

Alkaloid from *Stemona* and *Lyophyllum*

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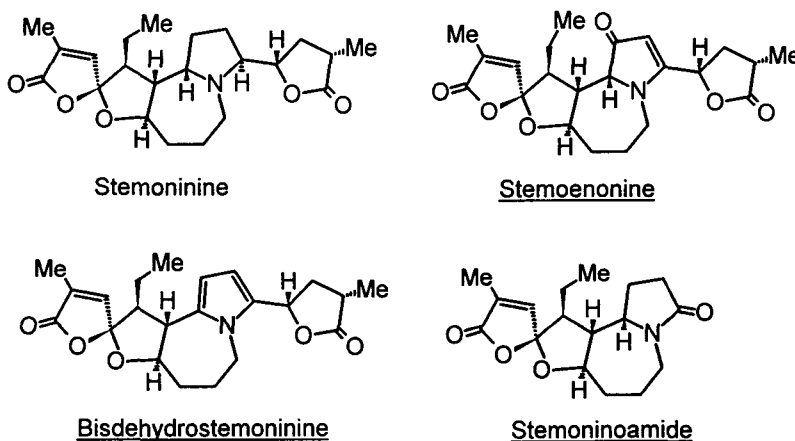
Wolfgang Steglich*

Institute of Organic Chemistry, University of Munich
Karlstrasse 23, 80333 Munich, GermanyI. Alkaloids from *Stemona*

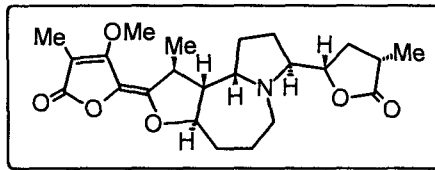
The extracts from the roots of *Stemona* plants have been used as anti-cough agents and insecticides for domestic animals in China and Japan. Early chemical studies and our investigation have depicted a series of novel structural classes which have not only the same azaazuline-ring as its basic skeleton, but also the complexity of the entire structures that are unique to each species.

There are two genera, six species of *Stemona* plants existing in China[1]. These plants are distributed in all provinces along the Yang-Zhi-River. *Stemona* plants have fleshy and clustered radices. The folk medicinal material are prepared mainly radices of *Stemona japonica*, *S. sessilifolia* and *S. tuberosa*.

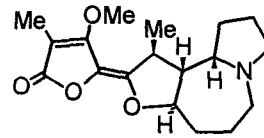
Modern Chemical and spectral methods have been successfully applied to the structural elucidation. More than 25 new alkaloids, including several new skeletons, have been found successively. Together with other known alkaloids, the detail ^1H and ^{13}C NMR data of all these compounds are assigned. All the alkaloids are concluded to be within seven structural types[2-6] as shown in the following figures.



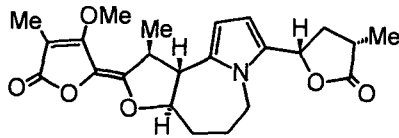
Stemoninine type alkaloids



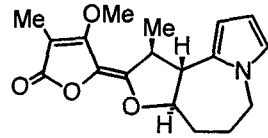
Protostemonine



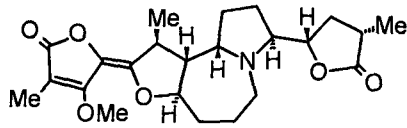
Neostemonine



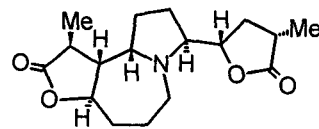
Bisdehydroprotostemonine



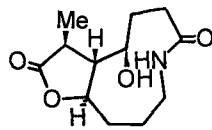
Bisdehydroneostemonine



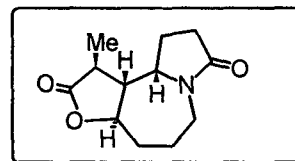
Isoprotostemonine



Stemonine

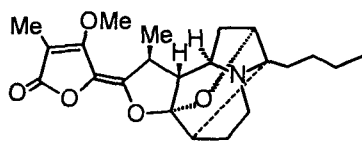


Parvistemoamide

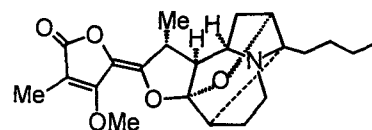


Stemoamide

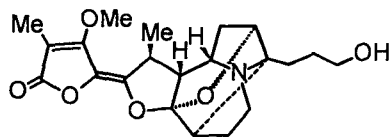
Protostemonine type alkaloides



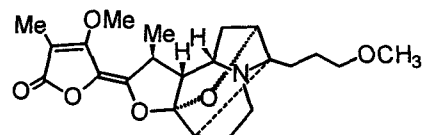
Stemofoline



Isostemofoline

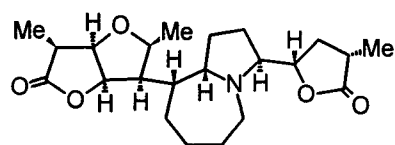


Oxystemofoline

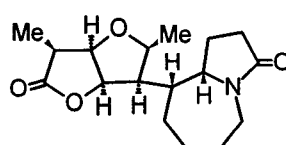


Methoxystemofoline

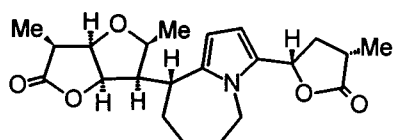
Stemofoline type alkaloids



Parvistemonine

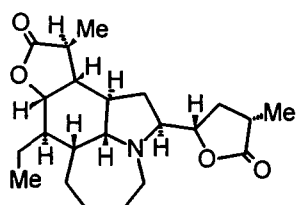


Parvistemonine

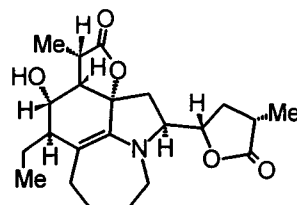


Bisdehydroparvistemonine

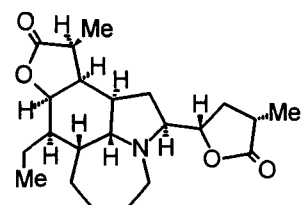
Parvistemonine type alkaloids



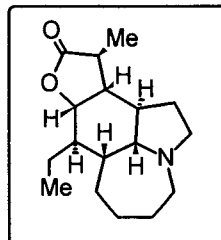
Tuberstemonine



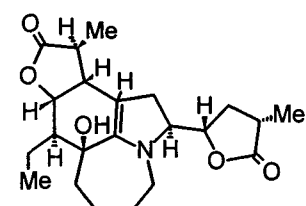
Oxotuberstemonine



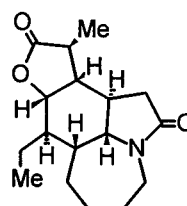
Neotuberstemonine



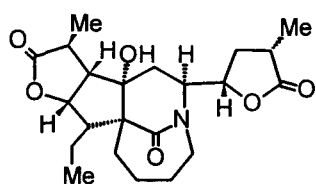
Stenine



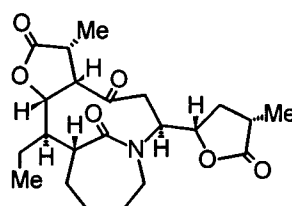
Tuberstemonol



Tuberstemonine-C17-one

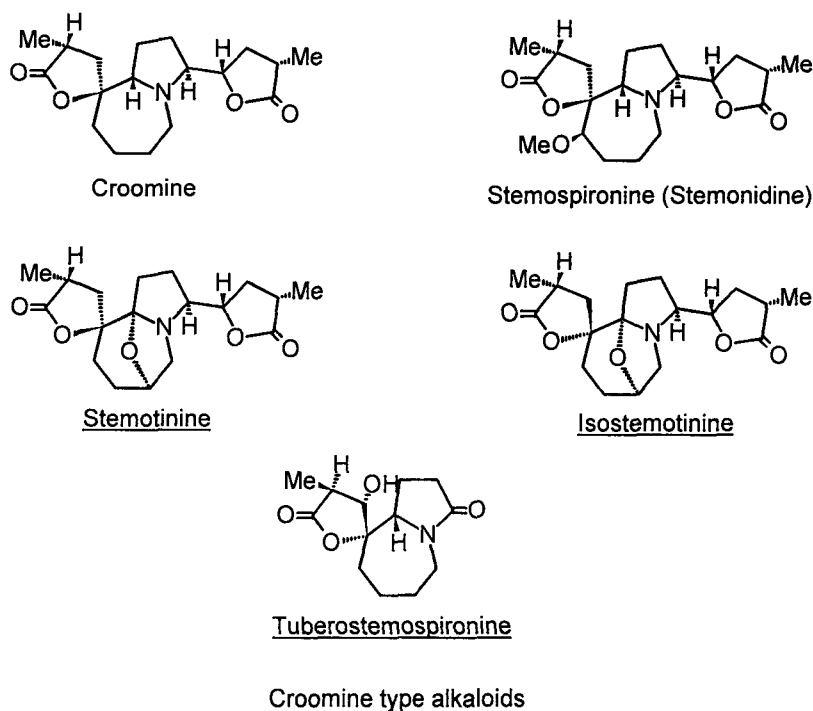


Tuberstemoninoamide



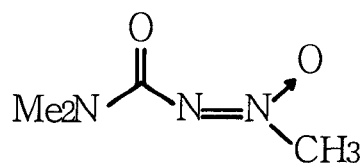
Tuberstemonone

Tuberstemonine type alkaloids



II. Alkaloids from *Lyophyllum*

In the fruit bodies of European fungi *Lyophyllum connatum*, the biosynthetic pathway of Lyophylline[7] has been investigated by feeding experiments with ^{13}C labeled precursors. The mechanism of its formation has been carried out. A nitroso compound was confirmed to be an intermediate. Interestingly, some homologues of the precursors could be converted to related azoxy compounds (unnatural natural products!) inside the fruiting bodies.



Lyophyllin

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- 2) Ye, Y.; Qin, G. W.; Xu, R. S. *Phytochemistry*, 1994, **37**, 1205 and 1201.
- 3) Ye, Y.; Qin, G. W.; Xu, R. S. *J. Nat. Prod.*, 1994, **57**, 665.
- 4) Lin, W. H.; Ye, Y.; Xu, R. S. *J. Nat. Prod.*, 1992, **55**, 571.
- 5) Lin, W. H.; Xu, R. S.; Zhong, Q. X. *Huaxue Xuebao*, 1991, **49**, 927.
- 6) Lin, W. H.; Ye, Y.; Xu, R. S. *Chinese Chem. Lett.*, 1991, **2**, 369.
- 7) Fugmann, B. and Steglich, W. *Angew. Chemie Int. Ed. Engl.* 1984, **23**, 72