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An annotated list of Mongolian phytoparasitic micromycetes

UWE BRAUN

Abstract: BRAUN, U.: An annotated list of Mongolian phytoparasitic micromycetes. Schlechtendalia **3**: 1-32. The present knowledge on the distribution and host range of phytoparasitic micromycetes in the Mongolian Republic is summarized in this paper. Fungi of the following taxonomical units are included: Peronosporales, Erysiphales, Ustilaginales, Uredinales, and Deuteromycetes.

Zusammenfassung: BRAUN, U.: An annotated list of Mongolian phytoparasitic micromycetes. Schlechtendalia **3**: 1-32.
In der vorliegenden Arbeit wird der Kenntnisstand über die Verbreitung und das Wirtsspektrum phytoparasitischer Kleinpilze in der Mongolei zusammengefaßt. Pilze folgender taxonomischer Gruppen werden behandelt: Peronosporales, Erysiphales, Ustilaginales, Uredinales und Deuteromyzeten.

Introduction

The mycoflora of the Mongolian Republic is little known. Most „Mongolian" records of fungi before 1945 refer to Inner Mongolia, belonging to China [e.g. JOERSTAD (1959), numerous rust fungi]. Some other „Mongolian" collections are from Russia [e.g. FAULL's (1938) records of *Uredinopsis macrosperma* from „Mt. Tigerek" and „Kolyvanskoje"] or the locations are very unclear [e.g. *Puccinia ustalis* from North Mongolia (SYDOW 1904)].

At the beginning of the sixties, T. Puncag (Botanical Institute of the Mongolian Academy of Sciences, Ulaanbaatar) began to deal with Mongolian phytoparasitic fungi (PUNCAG 1965). Comprehensive mycological investigations were carried out in 1964 during the 2nd Mongolian-German Biological Expedition, organized by the Mongolian Academy of Sciences in co-operation with the East German Academy. The mycological results were published by SCHMIEDEKNECHT & PUNCAG (1966a, 1966b, 1967a, 1967b). The collections of these expeditions are deposited at UBA (Herbarium of the Botanical Institute, Mongolian Academy of Sciences, Ulaanbaatar) together with T. Puncag's herbarium. Duplicates are housed at JE (Herbarium Haussknecht, University Jena, Germany). In the following years, up to about 1975, Puncag continued his mycological explorations of Mongolia. In 1979, he published a summarizing book on the Mongolian Peronosporales, Erysiphales, Uredinales, and Ustilaginales. This book, written in Mongolian, is little distributed. SCHMIEDEKNECHT (1986) discussed ecological problems of Mongolian phytoparasitic fungi.

In 1988, some East German mycologists collected numerous fungi of different taxonomical groups in various parts of Mongolia. Phytopathogenic micromycetes were mainly gathered and determined by U. Braun (specimens at HAL). The results of these mycological excursions were published by DÖRFELT & TÄGLICH (1990). Additional specimens have been collected during the last 30 years by some East German botanists and mycologists [e.g. E. Jäger, W. Hilbig, and H. Dörfelt (material at HAL); H. Manitz (material at JE); H.-D. Knapp (material in his private herbarium)]. Duplicates of Dörfelt's collections are housed at UBU (Herbarium, Botany Dept., Mongolian State University, Ulaanbaatar). All samples from HAL, JE, and herb. Knapp were re-examined.

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Some Russian mycologists examined different groups of phytopathogenic fungi in Mongolia (GOLUBEVA & KARATYGIN 1986; KARATYGIN, NOVOŽILOV & ŠKARUPA 1990). The specimens in question are preserved at LE.

Taxonomy and Nomenclature

The following monographs and handbooks are the taxonomical and nomenclatural basis of the present list:

(1) Peronosporales - CONSTANTINESCU (1991), NOVOTEL'NOVA & PYSTINA (1985);
(2) Erysiphales - BRAUN (1987, 1995a, 1999);
(3) Ustilaginales - UL'JANIŠČEV (1968), VÁNKY (1985, 1994), SCHOLZ & SCHOLZ (1988), KARATYGIN & AZBUKINA (1989);
(4) Uredinales - GÄUMANN (1959), CUMMINS (1971), KUPREVIČ & UL'JANIŠČEV (1975), UL'JANIŠČEV (1978), BRAUN (1982);
(5) Fungi imperfecti - VASIL'EVSKIJ & KARAKULIN (1950), ELLIS (1976), SUTTON (1980), BRANDENBURGER (1985), BRAUN (1995b, 1998).

Flora and Vegetation

A comprehensive survey of all aspects of the Mongolian vegetation, including plant communities, was published by HILBIG (1987, 1995). Taxonomy and nomenclature of the host plants follow GRUBOV (1982).

Arrangement and Abbreviations

The following data are provided: scientific fungal name, host plants, distribution in Mongolia [administrative districts are numerated (I-XVIII)], year and collector, literature references in brackets [1 = SCHMIEDEKNECHT & PUNCAG (1966a), 2 = SCHMIEDEKNECHT & PUNCAG (1966b), 3 = SCHMIEDEKNECHT & PUNCAG (1967a), 4 = SCHMIEDEKNECHT & PUNCAG (1967b), 5 = PUNCAG (1979), 6 = DÖRFELT & TÄGLICH (1990), 7 = GOLOBEVA & KATATYGIN (1986), 8 = KARATYGIN et al. (1990)].

All samples recorded by SCHMIEDEKNECHT & PUNCAG (1966a,b; 1967a,b), PUNCAG (1979), GOLUBEVA & KARATYGIN (1986), and KARATYGIN et al. (1990) were collected by these authors themselves. In these cases, the names of the collectors are omitted. The herbaria, in which the Mongolian collections are housed, are mentioned in the introductional chapter (only indicated for unpublished specimens).

The administrative districts of Mongolia (Aimak) are numerated. This numeration is used in the following list.

Administrative districts of Mongolia: (number, name of the district, name of the district capital) Fig. 1

I. Uvs Aimak - Ulaangom
II. Zavhan Aimak - Uliastay

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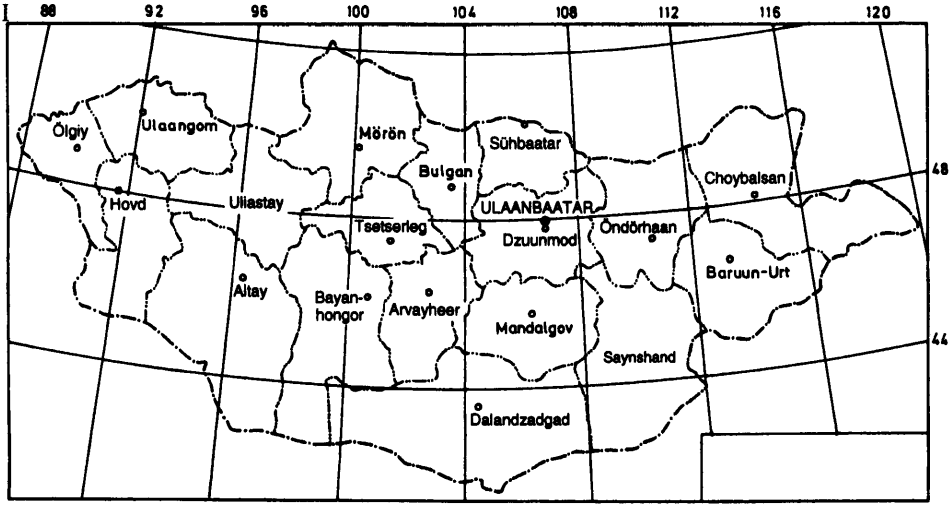

Fig. 1: Map of Mongolia; Aimaks and their centres (from HILBIG 1986, 1995).

III. Hövsgöl Aimak (Chövsgöl, Chubsugul Aimak) - Mörön
IV. Bulgan Aimak - Bulgan
V. Selenge Aimak (Selenga Aimak) - Sühbaatar (Süchbaatar)
VI. Archangay Aimak (Archangaj Aimak) - Tsetserleg
VII. Övörhangay Aimak (Inner Hangay, Övörchangaj Aimak) - Arvayheer (Arvajcheer)
VIII. Töv Aimak (Tev Aimak, Central Aimak) - Dzuunmod
IX. Hentiy Aimak (Chentej Aimak) - Öndörhaan (Öndörchaan)
X. Dornod Aimak (East Aimak) - Choybalsan
XI. Bayanölgiy Aimak (Bajanölgij Aimak) - Ölgiy (Ölgij)
XII. Hovd Aimak (Chovd Aimak) - Hovd (Chovd)
XIII. Govaltay Aimak (Gobi-Altay-Aimak, Govaltaj Aimak) - Altay (Altaj)
XIV. Bayanhongor Aimak (Bajanchongor Aimak) - Bayanhongor (Bajanchongor)
XV. Dundgov Aimak (Central-Gobi-Aimak) - Mandalgov
XVI. Ömnögov Aimak (South-Gobi-Aimak) - Dalandzadgad
XVII. Dornogov Aimak (East-Gobi-Aimak) - Saynshand
XVIII. Sühbaatar Aimak (Süchbaatar Aimak) - Baruun-Urt

„Sum“ („Somon“) is the name of the smaller administrative units. The following additional Mongolian denotations are used: gol (= river), nuur (= lake), uul (= mountain).

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Annotated List

(1) PERONOSPORALES

Albugo Gray

Albugo candida (J.F. Gmel.: Fr.) O. Kuntze, Rev. gen. pl. 2: 658 (1891)
On *Chorispora tenella*, IV, Bulgan, Uljatajn-gol (7).

Peronospora Corda

Peronospora aestivalis Syd., in Gäumann, Beitr. Krypt.-Fl. Schweiz 5(4): 200 (1923)
On *Medicago falcata*, Ulaanbaatar, 1988, Braun (6).

Peronospora alta Fuckel, Fungi rhen. 39 (1863)
On *Plantago depressa*, XI, Bulgan, Chovd-gol, 1964 (1). *P. major*, IV, Uljatajn-gol (7).

Peronospora arabidis-hirsutae Gäum., Beih. Bot. Centralbl. 35(1): 520 (1918)
On *Arabis sagittata*, IV, Bulgan, Uljatajn-gol (7).

Peronospora arborescens (Berk.) Casp., Ber. Ver. Königl. Preuss. Akad. Wiss. Berlin 1855: 330 (1855)
On *Papaver nudicale*, IV, Bulgan, Chargajtan-am (7).

Peronospora axyridis Benois, Parazit. grib. Jakutii: 39 (1973)
On *Axyris amaranthoides*, IV, Bulgan, Chargajtan-am (7).

Peronospora chenopodii Schltdl., Bot. Ztg. 10: 619 (1852)
On *Chenopodium album*, XI, Chovd-gol, 1964 (1). *Ch. foliosum*, IV, Uljatajn-gol and Chargajtan-am (7).

Peronospora desertorum Jacz., Opred. grib. 1: 139 (1931)
On *Alyssum turkestanicum*, IV, Bulgan, Uljastajn-gol (7). This species is known from Central Asia (NOVOTEL'NOVA & PYSTINA 1985).

Peronospora destructor (Berk.) Casp., in Berk., Outl. Brit. Fung.: 349 (1860)
On *Allium sativum*, V, state farm Batsumber, 1964 (1).

Peronospora echinospermi (D.B. Swingle) D.B. Swingle, J. Mycol. 7: 126 (1894)
On *Lappula semialata*, IV, Bulgan, Bulgan-gol (7). *L. intermedia*, VIII, Terelsh, 1988, Braun (6).

Peronospora farinosa (Fr.: Fr.) Fr., Summ. veg. scand. 2: 493 (1848)
Syn.: *P. minor* (Casp.) Gäum., *P. tatarica* Săvul. & Rayss.
On *Atriplex laevis*, IV, Bulgan, Uljatajn-gol (7).

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Peronospora glaucii Lobik, in Jacz., Opredel. grib. 1: 149 (1931)
On *Glaucium squamigerum*, IV, Bulgan, Uljatajn-gol and Chargajtan-am (7).

Peronospora hyoscyami de Bary, Ann. Sci. Nat., Bot., Sér. 4, 20: 123 (1863)
On *Hyoscyamus pusillus*, IV, Bulgan, Bulgan-gol (7).

Peronospora lathyri-humuli Benois & Jacz., Opredel. grib. 1: 151 (1931)
On *Lathyrus humilis*, VIII, Chentej, Terelsh, 1988, Braun (HAL).

Peronospora lepidii (McAlpine) G.W. Wilson, Mycologia 6: 198 (1914)
On *Lepidium densiflorum*, IV, Bulgan, Uljatajn-gol (7).

Peronospora oxytropidis Gäum., Beitr. Krypt.-Fl. Schweiz 5(4): 208 (1923)
On *Oxytropis riparia*, IV, Bulgan, Chargajtan-am (7).

Peronospora parasitica (Pers.: Fr.) Fr., Summa veg. scand. 2: 493 (1849)
On *Capsella bursa-pastoris*, IV, Bulgan, Uljatajn-gol and Chargajtan-am (7).

Peronospora rumicis Corda, Icon. Fung. 1: 20 (1837)
On *Rumex thyrsiflorus*, VIII, Chentej, Terelsh, 1988, Braun (6).

Peronospora sulfurea Gäum., Beitr. Krypt.-Fl. Schweiz 5(4): 128 (1923)
On *Artemisia macrocephala*, IV, Uljatajn-gol (7).

Peronospora tomentosa Fuckel, Fung. rhen. 15 (1863)
On *Cerastium arvense*, IV, Bulgan, Uljatajn-gol and Chargajtan-am (7).

Peronospora trifolii-hybridi Gäum., Beitr. Krypt.-Fl. Schweiz 5(4): 211 (1923)
On *Trifolium eximum*, IV, Bulgan, Uljatajn-gol (7).

***Plasmopara* J. Schröt.**

Plasmopara pusilla (de Bary) J. Schröt., Pilze Schles. 1: 237 (1886)
On *Geranium collinum*, IV, Uljatajn-gol (7).

***Phytophthora* de Bary**

Phytophthora infestans (Mont.) de Bary, J. Roy. Agric. Soc. 12: 240 (1876)
On *Solanum tuberosum*, V, Zuun-charaa sum, 1964 (1).

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(2) ERYSIPHALES

Blumeria Golovin ex Speer

Blumeria graminis (DC.) Speer, Sydowia 27: 2 (1975)
Syn.: *Erysiphe graminis* DC.
On *Chloris virgata*, I, Aczit-nuur, 1964 (1,5). *Poa angustifolia*, VIII, Chentej, Terelsh, 1988, Braun (6).

Erysiphe DC.

Erysiphe aquilegiae DC. var. *ranunculi* (Grev.) R.Y. Zheng & G.Q. Chen, Sydowia 34: 302 (1981)
On *Thalictrum simplex*, XII, Mjangad sum, 1964 (1,5). *Th. foetidum*, X, 1965 (5).

Erysiphe buhrii U. Braun, Česka Mykol. 32(2): 80 (1978)
On *Gypsophila desertorum*, I, Aczit-nuur, 1964 (1,5). *G. paniculata*, I, Ulaangom, Uvs-nuur, 1964 (1,5). *Stellaria gypsophiloides*, I, Aczit-nuur, 1964 (1,5).

Erysiphe convolvuli DC., Fl. Fr. 2: 274 (1805)
(var. *convolvuli*)
On *Convolvulus ammanii*, I, Sagil sum (1). *C. arvensis*, I, ca. 20 km w. Davast (1).

Erysiphe heraclei DC., Fl. Fr. 6: 107 (1815)
Syn.: *E. umbelliferarum* de Bary
On *Cnidium dahuricum*, XII, Mjangad sum, 1964 (1,5). *Sphallerocarpus gracilis*, X, 1965 (5).

Erysiphe pisi DC., Fl. Fr. 2: 274 (1805)
(var. *pisi*)
On *Lathyrus humilis*, IX, Bajandavaa, 1965 (5). *Vicia cracca*, Ulaanbaatar, 1969 (5).
Notes: The material on *Lathyrus* could not be re-examined. It belongs possibly to *Microsphaera trifolii*.

Erysiphe polygoni DC., Fl. Fr. 2: 273 (1805)
On *Polygonum aviculare* s.lat., XII, Erdeneburen sum, 1964 (1,5); XIV, Dulan-Bogd-uul, 1975, Knapp (herb. Knapp).

Golovinomyces (U. Braun) V.P. Gelyuta

Golovinomyces adenophorae (R.Y. Zheng & G.Q. Chen) V.P. Gelyuta, Ukr. Bot. Ž. 45(5): 62 (1988)
Syn.: *Erysiphe adenophorae* R.Y. Zheng & G.Q. Chen.
On *Adenophora* sp., VII, near Arvajcheer, ca. 75 km eastward, 1978, Knapp (herb. Knapp).

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Golovinomyces artemisiae (Grev.) V.P. Gelyuta, Ukr. Bot. Ž. 45(5): 62 (1988)
Syn.: *Erysiphe artemisiae* Grev.
On *Artemisia dracunculus*, II, Telmen sum, 1964 (1,5). *A. phaeolepis*, I, Tarialan sum, 1964 (1,5). *A. viridis*, VIII, Bogd-uul, 1969 (5).

Golovinomyces cichoracearum (DC.) V.P. Gelyuta, Ukr. Bot. Ž. 45(5): 62 (1988)
(var. *cichoracearum*)
Syn.: *Erysiphe cichoracearum* DC.
On *Aster alpinus*, I, Tarialan sum, 1964 (1,5). *Cirsium esculentum*, XII, Durgun sum, Chandman sum, 1964 (1,5).

Golovinomyces cynoglossi (Wallr.) V.P. Gelyuta, Ukr. Bot. Ž. 45(5): 62 (1988)
Syn.: *Erysiphe cynoglossi* (Wallr.) U. Braun, *E. horridula* (Wallr.) Lév.
On *Lappula intermedia*, IX, Chargaltchaan sum, 1965 (5); VIII, Chentej, Terelsh, 1988, Braun (6). *L. marginata*, I, Aczit-nuur, 1964 (1,5). *Myosotis suaveolens*, I, Tarialan sum, 1964 (1,5).

Golovinomyces orontii (Castagne) V.P. Gelyuta, Ukr. Bot. Ž. 45(5): 63 (1988)
Syn.: *Erysiphe orontii* Castagne, *E. cucurbitacearum* R.Y. Zheng & G.Q. Chen, *E. cichoracearum* auct. p.p., *E. polyphaga* Hammarlund, nom. nud.
On *Cucumis sativus*, V, state farm Amgalan, 1961, 1962 (1,5).

Golovinomyces sordidus (Junell) V.P. Gelyuta, Ukr. Bot. Ž. 45(5): 63 (1988)
Syn.: *E. lamprocarpa* auct., *E. sordida* Junell.
On *Plantago major*, XII, Bulgan sum, 1964 (1,5); Ulaanbaatar, 1969 (5).

Leveillula G. Arnaud

Leveillula saxaouli (Sorokin) Golovin, Tr. Bot. Inst. Im. V. L. Komarova, AN SSSR, Ser. II, 10: 216 (1956)
On *Haloxylon ammodendron*, XVI, Bulgan sum, 1970 (5).

Leveillula taurica (Lév.) G. Arnaud, Ann. Epiphyt. 7: 94 (1921) emend. U. Braun (1980)
Syn.: *L. taurica* f. *caryopteris* Puncag (1979, p. 302), nom. inval.
On *Astragalus monophyllus*, I, Davast sum, 1964; *Caryopteris mongolica*, XVI, Bulgan sum, 1970 (5); *Clematis orientalis*, I, Naranbulag sum, 1964; *Dontostemon senilis*, XII, Mjangad sum, 1964; *Hedysarum mongolicum*, near Ulaangom, 1964; *Limonium klementzii*, XII, Manchan sum, 1964; *Oxytropis aciphylla*, I, Aczit-nuur, 1964; *Plantago major*, XVI, Bulgan sum, 1970 (5); *P. minuta* s.lat., XII, Mjangad sum, 1964; *Scorzonera austriaca*, XII, Mjangad sum, 1964; *S. pseudodivaricatum*, the same locality; *Vicia costata*, I, Sagil sum, 1964; *Zygophyllum rosovii*, I, Chjargas sum, 1964 (all specimens 1,5).
Notes: PUNCAG (1979) described *L. taurica* f. *caryopteris* as follows: primary conidia 34-64 x 12-17 µm, more or less lanceolate, secondary conidia cylindric-ellipsoid, 51-60 x 13-17 µm, ascomata 150-232 x 150-215 µm diam., ca. 12 asci, 2 spores, 30-43 x 17-25 µm.

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***Microsphaera* Lév.**

Microsphaera atraphaxidis Schmied., Feddes Repert. 73(3): 164 (1966), as „*atraphaxis*"
Syn.: *Trichocladia atraphaxidis* Golovin
On *Atraphaxis pungens*, XII, Mjangad sum, 1964, holotype UBA, isotype JE (1,5); XVI, Bulgan sum, 1970 (5).

Microsphaera trifolii (Grev.) U. Braun, Nova Hedwigia 43: 685 (1981)
Syn.: *Erysiphe trifolii* Grev., *E. martii* sensu Blumer.
On *Melilotus dentatus*, XII, Altaj sum, 1964 (1,5). *Oxytropis trichophysa*, Turgen sum, 1964 (1,5). *Lathyrus humilis*, VIII, Chentej, Gorchi, 1983, Dörfelt (HAL).
Notes: The material on *Oxytropis* could not be re-examined. It belongs possibly to *M. astragali*.

***Neoerysiphe* U. Braun**

Neoerysiphe galeopsidis (DC.) U. Braun, Schlechtendalia 3: 50 (1999)
Syn.: *Erysiphe galeopsidis* DC.
On *Drepanocaryum sewerzowii*, XII, Manchan sum, 1964 (1,5). *Phlomis oreophila*, Ulaanbaatar, Bogd-uul, 1969 (5, as *E. labiatarum*).

***Podosphaera* J. Kunze**

Podosphaera clandestina (Wallr.: Fr.) Lév., Ann. Sci. Nat., Bot., 3 Sér., 15: 136 (1851)
(var. *clandestina*)
On *Padus asiatica*, VIII (5).

***Sphaerotheca* Lév.**

Sphaerotheca aphanis (Wallr.) U. Braun, Mycotaxon 15: 136 (1982)
(var. *aphanis*)
Syn.: *Sph. macularis* auct. p.p., *Sph. alchemillae* (Grev.) Junell.
On *Alchemilla vulgaris* s.lat., I, Underchangaj sum, 1964 (1,5).

Sphaerotheca aphanis var. *hyalina* U. Braun, Zbl. Mikrobiol. 140: 240 (1985)
On *Potentilla evestita*, I, Tarialan sum, 1964 (1). *P. tergemica*, VIII, Chentej, Terelsh, 1988, Braun (6). *Sibbaldianthe adpressa*, II, Telmen sum, 1964 (1,5).

Sphaerotheca drabae Juel, Bot. Not. 1890: 9 (1890)
Syn.: *Sph. fuliginea* auct. p.p.
On *Draba* sp., I, Tarialan sum, 1964 (1,5).

Sphaerotheca ferruginea (Schltdl.: Fr.) Junell, Trans. Br. Mycol. Soc. 48: 547 (1965)
Syn.: *Sph. macularis* f. *sanguisorbae* Jacz.
On *Sanguisorba officinalis*, X, Bajan-uul sum, 1965 (5); VIII, Chentej, Terelsh, 1988, Braun (6).

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Sphaerotheca fusca (Fr.) S. Blumer, Beitr. Krypt.-Fl. Schweiz 7(1): 117 (1933) emend. U. Braun (1985: 167)
Syn.: *Sph. fuliginea* auct. p.p.
On *Odontites serotina*, XII, Erdeneburen sum, 1964 (1,5). *Scrophularia incisa*, IX, Cencher mandal sum, 1965 (5); Ulaanbaatar, Songiny bulan, 1968 (5). *Senecio nemorensis*, III, Tarialan sum, 1964 (1,5). *Taraxacum* sp., XII, Bulgan sum, 1964 (1,5); I, Burgastayn-gol, near Urugnuur, 1964 (1); Ulaanbaatar, Chaisan, 1978, Knapp (herb. Knapp); Ulaanbaatar, airport, 1956 (BUHR 1958).

Sphaerotheca pannosa (Wallr.: Fr.) Lév., Ann. Sci. Nat., Bot., 3 Sér., 15: 138 (1851)
On *Rosa acicularis*, Ulaanbaatar, 1969 (5).

***Uncinula* Lév.**

Uncinula adunca (Wallr.: Fr.) Lév., Ann. Sci. Nat., Bot., 3 Sér., 15: 151 (1851)
On *Populus laurifolia*, XII, Erdeneburen sum, 1964, (1,5). *Salix* sp., VIII, 1969 (5).

(3) USTILAGINALES

***Anthracoidea* Bref. emend. Kukkonen**

Anthracoidea caricis (Pers.) Bref., Untersuch. Ges. Mykol. 12: 144 (1895) s.str.
On *Carex amgunensis* (sect. *Montanae*), VIII, Chentej, 1983, Dörfelt (HAL); VIII, Chentej, Terelsh, 1988, Braun (6); VIII, Chentej, Sharga-most, 1981, Hilbig (HAL); VII, w. Chuczirt, 1985, Manitz (JE).
Notes: The features of the smut spores coincide with those of *A. caricis*: spores angular, 16-23.5 x 12-20 µm (∅ 19.2 x 16.3 µm), wall irregularly thickened, with internal swellings and light-refracting spots.

Anthracoidea caryophylleae Kukkonen, Ann. Bot. Soc. „Vanamo" 34(3): 53 (1963)
On *Carex obtusata*, I, Turgen-uul, Burgastajn-gol, 1964 (2,5), as *Cintractia caricis*.
Notes: The determination of the host plant has been proven. The spores are characterized as follows: shape variable, subglobose to angular-irregular, 12-20 µm diam., elongated spores up to 27 µm in length, wall regular or irregularly thickened in angular spores, with light-refracting spots.

Anthracoidea eleocharidis Kukkonen, Trans. Br. Mycol. Soc. 47: 274 (1964)
On *Carex duriuscula*, Mongolian Altaj, N. Changaj (8).

Anthracoidea elynae (Syd.) Kukkonen, Ann. Bot. Soc. „Vanamo" 34(3): 65 (1963)
Syn.: *Cintractia elynae* Syd.
On *Kobresia myosuroides* (= *K. bellardii*), XI, Tolbonur sum, 1964 (2,5); I, Turgen-uul, 1964 (2,5); VII, Orchon valley, ca. 90 km from Chuczirt, 1988, Braun (6). *K. smirnovii*, XI, Tolbonur sum, 1964 (2,5); Mongolian Altaj, N. Changaj (8).

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Anthracoidea fischeri (P. Karst.) Kukkonen, Ann. Bot. Soc. „Vanamo" 34(3): 73 (1963)
Syn.: *Cintractia fischeri* (P. Karst.) Liro
On *Carex canescens*, V, 1977 (5).

Anthracoidea heterospora (B. Lindeb.) Kukkonen, Ann. Bot. Soc. „Vanamo" 34(3): 63 (1963)
On *Carex orbicularis*, I, Davst sum, Chandgajtyn-gol, 1964 (2,5), as *Cintractia caricis* on *Carex* sp.
Notes: Host and fungus have been re-examined and determined. The spores are subglobose, ellipsoid to slightly angular, 16-20 x 13-18 µm, wall regular, 0.8-2.5 µm, faintly verruculose, without light-refractive spots, partly with internal swellings.

Anthracoidea irregularis (Liro) ex U. Braun & G. Hirsch, Feddes Repert. 89(1): 45 (1978)
On *Carex pediformis*, XII, Bulgan sum, 1964 (2,5); I, Turgen-uul, Burgastajn-gol, 1964 (2,5); VIII, Chentej, 1983, Dörfelt (HAL), material distributed as „Vánky, Ustil. 456"; VIII, between Nalajch and Terelsh, 1985, Manitz (JE); VIII, Chentej, Terelsh, 1988, U. Braun (6); Ulaanbaatar, 1988, Braun (6); IV, Bulgan, Shatsgatynnuru (7); Mongolian Altaj, Chuch-Pur nuur (8).

Anthracoidea karii (Liro) Nannf., Bot. Not. 130: 368 (1977)
On *Carex* sp. (subgen. *Vignea*), I, Turgen-uul, Burgastajn-gol, 1964 (2,5), as *Cintractia caricis*.
Notes: The inflorescences are strongly destroyed. Therefore, the exact determination of this host was impossible. The spores are regularly subglobose to very slightly angular, small, 17.5-21 x 10.5-18 µm, wall regular, thin, without light-refractive spots, occasionally with a few internal swellings. NANNFELDT (1979) recorded this species only from Europe and North America. KARATYGIN & AZBUKINA (1990) listed some collections from the Russian Far East.

Anthracoidea rupestris Kukkonen, Ann. Bot. Soc. „Vanamo" 34(3): 47 (1963)
On *Carex rupestris*, Mongolian Altaj, Alag-Chajrchan and Chuch-Pur nuur (8).

Anthracoidea sempervirentis Vánky, Bot. Not. 132: 225 (1979)
On *Carex stenocarpa*, Mongolian Altaj, N. Changaj (8).
Notes: This is the first collection of this fungus from Asia. *A. sempervirentis* is neither known from Russia nor from Central Asia (see KARATYGIN & AZBUKINA 1989).

***Microbotryum* Lév.**

Microbotryum violaceum (Pers.: Pers.) G. Deml & Oberw., Phytopathol. Z. 104(4): 353 (1982)
Syn.: *Ustilago violacea* (Pers.: Pers.) Roussel, *U. silenes-inflatae* Liro, *Microbotryum silenes-inflatae* (Liro) G. Deml & Oberw.
On *Silene repens*, V, Zuun-charaa, 1964 (3,5). *S. jenisseensis*, Ulaanbaatar, Bogd-uul, Saisan, 1974, Hilbig and Shamsran (HAL); VII, Changaj, between Charchorin and Chuchirt, 1988, Braun (6).

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***Orphanomyces* Savile**

Orphanomyces arcticus (Rostr.) Savile, Can. J. Bot. 52: 342 (1974)
Syn.: *Cintractia arctica* (Rostr.) Lagerh.
On *Carex* sp., XII, Altaj sum, 1964 (2,5). *C. duriuscula*, XVI, Gobi-Altaj, Gurvan-Sajchan-uul, Joly-am, 1988, Braun (6).

***Schizonella* J. Schröt.**

Schizonella melanogramma (DC.) J. Schröt., in Cohn, Beitr. Biol. Pfl. 2: 385 (1877)
On *Carex duriuscula*, XII, Manchan sum, 1964 (2,5). *C.* sp., IV, Bulgan, Chargajtan-am (7).

***Sporisorium* Ehrh. ex Link**
(emend. LANGDON & FULLERTON 1978, VÁNKY 1985)

Sporisorium destruens (Schltdl.) Vánky, Symb. Bot. Upsal. 24(2): 115 (1985)
Syn.: *Sphacelotheca destruens* (Schltdl.) J.A. Stevenson & A.G. Johnson.
On *Panicum miliaceum*, V, Zuun-charaa, 1962, 1963 (2,5).

***Thecaphora* Fingerh.**

Thecaphora trailii Cooke, Grevillea 11: 155 (1883)
On *Saussurea* sp., IV, Bulgan (7).

***Tilletia* Tul. & C. Tul.**

Tilletia caries (DC.) Tul. & C. Tul., Ann. Sci. Nat., Bot., 3 Sér., 7: 113 (1847)
Syn.: *T. tritici* (Berk.) G. Winter
On *Triticum aestivum*, XII, Mjangad sum, 1964 (2,5); V, state farm Zhargalant, 1961; Zuun-charaa, 1961 (5). According to SCHMIEDEKNECHT & PUNCAG (1966b), generally distributed in Mongolia wherever *Triticum* is cultivated.

Tilletia laevis J. Kühn, in Rabenh., Fungi eur. 1697 (1873)
Syn.: *T. foetida* (Wallr.) Liro.
On *Triticum aestivum*, V, state farm Zhargalant, 1961, 1962; Zuun-charaa, 1961 (5). According to SCHMIEDEKNECHT & PUNCAG (1966b), generally distributed in Mongolia wherever *Triticum* is cultivated.

Tilletia poae Nagorny, Zap. Nauč.-Prikl. Otd. Tifl. Bot. Sad. 5: 170 (1926)
On *Poa* sp., VIII, 1963 (5).

Tilletia sp.
On *Clinelymus sibiricus*, V, around Ulaanbaatar, 1963 (2).
Notes: This material could not be re-examined. The common *T. controversa* J. Kühn (incl. *T. elymicola* Lavrov) occurs on *Elymus* s.lat. and allied genera.

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Tilletia sphaerococca (Wallr.) A.A. Fisch.Waldh., Bull. Soc. Imp. Nat. Mosc. 40: 255 (1867)
Syn.: *T. decipiens* (Pers.) Körn., *T. menieri* Har. & Pat.
On *Phalaris arundinacea*, V, 1977 (5).

***Urocystis* Rabenh. ex Fuckel**

Urocystis agropyri (Preuss) A.A. Fisch.Waldh., Bull. Soc. Imp. Nat. Mosc. 40: 258 (1867)
On *Agropyron* sp., XII, Bulgan sum, 1964 (2,5). *Aneurolepidium pseudagropyrum*, V, Zuuncharaa sum, 1964 (2,5). *Aneurolepidium* sp., XI, Tolbonur sum, 1964 (2,5); XII, 1964 (2,5).

Urocystis primulicola Magnus, Verh. Bot. Ver. Prov. Brandenburg 20: 53 (1878)
On *Primula farinosa*, VIII, near Gorchi, 1985, Manitz (JE).
Notes: The spore balls are 30-68 µm diam.

Urocystis pulsatillae (Bubák) Moesz, A Kárpat-medence üsuö gyombái: 211 (1950)
On *Pulsatilla turczaninovii*, VIII, Chentej, Gorchi, 1983, Dörfelt (HAL).

Urocystis sorosporioides Körn. ex A.A. Fisch.Waldh., Ann. Sci. Nat., Bot., Sér. 6, 4: 241 (1877)
On *Thalictrum foetidum*, I, ca. 25 km w. Urug-nuur, 1964 (2,5).

Urocystis tritici Körn., Hedwigia 16: 33 (1877)
On *Triticum aestivum*, V, Tsetserleg sum and Zuuncharaa, 1961, 1962 (2,5).

Urocystis violae (J. Sowerby) A.A. Fisch.Waldh., Bull. Soc. Imp. Nat. Mosc. 40: 258 (1867)
On *Viola biflora*, II, Bulnaj sum, 1976 (5).

***Ustilago* (Pers.) Rousseau**

Ustilago avenae (Pers.) Rostr., Overs. K. Dansk. Vid. Selsk. Forh. 1890: 13 (1890)
On *Avena sativa*, XII, Mjangad sum, 1964, 1967 (2,5); I, Sagil sum, 1964 (2,5); IX, Zhargalantchaan sum, 1961 (5); VIII, 1961 (5); V, Zuun-charaa, 1961 (5); IV, Un't sum, 1966 (5); VII, Chuczirt sum, 1967 (5); VII, Zuun-Sajan-ulaan sum, 1967 (5). According to SCHMIEDEKNECHT & PUNCAG (1966b), generally distributed in Mongolia wherever *Avena* is cultivated.

Ustilago bistortarum (DC.) Körn., Hedwigia 16: 38 (1877)
Syn.: *Sphacelotheca ustilaginea* (DC.) S. Ito.
On *Polygonum viviparum*, VI, Cencher sum, 1964 (2,5); XIII, Zhargalant sum, 1964 (2,5); I, Turgen-uul, 1964, Schmiedeknecht (JE); VIII, Chentej, 1983, Dörfelt (HAL, distributed as „Vánky, Ustil. 483"); IV, Bulgan, Uljatajn-gol (7), as *Sphacelotheca hydropiperis*; Mongolian Altaj, Chuch-Pur (8); VII, ca. 60 km n.w. Chuczirt, 1988, Braun and VIII, Chentej, Terelsh, 1988, Braun (6). *P. angustifolium*, VII, w. of Chuczirt, Manitz (JE).

Ustilago bosniaca G. Beck, Ann. K.K. Naturhist. Hofmus. 9: 121 (1894)
On *Polygonum alpinum*, IV, Bulgan, Shatsgatyn-nuru (7).

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Ustilago bullata Berk., in Hooker, The botany of the Antarctic voyage, 2. Fl. Novae-Zelandiae, Part 2: 196, London 1855
On *Agropyron repens*, V, Zuun-charaa, 1962, 1963 (2,5).

Ustilago hordei (Pers.) Lagerh., Mitt. Bad. Bot. Ver. 1889: 70 (1889)
Syn.: *U. kolleri* Wille, *U. levis* (Kellerm. & Swingle) Magnus.
On *Avena sativa*, IX, Zhargalant-chaan sum, 1967 (5); VIII, 1961 (5); V, Zuun-charaa, 1961, 1962 (5); VII, Zuun-Bajan-ulaan sum, 1967 (5); VII, Chuczirt sum, 1967 (5). *Hordeum sativum*, I, Sagil sum, 1964 (2,5); VIII, 1961 (5). According to SCHMIEDEKNECHT & PUNCAG (1966b), this species is generally distributed in Mongolia.

Ustilago hypodytes (Schltdl.) Fr., Syst. mycol. 3(2): 518 (1832)
Syn.: *U. agrestis* Syd., *U. williamsii* auct. p.p.
On *Agropyron desertorum*, XI, Tolbonur sum, 1964 (2,5); I, 1964 (2,5); XII, 1964 (5). *A. repens*, V, state farm Zhargalant, 1962 (2,5); Zuun-charaa sum, 1963 (2,5); XII, Bulgan sum, 1964 (2,5). *Aneurolepidium dasystachys* s.lat., II, Santmargac sum, 1964 (2,5); II, Telmen sum, 1964 (2,5). *A.* sp., II, Santmargac sum, 1964 (2,5). *Psammochloa villosa*, XVI, Bulgan sum, 1969 (5). *Stipa grandis*, XVIII, Suchbaatar sum, 1962 (2,5). *Agropyron* sp., IV, Bulgan sum, Shatsgatynnuru and *Roegneria* sp., IV, Bulgan-gol (7). *Agropyron cristatum* and *A. nevskii*, Mongolian Altaj, Tugreka (8). *Poa attenuata*, N. Changaj (8).

Ustilago maydis (DC.) Corda, Icon. fung. 5: 3 (1842)
On *Zea mays*, XIII, Sojol, 1959 (2,5).

Ustilago minima Arthur, Iowa Agric. Coll. Dept. Bot. Bull. 1884: 172 (1884)
Syn.: *Sorosporium reverdattoanum* Lavrov.
On *Achnatherum splendens*, XII, Bulgan sum, 1964 (2,5); XII, Erdeneburen sum, 1964 (2,5); I, Davst sum (2,5); XVI, 10 km s. Dalanzadgad, 1983, Dörfelt (HAL, distributed as „Vánky, Ustil. 493"); Mongolian Altaj, Vokta (8).

Ustilago pustulata (DC.) G. Winter, Hedwigia 19: 109 (1880)
On *Polygonum viviparum*, XVI, Gurvan-Sajchan-uul, Dund-Sajchan, Joly-am, 1988, Braun (6).

Ustilago scorzonerae (Alb. & Schwein.) J. Schröt., in Cohn, Pilze Schles. 1: 274 (1887)
On *Scorzonera radiata*, VI, Cencher sum, 1964 (2,5).

Ustilago trebouxii Syd. & P. Syd., Ann. Mycol. 10: 214 (1912)
Syn.: *U. helictotrichi* Schmiedeknecht (1966b: 179), according to VÁNKY (1992: 424).
On *Helictotrichon* sp., I, Turgen sum, 1964 (2,5; JE = isotype, UBA = holotype of *U. helictotrichi*).

Ustilago tritici (Pers.) Rostr., Overs. Kon. Dansk Vid. Selsk. Förh. 1890: 15 (1890)
Syn.: *U. nuda* (Jensen) Rostr.

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On *Hordeum vulgare*, XI, Chovd sum, 1964 (2,5); VIII, 1961 (5); V, 1961, 1962 (5); VII, Zujl sum, 1967 (5). *Triticum sativum*, XII, Mjandad sum, 1964 (2,5); VIII, 1961 (5); V, 1961, 1962 (5). According to SCHMIEDEKNECHT & PUNCAG (1966b), generally distributed in Mongolia.

Ustilago williamsii (Griffiths) Lavrov, Tr. Biol. Inst. Tomsk. Gos. Univ. 2: 22 (1936)
Syn.: *Sorosporium williamsii* Griffiths, *Tranzscheliella williamsii* (Griffiths) Dingley & Versluys, *T. otophora* Lavrov.
On *Stipa* cf. *caucasica*, XII, Manchan sum, 1964 (2,5); I, Aczit-nuur, 1964 (2,5). *S. orientalis*, XII, Altaj sum, 1964 (2,5); IV, Bulgan, Bulgan gol (7). *Stipa gobica*, Mongolian Altaj, Tugeka (8). *S. breviflora*, Zaaltajskoje Gobi (8).

(4) UREDINALES

(the abbreviations in brackets, between host plant and district number, refer to the developmental stages of the rust: 0 - spermogonia, I - aecia, II - uredinia, III - telia)

Aecidium Pers.

Aecidium euphorbiae J.F. Gmel.: Pers., Syn. meth. fung.: 211 (1801)
On *Euphorbia discolor* (O,I), VIII, Bajanzurch sum, 1964 (3,5); VII, Changaj, ca. 60 km n.w. Chuczirt, 1988, Braun (6). *E. kozlovii* (O,I), XVI, Bulgan sum, 1962 (3,5). *E. subcordata* (O,I), XII, Manchan sum, 1964 (3,5). *E.* sp. (O,I), XII, 1964 (3,5); VI, Czulutyn-gol, ca. 40 km n. Czulut, 1978, Knapp (herb. Knapp).

Aecidium pulsatillae Tranzschel, Tr. Bot. Mus. Imp. Spb. AN 7: 115 (1909)
On *Pulsatilla* sp. (O,I), VI, Ugij-nuur sum, 1964, Schmiedeknecht (JE).

Aecidium ranunculi-acris Pers., Syn. meth. fung.: 210 (1801)
On *Halerpestes ruthenica* (O,I), XIII, Zhargalant sum, 1964 (3,5). *Ranunculus japonicus* (O, I), VIII, Chentej, Gorchi, 1983, Dörfelt (HAL); VII, Chuczirt, 1988, Braun (6). *Ranunculus pulchellus* (O,I), VI, Ugij-nuur sum, 1964 (3,5); VII, Czuluutyn-gol, 1985, Manitz (JE).
Notes: These aecia belong possibly to *Uromyces dactylidis*. SCHMIEDEKNECHT & PUNCAG (1967a) and PUNCAG (1979) recorded these specimens under the latter name, but a clear morphological differentiation of *Ranunculus* aecia is hardly possible. Therefore, I prefer to assign all samples to *Aecidium ranunculi-acris*.

Aecidium thalictri Grev., Scott. Crypt. Fl. 1: 4 (1823)
On *Thalictrum minus* (O,I), VIII, Chentej, Gorchi, 1983, Dörfelt (HAL). *T. simplex* (O,I), VIII, Chentej, Gorchi, 1983, Dörfelt (HAL).

Chrysomyxa Unger

Chrysomyxa pyrolata G. Winter, in Rabenh., Krypt.-Fl. Deutschl. 1(1): 250 (1881)
On *Pyrola incarnata* (O,I), VIII, Ulaanbaatar chot, Bogd-uul, 1964 (3,5).

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Chrysomyxa rhododendri de Bary, Bot. Z. 37: 809 (1879)
On *Rhododendron dahuricum* (II,III), V, Delgerchaan-uul, 1977 (5). *R. parviflorum* (II), VIII, Chentej, Terelsh, 1988, Braun & Dörfelt (6). *R.* sp. (II), VIII, Chentej, Gorchi, 1983, Dörfelt (HAL).

Coleosporium Lév.

Coleosporium aconiti Thüm., Mycoth. univ. 1440 (1879)
On *Aconitum barbatum* (II,III?), II, Bajan sum, 1976 (5).

Coleosporium campanulae (F. Strauss) Tul., Ann. Sci. Nat., Bot., 4, 2: 137 (1854)
On *Adenophora stenanthina* (II,III), VIII, Bogd-uul, 1962 (3, 5). *Campanula glomerata* (II, III), V, Zuun-charaa, Nojon-uul, 1963, 1964 (3,5).

Coleosporium cimicifugatum Thüm., Bull. Soc. Imp. Nat. Mosc. 53: 222 (1878)
On *Cimicifuga foetida* (II,III), VIII, Segneger uul, 1963 (5).

Coleosporium inulae Rabenh., Bot. Z. 9: 455 (1851)
(emend. Braun 1981)
Syn.: *C. ligulariae* Thüm., *C. saffianoffianum* Thüm.
On *Ligularia sibirica* (II,III), V, 1977 (5).

Coleosporium rhinanthacearum Tul., Ann. Sci. Nat., Bot., 4, 2: 190 (1854)
Syn.: *C. euphrasiae* (Schumach.) G. Winter.
On *Pedicularis resupinata* (II,III), V, Zuun-charaa sum, Nojon-uul, 1963 (3,5).

Coleosporium saposhnikoviae Puncag (1979: 52-53, Fig. 4), nom. inval.
On *Saposhnikovia divaricata* (II,III), V, Ereegijn sanggijn azhachuj chech czuluutyn davaanaas, 1967 (5). Fig. 2
Notes: PUNCAG (l.c.) published this species without Latin description. The described and illustrated telia (73-123 x 12-21 µm, apex 17-25 µm thick) belong undoubtedly to *Coleosporium*, but the host identity could not be verified.

Fig. 2: *Coleosporium saposhnikoviae*, original illustration from PUNCAG (1979).

Coleosporium tussilaginis (Pers.) Berk., Outl. Brit. Fung.: 333 (1860)
(emend. Braun 1981)
Syn.: *C. cacaliae* G.H. Otth, *C. senecionis* (Pers.) J. Kickx, *C. sonchi-arvensis* (Pers.) G. Winter.
On *Cacalia hastata* (II,III), VIII, Bogd-uul, 1962 (3,5); V, Zuun-charaa, Nojon-uul, 1963 (3,5). *Senecio campester* (II, III), Zuun-charaa, Tariny-am, 1964 (3, 5). *Sonchus arvensis* (II,III?), II, Bulgan sum, 1976 (5).

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***Cronartium* Fr.**

Cronartium ribicola J.C. Fisch., in Rabenh., Fungi eur. 1595 (1872)
On *Ribes nigrum* s.lat. (II,III), I, Davst sum, 1964 (3,5); V, Experimental station Shamar, 1963 (3,5); V, Zuun-charaa, 1963 (5); VIII, 1963 (5).

***Melampsora* Castagne**

Melampsora arctica Rostr., Medd. Grönl. 3: 538 (1888)
(emend. Braun 1981)
Syn.: *M. orchidi-repentis* Kleb.
On *Gymnadenia conopsea* (I), II, Bulgan sum, 1976 (5).

Melampsora caprearum Thüm., Mitt. Forstl. Versuchsw. Oest. 2: 34 (1879)
Syn.: *M. laricis-caprearum* Kleb.
On *Salix pyrolifolia* (II,III), I, Davst sum, 1964 (3,5).

Melampsora epitea Thüm., Mitt. Forstl. Versuchsw. Oest. 2: 38 (1879)
(emend. Braun 1981)
Syn.: *M. larici-epitea* Kleb.
On *Salix arbuscula* (II,III), I, Underchangaj sum, 1964 (3,5). *S. ledebouriana* (II), Ulaanbaatar, 1988, Braun (6). *S. myrtilloides* (II), VIII, Chentej, Terelsh, 1988, Braun (6). *S. rhamnifolia* (II), VIII, Chentej, n. Gorchi, 1988, Braun & Wähner (6). *S.* cf. *starkeana* (II,III), I, Davst sum, 1964 (3,5).

Melampsora euphorbiae (C. Schub.) Cast., Obs. pl. acotyl. 2: 18 (1843) s.lat.
On *Euphorbia esula* s.lat. (II,III), I, near Ulaangom, 1964 (3,5). *E. potanini* (II,III), I, Turgen sum, 1964 (3,5). *E. subcordata* (II,III), XII, Manchan sum, 1964 (3, 5). *E. discolor* (II,III?), III, 1966 (5); (II), XII, Char-us-nuur, 1982, Jäger (HAL); (II), VIII, Bogd-uul, n. Zuun-mod, 1988, Braun (6).

Melampsora euphorbiae-gerardianae W. Muell., Centralbl. Bakt. II, 17: 210 (1906)
On *Euphorbia* sp. (II,III), III, between Shine-Ider sum and Mörön, 1964 (3,5).

Melampsora larici-pentandrae Kleb., Z. Pflanzenkr. 7: 330 (1897)
On *Salix pentandra* (II,III), II, Tosoncengel sum, 1964 (3,5).

Melampsora larici-populina Kleb., Z. Pflanzenkr. 12: 43 (1902)
On *Populus laurifolia* (II,III), IV, Chutag sum, 1964 (3,5).

Melampsora liniperda (Körn.) Palm, Sv. Bot. Tidskr. 4: 4 (1910)
Syn.: *M. lini* var. *liniperda* Körn.
On *Linum baicalense* (II,III), VIII, Czingis-uul, 1964 (3,5); III, Tarialan sum, 1964 (3,5); V, Zuun-charaa sum, 1964 (3,5).

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Melampsora populnea (Pers.) P. Karst., Bidr. Känn. Finl. Nat. Folk 31: 53 (1879)
Syn.: *M. magnusiana* Kleb.
On *Populus tremula* (II,III), V, Zuun-charaa sum, Nojol-uul, 1964 (3,5).

Melampsora stellerae Teich, Bull. Univ. Asie Centr. 19: 181 (1934)
On *Stellera chamaejasme* (II,III), VII, 1967 (5).

***Melampsoridium* Kleb.**

Melampsoridium betulinum (Fr.) Kleb., Z. Pflanzenkr. 9: 22 (1899)
Syn.: *Aecidium laricis* Kleb.
On *Larix sibirica* (I), VIII, Chentej, Gorchi, 1983, Dörfelt (HAL). *Betula humilis* (II,III), I, Tosoncengel sum, 1964, Schmiedeknecht (JE). *B. microphylla* (II,III), I, Davst sum, 1964 (3, 5). *B. platyphylla* (II,III), II, Tosoncengel sum, 1964 (3,5).

***Phragmidium* Link**

Phragmidium andersoni Shear, Bull. Torrey Bot. Club 29: 453 (1902)
On *Potentilla fruticosa* (III), II, Tosoncengel sum, 1964 (3,5); VI, 1967 (5).

Phragmidium fusiforme J. Schröt. var. *rosae-acicularis* (Liro) Savile, Fungi Canad. 54 (1974)
Syn.: *Ph. fusiforme* auct., *Ph. rosae-acicularis* Liro
On *Rosa acicularis* (O,I), VIII, Bogd-uul, 1964 (3,5); (II,III), II, Tosoncengel sum, 1964 (3,5); (II,III), IV, Un't sum, 1964 (3,5); V, Zuun-charaa, 1962 (5); (II,III), Ulaanbaatar, 1988, Braun (6); (II,III), VII, 60 km n.w. Chuczirt, 1988, Braun (6); (II,III), VIII, Chentej, Terelsh, 1988, Braun (6).

Phragmidium potentillae (Pers.) P. Karst., Bidr. Känn. Finl. Nat. Folk 31: 49 (1879)
On *Potentilla acaulis* (0-III), V, Zuun-charaa sum, 1962 (3,5); VIII, Bonur sum, 1963 (3,5); Ulaanbaatar, 1964 (3,5); VI, Ugij-nuur sum, 1964 (3,5); IV, 1966 (5); III, 1966 (5); VII, 1967 (5). *P. conferta* (0-III), V, Zuun-charaa, 1963, 1964 (3,5); VIII, Lun sum, 1964 (3,5); IV, 1966 (5). *P. evestita* (0,I,III), VI, Cecerleg sum, 1964 (3,5). *P. multifida* (0-III), VIII, Lun sum, 1964 (3,5); I, Davst sum, 1964 (3,5). *P. nivea* (0-III), I, Underchangaj sum, 1964 (3,5); V, near Zuun-charaa, 1963 (3). *P. nudicaulis* (0-III), V, Zuun-charaa sum, 1963, 1964 (3,5); IV, 1964 (5); III, 1966 (5); VII, 1964 (5). *P. tergemica* (II,III), Ulaanbaatar, 1988, Braun (6); VIII, Chentej, Terelsh, 1988, Braun (6). *P.* sp. (II,III), VIII, Chentej, Gorchi, 1983, Dörfelt (HAL).
Notes: SCHMIEDEKNECHT & PUNCAG (1967a) recorded *P. supina* L. as host from Zuun-charaa sum (V). This host was, however, not listed by PUNCAG (1979).

Phragmidium rubi-saxatilis Liro, Ured. Fenn.: 421 (1908)
On *Rubus saxatilis* (0-III?), VIII, Bogd-uul, 1969 (5).

Phragmidium tuberculatum J. Muell., Ber. Deutsch. Bot. Ges. 3: 391 (1885)
On *Rosa oxyacantha* (0,I,III), XII, Bulgan sum, 1964 (3,5); X, Bajan-uul sum, 1965 (5).

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***Puccinia* Pers.**

Puccinia abberans Peck, Bot. Gaz. 4: 217 (1879)
Syn.: *P. hutchinsiae* Diet. (sensu SCHMIEDEKNECHT & PUNCAG 1967b).
On *Smelovskia calycina* (III), XII, Manchan sum, 1964 (4,5); XII, Czenst-uul, 1982, Jäger (HAL).
Notes: UL'JANIŠČEV (1978) recorded this species from Central Asia and Siberia.

Puccinia absinthii (Hedw. f.) DC., Fl. Fr. 5: 56 (1815)
(var. *absinthii*)
On *Artemisia glauca* (II,III), V, Zuun-charaa sum, 1963, 1964 (4,5); VIII, state farm Zhargalant, 1961 (4). *A. macrocephala* (II,III), VIII, state farm Zhargalant, 1962 (4,5). *A. siversiana* (III), IV, Unt sum, 1964 (4,5).

Puccinia acetosae Körn., Hedwigia 15: 184 (1886)
On *Rumex gmelinii* (II,III), V, Zuun-charaa, 1964 (4, 5).

Puccinia acroptili Syd., Monogr. Ured. I: 4 (1904)
On *Acroptilon picris* (II,III), V, Bulgan sum, 1969, 1970 (5).

Puccinia aegopodii Röhl., Deutschl. Fl., Ed. 2, III, 3: 131 (1813)
On *Aegopodium alpestre* (III), VIII, Bogd-uul, 1964 (4,5); VIII, Chentej, Terelsh, 1988, Braun (6).

Puccinia altensis Lindr., Medd. Stockh. Högs. Bot. Inst. 4: 4 (1901)
On *Conioselinum* cf. *tataricum* (III), VII, ca. 60 km w.n.w. Chuczirt, 1988, Braun (6).

Puccinia angelicae (Schumach.) Fuckel, Jahrb. Nass. Ver. Nat. 23-24: 52 (1870)
(var. *angelicae*)
On *Angelica decurrens* (II,III), XII, Bulgan sum, 1964 (4,5). *Cnidium multicaule* (II,III), XVI, Gurvan-Sajchan-uul, Dund-Sajchan, Joly am, 1988, Braun (6).

Puccinia asparagi DC., Fl. Fr. 2: 595 (1805)
On *Asparagus dahuricus* (II,III), X, Chalch-gol sum, 1967 (5).

Puccinia behenis G.H. Otth, Mitt. Naturf. Ges. Bern 1870: 113 (1871)
On *Gypsophila dahurica* (III), II, Tosoncengel sum, 1964 (4,5); X, Bajan-uul sum, 1965 (5); V, Zuun-charaa, 1964 (5); VII, 1967 (5).

Puccinia bistortae DC., Fl. Fr. 5: 61 (1815)
(var. *bistortae*)
Syn.: *P. cari-bistortae* Kleb.
On *Cnidium* sp., *Siler divaricatum*, and *Sphallerocarpus gracilis* (0,I), V, Zuun-charaa, 1961, 1963 (4,5) [it is not clear if all aecial stages belong to var. *bistortae*]. *Polygonum bistorta* s.lat. (II,III), VI, Cencher sum, 1964 (4,5); XIII, Zhargalant sum, 1964 (4,5). *Polygonum nitens* (II,III), I, Turgen sum, 1964 (4,5).

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Puccinia bistortae DC. var. *vivipari* U. Braun, Feddes Repert. 92: 103 (1981)
Syn.: *P. polygoni-vivipari* P. Karst.
On *Polygonum viviparum* (II,III), V, Zuun-charaa, 1963, 1964 (4,5); III, 1966 (5); VII, ca. 60 km w.n.w. Chuczirt, 1988, Braun (6); XVI, Gurvan-Sajchan-uul, Dund-Sajchan, Joly am, 1988, Braun (6).

Puccinia bupleuri F. Rudolphi, Linnaea 4: 514 (1829)
On *Bupleurum bicaule* s.lat. (0,I), Ulaanbaatar, 1964 (4,5). *B. multinerve* (0,I,III), I, Turgen sum, 1964 (4,5). *B. pusillum* (0,I), XI, Bajan-enger sum, 1964 (4,5). *B. scorzonerifolium* (0,I), VI, Tajchar sum, 1964 (4,5).

Puccinia burnettii Griffiths, Bull. Torrey Bot. Club 29: 208 (1902)
On *Ceratoides papposa* (0,I), IV, Shatsgatynnuru, Chargajtan-am (7).

Puccinia calcitrapae DC., Fl. Fr. 2: 221 (1805)
(emend. Braun 1981)
Syn.: *P. centaureae* DC., *P. carduorum* Jacky, *P. cirsii* Lasch
On *Carduus nutans* (II,III), V, state farm Zuun-Buren, 1963 (4,5). *Centaurea monanthos* (II,III), V, state farm Ero, 1964 (4,5); VIII, Chentej, near Nalaich, 1978, Knapp (herb. Knapp). *Cirsium esculentum* (II,III), V, 1962 (5). *Cirsium* sp. (II,III), V, state farm Zuun-Buren, 1963 (4); V, Zuun-charaa, Cherchenceg-uul, 1964 (4). *Leuzea uniflora* (III), VIII, Bogd-uul, 1964 (4,5); III, Shine-Ider sum, 1964 (4,5); VIII, Chentej, 1983, Dörfelt (HAL).
Notes: SCHMIEDEKNECHT & PUNCAG (1967b) referred the fungus on *Centaurea monanthos* to *Puccinia montana* Fuckel, but it belongs to *P. calcitrapae* s.lat. UL'JANIŠČEV (1978) recorded *Leuzea uniflora* as host of *P. centaureae* and AZBUKINA (1974) listed it under *P. calcitrapae*.

Puccinia calthicola J. Schröt., in Cohn, Beitr. Biol. Pfl. 3: 61 (1879)
On *Caltha palustris* (0,I), VIII, Chentej, Terelsh, 1988, Braun (6).

Puccinia caricina DC., Fl. Fr. 5: 60 (1815) s.lat.
Syn.: *P. urticae-caricis* Kleb., *Aecidium grossulariae* Schumach.
On *Ribes altissima* (0,I), V, Zuun-charaa, Schaamar, 1963 (4); VIII, Chentej, Gorchi, 1983, Dörfelt (HAL). *R. nigrum* (0,I), V, Zuun-charaa, Schaamar, 1963 (4,5). *Urtica cannabina* (0,I), V, Zuun-charaa, 1962, 1963, 1966 (5).

Puccinia cicutae Lasch, in Klotzsch, Herb. viv. mycol. 787 (1845)
On *Cicuta virosa* (0-III), IX, Mörön sum, 1965 (5).

Puccinia cinae Tranzschel & Kuprev., in Kuprev., Acta Inst. Bot. Acad. Sci. USSR, Pl. Crypt., Fasc. II: 406 (1935)
On *Artemisia mongolica* (0,II,III), V, Zuun-charaa sum, 1963 (4,5). *A. siversiana* (0,I,III), V, state farm Zuun-Buren, 1963 (4,5).

Puccinia cnici-oleracei Pers. ex Desm., Cat. Pl. Omis.: 24 (1823)
(emend. HYLANDER et al. 1953)

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On *Artemisia borealis* s.lat. (cf. *A. pycnorhiza*) (III), II, Telmen sum, 1964 (4,5).
Notes: SCHMIEDEKNECHT & PUNCAG (1967b) recorded this collection as *Puccinia dracunculina*. It belongs, however, to *P. cnici-oleracei*.

Puccinia commutata Syd. & P. Syd., Monogr. Ured. I: 201 (1902)
On *Valeriana officinalis* s.lat. (0,I,III), VIII, Chentej, Gorchi, 1983, Dörfelt (HAL).

Puccinia coronata Corda, Icon. Fung. 1: 6 (1837)
(var. *coronata*)
On *Hordeum brevisubulatum* (III), I, Davst sum, 1964 (4,5).

Puccinia crepidis J. Schröt., in Cohn, Krypt.-Fl. Schles. III, 1: 319 (1887)
On *Crepis flexuosa* (0,I), XII, Manchan sum, 1964 (4,5). *Crepis* sp. (II,III), XI, Tolbo sum, 1964 (4,5).
Notes: The aecia on *C. flexuosa* are abundant, scattered (systematic infection) and the spores are about 16-24 µm diam.

Puccinia crepidis-pygmaeae Gaillard, Bull. Soc. Myc. Fr. 3: 183 (1887) emend. JOERSTAD (1934)
Syn.: *P. crepidis-sibiricae* Lindr.
On *Crepis krylovii* (0,I?), V, 1964 (5). *C. crocea* (0,I), VI, Tajchar sum, 1964 (4,5).
Notes: The material in JE on *C. crocea* agrees with *P. crepidis-pygmaeae* (aecia localized, in groups, spores 16-21 µm diam.).

Puccinia dioicae Magnus, Amtl. Ber. 50. Vers. Dt. Naturf. Ärzte, München: 199 (1877) emend.
Syn.: *Puccinia centaureae-caricis* Tranzschel, *P. serratulae-caricis* Kleb., *P. silvatica* J. Schröt., *P. vaginatae* Juel.
On *Leuzea uniflora* (I), VIII, Chentej, Gorchi, 1983, Dörfelt (HAL). *Saussurea daurica* (I), I, Naranbulag sum, 1964 (4,5). *Taraxacum* sp. (0,I), XIII, Chujsijn gov', 1964 (4,5); XI, Chovd-gol, 1964 (4,5).
Notes: UL'JANIŠČEV (1978) mentioned *Leuzea uniflora* as host of *P. centaureae-caricis* from Siberia. *Saussurea alpina* and *Carex vaginata* were recorded as host plants of *P. vaginatae* from the European part of Russia.

Puccinia dioicae Magnus var. *opizii* (Bub.) U. Braun, Feddes Repert. 93: 264 (1982)
Syn.: *P. opizii* Bub.
On *Crepis* sp. (0,I), XIII, Zhargalant sum, 1964 (4,5).

Puccinia doronici Niessl, Verh. Naturf. Ver. Brünn 10: 9 (1872) emend. BRAUN (1981)
Syn.: *P. asteris-alpini* Syd., *P. uralensis* Tranzschel.
On *Aster alpinus* (III), VI, Bulgan sum, 1964 (4,5).
Notes: This species belongs to the *P. cnici-oleracei* complex. It is, however, distinguished by black telia with fairly dark brown spores. It is a microcyclic species. *P. cnici-oleracei* is, however, leptocyclic.

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Puccinia drabae F. Rudolphi, Linnaea 4: 115 (1829)
On *Arabis altaica* (III), I, Turgen sum, 1964 (4,5). *Draba hirta* (III), XII, Bulgan sum, 1964 (4,5).

Puccinia echinopis DC., Fl. Fr. 5: 97 (1815)
On *Echinops dahuricus* (III), VIII, Bogd-uul, 1964 (4,5); III, 1967 (5).

Puccinia elymi Westend., Bull. Acad. Roy. Belg. 18: 408 (1851)
On *Clinelymus sibiricus* (II,III), VIII, state farm Zhargalant, 1960, 1963 (4,5); VIII, Bogd-uul, 1962 (4,5); V, Zuun-charaa, 1963 (4,5).

Puccinia fergussonii Berk. & Broome, Ann. Mag. Nat. Hist. IV, 15: 35 (1875)
On *Viola uniflora* (III), VIII, Chentej, Terelsh, 1988, Braun (6).

Puccinia festucae Plowr., Grevillea 21: 109 (1893)
On *Lonicera* sp. (I), VIII, Chentej, Gorchi, 1983, Dörfelt (HAL).

Puccinia gentianae (F. Strauss) Röhl., Deutschl. Fl., Ed. 2, III, 2: 131 (1813)
On *Gentiana decumbens* (III), III, Shine-Ider sum, 1964 (4,5); V, Zuun-charaa sum, 1963, 1964 (4,5). *G. macrophylla* (0,III), V, Zuun-charaa sum, 1964 (4,5). *G.* sp. (III), VIII, near Gorchi, 1985, Manitz (JE).

Puccinia graminis Pers., Syn. meth. fung.: 228 (1801)
Syn.: *Aecidium berberidis* Pers.
On *Berberis sibirica* (0,I), VIII, Bogd-uul, 1963 (4,5); VIII, state farm Batsumber, 1963 (4,5); VIII, Chentej, Gorchi, 1983, Dörfelt (HAL). *Clinelymus sibiricus* (II,III), VIII, state farm Zhargalant, 1964 (4,5). *Elymus giganteus* (II,III), XIII, Zhargalant sum, 1964 (4,5). *Hordeum vulgare* (II,III), V, Zuun-charaa sum, 1962 (4,5). *Triticum vulgare* (II,III), generally distributed in Mongolia, e.g. V, VI, X (4,5).

Puccinia gymnandrae Tranzschel, Bot. Zap. Izd. Pri Bot. Sad. Imp. SPb. Un.-ta 3: 137 (1891)
On *Lagotis altaica* (III), XII, Bulgan sum, 1964 (4,5). *L. integrifolia* (III), XII, Shavrijn-ovod, 1982, Jäger (HAL).

Puccinia haleniae Arthur & Holw., in Arthur, Bull. Geol. Nat. Hist. Survey Minn. 3: 30 (1887)
On *Halenia corniculata* (III), V, Zuun-charaa, 1963 (5); VII, 1967 (5).

Puccinia hemerocallidis Thüm., Bull. Soc. Imp. Nat. Mosc. 54: 81 (1880)
On *Hemerocallis minor* (II,III), V, 1967 (5).
Notes: *H. minor* is known as host of this species from the Far East of Russia (AZBUKINA 1974).

Puccinia hieracii Mart., Prod. Fl. Mosc., Ed. 2: 227 (1817)
(var. *hieracii*)
Syn.: *P. taraxaci* Plowr.
On *Hieracium umbellatum* (II,III), V, state farm Ero, 1964 (4,5). *Taraxacum* sp. (II), I, Davst sum, 1964 (4,5).

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Puccinia holboellii (Hornem.) Rostr., Medd. Grönl. 3: 534 (1888)
On *Draba lanceolata* (III), VII, ca. 90 km w.n.w. Chuczirt, 1988, Braun (6).

Puccinia holcina Erikss., Ann. Sci. Nat., 8 Sér., 9: 274 (1899) emend. HENDERSON & BENNELL (1979)
Syn.: *P. fragosoi* Bubák.
On *Allium krylovii*, *A. odoratum*, *A.* sp. (0,I), II, near Bajan-nuur, 1964; I, Santmargac sum, 1964 (4,5).

Puccinia iridis Rabenh., Deutl. Krypt.-Fl. 1: 23 (1844)
On *Iris biglumis* (II), III, Murun sum, 1964 (4,5); V, Zuun-charaa, 1963 (5); XVI, Bulgan sum, 1971 (5); Ulaanbaatar, 1971 (5). *I. sibirica* (II,III), Chara, valley of Chara-gol, 1963 (4); III, Murun sum, 1964 (5); X, Uluun choroot, 1965 (5).

Puccinia jackyana Gäum. ex Joerst., Bull. Res. Counc. Israel 10 D, 1-4: 181 (1961)
On *Scorzonera austriaca* (0-III), V, Zuun-charaa, 1964 (4,5).

Puccinia lasiagrostidis Tranzschel, Consp. Ured. URSS: 96 (1939)
On *Lasiagrostis splendens* (III), XIII, Zhargalant sum, 1964 (4,5); XVI, Bulgan sum, 1970 (5).
Notes: CUMMINS (1971) recorded this species from Central Asia and China.

Puccinia leveillei Mont., in Gay, Hist. Fis. Polit. Chile 8: 41 (1852)
On *Geranium pseudosibiricum* (III), III, Chentej, Gorchi, 1983, Dörfelt (HAL); (III), III, Chentej, Terelsh, 1988, Braun (HAL).

Puccinia longissima J. Schröt., in Cohn, Beitr. Biol. Pfl. 3: 70 (1879)
Syn.: *Aecidium sedi* (DC.) J. Schröt.
On *Rhodiola rosea* (I), VI, Tarbagatei mountains, n. Tarjat, 1978, Knapp (herb. Knapp).
Notes: This specimen belongs undoubtedly to this species. CUMMINS (1971) listed *Rhodiola* as aecial host genus and circumscribed the distribution of this species as follows: Europe to North Africa. *P. longissima* is, however, known from Asia, e.g. on *Koeleria gracilis* in Siberia (UL'JANIŠČEV 1978), on *Sedum* and *Koeleria* in the Far East of Russia (AZBUKINA 1974) and on *Sedum* spec. in China (WANG 1951).

Puccinia maculosa (F. Strauss) Röhl., Deutschl. Fl., Ed. 2, III, 3: 131 (1813) emend. HYLANDER et al. (1953)
Syn.: *P. chondrillae* Corda, *P. mulgedii* Syd., *P. prenanthes-purpureae* Lindr., *P. prenanthis* J. Kunze, *P. prenanthis* Lindr., *P. lactucarum* Syd.
On *Lactuca sibirica* (0,I), XII, Uencz sum, 1964 (4,5). *Prenanthes* sp. (0,I), XIII, Sharga sum, 1964 (4,5). *Lactuca versicolor* (0-III), V, Zuun-charaa, 1964 (4,5).

Puccinia magelhaenica Peyr. ex Magnus, Ber. Nat.-Med. Ver. Innsbruck 21: 41 (1894)
Syn.: *P. arrhenatheri* (Kleb.) Erikss.
On *Berberis sibirica* (0,I), I, Turgen sum, 1964 (4,5).

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Puccinia melasmioides Tranzschel ex Syd., Monogr. Ured. I: 538 (1904)
On *Aquilegia sibirica* (III), Ulaanbaatar, Bogd-uul, 1969 (5).

Puccinia menthae Pers., Syn. meth. fung.: 227 (1801)
On *Mentha austriaca* (0-III), V, Zuun-charaa sum, 1964 (4,5). *M. haplocalyx* (II), I, Davst sum, 1964 (4,5).
Notes: PUNCAG (1979) changed the host determination of *M. austriaca* and called it *M. arvensis*.

Puccinia minussensis Thüm., Bull. Soc. Nat. Hist. Mosc. 53: 214 (1878)
On *Mulgedium sibiricum* (0,II,III), V, Zuun-charaa sum, 1963, 1964 (4,5). *Lactuca tatarica* (I,III), XI, Chovd gol, 1964 (4,5); XII, Bulgan sum, 1964 (4,5).
Notes: SCHMIEDEKNECHT & PUNCAG (1967b) placed the sample on *Lactuca tatarica* in *P. lactucarum*, but it must be referred to *P. minussensis*. The mycelium is systematic and causes deformations.

Puccinia mixta Fuckel, Fungi. rhen. 377 (1863)
Syn.: *P. allii* auct. p.p.
On *Allium schoenoprasum* (II,III), V, Zuun-charaa sum, 1964 (4,5).

Puccinia nitidula Tranzschel, in Tranzschel & Serebr., Mycoth. Ross. Exs. 158/159 (1911)
On *Polygonum angustifolium* (II,III), III, Shine-Ider sum and Mörön, 1964 (4,5). *P. alpinum* (II,III), Ulaanbaatar (5).

Puccinia passerinii J. Schröt., Abh. Schles. Ges. Vaterl. Cult. 53: 117 (1876)
On *Thesium refractum* (0,I,III), I, w. Ulaangom, 1964 (4,5); I, Chachiraa, 1978, Schamsran et al. (HAL); VII, n. Chuczirt, 1985, Manitz (JE). *Th. longifolium*, VIII, Chentej, Terelsh, 1988, Braun (6).

Puccinia peckii Kellerm., J. Mycol. 8: 20 (1902)
Syn.: *Aecidium peckii* de Toni
On *Epilobium angustifolium* (I), VIII, Chentej, Gorchi, 1983, Dörfelt (HAL); VIII, Chentej, Terelsh, 1988, Braun (6).
Notes: This species occurs in North America, Siberia, and the Far East of Russia (UL'JANIŠČEV 1978).

Puccinia permixta Syd., Ann. Mycol. 10: 216 (1912)
On *Allium altaicum* (0,I), V, Zuun-charaa, 1963 and Chevsgel sum, 1962 (4,5). *Allium bidentatum* (0,I), XVI, Bulgan sum, 1970 (5). *Allium anisopodium*, *A. odoratum*, *A. senescens*, *A. cepa* (0,I), V, Zuun-charaa, 1962-1964 (4,5). *Cleistogenes squarrosa* (II,III), V, around state farm Zuun-charaa, 1963 (4,5).
Notes: CUMMNINS (1971) recorded this species from Russia and Afghanistan to China.

Puccinia phlomidis Thüm., Bull. Soc. Nat. Mosc. 52: 216 (1878)
On *Phlomis tuberosa* (III), VIII, state farm Zhargalant, 1963 (4,5); VIII, Chentej, Terelsh, 1988, Braun (6). *Lagochilus ilicifolius* (III), IV, Bulgan, Shatsgatynnuru (7).

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Puccinia poarum Nielsen, Bot. Tidskr. 3(2): 34 (1877)
On *Poa botryoides* (II,III),VIII, Ulaanbaatar, Bogd-uul, Zajsan ravine, 1964 (4,5).

Puccinia polygoni-amphibii Pers., Syn. meth. fung.: 227 (1801)
(var. *polygoni-amphibii*)
On *Geranium pseudosibiricum* (0,I), I, Undurchangaj sum, 1964 (4,5). *Polygonum amphibium* (II,III), X, 1965 (5).

Puccinia polygoni-amphibii Pers. var. *convolvuli* Arthur, Manual of Rusts: 233 (1934)
Syn.: *P. polygoni* Alb. & Schwein.
On *Geranium sibiricum* (0,I), V, Zuun-charaa sum, 1963, 1964 (4,5). *Polygonum convolvulus* (II,III), V, Zuun-charaa, 1963, 1964 (4,5).

Puccinia primulae Duby, Bot. Gall.: 891 (1830)
On *Primula nutans* (I), XII, Bodonczin-gol, 1982, Jäger (HAL).
Notes: This species is distributed in Europe, but it is neither known from the European part of Russia nor from Central Asia (Ul'janiščev 1978). Zhuang (1986) recorded it on *Primula* sp. from China. The identity of the present aecia is fairly certain (spores subglobose-ellipsoid to more or less angular, ca. 13-20 µm diam., elongated spores up to 27 µm, wall very thin, 0.5-1.5 µm, colourless to very faintly yellowish.

Puccinia psammochloae Wang, Acta Phytotax. Sinica 10: 293 (1965)
Syn.: *P. magnusiana* auct. p.p. sensu Schmiedeknecht & Puncag (1967b).
On *Psammochloa villosa* (II,III), Zhargalant sum, Zavchan valley, 1964 (4, 5).
Notes: This fungus belongs undoubtedly to *P. psammochloae* (see Cummins 1971). The Mongolian collection could not be compared with type material of *P. psammochloae*. Puncag (1979) provided a full description and illustration of the Mongolian material.

Puccinia punctata Link, Mag. Ges. Naturf. Freunde Berlin 7: 30 (1815)
(var. *punctata*)
On *Galium verum* (II,III), VIII, Chentej, Gorchi, 1983, Dörfelt (HAL); VIII, Chentej, Terelsh, 1988, Braun (6).

Puccinia punctiformis (F. Strauss) Röhl., Deutschl. Fl., Ed. 2, III, 3: 132 (1813)
Syn.: *P. suaveolens* Rostr.
On *Cirsium arvense* s.lat. (II,III), XII, Mjangad sum, 1964 (4,5); XVI, Bulgan sum, 1970 (5).

Puccinia pyrethri Rabenh., Herb. viv. mycol. 1990 (1855)
On *Leucanthemum sibiricum* (II,III), V, Chach czuluutyn davaa, 1964 (4,5).
Notes: Schmiedeknecht & Puncag (1967b) referred this collection to *P. leucanthemi*. Puncag (1979) changed the determination and described uredinia and telia.

Puccinia recondita Roberge ex Desm., Bull. Soc. Bot. Fr. 4: 798 (1857) emend. Cummins (1971)

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Syn.: *Aecidium clematidis* DC., *Puccinia agrostidis* Plowr., *P. persistens* Plowr., *P. actaeae-agropyri* Fisch., *P. agropyrina* Erikss., *P. perplexans* Plowr., *P. alternans* Arthur, *P. thalictri-koeleriae* Gäum., *P. triticina* Erikss., *P. symphyti-bromorum* F. Muell., *P. dispersa* Erikss.
On *Aconitum barbatum* (0,I), Mongolia, without location, Jäger E 453 (HAL); VIII, Chentej, Gorchi, 1983, Dörfelt (HAL); VIII, Chentej, Terelsh, 1988, Braun (6). *A. excelsum* (0,I), VIII, Chentej, Gorchi, 1983, Dörfelt (HAL); VIII, Chentej, Terelsh, 1988, Braun (6). *Aquilegia sibirica* (0,I), XII, Bulgan sum, 1964 (4,5); XIII, Chaliun sum, 1964 (4,5); VIII, Chentej, Gorchi, 1983, Dörfelt (HAL). *Aquilegia viridiflora* (0,I), VIII, Chentej, 1978, Knapp (herb. Knapp). *Atragene sibirica* (0,I), VIII, Chentej, Gorchi, 1983, Dörfelt (HAL). *Cimicifuga foetida* (0,I), VIII, Chentej, Gorchi, 1983, Dörfelt (HAL); VIII, Terelsh-gol, 1985, Manitz (JE); VIII, Terelsh, 1988, Braun (6). *Isopyrum fumarioides* (0,I), V, Zuun-charaa sum, 1964 (4,5). *Lappula echinata* (0,I), V, Zuun-charaa sum, 1963, 1964 (4,5). *Lappula intermedia* (0,I), II, Bajan-nuur sum, 1964 (4,5). *Thalictrum alpinum* (0,I), VIII, n. Gorchi, 1988, Braun (6). *T. foetidum* (0,I), XII, Manchan sum, 1964 (4,5). *T. minus* (0,I), VII, Chuczirt and VIII, between Terelshand Nalaich, Tuul plain, 1988, Braun (6). *T. petaloideum* (0,I), VIII, Terelsh, 1985, Manitz (JE). *T. simplex* (0,I), XII, Mjangad sum, 1964 (4,5). *T. squarrosum* (0,I), VI, Tajchar sum, 1964 (4,5). *T.* sp. (0,I), V, Zuun-charaa sum, 1963 (4). *Agropyron cristatum* (II,III), V, Zuun-charaa sum, 1963 (4,5). *A. repens* (II,III), V, Zuun-charaa, 1963 (4,5). *Alopecurus brachystachys* (II,III), V, Zuun-charaa, 1963 (4,5). *Aneurolepidium chinense* (II,III), III, Shine-Ider sum, 1964 (4,5). *A. pseudagropyrum* (II,III), V, state farm Altan-Bulag, 1963 (4,5). *Bromus inermis* (II,III), V, Zuun-charaa, 1962-1964 (4,5). *Calamagrostis epigeios* (II,III), V, Zuun-charaa sum, 1963 (4,5). *Clinelymus dahuricus* (II,III), state farm Zhargalant, 1960; Zuun-charaa sum, 1963; Ulaanbaatar, 1962 (4,5). *Clinelymus sibiricus* (II,III), V, Zuun-charaa sum, 1963, 1964; Ulaanbaatar, Bogd-uul, 1962 (4,5). *Triticum vulgare* (II,III), V, Zuun-chraa, 1961, 1962 (5).

Puccinia schirajewskii Tranzschel, Mycoth. Ross. Exs. 109-110 (1911)
On *Serratula cardunculus* (0-III), V, Zuun-charaa sum, 1963 (4,5). *S.* sp. (II), VIII, ca. 20 km n. Erdene-saut, 1978, Knapp (herb. Knapp).

Puccinia senecionis Lib., Pl. Crypt. Ard. 92 (1830)
Syn.: *P. subcircinata* Ellis & Everh.
On *Senecio octoglossus* (0,I,III), V, Zuun-charaa, 1963 (4,5).

Puccinia septentrionalis Juel, Oefvers. K. Vet.-Akad. Foerh. 52: 383 (1895)
On *Thalictrum alpinum* (0,I), Czuluut sum, 1964 (4,5).

Puccinia serpylli Lindr., Acta Soc. Fauna Fl. Fenn. 26(5): 11 (1904)
On *Thymus serpyllum* (III), II, Santmargac sum, 1964 (4,5).
Notes: This species is known from Finland, the European part of Russia, and Siberia.

Puccinia sjuzevii Tranzschel & Erem., in Tranzschel, Consp. Ured. USSR: 128 (1939)
On *Carex pediformis* (II,III), near Ulaanbaatar, 1964 (4,5), as *P. atrofusca.*
Notes: SCHMIEDEKNECHT & PUNCAG (1967b) placed this fungus in *P. atrofusca.* The latter species is, however, a North American species, distinguished by amphispores with two germ pores

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and larger teliospores. *P. sjuzevii* is known on *C. pediformis* from the Russian Far East (AZBUKINA 1974).

Puccinia stipae Arthur var. *stipina* (Tranzschel) H.C. Greene & Cummins, Mycologia 50: 21 (1958)
On *Dracocephalum moldavicum* s.lat. (0,I), VI, Ugij-nuur, 1964 (4,5). *Leonurus* sp. (0,I), Ulaanbaatar, 1964 (4,5). *L. sibirica* (0,I), XII, Bulgan sum, 1964 (4,5). *Panzeria lanata* (0,I), VI, Ugij-nuur sum, 1964 (4,5). *Phlomis tuberosa* (0,I), VIII, Bajancogt sum, 1964 (4,5).

Puccinia striiformis Westend., Bull. Roy. Acad. Belg. 21(2): 235 (1854)
Syn.: *P. glumarum* Erikss. & Henn.
On *Bromus sibiricus* (III), I, Undurchangaj sum, 1964 (4,5). *Hordeum sativum* (II,III), Tuja, 1957 (4,5). *Aneurolepidium pseudagropyrum* (II,III), V, Zuun-charaa, 1964 (4, 5). *Agropyron repens* (II,III), V, Zuun-charaa sum, 1963 (4,5). *Clinelymus dahuricus* (II,III?), VIII, Bogd-uul, 1962; state farm Zhargalant, 1960 (4,5). *Triticum vulgare* (II,III?), V, Zuun-charaa, state farm Batsumber Raschant, 1964 (4,5).

Puccinia sweertiae G. Winter, in Rabenh., Krypt.-Fl. Deutschl. 2(1): 205 (1884)
On *Sweertia obtusa* (I,III), XI, Tolbo sum, 1964 (4,5).

Puccinia turgenica Schmied., Feddes Repert. 74(3): 104 (1967)
On *Claytonia joanneana* (I,III), I, Turgen sum, 1964 (4,5), isotype = JE, holotype = UBA.
Notes: This species was described from Mongolia and is only known from the type collection. An illustration was published together with the original description.

Puccinia umbilici Duby, Bot. Gall.: 890 (1830)
Syn.: *P. rhodiolae* Berk. & Broome.
On *Rhodiola rosea* (III), VIII, Chentej, near Nalaich, 1978, Knapp (herb. Knapp).

Puccinia universalis Arthur, J. Mycol. 14: 21 (1908)
Syn.: *Aecidium martianoffinum* Thüm., *P. atrofusca* auct. p.p.
On *Artemisia* sp. (I), VIII, Chentej, Gorchi, 1983, Dörfelt (HAL). *A. dracunculus* s.lat. (0,I), II, Santmargac sum, 1964 (4,5); Telmen sum, 1964 (4,5); V, Zuun-charaa, 1963, 1964 (4,5); Ulaanbaatar, 1988, Braun (6). *Carex duriuscula* (II,III), V, Zuun-charaa, 1964 (4,5).
Notes: The collection on *Carex duriuscula* could not be examined. The determination is uncertain. An additional sample of „*P. atrofusca*" on this host was misidentified and belonged to *P. sjuzevii*.

Puccinia ustalis Berk., in Hook., J. Bot.: 207 (1854)
On *Ranunculus* cf. *altaicus* (III), XII, Shavrijn, 1982, Jäger (HAL).
Notes: SYDOW (1904) recorded this species from „North Mongolia".

Puccinia variabilis Grev., Scott. Crypt. Fl. 3: pl. 75 (1824)
On *Taraxacum officinale* s.lat. (0-III), V, Zuun-chraa, 1964 (4,5).

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Puccinia veronicae-longifoliae Savile, Can. J. Bot. 46: 635 (1968)
On *Veronica longifolia* (III), V, Zuun-charaa sum, 1963 (4,5), as *P. veronicarum*.

***Pucciniastrum* Otth**

Pucciniastrum agrimoniae (Dietel) Tranzschel, Scr. Bot. Hort. Univ. Imp. Petrop. 4: 301 (1895)
On *Agrimonia pilosa* (II,III), III, Tarialan sum, 1964 (3,5); X, 1965 (5).

Pucciniastrum areolatum (Fr.) G.H. Otth, Mitt. Naturf. Ges. Bern 1863: 85 (1863)
Syn.: *P. padi* (G. Winter) Dietel, *Thecopsora areolata* (Fr.) Magnus.
On *Padus asiatica* (II,III), V, Delgerchaan-uul, 1977 (5).

Pucciniastrum epilobii G.H. Otth, Mitt. Naturf. Ges. Bern 1861: 72 (1861)
Syn.: *P. abieti-chamaenerii* Kleb.
On *Chamaenerion latifolium* (II,III?), II, Bulnaj sum, 1976 (5).

Pucciniastrum potentillae Kom., in Jacz., Kom. & Tranzschel, Fungi Ross. Exs. 327 (1899)
On *Potentilla tergemica* (II,III?), IV (7).

Pucciniastrum pyrolae Arthur, N. Am. Fl. 7: 108 (1907)
On *Ramischia obtusata* (II,III), II, Tosoncengel sum, 1964 (3, 5). *Pyrola incarnata* (II), VII, ca. 60 km w.n.w. Chuczirt, 1988, Braun & Dörfelt (6); VIII, Chentej, Terelsh, 1988, Braun & Dörfelt (6).

Pucciniastrum vaccinii (G. Winter) Joerst., Skr. Vid.-Akad. Oslo I, 1951, 2: 55 (1952)
On *Vaccinium vitis-idaea* (II), VIII, Chentej, Terelsh, 1988, Braun (6).

***Trachyspora* Fuckel**

Trachyspora intrusa (Grev.) Arthur, Manual of Rusts: 97 (1934)
On *Alchemilla hebescens* (II,III), VII, ca. 60 km w.n.w. Chuczirt and in Chuczirt, 1988, Braun (6). *A.* sp. (III), I, Undurchangaj sum, 1964 (3,5).

***Tranzschelia* Arthur**

Tranzschelia anemones (Pers.) Nannf., in Fungi Exs. Suec. 839a (1939)
Syn.: *T. pulsatillae* (Rostr.) Dietel.
On *Pulsatilla ambigua* (0,III), V, Zuun-charaa sum, 1964 (3,5). *P. turczanovii* (0,III), VIII, Bogd-uul, 1964 (3,5); VI, Ugij sum, 1964 (3,5); VIII, Chentej, Gorchi, 1983, Dörfelt (HAL); VIII, Chentej, between Nalaich and Terelsh, 1985, Manitz (JE); VII, ca. 60 km w.n.w. Chuczirt, 1988, Braun (6). *P.* sp. (0,III), IV, Uljatajn-gol (7).

Tranzschelia pruni-spinosae (Pers.) Dietel, Ann. Mycol. 20: 31 (1922)
On *Anemone sylvestris* (I), VI, Bulnaj sum, 1977 (5).

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Tranzschelia myricariae (as „myricaria")
Puncag (1979: 242), nom. inval.
On *Myrica longifolia* (III), V, 1971 (5).
Notes: This species was published by PUNCAG (l.c.) without Latin description. The type material could not be re-examined. The position of this fungus in *Tranzschelia* is very doubtful. The described and depicted teliospores (see Fig. 3) coincide with those of *Puccinia thuemeniana* Voss. The latter species is, however, a macrocyclic rust. *T. myricariae* must either be reduced to synonymy with *P. thuemeniana* or it represents a separate, microcyclic species.

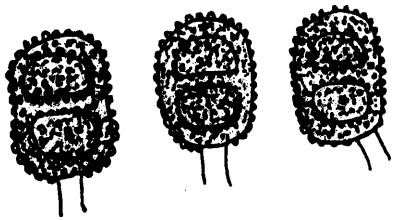

Fig. 3: *Tranzschelia myricariae*, original illustration from PUNCAG (1979).

***Triphragmium* Link**

Triphragmium ulmariae (DC.) Link, in Willd., Sp. Pl. 6(2): 84 (1826)
On *Filipendula ulmaria* (0,II,III), V, Zuun-charaa sum, 1963, 1964 (3,5); VIII, state farm Zhargalant, 1963 (3,5).

***Uromyces* (Link) Unger**

Uromyces fallens (Arthur) Barthol., N. Am. Ured.: 61 (1928)
Syn.: *U. trifolii* auct.
On *Trifolium lupinaster* (II,III?), V (5).

Uromyces fischeri-eduardi Magnus, Ber. Dt. Bot. Ges. 25: 340 (1907)
On *Vicia multicaulis* (III), I, Tosoncengel sum, 1964 (3,5).

Uromyces geranii (DC.) Fr., Summ. veg. scand.: 514 (1849)
(var. *geranii*)
On *Geranium sibiricum* (0-III), V, Zuun-charaa, 1964 (3,5); VIII, Chentej, Gorchi, 1983, Dörfelt (HAL), together with *Ramularia geranii*. *G.* cf. *pratense* (III), I, Undurchangaj sum, 1964 (3,5). *G. pseudosibiricum* (III), Chentej, Terelsh, 1988, Braun (6).

Uromyces glycyrrhizae (Rabenh.) Magnus, Ber. Dt. Bot. Ges. 8: 383 (1890)
On *Glycyrrhiza uralensis* (0,II), XII, Bulgan sum, 1964 (3,5).

Uromyces hedysari-obscuri (DC.) Carestia & Picc., Erb. Critt. Ital., Ed. II, IX, No. 447 (1871)
On *Hedysarum alpinum* s.lat. (aff. *H. connatum*), (0,I,III), I, Turgen sum, 1964 (3,5). *H.* sp., VII,1967 (5).

Uromyces inequialtus Lasch, in Rabenh., Fungi eur. 94 (1859)
On *Silene repens* (0-III), V, Zuun-charaa sum, 1964 (3,5).

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Uromyces lapponicus Lagerh., Bot. Not. 7: 274 (1890)
On *Astragalus adsurgens* s.lat. (0,I), XII, Uencz sum, 1964 (3). *A. membranaceus* (0,I), VIII, Chentej, Terelsh, 1988, Braun (6). *Oxytropis* cf. *ambigua* (0,I), VI, Cencher sum, 1964 (3,5). *O. glabra* (0,I), XII, Altaj sum, 1964 (3,5). *O. riparia* (0,I), IV, Bulgan, Chargajtan-am; Shatsgatynnuru (7).

Uromyces limonii (DC.) Berk., Outl. Brit. Fung.: 333 (1860)
On *Goniolimon speciosum* (III), Ulaanbaatar, 1964 (3,5). *Limonium flexuosum* (III), III, 1966 (5).

Uromyces mongolicus U. Braun & G. Hirsch, Haussknechtia 4: 57 (1988)
On *Euphorbia kozlovii* (II,III), XVI, near Dalanzadgad, 1985, H. & R. Manitz (JE, holotype).
Notes: This species is only known from the type collection. Line drawings and SEM micrographs are added to the original description.

Uromyces polygalae Puncag (1979: 219), nom. inval.
On *Polygala sibirica* and *P. tenuifolia* (0,I,III), X, Czojbasal sum, 1962 (5).
Notes: PUNCAG (l.c.) described aecia and telia. The teliospores are ellipsoid-ovoid, smooth, ca. 21-30 x 17-23 µm, apical pore with cap (Fig. 4). The type material could not be re-examined and the identity of the host plants could not be proven.

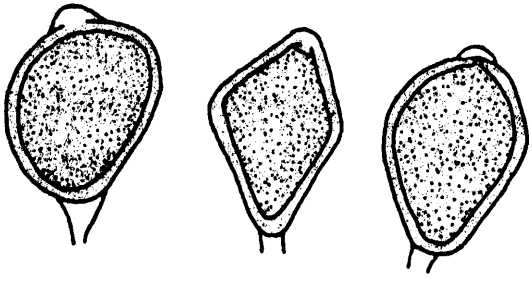

Fig. 4: *Uromyces polygalae*, original illustration from PUNCAG (1979).

Uromyces polygoni-avicularіae (Pers.) P. Karst., Bidr. Känn. Finl. Nat. Folk 4: 12 (1879)
Syn.: *U. polygoni* (Pers.) Fuckel.
On *Polygonum angustifolium* (0-III), V, Zuun-charaa, 1964 (3,5). *P.* cf. *minus* (0,I), XII, Mjangad sum, 1964 (3,5).

Uromyces punctatus J. Schröt., Abh. Schles. Ges. Vaterl. Cult., Nat. Abt., 1869-72: 10 (1870)
On *Oxytropis nitens* (II,III), II, Tosoncengel sum, 1964 (3,5).

Uromyces salsolae Reichardt, Verh. K. K. Zool.-Bot. Ges. Wien: 842 (1877)
On *Salsola collina* (II,III), X, Chalch sum, 1965 (5).

Uromyces striatus J. Schröt., Abh. Schles. Ges. Vaterl. Cult., Nat. Abt., 1869-72: 11 (1870)
On *Thermopsis lanceolata* (III), III, Shine-Ider sum, 1964 (3,5); VIII, Bajandelger sum, 1964 (3,5).

Uromyces valerianae Fuckel, Jahrb. Nass. Ver. Naturk. 23-24: 53 (1870)
On *Valeriana officinalis* (II,III), V (5).

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Uromyces viciae-fabae (Pers.) J. Schröt., Hedwigia 14: 161 (1875)
Syn.: *U. fabae* de Bary ex Cooke.
On *Vicia amoena* (III), V, Zuun-charaa sum, 1963 (3,5); II, Un't sum, 1966 (5); X, Bajan-uul sum, 1965 (5). *V. cracca* (0-III), I, Davst sum, 1964 (3,5).

(5) FUNGI IMPERFECTI

Colletotrichum graminicolum (Ces.) G.W. Wils., Phytopathology 4: 110 (1914) s.lat.
On *Festuca* sp., VIII, Chentej, Terelsh, 1988, Braun (6).

Cladosporium uredinicola Speg., An. Soc. Mus. Nac. Hist. Nat. B. Aires 23: 122-123 (1912)
On *Draba lanceolata* (with *Puccinia holboellii*), VIII, Chentej, Terelsh, 1988, Braun (6).

Marssonina sennensis (Gonz.Frag.) Karak., in Vassil. & Karak., Parazitnye nesoveršennye griby II: 404, Moskva, Leningrad 1950
On *Sanguisorba officinalis*, VIII, Chentej, Terelsh, 1988, Braun (6).

Ramularia didyma Unger, Exanth. Pfl.: 169, Wien 1833
Syn.: *R. aequivoca* (Ces.) Sacc.
On *Ranunculus japonicus*, VIII, Chentej, Terelsh, 1988, Braun (6).

Ramularia geranii Fuckel, Jahrb. Nass. Ver. Naturk. 23-24: 361 (1870)
On *Geranium sibiricum*, VIII, Chentej, Gorchi, 1983, Dörfelt (HAL).

Ramularia grevilleana (Tul & C. Tul) Joerst., Meld. Stat. Plantenpatol. Inst. 1: 17 (1945) emend. U. Braun (1998)
Syn.: *R. arvensis* Sacc.
On *Potentilla anserina*, VIII, Chentej, Nalaich and Terelsh, 1988, Braun (6). *P. longifolia*, VIII, Chentej, Terelsh, 1988, Braun (6).

Septoria lamii Sacc., Michelia 1: 180 (1878)
On *Lamium album*, VIII, Chentej, Terelsh, 1988, Braun (6).

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