

Masami MIZUSHIMA** : Notes on *Stellaria* in E. Asia

(Critical studies on Japanese plants 4)*

水島正美** : 東亜産ハコベ属の記 (日本植物寸評 4)

‡ In eastern Asia, 6 species have been described in *Stellaria* subgen. Schizothecium Fenzl, viz. *S. monosperma* Hamilton, *S. crispata* Wallich, *S. paniculata* Edgeworth and *S. glandulifera* Klotzsch from Himalayas, *S. paniculigera* Makino from Japan, and *S. drymarioides* Thwaites from Ceylon. Exception the Ceylon plant which may be an independent species, the rest resembles each other. Edgeworth & Hooker fil. recognized *S. paniculata* and *S. crispata*, and reduced *S. monosperma* to a synonym of the latter, but Maximowicz reduced *S. crispata* and *S. paniculata* to *S. monosperma*. *S. glandulifera* has been neglected owing, presumably, to its interconnecting character between *S. crispata* and *S. paniculata* or for some other reasons. From these treatments, the close affinity of Himalayan plants might easily be perceivable. Besides, Edgeworth & Hooker fil. pointed out that Schizothecium (erroneously cited as 'Schizothegium' in Fl. Brit. Ind. 1: 229, 1874) has 3-celled ovary by which the group differs largely from any other sections of the genus, and this statement led Makino to abandon Maximowicz's *S. monosperma* var. *japonica* and to describe *S. paniculigera* from Japan. To make clear the relationship between these species and the structure of the ovary, I undertook the re-examination and the result obtained is as follows.

So far as I could ascertain upon Afghan and Himalayan specimens, all dissected are unilocular in the adult stage. Three septa in the ovary may present, I guess, in a very young stage. Though I have not yet the chance to examine authentic specimens used for the preparation of Hooker's Flora of British India, here I dare to propose to omit the diagnostic character "ovary 3-celled" from the description of subgen. Schizothecium.

Judging from the description of *S. crispata* and *S. monosperma*, I agree with the old authors' verdict in uniting the two. *S. glandulifera* was nicely illustrated in Klotzsch und Garcke, Die Botanischen Ergebnisse der Reise des Prinzen Waldemar von Preussen t. 28, (1862), and it is doubtlessly close in appearance to *S. crispata* in sessile leaves but differs in petals shorter than the sepal. According to

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Edgeworth & Hooker fil., petals are as long or twice as long as the sepal in *S. crispata* ($\equiv S. monosperma$), while in *S. paniculata* they are shorter than the sepal. Thus *S. glandulifera* stands intermediately between *S. crispata* and *S. paniculata* in having sessile leaves of the former and petals surpassed by the calyx of the latter. In specimens having sessile leaves and labelled as *S. crispata* which I examined, corollas are shorter than calyces, but when an ample material is available, long petals may be observable. Comparing flowers of *S. crispata* with those of *S. paniculata*, sepals are 4-5 mm long and acuminate to acute at the apex in bloom in the former, and are 2-3, rarely 4-5 mm long and acute to obtuse in the latter. Moreover, it is interesting and important that the smaller the calyces are, the more slender but not always shorter in relative length the androecia become. This tendency is understood as denoting the gynodioecism. The following facts might be the proof. Anthers of larger flowers (in *S. crispata* and rarely in *S. paniculata*) are about 1/3 mm across and have globose pollen grains against smaller anthers 1/4 mm across or less and smaller pollen grains not a perfect globe of smaller flowers (in *S. paniculata*). Both flowers well produce capsules containing one seed closely enveloped by membranous pericarps. Seeds are globose, chesnut-brown, slightly wrinkled or granulate, about 3 mm across, and they seem to be fertile in both types in my examination. Thus the larger and smaller flowers can be considered as representing hermaphrodite and female flowers respectively as is well known in *S. graminea* L. Judging from the illustration (Klotzsch u. Garcke, op. cit.), *S. glandulifera* appears to be the hermaphrodite type. The presence or absence of the petiole is not an essential difference because of the variability of their length connecting *S. crispata* and *S. paniculata*. In *S. crispata* lower leaves have sometimes short petioles 1-3 mm long but in *S. paniculata* they attain to 10 mm long. The shape of petals varies considerably especially in the depth of cutting and the length of claw (Fig. 1). All ovaries or capsules of *S. crispata* and *S. paniculata* contain 3 ovules or 1 seed and 2 undeveloped ovules. Fig. d of t. 28 (Klotzsch u. Garcke, op. cit.) represents 3 ovules in an ovary. Basing upon these facts mentioned above, *S. crispata*, *S. monosperma*, *S. glandulifera*, and *S. paniculata* are considered to form a single species to which the oldest and legitimately published name, *Stellaria monosperma* Hamilton ex D. Don, should be applied. It is convenient to recognize *S. paniculata* with distinct petioles and mostly female flowers as forma *paniculata* (Edgew.) m.

Makino distinguished Japanese *S. paniculigera* from the Himalayan plant on

the basis that "this species (*S. paniculigera*) comes very near to *S. crispata* (= *S. monosperma* Buch.-Ham. ; *S. paniculata* Edgew.), but my species has 2-lined-pubescent stem, acuminate sepals, 5-stamens, longer styles and 1-celled ovary." All these characteristics are common to Japanese and Himalayan plants except for 5 stamens. A Japanese plant, *S. paniculigera*, has always 5 stamens of the outer whorl. The lined-pubescence on stems are not always 2, and oppositely the Himalayan *S. monosperma* has often 2-lined-pubescence. When stems have 2 lines of hairs, one of the two is always faint in both populations. Sepals are acuminate to obtuse at the tip in the Himalayan population but always acuminate in the Japanese one. Here I add, however, two slight differences between these plants not mentioned by Makino. Firstly, although the shape of petals is very variable in the Himalayan plant, the lobes are almost always shorter and broader than the Japanese one and have a rounded to obtuse tip and sinus. Those of the Japanese plant are more deeply cleft, somewhat falcate, often acute at the tip and sinus, but petals of this shape are rarely met with in the Himalayan plant. Secondly, the pubescence of leaves is often thinner in the Japanese plant than the Himalayan. Thus all the differences counted between *S. paniculigera* and *S. monosperma* are scarcely workable in separating them specifically, and accordingly it is better to consider *S. paniculigera* Mak. as a geographical variety of *S. monosperma* Ham. as Maximowicz did at first.

When Makino published his species in 1909, he did not indicate neither the precise type locality nor the type specimen. In the Herbarium of University of Tokyo (TI), a specimen bearing the label with Makino's handwriting "*Stellaria paniculigera* Makino, sp. nov." The specimen was collected by G. Nakahara on Aug. 16, 1904 at "Hinoimata, Aidsu," and it matches with Makino's original description. Therefore I selected it as the lecto-type specimen of *S. paniculigera* Mak. under the present International Code of Botanical Nomenclature.

A specimen from Yunnan, China (Henry, no. 13562) is quite alike to *f. paniculata* (Edgew.), but is hispid on stems and leaves. Hispid hairs consist of more or less 4 cells including one basal cell, and they are deciduous leaving hardened and elevated basal cells by which the leaves are scabrous especially on the margin and the upper surface. Flowers are female and have only 5 stamens of the outer whorl as in the Japanese race, but petals are similar to the Himalayan race. Ovules are 3 in an ovary and the capsule contains 1 seed and 2 undeveloped ovules. Although the taxonomic position of this plant is doubtlessly in Schizo-

thecium, I could not find any known taxa comparable with this form other than the species in discussion. Hence I name it expediently forma *scabrifolia* m. under *S. monosperma* var. *monosperma*.

Stellaria monosperma Buchanan-Hamilton ex D. Don, Prodr. Fl. Nep. 215 (1825).

var. ***monosperma***.

S. crispata Wallich [Cat. no. 633] ex Edgeworth et Hooker fil. in Hooker fil., Fl. Ind. 1: 229 (1874).

S. glandulifera Klotzsch in Klotzsch u. Garcke, Bot. Ergebn. Reise Prinz. Waldemar: 141, t. 28 (1862).

Foliis supra pubescentibus deinde decalvatis vel ab initio glabris. Sepalis acuminatis ad obtusis; petalis latoribus lobis sinibusque saepe rotundatis obtusisve; staminibus saepe 10.

f. ***monosperma***.

Foliis sessilibus vel cum petiolulis plus minusve 2 mm longis subsessilibus; laminis saepe lineari-oblongis vel oblanceolatis, apice elongato acuminatis, basi

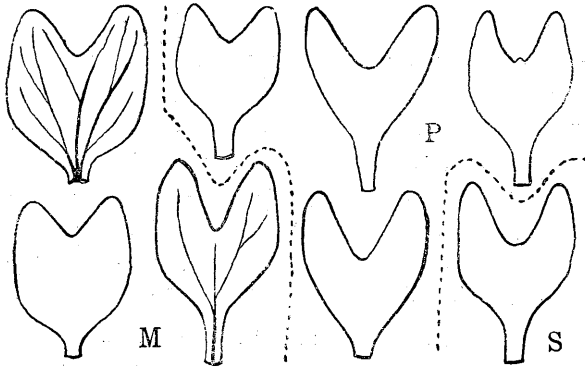


Fig. 1. Variation of petals, veins mostly omitted. M: f. *monosperma*. P: f. *paniculata*. S: f. *scabrifolia* All $\times 6.5$.

rotundatis cordatisve, margine saepe glabris et laevibus, infra medium vel non raro supra medium latissimis. Floribus saepe hermaphroditis majoribusque.

Hab. India: Nongtri (?), 4500 ft., Khasia (Nov. 3, 1872; C. B. Clarke,

no. 18699 C, US no. 681915); Keran, Kishenganga Valley, 5-6000 ft., in forest, W. Kashmir (July 18, 1939, R. R. & L. D. Stewart, no. 17628, US no. 1942162).

Afghanistan: Trokikhori to Chatrass, Nuristan (Aug. 1, 1955, S. Kitamura, Kyoto Univ.)—leaves sessile but the base of blades obtuse, flowers smaller and female; Chatrass, Nuristan (Aug. 2, 1955, S. Kitamura, Kyoto Univ.).

f. ***paniculata*** (Edgew.) Mizushima, stat. nov.

S. paniculata Edgeworth in Trans. Linn. Soc. Bot. **20**: 35 (1846)—Edgew. et Hook. fil. l. c. (1874).

Foliis distinctissime petiolatis; laminorum forma vario, oblongo-lanceolatis ad ellipticis, apice saepe longe acuminatis, basi in petiolum attenuatis, margine saepe glabris laevibusque, circa medium latissimis. Floribus saepe femineis minoribusque.

Hab. India: Khupiong (?), 7000 ft., Sikkim (Sept. 28, 1884, C. B. Clarke, no. 35995 A, US no. 803286); Darjeeling (Aug. 28, 1869, C. B. Clarke, no. 8877 A. US no. 484347); Jabberkhet, Landour, 7000 ft., Mussourie (Aug. 19, 1937, R. R. Stewart, no. 16043, US no. 1942022); Nag Tebba, Tehri near Mussoorie, 7-8000 ft., Garhwal (Sept. 2, 1944, R. R. Stewart, no. 21278, US no. 1994927); Simla (Sept. 1884 ex Herb. J. R. Drummond, no. 1077, US); Nandukital, Kulu, Punjab, cliff face in fir forest, 10000 ft. (Oct. 3, 1930, W. Koelz, no. 1444, US no. 1595939).

Indochina: near Chapa, 1700 m (Oct. 1933, no. 4761, US no. 1719713)—flowers larger and hermaphrodite.

f. **scabrifolia** Mizushima, f. nov.

Habitu f. *paniculatae* simile, sed caulis foliisque pilis deciduis itaque caule subbifariam foliis supra margineque scabris cum cellulis induratis. Floribus femineis videnture et staminibus 5.

Hab. China: Szemao, Yunnan (A. Henry, no. 13562, US no. 459633)—holotype.

var. **japonica** Maximowicz in Bul. Acad. St.-Pét. **18**: 384 (1873)—Yatabe. Nippon-shokubutsu-hen 221, fig. 229 (1900)—Matsumura, Ind. Pl. Jap. **2** (2): 90 (1912).

'*S. monosperma* Ham.': Matsum., Cat. Pl. Herb. Imp. Univ. 23 (1886).

S. paniculigera Makino in Bot. Mag. Tokyo **23**: 145 (1909)—Ohwi, Fl. Jap. 499 (1953)—Honda, Nom. Pl. Jap. rev. ed. 70 (1957)—e typo.

Planta f. *paniculatae* valde affinis. Foliis petiolatis, ex toto subnudis vel praesertim supra minute pubescentibus mox glabrescentibus, basi in petiolum attenuatis, apice acuminatis. Sepalis fere semper acuminatis lanceolatis: petalis angustioribus, lobis subfalcatis apice acutis, sinibus acutis obtusisve; staminibus saepissime 5.

Hab. Japan: Kyushu; Shikoku; Honshu (northeastwards to prov. Rikuchu in the Pacific side & prov. Echizen in Japan Sea side).

Distr. sp.: N. E. Afghanistan; Himalayas in India; S. W. China; Indochina; Japan.

‡ In the Larbreae group of *Stellaria*, there is a well marked species, *S. saxatilis* Hamilton ex D. Don, 1825, covered with a dense stellate-tomentum on stems, leaves and calyces especially when young. Merrill described in 1905 *S. laxa* from Luzon in the Philippines without any statement on its relationship, and Hayata distinguished in 1908 *S. stellato-pilosa* from *S. saxatilis* by its lanceolate leaves and entirely separate sepals. Three years later, Hayata himself remarked that *S. stellato-pilosa* comes near to *S. saxatilis* from which it is hardly distinguishable, but he did not unite them. In his Enum. Philipp. Pl. 2: 138 (1923), Merrill demonstrated his verdict upon the examination of Formosan plant (Faurie, nos. 541 and 1385) that Hayata's species can not be distinguished from *S. laxa*. Since then the name *S. laxa* has been applied by the authors of the flora of Formosa for *S. stellato-pilosa* Hay. which is "hardly distinguishable from *S. saxatilis*" of continental southeastern Asia.

Re-examining these three plants, I am of belief that neither of them are independent species nor represent geographical races but they form together a well-marked species, *S. saxatilis* Ham., for the following reasons. In the differences which Hayata laid much stress, the shape of leaves is not workable because of their variableness from ovate, ovate-lanceolate to lanceolate. The base of blade is rounded in general and not rarely cordate or obtuse, and is from sessile to bearing faint petioles of 0.5 mm long. In the specimens examined, the two Chinese ones have blades obtuse at the base with longer petioles 1-2 mm long. This form was collected in Hupeh and Szech'uan, but at present it may be better to consider it as occasional individuals deserving at most the rank of forma (f. *petiolata* m., f. nov.) rather than a geographical variety. The leaf-tip is acuminate to acute. Although Hayata emphasized that leaves are lanceolate and narrower than those of *S. saxatilis*, his fig. 2 of pl. II in Flora Montana Formosae (1908) represents a rather ovate leaf shallowly cordate at the base and acute at the tip. Fig 1 of the same plate shows a part of the fruiting specimen having lanceolate to oblong-lanceolate leaves. Above all, the shape and size of the leaf as well as the density of stellate tomentum on adult parts are variable by individuals in the populations of Formosa and of the continent. Secondly, the degree of fusion of the base of sepals is also variable to a certain extent. As one of the key character of the Larbreae group, the character that sepals are more or less coherent into an obconic tube has been used. But it does not seem to rule all the species of the group, and those taxa under consideration are just the case. So far as the specimens that

I examined are concerned, sepals are free to the base at least in bloom except for a few specimens. In specimens with ripe capsules, some calyces are incrassate at the base, although the phenomenon is a matter of individual variation. Then the entirely free sepals which Hayata emphasized do not merit a distinguishing point. Capsules are described as 4 mm long in *S. stellato-pilosa* while it is about 5 mm long in *S. laxa*. This difference belongs actually to the individual variation of both plants, and it is included in the range of variation in the continental *S. saxatilis*. In these three taxa, the number of seeds in a capsule varies also from 5 to 12, and the number 5 to 6 represented in the original description of *S. laxa* is included in the variation. Seeds are described as 1 mm in diameter in *S. stellato-pilosa* and 1.5 to 1.8 mm long in *S. laxa*. According to the measurement on the specimens I examined, it ranges from 1 to 1.5 mm across or long by a slight modification of the shape of seeds. Most of seeds measured are, however, less than 1.5 mm across and none attained to 1.8 mm. Thus the treatment by Merrill that Formosan *S. stellato-pilosa* Hay. is the same as Philippine *S. laxa* was right except for the discrepancy between the actual size of seeds and that of the original description of *S. laxa*, yet it should be better to reduce them to the synonyms of the oldest name, *S. saxatilis* Hamilton.

Hayata cited two specimens under the original description of *S. stellato-pilosa*, viz. S. Nagasawa no. 622 and T. Kawakami & U. Mori no. 2258, without indicating the holotype specimen. Judging from pl. II in Hayata, op. cit. (1908), figs. 1 to 12 can most probably be drawn from no. 2258 except for at least fig. 2 which may be from no. 622. Accordingly the specimen no. 2258 kept in the Herbarium of the University of Tokyo (TI) can be selected as the lectotype specimen of Hayata's species.

Stellaria saxatilis Buchanan-Hamilton [in Wallich, Cat. no. 634] ex D. Don, Prodr. Fl. Nep. 215 (1825)—Miquel, Fl. Ind. Bat. **1** (1): 1054 (1855)—Edgeworth et Hooker fil. in Hooker fil., Fl. Brit. Ind. **1**: 232 (1874)—Franchet, Pl. Delav. **2**: 98 (1889)—Koorders, Exkurs.-fl. Java **2**: 211 (1912)—Handel-Mazzetti, Symb. Sin. Anthoph. **1**: 190 (1929)—Mizushima in Kihara, Fauna & Fl. Nep. Himal. **1**: 124 (1955).

S. laxa (non F. Behm. 1887) Merrill in Philipp. Gov. Lab. Bur. Bull. **29**: 12 (1905); Enum. Philipp. **2**: 138 (1923)—T. Suzuki in Masamune, Short Fl. Form. 62 (1936).

S. stellato-pilosa Hayata, Fl. Mont. Form. 58, pl. II (1908); Mater. Fl. Form.

37 (1911); Ic. Pl. Form. 1: 71 (1911)—Makino et Nemoto, Fl. Jap. ed. 2, 302 (1931)
—e type.

Hab. Formosa: Mt. Morrison (=Niitaka), 12000 ft. (Oct. 20, 1906, T. Kawakami & U. Mori, no. 2258, TI*)—lectotype of *S. stellato-pilosa*; top of Mt. Morrison, 13094 ft. (Nov. 3, 1905, S. Nagasawa, no. 622, TI); Oiwake on open ground, 7500 ft. (Apr. 20, 1911, B. Hayata, TI); Mt. Tanco (Aug. 5, 1918, Takahashi, TI); Mt. Morrison (Aug. 30, 1927, S. Suzuki, KAG); Onoë (Aug. 3, 1926, S. Suzuki, no. 121, KAG); Mt. Niitaka, 9000 ft. (Oct. 10, 1927, R. Kanehira & S. Sasaki, no. 21829, UC no. 344427 and UC no. 1372624); between Sekigahara and Gôkwan, prov. Kwarenkô (Sept. 10, 1934, M. Tagawa, no. 859, TI); Sekizan in Mt. Morrison, 2500 m, in meadow on sunny slope (Dec. 1936, K. Moriya, no. 2148, TI).

Philippines; Mt. Baudan, Benguet subprov., Luson (Sept. 1921, M. Ramos & G. Edano, no. 40321, UC no. 239100).

China: in wet place, Hsien Shan Hsien, 960 m, W. Hupeh (Sept. 17, 1926, Y. Chen, no. 15049, UC no. 343590)—*f. petiolata* Mizushima, *f. nov. foliis cum petiolulis 1-2 mm longis subpetiolatis a type differt*; copious in Mt. Daliang-schan near Tjiaodjio, 2200-2600 m, S. W. Szech'uan (Apr. 24, 1914, H. F. Handel-Mazetti, no. 1622, US no. 1529630); roadside, Kuan Hsien, 3000-3600 ft., Szech'uan (July 9, 1928, W. P. Fang, no. 2104, US no. 1525289); roadside, Mowchow Mow Hsien, Szech'uan (Sept. 25, 1928, W. P. Fang, no. 5527, US no. 1525288)—*f. petiolata* Mizush.; roadside in plain and in Hsi-shan, 1900-2200 m, Yunnan-fu. Yunnan (May 4, 1916, O. Schoch, no. 87, US no. 1235281); on dry calcareous hill near Tong-tchouan 2900 m, Yunnan (E. E. Maire, no. 3759, US no. 388854).

Indochina: Doi Angka, Siam (July 16, 1922, A. F. G. Kerr, no. 6297, UC no. 237067); on siliceous bank of torrent near Chapa, 1200 m, Tonkin (Apr. 1936, no. 5715, US no. 1717102); without precise locality (1921-22, B. Hayata, TI).

India; Marphlang, 6000 ft., Khasia (June 12, 1885, C. B. Clarke, no. 38259 D, US no. 803413).

Distr.: Himalayas from Nepal to Khasia and Bhutan; Yunnan, Szech'uan, Hupeh in China; Indochina; Java; Philippines; Formosa.

* Herbarium abbreviations:

US—United States National Herbarium, Washington, D. C., U. S. A.

UC—The Herbarium of the University of California, Berkeley California, U. S. A.

TI—The Herbarium of the University of Tokyo, Tokyo, Japan.

KAG—The Herbarium of Kagoshima University, Kagoshima, Kyushu, Japan.

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J. D. Hooker の *Flora of British India* 1: 229 (1874) に *Schizothecium* 亜属 (同書には節として) の最大特徴として子房 3 室を挙げ、之によりハコベ属の他群とは大に異なるとの意見が察せられる。又、牧野博士はオオヤマハコベを記載するに当り、インドの *Stellaria monosperma* Buch.-Ham. に似るが子房 1 室なるを異れりとされた。筆者は以前から此の点に疑問を抱き解決の折を待つていたが、今回材料を得て検討を加えることが出来た。結果は予想通りで、少くとも成熟した子房は完全に 1 室で隔壁の痕跡すらないものであつた。開花には遠い蕾を解剖しても全くの 1 室としか見えない。Hooker の書のナデシコ科は Edgeworth との共同であるが、筆者は其の權威に抗して、*Schizothecium* の特徴から「子房 3 室」を断然除外する。すると残るのは「心皮 3, 胚珠 (卵子) 3 内外, 種子 1 稀に 2」というだけになる。尚今回扱つた種類はヒマラヤから記載された 4 種と邦産のオオヤマハコベとであるが、此の類には雌花異株 (雌性 2 家) の性があるものと見られ、両性花の個体群と雌花の個体群とに夫々別名を設けていたことになる。此の性質は既にカラフトホソバハコベ (*S. graminea* L.) で顯著であり、便宜上両方の形に品種の級位を与えて区別してもいる。ヒマラヤ産のものも之に倣い、両性花を着けて無柄葉の傾向ある方を *f. monosperma* とし、雌花を着けて有柄葉の傾向ある方 *f. paniculata* とする。後者に似て茎葉に硬尖毛を生ずるものが支那大陸雲南省にあり (Henry 13562), 之を *f. scabrifolia* と命名する。オオヤマハコベは 5 雄蕊, 花卉の裂片が少し鎌形に曲り鋭頭をなす点以外は *f. paniculata* に酷似する。故に地方的変種と見るを至当と考える。

台湾のナガサワハコベは全株殊に若い部分に密に星毛を布くので著しいが、Merrill は之をフィリッピン *Stellaria laxa* に同じとした。然し彼は大陸側の *S. saxatilis* Buch.-Ham. を知らなかつたと想像出来る節があり、之等 3 者の関係を明確にする必要を感じていた。所が比較検討の結果、全く同一種に属し *S. saxatilis* の名を以て呼ぶべきものとの結論に達した。Merrill は *S. laxa* の発表に際し何等の記相的ノートを附けず、早田博士が挙げられた特徴は全くナガサワハコベ特有のものではない。唯 *S. laxa* は種子が 1.5~1.8 mm 長と記されたが、測つた値は 3 者共に径 1.5 mm 以下が多くて最大が 1.5 mm であつた。此の点は *S. laxa* の原標本 (Elmer 6612) に当ればよく分ると思うが、目下其の所在を掴みずにいる。然し上記の如く他の点では差を見出し難いので、*S. laxa* とナガサワハコベとを *S. saxatilis* の異名に下した方が良いと思う。

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