



Revision of the Species Composition of Slime Molds in the Ile Alatau (Kazakhstan)

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Abstract

After the revision, it was found that the biota of slime molds in the Ile Alatau (Kazakhstan) has 62 species. The article provides a systematic list of slime molds. In the Ile Alatau these fungi-like organisms are represented by two classes: Protosteliomycetes and Myxomycetes. The Myxomycetes class is more widely represented and has 4 orders. The largest number of species is characteristic of the genera *Trichia* (8 species), *Physarum* (6), *Arcyria*, *Diderma* (5 species each) and *Badhamia* (4 species). The most common species in the research area are *Lycogala epidendrum*, *Fuligo septica*, *Hemitrichia clavata*, *Trichia varia*, *Stemonitis axifera*, *S. fusca*, *S. splendens* and *Stemonitopsis typhina*. Representatives of slime molds were found on various 18 substrates. The largest number of slime molds species (54) was recorded on *Picea schrenkiana*. There are 13 species on *Populus tremula* and 4 species on *Betula tianschanica*. The remaining substrates are characterized by 1-2 species. It is necessary to note the species of the genus *Diderma* that appear in early spring after snowfall: *Diderma niveum*, found on *Artemisia juncea* and representatives of *Poaceae*, and *D. radiatum* on dry grasses, leaves and branches of shrubs.

Keywords: Biota; Ile Alatau ; Myxomycete; Slime Molds; Species; Substrate

Abbreviations: IB: Ibidem; MASL: Meters above Sea Level; SAG: Small Almaty Gorge; BAG: Big Almaty Gorge; IG: Issyk Gorge; TG: Turgen Gorge; PG: Prokhodnoye Gorge.

Introduction

Ile Alatau , the most Northern range of the Tien Shan, is almost 380 km long, 30-40 km wide, up to 5000 m high. The climate in the Ile Alatau is diverse and differentiated by high-altitude climatic zones. Vegetation of Ile Alatau is characterized with specific spectrum of altitudinal belts. There is no continuous belt of coniferous forests and alpine tundra belt. A distinctive feature of Ile Alatau ridge is the wide spread of all subtypes of mountain steppes [1].

In mycological respect, Ile Alatau is well studied. According to the assumptions of some scientists, there are about 2000 species of fungi and fungi-like organisms on the territory of the ridge [2]. However, until recently, the biota of slime molds has been studied very poorly, as in whole Kazakhstan. A significant number of slime molds species are listed only in the annotated list of Altai fungi [3]. It should also be noted that this group of organisms has undergone significant taxonomic changes.

The purpose of our study was to conduct an inventory and revision of slime molds species on the territory of the Ile Alatau and add newly discovered species or locations to the list.

Materials and Methods

The study was conducted in the Ile Alatau ridge (southeastern regions of Kazakhstan) for several years (2008, 2009, 2011, 2016, and 2019). Slime molds were collected during field trips. A Canon 600E camera was used for photographing of fungi.

For light microscopy, small fragments of samples were placed in a drop of distilled water on a microscope slide without any staining [4], examined and photographed using a photomicroscope Polyvar with Nomarski interference contrast optics. Measurements of different slime molds structure were made. Specimens were identified with the literature on myxomycetes [5,6].

Dried specimens are stored in the herbarium of the Institute of Botany and Phytointroduction, Almaty, Kazakhstan (AA). The systematics of the taxa is in accordance with *Ainsworth and Bisby's* dictionary of the fungi [7] and they are listed in alphabetical order. The names of the host plants are given in accordance with the on-line identifier of plants [8], the names of fungal taxa – in accordance with the Index Fungorum database [9].

Results and Discussion

After the revision, it was found that the biota of slime molds in the Ile Alatau has 62 species. The following is a systematic list of slime molds.

Kingdom of Protozoa R. Owen Sub-kingdom Mycetozoa Caval.-Sm. Class Myxomycetes G. Winter Order Liceales E. Jahn Family Cribrariaceae Corda

- *Cribraria macrocarpa* Schrad. -on *Picea schrenkiana* Fisch. & C.A. Mey., Talgar gorge, 07.07.1967, I.N. Golovenko.
- *Cribraria cancellata* (Batsch) Nann.-Bremek. -on *Picea schrenkiana*, SAG, spruce forests along the Battery river, 14.08.1946, M.N. Kuznetsova; ib., Shaggy hill, 28.07 и 16.08.1948, S.R. Schwartzman; ib., heads, 17.08.1948, S.R. Schwartzman; ib., nursery, 13.10.1954, ib., headwaters of the Kazachka river, 16.08.1958, I.N. Golovenko; Butakov gorge, 15.08.1948; IG, 24.06.1949, V.Kh. Temralieva; 19.09.1959, I.N. Golovenko; 01.08.1962, N.M. Filimonova; BAG, on the way to the lake, 23.09.1958, I.N. Golovenko.

Family Tubiferaceae T. Macbr.

- *Lycogala epidendrum* (L.) Fr. (Figure 1) -on *Picea schrenkiana*, SAG, the lower boundary of the spruce belt, 31.07.1946, M.N. Kuznetsova; ib., spruce forests

along the Battery river, 14.08.1946, M.N. Kuznetsova; 09.08.1948, S.R. Schwartzman; 21.08, 27.09 и 07.10.1958, I.N. Golovenko; ib., Shaggy hill, 28.08.1948, S.R. Schwartzman; ib., headwaters of the Kazachka river, 16.08.1958, I.N. Golovenko; ib., heads, 28.08.1959, I.N. Golovenko; ib., Gorelnik, 01.08.1959, I.N. Golovenko; BAG, below the lake, 12.06.1949, I.N. Golovenko; ib., spruce forests, 13.08.2009, Y.V. Rakhimova; PG, 21.06.1951, 23.09.1958, I.N. Golovenko; Talgar gorge, 06.09.1958, I.N. Golovenko; 07.07.1967, I.N. Golovenko; TG, heads, 09.10.1964, I.N. Golovenko; on *Populus tremula* L., SAG, Shaggy hill, 11.08.1948, S.R. Schwartzman; 20.08.1958, I.N. Golovenko; ib., tree nursery, 13.10.1954, ib., spruce forests along the Battery river, 21.08, 27.09, 07.10.1958, I.N. Golovenko; on an unidentified stump, BAG, lowland, 06.2011, Y.V. Rakhimova.



Figure 1: *Lycogala epidendrum* on an unidentified stump.

- *Lycogala flavofuscum* (Ehrenb.) Rostaf. -on *Picea schrenkiana*, SAG, spruce forests along the Battery river, 29.09.1954, 24.08.1955, I.N. Golovenko; TG, along the Chin-Turgen river, 16.09.1962, 09.10.1964, I.N. Golovenko.
- *Reticularia lycoperdon* Bull. -on *Picea schrenkiana*, SAG, Mynzhilki, 07, 08, 19.08.1948, S.R. Schwartzman; ib., Chimbulak, 28.08.1959, I.N. Golovenko; BAG, below the lake, 16.07.1961, I.N. Golovenko; IG, 01.08.1962, N.M. Filimonova; on *Populus tremula* L., SAG, Shaggy hill, 13.08.1960, I.N. Golovenko.
- *Reticularia olivacea* (Ehrenb.) Fr. -on *Picea schrenkiana*, SAG, Kimasar, 10.08.1948, S.R. Schwartzman; ib., heads, 15.08.1948, S.R. Schwartzman; on *Populus tremula* L., SAG, spruce forests along the Battery river, 06.10.1960, I.N. Golovenko.
- *Reticularia splendens* Morgan -on *Betula tianschanica* Rupr, SAG, agroforestry, along the river, 20.05.1967, D.I. Samgina, F.I. Kamaletlinova.
- *Tubifera ferruginosa* (Batsch) J.F. Gmel. -on *Picea schrenkiana*, Talgar gorge, 06.09.1958, I.N. Golovenko; IG, forest, 17, 19.09.1959, I.N. Golovenko, 01.08.1962,

N.M. Filimonova; SAG, Chimbulak, 28.08.1959, I.N. Golovenko; ib., 20.08.1963, I.N. Golovenko; BAG, on the way to the lake, 16.07.1961, I.N. Golovenko; ib., Kumbelsai, 24.07.1962, I.N. Golovenko.

Order Physarales T. Macbr. Family Didymiaceae Rostaf. ex Cooke

- *Diderma montanum* (Meyl.) Meyl. -on *Picea schrenkiana*, SAG, along the Battery river, 27.09.1958, I.N. Golovenko.
- *Diderma niveum* (Rostaf.) T. Macbr. (Figures 2 & 3) -on *Artemisia juncea* Kar. & Kir., Ulken Boguty mountains, 1251 m a.s.l., 43°27'38.3"N, 78°47'49.9"E, 15.03.2019, Y.V. Rakhimova; on species of Poaceae, Chu-Ile mountains, Kindiktas, Kurdai pass area, rocky slope,

02.05.2008, Y.V. Rakhimova; on *Picea schrenkiana*, on moss tufts, SAG, spruce forests along the Kazachka river, 08.10.1957, I.N. Golovenko.

- *Diderma radiatum* (Rostaf.) Morgan -on *Picea schrenkiana*, Talgar gorge, 05.09.1958, I.N. Golovenko; ib., Monk canyon, 22.09.1959, N.Kh. Eremina; TG, heads, 08.10.1964, I.N. Golovenko; SAG, along the Battery river, 27.09.1958, 28.08, 07.09.1959, 06.10.1960, I.N. Golovenko; BAG, Kumbelsai, 24.07.1962, I.N. Golovenko; IG, 16, 18.09.1959, I.N. Golovenko; on dry grasses, leaves and branches of shrubs, SAG, the northern slope of the Cross Mountain, 11.05.1946, M.N. Kuznetsova; Talgar gorge, 15.05.1958, I.N. Golovenko.



Figure 2: *Diderma niveum* on *Artemisia juncea*



Figure 3: *Diderma niveum* on *Artemisia juncea*

- *Diderma spumarioides* (Fr. & Palmquist) Fr. -on various plant residues; IG, below Boskul Lake, 19.09.1959, I.N. Golovenko.
- *Diderma testaceum* (Schrad.) Pers. -on *Picea schrenkiana*, SAG, along the Battery River, 27.09.1958, I.N. Golovenko; IG, 18.09.1958, I.N. Golovenko.
- *Didymium macrospermum* Rostaf. -on dry grasses, BAG, 13.07.1958, I.N. Golovenko.
- *Didymium serpula* Fr. -on *Populus tremula* L., BAG, spruce forests along the Battery River, 07.10.1958, I.N. Golovenko.
- *Didymium squamulosum* (Alb. & Schwein.) Fr. -on *Picea schrenkiana*, below the Issyk lake, 01.08.1962, N.M. Filimonova.
- *Lepidoderma tigrinum* (Schrad.) Rostaf. -on *Picea schrenkiana*, SAG, Lebedev canyon, 22.09.1954, I.N. Golovenko.
- *Mucilago crustacea* P. Micheli ex F.H. Wigg. -on dry grasses, leaves and branches of shrubs, SAG, the northern slope of the Cross Mountain, 12.09.1946, M.N. Kuznetsova.

Family Physaraceae Chevall.

- *Badhamia foliicola* Lister -on *Picea schrenkiana*, SAG, spruce forests along the Battery river, 06.10.1960, I.N. Golovenko.
- *Badhamia panicea* (Fr.) Rostaf. -on *Rhytidiadelphus triquetrus* (Hedw.) Warnst., IG, below the lake, 19.09.1959, I.N. Golovenko.
- *Badhamia utricularis* (Bull.) Berk. -on *Picea schrenkiana*, SAG, spruce forests along the Battery river, 16.08.1958, 21.08.1958, I.N. Golovenko; Talgar gorge, 22.09.1961, I.N. Golovenko; PG, 20.09.1967, I.N. Golovenko; on *Populus tremula* L., SAG, Shaggy hill, 20.08.1958, I.N. Golovenko.
- *Badhamia viridescens* Meyl. -on *Picea schrenkiana*, BAG, spruce forests along the Kumbel river, 24.08.1962, I.N. Golovenko.
- *Craterium aureum* (Schumach.) Rostaf. -on *Picea schrenkiana*, SAG, spruce forests along the Battery river, 27.09.1958, 06.10.1960, I.N. Golovenko.
- *Craterium leucocephalum* (Pers. ex J.F.Gmel.) Ditmar -on *Picea schrenkiana*, SAG, Gorelnik, 14.08.1946; ib.,

spruce forests along the Battery river, 28.08.1946, M.N. Kuznetsova; 24.08.1955, I.N. Golovenko; ib., Chimbulak, 27.10.1954, I.N. Golovenko; on the stems of live herbs, SAG, spruce forests along the Kazachka river, 17.09.1957, I.N. Golovenko.

- *Fuligo candida* Pers. (Figure 4) -on representatives of Poaceae, foothills, suburban areas, 02.05.2008, Y.V. Rakhimova.



Figure 4: *Fuligo candida* on Poaceae.

- *Fuligo intermedia* T. Macbr. -on *Picea schrenkiana*, heads of the TG, 09.10.1964, I.N. Golovenko.
 - *Fuligo septica* (L.) F.H. Wigg -on *Picea schrenkiana*, SAG, Gorelnik, 09.08.1948, S.R. Schwartzman; 22.08.1952, 29.09.1954, 23.08.1957, I.N. Golovenko; BAG, 20.08.1956, I.N. Golovenko; PG, 25.07.1952, I.N. Golovenko; Talgar gorge, 05.09.1958, I.N. Golovenko; TG, along the Chin-Turgen river, 16.09.1962, I.N. Golovenko; ib., the Assy plateau, the border of the spruce forests, 02.08.2016, Y.V. Rakhimova; Burunsai gorge, 11.07.1948, S.R. Schwartzman.
 - *Leocarpus fragilis* (Dicks.) Rostaf. -on *Picea schrenkiana*, SAG, 14-26.08.1946, M.N. Kuznetsova; 15.09.1955, 26.08.1959, 27.09, 06.10.1960, I.N. Golovenko; Talgar gorge, 06.09.1958, I.N. Golovenko; BAG, on the way to the lake, 15.09.1959, I.N. Golovenko; IG, 17, 19.09.1959, I.N. Golovenko; on *Populus tremula* L., SAG, Shaggy hill, 20.08.1958, I.N. Golovenko; on on moss tufts, SAG, 26.08.1964, M.N. Kuznetsova; BAG, on the way to the lake, 15.09.1959, I.N. Golovenko.
 - *Physarum album* (Bull.) Chevall. -on *Picea schrenkiana*, SAG, 24.08.1955, 27.09.1958, I.N. Golovenko; on *Populus tremula* L., SAG, 07.10.1958, I.N. Golovenko; on *Geranium collinum* Stephan ex Willd., SAG, 24.08.1955, I.N. Golovenko.
 - *Physarum bitectum* G. Lister -on *Polystichum lonchitis* (L.) Roth., SAG, 28.08.1959, I.N. Golovenko.
 - *Physarum bivalve* Pers. -on *Picea schrenkiana*, on moss tufts, SAG, Gorelnik, 01.08.1959, G.I. Pet'ko; IG, Bear Forest, 18.09.1959, I.N. Golovenko.
 - *Physarum compressum* Alb. & Schwein. -on *Picea schrenkiana*, SAG, 28.08.1959, I.N. Golovenko; IG, Bear Forest, 19.09.1959, I.N. Golovenko.
 - *Physarum contextum* (Pers.) Pers. -on *Picea schrenkiana*, IG, 18.09.1959, 01.08.1962, I.N. Golovenko.
 - *Physarum viride* (Bull.) Pers. -on *Picea schrenkiana*, SAG, 28.08.1959, I.N. Golovenko.
- Order Stemonitiales T. Macbr. Family Stemonitidaceae Fr.**
- *Brefeldia maxima* (Fr.) Rostaf. -on *Picea schrenkiana*, SAG, Chimbulak, 27.10.1954; ib., spruce forests along the Battery river, 06.10.1960, I.N. Golovenko.
 - *Comatracha nigra* (Pers.) J. Schröt. -on dry branches of *Artemisia* sp., SAG, high-mountain steep slope along the Kazachka river, 03.06.1946, M.N. Kuznetsova.
 - *Comatracha pulchella* (C. Bab.) Rostaf. -on *Picea schrenkiana*, BAG, 22.07.1962, I.N. Golovenko.
 - *Lamproderma columbinum* (Pers.) Rostaf. -on live stems of *Equisetum hyemale* L., SAG, along the Battery river, 27.09.1958, I.N. Golovenko; on dry grasses, leaves and branches of shrubs, SAG, the northern slope of the Shaggy hill, 09.05.1946, M.N. Kuznetsova; ib., Lebedev canyon, 04.05.1958, I.N. Golovenko.
 - *Stemonitis axifera* (Bull.) T.Macbr. -on *Picea schrenkiana*, SAG, spruce forests along the Battery river, 09.08.1948, S.R. Schwartzman; ib., headwaters of the Kazachka river and spruce forests along the Battery river, 16.08.1958, 27.09.1958, I.N. Golovenko; ib., 28.08.1959, I.N. Golovenko; ib., the northern slope of the Shaggy hill, 20.10.1946, M.N. Kuznetsova; ib., heads, 17.08.1948, S.R. Schwartzman; ib., on the way to the Tuyuksu Gate, at the top of the pass, 12.08.1948, S.R. Schwartzman; ib., spruce forests along the Small Almaty river, 28.10.1954, 17.07.1957, I.N. Golovenko; BAG, Kumbelsai, 11.07.1956, 24.07.1962, I.N. Golovenko; ib., PG, 23.07.1959, I.N. Golovenko; ib., spruce forests below the lake, 20.09.1959, I.N. Golovenko; IG, 24.06.1949, 17.09.1959, I.N. Golovenko; Talgar gorge, 05.09, 07.09.1958; ib., 07.07.1967, I.N. Golovenko.
 - *Stemonitis fusca* Roth. -on *Picea schrenkiana*, SAG, Chimbulak, 17.09.1957, I.N. Golovenko; ib., spruce forests along the Battery river, 20.08.1958, I.N. Golovenko; ib., Shaggy hill, 21.08.1958, 06.10.1960, I.N. Golovenko; BAG, 23.09.1958, ib., spruce forests along the Kumbel river, 24.07.1962, I.N. Golovenko; Talgar gorge, 04.09.1958, I.N. Golovenko; on *Pinus sylvestris* L., SAG, nursery, 05.07.1961, I.N. Golovenko; on *Betula tianschanica* Rupr., SAG, nursery, 05.07.1961, I.N. Golovenko; on *Quercus robur* L., SAG, nursery 05.07.1961, I.N. Golovenko; on

Sorbus tianschanica Rupr., SAG, nursery, 13.08.1948, S.R. Schwartzman.

- *Stemonitis splendens* Rost. -on *Picea schrenkiana*, SAG, Shaggy hill, 20.10.1946, M.N. Kuznetsova; ib., spruce forests along the Battery river, 24.08, 29.09.1955, I.N. Golovenko; ib., heads of the SAG, 20.08.1963, I.N. Golovenko; on *Betula tianschanica* Rupr., SAG, nursery, 13.10.1954, S.R. Schwartzman.
- *Stemonitopsis typhina* (F.H. Wigg.) Nann.-Bremek. -on *Picea schrenkiana*, SAG, spruce forests along the Battery river, 27.09.1958, I.N. Golovenko; ib., Chimbulak, 28.08.1959, I.N. Golovenko; IG, spruce forests below Zharsai, 18, 19.09.1958, I.N. Golovenko; TG, along the Chin-Turgen river, 16.09.1962, I.N. Golovenko; BAG, spruce forests along the Kumbel river, 24.07.1962, I.N. Golovenko; on *Populus tremula* L., SAG, aspen trees, 31.05.1946, M.N. Kuznetsova; ib., Shaggy hill, 20.08.1958, I.N. Golovenko.
- *Symphytocarpus confluens* (Cooke & Ellis) Ing & Nann.-Bremek. - on *Picea schrenkiana*, Talgar gorge, 05.09.1958, I.N. Golovenko.

Order Trichiales T. Macbr. Family Arcyriaceae Rostaf. ex Cooke

- *Arcyodes incarnata* (Alb. & Schwein.) O.F. Cook -on *Picea schrenkiana*, SAG, 28.08.1959, I.N. Golovenko; IG, below the lake, 17-19.09.1959, I.N. Golovenko.
- *Arcyria denudata* (L.) Wettst. -on *Picea schrenkiana*, SAG, Shaggy hill, 01.08.1948, S.R. Schwartzman; 20.08.1958, I.N. Golovenko; ib., headwaters of the Kazachka river, 08.10.1957, I.N. Golovenko; ib., spruce forests along the Battery river, 27.09.1958; ib., Chimbulak, 28.08.1959, I.N. Golovenko; on *Salix* sp., SAG, spruce forests along the Kazachka river, 13.08.1958, I.N. Golovenko; on *Populus tremula* L., Shaggy hill, 20.08.1958, I.N. Golovenko; ib., along the Battery river, 27.09.1958, I.N. Golovenko; on *Crataegus* sp., SAG, 09.06.1949, M.N. Kuznetsova; on *Prunus armeniaca* L., Deep canyon, 09.11.1945, M.N. Kuznetsova.
- *Arcyria ferruginea* Saut. -on *Picea schrenkiana*, SAG, heads, 10.08.1948, S.R. Schwartzman; ib., Kamenka canyon, Kumyssai, 17.08.1947, I.N. Golovenko; ib., the gorge of Kazachka river, upper reaches, 16.08.1958, I.N. Golovenko; ib., 28.08.1959, I.N. Golovenko; BAG, spruce forests, 13.07.1958, I.N. Golovenko; Talgar gorge, 06.09.1958, I.N. Golovenko; IG, below the lake, 17.09.1959, I.N. Golovenko.
- *Arcyria incarnata* (Pers. ex J.F. Gmel.) Pers. -on the fruit body of *Heterobasidion annosum* (Fr.) Bref., SAG, Chimbulak, 15.09.1959, I.N. Golovenko; on *Picea schrenkiana*, SAG, spruce forests along the Battery river, 27.09.1958, I.N. Golovenko; ib., the upper reaches, 20.08.1963, I.N. Golovenko; BAG, below the lake, 15.09.1959; ib., Kumbelsai, 24.07.1962, I.N. Golovenko; on *Populus tremula* L., SAG, Shaggy hill, 20.08.1958, I.N. Golovenko.
- *Arcyria obvelata* (Oeder) Onsberg -on *Picea schrenkiana*, SAG, Chimbulak, 28.10.1954, I.N. Golovenko; ib., Gorelnik, 01.08.1959, G.I. Pet'ko; BAG, Kumbelsai, 24.07.1962, I.N. Golovenko; TG, heads, 08.10.1964, I.N. Golovenko; Talgar gorge, spruce forests, 07.07.1967, I.N. Golovenko; on *Ulmus pumila* L., SAG, 20.06.1945, M.N. Kuznetsova; on the grounds, SAG, 09.06.1945, M.N. Kuznetsova.
- *Arcyria oerstedii* Rostaf. -on *Picea schrenkiana*, SAG, Kimasar, 12.09.1954, I.N. Golovenko; PG, 23.09.1958, I.N. Golovenko; IG, below the lake, 19.09.1959, I.N. Golovenko.
- *Perichaena liceoides* Rostaf. -on *Picea schrenkiana*, BAG, Kumbelsai, 24.07.1962, I.N. Golovenko.

Family Trichiaceae Chevall.

- *Hemitrichia serpula* (Scop.) Rostaf. -on *Picea schrenkiana*, TG, along the Chin-Turgen river, 09.10.1964, I.N. Golovenko.
- *Hemitrichia clavata* (Pers.) Rostaf. -on *Picea schrenkiana*, TG, along the Chin-Turgen river, 16.09.1962, I.N. Golovenko; SAG, Lebedev canyon, 12.09.1964, N.Kh. Eremina; ib., the gorge of the Kazachka river, 28.08.1964, I.N. Golovenko; on *Populus tremula* L., SAG, Shaggy hill, 11.10.1949, I.N. Golovenko; ib., nursery, 13.10.1954, I.N. Golovenko; ib., spruce forests along the Battery river, 29.09.1955, I.N. Golovenko; ib., the gorge of the Kazachka river, 08.10.1957, I.N. Golovenko; Talgar gorge, Monk canyon, 22.09.1959, N.Kh. Eremina.
- *Metatrichia vesparia* (Batsch) Nann.-Bremek. ex G.W.Martin & Alexop. -on *Picea schrenkiana*, SAG, the northern slope of the Shaggy hill, 20.10.1946, M.N. Kuznetsova; Talgar gorge, Monk canyon, 22.09.1959, N.Kh. Eremina.
- *Trichia affinis* de Bary. -on *Picea schrenkiana*, SAG, spruce forests along the Kazachka river, 14.08.1958; ib., along the Battery river, 27.09.1958, I.N. Golovenko; ib., 28.08.1959, I.N. Golovenko; ib., IG, 19.09.1959, I.N. Golovenko; on *Populus tremula* L., SAG, Shaggy hill, 20.08.1958, I.N. Golovenko.
- *Trichia botrytis* (J.F. Gmel.) Pers. -on *Picea schrenkiana*, Talgar gorge, 05.09.1958, I.N. Golovenko; PG, 23.09.1958, I.N. Golovenko; ib., Kumbelsai, 24.07.1962, I.N. Golovenko; SAG, spruce forests along the Battery river, 27.09.1958, I.N. Golovenko.
- *Trichia contorta* (Ditmar) Rostaf. -on *Picea schrenkiana*, IG, floodplain forest below the lake, 19.09.1959, I.N. Golovenko.
- *Trichia decipiens* (Pers.) T. Macbr. -on *Picea schrenkiana*, IG, spruce forests below Zharsai, 18, 19.09.1959, I.N. Golovenko; TG, along the Chin-Turgen river, 16.09.1962,

I.N. Golovenko; on *Rhytidiadelphus triquetrus* (Hedw.) Warnst., BAG, spruce forests near the Big Almaty Lake, 01.08.2016, Y.V. Rakhimova.

- *Trichia favoginea* (Batsch) Pers. -on *Picea schrenkiana*, SAG, the foot of Shaggy hill, 28.07.1948 S.R. Schwartzman; ib., Lebedev canyon, 22.09.1954, I.N. Golovenko; ib., along the Battery river, 06.10.1960, I.N. Golovenko; IG, 24.06.1949, V.Kh. Temralieva; 19.09.1959, I.N. Golovenko; on *Quercus robur* L., SAG, Shaggy hill, 17.07.1954, I.N. Golovenko.
- *Trichia persimilis* P. Karst. -on *Picea schrenkiana*, SAG, along the Battery river, 27.09.1958, I.N. Golovenko; BAG, Kumbelsai, 24.07.1962, I.N. Golovenko; TG, along the Chin-Turgen river, 09.10.1964, I.N. Golovenko.
- *Trichia scabra* Rostaf. -on *Picea schrenkiana*, SAG, along the Battery river, 06.10.1960, I.N. Golovenko.
- *Trichia varia* (Pers. ex J.F. Gmel.) Pers. -on *Picea schrenkiana*, SAG, 20.10.1946, M.N. Kuznetsova; ib., 17.08.1948, S.R. Schwartzman; ib., 09.06.1954, I.N. Golovenko; ib., Chimbulak, 27.10.1954, 28.09.1959, I.N. Golovenko; ib., along the Battery river, 15.09.1955,

23.09.1956, 27.09.1958, I.N. Golovenko; ib., 20.07.1963, I.N. Golovenko; IG, Bear Forest, 18.09.1959, I.N. Golovenko; on *Betula tianschanica* Rupr., Talgar gorge, 22.09.1961, I.N. Golovenko; on *Sorbus tianschanica* Rupr., SAG, Shaggy hill, 20.10.1946, M.N. Kuznetsova; ib., 20.08.1958, I.N. Golovenko; ib., Gorelnik, 07.08.1948, S.R. Schwartzman.

Class Protosteliomycetes Alexop. & Mims Order Ceratiomyxales G.W. Martin ex M.L. Farr & Alexop. Family Ceratiomyxaceae J. Schröt.

Ceratiomyxa fruticulosa (O.F. Müll.) T. Macbr. var. *fruticulosa* -on *Picea schrenkiana*, SAG, Gorelnik, 8.08.1948, S.R. Schwartzman, 23.08.1958, I.N. Golovenko; BAG, below the lake, 12.07.1960, 24.07.1962, I.N. Golovenko; Talgar gorge, 19.09.1961, I.N. Golovenko; on *Populus tremula* L., SAG, Lebedev canyon, 04.05.1958, I.N. Golovenko; ib., Shaggy hill, 20.08.1958, I.N. Golovenko; on on the grounds, SAG, the northern slope of the Cross Mountain, 12.09.1946, M.N. Kuznetsova.

Class	Order	Family	Genus	Number of species	
Myxomycetes	Liceales	Cribrariaceae	<i>Cribraria</i>	2	
			Tubiferaceae	<i>Lycogala</i>	2
				<i>Reticularia</i>	3
	<i>Tubifera</i>	1			
	Physarales	Didymiaceae	<i>Diderma</i>	5	
			<i>Didymium</i>	3	
			<i>Lepidoderma</i>	1	
			<i>Mucilago</i>	1	
	Physarales	Physaraceae	<i>Badhamia</i>	4	
			<i>Craterium</i>	2	
			<i>Fuligo</i>	3	
			<i>Leocarpus</i>	1	
			<i>Physarum</i>	6	
	Stemonitales	Stemonitidaceae	<i>Brefeldia</i>	1	
			<i>Comatricha</i>	2	
			<i>Lamproderma</i>	1	
			<i>Stemonitis</i>	3	
			<i>Stemonitopsis</i>	1	
			<i>Symphytocarpus</i>	1	
			Trichiales	Arcyriaceae	<i>Arcyodes</i>
	<i>Arcyria</i>	5			
	<i>Perichaena</i>	1			
	Trichiaceae	<i>Hemitrichia</i>			2
		<i>Metatrichia</i>	1		
		<i>Trichia</i>	8		
	Protosteliomycetes	Ceratiomyxales	Ceratiomyxaceae	<i>Ceratiomyxa</i>	1
Total	5	8	26	62	

Table 1: Taxonomic structure of the slime molds biota of Ile Alatau.

Slime molds in the Ile Alatau have 62 species and are represented by two classes (Table 1), of which the Protosteliomycetes class consists of the order Ceratiomyxales, the family Ceratiomyxaceae and one species *Ceratiomyxa fruticulosa*.

The Myxomycetes class is more widely represented and has 4 orders. From the order Liceales, two representatives of the family Cribriaceae were found: *Cribraria macrocarpa* and *C. cancellata*; as well as six species from the family Tubiferaceae -representatives of the genera *Lycogala*, *Reticularia* and *Tubifera*. The largest number of species was noted for the genus *Reticularia* (3), but the most common species in the research area is *Lycogala epidendrum*.

The order Physarales is represented by two families. The family Didymiaceae includes the genera *Diderma* (5 species), *Didymium* (3 species), *Lepidoderma* and *Mucilago* (one species each). From this family, it is necessary to note the species of the genus *Diderma* that appear in early spring after snowfall: *Diderma niveum*, found on *Artemisia juncea* and representatives of Poaceae, and *D. radiatum* on dry grasses, leaves and branches of shrubs. The second family

Physaraceae includes 16 species from the genera *Badhamia* (4 species), *Craterium* (2), *Fuligo* (3), *Leocarpus* (1), *Physarum* (6 species). The most common is *Fuligo septica*.

From the order Stemonitales, only one family Stemonitidaceae has been found, including six genera: *Brefeldia* (with one species), *Comatricha* (2), *Lamproderma* (1), *Stemonitis* (3), *Stemonitopsis* (1) and *Symphytocarpus* (with one species). The most common species are *Stemonitis axifera*, *S. fusca*, *S. splendens* and *Stemonitopsis typhina*.

The order Trichiales is represented by two families. The family Arcyriaceae includes 7 species from three genera *Arcyodes*, *Arcyria*, *Perichaena*. The largest number of species (5) was found from the genus *Arcyria*. The most common is *Arcyria denudata*. The Trichiaceae family includes 11 species from three genera *Hemitrichia*, *Metatrichia* and *Trichia*. The largest is the genus *Trichia*, which includes 8 species. The most common are *Hemitrichia clavata* and *Trichia varia*.

Representatives of slime molds were found on various 18 substrates (Figure 5).

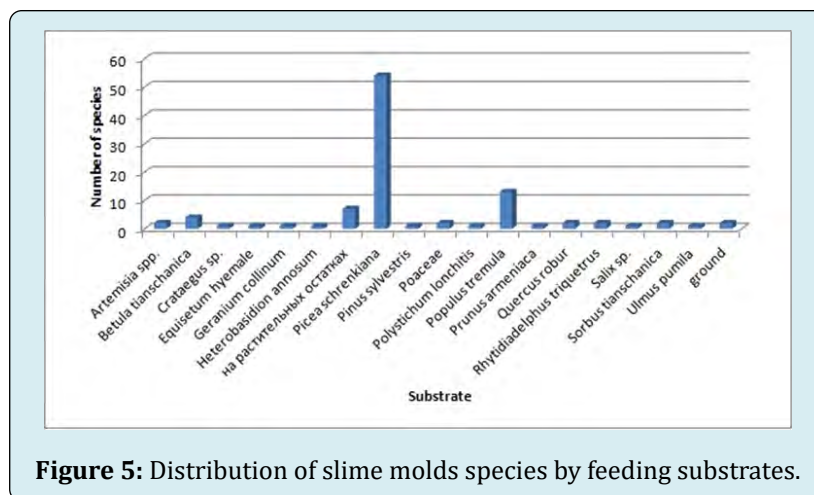


Figure 5: Distribution of slime molds species by feeding substrates.

The largest number of slime molds species (54) was recorded on *Picea schrenkiana*. There are 13 species on *Populus tremula* and 4 species on *Betula tianschanica*. The remaining substrates are characterized by 1-2 species.

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