Morphological Study of Duchesnea (Rosaceae)

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Morphological Study of *Duchesnea* (Rosaceae)

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バラ科ヘビイチゴ属植物の形態

Abstract

The morphological characters of three taxa of *Duchesnea*, *D. chrysantha* (diploid), *D. indica* (dodecaploid), and heptaploid and octoploid of *D.*×*harakurosawae*, were compared. *D.*×*harakurosawae* is a natural hybrid between *D. chrysantha* and *D. indica*. Two types of hybrids are closer to *D. indica* rather than the intermediate of *D. indica* and *D. chrysantha*. Moreover, the heptaploid is monecloser to *D. indica* than the octoploid.

A single morphological character is not useful to recognize any of these taxa, since the range of variation of each character overlaps. However, each taxon is recognizable by using a combination of some floral and leaf characters.

Key Words: *Duchesnea* — hybrid — morphology

Introduction

Duchesnea (Rosaceae), consisting of *D. chrysantha* (ZOLL. et MOR.) MIQ. (diploid) and *D. indica* (ANDR.) FOCKE (dodecaploid), has a wide distributional range in Asia, and at present widely naturalized in all continents. In Japan, these plants are common weeds occuring from Hokkaido to Okinawa (OHWI, 1953; KITAMURA and MURATA, 1961; HATUSIMA, 1971).

The heptaploid hybrid, described as *D.*×*harakurosawae* NARUHASHI et SUGIMOTO (1986), was firstly reported by HARA and KUROSAWA (1959) and later the other octoploid hybrid also discovered (NARUHASHI *et al.*, 1986). Cytological studies (NARUHASHI and IWATSUBO, 1991a, 1991b) demonstrated that the chromosome number of *D. indica* was not simply multiplied that of *D. chrysantha*. The occurrence of two types of hybrid was high percentage (about 20%) of total populations examined in Fukui Prefecture and Sado Island (NARUHASHI *et al.*, unpublished). At these areas, it makes difficult to identify the parental species and two hybrids are morphologically very similar to each other. Therefore, these plants including the heptaploid and the octoploid were examined in morphological field to clarify their morphological characteristics.

Materials and Methods

Materials were collected from Toyama Pref., Ishikawa Pref. and Fukui Pref., and counted their chromosome numbers.

The measurments of following morphological characters are taken:

1. Rosette diameter of plant before runner elongation at early spring. (n: number of samples =30)
2. Number of runners per plant, length of internode, and length of the longest runner. (n=20)
3. Number of stamens and pistils. (n=30)
4. Length, width, depth of depression, area, length/width, and depression/length of petal. (n=30)
5. Length, width, and length/width of calyx. (n=20)

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6. Length, width, number of incisions and length/width of epicalyx. (n=20)
7. Polar length, equatorial diameter, and polar length/equatorial diameter of pollen grain. (n=15)
8. Height, diameter, and height/diameter of false fruit. (n=30)
9. Length, thickness, width, length/width and length/thickness of achene. (n=20)
   Weight of achene.
10. Length, width, length/width, number of serrations, number of double serrations, and double serration nr./serration nr. of terminal leaflet. Ratio of presence/absence of double serration in terminal leaflet. (n=20)
11. Number of serrations of lateral leaflet. (n=20)
12. Area and dry weight/area of leaf.
13. Length, width, and length/width of stoma. (n=20)

Pollen grains preserved in 70% alcholic solution and dried specimens of leaves were observed.

Result

Duchesnea forms a rosette in winter, sprouts several runners in spring, and makes a flower at the third node on the runner. Rosette diameter and runner length are useful for comparison of their plant sizes. Rosette diameter before runner develops is shown in Table 1. The mean value of diameter is the smallest in *D. chrysantha*, intermediate in the heptaploid and the octoploid of *D.* × *harakurosawae*, and the largest in *D. indica*. But their ranges overlapped.

Measurements of runner are shown in Table 2. Values measured of the runner in *D. indica* and two types of *D.* × *harakurosawae* are lager than that of *D. chrysantha*. Moreover, the maximum value of runner length is recorded in *D.* × *harakurosawae*. This might be explained that the hybrids are sterile, therefore the energy which should be invested in fruit is spent in runner.

Length of internode of *D. chrysantha* are about 1/2 value of other two taxa.

In body size, *D.* × *harakurosawae* and *D. indica* are similar to each other and larger than *D. chrysantha*. This coincides with a previous study (SUGIMOTO and NARUHASHI, 1981).

Values of measurement of floral parts are shown in Table 3.

Numbers of stamens and pistils on three taxa show almost the same values. On the other hand *D. chrysantha* is smaller than other taxa in both calyx and epicalyx size. The heptaploid of *D.* × *harakurosawae* is slightly smaller than the octoploid of *D.* × *harakurosawae* and *D. indica*.

Of floral parts, petals are the most clear indication of the morphological difference in these taxa. The polygraphs showing values of measurement of 15 characters are presented in

Table 1. Rosette size. (Mean±SD)

	D. chrysantha	*D.* × *harakurosawae* (7X)	*D.* × *harakurosawae* (8X)	*D. indica*
Diameter (mm)	58±8	87±14	88±13	100±9
(range)	(21-111)	(43-141)	(51−144)	(45−158)
N*	20	6	9	16

* Number of populations.

Table 2. Measurements of runner.

	D. chrysantha	*D.* × *harakurosawae* (7X)	*D.* × *harakurosawae* (8X)	*D. indica*
Number of runners / plant	3.1±0.6	3.6±0.6	3.0±1.2	3.1±0.9
(range)	(1−10)	(1−10)	(1−11)	(1−7)
Internode length (mm)	46±6	108±4	106±22	108±17
Longest runner (mm)	532±134	1463±214	1363±411	1321±215
Max. runner length (mm)	1304	2591	3115	2358
N	8	5	7	9

Table 3. Measurements of sexual organ.

	D. chrysantha	*D.* × *harakurosawae* (7X)	*D.* × *harakurosawae* (8X)	*D. indica*
Pistil & Stamen				
pistil nr.	232.2±25.4	244.4±19.9	248.5±35.4	239.0±49.2
(range)	(118−394)	(152−366)	(158−407)	(142−456)
stamen nr.	20.6±0.4	20.8±0.7	20.9±0.7	20.7±0.6
(range)	(20−26)	(20−27)	(20−29)	(20−26)
N	13	4	10	9
Petal				
length(l) (mm)	7.3±0.3	8.4±0.6	9.1±0.9	9.0±0.7
(range)	(6.3−9.0)	(6.5−9.8)	(7.3−10.4)	(8.1−10.8)
width(w) (mm)	6.5±0.4	5.9±0.4	7.2±0.7	6.0±0.5
(range)	(5.6−8.3)	(4.8−6.9)	(5.6−7.6)	(5.4−7.4)
depression(d) (mm)	0.39±0.10	0.07±0.02	0.25±0.07	0.09±0.04
(range)	(0.05−0.73)	(0.00−0.27)	(0.05−0.41)	(0.00−0.29)
l/w	1.13±0.03	1.44±0.01	1.27±0.04	1.50±0.06
(range)	(0.84−1.32)	(1.28−1.56)	(1.16−1.43)	(1.34−1.74)
d/l×100	5.25±1.22	0.80±0.25	2.57±0.97	0.96±0.41
(range)	(0.45−8.78)	(0.00−2.88)	(0.56−4.41)	(0.00−2.84)
area (mm^2)	35.1±3.4	37.4±5.4	49.5±9.9	41.9±6.0
(range)	(25.5−50.6)	(23.7−48.1)	(31.9−58.2)	(32.7−60.2)
N	10	8	11	8
Calyx				
length(l) (mm)	7.6±0.4	7.9±1.0	9.1±1.2	9.7±1.5
width(w) (mm)	3.8±0.1	3.7±0.4	4.1±0.4	4.5±0.6
l/w	1.94±0.07	2.14±0.13	1.96±0.38	1.91±0.19
N	11	4	10	10
Epicalyx				
length(l) (mm)	7.3±0.6	7.7±1.1	9.8±1.6	9.6±1.4
width(w) (mm)	5.5±0.7	6.2±1.1	8.7±1.8	8.2±1.5
l/w	1.36±0.12	1.22±0.06	1.15±0.06	1.20±0.07
incision nr.	4.0±0.5	3.7±0.4	4.7±0.4	4.1±0.6
(range)	(3−7)	(3−6)	(3−7)	(3−6)
N	11	4	10	10

Fig. 1. These polygraphs explain that the heptaploid of *D.* × *harakurosawae* and *D. indica* are similar to each other, and are distinguishable to *D. chrysantha* and the octoploid of *D.* × *harakurosawae*. The difference of the polygraph shape hase mainly resulted from factor E, F, and G, but other factors are not efficient. As recognition of the shape of petals, length/width ratio, depression/length ratio and area of petal are chosen, and the results are shown in Fig. 2. In the figure, the spots of *D. indica* and the heptaploid of *D.* × *harakurasawae* make a crowd.

In *D. chrysantha*, petals are small, wide and depressed, while they are long and a little depressed in *D. indica*. The petals of the octoploid of *D.* × *harakurosawae* are large, wide and depressed, and intermediate between the parents in the shape. In the heptaploid, on the other hand, petals are similar to that of *D. indica* , but slightly smaller (Fig. 3).

Duchesnea × *harakurosawae* never produces normal pollen grains, and therefore no receptacle enlargement and no mature seeds produce. Mesurements of fruiting receptacles and achenes of *D. chrysantha* and *D. indica* are shown in Table 4.

In both of *D. chrysantha* and *D. indica* pollen grains are tricolpate and have opercula. The pollen grains of *D. indica* were larger than those of *D. chrysantha*, but the values of the ratio of equatorial diameter to polar length are nearly equal. The values of pollen sizes of these plants reported by IKUSE (1956), SHIMAKURA (1973), MAAS (1977), and NARUHASHI and TOYOSHIMA

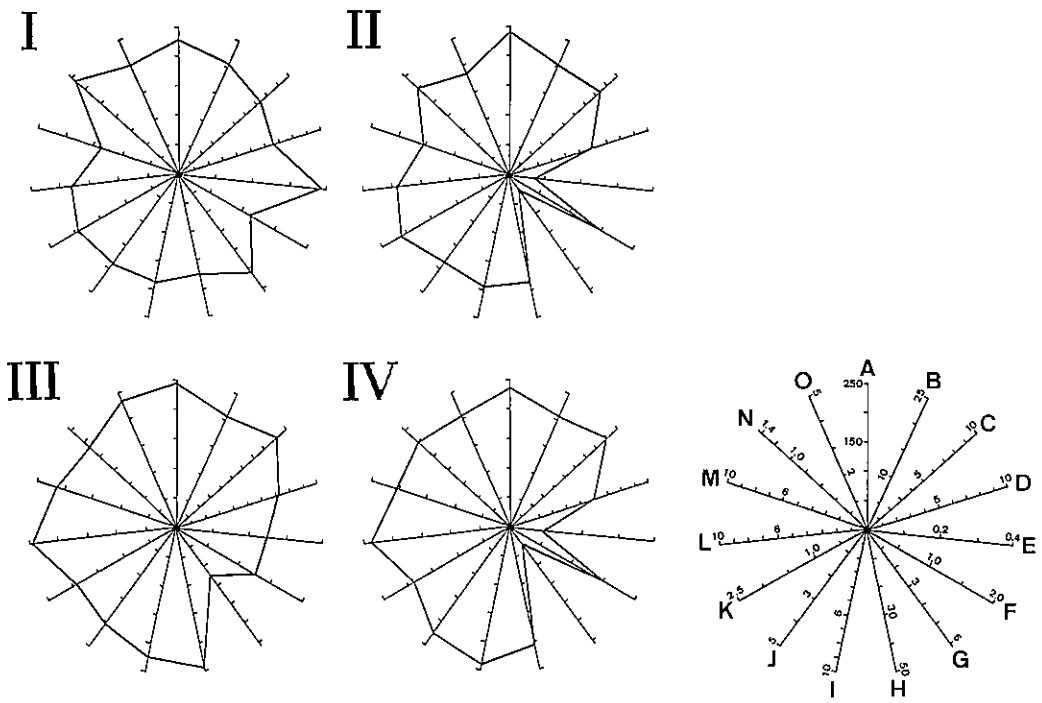

Fig. 1. Polygraphs showing variations in 15 morphological floral characters.
I: *D. chrysantha*, II: *D.* × *harakurosawae* 7X, III: *D.* × *harakurosawae* 8X, IV: *D. indica*. A: Number of pistils; B: Number of stamens; C: Length of petal (mm); D: Width of petal (mm); E: Depth of depression (mm); F: Length / width of petal; G: Depth of depression / length of petal (×100); H: Area of petal (mm²); I: Length of calyx (mm); J: Width of calyx (mm); K: Length / width of calyx; L: Length of epicalyx (mm); M: Width of epicalyx (mm); N: Length / width / of epicalyx; O: Number of incisions.

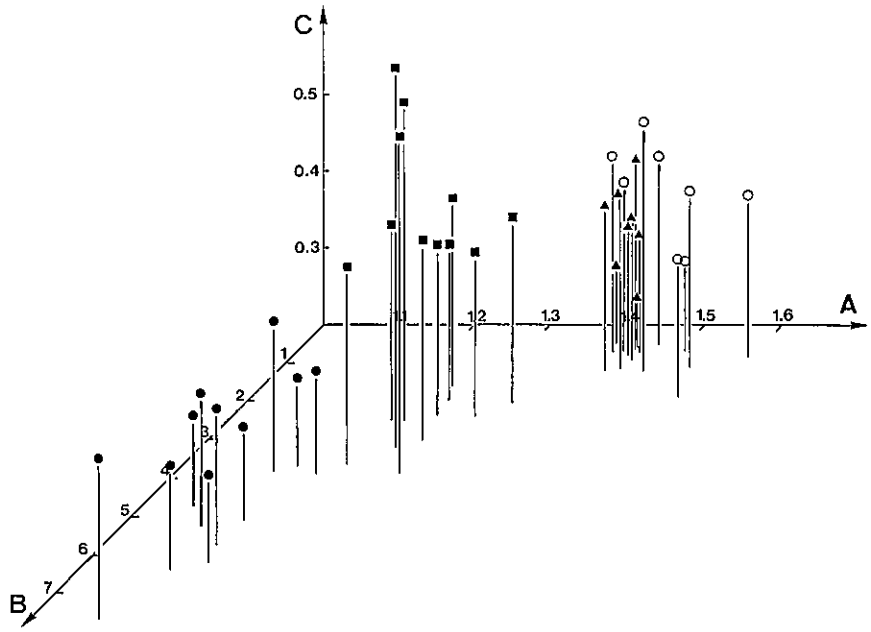

Fig. 2. Trimensional diagram indicates three morphological characters of petal.
A: Length / width of petal; B: Depth of dipression / length of petal (×100); C: Area of petal (mm²).
●: *D. chrysantha*; ▲: *D.* × *harakurosawae* 7X; ■: *D.* × *harakurosawae* 8X; ○: *D. indica*.

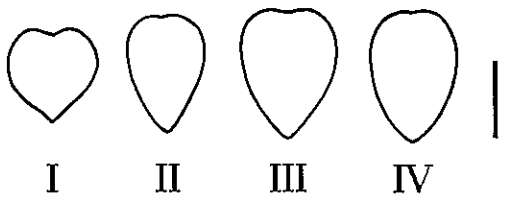

Fig. 3. Typical petal shapes. (bar indicates 5 mm) I, II, III, & IV (See, Fig. 1).

(1979), are not agree with this result. This might be thought the differences resulting from the different treatments or methods of materials.

In *Duchesnea* receptacles enlarged after pollination are called false fruits. Namely a false fruit consists of an enlarging receptacle and numerous achenes on it. The enlarged receptacles of *D. chrysantha* are whitish pink and those of *D. indica* are brightly red. The false fruits of *D. indica* are larger than those of *D. chrysantha*. The values of height/diameter of false fruits were similar to each other. Regression line is $h=0.75d+0.66$ ($r=0.84$) in *D. chrysantha*, and $h=0.83d+0.47$ ($r=0.87$) in *D. indica*. Therefore, false fruits of *D. chrysantha* show rather flatter shape than those of *D. indica*.

The achene is larger and heavier in *D. indica* than *D. chrysantha* (Table 4). The shape of achene in *D. indica* is rather slimer than *D. chrysantha*. The values ($1.22\times0.65\times0.99$ in *D. chrysantha*; $1.29\times0.78\times0.89$ in *D. indica*) of KASAHARA (1976) disagree with this result.

Table 4. Measurements of pollen grain, false fruit and achene.

	D. chrysantha	*D. indica*
Pollen grain		
polar length (p) (μm)	29.1±1.7	35.9±1.2
(range)	(25.3−35.3)	(31.4−41.7)
equatorial diameter (e) (μm)	23.5±1.8	29.3±1.0
(range)	(18.7−29.3)	(24.0−33.7)
p/e	1.25±0.04	1.23±0.04
(range)	(1.10−1.45)	(1.08−1.42)
N	10	8
False fruit		
height(h) (mm)	9.1±0.9	12.8±1.8
(range)	(6.4−12.7)	(7.7−18.7)
diameter(d) (mm)	11.1±1.1	15.8±1.8
(range)	(8.5−15.2)	(10.0−21.1)
h/d	0.82±0.04	0.81±0.04
(range)	(0.69−1.03)	(0.67−1.03)
N	10	7
Achene		
length(l) (mm)	1.05±0.03	1.23±0.08
(range)	(0.93−1.18)	(0.98−1.54)
thickness(t) (mm)	0.61±0.02	0.64±0.03
(range)	(0.66−0.99)	(0.70−1.19)
width(w) (mm)	0.80±0.03	0.89±0.06
(range)	(0.43−0.76)	(0.48−0.76)
l/w	1.31±0.02	1.39±0.06
w/t	1.33±0.02	1.39±0.05
N	10	15
weight(mg)	0.23±0.03	0.33±0.03
(range)	(0.19−0.26)	(0.27−0.41)
N	17	15

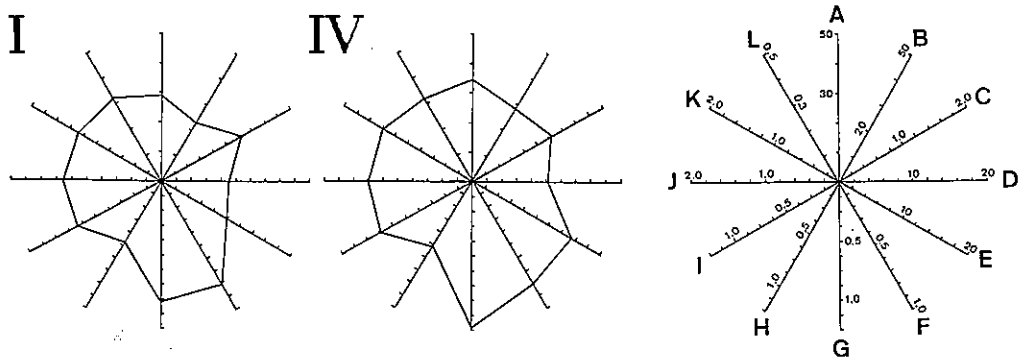

Fig. 4. Polygraphs showing variations in 12 morphological characters of pollen, false fruit and achene. I & IV (See, Fig. 1). A: Polar length (μm); B: Equatorial diameter (μm); C: Polar length / equatorial diameter; D: Height of false fruit (mm); E: Diameter of false fruit (mm); F: Height / diameter of false fruit; G: Length of achene (mm); H: Thickness of achene (mm); I: Width of achene (mm); J: Length / width of achene; K: Width / thickness of achene; L: Weight of achene (mg).

In the mean value of size on pollen grain, false fruit and achene, a clear distinction between *D. chrysantha* and *D. indica* is recognized. These sizes above mentioned of *D. indica* are larger than those of *D. chrysantha* (Table 4 & Fig. 4).

A leaf consisting of three leaflet, *i.e.*, one terminal leaflet and two lateral leaflets, has a long petiole and two lanceolate stipules. A terminal leaflet is obovate. A lamina is yellowish-green in *D. chrysantha*, and dark or deep green in *D. indica*. In *D.* × *harakurosawae*, the lamina colour is intermediate or nearer to those of *D. inidica*. The basal part of petiole is brownish-red in *D. chrysantha*, and purplish-red in other two taxa. Lateral leaflets in each taxon often deeply divided into two parts and therefore the leaves appear to be digitately five leaflets.

The measurements of leaves are shown in Table 5, and the lamina silhouettes of each taxon are shown in Fig. 5; the shapes of lamina and serrations vary considerably even in each taxon.

Duchesnea chrysantha has rather obtuse, wide, thin and double serrated leaves, while *D. indica* has acute, thick and little double serrated ones. Those of *D.* × *harakurosawae* are larger than *D. chrysantha* and show a range from resemble to *D. indica* to intermediate of two species. In the variation range, heptaploid is nearer to *D. indica* than octoploid (Table 5 & Fig. 6).

Discussion

Duchesnea chrysantha has small size of plant, rather thick rhizome, yellowish green thin leaf, late obovate terminal leaflet with many double serrations, reddish brown basal part of petiole, obcordate petal, small pollen grain size, small false fruit size with whitish pink colour, and rugose-reticulate small achene. While *D. indica* has large size of plant, no thick rhizome, green to dark green rather thick leaf, rhomboideus terminal leaflet with rare double serrations, reddish purple basal part of petiole, obovate petal, large pollen grain size, large false fruit size with brilliant red colour, and weak rugose-reticulate large achene.

Duchesnea × *harakurosawae* is considered as a natural hybrid between above two species and the hybrid consists of the heptaploid and the octo-

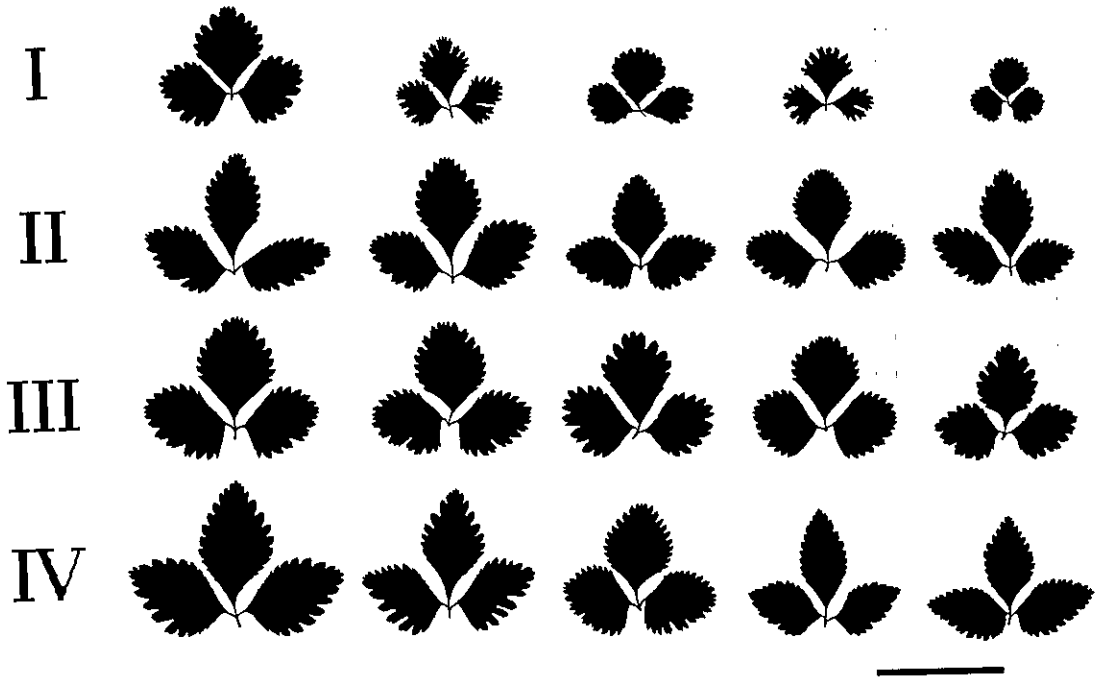

Fig. 5. Variations of leaf shapes. (ber indicates 5cm)
I, II, III, & IV (See, Fig. 1).

ploid. Habits of present three taxa such as inflorescent, flower, runner, leaf, *etc.* are the same. As a result of a detailed comparison of morphology on three taxa by using mass collection, there are no single character indicating a clear difference between three taxa, because range of variations of all present morphological characters overlap. However, the slight morphological differences are recognized judging from the combination of characters. The presence of no clear morphological differences among these taxa are explained as wide range of variation caused by variable environmental conditions in habitats of each taxon.

The heptaploid is closer to *D. indica* , while the octoploid is closer to *D. chrysantha*, judging from the shape and the size of petals, and the shape of leaves. Two types of hybrid, however, are closer to *D. indica* rather than the intermediate of *D. indica* and *D. chrysantha*. It is supported by the results of chromosome studies (NARUHASHI & IWATSUBO, 1991a, 1991b) that the heptaploid is nearer to *D. indica* and the octoploid to *D. chrysantha*. That is, the heptaploid consists of a half set of chromosome of *D. indica* and a half set of chromosome of *D. chrysantha*, while the octoploid consists of a half set of chromosome of *D. indica* and a full set of chromosome of *D. chrysantha*.

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Table 5. Measurements of leaf.

	D. chrysantha	*D.* × *harakurosawae* (7X)	*D.* × *harakurosawae* (8X)	*D. indica*
Terminal leaflet				
length(l) (mm)	21.0±2.2	38.1±3.1	37.1±3.0	39.0±7.6
width(w) (mm)	17.0±1.8	22.0±1.7	24.4±2.1	23.9±3.9
l/w	1.24±0.08	1.75±0.06	1.52±0.04	1.63±0.12
(range)	(0.92−1.47)	(1.47−2.22)	(1.15−1.85)	(1.28−2.06)
serration nr.(s)	16.5±2.0	19.8±0.6	20.1±2.2	21.8±2.6
(range)	(10−29)	(15−26)	(13−38)	(12−52)
double ser. nr.(d)	2.4±0.8	0.6±0.5	2.2±1.0	1.0±1.0
(range)	(0−8)	(0−7)	(0−9)	(0−17)
d/s × 100	14.1±3.9	2.9±2.6	10.5±4.6	4.3±3.9
(range)	(4.2−21.1)	(0.5−6.9)	(2.6−17.1)	(0.0−14.4)
r*	82.1±14.4	30.9±23.0	67.2±21.5	39.1±26.0
(range)	(40.0−100.0)	(3.7−75.0)	(20.0−90.0)	(0.0−84.0)
Lateral leaflet				
serration nr.	16.8±1.8	20.1±0.8	20.0±2.5	21.4±2.5
(range)	(10−29)	(13−26)	(12−37)	(10−47)
Leaf area (cm^2)	5.2±1.1	10.5±2.0	13.7±2.5	13.5±3.5
Leaf weight**(mg/cm^2)	2.66±0.61	3.61±0.40	3.07±0.41	3.58±0.62
(range)	(1.66−3.59)	(3.06−3.98)	(2.46−3.74)	(2.49−4.55)
N	25	6	11	25
Stoma				
length(l) (μm)	18.5±1.2	20.2±1.8	21.5±0.9	22.7±0.7
(range)	(14.4−23.6)	(13.7−27.7)	(17.9−23.6)	(16.5−29.5)
width(w) (μm)	13.0±0.8	13.9±1.6	14.6±0.4	15.4±0.4
(range)	(9.9−16.5)	(8.0−18.6)	(11.7−18.1)	(11.5−19.0)
l/w	1.43±0.08	1.47±0.11	1.48±0.04	1.48±0.02
(range)	(1.12−1.77)	(1.17−1.95)	(1.23−1.72)	(1.16−1.83)
N	5	5	5	5

* Ratio of presence/absence of double serration leaflet
**Dry weight of leaf without petiole

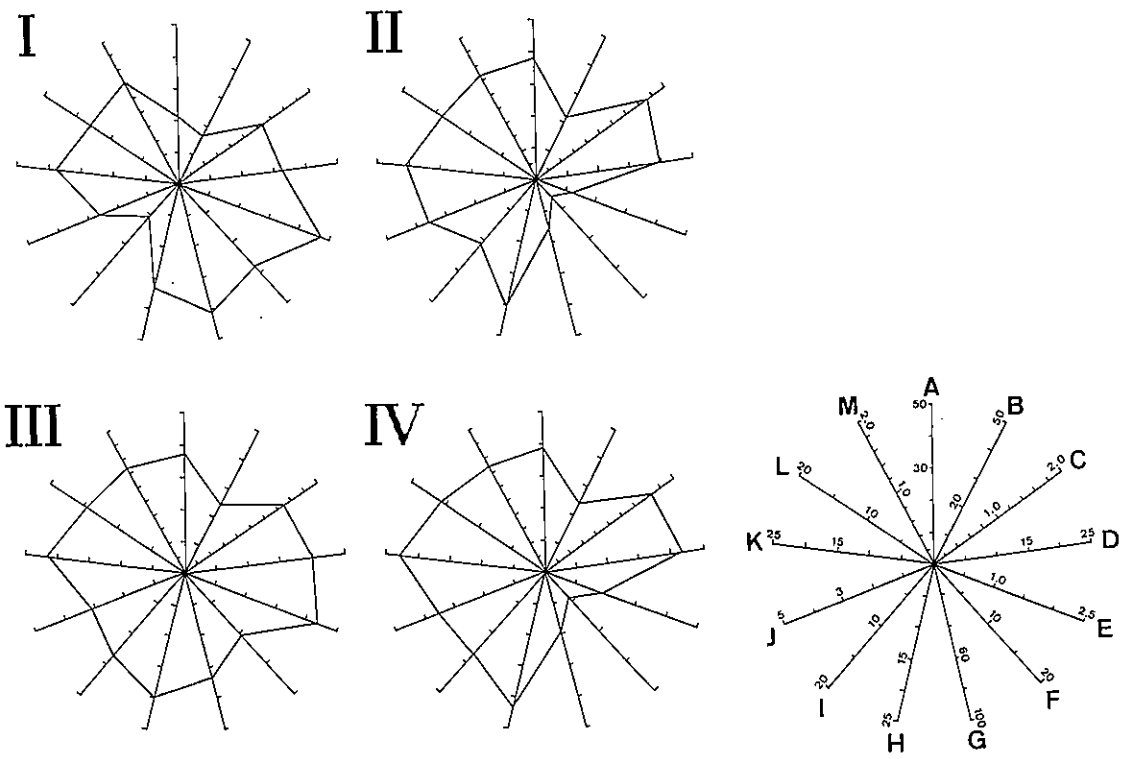

Fig. 6. Polygraphs showing variations in 13 morphological leaf characters.
I, II, III, & IV (See, Fig. 1). A: Length of terminal leaflet (mm); B: Width of terminal leaflet (mm); C: Length / width of terminal leaflet; D: Number of serrations of terminal leaflet; E: Number of double serrations of terminal leaflet; F: Ratio of double serration number to serration number of terminal leaflet; G: Ratio of presence / absence of double serration leaflet; H: Number of serrations of lateral leaflet; I: Area of leaf (cm^2); J: Dry weight of leaf (mg/cm^2); K: Length of stoma (μm); L: Width of stoma (μm); M: Length / width of stoma.

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摘　要

細胞学的には明確に区別できるヘビイチゴ属植物1サイトタイプを含む3分類群の，形態的特徴を明らかにすべく，その外部形態を詳細に比較検討した。

ヘビイチゴは小型で，根茎はやや肥大し，葉は黄緑色で薄く，広倒卵形で重鋸歯性の強い頂小葉を持つ。葉柄の基部は赤褐色を帯びる。また，花弁は大きく凹み，倒心臓形である。花粉粒は小さく，小型の白桃色の肥大した花托を持ち，痩果は網目状の皺が強い。一方，ヤブヘビイチゴは大型で根茎は肥大せず，緑～濃緑色の厚い葉を持つ。頂小葉は重鋸歯があまり出現せず，菱形状卵形を示す。葉柄の基部は赤紫色を帯びる。花弁は倒卵形で凹みは小さい。花粉粒は大きく，肥大した花托は大型で，光沢を持った濃紅色を呈する。痩果は大きく，皺は極めて弱い。

両種の雑種のアイノコヘビイチゴの形態は，ヤブヘビイチゴとヘビイチゴの中間よりヤブヘビイチゴに近い。そして，アイノコヘビイチゴの7倍体は8倍体に比べ，ヤブヘビイチゴの形態により近い。このことは染色体の研究（NARUHASHI & IWATSUBO, 1991a, 1991b）の結果と一致する。

これらの1サイトタイプを含む3分類群の形態上の差はいずれも量的なものであり，それぞれの変異の幅は重なり合う。故に，単一の形質で明確にこれらの分類群を識別することは不可能である。しかし，複数の形質を組み合わせ集団を分析することにより，これらの分類群を把握することができる。

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東京大学では1960年以来，ネパール・ブータン・シッキムなど東ヒマラヤの植物の調査を続けている。その成果は不定期ではあるが大部な学術報告書 Flora of Eastern Himalaya Part 1～3（1966.'71, '75）として出版されている。この3冊はどちらかといえば，フロラを主題とした報告書であったが，1988年に出された本書の第1巻では，書名も改められ，フロラのみならず，群落や材構造などの巾広い内容を含み，現地の研究者を編者に加え，執筆陣にも地方の若手研究者が参加するなど，名実ともに新しいスタイルとなった。今回の第2巻は，内容の構成は第1巻と同ようであるが，カラー口絵写真をさらに豊富に入れるなど，カラフルなものとなっている。

本書は，1983, '84, '85, '86, '88の5次にわたる植物調査の結果として出版されたものであり，それぞれ口絵のカラーまたは白黒写真（計107図版）を伴う以下の7篇の報文から成っている。

Micro-scale Vegetation Patterns on Talus in the Alpine Region of the Himalaya (9頁)

Comparative Morphology of Flowers and Chromosome Numbers in *Duchesnea indica* (Rosaceae) from Nepal and Japan (5頁)

Wood Structure of Himalayan Plants II (49頁)

Taxonomic Notes of the East Himalayan Species of *Impatiens* (30頁)

Taxonomic Notes on Some Alpine Species of *Ranunculus* in the Himalaya (21頁)

A Revision of the Genus *Kobresia* (51頁)

A Revision of the Genus *Poa* in the Himalaya (95頁)

これらの報文は，互いの関連性はないが，この種の調査は，長い時間をかけ積み重ねていくことによって，はじめて全体像が浮び上ってくる性質のものである。本書のような着実な出版の積み重ねは，やがてヒマラヤ植物学の集大成に結晶していくことだろう。大いに期待したい。（清水　建美）

○ 久山喜久雄(編)**フィールドガイド大文字山　法然院森の教室** 1991年8月16日，ナカニシア出版発行。口絵カラー2頁＋本文174頁，1800円。

大文字のお盆の送り火で名高い京都の大文字山のフィールドガイドブックが出版された。この本は，1985年に始った「法然院森の教室」における自然講座や野外活動，そして手作りの里山調査の活動の結晶ともいうべきもので，編者の久山さんほか法然院の貫主さん，動植物の研究者，元環境庁のスタッフ，仏教大学学生，ノーベル賞受賞者等々14名の多彩なメンバーの執筆になる。大文字は京都市民はもちろん，広く日本の心のふるさとでもある。とくに第3部の「大文字に想う」は，他のフィールドガイドにはみられない構成であり，収められた4篇の随筆には心が暖まる。本書が単なるガイドブックに留まらず，自然そして人間の在り方や地域を改めて新鮮な目で捉えるようにとの編者の願いがかなえられるよう，広く巷間に推奨したい。（清水建美）