

Appendix 1

Table A1. Plants used and collection data of the tribe Elsholtzieae. Herbarium abbreviations indicated in parentheses are followed by Thiers (2020). –: not applicable

Species	Collection data
<i>Collinsonia</i> L.	
<i>C. anisata</i> Sims	USA, Georgia, Anonym. 2022a (S)
<i>C. canadensis</i> L.	USA, Naugatuck, Eaton s.n. (S)
<i>C. punctata</i> Elliott	Without precise locality, Sidl s.n. (S)
<i>C. scabriuscula</i> Aiton	USA, Alabama, Anonym. 2029a (S)
<i>Elsholtzia</i> Willd.	
Sect. <i>Aphanochilus</i>	
<i>E. beddomei</i> C.B. Clarke ex Hook.f.	Myanmar, without precise locality, Cooper 5911A (UPS)
<i>E. blanda</i> Benth.	Myanmar, Kachin, Mokim s.n. (UPS)
	Myanmar, Shan state, Kang et al. 5868 (KB)
<i>E. cephalantha</i> Hand.-Mazz.	China, Sichuan, Smith 3437 (S)
<i>E. communis</i> (Coll. & Hemsl.) Diels	China, Sikang, Smith 13365 (UPS)
	Vietnam, Ha Giang, Do Van Hai et al. HG45 (KB)
<i>E. cyprianii</i> (Pavol.) S. Chow	China, without precise locality, Lai and Shan 2233 (TNM)
<i>E. flava</i> Benth.	India, Kumaon, Ram s.n. (S)
<i>E. fruticosa</i> Rehder	China, Yunnan, Wang and Tzeng 05947 (TNM)
	Myanmar, Shan state, Kang et al. 5767 (KB)
<i>E. incisa</i> Benth.	Myanmar, without precise locality, Meebold 17074 (S)
<i>E. myosurus</i> Dunn	China, Yunnan, Anonym. 22580 (S)
<i>E. penduliflora</i> W.W.Sm.	China, Yunnan, Henry 13253 (UPS)
	Myanmar Vietnam, Lao Cai, Do Van Hai et al. HLNP322
<i>E. pilosa</i> (Benth.) Benth.	India, Bengal, Anonym. 3973/1 (S)
<i>E. pubescens</i> Benth.	Indonesia, Sumbawa, Blomberg s.n. (S)
<i>E. rugulosa</i> Hemsl.	China, Sichuan, Smith 13420 (UPS)
	China, Yunnan, Xiang Chunlei et al. 528 (KH)
<i>E. stachyodes</i> (Link) Raizada & H.O.Saxena	China, without precise locality, Lai and Shan 585 (TNM)
<i>E. stauntonii</i> Benth.	USA, Pennsylvania, Brumbach 8022 (S)
	China, Peiping, Y. Liu 12675 (NY)
Sect. <i>Elsholtzia</i>	
<i>E. angustifolia</i> (Loes.) Kitag.	Korea, Chungcheongbuk-do, Hong et al. K2640-10 (KHUS)

<i>E. argyi</i> H. Lév.	Korea, Mt. Songni, Hong et al. 2944 (KHUS)
<i>E. ciliata</i> (Thunb.) Hylander	Without precise locality, Furuse s.n. (S)
	Without precise locality, Morariu 3247 (S)
	Korea, Mt. Gwangdeok, Hong et al. K2638-09 (KHUS)
<i>E. luteola</i> Diels	China, Yunnan, Maire 6758 (NY)
<i>E. minima</i> Nakai	Korea, Jeju-do, Hong k2641-13 (KHUS)
	Korea, Jeju-do, Hong k2641-27 (KHUS)
<i>E. nipponica</i> Ohwi	Japan, Tootoomi, Miyoshi 48506 (UPS)
<i>E. splendens</i> Nakai ex F. Maekawa	Korea, Mt. Songni, Hong 1002 (KHUS)
	Korea, Mt. Chungnyeong, Hong et al. 0412 (KHUS)
<i>E. strobilifera</i> Benth.	China, Yunnan, Tao 85386 (NY)
	Nepal, Hong et al. NE-760-1 (KHUS)
Sect. <i>Platyelasma</i>	
<i>E. densa</i> Benth.	China, Kashgar, Persson 578 (S)
<i>E. eriostachya</i> (Benth.) Benth.	Without precise locality, Fang 4409 (NY)
Keiskea Miq.	
Sect. <i>Eukeiskea</i>	
<i>K. japonica</i> Miq.	Japan, Musashi, Mizushima 494 (GH)
Sect. <i>Macrobracteatae</i>	
<i>K. elsholtzioides</i> Merr.	Without precise locality, Tao 102121 (MO)
<i>K. macrobracteata</i> Masam.	Taiwan, Taipei, Ho 1247 (TNM)
Mosla (Benth.) Buch.-Ham. ex Maxim.	
Sect. <i>Mosla</i>	
<i>M. dianthera</i> (Buch.-Ham. ex Roxb.) Maxim.	Japan, without precise locality, Anonym. s.n. (UPS)
	Korea, Mt. Bongwa, An et al. 1112 (KH)
<i>M. grosseserrata</i> Maxim.	Japan, Musashi, Ohwi 112 (UPS)
<i>M. hirta</i> (H.Hara) H.Hara	Japan, Kubokawa, Miyazaki 0310198 (KH)
	Japan, Susaki City, Taka Miyazaki 0310270 (KH)
<i>M. japonica</i> (Benth. ex Oliv.) Maxim. var. <i>japonica</i>	Japan, Shimosa, Hisauchi 1397 (UPS)
	Korea, Mt. Wolchul, Hwang et al. 81270 (KH)
<i>M. japonica</i> var. <i>thymolifera</i> (Makino) T.Yamaz. & Murata	Korea, Jeju-do, Park p0486 (KH)
	Korea, Busan, Kim et al. 2012-2-v390 (KH)
<i>M. punctata</i> Maxim.	Japan, without precise locality, Anonym. s.n. (UPS)
<i>M. punctulata</i> (J.F.Gmel.) Nakai	Japan, Musashi, Ohwi 113 (UPS)
	Korea, Incheon, Park 145409 (KH)

<i>M. scabra</i> (Thunb.) C.Y.Wu & H.W.Li	China, Jiangsu, Chow 80257 (UPS) China, Sichuan, Ming et al. 1819 (KH)
Sect. <i>Orthodon</i>	
<i>M. chinensis</i> Maxim.	China, Hunan, Li et al. 312 (UPS) Korea, Mt. Cheonbul, Chung et al. SGU0941 (KH)
<i>Perilla</i> L.	
<i>P. acuta</i> (Thunb.) Nakai	Without precise locality, Ber. s.n. (UPS) Korea, Oenarido, Park et al. 1013061 (KH)
<i>P. frutescens</i> (L.) Britton var. <i>frutescens</i>	Without precise locality, Anonym. s.n. (UPS) Korea, Jeju-do, Park et al. 145621 (KH)
<i>P. frutescens</i> var. <i>crispa</i> (Thunb.) H.Deane	Taiwan, without precise locality, Faurie 8075 (UPS) Korea, Gyeonggi-do, Yun 1145 (KH) Nepal, Maina, Polunin et al. 5594 (UPS)
<i>P. ocymoides</i> L.	
<i>Perillula</i> Maxim.	
<i>P. reptans</i> Maxim.	Japan, Kyushu, Makino 37181 (S) Japan, Kouchi, Taku Miyazaki 0310170 (KH)

Figure A1. Scanning electron micrographs of nutlet surface pattern in all investigated taxa in the tribe Elsholtzieae.

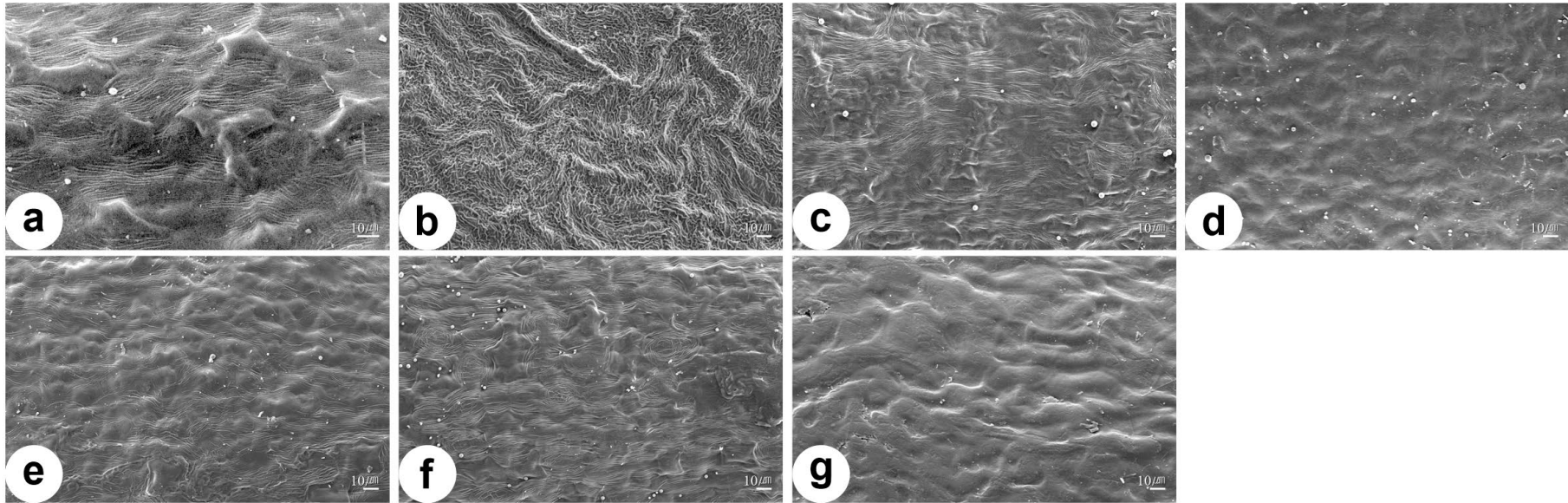


Fig. A1-1. Type I (undulate) microstructure of nutlets in the tribe Elsholtzieae. (a) *Elsholtzia beddomei*. (b) *E. cephalantha*. (c) *E. fruticosa*. (d) *E. pilosa*. (e) *E. pubescens*. (f) *E. rugulosa*. (g) *Perillula reptans*.

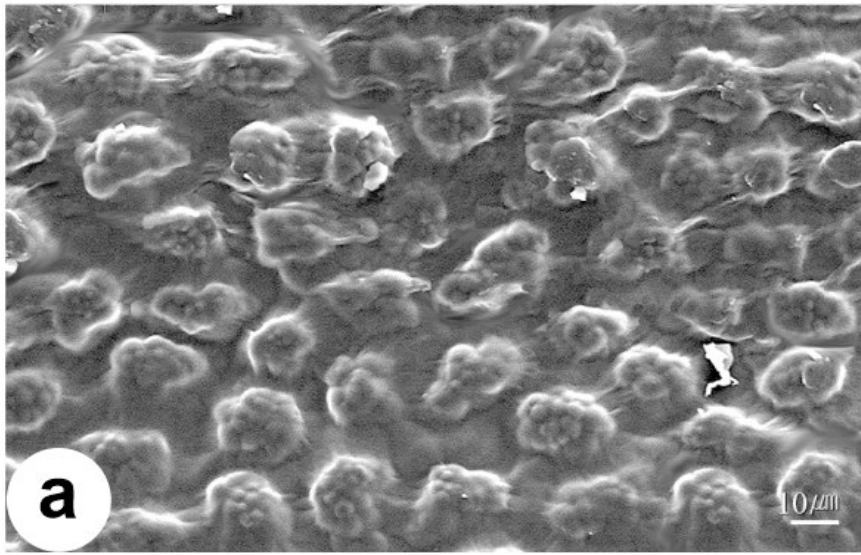


Fig. A1-2. Type II (papillae-like projection) microstructure of nutlets in the tribe Elsholtzieae. (a) *Elsholtzia communis*.

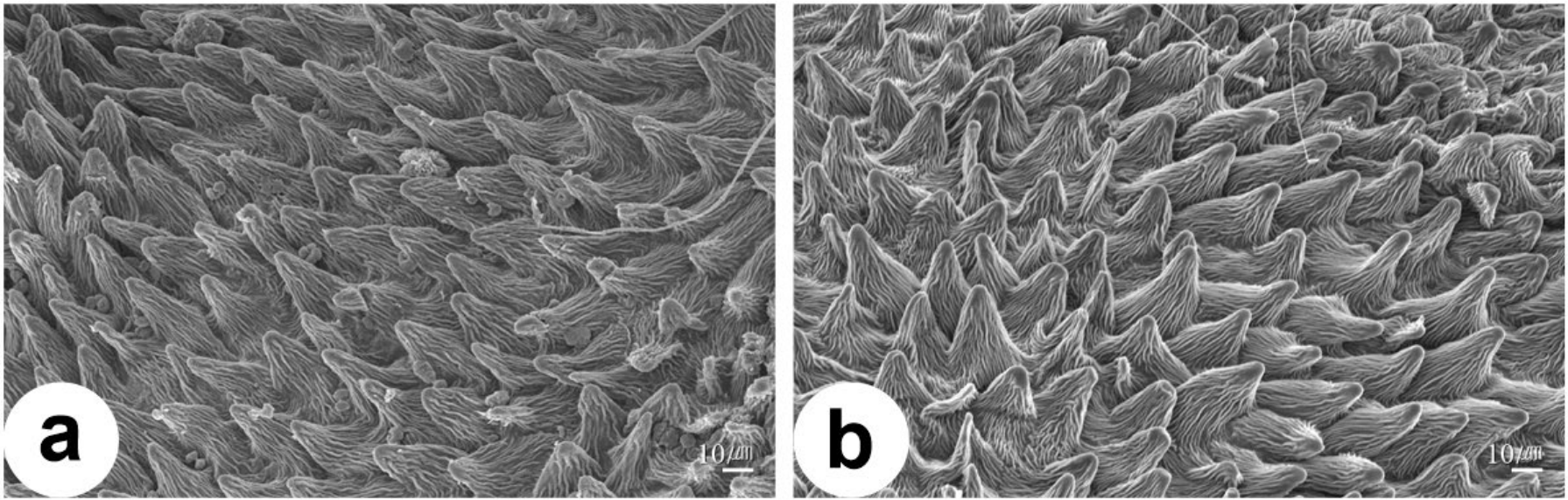


Fig. A1-3. Type III (tuberculate) microstructure of nutlets in the tribe Elsholtzieae. (a) *Elsholtzia densa*. (b) *E. eriostachya*.

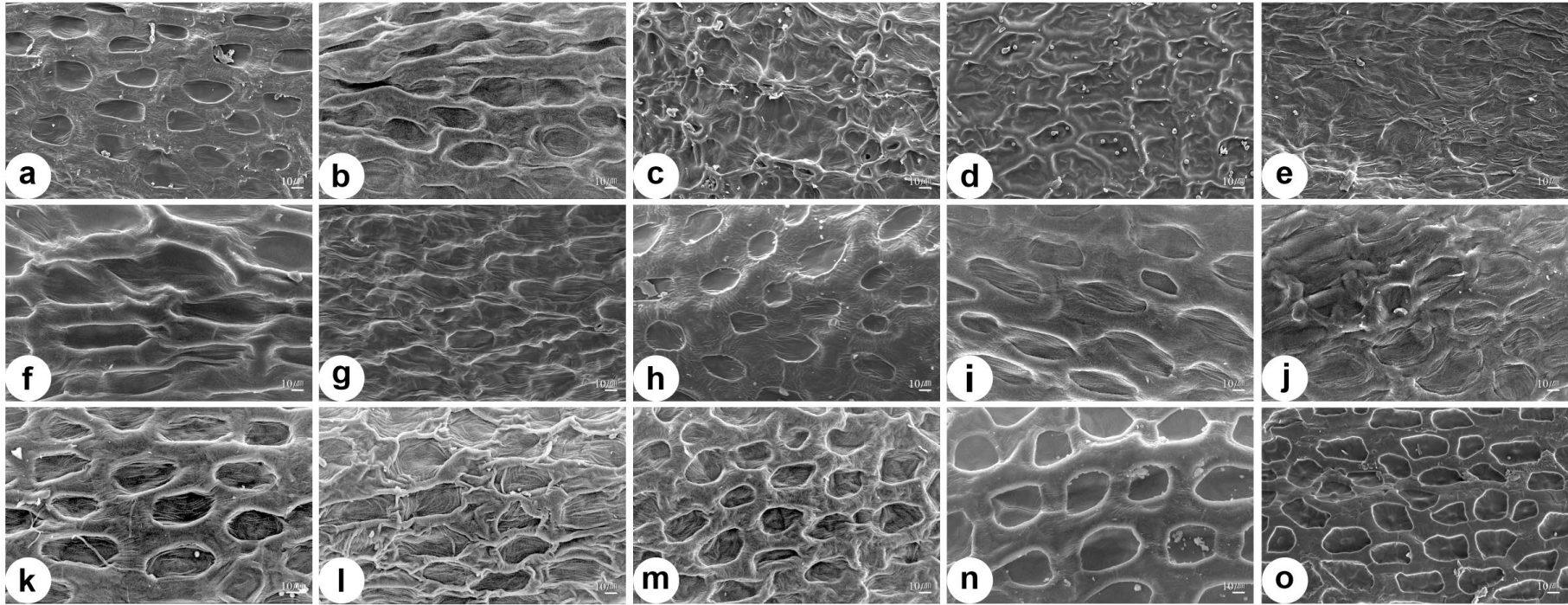


Fig. A1-4. Type IV-a (reticulate) microstructure of nutlets in the tribe Elsholtzieae. (a) *Elsholtzia blanda*. (b) *E. cypriani*. (c) *E. flava*. (d) *E. incisa*. (e) *E. myosurus*. (f) *E. stachyodes*. (g) *E. stauntonii*. (h) *E. angustifolia*. (i) *E. argyi*. (j) *E. ciliata*. (k) *E. luteola*. (l) *E. minima*. (m) *E. nipponica*. (n) *E. splendens*. (o) *E. strobilifera*.



Fig. A1-5. Type IV-b (reticulate-cellular) microstructure of nutlets in the tribe Elsholtzieae. (a) *Collinsonia anisata*. (b) *C. canadensis*. (c) *C. punctata*. (d) *C. scabriuscula*. (e) *Elsholtzia penduliflora*.

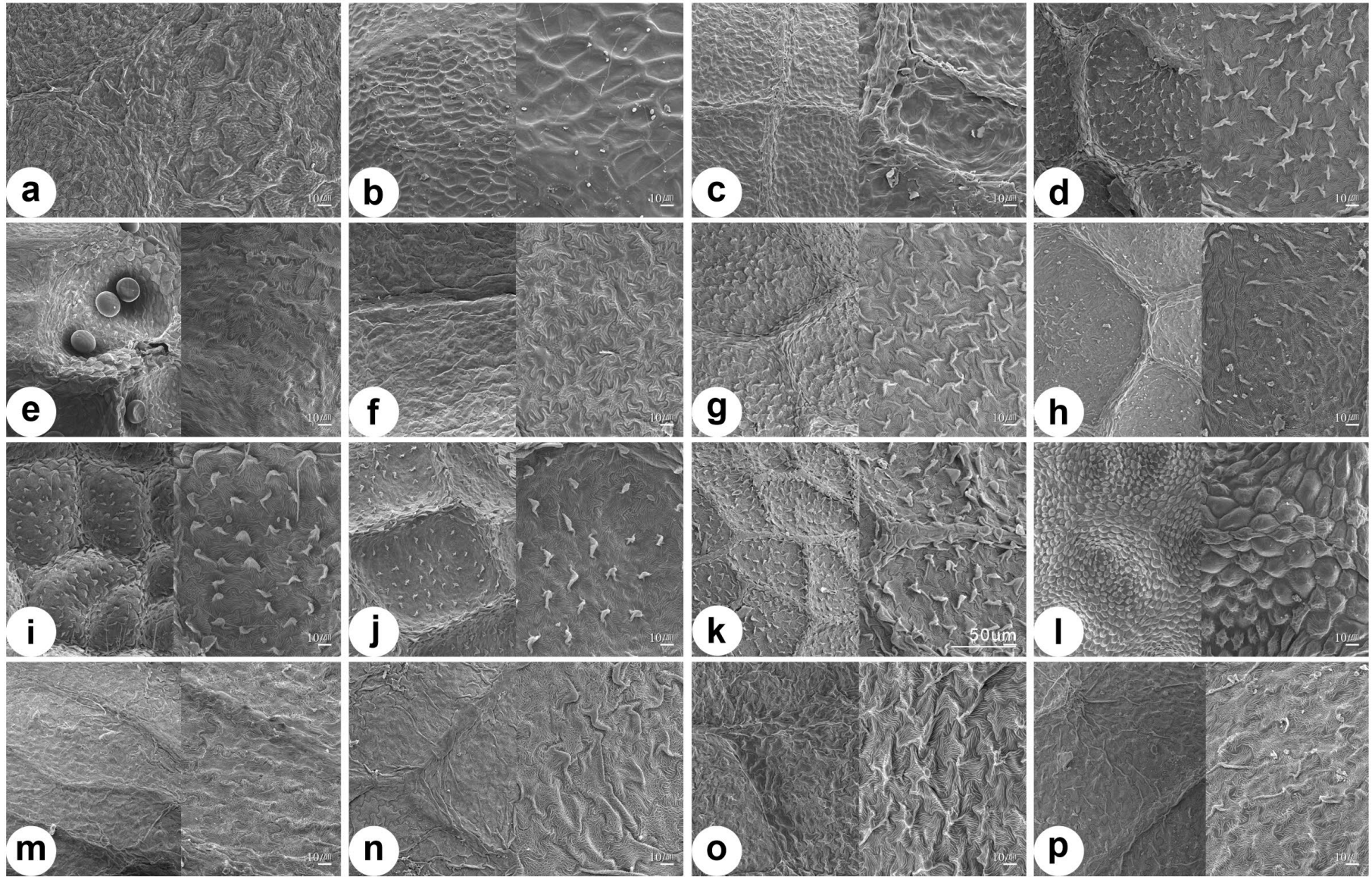
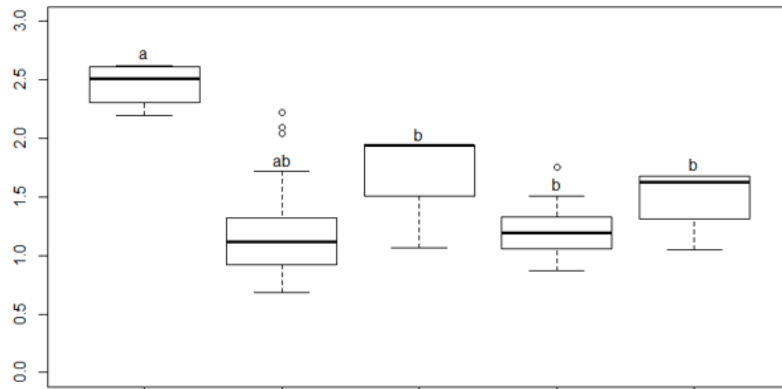


Fig. A1-6. Type IV-c (supra-reticulate) microstructure of nutlets in the tribe Elsholtzieae. (a) *Keiskea japonica*. (b) *K. elsholtzioides*. (c) *K. macrobracteata*. (d) *Mosla dianthera*. (e) *M. grosseserrata*. (f) *M. hirta*. (g) *M. japonica* var. *japonica*. (h) *M. japonica* var. *thymolifera*. (i) *M. punctata*. (j) *M. punctulata*. (k) *M. scabra*. (l) *M. chinensis*. (m) *Perilla acuta*. (n) *P. frutescens* var. *frutescens*. (o) *P. frutescens* var. *crispa*. (p) *P. ocymoides*.

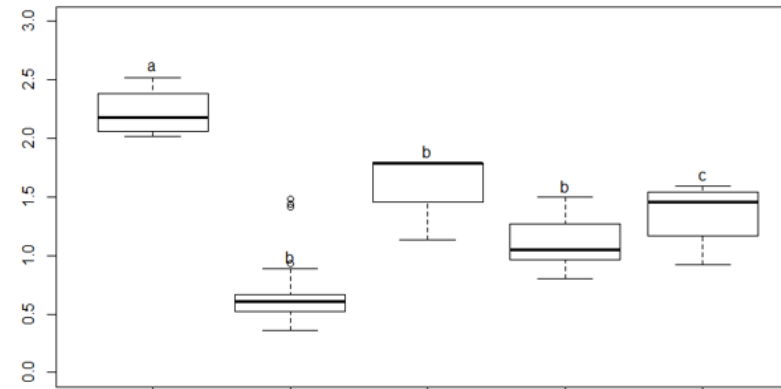
Figure A2. Variation of nutlet length and width among investigated taxa in tribe Elsholtzieae. (a-b) Nutlet length and width variation among the genera in the tribe; (c-d) nutlet length and width variation among the sections in the genus *Elsholtzia*.

length



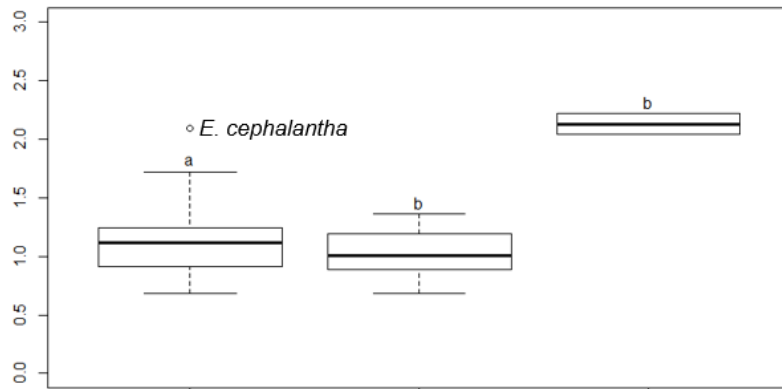
a *Collinsonia* *Elsholtzia* *Keiskea* *Mosla* *Perilla*

width



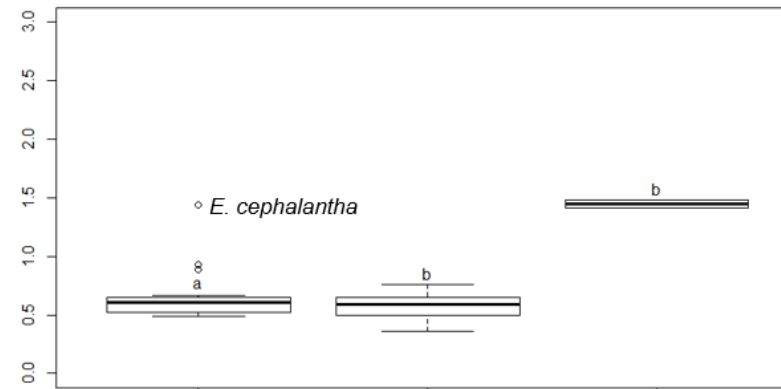
b *Collinsonia* *Elsholtzia* *Keiskea* *Mosla* *Perilla*

length



c *Aphanochilus* *Elsholtzia* *Platyelasma*

width



d *Aphanochilus* *Elsholtzia* *Platyelasma*