A Revision of *Lespedeza* Subgenus *Macrolespedeza* (Leguminosae) in China

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**Key words:** China, classification, Desmodieae, Leguminosae, Lespedeza, Macrolespedeza, taxonomy.

This paper is intended as a complement to the account of subgenus *Macrolespedeza* of the genus *Lespedeza* for the Flora of China treatment (*Flora of China* vol. 10. Fabaceae. Editors: Z. Y. Wu, P. H. Raven and D. Y. Hong in preparation). We provide here an introductory note on the subgenus in China, a key to the species, bibliography of all the species and synonyms, and taxonomic notes especially on the species described by Ricker (1942, 1946) and *L. thunbergii* (DC.) Nakai. Most of these items are not included in the Flora of China treatment. This is also a continuous paper from our previous revision of Chinese *Lespedeza* subgenus *Lespedeza* (Ohashi et al. 2009a).

The present circumscription of the genus *Lespedeza* was proposed by Schindler (1913) who modified the subgenus *Lespedeza* in the sense of Maximowicz (1873). Schindler’s generic concept has been followed in the recent general systems of the tribe *Desmodieae* in Hutchinson (1964), Ohashi et al. (1981) and Ohashi (2005).

Maximowicz (1873) created section *Macrolespedeza* under subgenus *Lespedeza*. Schindler (1913) adopted the section under genus *Lespedeza*. Nakai (1939) divided section *Macrolespedeza* into two sections *Macrolespedeza* s.s. and *Heterolespedeza*. 


**Subgen. Macrolespedeza of China**

Schindler (1913) recognized eight species of *Macrolespedeza* in his revision, of which seven were recorded from China. Akiyama (1988) recognized nine species of *Macrolespedeza* of which six were found in China. Li and Chen (1995) adopted 12 species in FRPS volume 41 that is the most recent comprehensive treatment of *Macrolespedeza* in China. A list of the species of *Macrolespedeza* in these three works is compared with our result in this paper (Table 1).

Meanwhile, Ricker (1942, 1946) described 10 new species of *Macrolespedeza* of the genus from China: *Lespedeza albiflora* Ricker from Kwangtung (Guangdong); *L. anhweiensis* Ricker from Anhwei (Anhui); *L. bracteolata* Ricker from the USA originated in China or Korea; *L. chekiangensis* Ricker from Chekiang (Zhejiang); *L. hupehensis* Ricker from Hupeh (Hubei); *L. merrillii* Ricker from Chekiang; *L. metcalfii* Ricker from Anhwei; *L. paradoxa* Ricker from Anhwei; *L. veichii* Ricker from Hupeh; and *L. wilfordii* Ricker from Hongkong. These species were described based usually on a single herbarium specimen. His circumscription of the species is often difficult to reconfirm, because his new species were distinguished from the known species often on the basis of such variable characters as degree of hairs on branches or leaves, shape or size of leaflets, or size of calyx or flowers.

Of the 10 species of *Macrolespedeza*

Table 1. Chinese species of *Lespedeza-Macrolespedeza* recognized by Schindler (1913), Akiyama (1988), Li and Chen (1995) and the present study

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<td><em>L. formosa</em> (Vogel) Koehne</td>
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<td><em>L. thunbergii</em> (DC.) Nakai</td>
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<td><em>L. frickeana</em> Schindl.</td>
<td><em>L. maximowiczii</em> C. K. Schneid.</td>
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<td><em>L. patens</em> auct. non Nakai (= <em>L. thunbergii</em>)</td>
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<td><em>L. pubescens</em> Hayata (= <em>L. thunbergii</em>)</td>
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<td><em>L. viatorum</em> (= <em>L. thunbergii</em>)</td>
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<td><em>L. wilfordii</em> Ricker (= <em>L. thunbergii</em>)</td>
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described by Ricker from China, Akiyama (1988) listed seven species as imperfectly known in her revision, and did not treat *L. hupehensis*, *L. veitchii* and *L. wilfordii*. Akiyama and Ohba (1988) regarded *L. wilfordii* as a synonym of *L. formosa*. Li and Chen (1995) accepted *L. wilfordii* as correct species and regarded four species: *L. anhweiensis*, *L. chekiangensis*, *L. metcalfii* and *L. paradoxa* as synonyms of the known species in China. They treated four (*L. albiflora*, *L. hupehensis*, *L. merrillii* and *L. veitchii*) as unknown and did not treat *L. bracteolata*.

Most of the type specimens of Ricker’s species were missing in A, GH and NY when one of the author, H. Ohashi, had worked on Chinese Lespedeza for the Flora of China project in the Harvard University Herbaria in 2006 and 2007. He examined types of *L. anhweiensis*, *L. bracteolata* and *L. metcalfii* and also examined fragmental specimens of a few flowers, fruits or leaflets of *L. chekiangensis*, *L. hupehensis*, *L. veitchii* and *L. wilfordii* kept in US. These fragmental specimens were considered as isotypes of the four species separated by Ricker from the holotype in his studies. Each of them is packed in a small packet with Ricker’s memo and mounted with photographs of the type specimen. *Lespedeza merrillii* was examined only as a photograph of the type in NY. *Lespedeza albiflora* and *L. paradoxa* were not examined. *Lespedeza bracteolata* was referred to *L. buergeri* Miq. (Ohashi et al. 2009b). In the present study, however, examinations of some of Richer’s species are insufficient and further study is necessary for the missing specimens at the moment.

**Taxonomic treatment**


**Key to the species of China**

1a. Flowers chasmogamous and cleistogamous (except *L. forrestii*), usually less than 10 mm long (except *L. gerardiana*), in more or less elongated racemes of chasmogamous flowers with basal fascicles of cleistogamous flowers, or composed only of fasciculate racemes of cleistogamous flowers; standard white to yellowish or reddish purple; loments sessile or subsessile; herbs to subshrubs [subgenus **Lespedeza**] .. 2

1b. Flowers all chasmogamous, usually more than 10 mm long, in simple or compound racemes; standard usually rose-purple or reddish purple, rarely yellowish or white; loments shortly stipitate; shrubs to subshrubs [subgenus **Macrolespedeza**] .. 2

2a. Peduncles almost sessile, inflorescences not longer than subtending leaves; lateral and lowermost calyx-lobes acuminate to caudate .................................................. 3

2b. Peduncles distinct, inflorescences usually longer than subtending leaves; lateral and lowermost calyx-lobes obtuse or acute to acuminate .................................................. 4

3a. Leaflets ovate, elliptic, or obovate to broadly obovate; bracteoles nearly half

...
as long as calyx-tube; wings longer than keel; pods globose, less than 7 mm long .. ............................................ L. cyrtobotrya

3b. Leaflets ovate-oblong; bracteoles as long as calyx-tube; wings equal to keel; pods oblong, 13–15 mm long .......... L. fordii

4a. Winter buds depressed, scales distichously arranged; leaflets sharply acute, rarely obtuse; branches woody ....................... 5

4b. Winter buds thickened, scales spirally arranged; branches herbaceous or herbaceous-woody; leaflets rounded, obtuse or acute ......................... 7

5a. Corolla pale yellow; calyx-lobes acute and not spine-pointed at apex ......................................... L. buergeri

5b. Corolla red-purple; calyx-lobes acuminate to caudate and spine-tipped at apex ...... 6

6a. Leaflets acute and sharply pointed at apex; standard longer than keel ......................... L. maximowiczii

6b. Leaflets obtuse to rounded or retuse at apex; standard shorter than keel ....................... 7

7a. Lateral calyx-lobes ovate or triangular to narrowly ovate, apex acute to slightly acuminate, rarely obtuse, less than 2.5 mm long; keel-claw nearly as long as keel-lamina; pods orbicular ........................................ L. dunnii

7b. Lateral calyx-lobes narrowly ovate to narrowly triangular, apex acuminate, longer than 4 mm long; keel-claw nearly the half as long as keel-lamina; pods globose-ellipsoid to ellipsoid .............. 8

8a. Stems distinctly angled, densely spreading tomentose; leaflets thickly papery, broadly ovate-elliptic; calyx-lobes long acuminate; pods ovoid .................. L. davidi

8b. Stems terete or striate, appressed sericeous; leaflets papery, usually ovate-elliptic; calyx-lobes acute to acuminate; pods ellipsoid ......................... L. thunbergii


We observed distichously arranged winter bud scales in *Lespedeza dunnii* and *L. fordii* (Fig. 1). These two species are, therefore, newly accommodated in sect. **Heterolespedeza**.


Distr.: China and Japan. Li and Chen (1995) recorded this species erroneously in Taiwan and Korea.

Fig. 3. Lespedeza dunnii Schindl. Fujian, Dunn (collected on Mr. Dunn’s expedition to central Fukien, April to June 1905). Hongkong Herbarium, No. 2560 (A–holotype).

Scale bar = 10 mm.
**Lespedeza stottsae** L. H. Bailey in Gentes Herb. 1: 32 (1920).


Distr.: Endemic to China (Anhui, Fujian and Zhejiang).

Bailey (1920) described *Lespedeza stottsae* as a member of the subgenus *Lespedeza* and as being allied to *L. formosa* in lacking panicked racemes. Li and Chen (1995) considered that the species is close to *L. floribunda* Bunge of the subgenus *Lespedeza*. However, *L. stottsae* matches *L. dunnii* of the subgenus *Macrolespedeza* in leaflets, inflorescences, calyx and corollae, hence we regard the species as a synonym of *L. dunnii*.

*Lespedeza metcalfii* Ricker was separated from *L. dunnii* based on a single specimen in having much larger leaflets (up to 5.5 cm long, 2 cm wide) and flowers (calyx 7–8 mm long, corolla 10–12 mm long), apex of leaflets not retuse but mucronate, fewer-flowered and shorter raceme 2–3 cm long (Ricker 1946). Both species have long acuminate calyx-lobes. The holotype was collected in Anhui in 1936, and differs from *L. dunnii* in leaflets and slightly larger flowers. *Lespedeza metcalfii* appears to be included in *L. dunnii* as Li and Chen (1995) regarded both as conspecific.


[Figs. 1b, 5, 6]


Distr.: Endemic to China (Anhui, Fujian, Guangdong, Guangxi, Hunan, Jiangsu, Jiangxi, and Zhejiang).

*Lespedeza fordii* resembles *L. dunnii* in general features, leaflets and calyx, but is distinguishable from the latter by inflorescences shorter than the subtending leaves, larger pods (15 mm long in *L. fordii* while ca. 8 mm long in *L. dunnii*), sessile pedicels, and puberulent, not pubescent, on lower surface of leaves. Moreover, leaves of the specimens of *L. fordii* usually become blackish, but not in *L. dunnii*. Flowerings of *L. fordii* is June to August, but April to May in *L. dunnii*. Some specimens of *L. fordii* have more or less elongated inflorescences that are confusingly similar to *L. dunnii* in this point, but are distinguishable from each other by other characters mentioned above.

*Lespedeza anhweiensis* Ricker was described as having axillary, few flowered racemes up to 2.5 cm long, short pedicels nearly as long as the calyx, acuminate calyx-lobes about three times the length of the tube and oblong pods about 13 mm long. These characters indicate the species as identical with *L. fordii*.

*Lespedeza paradoxa* Ricker collected in Anhui in 1933 was noted by Ricker (1946) as follow: “Not closely related to any described species but in pod character approaching that of *L. thunbergii*, the pods of both species resembling those of *Campylotropis* rather than those of any other species of the *Macrolespedeza* section”. The characteristic features of *L. paradoxa* match those of *L. fordii*. We follow Li and Chen (1995) who regarded *L. paradoxa* as a synonym of *L. fordii*.

Fig. 5. Lespedeza fordii Schindl. Kwangsi (= Guangxi): Kwei-lin. 13 Aug. 1937. Fung 21189 (A).


Distr.: China, Japan and Korea.


[Fig. 7]


Distr.: China, Japan, Korea and Russia (E. Siberia and Far East).

Li and Chen (1995) listed the following 18 provinces as the area of Lespedeza bicolor in China: Anhui, Fujian, Gansu, Guangdong, Guangxi, Hebei, Heilongjiang, Henan, Hunan, Jiangsu, Jilin, Liaoning, Nei Mongol, Shaanxi, Shandong, Shanxi, Taiwan, and Zhejiang. However, this species is not distributed in Taiwan, and, as far as we have examined for specimens in the herbaria listed, Fujian, Guangdong and Guangxi are dubious for its distribution. Hsu et al. (1983) listed only Hebei, Heilongjiang, Jilin, Liaoning, and Nei Mongol for the area of L. bicolor.

Lespedeza veitchii Ricker was described based on a single specimen, E. H. Wilson 1391 in NY, collected in western Hubei, and was considered as nearest to L. elliptica Benth. from India. Li and Chen (1995) noted L. veitchii as similar to L. patens Nakai, probably because Ricker (1942) characterized the species by the spreading pubescence of the stems and petioles and somewhat larger leaves and flowers. However, L. patens, which they described in FRPS is considered to be L. thunbergii subs. thunbergii in this study. Ohashi had examined this species on four flowers and leaflets taken by Ricker from the holotype and L. veitchii is identical with L. bicolor.

Ricker referred some specimens of Lespedeza bicolor or L. elliptica with patent hairs on stem among the collection in A to L. patens, e.g., Smith 6683 (A).


[Fig. 8]


Distr.: N. China, Japan, Korea and Russia (Primorye in Far East).

This species is recorded from Gansu, Guangdong, Hebei, Heilongjiang, Henan, Jiangxi, Jilin, Liaoning, Shaanxi, Shanxi, and Zhejiang in China (Li and Chen in FRPS 1995). However, distribution in southern Provinces among these areas needs reconfirmation on the identification of voucher specimens, because *L. bicolor*, *L. floribunda* Bunge or *L. thunbergii* are sometimes erroneously referred to as *L. cyrtobotrya* in China.

See a note of *L. kawachiana* in the next species.


[Fig. 9]


Dist.: Endemic to China (Anhui, Fujian, Guangdong, Guangxi, Guizhou, Henan, Hunan, Jiangsu, Jiangxi, Sichuan, and Zhejiang). Recently, this species has become widely naturalized in Japan by greening for protection of newly constructed highway or developed areas (Ohashi et al. 2003, Iokawa and Ohashi 2007).

*Lespedeza hupehensis* Ricker was described by Ricker (1942) based on a single specimen as follows: a small erect shrub up to 1 m tall characterized in having short axillary racemes up to 5 cm long, calyx with acuminate teeth somewhat longer than the tube and bifid dorsal tooth, purple corolla with much shorter wings than the banner and keel, and broadly elliptic pods about 5 mm long. He considered it similar to *L. kawachiana* Nakai. *Lespedeza kawachiana* is, however, merely a form of *L. cyrtobotrya* Miq. with spreading hairs on the branches, although it was recognized as distinct at the rank of variety (Ohwi 1951) or form (Hatusima 1967). *Lespedeza cyrtobotrya* has inflorescences shorter than the subtending leave and wings longer than or equal to the keel. On the other hand, judging from the type of *L. hupehensis* (photos in NY and US) fully developed inflorescences are longer than the subtending leaves and shorter inflorescences appear to be immature and confined on the upper part of the branches. Observation of fragmental isotype of *L. hupehensis* in US confirmed the species has shorter wings than the keel as described by Ricker. *Lespedeza hupehensis* is, therefore, different from *L. cyrtobotrya* as well as *L. kawachiana*.

*Lespedeza hupehensis* appears to be similar to *L. davidii* in the calyx, corollae and young pods though it differs in having short inflorescences. Considering variation in *L. davidii*, however, it may be supposed that *L. hupehensis* is a poorly developed dwarf form
Fig. 8. *Lespedeza cyrtopteryx* Miq. a. Shansi (= Shanxi): Yuan-chu Distr. 16 July 1924. Smith 6324 (A). b. Inflorescences enlarged. Scale bar = 10 mm.
of *L. davidii* or might be a hybrid between *L. davidii* and probably *L. bicolor*. We tentatively treat the species as a synonym of *L. davidii* in this paper.

*Lespedeza merrillii* Ricker (as “*merrilli*”) was described by Ricker (1942) based on C. Y. Chiao 14377 (NY, US) which was collected on 21 July 1927 at Yen Tang Shan alt. 2700 ft., Zhejiang, China. It was remarked as follow: “nearest to *L. davidii* Franch. but at once distinguished from it by the sparingly appressed, instead of velvety, pubescence of the stems and longer calyx teeth (calyx teeth 3 times longer than the tube)”. This species has been treated by Akiyama (1988) and Li and Chen (1995) merely as an imperfectly known species. We regard this species as identical with *L. davidii*, although only one photo of the isotype in NY was available in 2006. However, the characterization of the calyx teeth seems to be uncertain, because the photo of the isotype seems to have no mature flowers. Under the circumstance, we tentatively regard *L. merrillii* as a somewhat glabrous form of *L. davidii* in this paper. However, there remains a possibility that it is a hybrid between *L. davidii* and *L. thunbergii*.


[Figs. 10–13]


*Desmodium thunbergii* DC., Prodr. 2: 337 (1825).


This species is distributed most widely in China among the members of the subgenus *Macrolespedeza* and shows wide ranges of morphological variation in stems, leaves and flowers. Many taxa had been described on the basis of polymorphic forms of this species. Schindler (1913) recognized first *Lespedeza formosa* (Vogel) Koehne as a single species including such species as synonyms as *Desmodium penduliflorum* Oudem., *L. sieboldii* Miq., *L. viatorum* Champ. ex Benth. and *L. elliptica* Benth. ex Maxim. This broad concept of the species has generally been adopted in China. However, Schindler (1913) overlooked *Desmodium thunbergii* DC. as a species of *Lespedeza*, which is based on *Hedysarum heterocarpon* L. in the sense of Thunberg (1784a, 1784b) recorded from Japan. Schindler considered Thunberg’s *Hedysarum heterocarpon* as it was correctly referred by Thunberg, because he treated the name recorded by Thunberg as a synonym of *Desmodium heterocarpon* (L.) DC. (Schindler 1928). The single specimen of *H. heterocarpon* collected by Thunberg in Japan is in UPS. This is the voucher specimen of Thunberg’s *H. heterocarpon* L. and is the type of *D. thunbergii* DC. The specimen is referable to *Lespedeza thunbergii* (DC.) Nakai (Nakai 1927). Schindler’s treatment, unfortunately, produced nomenclature confusions for *Lespedeza thunbergii* in China. Moreover, *L. thunbergii* has often been regarded as a synonym of the later synonym *L. formosa* in China (Fu 1955, Li and Chen 1995, Zhu et al. 2007).

Analytical studies on the morphological variation of *L. formosa* and *L. elliptica* were made by Hsu et al. (1983) in comparison with *L. bicolor* Turcz. in China. They showed a morphological distinction in relative length
Fig. 10. Lespedeza thunbergii (DC.) Nakai subsp. thunbergii. Kiangsi (= Jiangxi): Kiukigang. Allison 5 (A).
in the calyx and corolla among these species and the differences were correlated with geographical distribution in China. They regarded the former two species as subspecies of *L. bicolor* as subsp. *elliptica* (Benth. ex Maxim.) Hsu et al. and subsp. *velutina* (Nakai) Hsu et al. Akiyama and Ohba (1988) also compared morphological variation of *L. formosa* with *L. elliptica* and *L. bicolor* var. *velutina* Nakai and got a similar result to Hsu et al. (1983) among the species. They made the new combination of *L. formosa* subsp. *elliptica* (Benth. ex Maxim.) S. Akiyama & H. Ohba and subsp. *velutina* (Nakai) S. Akiyama & H. Ohba.

Ohashi (2001) made the concept of the species of Schindler (1913) broader by inclusion of *Lespedeza thunbergii* and recognized *L. formosa* as an infraspecific taxon of *L. thunbergii*. In this paper, our concept of *L. thunbergii* is similar to Ohashi (2001), but with a modified circumscription of infraspecific taxa. We recognize subsp. *thunbergii*, subsp. *elliptica* and subsp. *formosa* in China. Subsp. *thunbergii* was circumscribed first probably on cultivated plants growing in Nagasaki, but has been expanded to include wild ones occurring widely in China, Japan and Korea. Subsp. *formosa* is confined to southern China and Taiwan. Subsp. *elliptica* is a western form of subsp. *thunbergii*.

The morphological distinctions between subsp. *thunbergii*, subsp. *elliptica* and subsp. *formosa* are as follows:

**Key to the subspecies of Lespedeza thunbergii**

1a. Flower three to four times as long as calyx; lateral calyx-lobe nearly equal to or slightly shorter than the calyx-tube .......................................................... subsp. *formosa*

1b. Flower two to three times as long as calyx; lateral calyx-lobe longer than or equal to the calyx-tube ........................................... subsp. *thunbergii*

2a. Lateral calyx-lobes usually 1.5–3 times as long as the calyx-tube ...... subsp. *elliptica*

2b. Lateral calyx-lobes usually 1–1.5 times as long as the calyx-tube ........ subsp. *thunbergii*


*Desmodium thunbergii* DC., Prodr. 2: 337 (1825).

*Desmodium penduliflorum* Oudem. in Neerl. Plantent. 2: t. 2 (1866).


Distr.: Japan, Korea, Taiwan, China (Anhui, Gansu, Hebei, Henan, Hubei, Hunan,
Fig. 12. Lespedeza thunbergii (DC.) Nakai subsp. thunbergii. Hupeh (= Hubei): Chiensh Hsien. Chow 1361 (A).
Jiangsu, Jiangxi, Shaanxi, Shandong, Sichuan, Zhejiang), Japan and Korea.

8-2. subsp. **elliptica** (Benth. ex Maxim.) H. Ohashi, comb. nov. [Fig. 14] 


Distr.: SW. China (Gansu, Guizhou, Hubei, Shaanxi, Sichuan, Yunnan) and E. India.


**[Figs. 15, 16]**


Desmodium thunbergii is recognized as a form distributed in southeastern China and Taiwan. It does not occur in Japan and Korea.

Lespedeza chekiangensis Ricker was described from Zhejiang. Although the holotype of *L. chekiangensis* Ricker was missing in NY in 2006, two young flowers

Fig. 15. Lespedeza thunbergii (DC.) Nakai subsp. formosa (Vogel) H. Ohashi. Hong Kong. Hance 622 (GH).
from the holotype used by Ricker suggest this species may be referable to *L. thunbergii* subsp. *formosa*, though the flower is about 2.5 times as long as the calyx. The lateral calyx-lobes are as long as the calyx-tube.

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大橋広好\textsuperscript{a}，根本智行\textsuperscript{b}，大橋一晶\textsuperscript{c}：中国産マメ科ハギ属ヤマハギ亜属の分類

本論文は先に発表した中国産ハギ属ハギ亜属についての論文（Ohashi，Nemoto and K. Ohashi 2009a）と同じ目的でまとめたもので、中国産ヤマハギ亜属の研究史、種の検索表、正名および異名の出典と文献、各種の分布、種の分類学的扱いの根拠などをまとめたものである。各種の記載文は近く刊行される予定の Flora of China, vol. 10 Fabaceae に含まれるので、ここでは省略した。


種、キハギ節にはこれまでキハギとチョウセンキハギの 2 種より成るとされていたが、新たに 2 種を加えて 4 種とした。これまでの中国産のヤマハギ亜属の構成種の扱いとして、Schindler (1913)，Akiyama (1988)，中国植物志 (1995) と本論文の結果を比較として、表 1 に示した。

Ohashi (2001) はミヤギノハギ Lespedeza thunbergii を日本、朝鮮半島、台湾、中国、インド東部に広く分布する種とした。本論文ではミヤギノハギの種内分類群の設定を Ohashi (2001) から一部変更した。subsp. thunbergii は日本、朝鮮半島、中国に、subsp. formosa (Vogel) H. Ohashi は台湾と中国南部に、subsp. elliptica (Benth. ex Maxim.) H. Ohashi は中国西南部とインド東部に分布する地理的亜種とみなした。

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