

**Pattern of Calcium Oxalate Crystals in the Leaves of *Poligonum longisetum*
DE BRUYN and *P. persicaria* LINN., grown from 4000-year-old
Seeds, and in the Leaves of Same *Poligonum*
sp. Plants Now Growing**

It has now become certain from my past studies¹⁻¹¹⁾ that the pattern analysis of crystalline inorganic components present in plants plays an important role in elucidating the interrelationship of plant species (genuses and/or families). Consequently, it seems necessary to set up a "systematic tree of plants" reflecting the characteristics of crystalline inorganic components.⁴⁾

In this connection, calcium oxalate crystals⁵⁾ in the leaves of *Poligonum* species were taken up to examine the difference, if any, in the crystalline pattern between those in the leaves of the plants that sprouted from seeds dormant for almost 4000 years and those of the plants growing now in the same area. The seeds in question were excavated from the remains

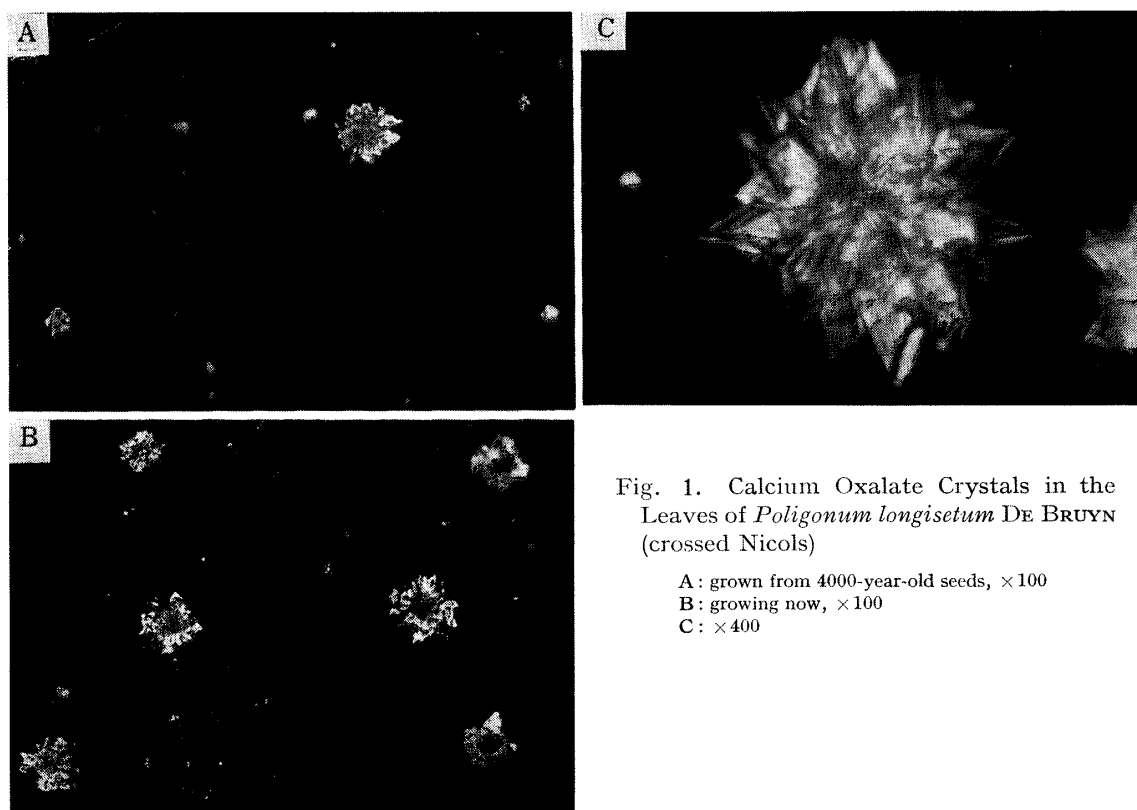


Fig. 1. Calcium Oxalate Crystals in the Leaves of *Poligonum longisetum* DE BRUYN (crossed Nicols)

A: grown from 4000-year-old seeds, $\times 100$
B: growing now, $\times 100$
C: $\times 400$

- 1) K. Umemoto, *Chem. Pharm. Bull.* (Tokyo), **21**, 1391 (1973).
- 2) K. Umemoto, *Chem. Pharm. Bull.* (Tokyo), **21**, 2799 (1973).
- 3) K. Umemoto, *Yakugaku Zasshi*, **94**, 110 (1974).
- 4) K. Umemoto, *Chem. Pharm. Bull.* (Tokyo), "in press."
- 5) K. Umemoto, *Yakugaku Zasshi*, **94**, 380 (1974).
- 6) K. Umemoto and K. Hozumi, *Chem. Pharm. Bull.* (Tokyo), **19**, 217 (1971).
- 7) K. Umemoto and K. Hozumi, *Yakugaku Zasshi*, **91**, 828 (1971); *idem, ibid.*, **91**, 845 (1971); *idem, ibid.*, **91**, 850 (1971); *idem, ibid.*, **91**, 890 (1971); *idem, ibid.*, **91**, 908 (1971); *idem, ibid.*, **91**, 1047 (1971).
- 8) K. Umemoto, M. Hutoh, and K. Hozumi, *Mikrochim. Acta*, **1972**, 508; *idem, Microchem. J.*, **17**, 173 (1972).
- 9) K. Umemoto and K. Hozumi, *Mikrochim. Acta*, **1973**, 301.
- 10) K. Umemoto and K. Hozumi, *Microchem. J.*, **17**, 689 (1972).
- 11) K. Umemoto and K. Hozumi, *Yakugaku Zasshi*, **93**, 1069 (1973).

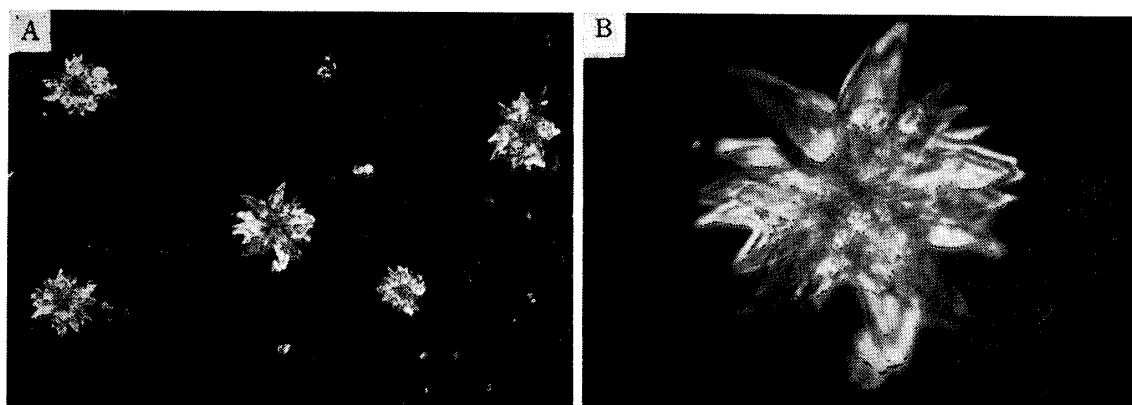


Fig. 2. Calcium Oxalate Crystals in the Leaves of *Polygonum persicaria* LINN. (crossed Nicols)
 A: $\times 100$
 B: $\times 400$

of middle Jōmon period (Shimozutsumi Iseki, 3990 ± 105 B.P.) at Shimozutsumi, Akita Prefecture, in August, 1972. The seeds were those of *Polygonum longisetum* DE BRUYN and *P. persicaria* LINN., the plants grew, and leaves were collected. The same plants presently growing in the area around the excavation of the remains were also collected for comparative examination. Crystal patterns were examined by the use of the "low-temperature plasma ashing method for biological tissue" devised by the author.

1. Both *P. longisetum* DE BRUYN and *P. persicaria* LINN. contained the same spherical clustered crystals (Fig. 1-C, Fig. 2-B), and the form of clustered crystals was the same in the leaves from plants that grew from 4000-year-old seeds and from those growing now. The tip of each crystal mass constituting the clustered crystal was pointed, and the structure was almost the same as or quite close to the structure of clustered crystals distributed in *Saxifraga* genus. The leaves examined also contained tiny crystals which were assumed to be calcium oxalate crystals.

2. Clustered crystals were distributed mainly in the mesophyll and along the costa. The size of clustered crystals was $15-50 \mu$ in the leaves that grew from 4000-year-old seeds (Fig. 1-A) and $30-50 \mu$ in the leaves from presently growing plants (Fig. 1-B) in the case of *P. longisetum* DE BRUYN. The size of clustered crystals was $30-50 \mu$ in both kinds of *P. persicaria* LINN. (Fig. 2-A).

Thus, there was no essential difference in the calcium oxalate crystals found in the leaves of *P. longisetum* DE BRUYN and *P. persicaria* LINN., either growing from the seeds dormant for 4000 years or growing at present. In addition, the crystals had the same shape and quality in both *P. longisetum* DE BRUYN and *P. persicaria* LINN., and this fact suggests that even crystallographically the two kinds of plant have the same or very closely related origin.

Acknowledgement The author expresses his best thanks to Prof. Y. Kasahara, Institute for Agricultural and Biological Sciences, Okayama University, to Dr. T. Sugahara, Akita City Board of Education, and to Dr. T. Sudo, Akita Prefecture Agriculture Experimental Station, for the supply of specimens used in the present work.

Kyoto College of Pharmacy
 Yamashina Misasagi,
 Higashiyama-ku, Kyoto, 607, Japan

KOUICHIRO UMEMOTO

Received February 7, 1974