

Umbelliferae of Taiwan⁽¹⁾

With 16 plates

By

Tang-shui Liu, Chuan-ying Chao and Tsan-iang Chuang^{(2) (3)}

INTRODUCTION

The present paper is a revision of the genera and species of the UMBELLIFERAE of Taiwan. The naturalized and cultivated species are not included. A taxonomic study was followed by a cytological survey of chromosome numbers. For chromosome counts, fresh young buds were fixed in Farmer's solution, acetocarmine smear technique was then employed to make temporary slides for chromosome determination. Drawings were made under the microscope with the aid of a camera lucida at the magnification of 1280 ×.

This paper includes 15 genera, 32 species and 1 variety of Umbelliferae of Taiwan. Four new species, one new variety and several new synonyms are listed herein. All specimens cited in this paper have been deposited in the Herbarium of the Department of Botany, National Taiwan University (TAI), Taiwan Forest Research Institute (TAIF), and the Herbarium of the Institute of Botany, Academia Sinica (AS). Voucher specimens for chromosome counts are all in the TAI and AS.

Key to the genera

1. Low creeping herbs; leaves simple; flowers in small axillary simple subcapitate umbels..... 2
2. Slender to stout, erect or ascending herbs; leaves simple or ternate or pinnately compound; flowers pedicellate in compound umbels (rarely simple or sessile)..... 3
3. Leaves with a pair of free stipules at base of petiole; fruits without secondary ribs; involucre wanting or inconspicuous *Hydrocotyle*

(1) The authors wish to express their gratitude to Dr. L. Constance, Department of Botany, California University for his invaluable suggestions; to Dr. C. E. DeVol, Department of Botany, National Taiwan University for his kind help during the progress of this study; to Mr. M. T. Kao for his assistance in collecting the specimens; and to Miss Wilma W. L. Hu and S. C. Kwan for making slides for chromosome counts. The illustrations of the new species were prepared by Mr. R. L. Wang and Mr. C. C. Kuo to whom the authors are deeply indebted.

(2) Professors, Department of Forestry and Department of Botany, National Taiwan University, and Assistant Research Fellow, Institute of Botany, Academia Sinica, respectively.

(3) We are indebted to the Institute of Botany, Academia Sinica for research support.

Specimens examined—Hwalien Hsien: E. Matsuda, Aug. 7, 1918 (TAI); S. Sasaki, May 30, 1919 (TAI); R. Kanchira & S. Sasaki, June, 1919 (TAIF); E. Matsuda 18546 (TAIF). Pingtung Hsien: S. Suzuki 11131 (TAI).

2. *Bupleurum* LINN. Sp., Pl. 236. 1753.

Odontites SPRENG. in Mag. Gesellsch. Nat. Freunde Berlin 6(3):258. 1814.

Diaphyllum HOFFM., Gen. Umbell. ed. 2. 115. 1816.

Glabrous herbs or woody at the base, erect or spreading. Leaves entire, simple. Umbel loosely compound; involucre and involucel foliaceous, setaceous, or wanting. Flowers yellow, pedicelled or sessile; calyx-teeth obsolete; petals obovate, emarginate; style short, stylopodium flattened. Fruits oblong to orbicular or ellipsoid, slightly compressed laterally and constricted at the commissure, usually glabrous; ribs distinct, sometimes subulate, rarely obscure; carpels subterete in transection; carpophore entire bifid or 2-partite. Vittae 1-3 in the intervals, rarely wanting or many. Seed face plane.

Consisting of more than 100 species of the northern hemisphere of the old world. Type species, *Bupleurum rotundifolium* LINN. One species in Taiwan.

In this genus, about 14 species are known for their chromosome numbers. Most of these species have either 14 or 16 somatic chromosomes, indicating that the basic chromosome numbers of this genus are 7 and 8. The species *B. aschlinense* has a diploid chromosome number of 12 (Suzuki, 1953). Our counts reveal that the new species, *B. Kaoi*, described here also has 12 somatic chromosomes (Plate XV, fig. 4). Thus, besides 7 and 8, 6 is also the basic chromosome number of this genus.

1. *Bupleurum Kaoi* LIU, CHAO et CHUANG sp. nov. (Plate III, fig. 6; Plate XIII, fig. 5).

Herba gracillima 30-40 cm. longa a basi ramosa; caule glabro supra ramoso; foliis radicalibus et caulinis [inferioribus petiolatis oblongo-lanceolatis 5-10 cm. longis, 0.5-1 cm. latis, summis sessilibus basi attenuatis oblanceolatis vel lanceolato-linearibus subamplexicaulibus margine integris 5-7-nervis; involucris 2-3-phyllis lanceolatis 5-10 mm. longis; umbellis 5-6-radiatis 1-3 cm. longis, inaequalibus; involucelli foliolis 4-5 lanceolatis, circ. 5 mm. longis, umbellulis vix brevioribus; petalis flavis latis involutis, staminibus quam petalis longioribus, stylis brevibus, stylopodio depresso-plano; fruitibus oblongis 2-3 mm. longis, 1-1.5 mm. latis, glabris; valliculae 3-vittatae; commissura 4-vittata; semine facie planiusculo.

Parenchyma erect glabrous herb, 40-70 cm. high. Radical leaves oblong-lanceolate or spatulate, 5-10 cm. long, 0.5-1 cm. broad, apex acute; upper cauline leaves numerous, oblanceolate to oblong spatulate, 1-3 cm. long, 3-7 mm. broad. Involucre 2-3, lanceolate, 5-10 mm. long; rays 5-6, 1-3 cm. long, unequal; involucels 4-5, linear-lanceolate, 1-5 mm. long. Flowers yellow. pedicels 1-3 mm. long. Fruit

oblong, 2-3 mm. long, 1-1.5 mm. broad, glabrous. Vittae large, usually 2-3 in the interval, 4 on the commissure.

This new species differs from *B. falcatum*, which is distributed in Japan, in both chromosome number and vittae. According to Hiroe and Bell & Constance (1957), *B. falcatum* has chromosomes $2n=16$ and the variety *B. falcatum* var. *scorzoneraefolium* has also 16 chromosomes. The new species described here has 12 somatic chromosomes, and the vittae are larger and distinct, while the vittae of the Japanese variety are very small and obscure. Therefore a new taxon is proposed herein.

Type locality—Fuhsinli (復興里), Houlung (後龍鎮), Miaoli Hsien, M. T. Kao K3746 type! (TAI).

Distribution—Endemic to Taiwan.

Specimens examined—Miaoli Hsien: M. T. Kao K3746 type! (TAI); S. Sasaki, Aug. 25, 1927 (TAI); T. Kawakami, B. Hayata & U. Mori 18557 (TAIF). Taichung Hsien: Y. Shimada 18558 (TAIF). Nantou Hsien: U. Mori 18559 (TAIF).

3. *Centella* LINN., Gen. Pl. ed. 6. 485. 1764.

Prostrate, glabrous or pubescent perennial herbs, rooting at the nodes. Leaves simple, petiolate, entire to crenate or palmately lobed; petioles sheathing at base. Umbel solitary or fascicled; peduncles axillary; involucre of 2-3 conspicuous bracts. Flowers white or rose-tinged; calyx-teeth obsolete; petals narrower, inflexed at apex. Fruit orbicular to ellipsoid, reniform, laterally compressed; commissure narrow; primary ribs prominent, filiform, the secondary ribs as distinct as the primary; carpophore entire, very short. Vittae none or occasionally containing small vittae. Seed laterally compressed.

About 20 species mostly in tropical region, especially in south Africa. Type species, *Centella villosa* Linn. One species in Taiwan.

C. asiatica is the only species whose chromosome number, $2n=18$, has been determined (Bell and Constance, 1960). Our count, $n=9$, for this species (Plate XV, fig. 5) is in agreement with that reported by Bell and Constance.

1. *Centella asiatica* (L.) URBAN in Martium Fl. Bras. 11:287. 1879. (Plate IV, fig. 8)

Hydrocotyle asiatica LINN., Sp. Pl. 1:234. 1753.

Hydrocotyle asiatica var. *crispata* MAXIM., Acad. St. Petersburg. 34:44. 1886.

Hydrocotyle rependa PERS., Spr. Syst. Veg. 1:875.

Centella bonienseis NAKAI et TUYAMA, Bot. Mag. Tokyo 50:31. 1936.

Hydrocotyle asiatica f. *crispata* (MAXIM.) HARA, Enum. Spermat. Jap. 3:303. 1954.

Stems long, creeping, rooting at the nodes. Leaves orbicular-reniform, entire, crenate or lobulate, 2.5-5 cm. in diameter, glabrous or nearly so; petiole 4-10 cm. long. Umbel 3-6-flowered, peduncles 2-8 mm. long, pedicels almost none. Fruit ellipsoid, 2-3 mm. long, 3-4 mm. broad.



Fig. 6. *Bupleurum Kaoi Liu, Chao et Chuang sp. nov.*

A. Habit. B. Umbellet. C. Flower. D. Petal. E. Stamen. F. Fruit.
G. Fruit transection.