

Hiroshi HARA* & Sachiko KUROSAWA*: On the *Duchesnea*
indica group**

原 寛*・黒澤幸子*: ヘビイチゴ類について

Makino in 1914 and 1921 made clear that there are two kinds of *Duchesnea* in Japan. The differences between the two plants are summarized below, with additional characters observed by us.

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| { | Achenes smooth or obsolete-ly elevated-nerved, glossy when fresh. Fruiting receptacles bright red glossy 11-20 mm across, with a red neck. Plants generally larger in all respects. Leaves deeper green, leaflets obovate—rhombic-oblong, up to 4-7 cm long, lateral ones often bifid. Dodecaploid (2n=84). | A |
| | Achenes distinctly rugose-tubercled, not shining. Fruiting receptacles pinkish white not shining 8-12 mm across, with a whitish neck. Plants smaller. Leaves yellowish green, leaflets rounded-obovate, less than 3 cm long 2.5 cm wide. Diploid (2n=14). | B |

The first botanist who noted the presence of these two races in Japan is Franchet (1873), who treated the plant B as *β. Wallichii*. In 1921 Makino regarded the plant B as *Duchesnea indica* (Andr.) Focke, and described the plant A as a new species, *D. major* Makino. However, Nakai noticed during his trip (1923-25) in Europe that the plant A was actually identical with *D. indica*, and he referred the plant B to *D. Wallichiana* (Seringe) Nakai, probably following the opinion of Franchet. Quite independently Odashima in 1935 distinguished these two plants in Taiwan (Formosa), and correctly identified the plant A as *D. indica*, and described the plant B as a new species, *D. formosana*. Handel-Mazzetti also made a remark in 1933 under *Potentilla indica* that 'Die japanische Pflanze scheint durch einen ganz anderen Zuschnitt der Blättchen und stark skulpturierte Früchtchen abzuweichen.' But later Handel-Mazzetti (1939) and Li (1951) failed to rightly recognize *D. formosana*, reducing it merely to a synonym of *D. indica*. Recently Kitamura treated the plant B as a variety of *D. indica* without expressing his opinion on the plant A (*D. major*) of Japan.

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The plant A is generally found in open woods or on shady hill-sides, while the plant B often on sunny road-sides or on cultivated grounds. Under favourable conditions, the plant A grows much larger having deep green elongate leaflets, and is easily recognizable even under a sterile condition in the field. On sunny barren grounds, however, it is difficult to distinguish the plant A from B in size, because the former becomes smaller with small lighter green leaves and small fruits. As compared with A, the plant B tends to have thinner roundish leaflets with deeper obtuse double teeth, reflexed fruiting calyx-lobes, and softer hairs. The amount of hairs, and the shape of petals, calyx-lobes and calyculs are apt to vary in both plants. The most stable outer morphological characters in separating the two plants lie in fruiting receptacles and achenes (cf. Figs. 1 & 2).

According to Ikuse (1956), the pollen grains of the plant B are $21-22 \mu \times 23-24 \mu$ in size, whereas those of A are larger attaining $27 \mu \times 29.5 \mu$. The stomata of the plant A is also larger statistically than those of the plant B. The length of stomata on the lower surface of leaves ranges from 25μ to 33μ in the former, and from 18μ to 24μ in the latter.

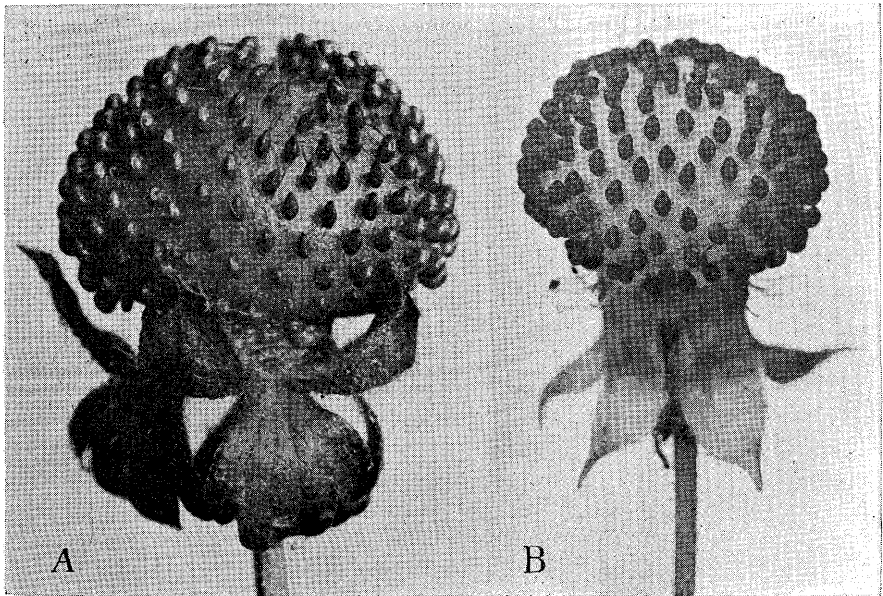


Fig. 1. Fruiting receptacles of (A) *Duchesnea indica* Focke (left) and (B) *D. chrysantha* Miquel (right). $\times ca. 4$. Photo by S. Watari.

Duchesnea indica planted in Mass., U. S. A. was cytologically studied by Ichijima in 1926, and was reported to have 42 gametic chromosomes. We have examined a plant cultivated at Paris under the name *D. indica*, and have confirmed

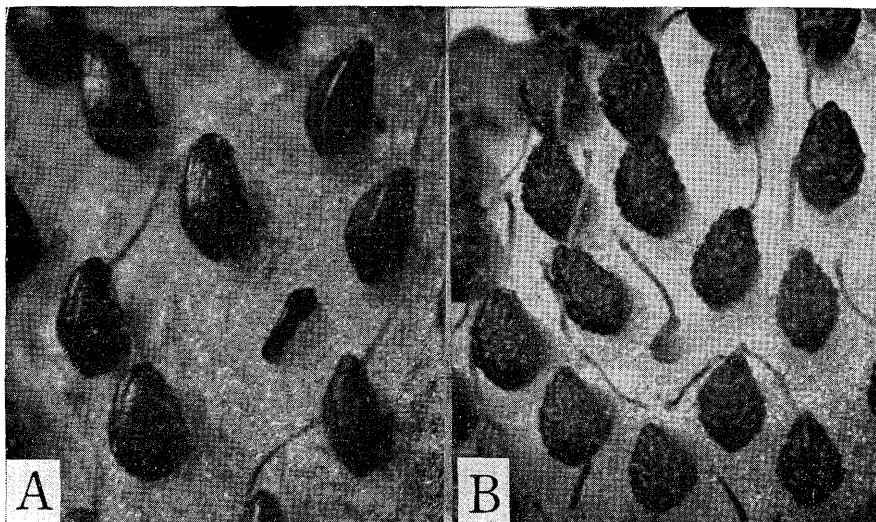


Fig. 2. Parts of fruiting receptacle of (A) *Duchesnea indica* (left) and (B) *D. chrysantha* (right). \times ca. 10. Photo by S. Watari.

that its somatic chromosomes are 84. So *D. indica* is considered to be dodecaploid, as the basic numbers of *Duchesnea* and its allied genera, *Potentilla* and *Fragaria*, are all 7. It became clear that the plant A collected at Kinugasa near Hikawa, and Yamatomachi in prov. Musashi, and Kanonzaki in prov. Sagami has also $2n=84$ chromosomes.

On the other hand the plant B collected at Yamatomachi and Musashiranzan in prov. Musashi, Usui in prov. Shimōsa, and Mashiko & Fubasami in prov. Kodzuke was unexpectedly diploid, having 14 chromosomes in root-tip cells (Fig. 3, A). A form of the plant B with pure white fruiting receptacles and yellowish gray achenes was also diploid (Fig. 3, B).

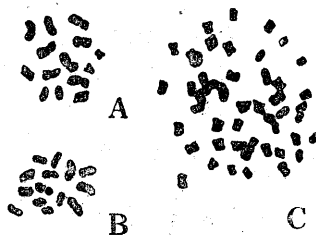


Fig. 3. Somatic chromosomes of *Duchesnea chrysantha* (A), f. *leucocephala* (B), and a putative hybrid (C). \times ca. 1600.

It is noteworthy that the two collections from Minenoyakushi and Sengen-one of

the Tama district in prov. Musashi were proved by us to have $2n=49$ chromosomes (Fig. 3, C). As they produce neither pollen grains nor fruits, this heptaploid seems to be a natural hybrid between the plants A and B, although it is nearer to the former in outer morphological characters. It is also probable that tetra-, hexa-, or octaploid is found in future in Japan, India, or elsewhere.

So far as our present knowledge is concerned, the plant A seems to be conspecific with *Duchesnea indica*, both being dodecaploid. Although the Indian specimens are mostly smaller than the Japanese ones, the original figure of Andrews which was based on a plant collected in north-east Bengal and cultivated in England, as well as some specimens from India and China such as Ichang, Hupeh (Henry, no. 3453), and Taipei Shan, Shensi (Leason 1910) are as large as *D. major* of Japan, and agree well with the latter in all respects. So *D. major* is regarded as a synonym of *D. indica* which is widely distributed from Afghanistan eastwards to Japan, and southwards to Java, and is naturalized in Europe and Americas.

For the diploid plant B, we here adopt the name *Duchesnea chrysantha* (Z. et M.) Miq. The type specimen of its basionym *Fragaria chrysantha* Zoll. et Mor., i.e. Zollinger no. 1987 from west Java, is extant neither in Dutch herbaria nor Genève, but in Zürich University, and we have examined the specimen which was kindly sent on loan. It consists of a plant with only one flower, but matches well with the plant B in various morphological characters. We have also confirmed by the courtesy of Mr. T. I. Chuang that the type specimen of *D. formosana* in National Taiwan University has tubercled achenes. If one wishes to treat this race as a variety, the correct name is *D. indica* var. *leucocephala* Makino. It occurs throughout Japan, Taiwan, southern China, Indo-China, and also in Java, Sumatra, and Philippines.

Potentilla Wallichiana Seringe from Nepal, to which Franchet and Nakai once referred the plant B, has smaller smooth achenes, and *P. denticulosa* Seringe from Nepal also has similar small achenes (cf. Fig. 4). But it is still doubtful if their achenes are fully mature, and if they represent another race of *D. indica*. *Duchesnea*

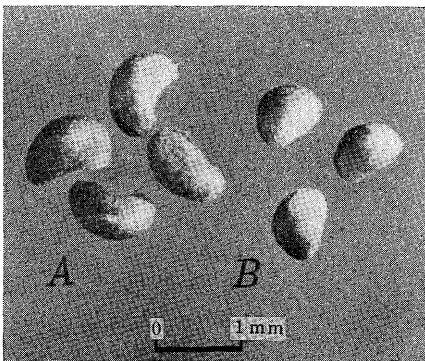


Fig. 4. Achenes from the types of (A) *Potentilla Wallichiana* Ser. (left) and (B) *P. denticulosa* Ser. (right).

sundaica Miquel and *Fragaria* (*Duchesnea*) *Filipendula* Hemsley do not belong to *Duchesnea* in a strict sense, and the former is a synonym of *Potentilla Kleiniana* Wight et Arnott, and the latter is *Potentilla Hemsleyana* Th. Wolf.

Under the present circumstances the *Duchesnea indica* group can be treated as follows:

(A) ***Duchesnea indica*** (Andr.) Focke in Engl. et Prantl, Pfl.-fam. **3**(3): 33 (1888)—Komarov, Fl. Mansh. **2**: 489 (1903)—Matsumura, Ind. Pl. Jap. **2**(2): 200 (1912), p.p.—Koidzumi, Consp. Rosac. Jap. 168 (1913), p.p.—Britton & Brown, Ill. Fl. ed. 2, **2**: 259 (1913)—Bailey, Stand. Cycl. Hort. **1**: 1080 (1914)—Cardot in Lecomte, Fl. Gén. Ind.-Chin. **2**: 650 (1920), p.p.—Hegi, Ill. Fl. Mitt.-Eur. **4**(2): 907, f. 1161 (1923)—Odashima in Journ. Soc. Trop. Agr. **7**: 80 (1935)—Juzepczuk in Fl. U.R.S.S. **10**: 67 (1941).

Fragaria indica Andrews, Bot. Repos. **7**: t. 479 (1807)—Wight, Icon. Pl. Ind. Or. **3**: t. 989 (1845)—Hooker f., Fl. Brit. Ind. **2**: 343 (1878)—Forbes et Hemsley, Enum. Pl. Chin. **1**: 240 (1887).

Duchesnea fragiformis J. E. Smith in Trans. Linn. Soc. **10**: 373 (1811), superfl.

Potentilla denticulosa Seringe in DC., Prodr. **2**: 573 (1825).

P. Wallichiana Seringe in DC., l.c. 574 (1825).

Fragaria malayana Roxburgh, Fl. Ind. ed. 2, **2**: 520 (1832).

F. Roxburghii Wight et Arnott, Prodr. Fl. Pen. Ind. **1**: 300 (1834), pro syn.

F. nilagirica Zenker, Pl. Ind. Dec. **1**: 7, t. 9 (1835).

Potentilla Durandii Torrey et Gray, Fl. N. Amer. **1**: 444 (1840).

Potentilla indica (Andr.) Th. Wolf in Ach. et Graebn., Syn. Mitt.-Eur. Fl. **6**: 661 (1904); in Bibl. Bot. **16** (Ht. 71): 664 (1908)—Hand.-Mzt., Symb. Sin. **7**: 517 (1933); in Act. Hort. Gotob. **13**: 320 (1939), p.p.

Duchesnea indica var. *β major* Makino in Bot. Mag. Tokyo **28**: 184 (1914).

D. major (Makino) Makino in Journ. Jap. Bot. **2**(5): 19 (1921); Ill. Fl. Jap. rev. ed. f. 1353 (1949)—Terazaki, Shokub. Dzukan f. 205 (1933)—Ohwi, Fl. Jap. 628 (1953)—Okuyama, Colour. Ill. Pl. Jap. **1**: 134, t. 66, f. 4 (1957).

Nom. Jap. Yabu-hebiichigo (Makino 1914).

(B) ***Duchesnea chrysantha*** (Z. et M.) Miquel, Fl. Ind. Bat. **1**: 372 (1855).

Fragaria chrysantha Zollinger et Moritzi, Syst. Verz. 7 (1846).

Fragaria indica *β. Wallichii* Franch. et Sav., Enum. Pl. Jap. **1**: 129 (1873), excl. syn. *Potentilla Wallichiana*.

Potentilla indica var. *Wallichii* (Fr. et Sav.) Wolf in Bibl. Bot. **16**: 666 (1908).

'*Duchesnea indica* Focke': Matsum., Ind. Pl. Jap. **2**(2): 200 (1912), p.p.—Koidzumi, l.c. (1913), p.p.—Makino in Bot. Mag. Tokyo **28**: 183 (1914), *α. typica* Makino; Ill. Fl. Jap. rev. ed. f. 1352 (1949)—Terazaki, Shokub. Dzukan f. 204 (1933)—Li in Lloydia **14**: 231 (1951), p.p.—Ohwi, Fl. Jap. 628 (1953).

'*D. Wallichiana* Nakai' ex Hara in Journ. Jap. Bot. **10**: 22 (1934), excl. basionym—Nakai in Bull. Sci. Mus. Tokyo **31**: 57 (1952).

D. formosana Odashima in Journ. Soc. Trop. Agr. **7**: 79 (1935).

D. indica var. *japonica* Kitamura in Act. Phytotax. Geobot. **15**: 160 (1954); Faun. & Fl. Nepal Himal. **1**: 148 in nota (1955).

D. indica var. *leucocephala* f. *japonica* (Kitam.) Midzushima in Misc. Rep. Res. Inst. Nat. Resour. **45**: 68 (1957).

Nom. Jap. Hebi-ichigo, Taiwan-hebiichigo (Odashima 1957).

f. **leucocephala** (Makino) Hara, comb. nov.

D. indica var. *leucocephala* Makino in Journ. Jap. Bot. **7**: 6 (1931).

D. Wallichiana f. *leucocephala* (Mak.) F. Maekawa ex Honda, Nom. Pl. Jap. **148** (1939), comb. nud.

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ヘビイチゴとヤブヘビイチゴの区別は牧野先生(1914 & 21)が明かに指摘されて以来、日本では一般に認められている。しかしその学名については問題があり、*Duchesnea indica* (Andr.) Focke がヤブヘビイチゴであることに気付かれたのは中井先生で、ヘビイチゴの方は *D. Wallichiana* (Ser.) に当てられた。その後小田島氏は独立に台湾で2種の差異を認め、ヤブヘビイチゴにはふれずにその形をヘビイチゴ *D. indica* とよび、ヘビイチゴをタイワンヘビイチゴ *D. formosana* と名付けた。これらの見解はおのおの部分的に正しかつたが説明の不足から分り難い点もあつたので外国の学者にはほとんど理解されなかつた。私共も多年この問題に注意してきたが、ヤブヘビイチゴはやはり *D. indica* と同種であり、12 倍体植物であるとの結論に達した。この形は欧米に広く帰化している。インド産はやや小形のものが多いが今のところ別変種として区別するにも及ばないように思う。一方ヘビイチゴは *D. chrysantha* (Z. et. M.) Miq. で2倍体であり、その分布は日本のほか南支からマレーシアに及んでいる。なお学名、異名についての詳細は欧文欄を参照されたい。また多摩地方の峯の薬師下及び浅間尾根下で採集したものはヤブヘビイチゴに似ているが果実を作らずまた花粉もできず、染色体数は49(7倍体)で、ヤブヘビイチゴとヘビイチゴの自然雑種と推定される。この外にも染色体数を異にする他系統のものが存在する可能性があり今後解決すべき問題が残っている。