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中国紫堇属新分类群*

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NEW TAXA OF CORYDALIS FROM CHINA

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关键词 紫堇属, 新分类群

Key words *Corydalis*, New taxa

分类学

变根紫堇组——Sect. *Linstowianae* C.Y.Wu et Z.Y.Su, sect. nov. Fig.1.

Herbae perennes (?) radicibus palaribus perpendicularibus vestute tuberascentibus in parte medio, inferiore vel superiore. Folia biternata, Flores purpurascens usque rosei, calcaribus longitudine laminas subaequantibus, nectariis brevissimis ca. 1/5 calcaris partes aequantibus, stigmatibus quadratis 8-papillatis. Capsulae lanceolatae, seminibus biseriatis.

Typus sectionis: *C. linstowiana* Fedde

After strict onogenetic investigation of many Fumariaceae members, Ryberg (1960) came into an important conclusion that "in all members of the Fumariaceae growth begins with the formation of primary root of normal appearance, whatever may be their further development. It thus appear evident to me that the tap root forms the original stage from which other structures can be derived". As the onogeny of plant organs repeats its phylogenetic process, it seems reasonable to explain that the root of *C. linstowiana* occupies the intermediate position between tap root and tuber in the root evolution. If we consider all of its characters including flowers, stigma etc., it is perhaps closer to Sect. *Incisae*.

蔓生黄堇组——Sect. *Vermiculares* Z.Y.Su et Liden, sect. nov. Fig.2.

Herbae rupestres scandentes. Folia ternata. Racemi foliis oppositi. Bractae tripartitae longipetiolatae. Flores flavi, calcaribus laminam subaequantibus stigmatibus quadratis spice 4-papillatis. Capsulae lineari-oblongae, propter constrictionem inter semina velut vermiculares.

Typus sectionis: *C. vermicularis* Liden et Z.Y.Su

In the section, formerly only type species has been known from NW Sichuan (Dege). Recently, Liden has further proposed that *C. brevirostrata* closes to the type species by their large cup-like caruncles, and included them in a new section *Cupulares* Su et Liden ined. When Liden and I established the section, Prof. Wu Zheng-Yi maintained his point that the type species *C. vermicularis* is a special population of *C. latiloba* in humid circumstance. His opinion as an argument is written in *Flora Republicae Popularis Sinicae* (abbreviated to FRPS below). The argument of type species and the confusion of the section names will be

cleared up in the process of preparing the English version of FRPS. I have to publish the section, otherwise it will become a nomen nudum in FRPS.



Fig.1 Type of sect. *Linstowianae* C.Y.Wu et Z.Y.Su:
Corydalis linstowiana Fedde: 1. plant with a middle swollen part on the root; 2. young tap-root without any swollen part; 3. old root with an upper swollen part; 4. old root with a lower swollen part; 5. fruitful branch; 6. flower; 7. inner petals; 8. phalange with anthers; 9. gynoecium; 10. stigma.

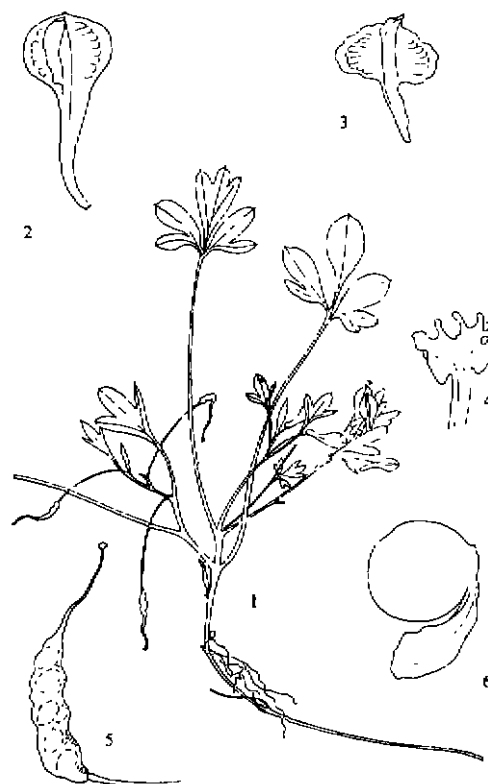


Fig.2 Type of sect. *Vermiculares* Z.Y.

Su et Liden: *Corydalis vermicularis*

Liden et Z.Y.Su in EDINB.

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1. plant; 2. upper petal; 3. lower petal; 4. stigma; 5. fruit; 6. seed with a caruncle.

甘南紫堇 新种

Corydalis sigmantha Z.Y.Su et C.Y.Wu sp. nov. Fig.3.

Affinis *C. potaninii* Maxim., sed foliis regulariter pinnatis, segmentis ovatis grosse serratis, floribus purpureis sigmoideis, petalis exterioribus apice emarginatis, cristis altioribus apicem superantibus facile differt.

Type: Zhugqu, SE Gansu, in alpine meadow, 3600 m, 1 Jul. 1964, Kuo Beng-Zhao 5230 (WUK holo)

Erect perennial herb with taproot which apically is clad with few scaly remnants of old cataphylls or leaves. Stems 40~50 cm long apparently axillary from a lax rosette of basal leaves, leafy along the upper part, un- or hardly branched. Basal leaves ca. 26 cm long, long-stalked, with 3~4 pairs of opposite distant

pinnae decreasing in size towards the apex; pinnae sessile coarsely serrated, the lowermost ones, ca. $4.5 \times 3 \sim 3.5$ cm. Cauline leaves like the radical, but short-stalked to stalkless with pinnae fewer and narrower. Racemes lax, many-flowered (10~15). Lowermost bracts like the upper leaves, ca. 3×4 cm, ternate to triparted with three ovate entire or slightly divided lobes; subsequent ones progressively becoming smaller and less divided; upper ones lanceolate entire; all longer than the 6~15 mm long slender pedicels. Flowers purple ca. 2.5 cm long, sigmoid. Sepals absent. Outer petals apically emarginate with broad wing and higher crest which protrudes beyond the apices of the petals. Upper petal with a 12×3 mm downwardly curved

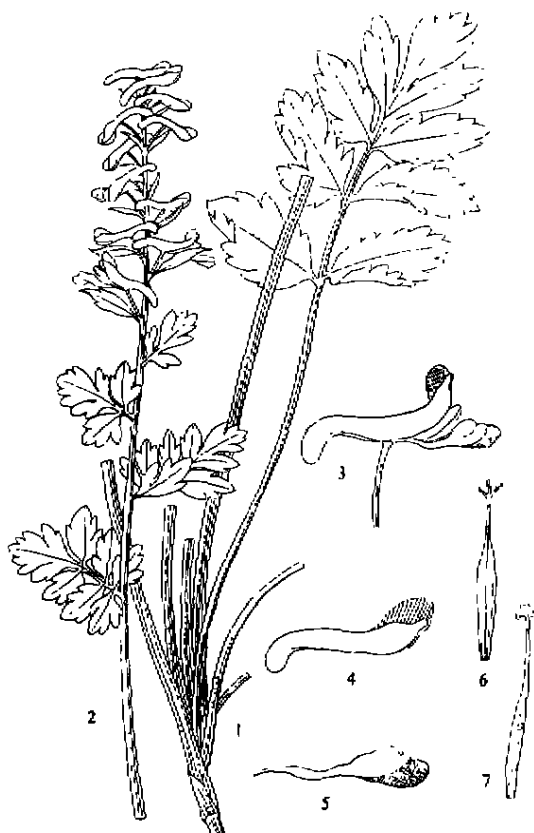


Fig. 3 *Corydalis sigmantha* Z.Y.Su et C.Y.Wu: 1. a fragment of plant with a basal leaf; 2. flowering branch with some leaves; 3. flower; 4. upper petal; 5. lower petal; 6. phalange with anthers; 7. gynoeceum with stigma



Fig. 4 *Corydalis meglosperma* Z. Y. Su et C. Y. Wu; plant.

spur and a nectary about $2/3$ as long as spur. Lower petal ca. 1.7 cm long abruptly constricted near the base. Inner petals ca. 1.5 cm long, each with a claw slightly longer than the lamina. Ovary linear with a long-style and a seriate ovules. Stigma subrounded with 8-papillae.

Distribution: Known only from the type collection.

假草黄堇 新种

Corydalis straminoides C.Y.Wu et Z.Y.Su, sp. nov.

C. densispicae affinis, sed floribus flavis apice purpurascens, petalis exterioribus denticulato-cristatis, margine crenatis. stigmatibus quadratis apice 4-papillatis facile differt.

Type: Shuo Xian, NE Xizang, 4000 m. in valley or under forest. 17 Aug. 1976, Tao De-Din 10952 (KUN-holo).

Perennial herb. Root and basal leaves absent. Stems ca. 40 cm long, leafy and branched along the upper part, downwardly attenuate. Cauline leaves short-stalked subtriangular bipinnate; ultimate lobes lacceolate ca. $10 \sim 15 \times 3 \sim 5$ mm. Terminal racemes ca. 5~7 cm, lateral ones ca. 3 cm long, densely many-flowered. Bracts lanceolate 8~10 mm long, entire, sometimes the lowermost ones more or less pinnate. Pedicels 6~10 mm long. Flowers yellow with the keels of the outer petals purplish. Sepals minute denticulate. Outer petals with crenate wings and denticulate crests. Upper petal 1.3~1.5 cm long, with a cylindrical spur as long as the lamina and a nectary $2/3$ as long as the spur. Lower petal ca. 7 mm long. Inner petals ca. 6 mm long. Stigma quadriangular with four apical papillae and two prominent basal lobes. Capsules sausage-shaped, $7 \sim 10 \times 2$ mm, more or less striate.

Distribution: Known only from the type collection.

大子黄堇 新种 小子黄堇(中国植物志)

Corydalis megalosperma Z.Y.Su, sp. nov. — *C. paucisperma* Z.Y.Su in FRPS ined. Fig. 4.

C. pachypoda (Franch.) Hand.-mazz. persimilis, sed racemis longioribus (in illa corymbosis), pedicellis brevioribus, capsulis oligospermatibus (solum 1 usque 2), seminibus conspicue majoribus facile differt.

Type: Zhongdian, W. Yunnan, 4200 m. in dishevelled screes. 2 Oct. 1986, Qian Zhi-Gang et Sun Hang 0989 (KUN-holo).

Perennial caespitose herb. Taproot ca. 9~10 cm long, apically with straw-like remnants of old petioles. Stems 10~20 cm long, axillary from the rosette of basal leaves, each with 1~2 leaves, simple or hardly branched. Basal leaves including broad sheathing petioles up to 10~15 cm long; laminae ca. 5×2 cm, oblong pinnate with 3~4 pairs of pinnae; pinnae about 1×1 cm, subsessile subopposite twice tripartite with subovate or obovate ultimate lobes $4 \sim 7 \times 2 \sim 4$ mm. Cauline leaves like the radical, but smaller, each bears a short but complanate petiole. Racemes rather lax, many-flowered, ca. 5 cm in flower, 9 cm long in fruit. Lower bracts 2~2.5 cm long, pinnate or leaf-like, upper ones becoming progressively smaller, entire, lanceolate. Pedicels ca. 1~2 cm in flower, erect, and 2.5~3 cm long in fruit, always downwardly curved. Flowers yellow with the keels of outer petals purplish. Sepals minute fimbriate. Outer petals narrowly crested. Upper petal ca. 2 cm long with a straight cylindrical spur 1.2~1.4 cm long and a nectary about $1/2$ as long as spur. Lower petal ca. 1 cm long. Inner petals ca. 8 mm long, apically brownish. Stigma quadrangular with four apical papillae and two basal lobes. Fruit obovate $8 \sim 12 \times 3 \sim 4$ mm, pendulous on the curved pedicel, only 1~2-seeded. Seeds subrounded ca. 2.5 mm long, smooth, each with a clavate caruncle.

Distribution: Known only from type collection.

As I have made a mistake in FRPS to use the hybrid epithet "*paucisperma*" for the new species as a nomen undum through an oversight, it is necessary to use another epithet "*megalosperma*" to substitute it in the present paper.

The new species is so similar to *C. pachypoda* (Franch.) Hand.-Mazz. that M. Liden has ever recognized it as an aberrant form of the latter. It can be distinguished from *C. pachypoda* by the long racemes, the smaller flowers and the fruits with fewer and larger seeds.

囊瓣延胡索 新种

Corydalis saccata Z.Y.Su, sp. nov. Fig.5.

C. kiautschouensis V. Poelln. affinis, sed petalis anticis late saccatis facile differt.

Type: Dagu mountain of Dandong (andong in former name), N Liaoning. 29 April, 1961, Zhao Da-Chang 25 (IFP-holo).

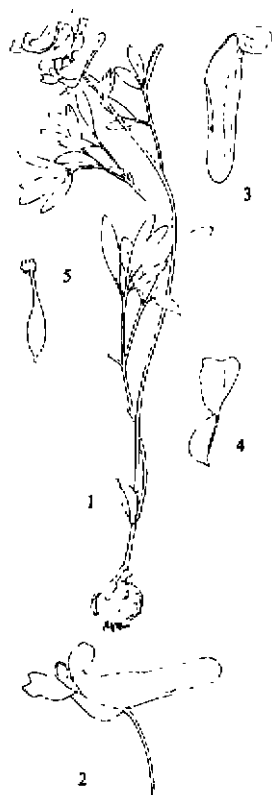


Fig 5 *Corydalis saccata* Z.Y.Su: 1. plant, 2. flower,
3. upper petal; 4. lower petal;
5. gynoecium with stigma.



Fig. 6 *Corydalis foliaceo-bracteata* C.Y.Wu et Z.Y.Su:
1. plant; 2. flower; 3. inner petals; 4. phalange with
anthers; 5. gynoecium with stigma.

Tuber globose ca. 8~15 mm long. Stems ca. 20 cm long, often unbranched, downwardly attenuate, leafy, with a scale-leaf along the lower part. Cauline leaves three, the lowermost one axillary from the scale leaf, others disposed the upper part, biternate; ultimate leaflets oblong-lanceolate ca. 15~20 × 3~6 mm, entire. Racemes slightly overtopping the leaves, 4-flowered, with a peduncle ca. 2.5 cm long. Bracts ovate-lanceolate ca. 5~7 × 3~4 mm, entire, the lowermost one sometimes apically denticulate. Pedicels slender, 6~12 mm long. Flowers bluish-purple. Sepals minute denticulate, often deciduous. Outer petals with emarginate limbs. Upper petal ca. 18~20 mm long with a recurved limb and a stout spur ca. 14 × 3~4 mm; nectary acuminate about 2/3 as long as spur. Lower petal 11~12 mm long, straight overtopping the upper petal, broadly saccate at base. Inner petals ca. 9 mm long. Ovary narrowly ovate with biseriate ovules and a slender style. Stigma subquadrate with apical four papillae and two twinned papillae at the decurrent base.

Distribution. Known only from the type collection.

Formerly the species was established by M. Liden and me in 1991, but recently he has changed his mind and insists that it should be put into *C. kiautschouensis* V. Poelln. s. l., a polymorphic species. As the variance of *C. kiautschouensis* often appears in the leaves and bracts, I believe that it is easily distinguished by its special lower petal.

叶苞紫堇 新种

Corydalis foliaceo-bracteata C.Y.Wu et Z.Y.Su, sp. nov. Fig.6

Species ad sectionem Incisae Fedde pertinens, sed foliis caulinis basi auriculato vaginatis, bracteis foliaceis petiolulatis, inflorescentiis paucifloris subcorymbosis, ad speciebus nobis notis bene distincta.

Type: Markam, N Sichuan "along the margin of forest", 2860 m, 20 May 1957, Li Xing 71084 (holo. SZ, iso, SM).

Caespitose herb with a short taproot ca. $10 \times 2 \sim 4$ mm, downwardly often branching into fibrous roots, apically providing with several stems which 10~40 cm long, leafy, often branched in the lower part. Basal leaves few, long-stalked, formed a lax rosette, often withered or absent in the adult. Cauline leaves biternate, 3~5, similar to the radical, but becoming smaller and more shortly stalked upwards; each bears a auriculate vagina at the base; the lower ones ca. 6 cm long with a lamina ca. 2×3 cm, slightly glaucous beneath; primary leaflets short-stalked with tree almost stalkless secondary leaflets which often deeply cleft into three ceneate lobes. Racemes subcorymbose densely 2~5-flowered. Lower bracts similar to the uppermost leaf, ca. 3.5 cm long including a stalk ca. 1.6 cm, biternate, upper ones gradually become smaller, short-stalked ternate to triparted. Pedicels 3~4 mm in flower, 5~15 mm long in fruit. Flowers ca. 11~14 mm long, pinkish with the keels of the outer petals darker. Outer petals mucronate ecristate. Spur of the upper petal about 6~8 mm long with a slender nectary $1/2$ as long. Lower petal 6~9 mm long with a broader lamina and a small basal pouch. Inner petals ca. 6~6.5 mm long. Stigma shallowly quadranguler with four apical paillae and two lateral pairs of geminate papillae. Capsules linear 1.5~2.5 cm long, with a row of seed.

Distribution and ecology: SE Gansu and NW Sichuan, along the margin of forest, in slope of mountains or in valley near streams, 1150~2860 m.

Additional specimens examined: Wenchuan, N Sichuan, "along the strea", 1900~1950 m, 16 Apr. 1987, You Hui-Zhong et Yang Ai-yue 438 (KUN), "in fissures of rock", 2750 m, 12 Jul. 1975, Sichuan Pl. Exped. 8272 (CDBI); Kangding, "in shrub forest", 3100 m, 24 Jun. 1980, Chen Ze-Ying et Liu Pei-Song 112936 (SZ); Wensian, S Gansu, "in valley", 1100 m, 30 Apr. 1960, Wang Tso Ping 1901 (HNWB).

With its stalked bracts, its subcorymbose inflorescens of 2~5 flowers and auriculate sheath of cauline leaves, the present species is not similar to any species in sect. Incisae, but superficially similar to *C. auriculata* Liden Z.Y.Su, a species from Tibet bearing auriculate sheath on the cauline leaves. In that species, however, the inflorescens racemose with 10~15 flowers, only lowermost bracts like the upper leaves, flowers "pale green" or "cream, fading to dull red", outer petals with crests but without mucronate and the fruit elliptic.

豌豆根紫堇 新种

Corydalis tuberi-pisiformis Z.Y.Su, sp. nov. Fig.7.

C. benecintae W.W.Smith affinis, sed tutere pisiformi, foliolis oblongis parvioribus, bracteis saepe divis, floribus parvioribus facile differt.

Type: Pingwu, N. Sichuan, 3500 m, in meadow 17 Jul 1978, Pingwu Exp. 473 (SM-holo)

Tuber globose as a pea in size. Stems ca. 20 cm long, leafy and branched along the upper part, with 1~2 scale-leaves on the downwardly attenuate lower part. Cauline leaves fleshy and glaucescent below, long-stalked ternate; lobes entire or slightly trilobed, the terminal one ca. $10 \times 4 \sim 6$ mm, short stalked, lateral ones more or less smaller, stalkless. Racemes corymbose 3~4-flowered, with a peduncle ca. 4 cm long. Bracts cuneate ca. $10 \times 5 \sim 6$ mm, entire or nearly divided. pedicels thin 2~5 cm long, always curved in fruit. Flowers purple with the keels of the outer petals darkened. Sepals subtriangular, ca. 2 mm long. Outer petals crested, with broad and sinus wing. Upper petal 2~2.3 cm long, with a thick spur ca. $13 \sim 15 \times 3 \sim 4$ mm and a nectary ca. 6 mm long. Lower petal ca. 11 mm long. Inner petals 7~8 mm long, each with a emarginate apex. Ovary elliptic with a long slender style. Stigma quadrangular, with four apical papillae.



Fig 7 *Corydalis tuberosiformis* Z.Y.Su: 1. plant, 2. flower; 3. sepal; 4. upper petal; 5. phalange with anthers; 6. gynoecium with stigma.



Fig 8 *Corydalis latiloba* var. *wumungensis* C.Y.Wu et Z.Y.Su: 1. plant with a elongate rhizoma; 2. young taproot; 3. flower; 4. upper petal; 5. lower petal; 6. inner petals; 7. gynoecium with stigma; 8. phalange with anthers.

Distribution: Known only from the type collection.

Superficially the new species bears a strong resemblance to *C. dajiangensis* and they share the same distribution, so that M. Liden had ever recognized them as the same species. But *C. dajiangensis* can be distinguished by the smaller flowers (1.2~1.5 cm long) with a shorter and slender spur.

乌蒙黄堇 新变种

Corydalis latiloba* var. *wumungensis C.Y.Wu et Z.Y.Su, var. nov. Fig.8.

A typo differt caulibus valde ramosis fastigiatis, foliis crassiusculis sine alto-pulveratis, racemis brevioribus lax paucifloris, petalis exterioribus cristatis, calcaribus brevioribus latioribusque, nectariis gracilioribus differt.

Type: Luqian, C. Yunnan, 1600 m, in fissures of limestone. Mao Ping-Yih 1814 (KUN-hlo; PE-Iso).

Distribution: C. Yunnan: Luquan, 2400 m, Y.Y.Hu 652354 (YM); Dongchuan, 2500 m, S.B.Lan 598 (PE); Nanhua, D.G.Lei s.n.(KUN).

西藏宽裂黄堇 新变种

Corydalis latiloba* var. *tibetica Z.Y.Su et Liden, var. nov.

A typo differt foliis omnibus basalibus paene pinnatis, caule brevissimo scapiformi efolcato, pedicellis crassioribus longioribus fructifere arcuato-decurvatis; a *C. pseudorupestris* differt foliis lobisque majoribus, pedicellis longioribus crassioribus, capsulis longioribus angustioribus, ca. 15~20×2 mm, (in illa 6×4 mm).

Type: Jomda, E. Xizang, 3200 m, in fissures of limestone. 28 Aug. 1976, Xizang Exp. 9912 (PE-holo).

Only one collection is known from type locality.

短萼黄堇 新种

Corydalis pseudorupestris Liden et Z.Y.Su, sp. nov. Fig. 9

C. latilobae affinis, sed caulibus brevissimis scapiformibus efoliatis, foliis basalibus bipinnatis, pinnis lobisque minoribus, capsulis multo brevioribus latioribusque longistylis, pedicellis brevioribus fructifere elongatis facile differt.

Type: Muli, SE Sichuan, 300 m, in fissures of limestone. 18 Jun. 1978, Xizang medicinal plant Exp. 175 (SM-holo).

Caespitose herb with a taproot and a rosette of basal leaves. Stems very short (ca. 3 cm long) leafless scapiform, apparently axillary from basal leaves. Basal leaves ca. 9 cm long with 3~4.5×1.5 cm bipinnate laminae; pinnae about 1 cm long, subsessile ternate to triparted, with three lobes ca. 4~5×2.5 mm, entire or slightly lobed. Racemes corymbose, dense 4~6-flowered. Bracts subovate ca. 2 mm long. Pedicels slender 5~8 mm in flower, elongating to 10~25 mm long in fruit. Flowers yellow suberect, with the keels of the outer petals purplish. Sepals minute, often absent. Outer petals narrowly crested with broad wings and apically mucronate. Upper petal ca. 12 mm long with a narrow spur ca 4 mm long. Lower petal ca. 8 mm long backwardly attenuate. Inner petals ca. 7 mm long, each with a crest projecting slightly beyond the tip. Stigma divaricate with two arms, each with two apical papillae. Capsules shortly oblong-ovate, ca. 6×4 mm, with styles ca. 6 mm long.

Distribution: Known from the type collection only.

Some new taxa in the paper are known from the type collection only or from very few specimens. In this case, it is easy to make errors of judgement. A recent comment from M. Liden informed me that "I am not sure what is best to do with these very variable species (viz. *C. pseudorupestris* Liden et Z.Y.Su, *C. latiloba* var. *wumungensis* C.Y.Wu et Z.Y.Su and var. *tibetica* Liden et Z.Y.Su). The problem is that there seems to be both a geographical variation and considerable plasticity. The plant we collected in the dragon fountain in Zhongdizn has flowered at last, and produced narrowly oblong capsules, in spite of the fact that the original collection had very short capsules. Therefore, I suspect that it might be the same with "pseudorupestris" from Muli, especially as recent collections from Muli contain mainly long-fruited and

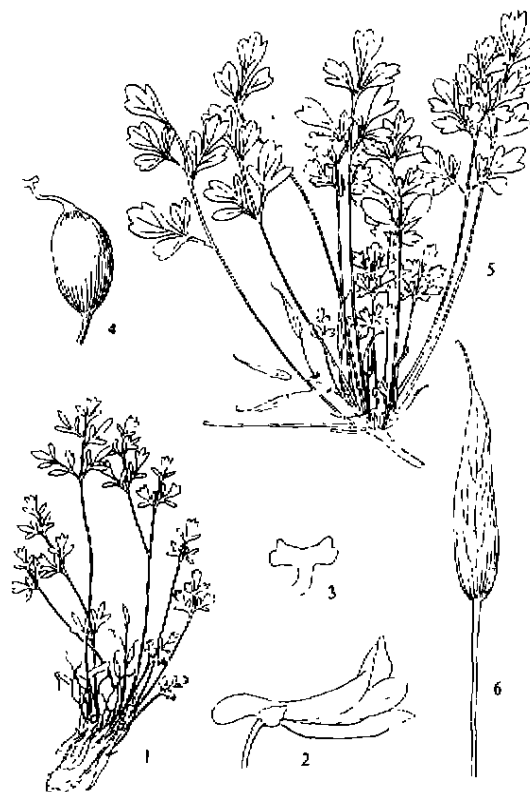


Fig.9 *Corydalis pseudorupestris* Liden et Z.Y.Su: 1. plant; 2. flower; 3. stigma; 4. fruit with a style; *Corydalis latiloba* var. *tibetica* Z.Y.Su et Liden: 5. plant; 6. fruit.

rather lax-growing specimens. Therefore, I think it is best to leave it unrecognized". Noteworthy, the taxa he criticizes here include those formerly established by us. This means that he will correct the errors unceasingly, when he finds the evidence enough to prove his conclusion being in wrong or in doubt. I admire his scientific thinking and intend to accept his advice, but I can't change my mind at once, because I have no chance to check up his specimens yet and they are involved in FRPS already before receiving his comment. I have to publish these taxa, otherwise they will become nomen nudum in FRPS and difficult to cite them as evidence for the further correction. There is no hiding the fact that the revision work of *Corydalis* in China is far from satisfaction in spite of so many efforts by us in the past twenty years. I would like to correct the errors I had made unceasingly, when I find the evidence enough to prove it being in wrong.