

TRITERPENE ACIDS AND BERGENIN IN  
*PELTOBOYKINIA WATANABEI* AND *BOYKINIA LYCOCTONIFOLIA*\*

KAZUO IZAWA, MASAHIRO NAGAI and TAKAO INOUE

Hoshi College of Pharmacy, Ebara 2-4-41, Shinagawa-ku, Tokyo, Japan

(Received 11 January 1973. Accepted 1 February 1973)

**Key Word Index**—*Peltoboykinia watanabei*; *Boykinia lycoctonifolia*; Saxifragaceae; isocoumarin; bergenin; triterpenes,  $\alpha$ -peltoboykinolic acid;  $\beta$ -peltoboykinolic acid; chemotaxonomy.

In our previous work<sup>1,2</sup> we reported the isolation of two triterpene acids,  $\alpha$ -peltoboykinolic acid (I) and  $\beta$ -peltoboykinolic acid (II) from the rhizomes of *Peltoboykinia tellimoides* (Maxim.) Hara. Their structures were elucidated as urs-12-en-3 $\beta$ -ol-27-oic acid and olean-12-en-3 $\beta$ -ol-27-oic acid respectively. Bergenin (III) is also known as a chemical component of the rhizomes.<sup>3</sup> It was of chemotaxonomic interest to see whether the above compounds occur in two related plants which we have now examined.

*Plant.* *Peltoboykinia watanabei* (Yatabe) Hara, distributed in the southern part of Japan and *Boykinia lycoctonifolia* (Maxim.) Engl., distributed in the northern part of Japan.

The dried and powdered rhizomes of *P. watanabei* were extracted with MeOH. The methanolic extract was dissolved in H<sub>2</sub>O and extracted with C<sub>6</sub>H<sub>6</sub>. The C<sub>6</sub>H<sub>6</sub> solubles were chromatographed on silica gel with 5% EtOAc in C<sub>6</sub>H<sub>6</sub>, affording I, m.p. 230–3° (m.m.p., co-TLC; yield, 0.055% of the dried rhizomes) and II, m.p. 220–2° (m.m.p., co-TLC; yield, 0.1%). The H<sub>2</sub>O solubles were concentrated to a small volume and allowed to stand for a day at room temp. The precipitate (yield, 10%) was collected and found by PPC (6% aq. AcOH as the solvent) to consist mainly of III. On recrystallization of the precipitate from H<sub>2</sub>O, III, m.p. (143–9°) 235–8° was obtained (m.m.p., co-TLC).

The dried and powdered rhizomes of *B. lycoctonifolia* were extracted with Et<sub>2</sub>O and subsequently with MeOH. The ethereal extract was chromatographed on silica gel and elution with 10% Et<sub>2</sub>O in C<sub>6</sub>H<sub>6</sub> gave II (yield, 0.07%); I could not be detected on TLC of any chromatographic fractions nor could III on PPC of the methanolic extract of the rhizomes.

*P. tellimoides*, *P. watanabei* and *B. lycoctonifolia* were first reported as new species of *Saxifraga*, and then were transferred to *Boykinia*; afterwards, the first two were placed in a new genus *Peltoboykinia* of which they are the only species. A few plant taxonomists consider that *P. watanabei* is a variety of *P. tellimoides*. It can be seen that all three plants contain II and the two *Peltoboykinia* species have I and III in addition. The similarity of the chemical constituents of *P. tellimoides* and *P. watanabei* is in agreement with their taxonomic situation and separates them from *Boykinia*. It would obviously be of interest to examine the other 8 or 9 *Boykinia* species which occur elsewhere than Japan.

\* Part III in the series "Studies on the Constituents of Saxifragaceous Plants". For Part II see Ref. 1.

<sup>1</sup> NAGAI, M., INOUE, T. and IZAWA, K. (1971) *The Proceedings of the Hoshi College of Pharmacy* **13**, 63.

<sup>2</sup> NAGAI, M., IZAWA, K. and INOUE, T. (1969) *Chem. Pharm. Bull. (Tokyo)* **17**, 1438.

<sup>3</sup> YAMAKI, T. and INOUE, T. (1946) *Sigenkagaku Kenkyusho Iho* No. 10, 13; (1948) *Chem. Abstr.* **42**, 3034h; (1950) *ibid.* **44**, 9013d.