

A POSSIBLE CANNIZZARO'S REACTION OF BERBERINE *IN VIVO*

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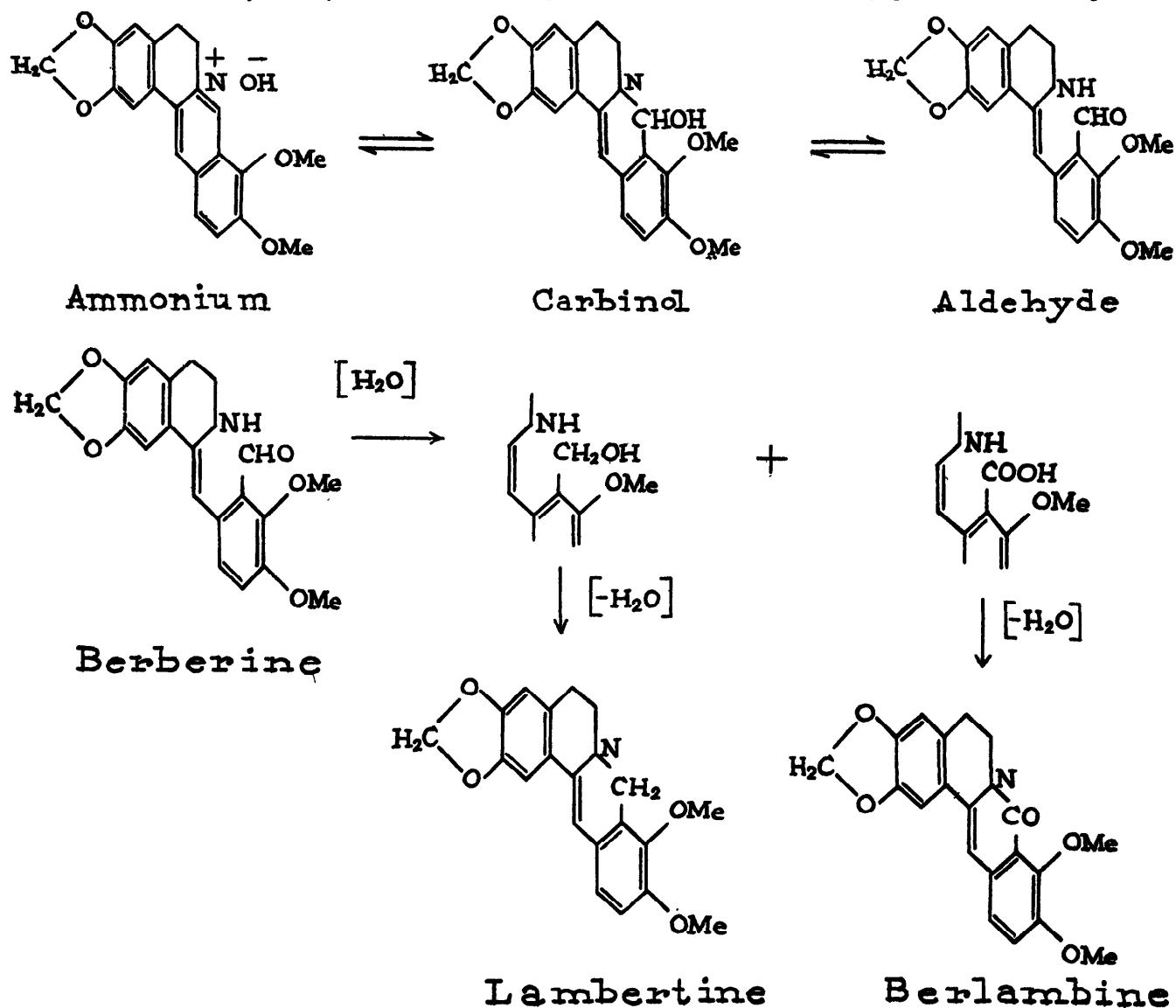
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## ABSTRACT

Three alkaloids berberine, lambertine and berlambine occur simultaneously in *Berberis lambertii* Parker. This work deals with establishing that lambertine and berlambine are not artifacts during isolation. The author suggests that berberine has undergone Cannizzaro's reaction to produce the other two alkaloids, a reaction so far known *in vitro* taking place also *in vivo*.

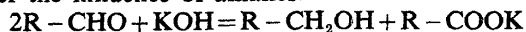
While elucidating the fine structures of two alkaloids, lambertine and berlambine, earlier isolated by Chatterjee<sup>1</sup> from *Berberis lambertii* Parker, it was shown by the present author<sup>2</sup> that these are identical with two synthetic alkaloids, dihydroanhydroberberine and oxy-

anhydroberberine obtained by Gadamer<sup>3</sup> while treating berberine with strong alkalies. During isolation of lambertine and berlambine Chatterjee used 5% ammonium hydroxide. The present work was undertaken to check up if these were actually present within the plant or



were mere *artifacts*. With this end in view berberine was treated with different strengths of ammonium hydroxide over varying periods and conditions but no such transformation as reported by Gadamer could be produced. It was thereby concluded that lambertine and berlambine do occur in nature.

Cannizzaro's reaction is common to aldehydes where two moles of an aldehyde undergo disproportionation into one mole of an alcohol and one mole of an acid under the influence of alkalis.



It is well known that berberine, the common alkaloid of the genus *Berberis*, may exist in three forms, ammonium, carbinol and aldehyde.

Simultaneous occurrence of the three alkaloids berberine, lambertine and berlambine in a plant strongly suggests that a portion of berberine in its aldehyde form has undergone Cannizzaro's reaction followed by ring closure with elimination of water within the plant,

showing that a reaction so far known *in vitro* has occurred also *in vivo*.

Presence of an alkaloid in association with its oxidised or reduced partner is not uncommon in nature. Quinine occurs associated with dihydroquinine in *Cinchona* bark. Aphyllidine follows aphylline in *Anabasis aphylla*. In the former an exocyclic vinyl double bond and in the latter a ring double bond have suffered reduction. In *Coca* leaves alkaloids containing secondary hydroxyl group coexist with keto-forms. Companionship of keto—alcohol and keto—keto alkaloids is frequent in *Lobelia*. But the present record of the trio, alcohol—aldehyde—acid alkaloids namely lambertine, berberine and berlambine in *Berberis lambertii* Parker seems to be unique in literature.

#### LITERATURE CITED

- CHATTERJEE, R. AND A. BANERJEE—*J. Ind. Chem. Soc.* 30, 1953.  
 — AND P. C. MAITI—*Ibid.* 32, 1955.  
 GADAMER, J.—*Arch. Pharm.* 248, 1910.