TABLE I

A. HYDROGENATION OF MALEIC ACID

Hydrogen absorbed, cc.	Total time, seconds Catalyst I (original method)	Catalyst II (modified method)
100	78	60
200	123	98
300	166	135
400	208	173
500	249	213
600	288	253
B. HYDROGENATION OF BENZALDEHYDE[4]		
100	70	152
200	125	239
300	181	314
400	240	388
500	304	465
600	372	545

These results show that the catalyst prepared by the modified procedure was in this case somewhat better for the hydrogenation of maleic acid than that made in the usual way, while the reverse is true for the hydrogenation of benzaldehyde. Reference to the previous study of rates of hydrogenation by this same technique[2] shows that the catalysts reported here are even more active than those in the earlier work.

(4) The addition of a trace of $FeSO_4$ sometimes promoted the reaction and sometimes poisoned it.

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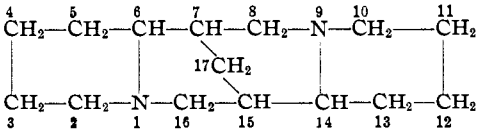
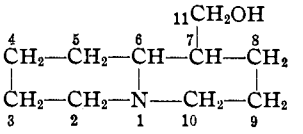
The Numbering of the Sparteine Molecule and its Derivatives

BY JAMES FITTON COUCH

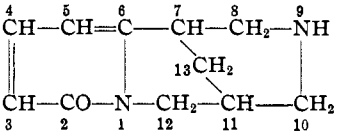
The constitution of sparteine as modified by Clemo and Raper [*J. Chem. Soc.*, 644–645 (1933)] from the structure suggested by Ing [*ibid.*, 504–510 (1933)] may be rearranged to the following form, and the component atoms may then be



numbered in the fashion indicated beginning with a ring nitrogen atom in the conventional way. It would be more convenient in this particular case to start with carbon atom number 16 but it is better to adhere to the established rule. This arrangement of the sparteine formula which has been accepted by Prof. Clemo [personal communication] shows at once its symmetrical character and relationship to other lupine alkaloids and to cytisine and anagyrine. Lupanine becomes 2-keto-sparteine, hydroxylupanine tentatively its 10-hydroxy derivative and anagyrine is 3,4,5,6-tetradehydro-2-keto-sparteine. Lupinine may be formulated as



and cytisine



indicating a close relationship between these alkaloids since cytisine may be derived from (hypothetical) tetradehydro-2-keto-lupinine by condensation of methylamine across atoms 9 and 11 of the lupinine skeleton, atom 8 becoming atom 13 of cytisine. Sparteine may be theoretically derived from lupinine by condensation with piperidine in an analogous manner.

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Amino Alcohols Derived from 1,2,3,4-Tetrahydrodibenzofuran

BY RICHARD A. ROBINSON AND ERICH MOSETTIG

In logical connection with a study of derivatives of 4,5-phenanthylene oxide [Mosettig and Meitzner, THIS JOURNAL, **56**, 2738 (1934)] the investigation of dibenzofuran derivatives was begun in this Laboratory in 1932 with the hope of finding in this series compounds resembling, particularly in their analgesic action, morphine. In our first paper dealing with dibenzofuran derivatives [Mosettig and Robinson, *ibid.*, **57**, 902 (1935)] we outlined in some detail the direction in which our further synthetic experiments were to proceed. In the meantime other research groups [Kirkpatrick and Parker, *ibid.*, **57**, 1123 (1935); Gilman, Smith, and Cheney, *ibid.*, **57**, 2095 (1935)] have approached the synthesis of possibly analgesic and hypnotic substances in the dibenzofuran series in a way which is in part similar to ours; previous publications from these investigators had not indicated any intention of seeking morphine-like substances. In order to avoid unnecessary duplication of effort, some of our recent experimental results are submitted in this preliminary form.