

MECONOPSIS LEPIDA AND *M. PSILONOMMA* (PAPAVERACEAE) REDISCOVERED AND REVISED

TOSHIO YOSHIDA^{1,2} AND HANG SUN³

Abstract. Two little-known species of *Meconopsis* (Papaveraceae), *M. lepida* and *M. psilonomma*, first collected by Reginald Farrer on Gansu Min Shan, China, in 1914, were recently rediscovered and are here revised based on literature studies, field research and an examination of specimens. Accounts of the rediscoveries and detailed revisions are accompanied by explanatory photos, maps and tables. Two new varieties of *M. psilonomma*, var. *zhaganaensis* and var. *calcicola*, are described.

Keywords: *Meconopsis lepida*, *Meconopsis psilonomma*, *Meconopsis sinomaculata*, Reginald Farrer, Joseph Rock, Gansu (Kansu), Min Shan, Die Shan, Zhouqu (Siku)

Gansu Min Shan is located in the southern corner of Gansu (Kansu in Farrer, 1926) Province near the Sichuan border, China. The western part of Gansu Min Shan runs west-northwest to east-southeast along the boundary between Zhuoni (卓尼) Xian and Diebu (迭部) Xian, and is now called Die Shan (迭山). The northern slope of Die Shan is the watershed of the Tao He (Tao River), which flows to the Huang He (Yellow River). The eastern part of Gansu Min Shan is smaller than the western part, running northwest to southeast along the boundary between Dangchang (宕昌) Xian and Zhouqu (舟曲) Xian. The southern slope of Gansu Min Shan is the watershed of the Bailong Jiang (Bailong River), which flows to the Min Jiang (Min River) in Sichuan Province, which in turn enters the Chang Jiang (Yangtze) (Fig. 1–3). Gansu Min Shan has a unique flora, a mixture of northwestern Chinese plants and more southern and southwestern Sino-Himalayan plants such as *Meconopsis*.

Reginald Farrer, a British plant hunter and gardening

legend, often called “prince of alpine gardeners,” accompanied by William Purdom, an earlier British plant hunter in northwestern China, discovered *Meconopsis lepida* Prain and *M. psilonomma* Farrer (Papaveraceae) on Gansu Min Shan in 1914. Since then, no one has reported on these species in the region except Joseph Rock. Rock explored Die Shan extensively in 1925 and 1926 and was the second person to collect *M. psilonomma* at the type locality by following the route of Farrer and Purdom.

The travels of Farrer and Purdom in Gansu were described in Farrer’s *On the eaves of the world* published in 1926 in two volumes. The travels of Rock in this region were communicated in fragments and compiled in *Joseph Franz Rock—Phytogeography of northwest and southwest China* (Rock, 2010) and in Rock’s diaries preserved in the Royal Botanic Garden, Edinburgh, and transcribed in digital format and available on the website of the Arnold Arboretum of Harvard University (Rock, 2012).

FIRST COLLECTION OF *MECONOPSIS LEPIDA*

Meconopsis lepida was first collected and photographed on June 20, 1914 on the mountain called Thundercrown by Farrer and now known as Leigu Shan (雷古山), which literally translates to Thunder Old Mountain, above Siku (now called Zhouqu), supposedly within the area marked A in Fig. 2. On a label of the type collection, *R. Farrer 123* (Fig. 4), Farrer wrote “*Meconopsis* sp. nova (to Fedde) *M. ‘Eucharis.’* This lovely plant of the Primulina group (description & photographs earlier) has only been seen on the cooler slopes & rock ledges of the high limestones on Thundercrown from 12–13,000 ft. It was in splendor on June 20: practically all the seed was gone from the elongate narrow glabrous (or very sparsely haired) capsules by August 27. Species infaustissime biennis.” A black and white photo of the flowering plants is in vol.2, p.16–17 (Farrer, 1926).

Farrer (1919: 506) also described the habitat of *M. lepida* in his *The English Rock-Garden* as follows: “*Meconopsis*

sp. (F 123) (*M. lepida*, sp. nova) inhabits the upper alpine banks and ledges on Thundercrown, markedly preferring the cooler westerly aspect. It is not found in the open turf, but often occurs at its fringes round the base and up the gullies of little limestone outcrops in the huge grassy flanks of the mountain at 12,500 feet, not steadily abounding, but appearing in sporadic outbursts.”

Farrer recorded phonetic spellings of the local name of Thundercrown as Lei-gor S’an in Farrer (1926) and Lei-Go-S’an on the specimen label. The English name, Thundercrown, was supposedly translated from 雷冠山, which is written Leiguan Shan in *Pinyin* transliteration and literally means Thunder Crown Mountain. Leiguan Shan (雷冠山) may be the origin of Leigu Shan (雷古山). There occur frequent thunderstorms with torrential rain in summer on the south-face of the mountain. One such deluge caused huge debris flows and brought devastating damage to the town of Zhouqu on August 8, 2010.

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¹Hoshiya 330-6, Oamishirasato-shi, Chiba 299-3222, Japan

²Corresponding author: kharka@wa2.so-net.ne.jp

³Key Laboratory for Plant Diversity and Biogeography of East Asia, Kunming Institute of Botany, Chinese Academy of Sciences, Kunming 650201, Yunnan, China; sunhang@mail.kib.ac.cn



FIGURE 1. Gansu Min Shan and neighboring region, based on Google Maps.

FIRST COLLECTION OF *MECONOPSIS PSILONOMMA*

The type locality of *Meconopsis psilonomma* is in the watershed of Dayugou (大峪沟), supposedly within the area marked C in Fig. 3. Farrer and Purdom left the town of Zhuoni (卓尼; Jo-ni in Farrer, 1926) on July 27, 1914 and entered Boyugou (博峪沟; Bao-u-go in Farrer, 1926), then crossed over an eastern spur and down to Dayugou. After an accident resulting in Farrer's fall with his horse into the stream from a half-broken wooden bridge, they reached Ajiao (阿角; Ardjery in Farrer, 1926) on the western shore of upper Dayugou just below the confluence of two tributaries, Dagou (大沟; meaning large valley) from the south and Xiaogou (小沟; meaning small valley) from the southeast.

Dagou carries a large amount of furiously flowing water through a narrow gorge, along which there is no passable route. In contrast, Xiaogou ('Main valley' in Farrer, 1926) carries a smaller amount of water in the bed of a wide valley along which a trail runs toward the head of the valley and over a pass named Thari Khikha on the main ridge of easternmost Die Shan. *Meconopsis psilonomma* supposedly grew somewhere on the north side of the ridge within the area marked C.

Farrer and Purdom waited at Ajiao from July 29 or 30 until tents for their army escort arrived from Zhuoni. During their days of wait, Farrer explored a ridge between Dagou and Dibugou (地布沟; Ch'i-pu kou in Rock, 2010, 2012), the westernmost tributary of Dayugou, whereas Purdom reconnoitered Xiaogou to find good campsites. It is

suspected that Purdom, in fact, collected the type specimens of *M. psilonomma* during those days, because the collection was dated July 30, 1914. The photo of *M. psilonomma* in Farrer's book was also supposedly taken by Purdom on this occasion, because the plants in the photo resemble the type specimen and do not appear to be rain laden as mentioned by Farrer in *The Gardeners' Chronicle* quoted below. Purdom was also engaged as photographer during their travels, although it has been stated in most of the literature that Farrer collected the specimens of *M. psilonomma* and photographed the plants in the field.

Farrer and Purdom finally departed Ajiao on 3 August, heading toward the head of Xiaogou with an army escort of 40 men dispatched by the local government at Zhuoni to prevent attack from Tepos, meaning the Tibetans of upper Diebu Xian centered at Zhagana (扎尕那). On the following day, 4 August 1914, Farrer came upon clusters of *M. psilonomma*, although the plants appeared to mostly past flowering in early August. Farrer (1915) described his new species in *The Gardeners' Chronicle* as follows:

"And then, among these suddenly a fresh tone—a great bent flower, rain-laden and heavy, like a gigantic specimen of the purple *Anemone coronaria*. It was another new *Meconopsis* (new, at least, to Fedde, for I do not know the diagnosis of *M. wardii*). Like the last, it belongs to the biennial Primulina group; but, leaving to



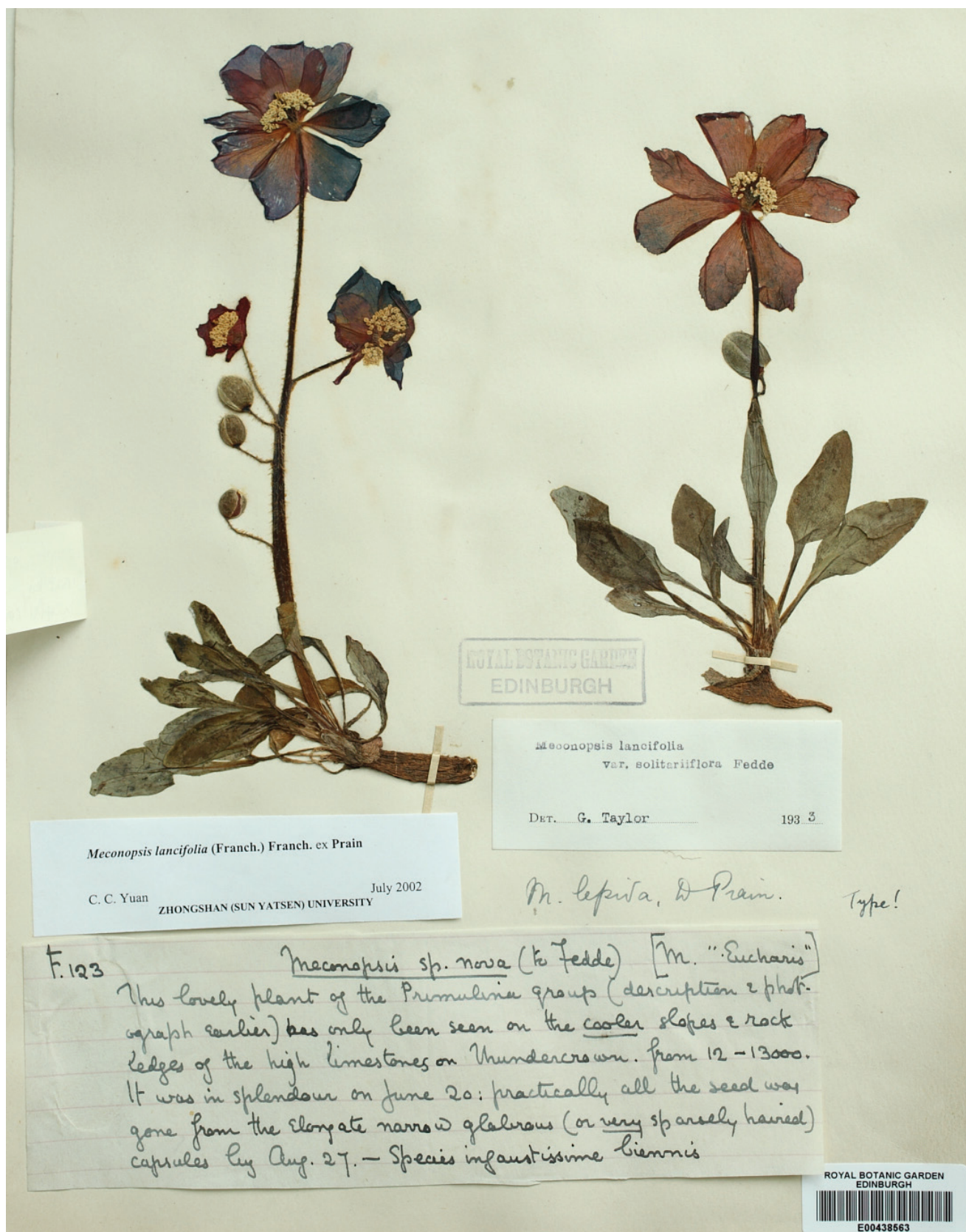


FIGURE 4. Type specimen of *Meconopsis lepida* Prain, R. Farrer 123. Royal Botanic Garden, Edinburgh.

the last its monopoly of small and dainty grace, this one stands pre-eminent in grandeur and opulence. Few and small are the leaves, all at the base, glaucous, narrow, almost hairless; the naked scape is invariably solitary, and invariably carries only one very large flower with six, seven, or eight very broadly ovate rhomboidal, crimped petals of rich lavender purple. The solitary imperial eye of colour at the top of each stout scape of 6 to 10 inches reminded me of the “solitary eye” which blind old Oedipus said they had torn from him when they took away Antigone; accordingly, until it is put in its place or more authoritatively and illustriously named, I think of this treasure as *Meconopsis psilonomma*.”

Farrer (1926) also described it in his book as follows [The words in parenthesis marked with * in the following quotations were inserted by the present authors]:

“In grandeur and opulence the Lonely Poppy (**M. psilonomma*) takes high rank above the Dainty Poppy (**M. lepida*), to whom is still left the pre-eminence in small and dainty grace; for the Lonely Poppy on its single and always solitary stem bears always only a single purple flower, whose great head, when bowed by rain, makes one think immediately of *Anemone coronaria* in the flower-fields of Southern Europe. It is a glorious thing to see in those high meadows of the Tibetan Alps; and I never saw it anywhere else, or on any day but this. No doubt but it has many other homes on those untrodden downs, but it was remarkable to find how limited a space it occupied on the green mountain-wall above our camp, though so abundant from eleven thousand feet upwards to the final arête, that now among the general jewelwork of the shimmering lawns it made quite a dappling of rich violet blots, its stem of six or eight inches aspiring above the rest, and its noble blossom modestly declining in the rain instead of standing erect in its usual bravery of expanded beauty. In the final arête it is yet more splendid. Almost all other flowers have ceased except the Harebell Poppy (**M. quintuplinervia*), which here looks anaemic and feeble beside its radiant new cousin; and the ridge runs in steps and ripples of dank raw earth overhung with a thatch of soaking moss and matted Rhododendrons in brownish autumnal tones. And here, in all the

opener lips and edges, shine the flowers of the Lonely Poppy, more imperial than ever in rich purple against the white pallor of the fog, upon their background of dull vague tones of brown and green.”

It is hardly believable that flowers of a scapose species of *Meconopsis* such as *M. psilonomma* were abundant in early August below 4,000 m elevation. At any rate, Farrer saw the flowers declining after the rain at that time.

The dried and pressed plants of Farrer’s type specimen, *R. Farrer* 255, in the herbarium of the Royal Botanic Gardens, Kew, was, unfortunately, stolen, leaving only a partly water-colored drawing (Fig. 5) of the type specimen. An isotype (i.e., bearing the same collection number) is in the Royal Botanic Garden, Edinburgh (E). The broken and somewhat crumpled plants with an old flower and two fruit capsules together with a black and white photo of the plants, which is also in Farrer (1926, II: 168–169), comprise the specimen at E. The following note written by Farrer himself is attached to that specimen:

“*Meconopsis* sp. nova (to Fedde) ‘*M. psilonomma*.’ A very indifferent specimen (the set having been stolen) of a superb species seen only once, on one portion of a great grass slope in the Tibetan Alps of Ardjeri, beginning at the topmost limit of *M. punicea* (11,500 feet), and ascending to the highest ridges at 12,500 feet, where *M. quintuplinervia* seemed pale and poor: - scattered freely in the grass, with *Allium kansuense*, *Gentiana* 217, *Primula* 13, and *P. tangutica*, etc. July 30: seed mid-September. Note, that it is invariably single-scaped and single-flowered: this specimen quite understates its size and stature.”

As indicated on the note, the type specimens are considered to be inferior, late flowering plants in lesser stature than most of the plants in the region, which had already finished flowering. The drawing of the type specimen at K and the photo mounted on the isotype specimen of *M. psilonomma* show that the flowers are lateral facing, open flat, and are borne singly on an erect, shorter scape.

Farrer considered the flowers of *M. psilonomma* to be “bowed” and “modestly declining” by the rain when he observed them on 4 August, “instead of standing erect in its usual bravery of expanded beauty.” He wrongly supposed that the scapes would be erect and the flowers would open widely to show the “bravery of expanded beauty” in fine weather. However, it is now known, based on the second collection of *M. psilonomma* by Rock and from our studies, that the flowers of *M. psilonomma* are usually cup shaped and normally bowed, as mentioned below.

SECOND COLLECTION OF *MECONOPSIS PSILONOMMA*

Rock visited the locality of *Meconopsis psilonomma* on July 7, 1925 and made a second collection of the species, *J. F. Rock* 12613 (Fig. 6). Rock’s observations on the flora of the alpine meadows around Tsari Khikha are recorded in his book (Rock, 2010: 75) as follows:

“The flora of the alpine meadows was very poor in comparison to that of Kuang-k’e (*Guangke 光克) Shan, but certain plants occurred here which were peculiar to the eastern end of the range, as *Meconopsis psilonomma* Farrer, a very



FIGURE 5. Drawing from the type specimen of *Meconopsis psilonomma* Farrer, *R. Farrer* 255. Royal Botanic Gardens, Kew.



FIGURE 6. Rock's specimen of *Meconopsis psilonomma* Farrer, J. F. Rock 12613, collected at the type locality. Royal Botanic Gardens, Kew.

distinct species which could never be mistaken for any other of the lavender or purple species of *Meconopsis*. To begin with, the flowering stalks are terete and hollow, spiny-haired, the spines dark red, the plant is 1-2 feet tall, the flowers are quite large semi-drooping and deep purplish blue, they are suspended from the very tip of the stalk in such a way as to appear artificially attached and not contiguous with the stem. It only occurs on Tsa-ri Khi-Kha in thick turf, most difficult to uproot, at 12,500 feet elevation and nowhere else. Farrer's Ardjeri is A-Chüeh (*Ajiao; 阿角), and it is precisely there where it grows. At Tsa-ri Khi-Kha it meets *Meconopsis quintuplinervia* Reg., a much less robust species, very easily uprooted, with solid, not hollow stem, smaller flowers and much paler in color, and the red *Meconopsis punicea*."

According to Rock's field observations of *M. psilonomma*, the scapes are suddenly bent at the tip and the solitary flower is "semi-drooping," or "suspended," from the tip of the scape. Contrary to Rock's description, *M. psilonomma*, which is usually biennial, is easily uprooted, as can be surmised from the small dauciform taproot in Rock's specimens, whereas *M. quintuplinervia* is difficult to uproot because of the very hard, long, branched perennial roots. Rock could have mixed up these species.

Rock arrived at Ajiao (Adjuan in his diary) on June 30, 1925. After heavy rain, he set off for the head of Xiaogou on July 5. He wrote in his diary as follows:

"July 6. Set off for Tsarekhikha (*Tsari Khikha) accompanied by 10 Tebbu (*now transliterated as Diebu, 迭部) men with flint and steel lighted guns. Robbers in the neighborhood. At 9,450 feet defile was impassable because of water. Tebbu men made a bridge of larch and willow and dammed the water. — On to Lissedzadza: through Shimen. Rocks of conglomerate thousands of feet high on both sides, —. Ascended steep slopes of ravine. Saw herd of blue sheep; continued along 11,700 feet cliff. Caravan arrived and tents pitched. Met an old man who reported he had been beaten by five Tebbu Tibetan robbers. He stayed at camp. Robbers on other side of ravine. Rock fired his Colt 45 before he retired, to ward off robbers."

"July 7. Very little to collect but specimens # 12611–12620; shot a few birds; took some

photographs of high forested peak — Lidza tong, elevation 11,750 feet. Photographs looking south toward Shimen. Rock's men had gun exchange with robbers. One of the men shot by robbers; one robber shot dead by one of the Tebbu boys. Broke camp and decided to go to Minchow (*Min Xian, 岷县), one and a half day's distant, but bogged down by rain and returned to camp. Later set off for Choni (*Zhuoni卓尼). Camped in a meadow amidst lovely flowers. Poor vegetation on Mt. Lissedzadza."

Shimen (石門, stone gate) is a narrow gorge between huge rocks. There are several places called Shimen in Die Shan. The best-known Shimen in Die Shan is located at the head of Kachagou.

"July 8. Left camp. Elevation 10,200 feet, heading for Chan Chan nyi (*Zhanzhanni, 占占尼). Reached Adjuan without difficulty. The man wounded by robbers was carried on a litter."

It is quite believable that Rock collected his specimen numbered 12613 at the same locality as the type specimen of *M. psilonomma*, *R. Farrer* 255, because both Farrer and Rock similarly mentioned that they saw the plant in a limited small area at the head of Xiaogou and saw it nowhere else.

Rock noted on the label of the specimen: "Tao River basin: alpine meadows on Mt. Lissedzadza. Alt. 12,500 ft. Plant 1–1.5 ft. deep lavender purple, especially at base of corolla. Stem hollow."

"Lissedzadza" in Rock's diary and on the specimen label appears to mean the mountain with limestone outcrops around Tsari Khikha on the main ridge of easternmost Die Shan.

It is considered that Rock collected the plants during one of the best flowering seasons for the species. *J. F. Rock* 12613 represents the more typical plants of the species, with greater stature, thick scapes and cup shaped, semi-drooping, larger flowers than Farrer's specimen, *R. Farrer* 255.

Christopher Grey-Wilson (2014) included Rock's specimen, *J. F. Rock* 12613, within *Meconopsis sinomaculata* in his monograph of *Meconopsis*. If Grey-Wilson is correct in his identification, *M. sinomaculata* should be treated as a synonym of *M. psilonomma* because Rock's specimen proves to be *M. psilonomma*, which has priority over *M. sinomaculata*. *Meconopsis sinomaculata* was published by Grey-Wilson in 2002 based on a specimen (*SBQE* 500) collected at Gonggaling (贡嘎岭; Gonggan Len Pass in Grey-Wilson) in northern Sichuan.

PRELIMINARY RESEARCH IN GANSU MIN SHAN IN 2014

The mountainous regions of Zhouqu Xian, where the type locality of *Meconopsis lepida* is located, and in Zhuoni Xian, where the type locality of *M. psilonomma* is located, have been closed to foreigners despite China's reform policies of opening to the outside world promoted after the 1980s.

One of the authors (Yoshida) visited the areas open to foreigners in Gansu Min Shan in the summer of 2014, as a leader of a collaborative botanical team made up of the Blue

Poppy Society, Japan, and the Kunming Institute of Botany, Chinese Academy of Sciences.

On July 22 and 23, on the way from Zhagana to 34°16'14"N, 103°03'57"E, marked E in Fig. 3, Yoshida found a solitary-flowered, scapose, blue poppy (*T. Yoshida* K96) sparsely scattered among herbs and dwarf shrubs of *Potentilla* L. near the top of southwest-facing, partially shaded, partly moss-covered steep banks beside the road from 3,500 to 3,800 m elevation. It was not easy to find

the plants, because most had finished flowering and bore a narrowly ellipsoid, bristly or glabrous fruit on an elongate solitary scape (Fig. 7), and because of the partially shaded habitat as well.

The plants still in flower at this site had small leaves, half nodding, cup shaped, large flowers with filaments dilated toward the base and tightly surrounding the ovary at least at the base, and petals with a prominent deeply colored blotch at the base (Fig. 8). The plants resembled *Meconopsis sinomaculata* as described by Grey-Wilson and also Rock's specimen of *M. psilonomma*, J. F. Rock 12613, in appearance. However, our studies found that the anthers of these plants are dull orange or dull yellow and not blackish purple as in *M. sinomaculata*, and fruiting capsules of the plants are narrowly ellipsoid and not ellipsoid as in typical *M. psilonomma* and *M. sinomaculata*.

During the following day, Yoshida observed many flowering plants (*T. Yoshida* K97) resembling *M. sinomaculata* (*M. psilonomma*), but with shorter scapes, on open, rocky, limestone slopes, often on moss-covered thin earth beside the rocks, occasionally near the rock ledges, around Point E at 4,000 to 4,150 m elevation near the top of the main ridge of westernmost Die Shan. Most of the plants in this habitat had laterally facing, shallowly cup-shaped flowers (Fig. 9–10). A few of the plants had widely-opened or dish-shaped flowers with much shorter scapes (Fig. 11). The plants in this habitat had filaments scarcely

dilated or slightly dilated toward the base and radiating or loosely surrounding the ovary. No fruits were seen on 24 July. Despite the open habitat, the flowering season of this population was apparently later than that of *T. Yoshida* K96.

The ragged limestone outcrops of the main ridge of Die Shan around Point E appeared to be similar to the area at the head of Dayugou as described by Farrer and Rock. The habitat of the plants (*T. Yoshida* K96, K97) growing near Point E were located on the southwest or west facing steep slopes of westernmost Die Shan at the head of the Bailong Jiang (Chang Jiang) river system, whereas the supposed type locality of *M. psilonomma* marked D is located on the north side of easternmost Die Shan at the head of the Tao He (Huang He) river system. Point E is located some 50 km west of point D.

On alpine slopes in this region at the head of a tributary of Bailong Jiang, at 3,200 to 4,200 m elevation, Yoshida also found plants of *Gentiana spathulifolia* Maxim. ex Kusnez., *Aconitum gymnandrum* Maxim., *Parnassia oreophila* Hance, *Parnassia trinervis* Drude, *Primula gemmifera* Batal. var. *gemmifera*, *Delphinium pylzowii* Maxim. var. *trigynum* W. T. Wang, *Corydalis dasyptera* Maxim., *Androsace brachystegia* Hand.-Mazz., *Saxifraga tangutica* Engl., *Potentilla biflora* Willd. ex Schlecht. var. *lahulensis* Wolf, *Arenaria przewalskii* Maxim. and *Saussurea erubescens* Lipsch. Interestingly, many of these plants of northwestern China are rare or absent in Sichuan.

REDISCOVERY OF *MECONOPSIS LEPIDA* IN 2016

In 2016, one of us (Yoshida) explored the northwestern slopes of Leigu Shan, Dangchang Xian, which is open to foreign travelers, and on July 16 rediscovered *M. lepida* (Fig. 12–16) above a gulley near Yazitan (鸭子滩), at the point, 33°53'36"N, 104°19'20"E, alt. 3,500 m, marked B in Fig. 2. It is within 7 km northwest of the supposed type locality of *M. lepida*. Although one of type specimens, *R. Farrer* 123, bears 6 flowers in abnormal positions, the plants at this location have 1–4, often 2, bluish purple, half nodding flowers borne mostly on the upper half of the plant. They do not have basal flower buds. The flowers have pale yellow, elliptic or rounded anthers with incurved thecae and with broadened, membranous connectives at the center, as seen in Fig. 15. In these characters, *M. lepida* is distinctly different from the related *M. lancifolia*, which usually has basal flower buds, magenta purple petals and yellow or orange, short oblong anthers with straight thecae.

As described by Farrer, *Meconopsis lepida* at Point B also appears to prefer “the cooler westerly aspect” and “it is not found in the open turf, but often occurs at its fringes round the base and up the gullies of little limestone outcrops —,

not steadily abounding, but appearing in sporadic outbursts.”

Yoshida did not find *M. lepida* elsewhere on the accessible slopes in this region around Yazitan.

Meconopsis lepida grows among limestone rocks, near rock ledges and beside shrubs of *Rhododendron* L. on southwest-facing mossy slopes together with *Primula aerinantha* Balf. f. & Purdom, *Bistorta vivipara* (L.) S. F. Gray, *Hedysarum tanguticum* B. Fedtsch., *Cremanthodium* sp. and other herbs.

Around the foot of the gulley, large clumps of *Meconopsis quintuplinervia* Regel and *Allium chrysanthum* Regel grew in abundance, and *Fritillaria przewalskii* Maxim., *Corydalis curviflora* Maxim. ex Hemsl., *C. potaninii* Maxim., *Cypripedium guttatum* Swartz and other herbs were seen among shrubs of *Rhododendron* and *Spiraea* L. Although it was too early for the flowers, dense, pure colonies of *Chamerion angustifolium* (L.) Holub widely occupied southeast-facing slopes near grassy ridges around the foot of the gulley; such a large colony of *C. angustifolium* is not rare in the higher latitude regions of the northern hemisphere, but is rarely seen in the Sino-Himalaya region.

REDISCOVERY OF *MECONOPSIS PSILONOMMA* IN 2016

On July 20, 2016, Yoshida set off trekking from Zhagana toward the head of Dayugou with a local Tibetan guide and his friend who held the reins of a yak carrying their camping equipment. The guide knew the local plants of *Meconopsis* very well and promised to take Yoshida to the habitat of *M. psilonomma* at the head of Dayugou to see flowers as shown in photos of *R. Farrer* 255 and *J. F. Rock* 12613.

Most alpine meadows along the main ridge of Die Shan, including its northern side, belong to Diebu Xian, and are used for grazing yaks and sheep.

Zhagana is now becoming a center of tourism in Die Shan, with many guesthouses and hotels newly constructed or under construction. Most Tibetan people around Zhagana, who were once feared by Farrer and Rock, appear



FIGURE 7. *Meconopsis psilonomma* var. *zhaganaensis* T. Yoshida & H. Sun in fruit, at the type locality. Photograph by T. Yoshida, July 24, 2014, specimen preserved in T. Yoshida K96.



FIGURE 8. *Meconopsis psilonomma* var. *zhaganaensis* T. Yoshida & H. Sun, at the type locality. Photograph by T. Yoshida, July 23, 2014, specimen preserved in T. Yoshida K96.



FIGURE 9. *Meconopsis psilonomma* var. *calcicola* T. Yoshida & H. Sun, at the type locality. Photograph by T. Yoshida, July 24, 2014, specimen preserved in T. Yoshida K97.



FIGURE 10. *Meconopsis psilonomma* var. *calcicola* T. Yoshida & H. Sun, at the type locality. Photograph by T. Yoshida, July 24, 2014, specimen preserved in T. Yoshida K97.



FIGURE 11. *Meconopsis psilonomma* var. *calcicola* T. Yoshida & H. Sun, at the type locality. Photograph by T. Yoshida, July 24, 2014, specimen preserved in T. Yoshida K97.

to be peace-loving Buddhists. The two men accompanying Yoshida loved their land and gathered the lavish litter left by trekkers on the way to their destination.

They walked along the southern flank of Die Shan, then beyond the pass called Kalake (卡拉克) Yakou on the main ridge of Die Shan in a northern direction. On July 24, they finally reached their destination, the habitat of the solitary-flowered scapose blue poppy (Fig. 17–21). The habitat is not close to Tsari Khikha at the head of Xiaogou (小沟), the type locality of *M. psilonomma*, but is located around the pass called Donsari Khikha at the point, 34°18'12"N, 103°26'21"E, marked D in Fig. 3, on the dividing ridge between Dagou (大沟), the western tributary of Dayugou (大峪沟), and the eastern tributary of Kachegou (卡车沟). The Tibetan guide said that to reach the head of Xiaogou it would be necessary to wade across a stream, but at the time it was flooded and impassable due to the monsoon rains. He also indicated that the area was not part of their land.

On the way from Dzagana to Donsari Khikha along the southern flank of the main ridge composed of limestone outcrops, *Meconopsis integrifolia* (Maxim.) Franch. was in fruit without exception, and *M. punicea* Maxim. was also in fruit except for a few plants with large scarlet flowers waving like banners. Some plants of *M. racemosa* Maxim. were in fruit, whereas others on windblown scree near the ridge were in flower.

Point D is located some 15 km west-northwest of the supposed type locality of *M. psilonomma*, within the same valley-head of Dayugou. The blue poppy growing around Point D appears similar to the specimens of *M. psilonomma* collected at the type locality and considered to be typical plants of *M. psilonomma*, based on common features of the plants and the topography. Many features of *M. psilonomma* have been newly observed from living plants growing around Point D and from the dried specimens.

The majority of the plants of *Meconopsis psilonomma* in this region grow with *Ranunculus* L., *Potentilla* L., *Bistorta* Scop., *Anaphalis* DC., *Trigonotis* Stev., *Veronica* L., and other herbs on northwest-facing, partly moss-covered grassy slopes at around 3,750 m elevation. The slopes are scattered with dwarf shrubs of *Rhododendron* and *Salix* L. Some individuals of *M. psilonomma* grow close to the dwarf shrubs with their scapes protruding through the intricate canopy of the shrubs. The flora of the region around Donsari Khikha is poor in comparison with the area at Point E, as Rock mentioned about Thari Khikha, seemingly because of the drier climate and gentle topography around the passes.

Yoshida saw *Meconopsis psilonomma* only in the area around Point D, as did Farrer and Rock in the limited area around Tsari Khikha at the head of Xiaogou, and nowhere else.

In the region around Point D, some individuals of *Meconopsis psilonomma* were on the eastern slopes close to the grassy crest of the ridge of Donsari Khikha, but the majority of the population around Point D was on the western slopes. Many of the plants on both sides had already finished flowering and bore ellipsoid or obovoid fruits on erect scapes, but not a few plants still had flowers. The flowers were mostly cup shaped and usually facing laterally

or half nodding, but a few of the cup-shaped flowers were upright and appeared old. The filaments of the flowers were dilated in the lower half and tightly surrounded the ovary. A few flowers of the smaller plants were open, dish shaped and lateral facing or upright. The filaments of the dish-shaped flowers were sometimes scarcely dilated and loosely, not tightly, surrounding the ovary (Fig. 19). Farrer's specimen appears to be one such small plant. Other features of the plants were similar in appearance to *R. Farrer 255* and *J. F. Rock 12613*, and also to plants growing around Gonggaling and Point E.

The petals of *M. psilonomma* around Point D (Donsari Khikha), however, were pale purple or lavender purple and gradually deeper colored and bluish near the base and without a prominent blotch. The petals of *Meconopsis sinomaculata* (Fig. 22–26) and the plants around Point E (*T. Yoshida K96, K97*) were purple or deep purple and had a prominent dark purple blotch at the base. The anthers of *M. psilonomma* growing around Point D were dull yellow, as were those of *T. Yoshida K96* and *K97*, and not blackish purple as in *M. sinomaculata*. The fruiting capsules were mostly ellipsoid as in *M. sinomaculata* and *T. Yoshida K97* and not narrowly ellipsoid as in *T. Yoshida K96*.

Our collaborative studies of these plants have revealed that *M. sinomaculata* is a variety of *Meconopsis psilonomma*, as published by Hideaki Ohba in 2006, and the collections *T. Yoshida K96* and *K97* are also varieties of *M. psilonomma*.

Meconopsis lepida is characterized below with additional details of the features observed in the plants growing at Point A and the specimen, *T. Yoshida K108*, collected at that point.

Meconopsis lepida Prain, *Bull. Misc. Inform. Kew* 1915, No. 4: 158. 1915. TYPE: CHINA. S Gansu, Mountains of Thundercrown (Lei-go-shan), Siku Alps, 12–13,000 ft, June 1914, *R. Farrer 123* (Holotype: E; Isotypes: BM, K). Fig. 4, 12–16.

Synonym: *Meconopsis lancifolia* sensu Taylor, *The Genus Meconopsis* page 87. 1934, *pro parte*. *Meconopsis lancifolia* (Franch.) Franch. ex Prain subsp. *lepida* (Prain) Grey-Wilson, *The Genus Meconopsis—Blue poppies and their relatives*, p. 324. 2014.

Monocarpic herbs, 14–33 cm tall. Taproot dauciform or napiform, 4–7 cm long including slender extensions, 6–9 mm across, contracted at head. Entire plant sparsely or moderately covered with bristles, or sometimes glabrous; bristles rather narrow and weak, to 2.5 mm long, patent or retrorse on stem and rachis. Stem (below uppermost leaf) simple, 1–4 cm long, 1.5–3 mm across. Leaves crowded near base, petiolate; petiole membranous, linear, 1.5–6 cm long, 1–2 mm wide; lamina elliptic, narrowly ovate or oblanceolate, 1.5–6 cm long, 4–8 mm wide, base cuneate or attenuate, margin entire, apex obtuse or acute, both surfaces sparsely bristly or glabrous. Inflorescence shortly racemose, without basal flowers; flowers 1–4 (5), often 2, mostly on upper half of plant, ebracteate, half nodding, dish shaped or shallowly bowl shaped, 2.5–4.5 cm across; pedicel 2.5–7 cm long on terminal flower, 0.7–2.5 cm long on lateral flowers, warty toward apex, abruptly swollen at base of calyx; calyx 9–11 mm long; petals 6–9, violet, pale purple or bluish



FIGURE 12. *Meconopsis lepida* Prain. China, northwest side of Leigu Shan, Dangchang Xian, S Gansu, 3,500 m. Photograph by T. Yoshida, July 16, 2016, specimen preserved in T. Yoshida K108.



FIGURE 13. *Meconopsis lepida* Prain. China, northwest side of Leigu Shan, Dangchang Xian, S Gansu, 3,500 m. Photograph by T. Yoshida, July 16, 2016, specimen preserved in T. Yoshida K108.



FIGURE 14. *Meconopsis lepida* Prain. China, northwest side of Leigu Shan, Dangchang Xian, S Gansu, 3,500 m. Photograph by T. Yoshida, July 16, 2016, specimen preserved in T. Yoshida K108.



FIGURE 15. *Meconopsis lepida* Prain. China, northwest side of Leigu Shan, Dangchang Xian, S Gansu, 3,500 m. Photograph by T. Yoshida, July 16, 2016, specimen preserved in T. Yoshida K108.

purple, ovate, elliptic or narrowly obovate, 15–25 mm long, 6–14 mm wide, base cuneate, margin entire or serrulate near apex, sometimes wavy, apex obtuse or acute; stamens numerous, filaments filiform, similar to petals in color, 4.5–8 mm long, anthers elliptic or rounded, 1–1.4 mm long, 0.8–1.2 mm wide, thecae pale yellow, incurved, connectives surrounded by incurved thecae similar to thecae in color, tinged with brown after discharging pollen; ovary ellipsoid, 5–8 mm long, 2.5–4 mm across, sparsely or moderately bristly, or glabrous; style 1.5–2 mm long; stigma ovoid, 1–2 mm long, 0.7–1.5 mm across, 4–6 lobed. *Young fruiting capsules* narrowly ellipsoid; mature fruits unknown.

Distribution and habitat: CHINA. S Gansu: Zhouqu Xian and Dangchang Xian, around Leigu Shan (Thundercrown), 3,450–3,900 m; beside rocks and shrubs of *Rhododendron* L. (Ericaceae), near rock ledges, above tree line on more or less west-facing, semi shaded, steep, grassy slopes of limestone mountain; rooting in moss-covered humus.

Additional specimens examined : CHINA. S Gansu: above a gully near Yazitan, northwestern side of Leigu Shan

(Thundercrown), Dangchang Xian, 33°53'36"N, 104°19'20"E, alt. 3,500 m, July 16, 2016, T. Yoshida K108 (KUN, TI).

George Taylor (1934) included *Meconopsis lepida* in the conglomerate species *M. lancifolia sensu* Taylor. Christopher Grey-Wilson (2014) treated *M. lepida* as a subspecies of *M. lancifolia*. *Meconopsis lepida*, however, clearly differs from *M. lancifolia* (Franch.) Franch. ex Prain in the inflorescence, color, shape of thecae and other features as shown in Table 1.

Meconopsis psilonomma, including varieties, is characterized below with additional features observed in the field and herbaria. The type specimen, *R. Farrer* 255, is considered to be a late season, non-representative individual, flowering at a reduced stature, and, as mentioned, the original set of specimens was stolen, leaving only a water color drawing of the plant. Nonetheless, the Rock specimen (i.e., *J. F. Rock* 12613), collected at the same locality as the type collection, seemingly during the peak flowering season, is designated here as an epitype to compliment the holotype on which the drawing was based.



FIGURE 16. *Meconopsis lepida* Prain. China, northwest side of Leigu Shan, Dangchang Xian, S Gansu, 3,500 m. Photograph by T. Yoshida, July 16, 2016, specimen preserved in T. Yoshida K108.

TABLE 1. Comparison of major features separating *Meconopsis lepida* from *M. lancifolia*.

	<i>M. lepida</i>	<i>M. lancifolia</i>
Taproot	dauciform or napiform	Dauciform
Stem and rachis	Thinner, less hairy	Thicker, often densely or moderately hairy
Hairs	Narrower, shorter and weaker	Thicker, longer and harder
Lamina	Elliptic, narrowly ovate or oblanceolate, thinner and soft in texture, yellowish green and upper surface not glossy, margin flat, sparsely hairy or glabrous	Usually strap shaped, broadly linear or oblong, thicker and firm in texture, dark green and upper surface somewhat glossy, often wavy and incurved in the margin, moderately or sparsely hairy, rarely glabrous
Inflorescence	Short racemose, without basal flowers; flowers 1-4(-5), often 2, usually on upper half of plant	Racemose, usually with basal flowers; flowers (2) 3-7 (8)
Petal color	Usually bluish purple	Usually magenta purple
Pedicels	Warty toward apex	Rarely warty toward apex
Anthers	Elliptic or rounded	Short oblong
Thecae	Pale yellow, incurved	Yellow or orange, straight
Habitat	Less exposed to sunshine and wind; rooting in soft, wet soil covered with moss	Often in open and exposed to strong wind; rooting in drier soil mixed with gravel and roots of other plants

Meconopsis psilonomma Farrer, *Gard. Chron.* Ser. 3, vol. 57: 110. 1915. TYPE: CHINA. S Gansu, Min Shan, above Ardjeri, July 30, 1914, *R. Farrer* 255 (Holotype: K (lost); Isotype: E); S Gansu, Mt. Lissedzadza, 12,500 ft., July 7, 1925, *J. F. Rock* 12613 (Epitype: A; Isoepitypes: BM, E, K).

Monocarpic herbs, when in flower, 13–50 cm tall, when in fruit, to 60 cm tall. *Taproot* dauciform or narrowly napiform, 1–4 cm long, 0.6–1.3 cm across, contracted at head, distally extended with slender roots. Entire plant covered with bristles; bristles to 3(–4) mm long. Stem (below uppermost leaf) simple, 1–5 cm long. *Leaves* crowded near base of plant, petiolate; petiole membranous, broadly linear, 1.5–7.5 cm long, 1–3 mm wide; lamina oblong or oblanceolate or lowest small leaves obovate, 1.5–8 cm long, 0.5–2 cm wide, base attenuate, or occasionally cuneate in lowest leaves, margin entire, apex obtuse, acute or rounded, both surfaces moderately or sparsely hairy. *Inflorescence* scapose with solitary scapes and solitary flowers; scapes 2–7 mm across when fresh, 1.5–6 mm across when dried, densely retrorsely or patently bristly, hollow in larger plants. *Flowers* usually cup shaped, lateral facing or half nodding, occasionally dish shaped and lateral facing or upright in small plants, 3–7 cm across. *Calyx* 1.2–2 cm long, densely bristly. *Petals* 5–7(or 8), pale purple, lavender purple, purple or deep purple, deeper colored toward base, with or without prominent dark purple blotch, obovate, broadly obovate, rounded or elliptic, 2.5–7 cm long, 1.5–4 cm wide, base cuneate, margin entire, occasionally denticulate near apex, apex rounded or obtuse; large petals sometimes cut toward base. *Stamens* numerous;

filaments similar to or deeper than petals in color, 5–15 mm long, outer ones gradually shorter, at least inner ones dilated to 1.5 mm wide toward base, or all filaments scarcely dilated (var. *calcicola*); dilated part of filaments usually overlapping and tightly or loosely surrounding ovary; anthers oblong, 1.2–2.5 mm long, thecae dull orange, dull yellow or blackish purple. *Ovary* ellipsoid, 5–11 mm long, densely or sparsely bristly; style 2–4 mm long in flower, to 7 mm long in fruit; stigma clavate, 3–8 mm long, 3–7 lobed; lobes linear-oblong. *Fruiting capsules*, ellipsoid, obovoid or narrowly ellipsoid, 12–19 mm long, 5.5–12 mm across, bristly or occasionally glabrous, sometimes somewhat warty.

Distribution: China, S Gansu and N Sichuan, 3,400–4,150 m.

J. F. Rock 12613 was treated as *Meconopsis sinomaculata* by Grey-Wilson (2014). *J. F. Rock* 12613 is, however, considered to be typical *M. psilonomma*. It was collected at the type locality of *M. psilonomma* and is selected here as the epitype of *M. psilonomma* to complement the inferior type specimen already mentioned.

In his monograph, Grey-Wilson (2014: 308–312; photographs on pages 308–312) included plants on a hill near Huanglong (黄龙), northern Sichuan, in *M. psilonomma*. However, the flowers of the Huanglong plant are lateral facing and open flat in fine weather; the filaments are erect and tightly surround the ovary and the style; the outer filaments are similar to or a little shorter than the others at anthesis; the pistil is similar to or slightly longer than the stamens, which are much shorter than the petals, so

that the stigma is usually surrounded by the compact mass of anthers at the center of widely opened flowers. The flowers of *M. psilonomma* are usually cup shaped and lateral facing or half nodding even in fine weather; the outer filaments are gradually shorter; the pistil is longer than the stamens so that the stigma protrudes beyond the loose mass of anthers at anthesis. The Huanglong plants can be distinguished from *M. psilonomma* by these features.

Grey-Wilson (2014) compared the stamens of *Meconopsis psilonomma* with those of *M. henrici* in his monograph, p.311, as follows: in *M. henrici* all the

filaments are dilated in the lower half forming a distinct muff around the base of the ovary, while in *M. psilonomma* the filaments are less markedly dilated and affect only the outer stamens. In *M. henrici*, all the filaments are dilated in the lower half and form a distinct muff around the ovary, as he mentioned, but not only around the base of the ovary but, at least the innermost ones, around most of the ovary. In *M. psilonomma*, the outermost filaments are gradually shorter and sometimes hardly dilated, but the inner filaments are dilated and tightly surround most of ovary except in *M. psilonomma* var. *calcicola*.

KEY TO THE VARIETIES OF *MECONOPSIS PSILONOMMA*

- 1a. Petals pale purple or lavender purple, without prominent blotch at base; thecae dull orange var. *psilonomma*
- 1b. Petals purple or deep purple, with prominent dark purple blotch at base; thecae blackish purple, dull orange or dull yellow 2
- 2a. Thecae and style blackish purple var. *sinomaculata*
- 2b. Thecae dull orange or dull yellow; style pale green, sometimes tinged with purple 3
- 3a. Plants 30-55 cm tall in flower; flowers cup shaped; filaments slightly dilated toward base and tightly or loosely surrounding ovary var. *zhaganaensis*
- 3b. Plants 15-30 cm tall in flower; flowers shallowly cup shaped; filaments scarcely dilated or slightly dilated toward base, radiating or loosely surrounding ovary var. *calcicola*

***Meconopsis psilonomma* var. *psilonomma*.** (Fig. 5–6, 17–21).

Basionym: *Meconopsis henrici* Bur. & Franch. var. *psilonomma* (Farrer) Taylor, The Genus *Meconopsis* 81. 1934.

Usage synonym: *Meconopsis psilonomma* sensu Grey-Wilson, pro parte, The Genus *Meconopsis* – Blue Poppies and their relatives: 308 (2014).

Plants, when in flower, 15–40 cm tall, when in fruit, to 50 cm tall in fruit. *Scapes* 2.5–6 mm across when fresh, 2–5 mm across when dried. *Flowers* mostly cup shaped, lateral facing or half nodding, occasionally dish shaped and lateral facing or upright in small plants. *Petals* pale purple or lavender purple, gradually deeper colored and bluish near base, 3–4.5 cm long. *Filaments* dilated to 1.5 mm wide toward base, outermost filaments often scarcely dilated; dilated part of filaments, at least in inner ones, tightly surrounding ovary; thecae dull orange. *Style* pale green, 2–3 mm long in flower, to 5.5 mm long in fruit. *Fruiting capsules* ellipsoid or obovoid, 12–15 mm long, 8–11 mm across.

Distribution and habitat: China, S Gansu, Zhuoni Xian and Diebu Xian, eastern Die Shan, head of Dayugou valley, 3,500–3,800 m; on northwest-facing, rarely northeast-facing, partly moss-covered grassy alpine slopes near gentle grassy ridges of limestone mountains; scattered with dwarf shrubs such as *Rhododendron* and *Salix*; occasionally close to dwarf shrubs with scapes protruding through the intricate branches of the shrubs; rooting in gravelly humus.

Additional specimens examined: CHINA. S Gansu: Donsari Khikha at the head of Dayugou, Gansu Min Shan, Diebu Xian, 34°18'12"N, 103°26'21"E, alt. 3,750 m, July 24, 2016, *T. Yoshida K109* (KUN, TI).

Meconopsis psilonomma* var. *sinomaculata (Grey-Wilson) H. Ohba, J. Jap. Bot. 81(5): 296. 2006.

Basionym: *Meconopsis sinomaculata* Grey-Wilson, Plantsman, n. s., 1 (4): 221. 2002. TYPE: CHINA. N Sichuan, top of Gonggaling (Gonggan Len) between Jiuzhaigou Xian and Songpan Xian, 33°00'46"N, 103°42'53"E, 3,400–3,600 m, June 29, 2000, *SBQE 500* (Holotype: E; Isotypes: E, GB, HNWP, WSY). (Fig. 22–26).

Plants, when in flower, 28–50 cm tall, when in fruit, to 60 cm tall. *Scapes* 4–7 mm across when fresh, 3–6 mm across when dried. *Flowers* deeply cup shaped, lateral facing or half nodding. *Petals* purple or deep purple with prominent dark purple blotch at base, 4–7 cm long. *Filaments* dilated to 1.5 mm wide toward base, at least in inner ones tightly surrounding ovary, outermost filaments sometimes scarcely dilated; thecae blackish purple. *Ovary* tinged blackish purple around apex; style blackish purple, 2–4 mm long in flower, to 7 mm long in fruit. *Fruiting capsules*, ellipsoid, 12–17 mm long, 8–12 mm across.

Distribution and habitat: China, N Sichuan: Songpan Xian and Jiuzhaigou Xian, around Gonggaling, 3,400–3,750 m; south- and southwest-facing slopes with herbs and grasses and scattered shrubs of *Spiraea*, *Sibiraea* Maxim., *Potentilla*, *Salix* and *Rhododendron*; scapes occasionally protruding through branches of dwarf shrubs; rooting in gravelly humus.

Meconopsis psilonomma var. *sinomaculata* is the largest variety in stature and size of the flowers. The flowers sometimes appear to have a large dark purple eye in the center because the immature anthers, styles, upper ovaries, and base of petals are all dark purple.

Grey-Wilson (2014) included *J. F. Rock 12613*, collected in the eastern part of Die Shan, S Gansu, in *M. sinomaculata* Grey-Wilson. However, this specimen proves to be a typical



FIGURE 17. *Meconopsis psilonomma* Farrer var. *psilonomma*. China, Donsari Khikha, Diebu Xian, eastern Die Shan, S Gansu, 3,750 m. Photograph by T. Yoshida, July 24, 2016, specimen preserved in *T. Yoshida K109*.



FIGURE 18. *Meconopsis psilonomma* Farrer var. *psilonomma*. China, Donsari Khikha, Diebu Xian, eastern Die Shan, S Gansu, 3,750 m. Photograph by T. Yoshida, July 24, 2016, specimen preserved in T. Yoshida K109.



FIGURE 19. *Meconopsis psilonomma* Farrer var. *psilonomma*. China, Donsari Khikha, Diebu Xian, eastern Die Shan, S Gansu, 3,750 m. Photograph by T. Yoshida, July 24, 2016, specimen preserved in *T. Yoshida K109*.



FIGURE 20. *Meconopsis psilonomma* Farrer var. *psilonomma*, a flower with petals removed to show anthers and stigma. China, Donsari Khikha, Diebu Xian, eastern Die Shan, S Gansu, 3,750 m. Photograph by T. Yoshida, July 24, 2016, specimen preserved in *T. Yoshida K109*.



FIGURE 21. Dried fruits of *Meconopsis psilonomma* Farrer var. *psilonomma*. Photograph by T. Yoshida, based on T. Yoshida K 109.

plant of *M. psilonomma* var. *psilonomma* as previously mentioned. Grey-Wilson (2014) included SE Qinghai in the distribution of *M. sinomaculata*, but the plants in SE Qinghai resembling his *M. sinomaculata* appear to be another species that has unique scale-like hairs densely covering the ovary.

Additional specimens examined: CHINA. N Sichuan: on the western side of Gonggaling pass, Songpan Xian, 33°02'58"N, 103°41'42"E, 3,700 m, July 9, 2017, T. Yoshida K116 (KUN, TI).

Meconopsis psilonomma* var. *zhaganaensis T. Yoshida & H. Sun, var. nov. TYPE: CHINA. S Gansu, Diebu Xian, W of Zhagana, 34°15'27"N, 103°06'10"E, 3,700 m, July 23, 2014, T. Yoshida K96 (Holotype: KUN; Isotype: TI). (Fig. 7–8).

The proposed variety differs from variety *psilonomma* and variety *sinomaculata* in the narrowly ellipsoid fruit capsules to 7 mm across; it differs from var. *calcicola* in its taller stature and cup-shaped flowers.

Plants, when in flower, 30–55 cm tall in flower, when in fruit, to 60 cm tall in fruit. *Scapes* 2.5–5.5 mm across when fresh, 1.5–4.5 mm across when dried. *Flowers* cup shaped, lateral facing or half nodding. *Petals* purple with prominent dark purple blotch at base, 2.5–5 cm long. *Filaments* slightly dilated to 0.7 mm wide toward base, outermost filaments

sometimes scarcely dilated; tightly or loosely surrounding ovary; thecae dull orange or dull yellow. *Style* pale green sometimes tinged with purple, 1.5–3 mm long in flower, 2–4 mm long in fruit. *Fruiting capsules* narrowly ellipsoid, 14–19 mm long, 5.5–7 mm across.

Distribution and habitat: China, S Gansu, Diebu Xian, western Die Shan, 3,500–3,800 m elevation; usually among herbs and dwarf shrubs of *Potentilla* near the crest of southwest-facing, half shaded, partly moss-covered steep banks; rooting in wet humus covering rocks.

Meconopsis psilonomma* var. *calcicola T. Yoshida & H. Sun, var. nov. TYPE: CHINA. S Gansu, Diebu Xian, W of Zhagana, 34°16'14"N, 103°03'57"E, 4,050 m, July 24, 2014, T. Yoshida K97 (Holotype, KUN; Isotype, TI). (Fig. 9–11).

Meconopsis psilonomma var. *calcicola* differs from the other varieties in the shallowly cup-shaped flowers and from var. *psilonomma* in the petals with a prominent dark purple blotch at the base. It differs from var. *sinomaculata* in the dull orange thecae, and from var. *zhaganaensis* in its low stature.

Plants, when in flower, 15–30 cm tall, when in fruit, to 40 cm tall. *Scapes* 2–3.5 mm across when fresh, 1.5–2.3 mm across when dried. *Flowers* shallowly cup shaped, occasionally dish shaped, lateral facing or half nodding, rarely upright in small plants. *Petals* purple with prominent dark purple blotch at base, 3.2–4.2 cm long. *Filaments*



FIGURE 22. *Meconopsis psilonomma* var. *sinomaculata* (Grey-Wilson) H. Ohba. China, western side of Gonggaling, Songpan Xian, N Sichuan, 3,700 m. Photograph by T. Yoshida, July 9, 2017, specimen preserved in *T. Yoshida K116*.



FIGURE 23. *Meconopsis psilonomma* var. *sinomaculata* (Grey-Wilson) H. Ohba, flower opened by hand to show inside. China, western side of Gonggaling, Songpan Xian, N Sichuan, 3,700 m. Photograph by T. Yoshida, July 9, 2017, specimen preserved in *T. Yoshida K116*.



FIGURE 24. Fresh specimens of *Meconopsis psilonomma* var. *sinomaculata* (Grey-Wilson) H. Ohba. China, western side of Gonggaling, Songpan Xian, N Sichuan, 3,700 m. Photograph by T. Yoshida, July 9, 2017, specimen preserved in *T. Yoshida K116*.



FIGURE 25. Fresh specimens of *Meconopsis psilonomma* var. *sinomaculata* (Grey-Wilson) H. Ohba. China, western side of Gonggaling, Songpan Xian, N Sichuan, 3,700 m. Photograph by T. Yoshida, July 9, 2017, specimen preserved in T. Yoshida K116.

scarcely dilated, or slightly dilated to 0.7 mm wide toward base, radiating or loosely surrounding ovary; thecae dull orange. *Style* pale green, sometimes tinged with purple, 1.5–3 mm long in flower. *Fruit* not seen.

Distribution and habitat: China, S Gansu, Diebu Xian, western Die Shan, 4,000–4,150 m; on west- and southwest-facing rocky limestone slopes, often beside

rocks, occasionally on rock ledges, exposed to strong sun and wind, near the crest of the main ridge of westernmost Die Shan; rooting in shallow soil on rocks with other herbs, grasses and mosses.

Meconopsis psilonomma var. *calcicola* flowers in late July and probably until early August when most plants of other varieties have already finished flowering.

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FIGURE 26. *Meconopsis psilonomma* var. *sinomaculata* (Grey-Wilson) H. Ohba, erect fruit. China, western side of Gonggaling, Songpan Xian, N Sichuan, 3,700 m. Photograph by T. Yoshida, July 9, 2017, specimen preserved in *T. Yoshida K116*.

APPENDIX

Because of his pioneering work in exploring Gansu Min Shan, Farrer's map in his book (1926) is not precise in its topography, and the romanization of place names in the map and in the text often differ from their modern names and transliterations. Farrer's map is reprinted below (Fig. 27) with the type localities of *Meconopsis lepida* (A)

and *M. psilonomma* (C) marked. It is accompanied by a comparison table (Table. 2) giving place names on the map and their modern Chinese names. The table includes some additional place names used in Farrer's book (1926) and those used by Rock.

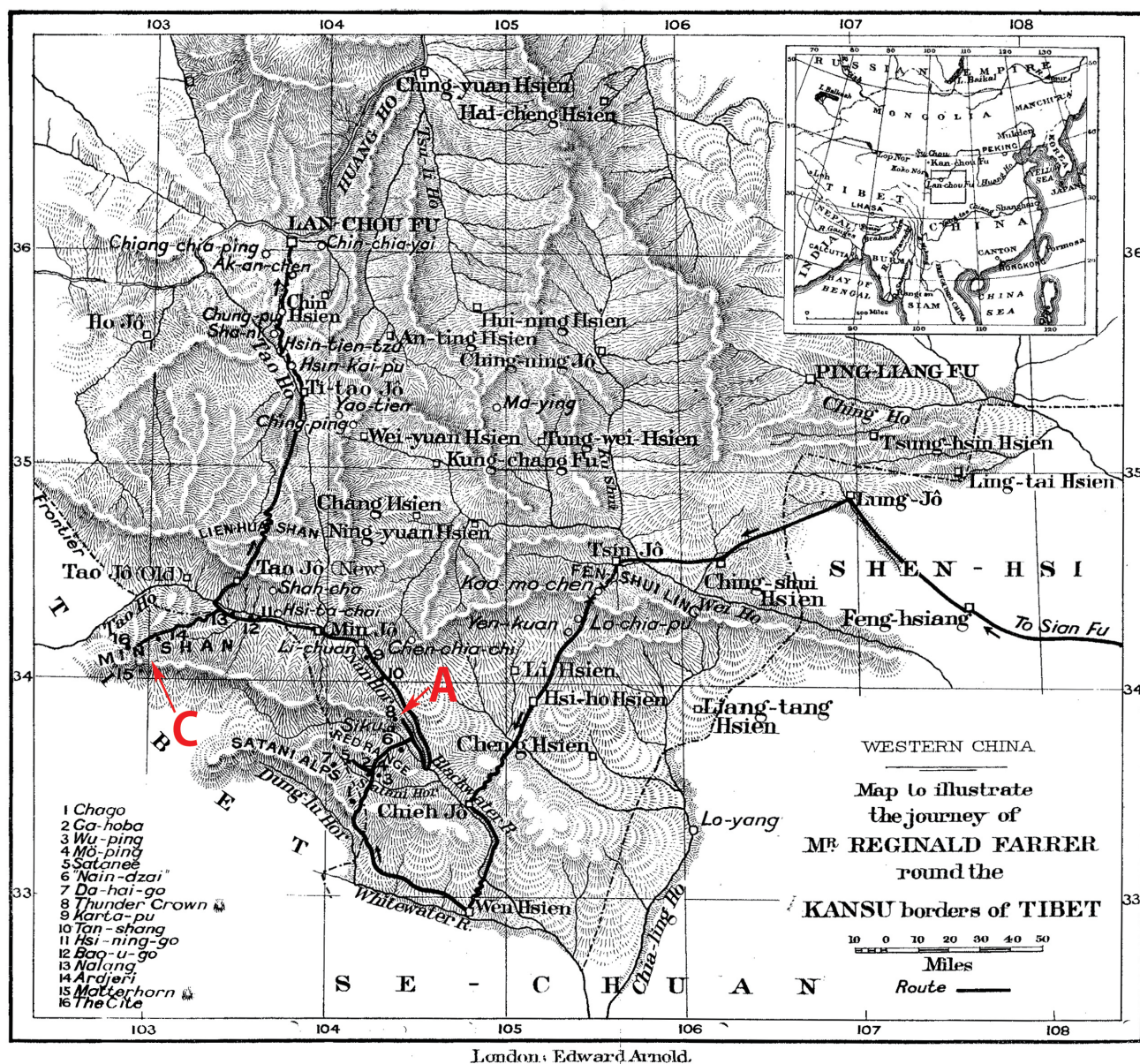


FIGURE 27. Map from Farrer (1926: at the end of volume 1). A, type locality of *Meconopsis lepida* Prain; C, type locality of *M. psilonomma* Farrer, both marked in red.

TABLE. 2. Comparison giving place names on the map and their modern Chinese names.

NAMES IN THE FARRER'S MAP		MODERN CHINESE NAMES	
N32-33, E104-105	Whitewater R.	白水江	Baishui Jiang
N32-33, E104-105	Wen Hsien	文县	Wen Xian
N32-33, E105-106	SE-CHUAN	四川	Sichuan
N32-33, E105-106	Chia-ling Ho	嘉陵河	Jialing He
N33-34, E103-104	Dung-lu Hor	中路河	Zhonglu He
N33-34, E104-105	3 Wu-ping	武坪	Wuping
N33-34, E104-105	5 Satanee	沙滩	Shatan
N33-34, E104-105	6 Nain dzai	南峪	Nan-yu
N33-34, E104-105	7 Da-hai-go	大海沟	Dahaigou
N33-34, E104-105	8 Thunder Crown	雷古山	Leigu Shan
N33-34, E104-105	Satani Hor	拱坝河	Gongba He
N33-34, E104-105	Siku (西固 Xigu)	舟曲	Zhouqu
N33-34, E104-105	Chieh Jô	武都	Wudou
N33-34, E104-105	Blackwater R.	白龙江	Bailong Jiang
N33-34, E105-106	Hsi-ho Hsien	西和县	Xihe Xian
N33-34, E105-106	Cheng Hsien	成县	Cheng Xian
N33-34, E106-107	Lo-yang	洛阳	Loyang
N33-34, E106-107	Liang-tang Hsien	两当县	Liangdang Xian
N34-35, E102-103	Tao Ho	洮河	Tao He
N34-35, E103-104	MIN SHAN (岷山)	迭山	Die Shan
N34-35, E103-104	12 Bao-u-go	博峪沟	Boyugou
N34-35, E103-104	13 Nalang	纳浪	Nalang
N34-35, E103-104	14 Ardjeri*	阿角	Ajiao
N34-35, E103-104	Tao Jô (OLd)	卓尼	Zhuoni
N34-35, E103-104	Tao Jô (New)	新城	Xinchuang
N34-35, E103-104	LIEN-HUA SHAN	莲花山	Lianhua Shan
N34-35, E103-104	Min Jô	岷县	Min Xian
N34-35, E103-104	Hsi-ta-chai	西寨 ?	Xizhai ?
N34-35, E104-105	Li-chuan	理川	Lichuan
N34-35, E104-105	Nan Hor	岷江	Min Jiang
N34-35, E104-105	9 Karta-pu	哈达铺	Hadapu
N34-35, E104-105	10 Tan-shang	宕昌	Dangchang
N34-35, E104-105	Chang Hsien	漳县	Zhang Xian
*Approaching route to 14 Ardjeri should be drawn more easterly, diverging from 12 Bao-u-go toward south, according to the text of the book Vol.II (p.138-191).			

TABLE. 2 CONT. Comparison giving place names on the map and their modern Chinese names.

NAMES IN THE FARRER'S MAP		MODERN CHINESE NAMES	
N34-35, E105-106	Li Hsien	礼县	Li Xian
N34-35, E105-106	Tsin Jô	天水	Tianshui
N34-35, E105-106	Ku Shui	苦水	Kushui
N34-35, E106-107	Wei Ho	渭河	Wei He
N34-35, E106-107	Ching-Shui	清水	Qingshui
N34-35, E106-107	Lung-Jô	陇县	Long Xian
N34-35, E107-108	Feng-hsiang	凤县	Feng Xian
N34-35, E107-108	SHEN-HSI	陕西	Shanxi
N34-35, E108-109	Sian Fu	西安	Xian
N35-36, E102-103	Ho Jô	临夏 ?	Linxia ?
N35-36, E103-104	Tao Ho	洮河	Tao He
N35-36, E103-104	Ti-tao Jô	临洮县	Lintao Xian
N35-36, E103-104	Hsin-tien-tzu	新添	Xintian
N35-36, E103-104	Chung-pu	中铺	Zhongpu
N35-36, E103-104	Ak-an-chen	阿干	Agan
N35-36, E104-105	Yao-tien	窑店	Yaodian
N35-36, E104-105	Ching-ping	庆坪	Qingping
N35-36, E104-105	Wei-yuan Hsien	渭源县	Weiyuan Xian
N35-36, E104-105	Nian-yuan Hsien	武山县 ?	Wushan Xian ?
N35-36, E104-105	An-ting Hsien	安定县	Anding Xian
N35-36, E104-105	Kung-chang (巩昌) Fu	陇西县	Longxi Xian
N35-36, E104-105	Hui-ning Hsien	会宁县	Huining Xian
N35-36, E104-105	Ma-ying	马营	Maying
N35-36, E105-106	Tung-wei Hsien	通渭县	Tongwei Xian
N35-36, E105-106	Ching-ning Jô	静宁	Jingning
N35-36, E106-107	PING-LIANG FU	平凉	Pingliang
N35-36, E107-108	Ching Ho	泾河	Jing He
N35-36, E107-108	Tsung-hsin Hsien	崇信县	Chongxin Xian
N35-36, E107-108	Ling-tai Hsien	灵台县	Lingtai Xian
N36-37, E103-104	LAN CHOU FU	兰州	Lanzhou
N36-37, E104-105	HUANG HO	黄河	Huang He
N36-37, E104-105	Ching-yuan Hsien	靖远县	Jingyuan Xian
N36-37, E104-105	Tsu-li Ho	祖厉河	Zuli He
N36-37, E105-106	Hai-cheng Hsien	海城	Haicheng

TABLE. 2 CONT. Comparison giving place names on the map and their modern Chinese names.

NAMES IN THE FARRER'S BOOK, VOL.II		MODERN CHINESE NAMES	
p.125	Mirgo Valley	木耳沟	Muergou
p.152	Main valley	小沟	Xiaogou
p.152	Wildest of all the ravines	大沟	Dagou
NAMES IN THE ROCK'S BOOK		MODERN CHINESE NAMES	
p.25	Kan-su	甘肃	Gansu
p.25	Ch'ing-hai	青海	Qinghai
p.25	Ssu-ch'uan	四川	Sichuan
p.25	Szechuan	四川	Sichuan
p.25	Min Shan	甘肃岷山	Gansu Minshan
p.25	Lien-hua Shan	莲花山	Lianhua Shan
p.27	His-ku (西固 Xigu)	舟曲	Zhouqu
p.27	Shih-men	石门	Shimen
p.28	Pai-lung Chiang	白龙江	Bailong Jiang
p.28	T'ao River	洮河	Tao He
p.29	Ch'e-pa kou	车巴沟	Chebago
p.29	Kuang-k'e La	光克拉	Guangke La
p.29	Cho-ni	卓尼	Zhuoni
p.29	K'a-cha kou	卡车沟	Kachegou
p.29	Ma-erh kou	木耳沟	Muergou
p.29	Po-yü kou	博峪沟	Boyugou
p.29	Ta-yü kou	大峪沟	Dayugou
p.29	T'ieh-pu (铁布)	迭部	Diebu
p.29	A-chüan (阿绢)	阿角	Ajiao
p.29	A-chüeh	阿角	Ajiao
p.29	Ta kou	大沟	Dagou
p.29	Hsiao kou	小沟	Xiaogou
p.30	Drag-gam-na	扎尕那	Zhagana
p.30	Yi-wa kou	益哇库	Yiwaku
p.33	The-wu	迭部	Diebu
p.69	Chan-chan-ni	占占	Zhanzhan
p.70	Cha-lieh	扎列	Zhalie
p.70	Ch'i-pu kou	地布沟	Dibugou