A Cytotaxonomtic Comparison of Parsley and Celery

by Minosuke HIROE*

広江美之助: パースレーとセルリーの細胞分類学比較

Received April 9, 1955

In 1814, Hoffman established the genus *Petroselinum* based on *Apium Petroselinum* L. The principal reason advanced was that in *Apium* the petals are white, while in *Petroselinum* they are very light green. The writer believes that petal color is likely to be of very little taxonomic value.

In species of the genus *Apium*, especially *Apium Petroselinum* L., the lateral branches appear to be the axis, forming a monopodial sympodium, while the true stem apex produces an inflorescence. In many Umbelliferae, on the other hand, growth is by quite ordinary monopodial branching. The fruit of the genus *Apium* is small and ovoid or orbicular. Both *Apium graveolens* (celery) and *A. Petroselinum* (parsley) contain the glucoside characteristic of *Apium*.

From a study of *Apium Petroselinum*, Ogawa¹⁾ concluded that the chromosome number is $n=11$. Recently, Wanscher²⁾ reported *Apium graveolens* to possess the chromosome number of $n=11$, also. In the present cytological observations on the root-tip cells of *A. Petroselinum* and *A. graveolens* (based upon plants cultivated in the Botanical Gardens of Kyoto University, Japan), it has been noted that metaphase plates show $2n=22$ (Figs. I-VI). Karyotype analysis of the two species showed that metaphase chromosomes comprise two sets of 11 chromosomes (Figs. II, IV-VI). Through observation of the karyotypes (Figs. II, IV) and idiograms (Figs. V-VI) indicates that there is a relationship of chromosome morphology between the two species.

From the fact that *A. Petroselinum* and *A. graveolens* have very similar morphological characters, but are different in the karyotypes, it may be assumed that they are closely related taxa. I wish, therefore, to express this relationship by placing them together in the same genus.

Involucel conspicuous; petals light green; node of radical leaf with 11 leaf gaps *Apium Petroselinum*

Involucel wanting; petals white; node of radical leaf with 19 leaf gaps *Apium graveolens*

Apium Petroselinum L. Sp. Pl. 264. 1753. Synonyms: *Apium crispum* Mill. Gard. Dict. ed. 8, *Apium* no. 2. 1768., *Petroselinum hortense* Hoffm. Gen. Umbell. 163.

* Department of Botany, Faculty of Science, Kyoto University, Kyoto, Japan. 京都大学理学部植物学教室

Table 1. Measurements of chromosomes in *Apium Petroselinum* and *A. graveolens*

	<i>A. Petroselinum</i> (10=1.0μ)											<i>A. graveolens</i> (10=1.0μ)										
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5	6	7	8	9	10	11
Chromosome																						
Long arm	28	23	25	25	25	23	20	20	25			28	23	30	30	18	20					
Short arm	10+15	10+18	15	15	15	15	15	10	5	20	10	10+15	10+18	10	10	8	5	25	25	20	15	5
Total	53	51	40	40	40	38	35	30	30	20	10	53	51	40	40	26	25	25	25	20	15	5
Constriction	SM	SM	SM	St	SM	SM	SM	SM	SM			SM	SM	St	St	St	St					

1814, *Petroselinum sativum* Hoffm., op. cit., 177, *Petroselinum vulgare* Lag. Amen. Nat. 103. 1821, *Carum Petroselinum* Benth. & Hook. Gen. Pl. 1: 891. 1867, *Petroselinum crispum* (Mill.) Nyman ex Kew Hand-list Herbac. Pl. 3, 122. 1925.

Type locality: "In Sardinia juxta seaturigines." Distribution: Central and northern Europe; adventive in America and Japan. The plant is cultivated as a vegetable. The karyotype analysis of this species may be depicted as follows:

$$K(2n)=22=2^{CS}A^{SM}+2^{CS}B^{SM}+2C^{SM}+2D^{St}+10E^{SM}+4F$$

The lengths of the chromosomes of *A. graveolens* and *A. Petroselinum* are shown below:

Apium graveolens L. Sp. Pl.264.1753. Synonyms: *Apium integrilobum* Hayata, Mater. Fl. Formosa 126. 1911.

Type locality: Europe. This has a wide range in Europe, North Africa, America (adventive), and western Asia to northwestern India, also in Japan; the plant is cultivated for use as a vegetable.

B. Hayata recorded *Apium integrilobum* according to the specimen collected by U. Faurie 122, "in humidis Maruyama, Taipeh, Formasa". The writer, after careful examination of the isotype and many other specimens in the type locality of this plant, concludes that *A. integrilobum* is merely a specimen of *A. graveolens* grown in barren soil. The karyotype analysis of this species may be depicted as follows:

$$K(2n)=22=2^{CS}A^{SM}+2B^{SM}+8C^{St}+8D+2E$$

The writer expresses his cordial thanks t2 Prof. S. Kitamura and Prof. L. Constance (University of California, U. S. A.) for their guidance, and to Prof.

M. Shigenaga for his guidance in the cytological technique.

Literature Cited

1. Ogawa, Mem. Coll. Sci. Kyoto Univ. 4: Fig. b, 311 (1929) 2. Wanscher, Hereditas 15: Fig. 8, 180 (1931)

Figs. I-VI, Metaphase chromosomes in root-tip cells of *Apium Petroselinum* L. and *Apium graveolens* L. taken with a imm. obj. (n. A. 1.25) and a periplane oc. of C. Zeiss and magnified by $\times 2000$ (pretreated with 8-Oxyquinoline and stained with Orsein).

Figs. I-II, Somatic chromosomes ($2n=22$) of *Apium Petroselinum* L. Fig. I, Photomicrograph of metaphase plate. Fig. II, Schematic reproduction of Fig. I.

Figs. III-IV, Somatic chromosomes ($2n=22$) of *Apium graveolens* L. Fig. III, Photomicrograph of metaphase plate. Fig. IV, Schematic reproduction of Fig. III.

Fig. V, Chromosome idiograms of *A. Petroselinum* L.

Fig. VI, Chromosome idiograms of *A. graveolens* L.