A Revision of the Chinese Species of Androsace, with Remarks on other Asiatic Species.

BY

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On account of my short publications concerning the Primulaceae collected by Dr. H. Smith in China* and some new Yunnan species†, Prof. W. W. Smith several months ago confided to me for revision the whole Chinese material of the genera *Androsace* and *Lysimachia* contained in the Edinburgh herbarium. It was indeed a pleasure to study this beautiful collection, but it led me much further than anticipated. When I formerly briefly described *Androsace rigida, mollis* and *euryantha*, it was to put an end to the mixing up of these very different plants under *Andr. Chamaejasme*. A more thorough study showed that there are also many more quite distinct species concerned, and that somewhat detailed keys stating the real differences of all the Chinese species must be worked out to facilitate their determination by botanists needing to determine a single specimen without material for comparison and unable to spend a long time studying these genera. For Knuth's keys‡ are not fitted for the purpose, as for instance, oppositions like "plantae robustae" to "plantae graciles" (l.c., p. 180–181) are too arbitrary; in many cases the most unreliable differences are used; in others species occupy places contradictory to the characters given in their diagnoses; and so have already led to many wrong determinations and superfluous descriptions of supposed novelties.

Besides the Edinburgh material I used several type specimens as well as the uncertain and undetermined ones from Kew, Paris, Berlin and Geneva (both Herb. Boissier and Delessert), and I express my best thanks to the directors of these herbaria for the loan of the plants in question. I have also to thank Dr. W. Mack (Vienna), who assisted me in drawing up several diagnoses, and M. Gagnepain (Paris) for information on and photos of types consisting of single sheets which are not lent out from there.

* See Acta Horti Gothoburgensis, II, p. 99 (1926).

† Sitzungsanzeiger d. Akademie d. Wissenschaften in Wien, 1923, p. 136 1924, p. 135, 200; 1925, p. 24, 145.

‡ in: Das Pflanzenreich, IV 237 (1905).

CLAVIS ANALYTICA SPECIERUM SINENSIUM.

1. *a.* Folia orbicularia vel ovata, uniformia, longipetiolata, basi cordata vel late rotundata vel truncata, saepe fissa. Scapus vel scapi plures aphylli umbelliferi e foliorum basalium fasciculo vel (interdum praeter tales) stoloniformes foliorum florumque verticillos saepe plures gerentes, vel stolonibus longis, herbaceis, supraterraneis, radicantibus additis. Flores albi vel rosei (Sect. *Pseudoprimula*) : 2.

b. Folia ovata vel obovata vel spathulata usque linearia, basi angustata sessilia, rarius cuneata petiolata, integra vel dentata. Scapus vel scapi plures umbelliferi* vel uniflori e foliorum rosula, raro e caule foliato erecto. Stolones, si adsunt, abbreviati, lignescentes, parcissime radicantes, cespites vel pulvinos formantes : 16.

2. *a.* Folia integerrima vel obscure undulato-crenata, subcoriacea, margine incrassata. Plantae perennes scapis erectis, estolonosae, brunnescenti articulato-pilosae (Subsect. *Mirabiles*) : 3.

b. Folia crebre crenata vel incisa : 4.

3. *a.* Folia ovata. Bracteae subulatae pedicellis sessili-glandulosis 2–3-plo breviores. Calycis 5-nervii lobi triangulares mucronati. Capsula calycis tubum aequans. Planta elata demissorum : **1. mirabilis.**

b. Folia orbicularia vel fere reniformia. Bracteae late ellipticae pedicellos brevistipitato-glandulosos aequantes. Calycis obscure nervati lobi rotundati. Capsula calycem totum aequans. Planta cespitosa parva alpina : **2. Graceae.**

4. *a.* Plantae singulares vel fasciculatae, rhizomate brevissimo nudo. Folia simplicia nec usque ad basin partita, lobulis ovatis vel latioribus. Bracteae parvae : 5.

b. Plantae humiles, pulvinato-cespitosae, rhizomatis ramis elongatis erectis petiolis emortuis rigidulis longe tunicatis. Folia fere ad basin trisecta partibus saltem lateralibus partitis. Bracteae conspicuae (Subsect. *Alchemilloideae*) : 15.

5. *a.* Folia cordato-orbicularia vel ovata, crenata vel dentata vel vix ad $\frac{1}{4}$ crenato-lobata. Scapi erecti vel demum procumbentes umbellas singulas† gerentes. Stolones nulli (Subsect. *Saxifragifoliae*) : 6.

b. Folia cordato-orbicularia vel reniformia, ad $\frac{1}{3}$ vel multo profundius lobata, sin autem minus, tum verticilli florum foliorumque plures superpositi vel plantae stoloniferae (Subsect. *Dissectae*) : 11.

* Cl. Knuth specimen certe abnormale *A. septentrionalis* umbellis 2 superpositis praeditum commemorat, ego tale cultum vidi *A. lactiflorae*. Umbellae tunc semper aphyllae.

† Cl. Forrest commemorat *A. saxifragifoliam* umbellis 2 superpositis praeditam.

6. *a.* Folia 20–65 mm. longa, si paulo minora, anguste cordata. Pedicelli 5–20 mm. longi. Calyx ad medium fissus lobis semper erectis. Corollae lobi obcordati. Capsula brunnea, truncata, calycis tubo inclusa : 7.

b Folia minuta usque ad 15 mm. longa, aperte cordata vel truncata, simpliciter crenata vel dentata. Pedicelli (saltem longiores) 10–40 mm. longi, tenuissimi. Calyx fructifer stellatim patulus lobis ovatis. Corollae lobi obovati, rotundati. Capsula albida, globosa : 10.

7. *a.* Petioli tenues. Folia cordato-ovata, membranacea, annotina rigidula, crenulata usque lobulato-crenata. Scapus elongatus pedicellique tenues. Calycis infra dimidium usque partiti lobi anguste ovati, obtusi, sub fructu lineari-oblongi. Corollae lobi profunde obcordati, lobulis angustis divaricatis. Indumentum subtilissime pulverulento-setulosum : **6. gracilis.**

b. Petioli crassi. Folia suborbicularia usque orbiculari-reniformia, herbacea vel rigidula. Calycis vix ad dimidium partiti lobi sub fructu immutati. Corollae lobi breviter obcordati, lobulis rotundis. Indumentum hirtum vel strigosum : 8.

8. *a.* Folia orbicularia vel reniformia, herbacea, ±grosse et saepe sublobato-bicrenata, sinu basali magno ultra ¼–ultra ⅓ laminae penetrante. Scapi validi, subreflexo (saepe brevissime) pilosi, foliis subbreviores usque subduplo longiores. Calycis lobi late ovati, triangulari-acuti, ubique laxe strigillosi : **3. Henryi.**

b. Folia nonnulla paululum longiora quam latiora, rigidula, simpliciter crenata, sinu basali parvo, non ultra ⅕ laminae penetrante. Scapi tenues. Calycis lobi subrotundato-obtusi : 9.

9. *a.* Folia crenata, subtus farinoso-pulverulenta et dense pilosa vel glabrescentia. Indumentum cinereum. Scapi erecti, foliis plus duplo usque sextuplo longiores, praeter basin patule villosam sicut umbellae inclusis calycibus breviter strigillosi et parce subsessili-glandulosi. Pedicelli scapis 6–10-plo breviores. Calycis lobi oblongo-ovati : **4. Paxiana.**

b. Folia sublobato-crenata, subtus parce hirsuta et hic illic pulverulenta. Indumentum ferrugineum. Scapi demum procumbentes, foliis paulo longiores, sicut umbellae et calyces patule hirti et dense subsessili-glandulosi. Pedicelli scapis 3–sub fructu 2½-plo breviores. Calycis lobi ovati : **5. kouytchensis.**

10. *a.* Radix annua (necnon biennis?). Scapus elongatus. Folia suborbicularia, late cordata vel ovata basi truncata, dense crenato-dentata vel dentata. Umbella 3–12-flora. Calyx fere ad basin fissus, lobis sub fructu ±auctis. Corolla conspicua. Indumentum breviter hirtellum, partim glandulosum : **7. saxifragifolia.**

b. Radix tenuis, perennans. Scapus brevissimus (var. **geophila**) vel elongatus. Folia reniformia, parce et grosse crenata. Umbella 2–5-flora. Calyx vix infra dimidium fissus lobis sub fructu immutatis. Corolla minutissima. Indumentum laxius, pilosum, glandulis raris : **8. Gmelini.**

11. *a.* Caules e rosula erecti vel procumbentes stoloniformes, usque ad 40 cm. longi, nec radicantes nec infiniti, verticillis 2–5, foliis normalibus, bracteis, floribus longipedicellatis constantibus. Folia orbicularia, profunde cordata, vix ad $\frac{1}{3}$ usque fere $\frac{1}{2}$ late crenato-lobata, lobulis anterioribus interdum bis trilobulatis vel tricrenatis, herbacea. Planta perennis praeter folia glabriora patule vel subdeflexo albo- vel sublateritio-velutina : **14. axillaris.**

b. Scapi erecti umbellis singulis bracteatis aphyllis terminati, pedicellis 6–14 mm. longis, setulis brevibus aut sursum aut deorsum curvatis strigillosis. Praeterea saepe stolones apice flagellares, usque ad 70 cm. longi, ad nodos sicut caules praecedentis foliatos floriferosque radicantes adsunt ; pedicelli eorum usque ad 75 mm. longi. Scapus interdum deest et stolones non radicant (var. **escaposa**). Folia orbiculari-reniformia, ad $\frac{1}{3}$–paulum infra $\frac{1}{2}$ late lobata, membranacea. Planta perennis indumento saepe multo parciore : **13. geraniifolia.**

c. Scapi erecti vel demum procumbentes umbellas singulas gerentes. Stolones aut nulli aut subaphylli nec floriferi. Folia ultra medium vel profundius partita : 12.

12. *a.* Pedicelli brevissimi, calyce non longiores. Planta estolonosa longius breviusve dense hirsuta. Scapi foliis duplo vel pluries longiores : **9. dissecta.**

b. Pedicelli calycibus pluries longiores. Scapi folia paulo vel non superantes : 13.

13. *a.* Stolonifera, stolonibus plurimis filiformibus. Petioli 10–25 cm. longi. Scapi filiformes. Pedicelli $2\frac{1}{2}$–6 cm. longi : **12. cuscutiformis.**

b. Estolonosae. Petioli $1\frac{1}{2}$–6 cm. longi. Pedicelli 5–20 mm. longi : 14.

14. *a.* Foliorum segmenta triloba lobulis mediis obovatis, lateralibus ovatis integris vel his unidentatis. Planta praesertim inferne longipilosa. Corollae lobi lati, paulum emarginati : **11. Gagnepainiana.**

b. Foliorum segmenta trifida lobulis trilobulatis vel tridentatis. Planta brevissime pubescens. Corollae lobi angusti, bilobuli (e descriptione) : **10. sutchuenensis.**

15. *a*. Planta dense subsessili-glandulosa et articulato-pilosa. Folia 3–5 mm. longa, lobo terminali trilobulato, lobulis omnibus ovatis. Bracteae lanceolatae, pedicellis tenuibus subtriplo–plus quadruplo breviores : **15. Wilsoniana.**

b. Planta brevissime hirtella. Folia maiora, lobis usque ad rhachin dissectis, lobulis lanceolatis vel linearibus. Bracteae pedicellis validiusculis plus duplo breviores usque subaequilongae, ellipticae, una alterave trifida : **16. alchemilloides.**

16. *a*. Scapus umbellifer, raro (e Maximovicz) flos unicus longipedicellatus caule erecto crebre foliato interdum ramoso apicalis praetereaque saepe scapi umbelliferi vel pedicelli uniflori eius foliis axillares. Planta ☉, certe etiam ☉. Flores albi vel rosei (Sect. *Orthocaulon*) : **47. erecta.**

b. Scapus vel scapi plures aphylli (rarissime cum folio uno alterove) umbelliferi vel uniflori (tunc brevissimi) e foliorum rosula : 17.

17. *a*. Plantae ☉ (vel saltem monocarpicae), radice valido, rosula vel rosulis paucis mox foliis mortuis permultis cinctis. Folia omnia aequalia, coriacea, spathulata, evaginata, integra, cartilagineo-marginata et dense pectinato-ciliata. Scapi saepe multi, elongati, umbelliferi. Flores rosei vel coccinei (Sect. *Aizoidium*) : 18.

b Plantae ☉ vel ☉ minute puberulae foliis herbaceis ellipticis vel lanceolatis vel obovato-lanceolatis saepe dentatis, vel ♃ rhizomate pluricipite* vel longius ramoso vel stolonifero repentes vel cespitosae vel pulvinatae (Sect. *Chamaejasme*) : 19.

18. *a*. Calyx basi mox truncatus, totus dense setulosus, sub fructu paulum sulcatus, lobis triangularibus, basi latis, margine praesertim inferne breviter et molliter barbatulis. Bracteae 3–5 mm. longae. Indumentum totum brevius, hispidulum : **17. integra.**

b. Calyx basi acutus, laxius pilosus, levis, lobis breviter oblongis rotundatis, basi angustis, margine toto longe et rigidiuscule barbulatis. Bracteae 4–9 mm. longae. Indumentum totum longius, hirsutum : **18. Bulleyana.**

19. *a*. Plantae ♃, rhizomate pluricipite vel longius ramoso vel stolonifero repentes vel cespitosae vel pulvinatae, multae heterophyllae, scapis e rosulis singulis, raro usque ad 6, umbelliferis vel unifloris et tunc brevissimis (Subsect. *Euchamaejasme*) : 20.

b. Plantae ☉ vel ☉, e radice vel radicibus fasciculatis simplicibus singulares etsi rosulis interdum compluribus, brevissime stipitatis, in unam congestis, saepe multiscaposae. Folia omnia aequalia, evaginata. Scapi elongati, umbelliferi, saepe multi. Flores albi vel rosei (Subsect. *Andraspis*) : 43.

* Incomplete quidem collectum facile rhizoma nec radix esse cognoscitur.

20. *a*. Folia* dimorpha vel trimorpha, foliis cuiusque rosulae exterioribus quam interiora saltem conspicue brevioribus vel magis sessilibus et vaginatis, plerumque autem forma indumentoque valde diversis, sin minus, rigidule mucronatis vel ciliatis : 21.

b Folia omnia aequalia vel rosularum interiora exterioribus paulo breviora et saepe multo pilosiora, nunquam cartilagineo-mucronata nec rigidule ciliata. Plantae pulvinatae, floribus albis vel roseis : 39.

21. *a*. Folia cartilagineo-apiculata vel longe mucronata. Flores rosei : 22.

b Folia rotundata vel obtusa vel acutiuscula, non mucronata. Plantae umbelliferae, raro scapo uno alterove unifloro : 25.

22. *a*. Folia valde dimorpha, exteriora ovata, saepe fere ad spinas reducta, interiora multoties maiora, late linearia usque obovata. Scapi longi, validi, umbellas multifloras densas vel desissimas gerunt. Planta singularis vel dense cespitosa, tota dense et breviter strigilloso-hirta : **39. spinulifera.**

b. Folia paulum vel non dimorpha, glauca, exteriora spathulata usque linearia. Scapi brevissimi uniflori vel longiores umbelliferi. Plantae subglabrae vel ciliatae vel pilosulae : 23.

23. *a*. Scapi foliis duplo vel pluries longiores, umbelliferi†, pedicellis patulis. Folia subaequalia vel distincte dimorpha, interiora obovato-lanceolata, exteriora spathulata, pilosa vel (var. **tibetica**) margine tantum ciliata. Calyx herbaceus, pilosus, lobis latis, triangulari-ovatis, obtusis usque rotundatis. Surculis ad nodos tantum foliatis laxe vel dense cespitosa : **29. Mariae.**

b. Scapi folia non superantes, 1–4-flori, pedicellis erectis. Folia lanceolata vel linearia, exteriora paulo breviora, marginibus inferioribus ciliis serius brunnescentibus villosis. Calyx subcoriaceus, striis membranaceis e sinubus decurrentibus, lobis angustis, ovato-oblongis, acutiusculis vel obtusis. Surculis imbricato-foliatis pulvinatae : 24.

24. *a*. Folia linearia vel (var. **decipiens**) elliptico-lanceolata, ciliata vel ciliato-denticulata, ciliis serius saepe deciduis, praetereaque saepe ut calyces parce subsessili-glandulosa. Flores 1–4, pedunculati. Calyx parce strigillosus, lobis ciliolatis. Planta dense vel (var. **decipiens**) profunde et laxe cespitosa : **31. longifolia.**

* inclusis cataphyllis vel squamis gemmae. Folia interiora sub anthesi interdum nondum plane expansa exterioribus amotis reperiuntur.

In *A. Mariae*, *brachystegia* and *yargongensis* the heterophylly is often suppressed. These are placed under *a* on account of their leaves being either mucronate or rigidly ciliate. The same is the case with *A. longifolia*, the heterophylly of which is but very slight. It is also so slight in *A. euryantha* and *incana* that they can be found by searching in this key under *a* as well as under *b*.

† unus alterve abnormalis tantum abbreviatus uniflorus.

b. Folia lineari-lanceolata, ut calyces subsessili-glandulosa, ceterum praeter vaginas glabra. Flores singuli, subsessiles. Calycis lobi marginibus villosuli. Planta dense pulvinata: **32. alaschanica.**

25. *a.* Folia valde dimorpha, interiora lanceolata usque spathulata, 7–30 mm. longa, saltem subtus dense et brevissime setulosa et brevistipitato-glandulosa, exteriora multoties breviora, obovato-rotundata, longius ciliata. Scapi usque ad 7 cm. longi umbellaeque dense hirtelli. Bracteae ellipticae, pedicellos aequantes vel triplo breviores. Flores magni, intense rosei. Planta cespitosa, surculis (e rosulis ortis raris et brevibus) erectis, foliatis: **38. Wardii.**

b. Folia aut longius pilosa aut ciliata tantum, raro etiam glandulosa, aut glanduloso-hirtella et paulum tantum dimorpha: 26.

26. *a.* Folia paulum dimorpha, rhombeo-obovata, marginibus hirsuto-ciliata et subtus costa vel lamina quoque hirta, surculos erectos diu et interstitiis parvis obvallantia. Planta igitur profunde pulvinata, scapis brevibus usque ad 13 mm. longis, interdum unifloris, cum umbellis hirsutis. Corolla conspicua, intense rosea: **23. euryantha.**

b. Folia aut valde dimorpha vel trimorpha aut rosulas in surculis elongatis dissitas formantia, aut breviter ciliata aut molliter pilosa: 27.

27. *a.* Planta singularis vel surculis ubique vaginatis cespites parvos formans, nunquam e rosulis propagata, laxe villoso-sublanata. Scapi 11–30 cm. longi, graciles. Pedicelli 13–40 mm. longi, graciles, brevistipitato-glandulosi, cuiusque umbellae longiores bracteas ellipticas sub 4–7-plo excedentes. Calyx costulatus. Folia mollia, exteriora cochleari-oblonga, rotundata, interiora triplo longiora, obovata vel obovato-lanceolata, 2–6 cm. longa, acutiora. Flores rosei: **40. sublanata.**

b. Plantae surculis nudis e rosulis plerumque praeterea scapiferis oriundis late cespitosae vel pulvinatae: 28.

28. *a.* Calyx (juvenilis valde pressus interdum indistincte tantum) multicostulatus. Scapi 6–33 cm. longi, pedicelli eis (5–) 7-plo–multoties breviores. Folia interiora spathulato-obovata, ad 2 cm. longa necnon multo maiora. Surculi stoloniformes prostrati cespites diffusos formant. Bracteae parvae, lanceolatae vel lineares. Flores rosei. Indumentum albo-pilosum et saltem calycibus etiam brevistipitato-glandulosum: 29.

b. Calyx levis vel nervis singulis pro lobis, paulum conspicuis. Scapi breves, raro ad 6–7½ cm. longi. Folia parva, interiora raro 2 cm. attingentia: 30.

29. *a.* Folia dimorpha, exteriora late sessilia, interiora iis sensim± triplo longiora, in petiolos alatos ideoque indistinctos attenuata, omnia herbacea, lanceolato-obovata, ubique hirsuta et brevistipitato-glandulosa, marginibus tenuiter et longe ciliata, illa obtusa, haec apiculata. Scapi 22–33 cm. longi, superne cum umbellis multifloris glandulosi tantum : **37. Forrestiana.**

b. Folia trimorpha, extima late vaginato-spathulata, triangulari-acuminata, subcoriacea, subglabra, media parva, lingulata, rotundata, faciebus et praesertim antice penicillatim sericeo-longipilosa, intima iis (transitoriis nullis) 3-plo–pluries longiora, obovato-elliptica, obtusissima vel subrotundata, in petiolos tenues contracta, ubique aequaliter pilosa et sessili- vel vix glandulosa. Scapi usque ad 23 cm. longi, cum umbellis (4–) 7–17-floris vel in var. **laxiflora** glabriore quoque 3–6-floris crebre pilosi : **33. Limprichtii.**

30. *a.* Folia valde dimorpha, exteriora lingulata, sessilia, interiora multo maiora, in petiolos distinctos contracta, rhombeo-spathulata vel breviter elliptica, utrinque rotundata, illa praesertim antice longius haec tota brevius hirsuta. Scapus 2½–7½ cm. longus, cum umbella 2–9-flora eglanduloso– et brevius glanduloso-pilosus. Bracteae lanceolatae vel obovatae, pedicellis sub 2–3-plo breviores. Flores rosei. Surculi albopilosi vel glabrescentes, ±prostrati cespites diffusos formant : **29. Mairei.**

b. Folia minus dimorpha, interioribus ad basin sessilem sensim angustatis, aut trimorpha. Surculi ascendentes cespites ±profunde pulvinatos formant : 31.

31. *a.* Folia trimorpha*, extima deorsum in vaginas late albo-membranaceas dilatata, lingulato-linearia lamina saepe valde reducta, brunnea, valde carinata, media evaginata, lingulato-linearia, intima elliptica vel lanceolata, subpetiolato-angustata, crassiuscula subcaesia, marginibus ciliata saepeque faciebus strigosa, annotina brunnea. Scapi 5–45 mm. longi, rigiduli, cum umbellis hirsuti, glandulis rarissimis subsessilibus. Bracteae lineari-lingulatae, pedicellis duplo breviores usque calyces subaequantes. Flores rosei. Surculi rigidi, crassi : **34. rigida.**

b. Folia ±dimorpha, exteriora linearia usque lingulato-oblonga, basi non vel vix dilatata : 32.

* In the axil of the scape or in the centre of non-scapiferous rosettes, shoots develop which in the Chinese species are straight, not very long, and not rooting, and thus cannot be called runners. These produce in the first year a rosette of leaves which match the innermost ones of the original rosette or are somewhat intermediate between these and the middle ones. They mostly remain, dry and dead, in the second year. In their midst is the bud for that year, which then produces a first whorl of cataphylls (bud scales), a second one of smaller leaves, a third (innermost) one of mostly much bigger leaves, and finally often the flower scape. In plants with only dimorphic leaves no bud scales are developed.

32. *a.* Folia rigidula, exteriora elliptica usque linearia, marginibus remote et rigide breviuscule vel brevissime ciliata necnon dorso aspera, interiora haud raro deficientia. Bracteae ovatae. Flores rosei : 33.

b. Folia dense et flexuoso longiciliata vel tota hirsuta vel sericea : 34.

33. *a.* Folia sicca spadicea, exteriora lineari-elliptica breviuscule ciliata vel (var. **stenophylla**) anguste linearia brevissime papilloso-ciliata, interiora (raro praesentia) sensim paulo maiora, elliptica, molliter ciliata dorsoque ± pilosa. Scapi ½–2½ cm. longi, validiusculi. Bracteae pedicellos vix 2 mm. longos superantes. Umbella villoso-hirsuta et subsessili-glandulosa. Corolla 7–10 mm. diametro : **28. yargongensis.**

b. Folia sicca albida, elliptica, interiora sensim longiora et inferne angustata, omnia breviuscule et rigide ciliata. Scapi tenues, 4–40 mm. longi. Bracteae pedicellis tenuibus 2½–9 mm. longis (demum usque triplo) breviores. Umbella hirsutula et subsessili-glandulosa : **27. brachystegia.**

34. *a.* Folia anguste linearia, demum costa marginibusque incrassata, interiora remote et longissime ciliata, mortua praeter bases brunneas albida, ciliis partim delapsis denticulata, exteriora hornotina iis breviora, superne dense penicillato-hirsuta. Bracteae ovato-lineares, pedicellis brevibus longiores : 35.

b. Folia lineari-lanceolata usque obovato-cochleata, indumento inter se vix diversa, marginibus non incrassata : 36.

35. *a.* Folia rigidula, intense viridia. Scapi praeter glandulas sparsiuscule villoso-hirsuti. Flores rosei : **20. bisulca.**

b. Folia rigida, caesioviridia. Scapi densissime villosi. Flores aurei : **21. aurata.**

36. *a.* Folia elliptica usque lineari-lanceolata, acuta vel obtusa, margine dorsoque ± aequaliter hirsuta vel villosa, glandulis subsessilibus immixtis, caesioviridia, sicca brunnea costa late prominua, interiora exterioribus sensim maiora. Bracteae ovatae usque oblongae. Flores rosei. Scapi subnulli usque 10 cm. longi : 37.

b. Folia obovato-cochleata, ciliata et hirsuta, saturate viridia, saltem exteriora late rotundata, interiora magis angustata saepe vix maiora. Scapi 3–50 mm. longi. Bracteae lineari-oblongae : 38.

37. *a.* Indumentum molle, pilis tenuissimis, sericeis, indistinctissime articulatis, penicillato-porrectis constans. Folia lineari-lanceolata, annotina crassa, saepe glabrescentia. Scapi tenues : **19. incana**

b. Indumentum hirsutum, margine patulum, pilis brevioribus longisve rigidulis, valde articulatis constans. Folia elliptica et interiora obovato-oblonga, annotina tenuiora. Scapi robusti : **22. Lehmanniana.**

38. *a.* Flores aurantiaco-lutei. Folia praesertim antice densissime pectinato-longiciliata : **36. lutea.**

b. Flores pallide vel intensius rosei. Folia densiuscule flexuoso-longiciliata : **35. mollis.**

39. *a.* Planta magna, foliis spathulato-oblongis, ± 15 mm. longis, mollibus, lanatis. Scapi 8–15 cm. longi, sicut umbellae 2–4-florae praeter glandulas tenues brevistipitatas glaberrimi. Bracteae parvae, late ellipticae. Pedicelli 9–26 mm. longi. Calycis tenuiter nervati lobi rotundati, margine ± ciliati : **41. Rockii.**

b. Plantae parvae, foliis usque ad 8 mm. longis, spathulatis vel obovatis vel lanceolatis, sericeo-ciliatis vel penicillatis vel brevius pilosis. Scapi subnulli usque 3 cm. longi, cum inflorescentiis pilosi. Bracteae pedicellos aequantes vel excedentes : 40.

40. *a.* Folia interiora ± maiora, rhombeo-spathulata vel lanceolata, acutiuscula, dorso pilosa : cfr. *euryantha* (supra sub nr. 26) et *incana* (sub nr. 37).

b. Folia spathulata vel obovata, omnino aequalia vel interiora paulo minora, rotundata : 41.

41. *a.* Scapi (raro) subnulli–28 mm. longi. Bracteae latae, spathulatae. Umbellae 3–7-florae, villosae. Folia tota breviter et dense et margine anteriore longe hirsuta, anguste spathulata et lineari-spathulata. Internodia interdum fere 25 mm. longa, aphylla. Calyx cupularis, teres : **24. zambalensis.**

b. Scapi nulli–(raro) 5 mm. longi, 1–(raro)2-flori. Bracteae late lineares. Folia margine fimbriata, ceterum glabra vel subglabra. Internodia brevissima, si aliquantum elongata, ± foliata : 42.

42. *a.* Folia obovata, late rotundata, margine anteriore longe radiatim fimbriata, sicca quoque mollia. Flores interdum bini et pedunculati. Calyx cupularis, teres, puberulus, lobis latis, rotundatis, margine fimbriatis. Corolla alba vel rosea, 5–8 mm. diametro : **25. Delavayi.**

b. Folia ovata vel elliptica, obtusa, partim antice ±villosa, sicca rigida. Internodia brevissima. Flores singuli, sessiles vel pedunculis usque ad 3 mm. longis. Calyx turbinatus, pentagonus, lobis oblongis, rotundatis, marginibus villosis, ceterum glaber. Corolla alba, 5 mm. diametro : **26. tapete.**

43. *a.* Folia in petiolos distinctos contracta. Scapi pedicellis subaequilongi usque subtriplo longiores. Pedicelli filiformes, partim saltem longissimi. Bracteae minutae. Calyx vix 2 mm. longus,

teres, tenuiter 15-nervius, ad ½ lobatus, lobis ovato-triangularibus, sinubus acutis. Corolla 3–3½ mm. diametro. Planta superne parce glandulosa, ceterum glabra : **46. filiformis.**

b. Folia sessilia vel in petiolos minime distinctos sensim attenuata. Pedicelli crassiores brevioresve. Calyx 3–5 mm. longus, teres vel pentagonus, enervius : 44.

44. *a*. Calyx teres, ad tertium inferum fissus, lobis ovato-oblongis, sinubus acutis. Bracteae ellipticae, pedicellis 2–8 mm. longis aequilongae vel triplo breviores. Scapi 2½–6 cm. longi. Corolla 3½–4 mm. diametro. Planta tota minute strigillosa : **45. Engleri.**

b. Calyx ad ½ vel minus fissus, pentagonus, lobis triangularibus. Planta tota subtilissime furcato-pubescens vel inferne glabrescens : 45.

45. *a*. Corolla calyce multo brevior, vix 2 mm. diametro. Scapi usque ad 7 cm. longi, pedicellis breviores usque triplo longiores. Bracteae ellipticae, conspicuae. Calycis lobi sub fructu sinubus latis acutiusculis sejuncti : **44. elongata.**

b. Corolla calyce longior. Scapi usque ad 23 cm. longi, pedicellis paulo usque multiplo longiores*). Bracteae minutae, lanceolato-subulatae. Calycis lobi sub fructu sinubus latissimis rotundatis inter se longe remoti : 46.

46. *a*. Corollae 3–5 mm. diametientis lobi oblongi, rotundati vel emarginati : **42. septentrionalis.**

b. Corollae 7–10 mm. diametientis lobi late obcordati : **43. lactiflora.**

ENUMERATIO SPECIERUM ET NOTAE CRITICAE.

Sectio Pseudoprimula Pax in Engl. & Prantl, Nat. Pflzfam., IV 1, (1889) 110. Knuth in D. Pflzr., IV 237 (1905), 173.

Subsectio Mirabiles Hand.-Mzt. (see key under 2a).

1. **A. mirabilis** Franch. in Journ. de Bot., ix (1895), 453. Knuth l.c. 184, Fig. 44A (1905).

Ad descriptionem addenda : Folia subtus lamina et praesertim costa setulis glandulosis sparsis obsita. Scapus dense et longe brunneo articulato-glandulosopilosus. Pedicelli glandulis minutis sessilibus obsiti. Capsula piriformi-globosa, calycis immutati tubum aequans, inferne membranacea, superne valvis lignosis dehiscens.

N.E. Szechuan. Farges 1051.

This species was placed by Knuth in the *Chamaejasme* section, where it is quite out of place, not conforming to the sectional characters. It may be somewhat related to *A. cordifolia* Wall., which I have not seen.

* abnormaliter etiam nulli.

2. **A. Graceae** Forr. in Not. Roy. Bot. Gard. Edin., viii (1915), 331.

N.W. Yunnan. Forrest 13010, 14359; Handel-Mazzetti 9658; Rock 10247.

This is similar in habit to a new species from Burma which differs especially by a very peculiar indument and may be described here*.

Subsectio Saxifragifoliae Hand.-Mzt. (see key under 5a).

3. **A. Henryi** Oliv. in Hook., Ic. plant., xx, t. 1973 (1891). Knuth l.c. 176 varr. *α typica* et *γ crassifolia*, excl. var. *β*.

Mountain forests from S. Shensi to Burma.

Shensi. Giraldi 4671.

W. Hupeh. Henry 4863, 5364; Wilson, Veitch Exp. 534, Arn. Arb. E. 3167.

N.E. Szechuan. Farges 544. W. Szechuan. Wilson, Arn. Arb. Exp. 966, 3163, 3169; Limpricht 1411; Weigold; H. Smith 2030.

Centr. Yunnan. Ten 59. W. Yunnan and Burma border. Forrest 17661, 17931, 24191, 25661, 25842, 26537, 27262; Handel-Mazzetti 9471.

N.W. Upper Burma. Seinghku Wang, 28° 8′ N., 97° 24′ E. Ward 6963.

The plants from the Burma frontier are more glabrous shade forms. Knuth's var. *crassifolia* has leaves somewhat crumpled, but by no means thicker than the type with which it is identical.

A. cortusifolia Nakai from Korea may be allied with this. Not seen by me.

4. **A. Paxiana** Knuth in Pflzr., IV 237 (1905), 176.

Syn.: *A. Henryi* var. *β omeiensis* Kn., l.c. (1905).

W. Szechuan, in lower forests and on cliffs. Scallan 4713; Faber 327; Wilson, Veitch Exp. 4034, 5055, Arn. Arb. E. 3168; Limpricht 1509.

* *A. phaeoblephara* Hand.-Mzt.

Rhizoma erectum, tenue, interdum apice fasciculato-pauciramosum, radicibus longissimis validis, petiolis mortuis persistentibus comatum vel longius cinctum. Folia rosulata, suborbicularia, 5–10 mm. diametro, basi latissime cuneata, crassa, supra laetius quam subtus viridia, hic in costae inconspicuae parte inferiore parce et toto margine densissime pilis crassis obtusis pluriarticulatis ad .75 mm. longis juvenilibus lilacinis serius rufescentibus seriebus pluribus ciliata; petioli crassiusculi, 7–15 mm. longi, laminis longiores, iisdem pilis dense obsiti. Scapus singulus, 11–33 mm. longus, tenuius villoso-hirsutus et sparse sessiliglandulosus. Umbella subcapitata, 8–12-flora, Bracteae pedicellis 2–5 mm. longis aequilongae vel subduplo longiores obovatae, herbaceae, marginibus superne ut folia, inferne parcius ciliatae. Pedicelli villoso-hirsuti. Calyx cupularis, 2.5–3 mm. longus, ad ⅔ in lobos ovatos ad 1 mm. latos uninervios, margine et hic illic dorso quam folia laxius longiusque pallide pectinato-ciliatos fissus. Corolla 4–5 mm. diametro, carnosula, fragrans, (saepe intensissime) rosea, annulo orali subplano, flavo, limbo fere toto in lobos obovatos subretusos fisso. Stamina annulum aequantia. Stylus inclusus. (Capsula ignota).

N.W. Upper Burma. Seinghku Wang, 28° N., 97° 24′ E. On ledges and earth slopes on the exposed side of broken limestone cliffs, 13,000–14,000 ft. 8. VII, 1926. F. K. Ward 7074.

It can be only by a mistake in editing that the Omi plant, Faber's specimen of which was determined as *A. Paxii* by Knuth in the Vienna herbarium, is found under two names in the " Pflanzenreich."

5. **A. kouytchensis** Bonti. in Bull. Soc. bot. Genève, 2. sér., v (1913), 297, Fig. II, 1.

Kweichou. " Lou-kouang-kiao monté de la côte raide sous rochers à droite chutes d'eau (pas vu ailleurs). Rte. P. f. K. yang [Ping-fang-Kweiyang]." Esquirol 3149.

Although there is no difference between this and *A. Henryi* and *Paxiana* in the direction of the calyx lobes after anthesis, as Bonati supposes, it can easily be distinguished by the differences pointed out in the key, and has as a chasmophyte the same relation to both these as *Primula Duclouxii* to its allies.

6. **A. gracilis** Hand.-Mzt. in Sitzgsanz. Akad. Wiss. Wien (1924), 135.

Descriptio completa : Primo vel saltem secundo anno florens, sed perennans, gracilis, scapis compluribus, erectis, tenuissimis, 7.5–16 cm. longis et pedicellis 5–20-nis 10–23 mm. longis, aequalibus, exterioribus patulis dense, ceterum parce pulverulento-setulosa. Folia cordato-ovata, 2–3.8 cm. longa, rotundata, sinu basali angusto, profundo, toto margine crenulata usque lobulato-crenata et dense ciliolata, sicca membranacea, partim hibernantia et rigidula, saturate viridia ; nervi basales 3–5, secundarii perpauci, obliqui, subtus tenuiter prominuli ; petiolus tenuis, laminam aequans usque ea $2\frac{1}{2}$-plo longior. Bracteae 2.5–4 mm. longae, lineari-lanceolatae, herbaceae. Calyx infundibularis, 3 mm. longus, vix ad $\frac{2}{3}$ in lobos anguste ovatos, obtusos fissus, his sub fructu elongatis, lineari-oblongis 5 mm. longus et utrinque argute multicostatus, forma immutatus. Corolla alba vel " rubro-alba," tubo lato, quam calyx breviore, limbo plano 6 mm. diametiente, fauce annulo elevato instructo, toto in lobos obcordatos partito, lobulis angustis, divaricatis. Antherae minutae, filamentis aequilongae, paululum exsertae. Stylus faucem attingens. Capsula (qualis adest) calycis tubum non excedens.

Centr. Yunnan. In low situations, moist and rocky. Ten 46, 353.

7. **A. saxifragifolia** Bge., Enum. pl. Chinae bor., in Mém. Acad. St. Pétbg. ii (1835), 127. Knuth in Pflzr. IV 237 (1905) 179, and there the synonyms from non-Chinese literature.

Syn. : *Primula minutiflora* Forrest in Not. Roy. Bot. Gard. Edin., iv (1908), 219, Pl. XXIX, A.

Grassy and cultivated low situations all over China except the high mountainous parts, but not common, to Manchuria, Japan, Tonkin, the Philippines, and the Punjaub.

Chih-li. Bunge ; Chanet 3, 1000 ; Clemens 1904.
Shantung. Le Jolis 46 ; Zimmermann 312 ; Nebel.
Kiangsu. Faber.
Chekiang. Faber.
Hunan. Handel-Mazzetti 11747, 11761.
Hupeh. Wilson 39.
Shensi. Giraldi.
Kansu ? Purdom.
Szechuan. Weigold ; Farges.
Kweichou. Bodinier 1538 ; Handel-Mazzetti 10916.
Yunnan. Delavay 974, 4974a; Forrest 310, 12284; E.E. Maire; Ten 358.
Kwangtung. (e Dunn et Tutcher.)

8. **A. Gmelini** (Gaertn.) Roem. et Schult., Syst. Veg., iv (1819), 165.
Syn.: *Cortusa Gmelini* Gaertner, De fruct. et sem. plant., i, (1788), 232 tab. L; Lamarck, Illustr., i (1791), 433; Rec. d. pl. (1823), tab. 99, fig. 2.
The type in Kansu ? (e Maximovicz) and through S. Siberia to W. Manchuria and the Altai.
Gaertner cannot be quoted for the combination *Androsace Gmelini*, as Roemer and Schultes and also Knuth do, for he says only " Haec genuina est *Androsaces* species & nihil cum *Cortusa* commune habet — — " but does not give it this name.

var. **geophila** Hand.-Mzt. in Acta hort. Gothobg., ii (1926), 112.
N.W. Szechuan. 3100–3300 m. H. Smith 2466, 2957.

Subsectio Dissectae Hand.-Mzt. (see key under 5b).

9. **A. dissecta** Franch., in Journ. de Bot., ix (1895), 454. Knuth, l.c. 178.
Syn.: *A. rotundifolia* var. *dissecta* Franch. in Bull. Soc. bot. France, xxxii (1885), 10.
S.W. Szechuan and N.W. Yunnan, in mountain forests.
Szechuan. Handel-Mazzetti 2620 ; Schneider 1408 ; Forrest 16261.
Yunnan. Delavay 55, 1036, 2079 ; Forrest 12466, 14161, 19430, 23048, 25734 ; Handel-Mazzetti 8741 ; Rock 9188.
This species seems to be near *A. Croftii* Watt, from Sikkim, which has much less divided leaves.

10. **A. sutchuenensis** Franch. in Journ. de Bot., ix (1895), 454. Knuth, l.c. 179.
N.E. Szechuan. Farges 774. Not seen by me.

11. **A. Gagnepainiana** Hand.-Mzt. in Sitzgsanz. Akad. Wiss. Wien (1924), 200.
Descriptio completa : Perennis, singularis vel fasciculata, rhizomate serius elongato, subhorizontali, radicibus tenuibus, longis, fulvis, valde fibrosis. Folia rosulata, numerosa, orbicularia, profunde cordata, ± duis tertiis vel fere ad basin 5–7-loba, lobis late cuneato

obovatis, antice contiguis vel subcontiguis, sinubus anguste vel latius rotundatis seiunctis, ad $\frac{1}{3}$ et infimis profundius trilobis, lobulis obovatis, acutis, uno alterove dente praeditis, herbacea, subtus quam supra pallidius viridia, ubique parce et nitide longipilosa, petiolis sicut scapi numerosi folia $\pm$ aequantes raro subduplo longiores flaccidis dense longipilosis 2–4-plo breviora. Umbellae 3–8-florae, divaricatae, bracteis lanceolatis, herbaceis, pilosis, 2–4 mm. longis, pedicellis tenuiusculis, aequalibus, strigillosis, 5–14 mm. longis. Calyx campanulato-infundibularis, viridis, basi sicut pedicelli purpurascens, 3–4 mm. longus, ad $\frac{1}{2}$ in lobos ovato-lanceolatos, hydathode crasso terminatos, intus conspicue trinervios fissus, extus obsolete 5 nervius et substrigoso-pilosus. Corollae albae vel roseo suffusae, centro viridis vel flavae, glabrae tubus 1 mm. longus, limbus 6 mm. diametro, fere totus in lobos paulum obcordatos, 2 mm. latos fissus, fauce annulo 10-gibboso instructus. Antherae oblongae, plumbeae, filamentis brevibus, faucem vix attingentes. Stylus crassus, $\frac{1}{2}$ mm. longus. Capsula immatura globosa, calycis tubum explens.

Yunnan, near the Burmese-Tibetan frontier, to N.W. Upper Burma. High alpine. Handel-Mazzetti 9495 ; Ward 6843, 7025, 7082.

K. Ward's specimens from Seinghku Wang, 28° 8′ N., 97° 24′ E., are smaller and dwarfer than mine, but otherwise agree completely.

12. **A. cuscutiformis** Franch. in Journ. de Bot., ix (1895), 454. Knuth l.c. 174.

Syn. : *A. stolonifera* Franch., l.c. 456 (nomen).

N.E. Szechuan. Farges 714.

A. cuscutiformis is next to *A. geraniifolia*, from which it differs by the much more divided leaves with acute lobules, the very long pedicels and much elongated stolons rooting at the ends only and producing but few and small leaves there and no flowers. Perhaps also the capsule is longer.

13. **A. geraniifolia** Watt in Journ. Linn. Soc. Bot., xx (1882), 17, pl. 16. Knuth l.c. 174 cum varr. *α Hookeriana* Kn., *β pedicellata* (Royle) Kn., ? *γ setosa* Kn.

Syn. : *A. elatior* Pax et Hffm. in Fedde, Repert., xvii (1921), 193.

W. Szechuan through W. Yunnan to Garhwal in the N.W. Himalaya. Mountain forests.

Szechuan. Soulié ; Orléans sec. Knuth ; Limpricht 2173, 2178.
Yunnan. Forrest 25485 ; Ward 1645 ; Handel-Mazzetti 8394.

A. geraniifolia is somewhat variable, indeed, but the varieties separated by Knuth are of little importance. In Duthie's nr. 4180 from Garhwal for instance are specimens represented with scapes shortly strigillose and others with them longer pilose, the hairs first spreading, then curved upwards. In these the scapes are only equal

in length to the leaves. Watt's type includes Hooker's Sikkim plant of which I have many specimens before me bearing no runners and quite matching *A. elatior* Pax et Hffm. The last named authors were misled by Knuth who followed Franchet in considering the runners a distinguishing character between *A. geraniifolia* and *axillaris*. Moreover he gives in the key the runners as at most equalling the scapes, whereas they are really up to 70 cm. long.

There are but three Yunnan plants which can be identified with the type, through the material not being always collected quite completely: Forrest's No. 25485 from N. of Yungchang; Ward's No. 1645 (locality not given); and my No. 8394 from the forests of the Doyon-lumba in the Salwin basin at 28° 2′ lat., 2,800-3,000 m. high. Forrest's plant has feeble primary scapes, perhaps developed after the runners; and there appear to be remains of a broken primary scape in both the others, while the runners root freely in the latter, whereas in the former there is only one young root seen at one of the uppermost nodes. The pedicels of these plants are strigillose, the hairs being reflexed, whereas they are directed upwards in Hooker's plants, but vary in direction in plants from Chumbi (King's collector 438).

There are many more specimens from Yunnan matching these except that they lack an erect scape and that their runners only slightly root, if at all. These are very like *A. axillaris*, but differ by the more slender habit, thinner leaves, and much scantier indument especially quite different on the pedicels. These characters as well as the always very long and thin pedicels show them to be forest or at least shade plants, and although they can by no means be separated specifically from *A. geraniifolia*, they constitute an approach, if not a real transition towards *A. axillaris* and may be characterized as

var. **escaposa** Hand.-Mzt.

Scapus erectus umbellifer deest. Stolones usque ad 70 cm. longi, arcuato-prostrati, non vel vix radicantes; pedicelli e nodis bracteatis foliatisque, elongati, tenuissimi. Planta parce retrorsum strigillosa.

W. Yunnan (Delavay). Wayside weed growing in shade, Valley of Chung River 8–9,000 ft. (Ward 252). Salwin Valley, 28° 10′, shady stony pasture on the margins of forest 10–11,000 ft. (Forrest 16245). Mountains above Tzeku and Tzechung, Mekong-Salwin divide, on bank of stream (Rock 8917). Shady grassy situations amongst rock and scrub on the banks of the Mekong River, 27° 24′ N., 99° 6′ E., 6,000 ft. (Forrest 19438). Rives du Me-khong (Soulie 1485). Probably same places (Monbeig). Chungtien Plateau 27° 30′, 9–10,000 ft., open stony pasture on the margins of Pine forest (Forrest 12514); dry shady banks in Pine forest 27° 40′ (F. 13855).

S.W. Szechuan. Muli, forest. Rock 6475.

14. **A. axillaris** Franch. in Journ. de Bot., ix (1895), 455. Knuth, l.c., 178 excl. pl. Souliei.

Syn.: *A. rotundifolia* var. *axillaris* Franch. in Bull. Soc. bot. France, xxxii (1885), 10.

Yunnan plateau and neighbouring Szechuan, on rocks and in thickets, common.

Yunnan. Delavay 306, 883 etc.; Henry 10868A; Schoch 162; Maire; Handel-Mazzetti 6444.

S.W. Szechuan. Handel-Mazzetti 2243, 2299.

The scapes of this species are, as Knuth has stated, not always erect, but often procumbent and with up to 5 whorls of leaves, bracts and flowers, being thus very similar to the runners of the previous species. They have, however, no flagellar ends nor do they root. The dissection of the leaves is variable in degree and offers no reliable difference; Maire's No. 184/1914 from N.E. Yunnan is a transition form.

Subsectio Alchemilloideae Hand.-Mzt. (see key under 4b).

15. **A. Wilsoniana** Hand.-Mzt.

Dense pulvinata, glandulis subsessilibus purpureis et pilis articulatis dense obsita, radicibus tenuissimis. Surculi fasciculati, usque ad 2½ cm. longi, petiolis mortuis 5–12 mm. longis, pallidis, adcumbentibus vel subpatentibus glabris vel glabrescentibus densissime tunicati. Folia permulta, ambitu reniformia, sinu basali ad ¼ penetrante; lamina 3–5 mm. longa et 4–6.5 mm. lata in petiolum 10–15 mm. longum subtus convexum supra sulcatum breviter decurrens, tripartita, lobo terminali trilobulato, lobis lateralibus bipartitis lobulis bi- vel trilobulatis, omnibus ovatis obtusis, sinubus rotundatis, carnosula, supra viridis, subtus purpurea. Scapi erecti, e rosulis singuli, 5½–6 cm. longi, tenues, sicut petioli basi purpurascentes. Umbella 2–4-flora. Bracteae lanceolatae, 1.5–3.5 mm. longae, .5–.75 mm. latae. Pedicelli 7–9 mm. longi, tenues, exteriores patentes. Calyx 2¼–3 mm. longus, aperte campanulatus, ad dimidium in lobos oblongo-triangulares apice ipso obtusos fissus, indumento intus parciore quam extus. Corolla alba (e nota collectoris), tubo 2–2.5 mm. longo, ore lato annulo tenui obscure 10-crenato instructo, limbo 7–8 mm. diametiente, disco c. .5 mm. lato, lobis late obovatis, 2–3 mm. latis, truncatis vel emarginatis. Antherae ovoideae, cum stylo crasso paulum exsertae.

W. Szechuan. Wa shan cliffs, 10,000 ft., July 1903. Wilson, Veitch Exp. 4002 (Herb. Kew).

This species can be compared in the mode of growth only with *A. alchemilloides* Franch. and in the shape of the leaves with *A. Gagnepainiana* Hand.-Mzt., but otherwise it is far enough from both.

16. **A. alchemilloides** Franch. in Journ. de Bot., ix (1895), 455. Knuth, l.c., 180.

N.W. Yunnan and neighbouring Szechuan. Subalpine rocks and stony places. Delavay 21; Forrest 2228, 5642, 10145, 23073; Handel-Mazzetti 4267, 6818; Rock 4163, 4375, 9036.

S.W. Szechuan. Forrest 20466.

" Folia breviter et non manifeste petiolata " of Knuth is incorrect, for the relation of the petiole to the blade is the same as in the other species of the section. The former appears less manifest only by being of about the same shape, consistency and colour as the leaf lobes. The mode of growth is approached by certain forms of *A. rotundifolia* Hardw. The bracts also are similar to certain examples of this, which is, I believe, the nearest ally. From the fact that this species is very variable, one should conclude just the contrary of what Knuth (p. 174) did, that it is a recent species rather than the starting point (" Ausgangspunkt ") of the section.

Sectio Aizoidium Hand.-Mzt. (For characters see in the key under 17*a*.)

The 3 species mentioned below, being biennial (see Botanical Magazine, pl. 8653, where this is stated from experience in cultivation, although I have doubts about " radice multicipite ") and having single rosettes of quite isomorphic leaves, are out of place in the *Chamaejasme* section, where they have been placed thus far. They differ from the species of this section much more than *A. saxifragifolia* and *Gmelini* do from the perennial *Pseudoprimulas*, or than *septentrionalis* from *obtusifolia*, and must form a section of their own.

17. **A. integra** (Maxim.) Hand.-Mzt. in Acta Hort. Gothobg., ii (1926) 112.

Syn.: *A. Aizoon* var. *integra* Max. in Bull. Acad. St. Petbg., xxxii (1888), 501. Knuth in D. Pflzreich., IV 237 (1905), 185.

A. Aizoon var. *purpurea* Pax et Hffm. in Fedde, Repert., xvii (1921) 193.

A. Aizoon var. *rosea* Pax et Hffm., l.c., 194.

A. Bulleyana var. *purpurea* Hand.-Mzt. in Sitzgsanz. Akad. Wiss. Wien (1924), 136.

N.W. and W. Szechuan. Arid places. Potanin; Weigold; Limpricht 1971, 2033, 2175, 2289; Wilson Arn. Arb. Exp. 3138, Veitch Exp. 4005 p.p.; Soulié 854, 2928.

18. **A. Bulleyana** Forr. in Not. Roy. Bot. Gard. Edin., iv (1908), 233.

Syn.: *A. coccinea* Franch. in Bull. Soc. bot. Fr., xxxiii (1886), 63, nomen; Irving in Bot. Mag. cxlii (1916), pl. 8653.

A. Aizoon var. *coccinea* Franch. in Journ. de Bot., ix (1895), 456, p.p. Knuth, l.c., p.p.

W. and N.W. Yunnan up to the Tibet frontier. Arid places. Delavay 65 ; Forrest 108, 10611, 13171, 14712, 17086, 19138, 20777, 23187 ; Ward 414 ; Schneider 2193 ; Rock 9995.

From Forrest's rich materials of this species the differences stated by me in the Acta Hort. Gothobg. l.c. 113 must be somewhat restricted to these left in the key here under 18. By these the Yunnan plant is still different enough from the Szechuan one. The corolla lobes are found also obcordate, but the true *A. Aizoon* Duby (*A. Aiz.* var. *himalaica* Kn.) confined to the W. Himalayas, differs very much by the soft and glandular* indument, the obtuse and nervose calyx lobes and the smaller corollas.

Sectio Chamaejasme Koch, Synops. (1837), 584. Knuth in D. Pflzr., IV 237 (1905), 180 p.p. maiore et incl. sect. *Aretia* (L.) Koch, l.c. 583 (*Aretia* Linné, Sp. pl. [1753], 141) et *Andraspis* Duby p.p. ; Koch.

This is the most developed section of the genus, almost all the possibilities imaginable within certain limits being realized in W. China and the Himalayas, a state highly comparable with that found in *Leontopodium* (see my monograph, in Beihefte zum Botanischen Centralblatt xliv [1927]). More markedly than in that genus, what I conceive here as species are well delimited and not connected by intermediates ; at least in the materials studied, which are large enough, I hardly found a single specimen intermediate between two of them.

It is very difficult to arrange the species of this section in a natural order, first as development has taken place in the most different directions and cannot be expressed in one, not even in two dimensions of space ; second as it is quite impossible to say what living species may be still near to the starting-point of the section. The trimorphism of leaves as found in several species is a highly derived state, of course ; the development of runners certainly is also not a primitive character in the genus ; and the carpet habit, connected again with isophylly, is an advanced adaptation to alpine conditions. Knuth is no doubt quite right in saying that the *Pseudoprimula* section with its forest plants is the oldest of the genus. Thus we must search for types in both sections showing approach to one another. Such seem to be *A. mirabilis* and *Graceae* on the one hand and something between *A. foliosa* Duby, *sublanata* and *Wardii* on the other. Then the Chinese species can be arranged into several series, and it must be kept in mind that each of these begins anew near this supposed point of origin. *A. sublanata, Rockii, Forrestiana* and *Limprichtii* have the common character of a many ribbed calyx and are near together even if this is not a very important one.

*In *A. integra* and *Bulleyana* glands can be found especially on the inner side of the calyx, but these are sessile.

The Chinese species of the old *Aretia* section are so nearly allied to certain of the *Chamaejasme* type, viz., *A. alaschanica* to *A. longifolia* (as Knuth pointed out), and *A. Delavayi* to *A. zambalensis*, while *A. tapete* also joins here, so that it is impossible to place them in a different section. Also the arctic *A. caespitosa, Vegae, Tschuktschorum* and *arctica* probably directly descend from *A. Lehmanniana*. The many European species of *Aretia*, however, form of course a natural group to be treated as a subsection, linked by *A. dasyphylla* with *A. villosa* (see below).

As no rule exists regarding priority in adopting sectional names, it is better, I think, in order to avoid mistakes, to keep *Chamaejasme* instead of the older generic name *Aretia*.

Subsectio Euchamaejasme Hand.-Mzt. (characters given in the key under 19*a*).

Series Villosae Hand.-Mzt.

Subseries Euvillosae Hand.-Mzt.

From *A. sarmentosa* or perhaps beginning from the more primitive *A. foliosa* there is a series of mostly well defined species leading to *A. villosa*, which is the most widely distributed, viz., from the Altai and Kumaon in the N.W. Himalaya to the Pyrenees. These species are:

A. foliosa Duby with very thick and short glabrous runners, leaves steadily increasing from the small almost orbicular outermost to the very big spathulate innermost, very densely and shortly ciliate at the edges, scape and umbel sessile glandular and moderately white hirsute.

A. sarmentosa Wall. (*A.s.* var. *Watkinsii* Hook. f.*) with long straight runners, very trimorphic leaves—the outer small, elliptic, triangular-acute, very long and densely silky villous all over and with short glands, the middle spoon-shaped much more glabrous, the innermost large, sessile, also almost glabrous—and a brown crispate indument of the pedicels.

A. primuloides Duby (Mém. Soc. Phys. Hist. nat. Gen., x (1843), t. III, fig. 3, with analysis, but no description; in DC., Prodr., viii (1844), 51) with thin and straggling, pilose, finally dark chestnut-brown true stolons, the outer leaves much larger than in the preceding species, narrow, spathulate, intermediates wanting, the inner again much larger (sometimes wanting ?), and white hoary umbels.†

* For the other vars. see beneath, under *A. Limprichtii*. Very similar to the Nepal plant is one edited by Duthie under nr. 714 from Tihri-Garhwal It has the same brown indument of the pedicels and the upper part of the scape, but less dimorphic leaves when the flowers have just opened.

† This species produces in cultivation shoots sparsely foliate all over which later die, a character leading towards *A. lanuginosa* Wall. and *tonkinensis* Bonti.

A. Jacquemontii Duby (ll. c.), with thin, arcuate, black runners, trimorphic leaves—the outermost being short almost glabrous scales, the middle almost acute, thickly white silky, the innermost, little larger, like the umbel dirty golden silky—and with long bracts and short pedicels.

A. Duthieana Kn. replacing *A. primuloides* in Hazara and neighbouring Kashmir, with thin but straight and often short black stolons, leaves much less (often hardly) dimorphic, umbels only (or almost only) glandular on the long pedicels and with short bracts which resemble those of *primuloides*. The present species is perhaps linked by certain specimens (Duthie 25686, Falconer) with *A. robusta* (Kn.) Hand.-Mzt., but its white indument is more confined to the edges and nerve of the leaves (thus recalling *A. euryantha*), and the glandular roughness is wanting.

A. robusta (Kn.) Hand.-Mzt. (*A. villosa* var. *robusta* Kn. in D. Pflzr., IV 237 (1905), 192) with glabrous brown erect stolons with the internodes often partly suppressed or covered, thus forming carpets, leaves quite uniform, larger than in the following species, very rounded at the tips and often broad, white silky and glandular asperous, the outer glabrescent and drying almost chestnut brown. It grows in the Karakorum and from W. Tibet to the Mt. Everest country, and was wrongly indicated by Knuth for China (see below under *A. Lehmanniana*). Though it may be connected by intermediates with *A. villosa* L., it is no doubt nearer to the phylogenetic type of that species and so cannot be treated as a variety of it.

A. villosa L., quite congruent with the European plant, is represented, for instance, in Duthie's No. 5759 from Kumaon. It may be noted here that its var. *arachnoidea* (Sch., N., Ky.) Kn. is not confined to the Carpathians but is found quite identical in the Alps and is of no systematic value.

A. dasyphylla Bge. (*A. olympica* Boiss.; *A. phrygia* Gdgr.), which in Songaria, the Alatao and Altai seems to be much the commoner, may probably prove to be a distinct species on a more careful study of the large material present. It has leaves thick, short, very obtuse, quite isomorphic and arranged almost in columns, with very articulate somewhat stronger hairs mixed with short-stalked glands. It forms the transition to the *Aretia*-types (see above, p. 280).

A. globiferoides (Kn.) Hand.-Mzt. (*A. villosa* var. *θ dasyphylla* f. 3 *globiferoides* Kn. in D. Pflzr., iv, 237 [1905], 193), confined to the Lebanon, differs by a looser growth and very dense and long indument.

A. globifera Duby, which I do not know well, and with which *A. Poissonii* Kn. is identical, as I am informed from Kew, must be nearly allied here, also perhaps

A. ferruginea Watt, whereas more *Aretia*-types seem to be nearer to the Chinese representatives of the *villosa* group, of which there are three, as follows.

19. **A. incana** Lam., Illustr., i (1791), 432.

Syn.: *A. villosa* α, β, γ. Turczaninow, Fl. Baical.-Dahur. in Bull. Soc. nat. Mosc., xxii, II (1849), 298.

A. villosa Maxim in Mél. biol., xii (1888), 753, non L.

A. villosa var. η *incana* Knuth in D. Pflzr. IV 237, (1905), 192.

Replacing *A. villosa* L. from lake Baical eastwards.

Chih-li. Limpricht 2532; Möllendorf.

Knuth gives *A. villosa* var. *typica* from both Eastern Asia and Arctic America but with a more than well founded query, except for Macoun's plant from St. Paul's island, which, however, is *A. Lehmanniana*. The true *A. villosa* differs from *A. incana* by thin leaves, broader, the outer rounded, white, or but very bright brown when dry, with a very thin rib often quite obsolete. There seems to be no transitions between them in Siberia, although they inhabit neighbouring countries.

There is a plant similar to *A. incana*, but larger, with leaves more distinctly ciliate, also with short-stalked glands almost at the margins only, and less keeled, the outer very long, in Armenia (Montbret 2611 Huet 6), the Pontus (Balansa) and Transcaucasia (Kolenati). This is called *A. olympica* Boiss. var. *glabrata* by Trautvetter, but Kotschy's plants identified with these by Knuth are quite different. It may also be considered rather as a species: *A. glabrata* (Trautv.) Hand.-Mzt.

20. **A. bisulca** Bur. et Franch. in Journ. de Bot., v (1891), 103.

Syn: *A. villosa* var. ζ *bisulca* Knuth in D. Pflzr., IV, 237 (1905), 192.

W. Szechuan. Bonvalot & Orléans.

Tibet. Tsangpo valley, 10,000–13,000 ft., at low altitudes forms close mats on open grassy slopes on the sunny side, at higher alt. forms cushions on the cliffs. Ward 5654.

I have not seen the type which is a single sheet in the Paris herbarium. M. Gagnepain kindly informs me that he considers *A. aurata* identical with this, but the latter has yellow flowers as Wilson notes and as can still be seen in his specimens, whereas *A. bisulca* is said to have flowers "albae vel carneae." As it is not likely that the colour varies so much in one and the same species of this genus, and as Ward's plant (besides differing from Wilson's in very unimportant details) agrees in having red flowers, I consider it the true *A. bisulca*. There is no weight in M. Petitmengin's argument that this may also be distinguished as a plant of the plains, for the plain of Litang is at more than 4,000 m. above sea level. The species is near the foregoing, yet so distinct that it can by no means be considered as a variety. The inner leaves differ considerably in both size and indument from the outer and are not connected by intermediates. The hairs are also thicker.

21. **A. aurata** Petitmg. in Bull. Soc. sci. Nancy, sér. 3., viii (1907), 12 ; Bull. Herb. Boiss., 2. sér., viii (1907), 529.

Syn. : *A. villosa* var. *aurata* Ptmg. in Bull. Ac. Géogr. bot., xviii (1908), 333.

W. Szechuan. Tatsienlu, heaths. Wilson, Veitch. Exp. 4008.

With these three species seem to be allied *A. apus* Franch. and *A. bryomorpha* Lipsky, perhaps also, if it is not a synonym of some other, *Andr. eritrichioides* Gandgr. in Bull. Soc. bot. Fr., xlvi (1899), 420, which was overlooked by Knuth. I have seen none of them.

Subseries Chamaejasmoideae Hand.-Mzt.

22. **A. Lehmanniana** Spreng.* in Isis, ix (1817), 1289, tab. 9.

Syn. : *A. villosa* var. *latifolia* Ledebour, Fl. altaica, i (1829), 218 ; Maxim. in Mél. biol., xii (1888), 753, saltem p.p.

A. chamaejasme var. *hirtifolia* Rupr. Sert. tiansch. in Mém. Ac. imp. Sci. St.-Pétbg., vii. Sér., xiv (1869) 60.

A. chamaejasme var. α *typica* Knuth in D. Pflzr., IV 237 (1905), 189, p.p. (the Chinese and Behring plant only).

– – var. γ *arctica* Knuth, l.c. (1905), 190.

– – var. δ *capitata* Knuth, l.c.

– – var. ζ *triflora* Knuth, l.c., vix *A. triflora* Adams.†

– – var. *trichophila* Pax et Hffm. in Fedde, Repert., xvii (1921), 194.

A. villosa var. δ *robusta* f. 1 *longiscapa* Knuth, l.c., 192, p.p. (as to the Chinese plant).

From the Alatao and probably Novaya Semlja to arctic America.

Chih-li. Möllendorf 27 ; Limpricht 2509.

Shansi. Potanin ; Serre.

Pax and K. Hoffmann are no doubt quite right when they say (l.c.): " Wahrscheinlich bildet var. *trichophila* mit var. *arctica* und anderen von R. Knuth zu *A. chamaejasme* gerechneten Varietäten eine besondere Art." The true *A. Chamaejasme*, which is restricted to Europe, differs from *A. Lehmanniana* as characterized in the key, by distinctly trimorphic leaves, the outermost linear-triangular acute, at the flowering period dry and white membranous, the middle linear or subspathulate, rounded, the innermost lanceolate, subacute, all bright green, long and closely but softly ciliate at the margins only, or often also at the back of the thin rib, and thinner, sparsely pilose shoots. The different colour of the dead leaves is a very obvious, although certainly less important difference.

A. Lehmanniana varies considerably in length as well as density of the indument, but I believe there is no occasion to distinguish definite

* not *A. Lehmanni* Duby 1844, which became *A. nepalensis* Derganc.

† *A. triflora* Ad. in Mém. Soc. nat. Mosc., v (1817), 89, is described with " tota planta glaberrima, folia glabra ciliata, corolla pallide sulphurea " and cannot be referred to Knuth's var. *triflora* nor to the asiatic representative of *A. Chamaejasme* at all. Thus the name *A. Lehmanniana* is not endangered by this which very possibly is prior.

varieties. The type specimens of *A. Lehmanniana* and *A. capitata* in the Berlin herbarium are obviously from the same set if not carpet with the first flowers opened and very strongly pressed. Chinese specimens exactly match such from St. Lawrence Bay. The species approaches more *A. villosa* than our *A. Chamaejasme* does, and was thus in Macoun's specimens from St. Paul's Island mistaken by Knuth for that. It is always easily distinguished by the leaves being firmer, broader, and with a spreading indument of strong hairs, and not of thin and soft ones penicillately directed forwards. Potanin's plant has been determined by Knuth as *A. Chamaejasme* in the Vienna herbarium, as *A. villosa* in the Berlin herbarium and then published as the latter.

The Turkestan and Caucasus plants including *A. Chamaejasme* var. *alatavica* Rupr., l.c., and *A. akbaitalensis* Derg., are also near *A. Lehmanniana*, but need further study for which the material in my hands is quite insufficient. The former more approaches the true Chamaejasme, the latter *A. coronata*. Var. *ciliata* (Trautv.) Kn. is unknown to me. *A. coronata* Watt is a very distinct, isophyllous species.* Also the Rocky mountain plants differ from all these.

23. **A. euryantha** Hand.-Mzt. in Sitzgsanz. Akad. Wiss. Wien (1924), 137.

Descriptio completa: Surculis erectis, paulum ramosis, hirtellis, passim laxe foliatis et interstitiis nudis parvis diu rosularum laxarum superpositarum foliis mortuis obvallatis pulvinos profundos 6–18 cm. altos formans. Folia rhombeo-obovata, 4–9 mm. longa, obtusa, ad basin late sessilem non vaginatam angustata, marginibus pilis albis± patulis inaequalibus aliis brevissimis aliis saepe folii latitudinem aequantibus hirsuto-ciliata et dorso medio vel toto quoque hirsuta et parcius subsessili-glandulosa, crassiuscula, mollia, saturate viridia, costa inconspicua, paulum dimorpha, interiora nisi magnitudine usque duplo maiore vix ab exterioribus purpurascentibus diversa, sicca fuscospadicea. Scapi singuli, 3–13 mm. longi, interdum uniflori, rigiduli, cum umbellis 1–3-floris dense sicut folia hirsuti et subsessili-glandulosi. Bracteae ellipticae, foliaceae, pedicellos validiusculos 1.5–4 mm. longos vel calyces quoque aequantes. Calyx turbinatus, 2½–3 mm. longus, herbaceus, ad vel infra medium in lobos ovatos obtusos fissus. Corolla carnosula, intense rosea, tubo crasse cylindrico, incluso, limbo plano 6–11 mm. diametiente, fere toto in lobos obovatos, late rotundatos usque subemarginatos fisso, annulo orali crasso, paulum prominuo. Antherae oblongae, filamentis brevibus supra medium tubum insertis, faucem paululo superantes. Stylus crassus vix 1 mm. longus. Capsula calycem subaequans.

* Zugmayer's plants from the Jeshil-Kul and the Mangzaka in N.W. Tibet published by Keissler in Ann. Naturh. Hofmus. Wien. xxii (1907), 29, as *A. globifera* are *A. coronata*.

N.W. Yunnan. High alpine rocky places. Mt. Waha S. of Yungning, 4,300–4,500 m. (Handel-Mazzetti 7107). Mountains of the Chungtien plateau, Lat. 27° 30′ N., open rocks and boulders, 14,000 ft. (Forrest 12629). Probably also on Mount Saganai above Muli in neighbouring Szechuan, the plant noted by me.

The relatively big and deep coloured flowers (although smaller in Forrest's plant than in mine) recall *A. Wardii*, the indument of which also is comparable but not mistakable. The mode of growth, shape and size of leaves, and length of scapes are quite different, both the former characters showing rather an approach to *A. coronata*, which differs by the more uniform indument of the smaller and uniform leaves.

24. **A. zambalensis** (Ptmgn.) Hand.-Mzt.

Syn.: *A. villosa* L. var. *Zambalensis* Petitmgn. in Bull. Herb. Boiss, 2 sér., viii (1908), 368.

A. chamaejasme var. *tibetica* Knuth in Fedde, Repert., ii (1906), 66; in Filchner, Exped., 261.

? *A. villosa* var. *latifolia* Maxim. in Mél. biol., xii, 753, p.p. (quoad pl. tibeticam, cfr. p. 754).

N.W. Yunnan to N.E. Tibet and Sikkim.

Yunnan: On cliffs and damp gravelly meadows on the Mekong-Yangtze divide, Lat. 27° 36′ N., Long. 99° 10′ E., 14–14,500 ft., July 1921. Forrest 19650. Mountains of Moting, N.E. of the Yangtze-Mekong watershed, among rocks, alpine region, June 1923. Rock 10337.

Szechuan. Soulié 3108.

N.E. Tibet. Filchner 115. Sang t'ang, Quellgebiet des Hoang-ho. Tafel 27.

Sikkim. Goraphu Chu, 15,100 ft., 6. viii. 1909. Smith & Cave 2198.

This species is very and perhaps perilously near *A. coronata* Watt which in the specimens before me has a shorter indument with hairs almost equal, not much longer at the leaf tips, and much smaller leaves. In habit it recalls also *A. cephalantha*, but the indument is quite different. It comes very near *A. Delavayi*, but the leaves are much narrower and the umbel is different even when the latter produces 2 flowers.

The plants supplied by Knuth with different names (*A. cham.* var. *typica* in Tafel's collection) are quite identical. Filchner's specimen has also superposed rosettes. It is strange also to find this conclusion arrived at from one single specimen: "Die Form scheint für Kansu und West (sic !)-Tibet überhaupt konstant und charakteristisch zu sein."

25. **A. Delavayi** Franch. in Journ. de Bot., ix (1895), 456. Knuth in D. Pflzr., IV, 237 (1905), 201.

N.W. Yunnan, High alpine. Delavay; Forrest 2319, 5762, 10309, 10413, 14082, 15008, 19726, 21496, 22779; Ward 81845; Handel-Mazzetti 4128, 6915, 9747; Rock 4705, 8659, 9481, 9951.

A. Delavayi is without doubt next to the preceding species and not always very clearly shows the *Aretia* characters, for it not infrequently has scapes up to 6 mm. long with two flowers on pedicels of 2 mm. length. The bracts are then similar to the leaves. If the internodes of the stems are somewhat elongated they are always more or less completely covered by the sheaths of scattered leaves. The outer ones are always appressed, at most with slightly spreading tips, and they persist. What Knuth says in his key is thus at least inconstant and of no use for purposes of determination. The species neither in habit nor in the leaves resembles *A. mucronifolia* at all, as he thinks.

26. **A. tapete** Maxim. in Bull. Acad. St. Petbg., xxxii (1888), 505. Knuth, l.c. (1905), 202.

Syn.: *Dionysia* spec.? Kanitz, Bot. Res. centr.-as. Exp. Széchenyi (Math. u. nat. Ber. Ung., iii 1884, 13).

A. Gustavi Knuth in Fedde, Repert., iii (1906), 84.

A. densa Pax et Hffm. in Fedde, Repert., xvii (1921) 194.

High alpine rock plant from S.W. Kansu and N.E. Tibet through all W. Szechuan.

S.E. Kansu. Potanin; Farrer 128.

N.E. Tibet. Przewalski; Tafel 31, 225, 274, 318, 333, 338a.

N.W. Szechuan. Potanin; H. Smith 3975, 3976. W. Szechuan. Széchenyi "Junnan" 242; Soulié 2272; Limpricht 1656. S.W. Szechuan. Handel-Mazzetti 2791.

The species is very variable and has thus been twice re-described as a new species. The variations, however, clearly correspond with somewhat different conditions of growth. Potanin's Kansu plant and Farrer's, which is quite identical with it, have much larger and more woolly leaves, and globuli more dissociate, in Farrer's quite distant indeed. In H. Smith's No. 3976 the axes between these, which only become visible on removing the leaves, are so shortened that they are practically wanting. The leaves often form distinct zones of glabrous basal parts and long silky foreparts; the inner ones are often somewhat shorter and thinner. Potanin's Szechuan plant has only a few leaves sparingly long silky on the margins, while H. Smith's is nearly glabrous. Or the outer leaves may be more glabrous throughout than the inner. In my own plant, in compact carpets the silky leaves remain included within the others on the stems and these form, when old, continuous

columns; in lax carpets the former fall off and the columns are interrupted. Also the Kansu plants show such transitions as outer leaves graduating into the inner as regards the indument. Sometimes there is a scape 1½ to 3 mm. long with two bracts.

The species which would follow this in a complete enumeration is the Himalayan *A. Selago*, which differs (though but little) by more keeled leaves and the calyx broader, softer and villous all over. *A. muscoidea* Duby may also have its affinity here.

Subseries Blepharophyllae Hand.-Mzt.

27. **A. brachystegia** Hand.-Mzt.

Surculis rigidulis, spadiceis, glabris vel breviter albido-setulosis, internodiis nudis brevissimis usque 2 cm. longis cespites parvos et laxos formans, *A. Chamaejasme* simillima. Folia rigidula, laete viridia, basi non vaginato-dilatata, marginibus ciliis subremotis erecto-patulis, rigidis, hyalinis, latitudine dimidia brevioribus fimbriata et hic illic medio dorso quoque obsita, ± dimorpha, exteriora linearilingulata, rotundata, basi late sessilia, interiora elliptica, plerumque sensim longiora, acutiuscula, deorsum angustata et late linearia, 2½ usque ad 8 mm. longa et ad 1½ (illa etiam 2) mm. lata, sicca scarioso-alba, costata et venosa, marginibus paululum incrassatis. Scapi singuli, tenues, 4–40 mm. longi, sicut umbellae 1–3-florae hirsutuli et subsessili-glandulosi. Bracteae late ovatae, raro ovato-oblongae, cucullato-rotundatae, basi saccatae, herbaceae, margine dense villoso-ciliatae, pedicellis tenuibus 2½–9 mm. longis demum usque triplo breviores. Calyx cupuliformis, 3–3½ mm. longus, basi saccatulus, infra medium in lobos late ovatos rotundatos partitus, herbaceus, saepe ruber, nervis inconspicuis. Corolla carnosula, rosea, tubo subgloboso, incluso, annulo orali angusto valde elevato, limbo patulo 7–9 mm. diametiente, fere ad basin in lobos late obovatos, rotundatos usque subemarginatos fisso. Antherae minutae, orbiculares, medio tubo subsessiles. Ovarium globosum; stylus 1 mm. longus, tenuis. Capsula calycem aequans.

Syn.: *A. mucronifolia* var. *typica* Pax et Hffm. in Fedde, Repert., Beih., xii (1922), 459, p.p.

A. Chamaejasme Hand.-Mzt. in Acta Hort. Gothobg., ii (1926), 115.

N.W. Szechuan. Mountains around Sungpan. Weigold. Mount Dongrergo near Sungpan, in snow valleys above Hwang lung ssu, ab. 4,300 m. H. Smith 3915. W. Tachienlu. Gi-la Pass. Limpricht 1656a.

S.W. Kansu. In the fine grass of the topmost arêtes and saddles from Thundercrown to the Min S'an Alps, at 13–14,000 ft. Farrer 142.

This species was before mistaken by me for the true *A. Chamaejasme*, which, although very similar in habit, differs by trimorphic leaves and stouter and longer scapes. It is similar to a plant collected by

Harriss, Chitral Rel. Exp. 16352, and edited as *A. villosa*, but lacks the glands on the leaves which are characteristic of this and all the Himalayan "*villosa*" forms; it also has stronger hairs and a quite different umbel. Harriss' plant differs considerably from the other Himalayan "*villosae*" by the short, sparse and equally distributed indument and may be an undescribed species. *A. flavescens* Maxim. seems also to be related, the plant from the Kurab Su, 2,950 m., and Kan Jailok, 3,180 m., in N.W. Tibet, collected by Zugmayer and published by Keissler in Ann. naturh. Hofmuseum Wien, xxii, 29 as *A. Hookeriana*, being that species.

28. **A. yargongensis,** Ptmgn. in Bull. Herb. Boiss., 2 sér., viii (1908), 367.

Surculi crassiusculi, glabri, hic illic papillosi, ascendentes, fusci, ramosi, internodiis 4–15 mm. longis nudis, parce radicosi, cespites pulvinatos usque ad 14 cm. altos formant. Folia in nodis rosulata permulta, coriacea, basi vix dilatata, apice saepe rubescentia, sicca spadicea reflexa persistentissima; exteriora 3–7 mm. longa rotundata usque acuta, marginibus remote ciliata, sparsissime sessili-glandulosa; interiora (raro praesentia) sensim paulo maiora, elliptica, 5–9 mm. longa et 1.5–2 mm. lata, molliter ciliata dorsoque ± pilosa. Scapi singuli, validiusculi, sat dense villoso-hirsuti et subsessili-glandulosi. Umbella villoso-hirsuta et subsessili-glandulosa. Bracteae pedicellos vix 2 mm. longos superantes, ovatae, interdum ± glabrescentes. Calyx poculiformis, 2–2.5 mm. longus, fere ad medium in lobos anguste ovatos fissus, nervis 1 pro lobis, paulum conspicuis. Corolla 7–10 mm. diametro, rosea, in lobos rotundatos marginibus contiguos fissa, carnosa, sicca densissime papillosa, annulo orali tenui prominulo. Stylus staminaque inclusa. (Capsula ignota.)

TYPUS: Folia exteriora lineari-elliptica, breviuscule et apice confertius longiusque ciliata. Scapi .5–2 cm. longi.

Syn.: *A. microphylla* Maxim. in Mél. biol., xii (1888), 752, non Hook. f.

A. mucronifolia var. *typica* Knuth in D. Pflzr., IV 237, 188 p.p.—Pax et Hffm. in Fedde, Repert., Beih. xii (1922), 460 p.p.—Hand.-Mzt. in Act. Hort. Gothobg., ii (1926), 115.

Kansu. Terra Tangutorum. Przewalski in herb. Kew.

W. Szechuan. Dongrergo near Sungpan, earthy alpine meadows, ab. 4,500 m. (H. Smith 3138). Mountains around Sungpan (Weigold) Hautes Montagnes, Zambala, Yargong, Prov. Batang (Soulié 5225). Beyü—Batang, rocks above the Mä-la pass, 4,950 m. (Limpricht 2332). Tachienlu: Sheto, stony slopes beneath the Laniba Pass on the way to Kiaki, 3,900–4,200 m. (Limpricht 1711b.)

var. **stenophylla** Hand.-Mzt., l.c. pro var. *A. mucronifoliae.*

Folia exteriora anguste linearia, brevissime papilloso-ciliata. Scapi 1.5–2.5 cm. longi. Calyces margine tantum barbato-ciliati.

W. Szechuan. Hsueh shan near Sungpan, alpine meadow, 4,100–4,300 m. H. Smith 3371.

I have received an excellent photograph of Petitmengin's type showing clearly the strong cilia to the leaves, their thick texture and incurved tips from which I have no doubt about the identity, and cannot agree with M. Gagnepain who wants to bring it into relation with my *A. mollis* and considers the plant treated of here and sent to him under the provisional name of *A. cephalantha* H.-M. identical with a N.W. Himalayan form of *A. villosa.* There is in the copious Kew material of the latter no specimen comparable with *A. yargongensis* as conceived here.

This species was mistaken by me for *A. mucronifolia* from Pax and Hoffmann's determination and the scantiness of the material of true *A. mucronifolia* I had before me. This is, as I now see from the rich Kew and Berlin material, very different by all the leaves being equal, much stronger, with longer cilia and invariably with one incurved mucro which has a long and later deciduous tip, and by having glandtipped hairs in addition to the hirsute indument on the scapes. The umbel of our plant recalls *A. Graceae.* The inner leaves are rarely, and in the variety not at all, evoluted, whence it is especially interesting.

There is a similar plant, certainly representing a new species and also comparable with *A. mucronifolia,* but with leaves of very different size, in Turkestan : Chanat Kokand (O. Fedtschenko in Herb. Berlin). The specimen I have seen is, however, too poor for description.

A. nepalensis Derg. (*A. Lehmannii* Wall., non *A. Lehmanniana* Sprg.) is most probably somewhat remotely allied to this.

A. Harrissii Duthie with leaves quite glabrous represents a distinct subseries in this vicinity.

Series Mucronifoliae Hand.-Mzt.

29. **A. Mairei** Lévl. in Bull. Géogr. bot., xxv (1915), 40.

Syn. : *A. Hookeriana* Knuth, l.c., 187 p.p. (the Chinese plants).

From the Tsinling shan range to N.E. Yunnan ; rocks in the mountain forest region.

Shensi. Purdom ; Giraldi 4660, 4661, 4662 ; Erb. Biondi 843.

W. Hupeh. Wilson 2060.

N.E. Szechuan. Farges.

N.E. Yunnan. Maire 109/1913 p.p.

Although in habit very similar to the Himalayan *A. Hookeriana,* it is quite different from it, the leaves being only dimorphic by complete

absence of the bud scales, the indument being also somewhat different. It also resembles *A. Limprichtii*, which differs by a nervose calyx, trimorphic leaves, and penicillate indument of the outer leaves, while it is always bigger. Its next ally is *A. Mariae*, and it may perhaps more or less run into this.

30. **A. Mariae** Kanitz in Wiss. Erg. R. Széchenyi Ostas., ii (1891), 714.
Handel-Mazzetti in Acta Hort. Gothobg., ii (1926), 113.

The typical form is rare, occurring only in Kansu and N.W. Szechuan (Lócsy 79c ; Weigold ; H. Smith 2488 p.p.), and is little more than a slight individual variation of the much commoner variety, *tibetica*.

To the type belongs *f. ubera* Hand.-Mzt. in Act. H. Goth., l.c. 114 (*A. tibetica* var. *ubera* H.-M., in Sitzgsanz. Ak. Wiss. Wien 1924, 136), the most fully developed specimens of which possess distinctly dimorphic leaves, but, from the rich materials seen since, this character hardly appears to be of any systematic value.

var. **tibetica** (Maxim.) Hand.-Mzt. in Act. H. Gothobg., l.c. 114.

Syn. : *A. sempervivoides* var. *tibetica* Max. in Bull. Acad. St. Petbg., xxxii (1888), 502.

A. tibetica var. *Mariae* Knuth in D. Pflzr., IV, 237 (1905), 187. Fig. 45B (bad).

A. longifolia Knuth in Fedde, Repert., ii (1906), 66, in Filchner, Exped., 261.

A. Hookeriana Pax et Hffm. in Fedde, Repert., Beih. xii (1922), 459.

From S. Shansi (Chieh hsiuh) to the Kuku-nor and Tachienlu, subalpine and alpine.

Shansi. H. Smith 5815.

S. Shensi. Purdom.

Kansu. Przewalski ; Potanin ; Futterer et Holderer 86, 98, 104 ; Filchner 44a ; Purdom ; Ridley 6, 10 ; Farrer 143, 328 ; Licent 3865.

Szechuan. Wilson 4005 p.p., 4007 p.p. ; Soulié 317, 1029 ; Weigold; H. Smith 2488 p.p. ; Limpricht 1826.

Besides the variability in indument there is a considerable one in the heterophylly, either little or very obvious. Shoots from the scapiferous rosettes are rare. Purdom's plant from Minchow (Herb. Kew) has up to 6 scapes from one rosette, the central one stouter than the others, as is seen in the species of the *Aizoidium* section. There is, however, no question of close affinity with the latter. From the rules of nomenclature *A. Mariae* is the valid name for the species, although it is *filius ante patrem*.

As I have pointed out in the Acta Hort. Gothobg. l.c., the W. Himalayan *A. himalaica* (Kn.) Hand.-Mzt. (*A. tibetica* var. *himalaica* Knuth) is a distinct species, differing by its glandular pilose umbel and thicker and more rigidly ciliate leaves.

A. sempervivoides Jacquem. and *A. mucronifolia* Watt have no doubt their affinity with this. The latter, so often indicated for China, is confined to India from Kashmir to Chitral.

31. **A. longifolia** Turcz. in Bull. Soc. nat. Moscou, v (1832), 202. Knuth in D. Pflzr., IV, 237 (1905), 187.

Manchuria, S. Mongolia, W. and S. Kansu.

Kansu. Przewalski; Licent 3667.

var. **decipiens** Hand.-Mzt.

Surculis elongatis, crassis, pauciramosis, praeter partes basales cataphyllis et vaginis foliorum mortuorum spadiceis dense tunicatis cespites laxos 4–versus 20 cm. altos formans. Folia ellipticolanceolata, usque ad 7–10 × 2½–3 mm. Calyx ± distincte costatus.

S. Kansu. Locally abundant on hot dry rocks and slopes of gravel and conglomerate about Siku, 4,500 ft., passing out of flower May 22 1914. Farrer 94.

The variety differs considerably in both habit and leaf shape from the type and may prove later a distinct species. Thus far I have seen too few specimens of the latter to decide.

32. **A. alaschanica** Maxim. in Bull. Ac. St. Petbg., xxxii (1888), 503. Knuth l.c. (1905) 199, fig. 47A.

Kansu-Mongolian border: Alashan. Przewalski.

A. squarrosula Maxim., of more western distribution, has its affinity here.

Series Hookerianae Hand.-Mzt.

33. **A. Limprichtii** Pax et Hffm. in Fedde, Repert., xvii (1921), 193.

Syn.: *A. sarmentosa* var. *Watkinsii* Knuth l.c. (1905), 183 p.p. (the Chinese plant).

W. Szechuan. Tachienlu country, subalpine. Soulié 316, 809, 853, 2930, 2931, 2932; Pratt 539, 702; Wilson, Veitch Exp. 4005 p.p., 4006; Limpricht 1636, 1725.

Tibet. Chog La Karma vall., 15,000 ft., stony soil. Norton, Mt. Ever. Exp. 1922, 247 (a small and dwarfer plant most probably belonging here).

var. **laxiflora** (Petitmgn.) Hand.-Mzt.

Syn.: *A. sarmentosa* var. *laxiflora* Ptgn. in Bull. Herb. Boiss., 2. sér., viii (1908) 368.

Tachienlu. Soulié 2245.

The variety may perhaps be considered as forming a link between *A. Limprichtii* and *Mairei*. There is also one abnormal specimen showing a leaf rosette half way up a flower scape, arising either by a concaulescence or by premature development of a scape from a rosette of the same year.

The species differs from *A. sarmentosa* Wall. by the smaller size, outer leaves spathulate-rounded, not ovate, and much less hoary,

and the inner long stalked. Var. *β yunnanensis* Kn. is *A. mollis* (see below). *A. Chumbyi* Hort. is a hybrid, probably of garden origin, between *sarmentosa* (or rather *primuloides*, I think) and *villosa*, as Prof. W. W. Smith informs me. As regards the plant cultivated at present under this name in the Vienna botanic garden, this interpretation appears well founded.

A. Hookeriana Klatt, a plant endemic in Sikkim and Chumbi, has its affinity here but differs by being much smaller and more glabrous with inner leaves spathulate-obovate or almost orbicular. It looks more like *A. Mairei* in habit. From the next it differs by the cataphylls soon becoming dark brown and—besides the leaf-shape mentioned—by the much longer, stoloniform shoots. Moreover, in the rich Berlin material I have not seen a single specimen with a cauline leaf, although the presence of such leaves is given by Knuth as a diagnostic character.

34. **A. rigida** Hand.-Mzt. in Sitzgsanz. Akad. d. Wiss. Wien (1924), 136.

Descriptio completa : Surculis ascendentibus, rigidis, crassis, usque ad 2 mm. diametientibus, spadiceis, internodiis nudis .5–4 cm. longis, primum albo-, serius brunneo-hirsutis cespites laxe pulvinatos usque 20 cm. altos format. Folia crassiuscule herbacea, marginibus pilis saepe inaequalibus et partim folii latitudinem superantibus crebre et patenter hyalino-ciliata saepeque laminae dorso imprimis costa longe breviusque strigoso-pilosa necnon interiora supra breviter hirtella, trimorpha, extima laminis lingulato-linearibus brunneis saepe valde reductis alte carinatis, deorsum in vaginas late albo-membranaceas dilatata, media et intima evaginata, intense vel subcaesio viridia, illa lingulato-oblonga vel spathulata, rotundata, late sessilia, exterioribus± aequilonga, intima elliptica vel lanceolata, subpetiolato-angustata, obtusa, illis demum duplo longiora, 3½–13 mm. longa, annotina brunnea, carinata. Scapi singuli, 5–45 mm. longi, rigiduli, cum umbellis 1–7-floris copiose sparseve hirsuti et raro sparseque subsessili-glandulosi. Bracteae herbaceae, lineari-lingulatae, pedicellis 1–6 mm. longis breviores usque calyces subaequantes, basi paululum saccato-dilatatae. Calyx cupulari-turbinatus, basi vix truncatus, 3–3½ mm. longus, hic et sinubus pro maxima parte membranaceus, circiter ad ½ in lobos oblongo-ovatos, rotundatos fissus, subenervius. Corolla rosea, tubo subgloboso incluso, limbo expanso 5–10 mm. diametiente, fere toto in lobos suborbiculares vel late obovatos undulatos vel subemarginatos fisso, annulo orali atriore, elato. Antherae ovatae, infra tertium superum tubi subsessiles. Stylus crassus, vix 1 mm. longus. Capsula calycem paululo excedens.

Syn. : *A. mucronifolia* Forrest in Not. Roy. Bot. Gard. Edin., iv (1908), 233.

N. Yunnan and S.W. Szechuan, subalpine and lower, xerophytic.

Szechuan. Handel-Mazzetti 2504 ; Schneider 1336.

Yunnan. Maire 109/1913 p.p. ; Forrest 2127, 5651, 5695, 5738, 5738a, 10038, 23062 ; Ward 263 ; Handel-Mazzetti 6692 ; Schneider 1855 ; Rock 3474, 3562, 8189, 8328.

Although this is a very characteristic species, it is quite variable in relative breadth of the leaves as well as in the amount of indument. In Forrest's numbers 5738 and 5738a there are specimens, collected no doubt side by side, which are on the one hand loosely cespitose with relatively big leaves and short pubescence, and on the other almost pulvinate with small leaves and longer pubescence (particularly dense in the young shoots which are not developed in the other form), thus presenting quite a different aspect, although certainly conspecific.

var. **minor** Hand.-Mzt.

Planta parva. Indumentum rigidius. Folia usque ad 6 mm. tantum longa ; vaginae exteriorum laminis paulo latiores.

Syn. : *A. mucronifolia α typica* Knuth in D. Pflzr. IV, 237, 188 p.p.* Pax et Hffm. in Fedde, Repert., Beih., xii (1922), 459 p.p.

S.W. Szechuan. From N.W. of Tachienlu southwards. Soulié 2244 ; Pratt 734 ; Limpricht 1793, 1925 ; Handel-Mazzetti 2654 ; Schneider 3547 ; Rock 6480.

N.W. Yunnan. Lichiang. Handel-Mazzetti 4129.

The variety is of course a high alpine form, but it may also inhabit a more nothern district than the type, although that cannot yet be confirmed, as the country between Muli and Wali on one side and Tachienlu on the other is unexplored. I do not like to regard as this variety all such smaller specimens as are naturally found in higher situations, but only those plants with reduced sheaths of the cataphylls, which is a more significant character.

35. **A. mollis** Hand.-Mzt. in Sitzgsanz. Akad. Wiss. Wien (1924), 136.

Descriptio completa ; Surculis ascendentibus, tenuibus, rigidulis, raro ad 1 mm. crassis, spadiceis, internodiis nudis 4 mm.–3½ cm. longis primum albo-, cito brunneo-longipilosis, mox glabris cespites pulvinatos ± latos densosque, usque ad 10 cm. altos formans. Folia tenuiter herbacea, saturate viridia, mollia, pilis hyalinis patentibus marginibus necnon costa densiuscule et antice densius flexuoso longiciliata et interiora faciebus parcius hirsuta, dimorpha, exteriora obovato-cochleata, 2½–5 mm. longa, late rotundata, basi in vaginas subherbaceas indistinctas late lineares nec dilatatas paulum angustata, interiora iis aequilonga usque subduplo longiora, transitoriis vix ullis, latius obovata, obtusa vel rotundata, ad basin anguste sessilem sensim angustata, annotina spadicea, costae tenuis basi incrassata saepe diutius persistente. Scapi singuli, raro usque ad 3, tenues, 3–50 mm. longi, cum umbellis 2–7-floris longe hirsuti et brevistipitato-glandulosi. Bracteae herbaceae, lineares vel lineari-lingulatae,

* As to Pratt's No. 734, which, however, is quoted again under *A. chamaejasme* var. α *typica*.

pedicellis tenuibus 1–6 mm. longis initio duplo longiores, serius aequilongae vel breviores, sub fructu etiam subtriplo breviores, basi brevissime saccatae. Calyx cupularis, 2½–3 mm. longus, herbaceus, basi saccatus, ad medium vel minus in lobos late ovatos, rotundatos fissus, marginibus et vittis e sinubus angustis decurrentibus saepe submembranaceis, subenervius. Corolla pallide vel intensius rosea, disco atriore, tubo subgloboso incluso, limbo patulo, 5–9 mm. diametiente, fere toto in lobos late obovatos, late rotundatos usque subemarginatos fisso, annulo orali paulum prominuo. Antherae oblongae, filamentis brevibus medio tubo insertis, faucem attingentes. Stylus crasssus, .5 mm. longus. Capsula calycem aequans.

Syn.: *A. sarmentosa* var. *yunnanensis* Knuth in D. Pflzreich., IV, 237 (1905), 183.

A. Chamaejasme Forrest in Not. Roy. Bot. Gard. Edin., iv (1908), 233.

W. and N.W. Yunnan to the Brahmaputra knee in Tibet, subalpine and alpine, not on limestone, it seems. Delavay 69, 1037, 1038, 2800; Forrest 477, 1810, 7370, 14263, 14917, 19307; Ward 80, 5768, 6963; Limpricht 1036*; Handel-Mazzetti 8896, 9280; Rock 8733.

Apart from *A. brachystegia*, *A. mollis* of all the Chinese species most resembles *A. Chamaejasme*. It is somewhat strange that Knuth placed it under *A. sarmentosa*, whence I could not anticipate that his var. *yunnanensis* is this plant. Apart from the foliage being trimorphic in *A. Chamaejasme*, although not very obviously so, *mollis* differs from that species in the thinner texture of its broader and more rounded leaves with still stronger hairs, and, like all the related Chinese species (*A. Lehmanniana* excepted), by the short and slender scapes. Forrest's No. 7370 possibly forms a transition to the former species.

36. **A. lutea** Hand.-Mzt.

Surculis ascendentibus, rigidis, ultra .5–fere 1 mm. crassis, atro-spadiceis, internodiis nudis 3–20 mm. longis, hornotinis albo-, annotinis brunneo- longe et dense hirsutis, sero glabrescentibus pulvinos laxius culos muscis hepaticisque intertextos, usque ad 5 cm. altos, 10-25 cm. diametientes formans. Folia herbacea, saturate viridia, mollia, pilis hyalinis patentibus, dimidio eorum diametro longioribus marginibus praesertim antice densissime pectinato-ciliata et dorso quoque obsita, dimorpha, exteriora obovato-cochleata, 3–5 mm. longa, late rotundata, basi in vaginas subherbaceas, indistinctas, late lineares nec dilatatas paulum angustata, saepe in surculis hornotinis tantum evoluta, annotina spadicea, costis inferne incrassatis. Scapi singuli, rigiduli, 5–25 mm. longi, cum umbellis 3–5-floris longe hirsuti et parce brevistipitato-glandulosi. Bracteae herbaceae, lineari-oblongae, pedicellis 2–5 mm. longis subaequilongae usque duplo longiores, basi valde hirsuta minute saccatae. Calyx turbinato-cupularis, 3 mm. longus,

* This No. was cited by me l.c. erroneously under *A. rigida*.

basi anguste truncatus, paulum ultra $\frac{1}{3}$ vel vix ad $\frac{1}{2}$ in lobos semiorbiculari-ovatos fissus, marginibus et vittis latissimis e sinubus decurrentibus submembranaceis, subenervius. Corolla carnosula, aurantiaco-lutea, tubo subgloboso, incluso, limbo expanso, 6–7 mm. diametiente, fere toto in lobos suborbiculares fisso, annulo orali lato, prominuo. Antherae oblongo-ovatae, supra medium tubi subsessiles, faucem attingentes. Stylus crassus, $\frac{2}{3}$ mm. longus. (Capsula ignota.)

N.E. Upper Burma. Near the Yunnan frontier. Hpawshi Bum, 12,600 ft. (Farrer, June 1919, No. 1059). W. flank of the N'Maikha–Salwin divide, long. 98° 48′ E. : W. flank of the Chimi-li, 26° 21′ N., on moist stony banks amongst rhododendron scrub, 12,000 ft. (Forrest, June 1924, No. 24558). N. of the Chimi-li, 26° 35′, on screes and ledges of cliffs, 12–13,000 ft. (Forrest, June 1925, No. 26830).

There are but two yellow flowered Androsaces described besides the somewhat mysterious *A. triflora* Ad. (see above under *A. Lehmanniana*), namely: *A. flavescens* Maxim. and *A. aurata* Ptgn. Both are far from the plant described here, which is next to the foregoing and but very little different except by the flower colour.

Series Strigillosae Hand.-Mzt.

37. **A. Forrestiana** Hand.-Mzt.

Perennis, praeter umbellam ubique pilis albis articulatis hirsuta et cum illa tenuiter subsessili-glandulosa, stolonibus paucis e rosulis scapiferis ortis, rigidulis, $2\frac{1}{2}$–$4\frac{1}{2}$ cm. longis, nonnisi apice penicillato-hirsuto rosulato-foliatis, non radicantibus laxe cespitosa.* Folia lanceolato-obovata, herbacea, caesioviridia, marginibus densius ciliato-hirsuta, dimorpha, exteriora late sessilia, obtusa, sicca fulvida, interiora eis sensim ± triplo longiora, usque ad 3 cm. longa et 6 mm. lata, in petiolos alatos ideoque indistinctos attenuata, apiculata. Scapi singuli, 22–33 cm. longi, validiusculi, erecti. Umbella 9–13 flora. Bracteae lanceolatae, ad 5 mm. longae, herbaceae, basi paululum scarioso-saccatae. Pedicelli inaequales, 7–20 mm. longi, tenues, suberecti. Calyx 3 mm. longus, turbinatus, basi truncatulus, ad $\frac{1}{2}$ vel paulo profundius in lobos ovatos, obtusos, margine paulum membranaceos et dense villoso-ciliolatos fissus, striis membranaceis e sinubus angustis breviter decurrentibus, costulis prominulis 3 pro lobo percursus. Corolla pallide rosea (e nota collectoris), tubo obovoideo calycem paulo excedente, 2 mm. crasso, ore constricto annulo tenui coronato, limbo 7 mm. diametiente $\frac{3}{4}$ in lobos obovatos, leviter emarginatos vel obcordatos fisso. Stamina medio tubo inserta, antheris orbicularibus inclusis filamenta aequantibus. Ovarium glabrum. Stylus crassus, 1 mm. longus. Capsula ignota.

* The plant has not been collected quite completely, consequently the mode of growth is not very well shown. Whether the leaves are only dimorphic, which, however, is very probable, also needs confirmation.

N.W. Yunnan. Around Atuntze, Lat. 28° 20′ N., shady situations by streams, 11,500 ft., June 1917. Forrest 14122.

This species is similar to *A. Limprichtii*, but has two kinds of leaves only, the outer ones of a different shape and indument, and much longer scapes.

38. **A. Wardii** W. W. Smith in Not. Roy. Bot. Gard. Edin., viii (1913), 129.

Syn.: *A. sarmentosa* var. *thibetensis* Petitmgn. in Bull. Ac. Géogr. bot. xviii (1908), p. 337.

? A. sarmentosa var. *stenophylla* Petitmgn., l.c.

N.W. Yunnan. From the Bei ma shan to the Tibetan frontier and N. of Atuntze, high alpine. Ward 170, 760, 842; Forrest 13994, 14084, 16437, 19602, 20595; Rock 10333.

W. Szechuan. S.E. of Batang. Soulié 3807.

Besides the preceding and following species it is not far removed from *A. Mairei* amongst the Chinese ones, but is more carpet-like, hardly stoloniferous and not creeping, with the leaves on the average bigger, not stalked, and with a different indument. With its large and intensely coloured flowers it also somewhat recalls *A. euryantha*.

The nearest ally, however, is the Himalayan *A. strigillosa* Franch., which differs by a longer indument (although also mixed with glands or traces of such), much bigger size and longer scapes.

From the rather poor description, *A. sarmentosa* var. *stenophylla*, which I have not seen, probably also belongs here, as the dimensions given for the leaves match some of the type specimens as well as Forrest's No. 14084, but the scape up to 14 cm. long would exceed the measurements of those specimens seen by me.

39. **A. spinulifera** (Franch.) Knuth in D. Pflzreich., IV 237 (1905), 184.

Syn.: *A. strigillosa* var. *spinulifera* Franch. in Bull. Soc. bot. Fr., xxxii (1885), 10.

A. Prattiana Knuth, l.c. (1905).

From W. Szechuan (Tachienlu) through N.W. Yunnan, not down to Tali. Also in E. Yunnan near Mile. Dry mountain meadows.

Szechuan. Soulié 888, 2929; Orleans; Pratt 571; Schneider 1456; Handel-Mazzetti 2509, 2993; Forrest 21242, 21441, 22427, 22947; Limpricht 1717, 1894; Rock 5584; Wilson, Arnold Arb. Exp. 1010.

Yunnan. Delavay 53, 1106; Forrest 2081, 5612, 9962, 10051, 10495, 20773, 20948; Schneider 3493; Handel-Mazzetti 3160, 3271, 4127, 6400; Py, ed. Bonati 570; Rock 3232, 3332, 3467, 3827, 5131, 5133, 8585, 9256, 11411; Ward 82.

A plant highly variable in size in response to environment, and also

somewhat variable in the shape of leaves, but very constant in all other characters. Full grown leaves vary from 10×2 mm. to 160×28 mm. and 180×23 mm. *A. Prattiana* falls within the limits of variation observed in Yunnan, as already stated by Stapf in Bot. Mag., tab. 9072. Other differences than those of the leaf shape are not actually present in Knuth's key or description, for "brevissime," applied to the indument, is in no contradistinction to "dense." Moreover he quotes Pratt's No. 571 under both species. Strangely enough, he speaks of the outer leaves as "folia juvenilia."

Another species of this affinity was discovered by K. Ward in Tibet. If it were not sufficiently characterized by the peculiar glandular-setose indument of the dense umbel it could be taken for a compact mountain form of *A. strigillosa*, somewhat more compact and longer setose specimens of which were gathered by the same collector under No. 5726. In shape and indument of the middle leaves, however, the new species also differs distinctly. In measurement it also somewhat recalls *A. Hookeriana*. It may be appropriately described here.*

Series Sublanatae Hand.-Mzt.

40. **A. sublanata** Hand.-Mzt. in Sitzgsanz. Akad. d. Wiss. Wien (1924), 135.

Descriptio completa: Rhizoma descendens, tenue, mono- vel oligocephalum, sub rosulis foliorum mortuorum fragmentis demum longe involutum. Folia dimorpha, exteriora cochleari-oblonga, rotundata, 7–17 mm. longa, solo adpressa, interiora obovata vel obovato-lanceolata, iis 3–3½-plo longiora, obtusa vel acutiuscula, basi sensim et interdum in petiolum indistinctum late alatum angustata, suberecta, omnia herbacea, laete viridia, utrinque et praesertim margine sicut scapi singuli, graciles, 11–30 cm. longi laxe villoso-sublanata necnon hic illic glandulis brevistipitatis obsita. Umbella 3–11-flora, pedicellis tenuibus, erectopatentibus, fructiferis patulis apice sursum curvatis, 13–40 mm. longis, sicut calyces bracteaeque glandulis

*A. adenocephala Hand.-Mzt.

Surculi crassi internodiis brevissimis usque ad 8 mm. longis, superne foliis mortuis flaccidis fuscis involuti cespites laxos formant, radicibus longissimis rigidis. Folia rigidula, trimorpha, basi sensim vaginato-dilatata, extima subscariosa brunnea marginibus inferne albida, triangulari-lanceolata, 5–7 mm. longa et ad 2 mm. lata, acuta, superne brevissime papilloso-strigillosa, cetera pallide viridia, media sensim paulo maiora, lingulato-linearia, subrotundata, pilis albis apice ad 1 mm. longis penicillato-hirsuta, intima rhombeo-oblonga usque late obovata, obtusa, basi longius breviusve petiolato-angustata, tota utrinque dense strigoso-hirsuta. Scapus singulus, 2–5.5 cm. longus, validiusculus, sparsius hirsutus et parce sessiliglandulosus. Umbella 3–6-flora, capitata, villoso-hirsuta, pilis albis, plurimis glandulis saepe purpureis capitatis. Bracteae pedicellis 2–2.5 mm. longis dimidio vel subduplo longiores, lineari-lanceolatae, obtusae. Calyx cupularis, ad medium circiter in lobos ovatos, obtusos, tenuiter trinervios, apicibus purpurascentes fissus. Corolla 7–8 mm. diametro, rosea vel alba, centro viridulo-flava, in lobos suborbiculares profunde fissa, carnosula, sicca densissime papillosa. Stylus staminaque inclusa. (Capsula ignota.)

Rong-Chu (Tumbatse). Forms small clumps on steep alpine turfy slopes facing south, 14,000 ft. 18. June 1924. F. K. Ward 5800.

brevistipitatis minutis et pilis paucis his praesertim superne obsitis. Bracteae ellipticae, 2–5 mm. longae, herbaceae. Calyx poculiformis, 3–4 mm. longus, vix quinta parte vel ad ½ in lobos late ovatos vel ovatos obtusos fissus, sinubus scariosus, costis ternis a basi lobos percurrentibus. Corollae roseae tubus calycem aequans, fauce elato annulatus, limbus planus 8–9 mm. diametro, totus in lobos late obovatos, undulatos vel subemarginatos fissus.

N.W. Yunnan. Pine forest region. Delavay; Forrest 10913, 12769, 16447, 17136, 20557, 23087; Handel-Mazzetti 4130, 4351, 4412; Schneider 3349; Rock 5109.

41. **A. Rockii** W. E. Ev. in Not. Roy. Bot. Gard. Edin., xv (1926), 130.

N.W. Yunnan. Rock 9612.

Mr. Evans is, I believe, quite right in placing this plant with *A. sublanata*. It looks somewhat like a *sublanata* or *Limprichtii* lacking the inner leaves, and with a slightly different size, shape and indument of the outer ones.

Subsectio Andraspis (Duby, Bot. Gall., i 1828, 382 p.p.; Koch, Synops, 1837, 585; Knuth, l.c. 208 excl. *A. erecta*, pro sectione) Hand.-Mzt.

I fully agree with Lüdi's view (in Hegi, Ill. Fl. v. Mittel-Eur., V 3, 1927, 1789–1790), that the section *Andraspis* is derived from *Chamaejasme*, but I think the connection is so strong that the former cannot stand as a separate section. There are the European species *A. lactea* L., *carnea* L., *hedraeantha* Griseb. and *obtusifolia* All., which are remote from both *A. Chamaejasme* and *villosa*, as he also believes, and form a subsection which may be called *Dicranothrix* Hand.-Mzt. *A. lactea* has still the same mode of growth as *villosa*, yet *A. obtusifolia* is quite different and *carnea* somewhat intermediate between them. Without doubt *A. obtusifolia* forms the link with the biennial species which thus are of European origin rather than of Asiatic as Lüdi seems to believe. *A. maxima* L., however, which is somewhat isolated in the *Andraspis* subsection, may be an exception and have immigrated from the East.

Within the present subsection three more series can be distinguished, two of which are represented in China, the third, probably the oldest (*Multiscapae* Hand.-Mzt.), only in Europe and W. Asia. This comprehends *A. Chaixii* Gren. et Gdr., *albana* Stev., *armeniaca* Duby, *macrantha* Boiss. et Huet and *multiscapa* Duby, the latter showing the highest development in its treeshaped hairs, like *A. multiflora* (Vand.) Mor. (*imbricata* Lam.) in the subsection *Aretia*.

Series Septentrionales Hand.-Mzt.

42. **A. septentrionalis** L., Sp. plant. (1753), 142. Knuth l.c. 214 (var. *typica* Kn., p. 215).

Kansu. Licent 3996 in herb. Upsala and Vienna.

Appears not yet to have been recorded for China proper.

43. **A. lactiflora** Pall., Reise d. v. Prov. Russ. R., iii (1776), 244, 253. Knuth, l.c., 216.

N. Kansu border : Ala shan. Przewalski e Knuth l.c.

I have not seen the Chinese plant quoted by Knuth who also had not seen it. The difference between this species and the former as regards the direction of the calyx lobes in mature fruit indicated by this author does not exist. There are only a few wild grown specimens matching the commonly cultivated plant as figured in the Bot. Mag., t. 2022. Karo's plants, for instance, have the habit of *A. septentrionalis* with thin, straight and relatively short pedicels, but the corolla of *lactiflora* ; and the No. 325 of the Herbarium Florae Rossicae edited as *septentrionalis* is rather *A. lactiflora*, for in the size of the corolla and breadth of its lobes lies the only constant difference.

The other species of the series are American and include no doubt *A. arguta* Greene which from the description is by no means an *Euchamaejasme* as Knuth thinks.

Series Elongatae Hand.-Mzt.

44. **A. elongata** L., Sp. pl. ed. 2, ii (1763), 1668. Knuth, l.c. 213 cum varr. *typica* et *mongolica* Kn.

Kansu. Potanin e Maximowicz in Mél. biol., xii, 747 (*β nana* Duby).

I have not seen the Chinese plant. Knuth (l.c. 214) places it under his var. *mongolica*, the distinguishing features of which are not obvious.

45. **A. Engleri** Knuth in D. Pflzreich. IV, 237 (1905), 213.

S. Shansi and Shensi, Loess steppes ?

S. Shansi. Near the town of Yün ch'eng. Ssü ho in H. Smith 5528.

S. Shensi. Giraldi 842, 4663, 4664.

I have seen only H. Smith's specimens which quite match Knuth's description except that I can find no stellate hairs ; nor have they 2- to 3-radiate furcate ones as have the other species of this series.

46. **A. filiformis** Retz., Observ., ii (1781), 10. Knuth, l.c. 217.

Korea.

Manchuria. Komarow 1238. Perhaps also in China proper.

The other species are American except *A. intermedia* Ledeb. (*Raddeana* Somm. et Lev.).

Sectio Orthocaulon Hand.-Mzt.

Characters given in the key under 15a.

47. **A. erecta** Maxim. in Bull. Acad. St. Petbg., xxvii (1881), 499. Knuth, l.c., 209, 210, fig. 48.

From Kansu to N.W. and N.E. Yunnan, dry grassy places in the mountain forest region.

Kansu. Przewalski; Potanin.

W. Szechuan. Soulié 486, 791; Orléans; H. Smith 2299, 2507, 2678; Weigold; Wilson Veitch Exp. 4001.

Yunnan. Delavay 2094; Maire ed. Bonati 2621B; Forrest 121, 2738, 6231, 6270, 10529, 20551; Schneider 2357; Handel-Mazzetti 4275, 7707.

Maximowicz draws attention to the fact that this species has not a true umbel; but this is also the case in others of the *Andraspis* section. Knuth says (p. 209) "Folia—non rosulata," and (p. 210) that smaller specimens become in habit not unlike *A. septentrionalis*. The basal leaves are rosulate, of course, but they are mostly dead at flowering time. The plant is, I believe, far removed from *A. septentrionalis* and deserves a section for itself. In Pax's system (l.c. p. 17), where "Folia basalia et scapus centralis aphyllus vel plantae dense caespitosae" is opposed to the genera *Stimpsonia* and *Ardisiandra* with "Caulis—foliosus" the present plant would not fall within the genus *Androsace*, but on account of the want of differences in the generative organs it cannot be excluded from it.