

FERNS OF MONGOLIA, CHINESE TURKESTAN, AND WESTERN MANCHURIA

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An interest in the problem of classification of the ferns of the vast territory limited by Siberia and Turkestan—namely, Mongolia, Chinese Turkestan, and Western Manchuria (not included in V. L. Komarof's *Flora of Manchuria*)—was suggested to me by a systematic arrangement of data concerning the distribution of ferns within the boundaries of both the European and the Asiatic parts of Soviet Russia on which I had been working. An answer to the question appeared certainly indispensable for a proper appreciation of the ferns of the Russian flora. Unfortunately, however, the only list of Mongolian vascular plants compiled by C. I. Maximovicz¹ as early as 1859, gives no clue to the answer, as not one of the 450 species of his list is a fern. Neither are ferns mentioned in the later literature on the Mongolian flora, or they are discussed in relation to separate small districts only. Herbaria had to be resorted to in consequence, and numerous specimens were found; some of them classified by eminent authorities, such as C. I. Maximovicz, V. L. Komarof, K. K. Kossinsky, Adr. Franchet, J. Milde, A. Fomin, and others, some left without any nomenclature whatever; to the latter belongs the excellent collection of P. S. Mikhno, kindly offered me for systematization, and all the very curious material of H. Krascheninnikof (1925) and E. P. Gorbunova (1924). Having supplied the data of the herbaria with annotations and having likewise inserted N. V. Pavlof's indications on his brilliant collections in Central Mongolia (1924), we offer in the present paper a list of ferns of the said territory. The localities determined by me from herbaria data have been indicated with an exclamation point (!) following the surname of the collector. The localities have been grouped on a plan of more or less

¹ *Index florae Mongoliae*; see Maximovicz, *Primitiae florae Amurensis* in *Mémoires prés. à l'Acad. des Sciences de St. Pétersbourg par divers savants* 9 (1859) 479-486.

natural regions. The orographical conditions of the country have been taken as most expressly telling on the contents of the flora of ferns and testifying as to its relationship to the adjacent flora. Such are the following regions:²

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|----------------------------------|-------------------------------------|
| 1. The Eastern Altai. | 6. Alashan. |
| 2. Urianhai-Sayan. | 7. Gobi Altai. |
| 3. Urga-Onon (Kentei Mountains). | 8. The Eastern Tian Shan. |
| 4. Khangai. | 9. Tian Shan and Dzungarian Alatau. |
| 5. The Great Khingan. | 10. The Dzungarian Plain. |

They are supposed to comprehend those localities only where one kind of fern at the least was observed, some of them being separated by wastes devoid of ferns. To give an opinion on the botanical and geographical division of the whole of Mongolia (and Chinese Turkestan) with more precision will prove possible only after an analysis of the distribution of different plant groups has been made—both of those to be met throughout all the country and those characterizing some definite regions.

Regarding the distribution of Mongolian ferns the following conclusions can be inferred:

1. The number of representative ferns (Polypodiaceæ, Ophioglossaceæ, Salviniaceæ, Marsileaceæ) is thirty-five plus two erroneously indicated in Mongolia. The number is considerable if compared with the adjacent Turkestan and the Kirghiz region where thirty-four species only are known.

2. An augmentation of the number can certainly be expected from subdivision of the larger species; the discovery on the Tian Shan and the Altai of species heretofore unknown is also possible, but it is certain to be of small significance.

3. Endemic species are none.

4. A considerable number of species belongs to the Eurasians whose distribution has been very extensive. Fourteen species are to be found both in Siberia and in Turkestan; fourteen others in Siberia, but not in Turkestan; and seven more in Turkestan, but not in Siberia.

5. The richest region is that of the Sayan Urianhai, with twenty-one species, where the Siberian types are represented best.

² The spelling of geographical names is either supported by Keith Johnston's *Royal Atlas of Modern Geography* (1861) and the geographical gazetteer of Webster's *New International Dictionary* (1924) or else combined on their principles.

6. The second place in this respect is occupied by the Tian Shan and the Dzungarian Alatau, thirteen species, where the Turkestan type prevails.

7. The Chinese type is represented by two species; namely, *Asplenium sarelli* in Alashan (this species, however, reaches the Russian Altai in the northwest), and *Cyclophorus assimilis* in Great Khingan.

8. Traces of a Mediterranean element (*Ceterach officinarum*) do not extend farther than the Kuldja and the Tian Shan.

9. The fern flora of Alashan is very poor (two species) and the Eastern Tian Shan and the Gobi Altai have yielded but one species, each partly owing to unfavorable climate and partly to a lack of information concerning these regions.

10. The deserts of the Chinese Dzungaria have only a few representatives (three species), chiefly among water ferns (*Salvinia*, *Marsilea*).

11. The Inner Desert of Gobi is quite devoid of ferns, as much as the plain of Chinese Turkestan.

Genus WOODSIA R. Brown

WOODSIA GLABELLA R. Br.

Woodsia glabella R. BR. ap. Richards., Frankl. Narr. of a Journ. (1823) 754.

Woodsia asplenioides RUPR., Distrib. Cryptog. Ross. (1845) 55.

2. Koso-gol Lake, 6 and 7-VII-02 (*Komarof!*). Araz, near Koso-gol, 15-VII-02; and Dolboi in the vicinity of Koso-gol, 26-VI-01 (*Komarof!*). Tannu Ola, Baikhaka district, 20-VII-15 (*Miklashevskaja!*). *Woodsia asplenioides*, described by Ruprecht, is referred to by him for the "Mongolia chinensis" and "Dahuria vicina." The authentic specimen is evidently connected with *W. glabella* R. Br., and not with *W. alpina* (Bolton) Gray as suggested by Christensen (Ind. Filic.).

WOODSIA ILVENSIS (Linn.) R. Br.

Woodsia ilvensis (Linn.) R. BR., Prodr. (1810) 158; Trans. Linn. Soc. London 11 (1815) 17.

Acrostichum ilvense LINN., Sp. Pl. ed. 1 (1753) 1071.

Mentioned: PALIBIN, Mater. Mongol. Flor. I No. 3; SHISHKIN, Urianhai 123; PRINTZ, Veg. Sib. Mong. Front. 102.

1. Aksu, Dzandlyk (*Saposhnikof!*).

2. In the vicinity of Koso-gol Lake, 1902 (*Komarof!*). Munku Sardyk (1897) No. 24 (*Peretolchin!*). Urianhai, Valley of the Khoroz, 8 versts to the estuary (*Shishkin!*). In the vicinity of Azass, below Chevar-Kul Lake, 9-VIII (*Krilof!*).

Lower and Upper Azass (*Kvilof!*). The Tannu Ola Range, upper course of the Kuile (*Kvilof!*). The Tannu Ola, Khandakaila Pass, 28 to 30-VI-15 (*Tugarinof!*). Tannu Ola, Baikara district, 20-VII-15 (*Miklachevskaja!*). The Sisti-kem (*Printz!*).

3. Urga: 12 versts east to Urga, 16-VI-97, No. 35 (*Klementz!*). Ulentui River, 42 kilometers south of Troitzkosavsk, 21-VII-13 (*Mikho!*). The Noin Ula settlement, 26-V-24, No. 204 (*N. Pavlof!*). The Shildgerein peat bog, 12-VII-97 (*Klementz!*). Along the middle course of the Bakulei (*Molesson!*).

4. On Dschargalanta River, 14-VIII-25 (*Krascheninnikof and Samatkinof!*), Nos. 561/48, 875/159,709, and 978/170, var. *acuminata* Fomin. Near Orotschen-sume, on granite rocks, 23-VIII-25 (*Krascheninnikof and Samatkinof!*). Between Urga and Lake Ische-tuchum-nor, Mount Ulan-bischiktychoda, 9-VIII-25 (*Krascheninnikof and Samatkinof!*) var. *acuminata* Fomin. In the vicinity of Lake Ische-tuchum-nor, Tamanyama Gorge, VII-1926 (*Samatkinof!*). In the vicinity of Ische-tuchum-nor Lake, Mount Bayn-surche, 25-VII-26; Mount Ulandamger, VII-1926; Mount Mongol, VII-1926; Mount Dulga, VII-1926 (*Samatkinof!*) f. *acuminata* (Fomin). Tzakh Mountains, in the Valley of the Sudj, 9-VII-24, No. 153 (*N. Pavlof!*). Along Orkhon River, 1891, No. 162 (*Levin!*). Valley of the Ikhi-gatzar-agol, 22-VI, and the Valley of Dzirgamantu, 23-VII-1894 (*Kashkarof!*). Bombot Mountain near Saingagan, 25-VII-26 (*N. Pavlof!*) var. *rufidula* (Michx.) Aschrs.

9. Borotala (*Schrenk!*).

WOODSIA SUBCORDATA Turcz.

Woodsia subcordata TURCZ. in Bull. Soc. Natur. Moscou 5 (1832) 206. Mentioned: RUPR., Distr. Cryptog. Ross. 52; POTANIN, Bot. Khingan 442 (*W. hyperborea*).

3. Northwest to the Dahban-urto station (*Ladyginsky!*).

5. The Eastern declivity of the Khingan, Talvar River, 20-VII-99 (*Potanin and Soldatof!*). The Mergen district from Tunkhen to Ai-uno (*Ladigin!*).

Genus CYSTOPTERIS Bernhardi

CYSTOPTERIS FRAGILIS (Linn.) Bernh.

Cystopteris fragilis (Linn.) BERNH. in Schard. neu. Journ. 1 (1806) 26, t. 2, f. 9.

Polypodium filix fragile LINN., Sp. Pl. ed. 1 (1753) 1091.

Mentioned: SHISHKIN, Urianhai 123; FEDTSCH., Consp. Turk. Kirg. No. 2; PRINTZ, Veget. Siber. Mong. Frontr. 102.

1. The Eastern Altai, Kerkuru, 8-VII-77 (*Potantin!*). Yamati River (Upper Selenga), 1-IX-77 (*Potantin!*). The northern declivity of Ulandaban, in a forest of *Larix*, 22-VI-79 (*Potantin!*). Kandagatta, 14-IX-76 (*Potantin!*). The Mongolian Altai: Onkatu, 25-VI-02 (*Saposhnikof!*); Kaurti, Chingessjay (*Krilof!*).

2. Northern foot of the mountains of the Tannu Ola Range, Turgailyk River, 24-VII-11. (*Miklashevskaja!*). Koso-gol Arassae Valley, 15-VII-02 (*Komarof!*). The mountains at the foot of Munku Sardyk, 21-VII-02 (*Komarof!*); Valley of the Ulei, 18-VII-02 (*Komarof!*). The eastern shore of the Koso-gol, the estuary of Khabsyl River, 10-VII-98, No. 1 (*Peretolchin!*). Koso-gol, Khilin, 2-VII-02 (*Komarof!*). Urianhai, along the Khoroz and Chingeskhem, the Ulu-o tributary, Karakul Lake (*Shishkin!*). The lower country of the Azass from estuary to lakelets, 5-VIII-92 (*Krilof!*). Urianhai, Upper Sisti-kem (*Prinz!*). Valley of the Kharkir, 21-VIII-79 (*Potantin!*).

3. Ulentui River, 21-VII-23 (*Mikhno!*). In the Khuanto peet bog, foliferous wood, 9-VIII-97, No. 65 (*Klementz!*). Mountains south to Urga, wooded hillside of the Bogusul, 5-VII-99 (*Palibin!*). Between Troitskosavsk and Urga, 30-VIII-23, No. 150 (*N. Pavlof!*).

4. Valley of the Ishükit, below Dodnor Lake (in Darkhat language called "Khadinai ulun"), a decoction used against toothache, 5-VI-80 (new style) (*Potantin!*). Kangate, 18-IX-76 (*Potantin!*). On Dschargalanta River, 5-IX-1925 (*Krascheninnikof and Samatkinof!*). In the Taskh Mountains along Suchor River, 10-VII-24, No. 149 (*N. Pavlof!*) var. *anthriscifolia* Koch. Halsandaba near Sain-gagan, 3-VIII-26 (*N. Pavlof!*) var. *dentata* Hook.

7. The center of Mongolia, Doundu Saikan Mountains, 7-VII-09 (*O. Chetirkin!*).

8. Between Khami and Uliasutai, the northern declivity of the Narat, the upper woody zone of Tsanlue Valley, 6,000 to 7,000 feet, 5 to 10-VI-77 (*Potantin!*).

9. The Dzungarian Alatau: Sairam, Borgati Springs, 500 feet, the upper Taldi, 900 to 1,000 feet, Arislin; Bogdo Mountain, 6,000 to 7,000 feet, Pilutschi Spring, 7,000 to 8,000 feet (*A. Regel!*). Kash Valley, 9,000 feet (*A. Regel!*). Sairam, 8,000 to 9,000 feet (*Fetissof!*). Tian Shan: Burkhan-tau (*Fetissof!*); Dzagastai, 4,000 to 7,000 feet, Musart 5,000 to 7,000 feet (*A. Regel!*).

10. The steppe valley of the Black Irtysh, Kichkinatau, 16 to 28-VII-76 (*Potanin!*).

CYSTOPTERIS MONTANA (Lam.) Bernh.

Cystopteris montana (Lam.) BERNH., Desv. Prodr. (1827) 264.

Polypodium montanum LAM., Fl. Franc. 1 (1778) 23.

Mentioned: SHISHKIN, Urianhai 123; PRINTZ, Veg. Sib. Mong. Front. 103.

2. The woody Urianhai, in subalpine districts of Kara-kul Lake, 18-VII-09 (*Shishkin!*). Tannu Ola, in the Baikhana district, 21-VII-15 (*Miklashevskaja!*). Urianhai, in the Altaiian, in subalpine coniferous woodlands (*Printz!*).

Genus STRUTHIOPTERIS Willdenow

STRUTHIOPTERIS GERMANICA Willd.

Struthiopteris germanica WILLD., Enum. (1809) 1071, Mag. d. Ges. f. Naturf. Fr. z. Berlin (1809) 160.

Osmunda struthiopteris LINN., Sp. Pl. ed. 2 (1753) 1066.

Mentioned: PRINTZ, Veg. Sib. Mong. Front. 103.

2. Urianhai, common in woods along the Sisti-kem and the Bei-kem (*Printz!*).

3. The Ulentui, 40 kilometers south to Troitskosavsk, 21-VII-23 (*Mikhno!*).

4. The Muniola Mountains, in birch woods, 26-VI-71 (*Przevalsky!*). This is probably the plant referred to by V. Komarov (Botanical itineraries of the main expeditions to Central Asia, p. 20) under the name of *Athyrium filix femina* Roth.

Genus DRYOPTERIS Adanson

DRYOPTERIS DILATATA Gray.

Dryopteris dilatata GRAY, Man. ed. 1 (1848) 631.

Mentioned: PRINTZ, Veg. Sib. Mong. Front. 103 (*Aspidium spinulosum* subsp. *dilatatum*).

1. Urianhai, Upper Sisti-kem, on the upper limit of the forest region (*Printz!*).

DRYOPTERIS FILIX MAX (Linn.) Schött.

Dryopteris filix max (Linn.) SCHÖTT, Gen. Fil. ad. (1834) t. 9.

Polypodium filix max LINN., Sp. Pl. ed. 2 (1753) 1090.

Mentioned: FEDTSCHENKO, Consp. Fl. Turk. and Kirg. No. 5.

1. The Dzungarian Alatau: along Kasch River, Borgati Spring, 1,600 to 2,000 meters; Borborogoossun, 2,700 meters; Ulustai Gorge, between Talkin and Aksu Valleys; Kungehz (*A. Regel!*). On Sarytzogan River (*Larionof!*). Tian Shan: the

Akburtash and Sharahboguchi Mountains, 1,300 to 1,600 meters; near Khanakai River, 1,600 to 2,000 meters.

DRYOPTERIS FRAGRANS (Linn.) Schött.

Dryopteris fragrans (Linn.) SCHÖTT, Gen. Fil. ad. (1834) t. 9.

Polypodium fragrans LINN., Sp. Pl. ed. 2 (1753) 1089.

1. Aksu River (the White Kobdo), 22-VII-09 (*Saposhnikof!*).

2. Urianhai, the estuary of the Taxa, rock, 24-VIII-16 (*Miklashevskaja!*). Urianhai, northern limit of the Tannu Ola along Urgailyk River, Baikal River, 24-VII-16 (*Miklashevskaja!*). Urianhai, the Tannu Ola Range, above Akkarasook (*Krilof!*). The Sayans, Bujba River, 10-VI-16 (*Miklashevskaja!*).

3. Khangai, Tamir River, coniferous forest, 25-IX-86 (*Potanin!*). Bomin Mountain, near Sain-gagan, 26-VII-24 (*N. Pavlof!*). On Bombot Mountain, near Sain-gagan, 25-VII-26 (*N. Pavlof!*).

4. The Mergen district, Erkeshan Volcano and others, 13-VI to 13-VII-10 (*Ladygin!*).

Besides which there is a specimen bearing the insufficient label "S. W. Mongolia, mountains (*Moellendorff!*)."

DRYOPTERIS LINNAEANA C. Chr.

Dryopteris linnaeana C. CHR., Ind. Filic. (1905) 275.

Dryopteris pulchella HAYEK, Fl. v. Steierm. (1908) 39.

Polypodium pulchellum SALISB., Prod. (1796) 403.

Polypodium dryopteris LINN., Sp. Pl. ed. 2 (1753) 1093.

Mentioned: SHISHKIN, Urianhai 124; KRILOF, Fl. Alt. No. 1769.

1. The wooded Urianhai: Chingeokhem River; Khoroz River, in its lower course, Valley of the Karagash near its estuary, 10-VII; declivities stretching towards Kara-kul Lake, 18-VII (*Shishkin!*); slope leading from Dzelamarti Pass to Doro-kul Lake in the neighborhood of Todji-kul Lake; near the upper Azass; in the lower part of Oiva-taiga Mountain (*Krilof!*).

2. Ulentui River, 42 kilometers south of Troitskosavsk, 21-VII-23 (*Mikhno!*).

DRYOPTERIS PHEGOPTERIS (Linn.) C. Chr.

Dryopteris phegopteris (Linn.) C. CHR., Ind. Fil. (1905) 284.

Polypodium phegopteris LINN., Sp. Pl. ed. 2 (1753) 1089.

Mentioned: PRINTZ, Veg. Sib. Mong. Front. 104 (*Phegopteris polypodioides* Fée).

2. Urianhai, in coniferous forests, on the upper Bei-kem near Mosgalewsky (*Printz!*).

DRYOPTERIS ROBERTIANA (Hoffm.) C. Chr.

Dryopteris robertiana (Hoffm.) C. CHR., Ind. Fil. 289 (1905).

Polypodium robertianum HOFFM., Deutschl. Fl. 2 (1795) 20.

Mentioned: SHISHKIN, Urianhai 124.

2. Northern Tannu Ola, foot of mountains along Tailk River, 24-VII-16 (*Miklashevskaja!*). The wooded Urianhai, along the Chingeoekhem, tributary to the Ulu-o (*Shishkin!*).

3. The Dzun-modo gold mines, on Urtodaban Mountain, 7-VII-23, No. 230 (*A. Gnadberg!*). The Dzun-modo gold fields, 6-VIII-22, No. 512 (*V. Lissovsky!*).

DRYOPTERIS SPINULOSA (Müll.) O. Kuntze.

Dryopteris spinulosa (Müll.) O. KUNTZE, Rev. Gen. Pl. 2 (1891) 813.

Polypodium spinulosum MÜLL., Fl. Dan (1777) t. 707.

Mentioned: SHISHKIN, Urianhai 124; PRINTZ, Veg. Sib. Mong. Front. 103.

2. The woodland Urianhai, upper Azass, 11-VIII (*Krilof!*). On the Sisti-kem, in forest (*Printz!*).

There is in the herbarium of the Principal Botanical Garden another specimen bearing the insufficient label, "The mountains of Southern Mongolia, N 890 *Moellendorff!*"

DRYOPTERIS THELYPTERIS (Linn.) A. Gray.

Dryopteris thelypteris (Linn.) A. GRAY, Man. ed. 1 (1848) 630.

Acrostichum thelypteris LINN., Sp. Pl. ed. 2 (1753) 1071.

Mentioned: FEDTSCHENKO, Consp. Fl. Turk. and Kirg. No. 4.

1. The Dzungarian Alatau: Kasch, the Borgati Spring, 1,000 meters (*A. Regel!*), along the Tabildlja, 1,300 meters (*Larionof!*).

Genus POLYSTICHUM Roth**POLYSTICHUM LONCHITIS (Linn.) Roth.**

Polystichum lonchitis (Linn.) ROTH, Fl. Germ. 3 (1800) 71.

Polypodium lonchitis LINN., Sp. Pl. ed. 2 (1753) 1088.

Mentioned: FEDTSCHENKO, Consp. Fl. Turk. and Kirg. No. 10.

9. The Dzungarian Alatau, on Arislin River, in the Valley of the Kasch, 2,600 meters (*A. Regel!*).

Genus ATHYRIUM Roth**ATHYRIUM ALPESTRE (Hoppe) Rylands.**

Athyrium alpestre (Hoppe) RYLANDS in MOORE, Ferns Gr. Brit. Nat.

Pr. 1 (1857) t. 7.

Aspidium alpestre HOPPE, Neu Bot. Taschenb. (1805) 216.

Mentioned: PRINTZ, Veg. Sib. Mong. Front. 104.

2. Urianhai, rather common in the Altaian, in somewhat moist places, above the limit of trees, at an altitude of from 1,800 to 2,000 meters (*Printz!*).

ATHYRIUM CRENATUM (Sommerf.) Rupr.

Athyrium crenatum (Sommerf.) Rupr., NYLAND, Spicil. Pl. Fenn. 2 (1844) 14.

Aspidium crenatum SOMMERF., Vet. Ak. Handl. 1834 (1835) 104.

Mentioned: SHISHKIN, Urianhai 125; PALIBIN, Mater. II 6; PRINTZ, Veg. Sib. Mong. Front. 105.

2. Tannuola, northern foot of mountains, Urgailik, Baikhaka district, 24-VI-16 (*Miklashevskaja!*). Urianhai woodland, hillside from the Dzelamart to the plain of Doro-kul Lake (*Shishkin!*). In the lower part of the Oiva, Mount Taiga, 16-VIII (*Shishkin!*). On stony ground in pine woods on the Upper Sisti-kem along the Kamsara and in the Dora Steppe (*Printz!*).

3. Upper Ero (*Mikhno!*). The Ulentui, 50 kilometers south to Troitskosavsk, 27-VII-23 (*Mikhno!*).

ATHYRIUM FILIX FEMINA (Linn.) Roth.

Athyrium filix femina (Linn.) ROTH, Fl. Germ. 3 (1800) 65.

Polypodium filix femina LINN., Sp. Pl. ed. 2 (1753) 1090.

Mentioned: SHISHKIN, Urianhai 124; PALIBIN, Mater. I No. 2; III 6; SAPOSHNIKOF, Mong. Alt. (*Asplenium filix femina* Bernh.); PRINTZ, Veg. Sib. Mong. Front. 104.

1. The Mongolian Altai, Chekhan, woodland (*Saposhnikof!*).

2. The right bank of the Ero, in the Khodotia locality, 30-VI (*N. Titoval!*). Urianhai, in the Valley of the Sisti-kem (*Shishkin!*). The Algiak Pass, the Alglat estuary, the upper Sisti-kem along the Kahmsara, and near the Utin cataracts, up to 1,800 meters above sea level (*Printz!*).

3. Valley of the Ukhtal, tributary to the Ere, 12-IX-23, No. 534 (*A. Gnadberg!*) var. *multidentata*. The Dsun-modo gold fields, 8-VIII, No. 1023 (*V. Lissovsky!*) var. *multidentata*. The middle course of the Bakulei, 1899 (*Molesson!*).

4. The estuary of the Ero (*Mikhno!*). The Ulentui, 1921 (*Mikhno!*).

5. Mongolia, the Valley of the Dzirgalantu, 22-VI-94 (*Kashkarof!*).

The Muniola Mountains have also been indicated (Przevalsky), supported by Komarof (Botanical itineraries of the main expeditions into Central Asia, p. 20), but the indication probably refers to *Struthiopteris germanica* Willd., as the only fern of the locality contained in the Przevalsky herbarium belongs to that species.

ATHYRIUM MONGOLICUM (Franchet) Diels.

Athyrium mongolicum (Franchet) DIELS, in Engl. and Prantl, Natürl. Pflanzenfamil. 1⁴ (1899) 224.

Asplenium mongolicum FRANCHET, Nouv. Arch. Mus. 7 (1883) 161.

Mentioned by Franchet (loc. cit.) in Eastern Mongolia: Jegol (David); however, the locality belongs to China proper, in Chihli Province, beyond the limits of our investigations.

Milde (Fil. Europ. 54) describes *A. fallaciosum* Milde in Northern China; V. Komarof (Flora of Manchuria I) thinks *A. mongolicum* Franchet is a synonym of that plant.

Genus ASPLENIUM Linnæus

ASPLENIUM PSEUDOFONTANUM Koss.

Asplenium pseudofontanum KOSS., in Not. Syst. ex Herb. Horti Botan. Petrop. 3 (1922) 121.

Mentioned: FEDTSCHENKO, Consp. Fl. Turk. and Kirg. No. 19 (*A. fontanum*).

9. Dzungarian Alatau; Borgati, 1,650 meters from Borgati to Kapchagai on the left side of the Kasch, 2,100 to 2,400 meters (*A. Regel!*).

ASPLENIUM RUTA MURARIA Linn.

Asplenium ruta muraria LINN., Sp. Pl. ed. 2 (1753) 1081.

Mentioned: PRINTZ, Veg. Sib. Mong. Front. 105; FEDTSCHENKO, Consp. Fl. Turk. and Kirg.

2. Near Ust-algiac, on the Sisti-kem (*Printz!*).

9. Tian Shan, Tekess River, 16-VI-03 (*Roborovsky!*).
Along Moozart River, 1,700 to 2,400 meters (*A. Regel!*).
Dzungarian Alatau, near Lake Sairam (*A. Regel!*).

ASPLENIUM SARELLI Hk.

Asplenium sarelli HK. in Blakiston, Yang-tsze (1862) 363-364.

6. Alashan, in abruptis montium, 25-VI-73 No. 169 (*Przevalsky!*).

ASPLENIUM SEPTENTRIONALE (Linn.) Hoffm.

Asplenium septentrionale (Linn.) HOFFM., Deutschl. Fl. 2 (1795) 12.

Acrostichum septentrionale LINN., Sp. Pl. ed. 2 (1753) 1068.

Mentioned: PRINTZ, Veg. Sib. Mong. Front. 105; FEDTSCHENKO, Consp. Fl. Turk. and Kirg. No. 14.

2. On dry hillsides facing south in Ust-algiac, rather common (*Printz!*).

9. The Dzungarian Alatau, Talki (*A. Regel!*); Borokhudzir near Karagali (*Fetissof!*). Tian Shan, Moozart, 1,800 to 2,000 meters; Sharabagutshi, 1,300 to 1,700 meters (*A. Regel!*).

ASPLENIUM TRICHOMANES Linn.

Asplenium trichomanes LINN., Sp. Pl. ed. 2 (1753) 1080.

Mentioned: FEDTSCHENKO, Consp. Fl. Turk. and Kirg. No. 15.

9. Tian Shan, Urtass-aksu (*Fetissof!*). Kungess, near Moozart River, 2,300 meters. Khanakhai in the Akburtash Mountains, 1,700 to 2,400 meters (*A. Regel!*).

ASPLENIUM VIRIDE Huds.

Asplenium viride HUDS., Fl. Angl. (1762) 385.

Mentioned: PRINTZ, Veg. Sib. Mong. Front. 105.

2. In moist subalpine coniferous forests and the Upper Sistikem (*Printz!*).

Genus CETERACH Lamarck**CETERACH OFFICINARUM** DC.

Ceterach officinarum DC., Fl. Franc. 2 (1805) 566.

Asplenium ceterach LINN., Sp. Pl. ed. 2 (1753) 1080.

Mentioned: FEDTSCHENKO, Consp. Fl. Turk. and Kirg. No. 20.

9. Tian Shan, Sharabagoutchi, 1,300 to 1,700 feet, in the Akburtash Mountains, Moozart River (*A. Regel!*).

Genus CHEILANTHES Swartz**CHEILANTHES ARGENTEA** (Gmel.) Kze.

Cheilanthes argentea (Gmel.) KZE. in Linnaea 23 (1850) 242.

Pteris argentea GMEL., Nov. Comm. Petrop. 12 (1768) 519, t. 12, f. 2.

Mentioned: SHISHKIN 125; POTANIN, Great Khingan 442.

2. Koso-gol Lake, 6-VII-02 (*Komarof!*). Urianhai along Uieck River, near the estuary of the Madsel (*Shishkin!*).

4. Valley of the Tol, near the crossing of the Zainshabin road, 2-VII-24, No. 148 (*N. Pavlof!*). Dschargalanta River, 14-VIII-25 (*Krascheninnikof and Samatkinof!*). Mountains east to the Orkhon, 3-X-86 (*Potanin!*). Hontu-tamir River, 17-VIII-26 (*N. Pavlof!*). Valley of the Urto-tamir, near the Zaingaghen khure, 29-VII-24, No. 147 (*N. Pavlof!*).

Genus CRYPTOGRAMMA R. Brown**CRYPTOGRAMMA STELLERI** (Gmel.) Prantl.

Cryptogramma stelleri (Gmel.) PRANTL, in Engl. Bot. Jahrb. 3 (1882) 413.

Pteris stelleri GMEL., Nov. Comm. Petrop. 12 (1788) 519.

Allosorus stelleri RUPR., Distrib. Crypt. Vasc. Ross. (1845) 47.

2. Koso-gol Lake, Arassai Valley, 14-VII-02 (*Komarof!*). The Sayans, the estuary of the Buida, tributary to the Oussah, 10-VI-16 (*Miklashevskaja!*).

Genus PTERIDIUM Gleditsch

PTERIDIUM AQUILINUM (Linn.) Kuhn.

Pteridium aquilinum (Linn.) KUHN, in v. Deck Reisen 3^a (1879) Bot. 11.

Pteris aquilina LINN., Sp. Pl. ed. 2 (1753) 1075.

Mentioned: PALIBIN, Mater. Fl. Mongol. 1: No. 1; 3: 6; 4: 39; PRINTZ, Veg. Sib. Mong. Front. 105.

2. Between Dzida River and Lake Koso-gol, the estuary of Khalun-arshan (*Molesson!*). Urianhai, common in subalpine coniferous forests. On the Altaian, at Ust-algiac, at Ust-sistikem (*Printz!*).

3. The Dzun-modo gold fields below Ayren-daba, 25-VIII-23, No. 23 (*A. Gnadberg!*). Khalkha, the Valley of Ero River, and the tributaries Ukhtai and Boroi, 6 to 8-VII-06, 800 to 1,200 meters (*Novitzki!*). The middle course of the Bakulei, 1899 (*Molesson!*). Ulentui River, 21-VII-23 (*Mikhno!*). The estuary of Ero River (*Mikhno!*).

5. The Khingan, 8-VII-07 (*Lipsky!*).

Genus POLYPODIUM Linnæus

POLYPODIUM LINEARE Thunb.

Polypodium lineare THUMB., Fl. Japon. (1784) 335.

Polypodium alberti RGL. in Act. Hort. Petr. 7 (1881) 662.

Mentioned: FEDTSCHENKO, Consp. Fl. Turk. and Kirg. No. 26.

9. The Dzungarian Alatau, Irenkhabirga Zaganssu, 2,000 to 2,600 meters (*A. Regel!*). Tian Shan, near the Mouzart Pass, 2,000 to 2,600 meters (*A. Regel! Fetissof!*).

POLYPODIUM VULGARE Linn.

Polypodium vulgare LINN., Sp. Pl. ed. 2 (1753) 1085.

Mentioned: PRINTZ, Veg. Sib. Mong. Front. 176; FEDTSCHENKO, Consp. Fl. Turk. and Kirg. No. 25.

2. Urianhai, northern foot of mountains of the Tannu-ola, near Urgalaik River, 24-VII-16 (*Miklashevskaja!*). Urianhai, along Azass River, near Lake Chevarkul (*Shishkin!*). Tannu Ola, Upper Kuile (*Krilof!*). Along the Kamsara (*Printz!*).

3. In chinks of rocks along the northern declivity in the Dzakh Mountains, in the Valley of the Suchj, 10-VII-24, No. 152 (*N. Pavlof!*) var. *rotundatum* Milde. The Ulentui, 40 versts to Troitskosavks, 21-VII-23 (*Mikhno!*).

5. Mergensai, the district of the Erkeshan Volcano and others, III to IV-1910 (*Ladygin!*).

9. The Bogdoöla Range, in the great peat bogs, 8-VI-97 (*E. Klementz!*). Dzung-alatau, the Upper Taldi (*A. Regel!*); Dzambi, (*Larionof!*). Tian Shan, near Moozart (*A. Regel!*).

Genus CYCLOPHORUS Desvaux

CYCLOPHORUS ASSIMILIS (Baker) C. Chr.

Cyclophorus assimilis (Baker) C. CHR., Ind. Fil. (1905) 198.

Mentioned: POTANIN, Great Khingan 422 (*Polypodium assimile* Baker).

5. Great Khingan, Talir River, on rocks, shady side, 20-VII-89 (*Potanin and Soldatof!*).

Genus SALVINIA (Micheli) Adanson

SALVINIA NATANS (Linn.) All.

Salvinia natans (Linn.) ALL., Fl. Pedem. 2 (1785) 289.

Marsilea natans LINN., Sp. Pl. ed. 2 (1753) 1099.

10. Karairtish, near the Durbaldy crossing, 16 to 28-VIII-76 (*Potanin!*).

Genus MARSILEA Linnæus

MARSILEA STRIGOSA Willd.

Marsilea strigosa WILLD., Sp. Pl. 5 (1810) 539.

10. Karairtish, near the Durbaldy crossing, 16 to 26-VIII-76 (*Potanin!*).

Genus BOTRYCHIUM Swartz

BOTRYCHIUM LUNARIA (Linn.) Sw.

Botrychium lunaria (LINN.) SW. in Schrad. Journ. 1800² (1801) 110.

Osmunda lunaria Linn., Sp. Pl. ed. 2 (1753) 1065.

Mentioned: SHISHKIN, Urianhai 125; FEDTSCHENKO Consp. Fl. Turk. and Kirg. No. 32.

2. Koso-gol Lake, Khilin, 2-VII-02. Norin-gol Valley, 24-VI-02; Khors Valley, 28-VII-02 (*Komarof!*). Urianhai woodland, the Valley of the Azass in the vicinity of Chevarkul in the Otig Range (*Krilof!*).

3. Ulentui River, 21-VII-23 (*Mikhno!*).

4. The meadows on the mountain pass Halsan-daba, near Sain-gagan, 7-VIII-26 (*N. Pavlof!*).

9. The Dzungarian Alatau, the estuary of the Khorgoss, 9,000 feet, near Lake Sairam, 8,000 feet (*A. Regel!*). Tian Shan, Muzart (*A. Regel!*).

BOTRYCHIUM MATRICARIAE (Schrank) Sprgl.

Botrychium matricariae (Schrank) SPRGL., Syst. Veg. 4 (1827) 23.

Osmunda matricariae SCHRANK, Baier. Fl. 2 (1789) 419.

Mentioned: SHISHKIN, Urianhai 125; PRINTZ, Veg. Sib. Mong. Front. 106.

2. Urianhai, along Sisti-kem River, between the estuary of the Siltiss and Aini, 1-IX-92, No. 957 (*Krilof!*). Ust-algiac and Ust-sisti-kem (*Printz!*).