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Materials for the moss flora of the Tomskaya Pisanitsa Museum-Reserve

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Abstract. The article provides a preliminary list of mossy species of the territory of the Tomskaya Pisanitsa Museum-Reserve. 36 species were found, including 4 liverworts and 32 leaf-stemmed mosses. The distribution of species by substrate types and growth forms is indicated.

1 Introduction

The Tomskaya Pisanitsa Museum-Reserve was organized in 1988 with the aim of preserving rock paintings from the late Neolithic – early Bronze Age era [1]. The territory received protected status two decades earlier. During the second half of the 20th century, it was the first archaeological monument of this kind to be museumified in the country.

2 Material

We found it interesting to study the moss flora of such a heavily visited historical and tourist site. The collection of herbarium material of bryophytes was carried out in the 2023 season in forest and rock communities.

The main tree species in the study area is common pine (*Pinus sylvestris*), deciduous trees such as birch (*Betula pendula*) or aspen (*Populus tremula*) are less common. Mosses more readily colonize the bases of deciduous tree trunks, although they are also found on pine trees. Rotten wood is encountered extremely rarely, since the area is cleared.

Petrophytic communities are represented on rock outcrops on the bank of Tom river. Rock mosses form small cushion-shaped tufts (*Bryum argenteum*, *Schistidium tenuinerve*, *Syntrichia ruralis*, etc.) and wefts (*Abietinella abietina*, *Pseudoleskeella tectorum*).

Even taking into account a well-built path network, degradation of the vegetation cover inevitably occurs. Forest moss species that live on the forest floor are disappearing due to soil compaction.

To date, 36 species of mosses have been discovered on the territory of the museum-reserve, of which 4 are hepatic and 32 are leafy. Below is a list indicating ecotope, substrate and growth form.

3 List of species

Abietinella abietina (Hedw.) Fleisch. Bank of Tom River. On the rocks. Weft.
Amblystegium serpens (Hedw.) Bruch. et al. Mixed forest, at the base of a birch trunk. On the bark. Weft.
Brachythecium rotaeanum De Not. On the forest floor and well. Weft.
Brachythecium salebrosum (F.Weber et D.Mohr) Bruch. et al. Mixed forest, at the base of the trunk. On the bark. Weft.
Bryum argenteum Hedw. On the rocks on the bank of the Tom River. Cushion turf.
Bryum caespiticium Hedw. River bank Tomi. On the rocks. Real short turf.
Bryum moravicum Podp. On a rotten wood, atypical - with single vegetative reproductive organs. Real short turf.
Callicladium haldaninum (Grev.) Crum. Pine forest, on the butt of a pine tree. Weft.
Cephaloziella rubella (Nees) Warnst. On the rotten wood. Weft.
Ceratodon purpureus (Hedw.) Brid. Mixed forest. On the ground. Cushion turf.
Chiloscyphus minor (Nees) J.J. Engel et R.M. Schust. Mixed forest. On the rotten wood. Weft.
Chiloscyphus profundus (Nees) J.J. Engel et R.M. Schust. On the rotten wood. Weft.
Climacium dendroides (Hedw.) Web. Et Mohr. Mixed forest. On the rotten wood. Tree-like (dendroid).
Dicranum montanum Hedw. Pine forest. On the butt of a pine tree. Real short turf.
Hylocomiadelphus triquetrus (Hedw.) Ochyra & Stebel. Mixed forest. On the rotten wood, on the butt of a pine tree. Carpet.
Hypnum cf. cupressiforme Hedw. River bank Tomi. On the rocks. Weft.
Lewinskya elegans (Schwägr. ex Hook. & Grev.) F. Lara, Garilleti & Goffinet. Mixed forest, at the base of the trunk. On the bark. Cushion turf.
Nyholmiella obtusifolia (Brid.) Holmen & E. Warncke. Mixed forest, at the base of the trunk. On the bark. Cushion turf.
Orthotrichum sp. River bank Tomi. On rocky outcrops. Cushion turf. Samples without sporophytes, but most likely this is *Orthotrichum anomalum* Hedw., found downstream of the Tom river [2].
Plagiomnium cuspidatum (Hedw.) T.Kop. Mixed forest. On the rotten wood, on the butt of a pine tree. Real turf.
Plagiothecium denticulatum (Hedw.) Bruch. et al. Pine forest. On the butt of a pine tree. Carpet.
Platygyrium repens (Brid.) Bruch. et al. On the bark of deciduous trees. Carpet.
Pleurozium schreberi (Brid.) Mitt. Mixed forest. On the rotten wood. Weft.
Pohlia nutans (Hedw.) Lindb. Mixed forest. On the well and forest floor. Real short turf.
Pseudoleskeella tectorum (Funck ex Brid.) Kindb. in Broth. River bank Tomi. On the rocks. Weft.
Ptilidium pulcherrimum (Weber) Vain. Mixed forest, at the base of a birch trunk. On the bark. Weft.
Pylaisia polyantha (Hedw.) Bruch et al. Mixed forest, at the base of the trunk. On the bark. Carpet.
Rhodobryum roseum (Hedw.) Limpr. In a sparse pine forest on the forest floor. Cushion turf.
Sanionia uncinata (Hedw.) Loeske. Mixed forest, at the base of the trunk. On the bark, on the rotten wood. Carpet.
Schistidium cf. flaccidum (De Not.) Ochyra. On the foundation of the building. On the asphalt. Cushion turf.

Schistidium tenuinerve Ignatova & H.H. Blom. Bank of Tom river. On rocky outcrops. Cushion turf.
Sciuro-hypnum oedipodium (Mitt.) Jaeg. On the soil and at the base of trees. Weft.
Sciuro-hypnum reflexum (Starke) Ignatov et Huttunen. Mixed forest. On the rotten wood. Weft.
Sciuro-hypnum starkei (Brid.) Ignatov et Huttunen. Mixed forest, at the base of the trunk. On the bark. Weft.
Syntrichia ruralis (Hedw.) Web. et Mohr. River bank of Tom. On rocky outcrops. Turf cushion.
Tetraphis pellucida Hedw. Mixed forest. On the rotten log. Real short turf.

The distribution by substrate type is as follows: at the base of tree trunks – 14 species; on the rotten wood– 13; on rocky substrate – 8; on the forest floor – 3; on artificial surface (asphalt) – 1 type. A number of species have been recorded for several types of substrates.

The predominant life form in the studied area is weft - 15 species; in second place is cushion turf (7 types); followed by carpet and real short turf - 4 types each; real turf – 3 types; turf cushion and tree-like form (dendroid) 1 type each.

Wefts and carpets serve as examples of an advanced growth form adapted to function in low light conditions [3]. For a weft, unlike a carpet, the task of retaining moisture is secondary. Cushion turf is characterized by intensive branching of plant shoots, not necessarily from a single point of attachment to the substrate. Real turf is formed from shoots with sparse or absent branching.

Species included in the Red Book of Kuzbass [4] were not found. Of particular interest is *Schistidium tenuinerve*, previously indicated as having the only location in the region, also in the Yashkinsky district in the vicinity of the village Morkovkino [5].

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