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Systematic revision of the *Aristolochia auricularia* group (*Aristolochiaceae*)

Abstract

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Within *Aristolochia*, the population cluster from S Anatolia (Turkey) morphologically characterized by a ± straight perianth tube and an expanded two-auricled limb has long been referred to one species, *A. auricularia*, from which a second one, *A. rechingeriana*, has been separated recently. Study of herbarium material has led to the recognition of four closely related species, here described and illustrated, the former two and two new ones: *A. geniculata* and *A. isaurica* .

Aristolochia auricularia Boiss. was originally described on the basis of a few flowering specimens from "Caria" (SW Asia Minor) having a straight perianth tube and a roundish-cordate, two-auricled limb (Boissier 1844). This character combination is very rare in Mediterranean *Aristolochia*, so that all the Turkish populations showing it were attributed to a single species by the most authoritative students of the genus in the Near East (Davis & Khan 1961, 1982). In fact the scant herbarium material named *A. auricularia* which is so far available bears witness of a remarkable heterogeneity among populations growing in the large area that encompasses the historical regions of south-western and south-central Anatolia (Caria, Pisidia, Lycia, Lycaonia, Isauria, Cilicia). The diversity concerns mainly phenotypic features, such as the shape and size of the different perianth parts, well-known as being diagnostic at species level within the genus. On such grounds a new species, closely allied to *A. auricularia*, has recently been recognized (Tan & Sorger 1987). A taxonomic treatment recognizing one undivided species can no longer be accepted; the Turkish populations combining an auriculate limb with a ± straight (or, rather, not U-shaped) limb are here regarded as belonging to an aggregate of four related species, well distinct on both morphological and geographical grounds.

Material and methods

This study has been based on several dried specimens of a few herbaria possessing most of the published material of "*Aristolochia auricularia*" (E, FI, FI-W, G, K). The treatment of *A. rechingeriana*, of which herbarium exsiccata are scarcely available, has been based chiefly on bibliographic data.

General terminology follows Stearn (1973), while morphological terms peculiar to the genus *Aristolochia* L. are defined as by Nardi (1984, 1991). In particular 'leaf blade' and 'petiole' are here used in their genuine sense, as anatomically defined, and contrary to the

interpretation of most authors who include under the term "petiole" the basal narrowly cuneate part of the blade, thus recording only "petiolate" leaves.

Original drawings by A. Maury (Florence) illustrate the text.

Results

Aristolochia auricularia group

Perennial herbs. Annual stems for the greater part underground, arising from a deep rootstock and ending above ground in rather short, branched, ± strigose leafy shoots. Leaves sessile to shortly petiolate, strigose on both sides; blades deltate to ovate-deltate, cuneate and cordate at the base, with rounded auricles. Flowers axillary, solitary, often paired with vegetative buds or young shoots; peduncles strigose, rather varying in length, longer than the respective petioles. Perianth utricle subglobose to ovoidal; tube straight to decidedly recurved, often at an angle of 90° (L-shaped), but never strongly recurved (U-shaped); limb expanded, abruptly much broader than the tube, concave, deltate to ovate, decidedly cordate at the base with two concave auricles ± stretching below over the tube, red brown to dark brown within, often mottled with yellow at the centre and/or at the throat. Ovary strigose.

1. Limb small (at most 13 x 12 mm), decidedly shorter than the tube (limb < 3/4 of tube); leaves large (wider than 26 mm), the largest ones much wider than long.....***A. isaurica***
— Limb larger (generally > 13 x 12 mm), longer to slightly shorter than the tube (limb > 4/5 of tube); leaves small (narrower than 26 mm), the largest ones not evidently wider than long.....2.
2. Tube geniculate, not widened towards the top; limb inside densely hispid in a large peripheral band.....***A. geniculata***
— Tube ± straight, gradually widened towards the top; limb inside almost glabrous to sparsely hispid, or densely hispid only in a very narrow marginal ring.....3.
3. Perianth smaller (< 41 mm long); tube moderately widened at the top (increase < 3 mm); limb smaller (< 24 mm long), ciliate to hispid within in a very narrow marginal ring.....***A. auricularia***
— Perianth larger (> 44 mm long); tube decidedly widened at the top (increase > 3 mm); limb larger (> 24 mm long), almost glabrous to sparsely hispid within.....***A. rechingeriana***

Aristolochia auricularia Boiss., Diagn. Pl. Orient. 5: 49. 1844 (Fig. 1) — Ind. loci: "Hab. in Cariâ interiori unde floriferam retulit Pinard aestate 1843, ego fructiferam in planitie Cariensi ad meridiem Cadmi sita Junio 1842 legi" (syntypes in G-BOIS). The lectotype is to be selected among Pinard's flowering specimens, as only they show the diagnostic features of the species. Duplicates of Pinard's original collection, completely agreeing with the protologue, are kept also in other Herbaria (FI!, FI-W!, G!, K!).

Rootstock elongated, cylindrical, 5-10 mm diam. Annual stems 5-10 cm long above ground, shortly branched. Leaves small, shortly petiolate, the lowest ones sometimes sessile; petioles (0-)1-6 mm long; blades acute to obtuse, 10-22 x 8-20 mm, increasing in fruiting plants. Flowers arranged at the axils of the lowermost leaves, the earliest ones arising from the first-formed, scale-like or reduced leaves; peduncles 2-20 mm long, the lowermost being longest. Perianth 25-40 mm long, reddish brown on the outside; utricle subglobose to ovoidal, 5-7 x 4-7 mm, almost glabrous outside; tube straight to slightly curved, 2-3(-4.5) mm diam. at the base, scarcely widened towards the top, 3-4(-6) mm

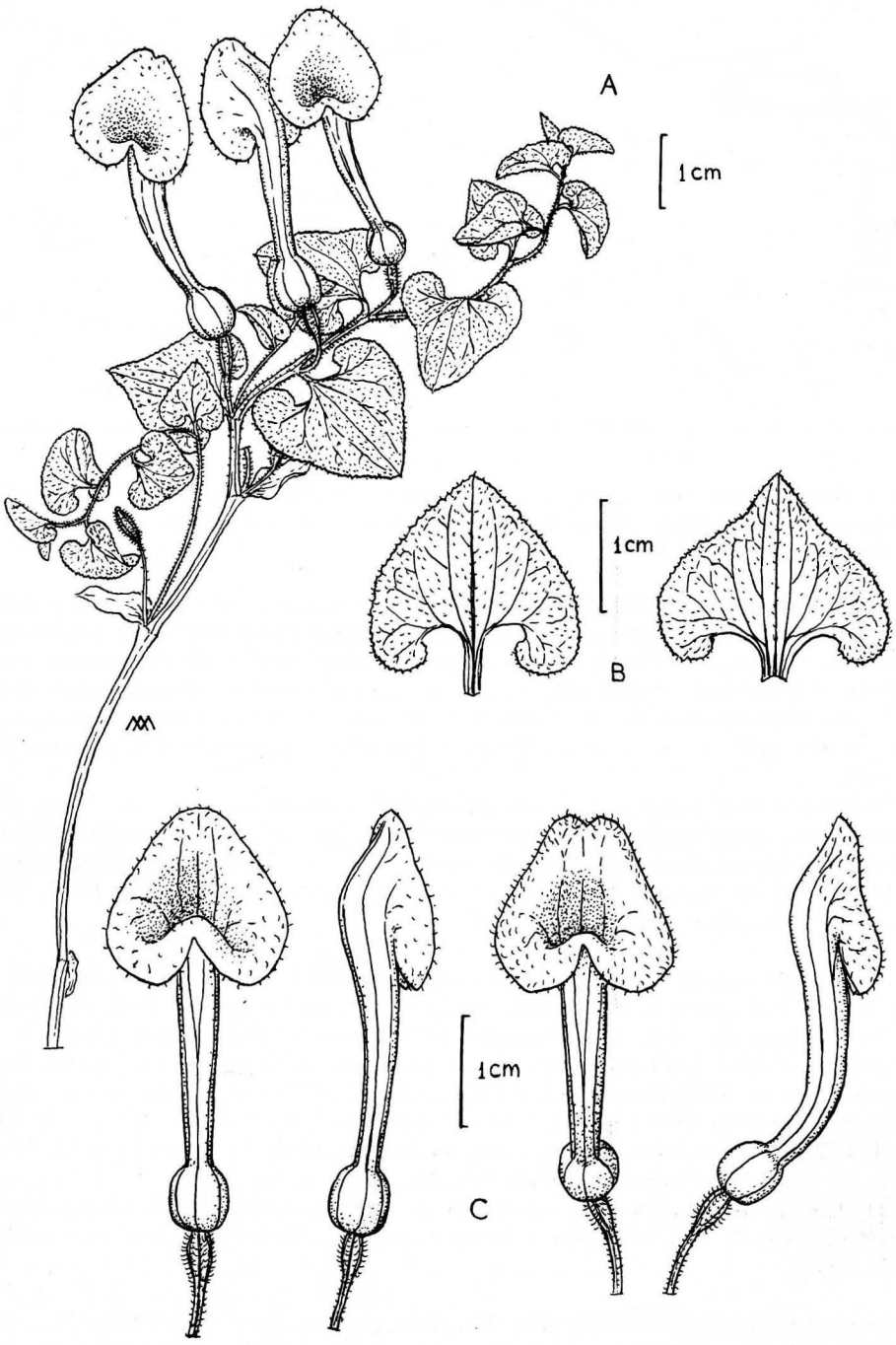

Fig. 1. *Aristolochia auricularia* Boiss. — **A**, habit; **B**, leaves; **C**, flowers.

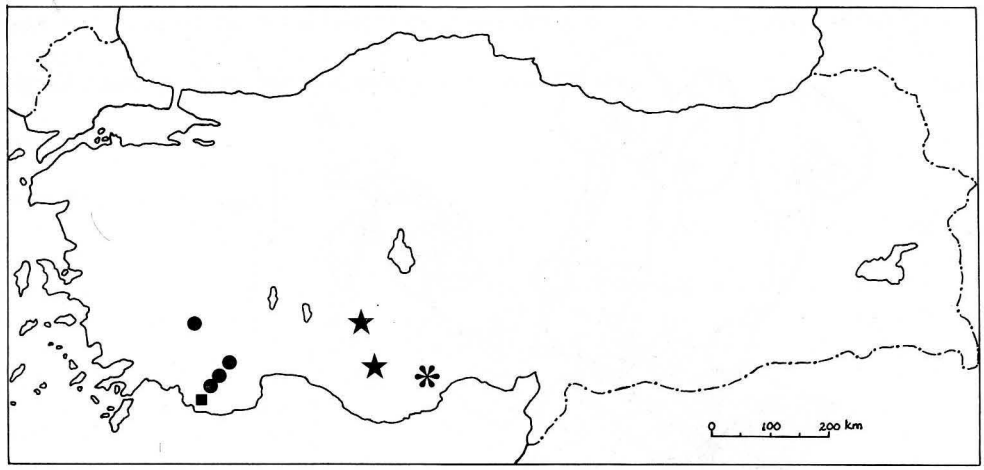

Fig. 2. Distribution of *Aristolochia auricularia* (dots), *A. rechingeriana* (square), *A. geniculata* (asterisk) and *A. isaurica* (stars). The locus classicus of *A. auricularia*, which cannot be accurately located, is not shown.

diam., 10-24 mm long, almost glabrous or sometimes with scattered minute hairs outside; limb deltate to broadly ovate, subequal to or moderately longer to slightly shorter than the tube (> 4/5 of it), 13-23 x 10-20 mm, obtuse to retuse, on the outside sparsely hispid with small white hairs, within almost ciliate to densely hispid in a marginal narrow ring (≤ 1 mm), almost glabrous in the larger central area and at the throat; auricles roundish, 4-8 x 4-8 mm, sparsely hispid inside. Ovary 3-5 mm long. Capsule almost globose, 30 x 28 mm.

Endemic to SW Anatolia (Caria, Pisidia, Lycia). *Aristolochia auricularia* seems to be the most widespread species of the aggregate (Fig. 2), probably for the simple reason that it is the best known among the little collected taxa of the group; even so, its knowledge is chiefly based on voucher specimens of the last century (see Boissier 1844, 1879, Duchartre 1864, Davis & Khan 1961, 1982).

Distribution vouchers. — C2 Denizli (?): Caria, 1843, *Pinard* (FI!, FI-W!, G!; K!; Duchartre 1864; Davis & Khan 1961, 1982); Caria interior, aestate 1843, *Pinard* (G-BOIS, syntype: Boissier 1844; Boissier 1879; Davis & Khan 1961, 1982). — C2 Denizli: In planitie Cariensi ad meridiem Cadmi, Jun 1842, *Boissier* (G-BOIS, fruct., syntype Boissier 1844; Davis & Khan 1961, 1982). — C2 Antalya: Lycia prope Elmalu, *Bourgeau* (Boissier 1879); Elmali, 14 Mai 1860, *Bourgeau 587* (fruct.: Davis & Khan 1961, 1982). — C2 Antalya: Elmali, along road to Korkuteli, dry, grey-red loamy, barren field, 30 Apr 1959, *Hennipman & al. 798* (K!; Davis & Khan 1982). — C2 Antalya: Akçay-Elmali, Weizenfeld 6 Km nach Akçay, 1000 m, 30 Mai 1962, *Huber-Morath 16636* (G!, fruct.). — C3 Antalya: Lycia, Stenez, s. d., *Forbes 552* (K!; Davis & Khan 1961, 1982).

Aristolochia rechingeriana Kit Tan & Sorger, Pl. Syst. Evol. 155: 101. 1987 (Fig. 3): Typus. — "C2, prov. of Antalya: south of Sinekcibeli geçidi, 1400 m s. m., 23 iv 1984, *Sorger & Kit Tan 84-17-2*" (holotype in "Herb. F. Sorger"; one broken flower seen: utricle 8 x 8 mm, tube straight, clearly dilated at the top, 25 mm long!). A hypothetical isotype was reported (Tan & Sorger 1987; Davis & al. 1988) as being kept

in RSA, but unfortunately it was not found in that Herbarium (Boyd in litt., 28 March 1991).

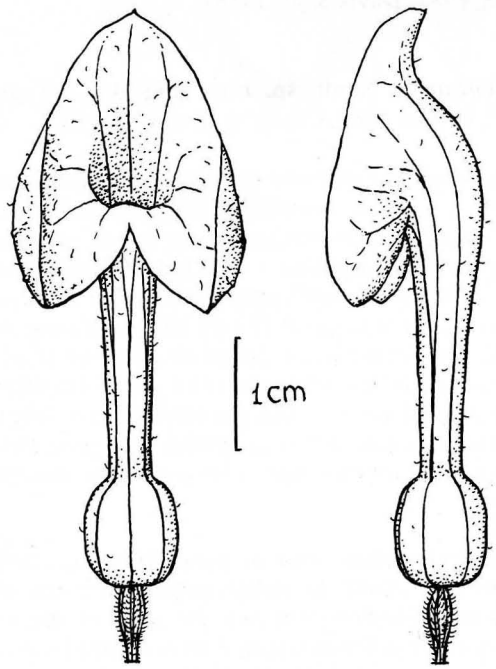

Fig. 3. *Aristolochia rechingeriana* Kit Tan & Sorger.— Flower (mottling on the limb inside not shown).

Rootstock elongated, cylindrical. Annual stems 5-10 cm long above ground. Leaves small, sessile or subsessile [originally: shortly petioled, with "petioles 2-4 mm"], acute to obtuse, 15-25 x 15-25 mm. Flowers with peduncles to 1.2 mm long. Perianth 45-60 mm long [originally: 50-70 mm]; utricle subglobose to ovoidal, 8-10 x 6-8 mm [originally: "10-12 x 8 mm"] ; tube straight to slightly recurved, 3-4 mm diam. at the base [originally: "4-5 mm broad"], decidedly dilated towards the top (7-8 mm diam.), 23-25 mm long [originally: 35 mm]; limb broadly ovate, subequal to or longer than the tube, 25-35 x 20-30 mm [originally: 30-40 x 20-35 mm], dark to purplish maroon with darker margin outside, sparsely pilose to subglabrous on both sides; auricles ± broadly obovate, 8-10 x 8-10 mm [originally: ca. 10 x 10 mm]. Ovary 5-6 mm long. Capsule unknown.

Endemic to SW Anatolia (Lycia). *Aristolochia rechingeriana*, found not far from the southernmost populations of *A. auricularia* (Fig. 2), is known only from the type gathering (Tan & Sorger 1987, Davis & al. 1988). It is really well-known only to its authors, since it is nearly impossible to study dried material of the species. The original description (Tan & Sorger 1987), later repeated unchanged (Davis & al. 1988), does not agree in some particulars with the only objective elements which I have seen, i.e. a single flower detached from the holotype (Sorger in litt. 15 April 1991) and the figures in the protologue (Tan & Sorger 1987: Fig. 3A, Aa). Some floral measurements, in the original description, appear to be overstated, and the leaf drawn in "'Fig. 3Aa" is clearly sessile not petiolate. But in spite of these discrepancies, the identity and distinctness of *A. rechingeriana* are not in doubt.

Distribution voucher. — C2 Antalya: South of Sinekcibeli geçidi, calcareous stony fallow ground, 1400 m, 23 Apr 1984, *Sorger & Kit Tan 84-17-2* (Herb. Sorger, holotype: Tan & Sorger 1987, Davis & al. 1988).

Aristolochia geniculata E. Nardi, **sp. nov.** (Fig. 4) — Typus: "C4 Içel: d. Mut, Mag ras Dag, 1200 m", 10 Mai 1965, *Coode & Jones 755* (K!).

Herba perennis, caulorhiza subterranea cylindracea, caulibus annuis aëriis brevibus, strigosis, foliis parvis, deltatis, sessilibus vel subsessilibus, strigosis, floribus praecocibus. Perianthium ad 60 mm longum, extra sparse minuteque puberulum, tubo geniculato sed propter geniculum angulum < 180° et ≥ 90° efformantem recto cylindraceo apicem versus haud dilatato ad 30 mm longo, limbo valde expanso concavo deltato vel late ovato basi biaurito ad 28 mm longo et 28 mm lato, intra atropurpureo atque in fascia marginali late circumcurrente dense hispidulo, in area centrali et ad fauces saepius flavo-maculatas subglabro, auriculis late obovatis intra dense hispidulis. Ab *Aristolochia rechingeriana* atque ab *A. auricularia*, a qua praeterea utriculo longiore floribusque saepe maioribus recedit, nostra praecipue differt perianthii tubo geniculato, apicem versus non dilatato, limbo intus in fascia marginali late circumcurrente dense hispidulo.

Rootstock elongated, cylindrical. Annual stems 10-15 cm long above the ground. Leaves small, sessile to very shortly petiolate; petioles 0-2 mm long; blades obtuse to retuse, 10-28 x 10-26 mm. Flowers borne in the axils of the lowermost leaves, the earliest ones arising from the first-formed, scale-like or reduced leaves; peduncles 4-25 mm long, the lowermost being longest. Perianth 35-60 mm long, greyish yellow and with scattered minute hairs outside; utricle ovoidal, 8-12 x 4-8 mm, violet brown inside; tube geniculate, i.e. abruptly bent like a knee in two straight portions forming an angle of < 180° and ≥ 90° (L-shaped), cylindrical, not gradually widened towards the top, 2-3.5 mm diam., 18-30 mm long; limb deltate to broadly ovate, subequal to or slightly shorter than the tube (> 4/5 of it), more rarely slightly longer, 18-28 x 15-28 mm, obtuse to retuse, densely hispid inside with small stiff white hairs arranged in a peripheral wide band (3-7 mm), almost glabrous in the central area and at the throat; auricles ± broadly obovate, 6-10 x 6-10 mm, densely hispid within. Ovary 3-6 mm long. Capsule unknown.

Endemic to south-central Anatolia (Cilicia). *Aristolochia geniculata* has so far been found on two mountains West from Mut (Fig. 2). A very poor dried specimen kept in E ("Karguçan, 250 m", 7 April 1980, *Renz & Taubenheim* !), having flowers with rather small limbs, appears to be closely related to the original populations of the species, growing at higher altitudes.

Distribution vouchers. — C4 Içel: Mut, Magras Dag, 1200 m, rough field with limestone blocks, 10 Mai 1965, *Coode & Jones 755* (K!, holotype); ibid., 11 Mai 1965, *Coode & Jones 755* (E!). — C4 Içel: Mut, Magras Dag, 1200 m, rough field with limestone boulders, 10 Mai 1965, *Coode & Jones 756* (E!; Davis & Khan 1982 as "*A. auricularia*). — C4 Içel: Mut, near summit of Adras Dag, c. 2000 m, 14 Mai 1965, *Coode & Jones 1007* (E!; Davis & Khan 1982 as "*A. auricularia*).

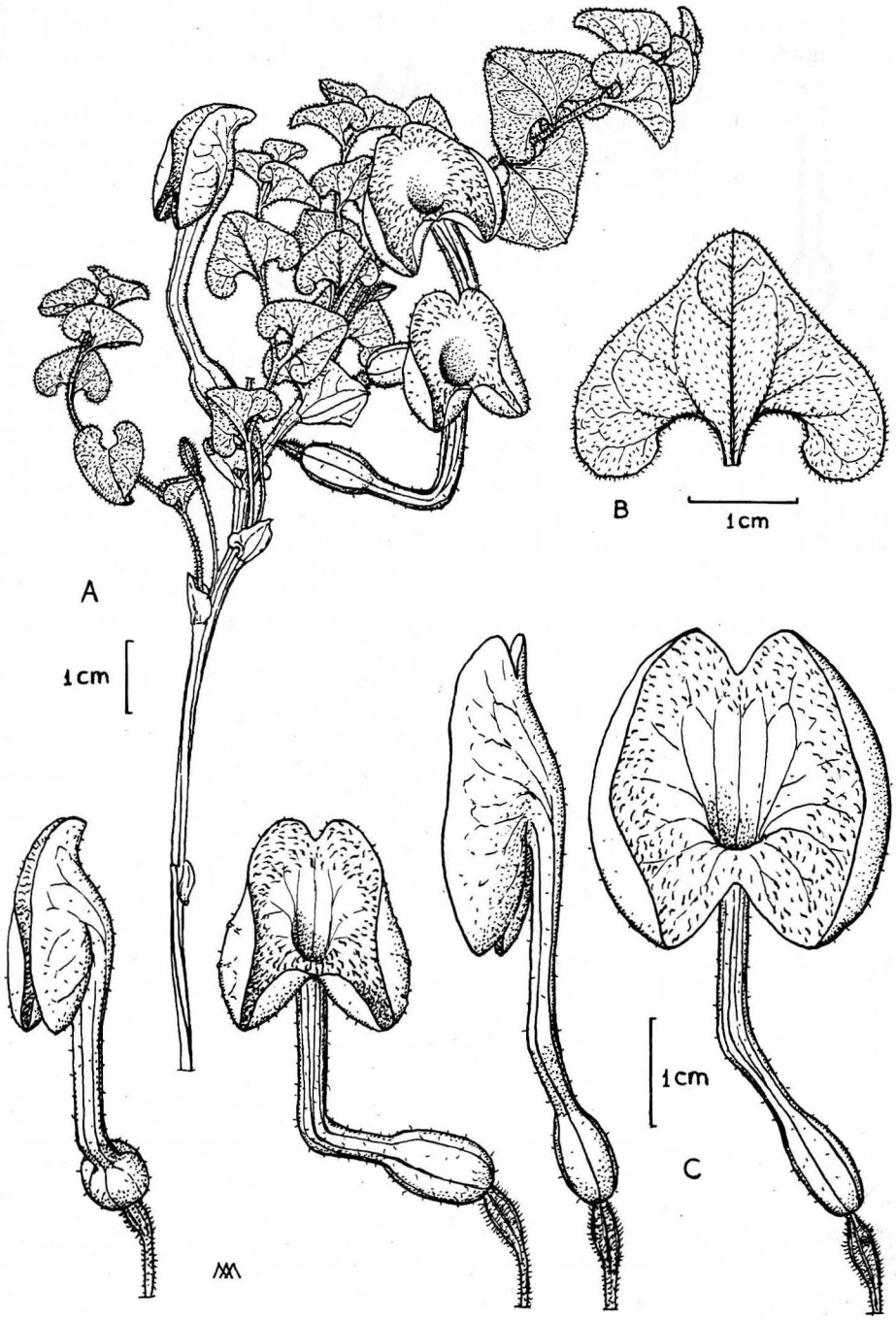

Fig. 4. *Aristolochia geniculata* E. Nardi. — **A**, habit; **B**, leaf; **C**, flowers (mottling on the limb inside not shown).

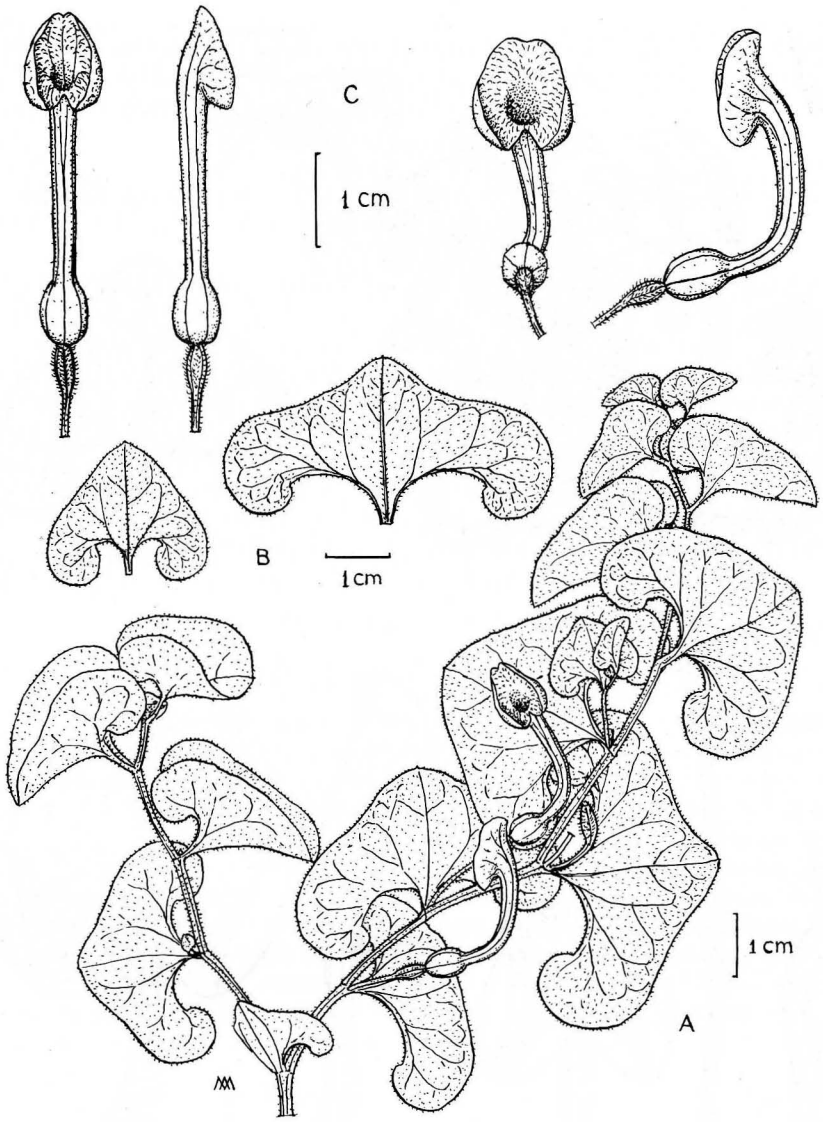

Fig. 5. *Aristolochia isaurica* E. Nardi.— **A**, habit; **B**, leaves; **C**, flowers (mottling on the limb inside not shown).

Aristolochia isaurica E. Nardi, **sp. nov.** (Fig. 5) — Type: "Lycaonien, Vilajet Konya, Hügerland 14 Km südlich Konya, 1100 m", 6 Jun 1948, *Huber-Morath 8769* (G!).

Herba perennis, caulibus annuis aëriis strigosis foliis moderate amplis late deltatis, saepe latioribus quam longioribus, sessilibus vel breviter petiolatis, strigosis. Perianthium extus sparse minuteque puberulum, tubo recto vel ad 90° curvato cylindraceo apicem versus haud dilatato, limbo parvo ad 13 mm longo et 12 mm lato, quam tubo

perspicue breviore, expanso concavo ovato basi biauriculato, intra atropurpureo atque in fascia marginali late circumcurrente dense hispidulo, in area centrali et ad fauces saepius flavo-maculatas subglabro, auriculis parvis rotundatis intra dense hispidulis. A ceteris speciebus *Aristolochiae auricularіae* gregis foliis latioribus atque perianthii limbo minore et quam tubo valde breviore in primis distinguitur. Differt praeterea ab *A. auricularia* et ab *A. rechingeriana* perianthii tubo apicem versus non dilatato, limbo intus in fascia marginali late circumcurrente dense hispidulo; et ab *A. geniculata* floribus minoribus, tubo haud geniculato.

Rootstock unknown. Annual stems 7-15 cm long above ground. Leaves rather large, sessile to shortly petiolate; petioles 0-5 mm long; blades kidney-shaped to very broadly deltate or ovate-deltate, the largest ones wider than long, rounded to obtuse, 16-32 x 26-52 mm. Flowers axillary, sometimes (abnormally) terminal on short, one-leaved branchlets; peduncles 3-8 mm long. Perianth 26-37 mm long, greyish yellow with scattered minute hairs outside; utricle subglobose to ovoidal, 4-7 x 3-4 mm; tube straight to decidedly curved to an angle of up to 90° in the lower half (L-shaped), cylindrical, not gradually widened towards the top, 2-2.5 mm diam., 17-20 mm long; limb small, decidedly shorter than the tube (< 3/4 of it), ovate, 10-13 x 8-12 mm, obtuse to retuse, densely hispid inside with small stiff white hairs arranged in a peripheral wide band (3-4 mm), almost glabrous in the central area and at the throat; auricles small, roundish, 3-4 x 3-4 mm, densely hispid within. Ovary 4-6 mm long. Capsule unknown.

Endemic to south-central Anatolia (Lycaonia, Isauria; Fig. 2).

Distribution vouchers. — C4 Konya: Lycaonia, Hügelrand 14 Km südlich Konya, Getreidefeld, 1100 m, 6 Jun 1948, *Huber-Morath 8769* (G!, holotype, Davis & Khan 1961, 1982, as "*A. auricularia*"). — C4 Konya: Isauria, Bozkir-Hadim, 54 Km nach Bozkir, Gök Çay Tal, Schiefer, 1200-1250 m, 15 Jun 1948, *Huber-Morath 8770* (G!; Davis & Khan 1961, as "*A. auricularia*, forma foliis latioribus"; Davis & Khan 1982, as "*A. auricularia*").

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