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Cherimoline, a Novel Alkaloid from the Stems of *Annona cherimola*

Chung-Yi Chen, Fang-Rong Chang and Yang-Chang Wu*

Graduate Institute of Natural Products, Kaohsiung Medical College, Kaohsiung, Taiwan, R.O.C.

Abstract: Specimens of *Annona cherimola* (Annonaceae) from Taiwan contained cherimoline (**1**), which was identified by analysis of spectral data. © 1997 Elsevier Science Ltd.

Although Annonaceous acetogenins constitute the majority of natural products from Annonaceae of Taiwan,[1] a large but significant number of alkaloids have been described. These include oxoaporphines,[2] aporphines,[3] benzylisoquinolines,[4] proaporphines,[5] phenanthrene alkaloids,[6] and some amides.[7] As part of our continuing investigation on the alkaloids of Formosan Annonaceous plants, we have isolated several alkaloids from the methanol stem extract of *Annona cherimola*. Among them, the cherimoline (**1**), present a novel structure in which the 6-membered lactone quinoline type. We report herein the structural elucidation of **1**.

Specimens of the *A. cherimola* were collected from Chia-Yi, Taiwan, September 1995. It is a subtropical fruit tree cultivated in southern Taiwan, which is indigenous to Ecuador and Peru. It has been used for the treatment of skin disease, especially for boil in folk medicine.[8] The methanol extract was separated by reversed and normal phase chromatography to obtain a fraction with a significant ^{1}H NMR spectrum. Purification by TLC on silica using 20:1 $CHCl_3$/MeOH as eluent gave cherimoline (**1**, 0.003% dry wt.).

Cherimoline (**1**), was obtained as a white powder, mp 203-205 ℃. The molecular formula, $C_{12}H_7NO_2$, was obtained from high resolution mass measurement (m/z 197.0473 $[M]^+$, calcd. 197.0477). The presence of lactone ring in the cherimoline molecule was indicated by IR band at 1760 cm^{-1} and a signal appearing at δ 162.8 in the ^{13}C NMR spectrum. The structure was confirmed from the ^{1}H NMR spectrum of **1** (Table 1), which contained signals at δ 8.30 (1H, dd, J=7.8, 1.2 Hz, H-10), 8.07 (1H, dd, J=7.8, 1.2 Hz, H-7), 7.79 (1H, td, J=7.8, 1.2 Hz, H-8) and 7.63 (1H, td, J=7.8, 1.2 Hz, H-9) on benzene ring, δ 7.47 (1H, d, J=7.2, H-2) and δ 7.21 (1H, d, J=7.2, H-1) on lactone ring and δ 9.54 (1H, s, H-5). The ^{13}C NMR (Table 1) and DEPT experiments of **1** showed 12 resonance lines consisting of seven methines and five quaternary carbons (including a lactone carbonyl signal at δ 162.8).

To confirm the structure , 2D NMR experiments were employed. The HETCOR experiment showed that the methine carbon signals at δ 100.4, 123.6, 127.4, 129.6, 131.5, 134.3 and 149.5 were correlated to the proton signals at δ 7.21, 8.30, 7.63, 8.07, 7.79, 7.47 and 9.54, respectively. The sequential correlations of the NOESY spectrum were successfully established as

shown in Figure 1. In particular, the NOE correlation of H-1 and H-10 was more significant than that of H-1 and H-2, this indicated that H-1 was closely to H-10 than H-2 and suggested the existence of an angular triple ring system. The above results support the structure of **1**, as a novel alkaloid, 4*H*-pyrano[3,4-c]quinolin-4-one, which we name cherimoline.

Table 1. ^{13}C (100 MHz, methanol-d_4) and ^{1}H NMR (400 MHz, methanol-d_4) data for cherimoline (1).

C#	δ_C	δ_H	mult., *J* (Hz)	NOE
1	100.4	7.21	d, 7.2	2, 10
2	134.3	7.47	d, 7.2	1
4	162.8			
4a	117.5			
5	149.5	9.54	s	
6a	147.6			
7	129.6	8.07	dd, 7.8, 1.2	8
8	131.5	7.79	td, 7.8, 1.2	7, 9
9	127.4	7.63	td, 7.8, 1.2	8, 10
10	123.6	8.30	dd, 7.8, 1.2	1, 9
10a	122.2			
10b	142.8			

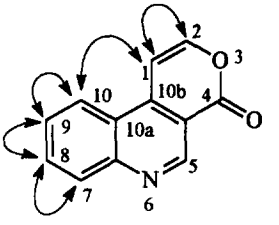

Fig. 1 NOESY experiments of cherimoline (**1**)

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References and notes.

1. Wu, Y. C. and Chang, F. R. *J. Chin. Chem. Soc.* **1995**, *53*, 76.
2. Wu, Y. C., Chang, G. Y., Duh, C. Y. and Wang, S. K. *Phytochemistry* **1993**, *33*, 497.
3. Yang, T. H., Chen, C. M. and Kuan, S. S. *J. Chinese Chem. Soc.* **1971**, *18*, 133.
4. Yang, T. H. and Chen C. M. *J. Taiwan Pharm. Assoc.* **1973**, *25*, 1.
5. Sonnet, P. E. and Jacobson, M. *J. Pharm. Sci.* **1971**, *60*, 1254.
6. Wu, T. S., Jong, T. T., Tien, H. J., Kuoh, C. S., Furakawa, H. and Lee, K. H. *Phytochemistry* **1987**, *26*, 1623.
7. Chen, C. Y., Chang, F. R. and Wu, Y. C. *J. Chin. Chem. Soc.* **1997**, in perss.
8. Kan, W. S., Mannual of Medicinal Plants in Taiwan., Taiwan, **1971**, p. 246.

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