A taxonomic study on the genus *Lycoris* (Amaryllidaceae)

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Ten taxa of the genus *Lycoris* (Amaryllidaceae) were reexamined on the basis of their morphological characteristics and distributions. Also, a new key and an enumeration were prepared. Ten taxa treated were classified into four groups. Group 1 consists of *L. sanguinea* var. *sanguinea*, *L. sanguinea* var. *koreana* and *L. sanguinea* var. *kiushiana*, and group 2 comprises *L. aurea*, *L. albiflora* and *L. chinensis* var. *sinukata*. Group 3 contains *L. squamigera*, *L. flavescens* and *L. chejuensis*, while in group 4 *L. radiata* is the only species present. Morphologically, two similar taxa, *L. sanguinea* var. *sanguinea* and *L. sanguinea* var. *koreana*, could be divided by the length of bracts and width of perianths. *Lycoris flavescens*, *L. chejuensis* and *L. chinensis* var. *sinukata* were treated as Korean endemic taxa. *Lycoris albiflora* and *L. sanguinea* var. *kiushiana* are distributed only in Japan, *L. sanguinea* var. *sanguinea* in China and Japan, and *L. aurea* in China, Taiwan and Japan.

Keywords: *Lycoris*, classification, key, enumeration, distribution

The genus *Lycoris* Herbert, which belongs to the family Amaryllidaceae under the order Liliales, consists of about 20 taxa, and its distribution is limited to moist and warm temperate woodlands of eastern Asia, as in China, Korea, Japan, Taiwan, and the Himalaya (Yamaguchi, 1959; Melchior, 1964; Nishikawa *et al.*, 1979; Kurita, 1987).

After Herbert, who described *L. aurea* and established this genus, Traub (1957, 1958) classified it into two subgenera: subgenus *Symmanthus* which is actinomorphic in perianth arrangement and has no white stripe on the midrib of leaves, and subgenus *Lycoris* which is zygomorphic in perianth arrangement and has a white stripe on the midrib. Traub's classification, however, has given rise to many problems, because the presence of white stripe on the midrib of leaves sometimes is not distinct and the perianth arrangement is changed in some taxa. For example, the perianths of *L. squamigera* Maxim. belonging to

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the subgenus *Symmanthus* under Traub’s classification show actinomorphic arrangement before full bloom, but they are changed into zygomorphic arrangement after anthers are opened.

Korean *Lycoris* was reported by Nakai (1911) as species of *L. squamigera* Maxim., and he also described a new species, *L. koreana* from the Mt. Backyang (Nakai, 1930). Koyama (1959) treated the latter as a variety, *L. sanguinea* var. *koreana*, based on the reason that there was no difference between the two except the protrusion of stamens out of corolla when their morphological and cytological characteristics were compared. Tae and Ko (1993) and Kim and Lee (1991) supported Koyama (1959)'s treatment based on their observation of its morphological, cytological and palynological characteristics. Lee and Oh (1974) regarded *L. sanguinea* var. *koreana* as *L. radiata* (L'Hér.) Herb.

Lee (1979) reported that the genus *Lycoris* in Korea consisted of five species; *L. aurea*, *L. albilora* Koidz., *L. koreana*, *L. radiata* and *L. squamigera*. However, Kim and Lee (1991) argued that *L. aurea* and *L. albilora* are not distributed in Korea, and treated the plants previously called *L. aurea* as *L. chinensis* K. Tae et S. Ko and those called *L. albilora* as a new species *L. flavescens* M. Kim et S. Lee. They also stated that the Korean *Lycoris* is composed of five taxa or four species and one variety including *L. chinensis*, *L. flavescens*, *L. radiata*, *L. squamigera* and *L. sanguinea* var. *koreana*. Recently, Tae and Ko (1993) added a new species, *L. chejuensis*, and treated the plants previously called *L. chinensis* as a variety, *L. chinensis* var. *sinuolata*. Likewise, the confusions on species identification has been raised owing to the similarities of morphological characteristics, and to karyotype variations among taxa.

The present study was focused on clarifying the taxonomic status of the 10 taxa including four foreign taxa morphologically and geographically. Their distribution maps were based on the specimens examined and the cited literatures.

**Enumeration of the genus *Lycoris***

*Lycoris* Herb., App. 20, 1821.
*Pleurastis* Rafin., Fl. Tellur. 4: 12, 1836.


(Key to the 10 taxa of the genus *Lycoris*)

1. Six perianths actinomorphic in shape, orange to red in color (group 1).
2. Styles 4.5−6.8 cm in length. Filaments 2.9−5.6 cm in length. Flower blooms from August to September. Perianth 3.5−4.2 cm in length. Bract 0.5−0.8 cm in width.
3. Bracts 2.35−3.15 cm in length. Perianth 0.6−0.7 cm in width
   ............................................................................................................ *L. sanguinea* var. *sanguinea*
4. Bracts 3.20−4.64 cm in length. Perianth 0.8−1.1 cm in width
   ............................................................................................................ *L. sanguinea* var. *koreana*

2. Styles 8.2−10.3 cm in length. Filaments 6.2−8.2 cm in length. Flower blooms in July. Perianth 6.5−7.1 cm in length. Bract 1.1−1.2 cm in width
   ............................................................................................................ *L. sanguinea* var. *kiushiana*
1. Six perianths zygomorphic in shape, pale purple, red, deep yellow, yellow, white or yellowish white in color (group 2, 3, 4).
4. Perianths deep yellow, yellow, white, yellowish white or pale purple in color. Leaves green and yellowish green in color without whitish stripe on midrib. Somatic chromosome number 12−18, 27 or 30 (group 2, 3).
5. Perianth margin undulate and reflexed (group 2).
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6. Perianths deep yellow in color. Flower blooms from late July to early August. Pedicel 2.2−4.0 cm in length. Somatic chromosome number 16
   ............................................................................................................ *L. chinensis* var. *sinuolata*

6. Perianths yellow or white. Flower blooms from September to November. Pedicel 0.5−1.6 cm in length. Somatic chromosome number 12−17 or 18.
7. Perianths white in color. Leaves produced from February to early May. Somatic chromosome number 16, 17 or 18
   ............................................................................................................ *L. albiflora*
7. Perianths yellow in color. Leaves produced from October to early April. Somatic chromosome number 12, 13, 14 or 15
   ............................................................................................................ *L. aurea*
5. Perianth margin smooth, not reflexed (group 3).

8. Perianths yellowish white or yellow in color. Tepal tube 1.1−2.2 cm in length. Styles 7.1−9.6 cm in length. Somatic chromosome number 19 or 30.
9. Perianths yellowish white in color, 5.9−6.7 cm in length. Bulbs circular in shape. Somatic chromosome number 30
   ............................................................................................................ *L. chejuensis*
9. Perianths yellow in color, 5.3–5.8 cm in length. Bulbs ovate in shape. Somatic chromosome number 19..............................................*L. flavescens*

8. Perianths pale purple in color. Tepal tube 2.4–3.2 cm in length. Styles 10.1–12.6 cm in length. Somatic chromosome number 27...............................*L. squamigera*

4. Perianths red in color. Leaves dark green in color with whitish stripe on midrib. Somatic chromosome number 33 (group 4)..............................................*L. radiata*

〈Group 1〉


Bulbs circular, tunicate with brown color, 2.4–3.6 cm long. Leaves pale green, grow from late February to early April. Peduncle produced from late August to September, 18–49 cm tall. Umbel 3-or 4-flowered with orange-red color, actinomorphic. Perianths 6, 3.5–4.3 cm long, about 6–7 mm in diameter. Perianth margin smooth. Style 4.0–6.6 cm long. Filaments 2.9–4.5 cm long. Style and filaments similar to perianth in length. Pedicel 0.9–3.9 cm long. Bracts 2, membranous, about 2–3 cm in length. Seed circular or ovate, fertile (Fig. 1).

**Distribution**: China (Yangtze River valley), Japan (Fig. 5).


Bulbs circular, tunicate with dark brown color, 1.5–3.5 cm long. Leaves green, grow from late February to May. Peduncle produced from late August to early September, 33.0–40.8 cm tall. Flowers orange to red in color, actinomorphic. Perianths 6, 4.2–4.9 cm long, 0.8–1.1 cm in diameter. Perianth margin smooth. Style 5.3–5.7 cm long. Filaments 3.9–5.5 cm long. Stigma red, papillate. Pedicel 2.4–4.5 cm long. Bracts membranous, about 3.0–5.0 cm in length. Seed black in color, about 6–8 mm in diameter.

**Distribution:** Japan (Gokanosho, Izumi, Kumamoto Pref.; Hoshikura, Nichinan, Miyazaki Pref.), Korea (Fig. 8).


Bulbs circular, brown, 2.0–3.5 cm long. Leaves pale green, grow from February to early May. Peduncle produced in July, 22–35 cm tall. Umbel 4–or 5-flowered, 6.5–7.1 cm long, 0.8–1.2 cm in diameter. Flowers orange to red in color, actinomorphic. Perianth margin smooth. Style 8.2–10.3 cm long. Filaments 6.2–8.3 cm long. Pedicels 3–8 cm long. Spathes valves 2, lanceolate, 4–6 cm long.

**Distribution:** Japan (Fig. 10).


**Group 2**


Bulbs ovate with long neck, 3.5–5.2 cm long. Leaves glabrous appearing in late February, 32.2–41.8 cm long, 1.4–2.5 cm diameter. Scape erect, produced from late July to early August, 40–70 cm tall, somewhat flattened. Spathes valves 2, lanceolate, 3–4 cm. Umbel 4–to 7-flowered. Perianths 5.5–6.0 cm long, zygomorphic. Pedicels 2.2–4.0 cm long. Flower deep yellow in color. Tepal tube 1.1–1.5 cm, long. Tepal segments oblanceolate, undulated on the margin and reflexed. Seed length 0.9–1.0 cm, black, fertile.

**Distribution:** Korea (Fig. 7).

**Specimens examined:** KOREA. Chunbuk: Mt. Naejang, 29 July 1990, *Kim s.n.* (JNU); Naejang Temple, 29 July 1990, *Kim s.n.* (JNU); Naejang Temple, 28 July 1990, *Kwan s.n.*


Bulbs ovate, tunicate with long neck, 4–5 cm long. Leaves glabrous appearing from late February to early May, 34–45 cm long. Scape erect, produced from September to early November. Umbel 5- or 6-flowered. Perianths 3.6–3.8 cm long, zygomorphic. Flowers white, undulated on the margin and reflexed. Sterile (Fig. 3).

Distribution: Japan (Fig. 9).


Bulbs ovate, tunicate with dark brown, 6.2–6.6 cm long. Leaves glabrous appearing from October to early April. Pedicels 0.5–2.0 cm long, green. Bracts 2, membraneous, lanceolate, 3–7 cm long. Scape erect, in September to October, 31–52 cm tall. Umbel 4– to 8– flowered, 4–7 cm long, 0.7–1.0 cm in diameter. Flower yellow, zygomorphic, undulated on the margin and reflexed. Style 9.0–10.0 cm long. Filaments 6.6–8.8 cm long. Somatic chromosome number 12 or 14 for fertile and 13 or 15 for sterile plants (Fig. 4).

Distribution: China, Japan, Taiwan (Fig. 6).

TAIWAN. Without specific locality, Aug. 1881, Hancock s.n. (K).


〈Group 3〉


Korean name: Che-Ju-Sang-Sa-Hwa, 저주상사화 (Tae and Ko, 1993).

Bulbs globose with short neck, 2.6–6.4 cm long. Leaves linear, green, 50–60 cm long, 1.6–2.4 cm in diameter. Scape appearing in August, 50–60 cm tall. Spathe valves 2, lanceolate. Umbel 5– to 8–flowered, zygomorphic. Perianths 5.9–6.8 cm long, yellowish white and red line along the midrib of segments. Pedicel 1.3–3.7 cm long. Ovary up to 5–8 mm long, 5–7 mm in diameter. Tepal tube 1.7–2.2 cm long. Sterile.

Distribution: Korea (Fig. 14).

Specimens examined: KOREA. Cheju: Andok Valley, 18 Mar. 1990, Kim s.n. (JNU); Andok Valley, 16 Aug. 1990, Kwan s.n. (JNU); Sogwangsori, 30 Aug. 1992, Tae s.n. (HNU 017467); Andok Valley, 13 Aug. 1993, Tae s.n. (HNU 017468); Sogwangsori, 13 Aug. 1993, Tae s.n. (HNU 017469), without specific locality, Aug. 1911, Taquet s.n. (TI).


Bulbs ovate with long neck, 4.5–5.2 cm long. Leaves glabrous appearing in February to May, green, 4–6 cm long. Scape erect, appearing in August. Umbel 5– to 8-flowered, 5.2–5.8 cm long. Flowers yellow or yellow with red tints along the margin of segments. Perianth margin smooth, zygomorphic. Bracts 2, lanceolate, 3.5–5.0 cm long. Style 7.1–9.6 cm long. Filaments 4.8–6.3 cm long. Stigma red. Sterile.

Distribution: Korea (Fig. 13).


Bulbs ovate, tunicate with long neck, 4.9–6.0 cm long. Leaves green, grow from late February to May. Peduncle produced from late July to August. Umbel 5– to 8-flowered with pale purple color, zygomorphic. Perianths 6, 7.2–7.8 cm long, 1.5–1.7 cm in diameter.
Perianth margin smooth. Style 10.9 – 12.6 cm long. Filaments 5.7 – 7.4 cm long. Pedicels 1.7 –
3.7 cm long, green. Bracts 2, membranous, 4 – 5 cm long. Sterile.

Distribution: China, Japan, Korea (Fig. 11).

Specimens examined: JAPAN. Aichi: Mikawa, 3 May 1952, Torii s.n. (KYO). Gumma: Mt.
Myogisan, Usuigun, 19 Aug. 1962, Murata s.n. (KYO 27409); Sindoji Amakuse Tomioka,
31 July 1936. Toh, s.n. (SNU 20805); Sindoji Amakuse Tomioka, 31 July 1936. Toh, s.n. (SNU
20806).

1989, Kim s.n. (JNU); Sunun Temple, 5 Aug. 1988, Kwan s.n. (JNU); Naejang Temple, 20
Aug. 1989, Kwan s.n. (JNU); Mt. Naejang, 1 Aug. 1975, Lee s.n. (SNUA). Chunnam: Paekyang
Temple, Aug. 1987, Kim s.n. (JNU); Paekyang Temple, 4 Aug. 1989, Kwan s.n.
(JNU); Paekyang Temple, 17 Aug. 1989, Kwan s.n. (JNU); Mt. Paekyang, 21 Aug. 1966, Lee
& Cho s.n. (SNUA); Naro Isl., 17 Aug. 1964, Lee et al. s.n. (SNUA); Paekyang Temple, 3 Aug.
1986, Tae s.n. (HNU 008095); Mt. Paekyang, 8 Aug. 1939, Toh s.n. (SNU 20207). Kyunggi:
Kanghwa Isl., 5 May 1935, Toh s.n. (SNU 20802); Ongjin-gun, Taechong-myon, Taechong
(KNU); Sangju, 1 Aug. 1992, Tae s.n. (HNU 017453).

〈Group 4〉

1987.

*Lycoris terracianii* Dammann, Cat. 44: 4, 1889, according to Kim and Lee (1991).

Korean name: Sok-San, 석산 (Yang, 1976; Lee, 1979; Lee and Kim, 1987; Kim and Lee,

Bulbs circular, tunicate with short neck, 2.5 – 4.0 cm long. Leaves dark green in color,
grow from September to late April. Peduncle produced in early September. Umbel 5– to 7-flowered with red color, zygomorphic. Perianths undulated on the margin and reflexed. Perianth segments 6, 3.3–4.3 cm long, 5–7 mm in diameter. Bracts 2, membraneous, 3–4 cm long. Pedicel 0.6–1.2 cm long, green. Style 7.2–9.5 cm long. Filaments 5.5–8.0 cm long. Sterile.

**Distribution:** China, Japan, Korea (Fig. 12).

**Specimens examined:** CHINA. Anhwei: 11 Aug. 1934, Fan & Li s.n. (K). Fukien: in 1912, Price s.n. (K). Kiangsi: Lu Shan (Kuling–Gebirge), Sep. 1908, Schindler s.n. (K).


**Discussion**

In this study, 10 taxa of *Lycoris* examined can be classified into four groups. Group 1 is composed of *L. sanguinea* var. *sanguinea*, *L. sanguinea* var. *koreana*, and *L. sanguinea* var. *kiushiana*. Although *L. sanguinea* var. *sanguinea* and *L. sanguinea* var. *koreana* have different bract length and perianth width, their morphological similarity makes it difficult to identify them and often lead to a confusion. Nakai (1930, 1952) and Lee (1979, 1984) regarded
L. sanguinea var. koreanana as an endemic species in Korea, L. koreana, which is also distributed in Japan (Fig. 8). Lycoris sanguinea var. sanguinea and L. sanguinea var. kiushianana are not found in Korea (Figs. 5, 10). Group 2 consists of L. chinensis var. sinuclata, L. albiflora, and L. aurea, and they have a common characteristic of undulate and reflexed perianth margin. Lycoris chinensis var. sinuclata is endemic to Korea (Fig. 7). For L. aurea and L. albiflora, Lee (1979) reported that they are distributed in Korea. However, Kim and Lee (1991) and Tae and Ko (1993) insisted that they are not distributed in Korea. The latter opinion is regarded as more appropriate (Figs. 6, 9). Group 3 includes L. squamigera, L. flavescens, and L. chejuensis, and are grouped under a common character of the smooth and not reflexed perianth margin. All of them are distributed in Korea, and especially L. flavescens and L. chejuensis are endemic plants in Korea (Figs. 11, 13, 14). Group 4 consists of only one species, L. radiata. However its distribution range is the widest of 10 taxa examined in this study (Fig. 12). Morphologically, it is characterized by perianth color, whitish stripe on midrib of leaves, and chromosome number of 2n = 33.

Literature Cited


상사화속에 대한 분류학적 연구

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적요


주요어: 상사화속, 분류, 검색표, 정리, 분포

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