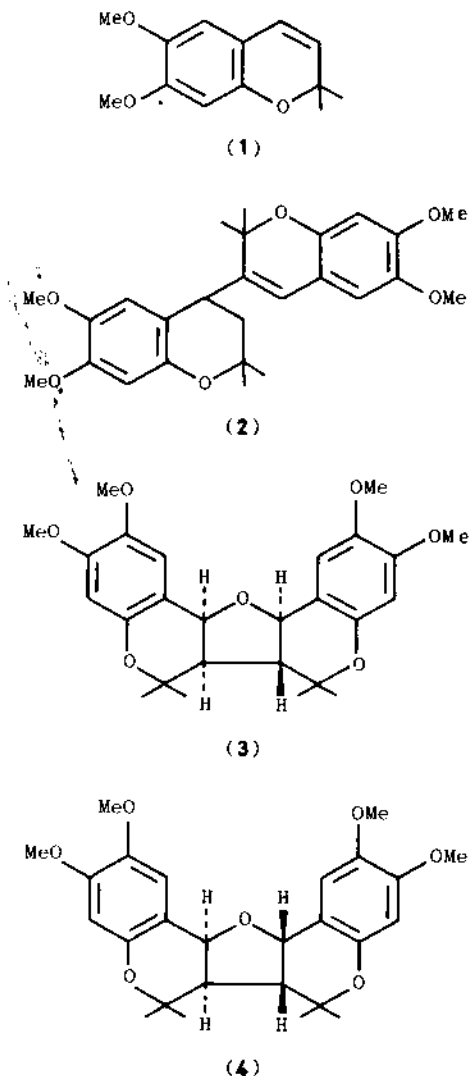
The Reaction of Precocene II with Chromium(VI) Oxidants

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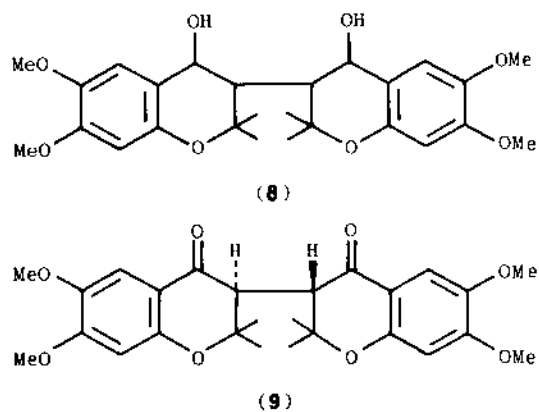
The reactions of precocene II with various chromium(VI) oxidants have been studied. Thus oxidation of precocene II with pyridinium dichromate on silica gel gives monomeric compounds whilst oxidation with Jones reagent or with chromium(VI) oxide in water affords dimeric substances; both monomeric and dimeric compounds are formed in the oxidation of precocene II with chromium(VI) oxide on silica gel.

In a previous work¹ we studied the dimerization of the antitumour hormone precocene II (1) with different Lewis acids supported in silica gel. Thus the reaction of (1) with $\text{SiO}_2\text{-AgNO}_3$ gave the dimers A (2), B (3), and C (4). The formation of (3) and (4) was explained in



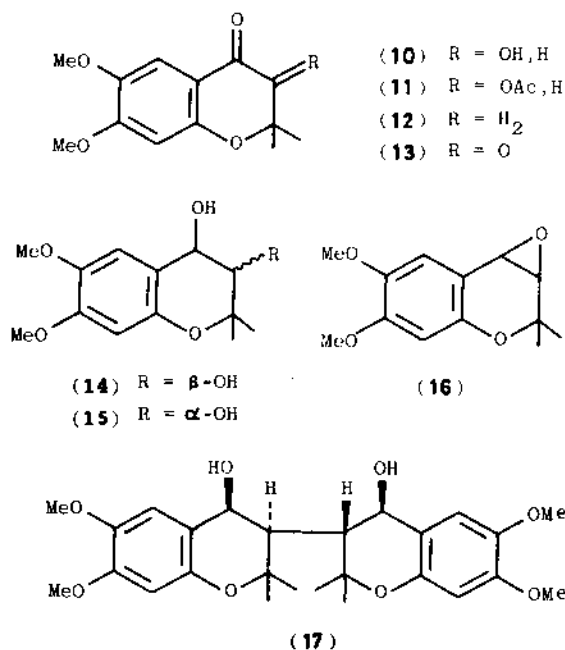
accordance with the mechanism shown in Scheme 1 (see full text). With a view to determining the existence of an intermediate such as (8) we intend to extend these studies using chromium(VI) reagents as Lewis acids and oxidants.

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Treatment of precocene II (1) with pyridinium dichromate-silica gel in light petroleum gave the 3-hydroxychromanone (10), the chromandione (13), and the diols (14) and (15). The structure of (10) was deduced from the spectral data. This compound (10) formed an acetate (11), identical with that obtained by treatment of the chromanone (12) with lead tetraacetate.⁴ The structures of the two diols, *cis*-(14) and *trans*-(15), were deduced from their ¹H n.m.r. spectra.⁵

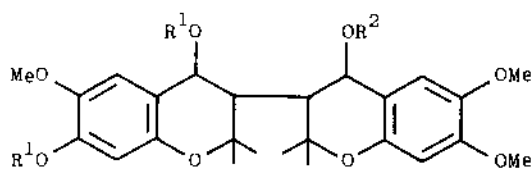
The formation of compounds (10), (13), (14), and (15) can be explained on the basis of the epoxidation of precocene II with the reagent to give the intermediate



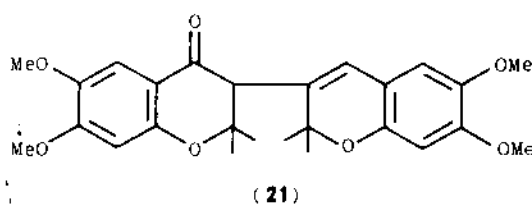
epoxide (16), hydration of which gave the diols (14) and (15). Oxidation of these with the reagent afforded first (10) and then (13). The obtention of precocene diols, (14) and (15), in the first part of this reaction mimics nature.^{5,6} When the mixture of diols (14) and (15) was treated with Jones reagent the chromandione (13) was

obtained. The reduction of (13) with lithium aluminium hydride gave the mixture of diols (14) and (15).

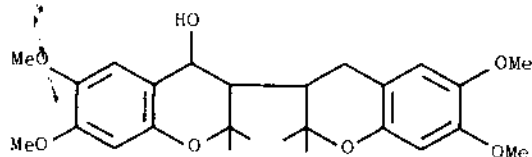
Treatment of precocene II with chromium(VI) oxide-silica gel gave the above-mentioned compounds (10), (13), (14), and (15), as well as the dimers A (2), B (3), and C (4). We then decided to pursue our work using a stronger oxidant. In this way, treatment of precocene II (1) with Jones reagent afforded the dimer B (3), the dimer C (4), the dimeric ketone (dimer E) (9), and the triol (dimer F) (18). The formation in this reaction of dimer E (9) was not evidence of the existence of the intermediate (8) since, when the dimer C (4) was treated with Jones reagent, this dimeric ketone (9) was again obtained as the only product. The reduction of (9) with LiAlH_4 afforded the diol (17) which spontaneously cyclized to give the dimers B (3) and C (4).



- (18) $R^1 = R^2 = \text{H}$
 (19) $R^1 = \text{Me}, R^2 = \text{H}$
 (20) $R^1 = R^2 = \text{Ac}$



(21)



(22)

The most polar dimer obtained was the dimer F to which the gross structure (18) was assigned. This compound was not methylated with diazomethane, but with dimethyl sulphate in acetone a dimethyl ether (19) was formed. At room temperature with acetic anhydride-pyridine, (18) could not be acetylated, but under reflux it gave the triacetate (20).

If dimer F (18) had the same stereochemistry at C-4 and C-4' as the dimer B (3) and C (4) it should have cyclized to give tetrahydrofuran derivatives analogous to these dimers, as occurs with the diol (17). For this reason we think that this triol (18) may have a different stereochemistry at these centres.

Finally, we treated precocene II with CrO_3 in water. In this way dimer B (3), dimer C (4), dimeric ketone (dimer E) (9), and dimers G (21) and H (22) were obtained. The structure (21) was given for dimer G, on the basis of spectroscopic data. The structure (22) was tentatively assigned to dimer H, as we observed that in the air this compound was transformed by oxidation into a less polar product identified as the dimer G (21).

Techniques used: U.v., n.m.r.

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Scheme 1: Mechanism of formation of (3) or (4)

Scheme 2 Mass-spectral fragmentation of (9)

Scheme 3: Mass-spectral fragmentation of (21)

Figure 1: Probable configuration in solution of the dimethyl ether of dimer F (18)

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