Moss flora of the National Park “Smolenskoye Poozerye”
(North-West Russia)
Флора мхов национального парка “Смоленское Поозерье”
(Северо-Западная часть России)

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Abstract
Moss flora of “Smolenskoye Poozerye” National Park includes 171 species. The annotated list provides the data on the distribution, habitat preference of species and locations of rare species. In the territory of the national park, complexes of rare species of mosses and valuable types of their habitats are revealed.

Резюме
Флора мхов национального парка “Смоленское Поозерье” включает 171 вид. Конспект видов включает сведения об их встречаемости, эколого-ценотическую характеристику, местообитания редких видов. На территории национального парка выделены комплексы редких видов мхов и местообитаний, имеющие ключевое значение для их сохранения.

KEYWORDS: moss flora, moss species, valuable communities, complexes of rare species

INTRODUCTION
The “Smolenskoye Poozerye” National Park was established in 1992 in the north-western part of the Smolensk Region. In the north, the National Park borders the Tver Region. The total area of its territory is 1462 km², the length from west to east is 55 km, from south to north – 50 km.

The territory of the “Smolenskoye Poozerye” is located in the west of the Russian Plain. The central and western parts of the Park have a moraine-hilly landscape, formed during the Valdai glaciation. Glacial lakes and peat bogs occupy depressions between hills and ridges. This territory is characterized by extensive wetlands and presence of rocky soil and boulders. In the southeastern part of the National Park, which was not affected by this glaciation, gently undulating sandy plains predominate, and erosive landforms (ravines and gullies) are expressed.

In the territory of the National Park, there are more than 30 glacial lakes; the largest (Sapsho, Baklanovskoye, Dgo, Rytoe, Chistik) are concentrated in its central and western parts. In the northern and eastern parts of the Park, along the border of the Valdai glacier, the largest oligotrophic bogs in the region have formed (Lopatinsky Moss, 1090 ha; Pelyshev Moss, 1622 ha; Vervizhsky Moss, 4000 ha). There are quite large mesotrophic and eutrophic floodplain mires. The river system belongs to the basin of Western Dvina River.

The climate of the area is moderately continental; the average annual precipitation is 700 mm, being the highest in the Smolensk Region.

As much as 74% of the territory of the National Park is covered with forest. The zonal types are hemiboreal spruce and mixed spruce+broad-leaved forests; however the old-growth forests retained in a few places. More areas are covered now by secondary aspen-birch-spruce forests with scattered Tilia cordata, Acer platanoides, and Quercus robur. In some places, areas of old spruce+broad-leaved forests have survived. Abandoned arable fields and hayfields are overgrowing with Betula pendula, Populus tremula, and Alnus incana.

Alnus glutinosa and Ulmus sp. are common in wet stream valleys and depressions around lakes. Pine forest grows on the sandy river terraces, while in glacial low ridges pine grows mixed with broad-leaves trees (Roshetnikova, 2002; Nemirova & Martynov, 2010).

The first data on moss flora of the “Smolenskoye Poozerye” National Park were published by Abramova et al. (2010), based on their own collections representing 106 species of mosses and 11 of liverworts. Later, Kosenkov (2012) compiled the list of bryophytes of the park, adding various published data; this list includes 129 mosses and 11 liverworts.

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The present paper is based on exploration of the National Park bryophyte flora by the author in 2011 and 2017–2019. Fifteen areas most diverse in its environ-

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mental conditions and biodiversity were studied using the route method. Own collections were supplemented by those made by E.V. Tikhonova in the course of geobotanical studies of the territory in 2016–2020. Altogether 44 species new for the bryoflora of the National Park were revealed, and only few of them were reported earlier (Teleganova, 2017). The present list summarizes data on mosses from literature and herbarium collections kept in Herbarium of the Kaluga State University (KLH).

**ANNOTATED LIST OF MOSSES**

Names of moss taxa are given according to Hodgetts *et al.* (2020). In some cases species names following the previously published Check-list of North Europe and East Asia (Ignatov *et al.*, 2006) are given in brackets.

Species names are followed by the frequency of occurrence: common (C), sporadic (S), rare (R); and then the species habitats are enumerated. Locality numbers are given for rare species, and herbarium labels are cited for species rare species found once to four times. Species new to the National Park are marked with asterisk, and species new to Smolensk Province with two asterisks.

*Abietinella abietina* (Hedw.) M. Fleisch. – S; on sandy soil in open dry places in young pine stands, pine forest edges, along roads in pine forests.

*Alleniella complanata* (Hedw.) S. Olsson, Enroth & D. Quandt [Neckera complanata (Hedw.) Huebener] – R; spruce+broad-
leaved forest near Gorodok village (55°44′19″N – 31°58′59″E) (coll. E.V. Tikhonova).

*Amblyodon dealbatus* (Hedw.) P. Beauv. – R; on the northern shore of Sapsho lake, on sandy soil near calcium-rich springs (coll. M.S. Ignatov, MHA).

*Amblystegium serpens* (Hedw.) Schimp. – S; on soil, tree trunk bases, rotten wood in forests, on artificial substrates (concrete, bricks, etc.).

*Anomodon longifolius* (Schleich. ex Brid.) Hartm. – R; in spruce/broad-leaved forest on trunks of broad-leaved trees (9, 12, 13); 1.5 km SSW of Klín Village (55°34′21.5″N, 31°56′6.7″E); 2.5 km W of Yarilo Village (55°35′33″N – 31°44′18″E) (coll. E.V. Tikhonova).

**A. viticulosus** (Hedw.) Hook. & Taylor – R; on maple trunks (13). Epiphyte in old-growth broad-leaved forests.

**Atrichum flavidum** Mitt. – S; on soil on slopes in spruce +broad-leaved forests in ravines and under upturned roots.

*A. undulatum* (Hedw.) P. Beauv. – C; on a bare loamy soil and under upturned roots in mixed forests.

*Aulacomnium palustre* (Schwägr.) – S; on hummocks in *Sphagnum* bogs, in swampy coniferous forests, on clearcuttings, occasionally on damp rotten wood.

*Barbula unguiculata* Hedw. – S; on a bare soil and rocks in open places.

*Brachytheciastrum velutinum* (Hedw.) Ignatov & Huttunen – C; in forests on tree bases, bare soil, rotten wood, occasionally on rocks covered with fine soil.

*Brachythecium albicans* (Hedw.) Schimp. – S; on dry sandy soil in open places: dry meadows, heaths, roadsides, pine forest edges.

*B. campestre* (Müll. Hal.) Schimp. – R; on trunk of *Fraxinus excelsior* in a mixed forest near Petrako village (Abramova et al., 2010).

*B. capillaceum* (F. Weber & D. Mohr) Giacom. [*Brachythecium rotematum* De Not.] – R; on soil on swampy shores of Mutnoe and Rytoe Lakes (Abramova et al., 2010).

*B. erythrorrhizon* Schimp. – S; on soil in small-leaved and mixed forests, in grass pine forests (coll. E.V. Tikhonova).

*B. rivulare* Schimp. – C; in wet habitats: on soil and rocks on banks of rivers and streams, near springs, in eutrophic mires, in older thickets.

*B. rutabulum* (Hedw.) Schimp. – C; on rotten wood in forests, occasionally on rocks covered with fine soil.

*B. salebrosum* (Hoffm. ex F. Weber & D. Mohr) Schimp. – C; in forests on soil, tree trunk bases, rotten wood, rocks.

*Bryoerythrophyllum recurvirostrum* (Hedw.) P.C. Chen – R; on northern shore of Sapsho lake (coll. M.S. Ignatov, MHA).

*Bryum argenteum* Hedw. – S; on a bare soil, artificial substrates (concrete, bricks, etc.).

*Buxbaumia aphylla* Hedw. – S; on sandy soil on banks of trenches in pine forests.

*Callicladium haldaneanum* (Grev.) H.A. Crum – C; in forests on tree trunk bases and rotten wood.

*Calliergon cordifolium* (Hedw.) Kindb. – S; in wet and swampy habitats: on wet and peaty soil in forests, at swamp edges, in eutrophic mires.

*C. giganteum* (Schimp.) Kindb. – R; in swampy forest near Bolshoye Strechnoe lake (Abramova et al., 2010); in eutrophic mires, on swampy shore of lake (3, 7).

*C. stellatum* (Hedw.) Kindb. – S; in wet and swampy habitats.

*C. linbergii* Mitt. (Hedenäs – R; on damp soil on swampy shore of lake (3).

*C. prolei* – R; forest slope to the lake, on soil near springs rich in calcium (1).

*C. stipitatum* (Hedw.) Lange & C.E.O. Jensen – S; on damp and peaty soil near springs, in swampy lakes in swampy forests and eutrophic mires.

*C. watsonii* (Hedw.) Schw. – S; on bare soil and artificial substrates (asphalt, concrete, bricks, etc.).

*Campylidium calcarea* (Crunsd. & Nyholm) Ochyra [*Calyptidium calcarea* (Crunsd. & Nyholm) Ochyra] – S; in swampy forests on tree trunk bases (3, 14).

*Campylium stellatum* (Myr) Ochyra [*Campylium stellatum* (Myr) Ochyra] – R; on damp soil near springs (1).

*Ceratodon purpureus* (Hedw.) Brid. – C; on bare soil and artificial substrates (asphalt, concrete, bricks, etc.).

*Chionoloma tenuirostre* (Hedw.) M.Alonso, M.J.Cano & J.A.Jiménez [*Oxystegus tenuirostris* (Taylor) R.H.Zander] – R; on slope of northern shore of Sapsho lake, near springs (Abramova et al., 2010).

*Cirripheydium philiferum* (Hedw.) Grout – S; on wet soil in forests, on banks of rivers, occasionally on rocks.

*Climacium dendroides* (Hedw.) F. Weber & D.Mohr – C; on damp soil in mixed and swampy forests, eutrophic mires, wet meadows.

*Cracionion piliforme* (Hedw.) Spruce – R; on damp soil near springs (1).

**Dicelycha falcatum** (Hedw.) Myrin – R; on boulders in dry riverbed (12).

*Dicranella heteromalla* (Hedw.) Schimp. – S; on bare sandy soil in pine and mixed forests: under upturned roots, on roadsides and banks of trench edges.

*D. rufescens* (Dicks.) Schimp. – R; on clayish trail to Sapsho lake (Abramova et al., 2010).

*D. varia* (Hedw.) Schimp. – R; on soil on forest trail (6).

**Dicranum bonjeanii** De Not. – S; on sandy soil in pine forests, occasionally on rocks covered with fine soil.

*D. flagellare* Hedw. – R; on birch trunk base near Strechnoe lake (Abramova et al., 2010), on soil on trail in spruce-pine forest, on damp rotten wood in swampy spruce forest (5, 6).

*D. fragillifolium* Lindh. – R; on tree trunk in old-growth broad-leaved forest between Szyrieta and Sermyatka Rivers (55°34′10″N – 32°22′28″E) (coll. E.V. Tikhonova).

*D. scyphum* Turner – R; Kurlov-Borsko foresetry, near Petrako Village, sq. 31 (55°29′32.1″N, 31°52′59.2″E), on trunk base in coniferous-small-leaved blueberry+forb forest (coll. E.V. Tikhonova).

**D. majus** Turner – R; on soil in swampy birch forest (3); 1 km W Loshamye Lake (55°30′35″N – 31°57′49″E), on soil in swampy coniferous+small-leaved blueberry+mossy forest; 3 km E of Ploschadka (55°25′16″N – 31°53′4″E), on soil in grassy spruce forest (coll. E.V. Tikhonova).

*D. montanum* Hedw. – C; in forests on rotten wood, tree trunk bases, exserted tree roots.

*D. polysetum* Sw. – C; on litter in mossy coniferous forests, occasionally on rotten wood.

*D. scoparium* Hedw. – C; in forests on rotten wood, tree trunk bases, occasionally on litter in mossy coniferous forests.

*D. viride* (Sull. & Lesq.) Lindh. – R; in spruce+broad-leaved forest on trunks of broad-leaved trees, less often on old birches and recently fallen trees (8, 9, 11, 13).

*Dracunculus aduncus* (Hedw.) Warnst. – S; on damp soil in wet and swampy habitats: banks of lakes, wet meadows, eutrophic mires.

*D. polygamus* (Schimp.) Hedenäs – R; in swampy birch forest and rich fens (3, 7).
**D. sendleri** (Schimp. ex H. Mül.) Warnst. – R; in rich fens (7).

*Encalypta vulgaris* Hedw. – R; on soil on northern shore of Sapsho Lake (coll. M.S. Ignatov, MHA).

*Eurhynchium pulchellum* (Hedw.) Ignatov & Huttunen – R; on trunk of *Acer platanoides* on shore of Dgo lake (Abramova et al., 2010).

*Eurhynchium angustirete* (Broth.) T.J. Kop. – C; in spruce and mixed forests on litter, soil, rotten wood, occasionally on rocks covered with fine soil.

*Fissidens adiantoides* Hedw. – S; on damp soil in wet swampy forests, eutrophic mires, near springs.

*F. bryoides* Hedw. – S; in forests on bare damp soil.

*F. osmundoides* Hedw. – R; on soil in birch forest on shore of Sapsho Lake and on damp peaty soil in swampy birch forest on shore of Mutnoe lake (Abramova et al., 2010).

*F. taxifolius* Hedw. – S; in forests on bare damp soil.

*Fontinalis antypiretica* (Hedw.) Ignatov & Ignatova – C; in forests on tree trunk bases and on rotten wood.

*Funaria hygrometrica* Hedw. – R; on soil along trail on lake shore (9).

*Grimmia muehlenbeckii* Schimp. – S; on rocks in forests; on a cement curb and granite memorial in Przhevalskoe (coll. M.S. Ignatov, MHA).

*G. pulvinata* (Hedw.) Sm. – R; on granite memorial near Petrakov village (11).

*Hamatocaulus vernicosus* (Mitt.) Hedenäs – R; on shore of Dgo lake, with *Calliergonella cuspidata* (Abramova et al., 2010); in rich fens (7).

**Hedwigia ciliata** (Hedw.) P. Beauv. – R; on boulders at pine forest edges (8, 11).

*Helodium blandowii* (F. Weber & D. Mohr) Warnst. – R; in rich fens (7).

*Herzogiella seligeri* (Brd.) Z. Iwats. – S; in forests on damp rotten wood.

*Homalia trichomanoides* (Hedw.) Brid. – S; on trunks and trunk bases of broad-leaved trees and *Populus tremula*.

*Hygrobiomyctiastegium varium* (Hedw.) Mönk. – R; on cement wall of fountain fence at camping on shore of Baklanovskoe Lake (Abramova et al., 2010).

*Hylomium melaschroides* (Hedw.) Schimp. – R; on tree trunks and trunk bases, occasionally on tree trunk bases and rotten wood.

**Hylomium unbratum** (Hedw.) M. Fleisch. – R; on litter in wet spruce forest (6).

*Hylomium splendens* (Hedw.) Schimp. – C; on litter in mossy coniferous forests, occasionally on tree trunk bases and rotten wood in mixed forests.

*Hypnum cupressiforme* Hedw. – S; on trunks and trunk bases of broad-leaved trees or birches, occasionally on rocks covered with fine soil.

*Isocolejeum alopecuroides* (Lam. ex Dubois) Issow. – R; on trunks of *Acer platanoides* (11, 13). Epiphyte in old-growth broad-leaved forest.

*Jochenia pallescens* (Hedw.) Hedenäs, Schlesak & D. Quandt [Stereodon pallescens (Hedw.) Mitt.] – C; on tree trunks and trunk bases, occasionally on rotten wood and rocks.

**Kindbergia praelonga** (Hedw.) Ochyra – R; at trunk base in wet spruce forest (12).

*Leptodictyum riparium* (Hedw.) Warnst. – R; on meadow, in wet hollow along Elsha River bank (Abramova et al., 2010); on wooden bridge in water (3).

*Leskea polycarpa* Hedw. – R; on trunk of *Salix* on lake shore (10).

*Leucodon sciuroides* (Hedw.) Schwärz. – R; in spruce & broad-leaved forest on trunks of broad-leaved trees (1, 9, 12, 13); on trunk of *Tilia cordata* in Przhevalskoe (Abramova et al., 2010); 3 km N-NE of Korevo, Kurov-Borskoe forestry, Gobzynskaya Dacha, sq. 21 (55°24'3"N – 31°56'18"E) (coll. E.V. Tikhonova). Epiphyte in old-growth broad-leaved forest.

*Lewinskaia speciosa* (Nees) F. Lara, Garilleti & Goffinet [Orthotrichum speciosum] (Nees) – C; on trunks of deciduous trees, most often on *Salix*.

*Mnium stellare* Hedw. – R; at tree base in spruce & broad-leaved forest (13).

*Neckera pennata* Hedw. – S; on trunks of broad-leaved trees and *Populus tremula* in spruce & broad-leaved forests, spruce-aspen forests, and on rocks at forest edge.

*Nyholmia obtusifolia* (Brid.) Holmen & E. Warncke [Orthotrichum obtusifolium] (Brid.) – S; on trunks of *Salix*, *Populus*, and broad-leaved trees.

*Oxyrynchium hians* (Hedw.) Loeske – C; on bare soil and slopes in forests, in overgrown meadows, occasionally on rocks covered with fine soil.

*Palustriella commutata* (Hedw.) Ochyra – R; on damp soil on shore of Sapsho lake (coll. M.S. Ignatov, MHA).

**P. decipiens** (De Not.) Ochyra – R; on damp soil near springs rich in calcium (1).

**Paraleucobryum longifolium** (Hedw.) Loeske – R; on rock at edge of pine forest (8).

*Plagiomnium affine* (Blandow ex Funck) T.J. Kop. – C; on damp soil and litter in spruce forests.

*P. cuspidatum* (Hedw.) T.J. Kop. – C; in forests on soil, tree trunk bases, rotten wood, and rocks covered with fine soil.

*P. elatum* (Bruch & Schimp.) T.J. Kop. – R; in damp and light habitats: swampy meadows, shrubs, eutrophic mires, near springs.

*P. ellipticum* (Brid.) T.J. Kop. – S; in wet habitats, most often on damp soil in alder and mixed forests, on lake shores, in eutrophic mires.

*P. medium* (Bruch & Schimp.) T.J. Kop. – S; on soil and litter in deciduous and mixed forests.

**P. rostratum** (Schrad.) T.J. Kop. – R; on trunk bases of *Acer platanoides* in spruce & broad-leaved forests (13).

*P. undulatum* (Hedw.) T.J. Kop. – S; on soil in damp deciduous and mixed forests, on lakeshores.

*Plagiothecium caviticum* (Brd.) Z. Iwats. – S; on bare soil, more often on slopes in ravines, occasionally on rocks covered with fine soil in forests.

*P. curvifolium* Schl. ex Limpr. – S; in spruce and mixed forests on trunk bases of *Picea*, occasionally on rotten wood.

*P. denticulatum* (Hedw.) Schimp. – C; in forests on bare soil, tree trunk bases, and rotten wood.

*P. curvifolium var. undulatum* R. Ruthe ex Geh. – R; on damp soil on lake shores, in wet hollows in forests (3, 5, 12).

*P. nemoralis* (Mitt.) A. Jaeger – R; on trail to Sapsho Lake (Abramova et al., 2010); on trunk base of *Acer platanoides* in spruce & broad-leaved forest (13).

*P. rossicum* Ignatov & Ignatova – C; on tree trunk bases and rotten wood in forests.

*Platygyrium repens* (Brd.) Schimp. – S; on trunks of deciduous trees and on recently fallen trunks.

*Pleuroziun schreberi* (Brd.) Mitt. – C; common species on litter in green-moss coniferous forests, occasionally in other types of forests on litter, at tree bases and on rotten wood.
Pohlia andalusica (Hohn.) Broth. – R; near Petrakovo (Abramova et al., 2010).

**P. cruda** (Hedw.) Lindb. = R; on bare soil in grassy pine forest (1).

**P. nutans** (Hedw.) Lindb. – S; in forests on bare soil, at tree bases, occasionally on rocks covered with fine soil and rotten wood.

**P. proliger**a (Kindb. ex Breidl.) Lindb. ex Arnell – R; 3,5 km W of Przhevalskoe, Bolshoe Strechnoe Lake (coll. M.S. Ignatov, MHA).

Polytrichum commune Hedw. – C; on damp soil and litter in swampy forests, at bogs edges.

*P. formosum* Hedw. [Polytrichastrum formosum (Hedw.) G.L. Sm.] – S; in coniferous and mixed forests on damp soil, forest litter, occasionally on rotten wood and under upturned roots.

**P. juniperin**um Hedw. – S; on bare sandy soil in forests and young pine stands.

P. longisetum Sw. ex Brid. [Polytrichastrum longisetum (Sw. ex Brid.) G.L. Sm.] – S; in forests on damp soil, at tree bases, under upturned roots, occasionally on damp rotten wood.

**P. pallidisetum** Funck [Polytrichastrum pallidisetum (Funck) G.L. Sm.] – S; on damp soil in deciduous and mixed forests.

**P. piliferum** Hedw. – S; on sandy soil in open dry places in young pine stands, at pine forest edges, and on heaths.

**P. strictum** Hedw. – S; on bare soil and cement (Abramova et al., 2010).

Sphagnum andalusicum (Rodr.) S.A.H. Brands – R; near dirty road.

Rhizomnium punctatum (Hedw.) T.J. Kop. – C; on damp rotten wood, damp soil, and rocks covered with fine soil in forests.

Rhodobryum roseum (Hedw.) Limpr. – S; on litter in spruce and mixed forests.

Rhytididiadelphus squarrosus (Hedw.) Warnst. – S; in more or less open and moist habitats: on damp meadows, grassy forest edges, and clearcuttings.

R. subpinnatus (Lindb.) T.J. Kop. – R; on litter in damp spruce forest (6); 0.5 km N of Przheval’skoe (55°31′10″N – 31°51′19″E), on soil in grassy spruce & small-leaved forest (coll. E.V. Tikhonova).

Saelania glaucescens – R; on northern shore of Sapsho Lake (coll. M.S. Ignatov, MHA).

Sanionia uncinita (Hedw.) Loeske – C; on rotten wood, tree trunks and trunk bases.

Schistidium apocarpum (Hedw.) Bruch & Schimp. – S; on boulders in more or less open habitats.

**S. papillosus** Culm. – R; 10 km N of Prechistoe Village (55°36′26.61″ N – 32°18′38.17″E), on boulder at forest edge near dirty road.

*Schiostostega pennata* (Hedw.) F. Weber & D. Mohr – R; under upturned roots in spruce and spruce & broad-leaved forests (9, 11, 12).

Sciruo-hyphnum curtum (Lindb.) M.S. Ignatov – S; in spruce and spruce & broad-leaved forests on litter, occasionally on rotten wood and tree trunk bases.

S. populeum (Hedw.) Ignatov & Huttunen – S; on tree trunks and rocks covered with fine soil in forests.

*S. reflexum* (Starke) Ignatov & Huttunen – S; on tree trunks and trunks bases, occasionally on rotten wood in broad-leaved forests, willow and alder stands.

*S. starkei* (Brid.) Ignatov & Huttunen – S; on soil, rotten wood, and tree trunk bases in mixed forests (coll. E.V. Tikhonova).

*S. starkei* (Brid.) Ignatov & Huttunen – S; on soil, rotten wood, and tree trunk bases in mixed forests (coll. E.V. Tikhonova).

*S. stagna* (Hedw.) Bruch & Schimp. – S; near Petrakovo (Abramova et al., 2010).

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*S. stellata* (Klinggr.) H. Klinggr. – С; one of the most common and widespread species in all types of Sphagnum bogs, less often in swampy pine forests.

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S. fimbriatum – C; at bog edges and in swampy forests; common in spruce forests.

** S. majus – R; on floating mat near water in pine-shrub-cottongrass-Sphagnum bog near Strechnoe Lake (Abramova et al., 2010); in hollows of Sphagnum bog (14).

*S. papillosum* Lindb. – R; in covers of open areas of Sphagnum bog (14).

S. riparium Ångstr. – S; in birch-willow communities at bogs edges and lake shores.

*S. rubellum* Wilson – R; in mixed patch with other Sphagnum species in covers and low, flat hummocks in pine-cottongrass-Sphagnum communities of Sphagnum bog (14).

** S. rassowi Warnst. – S; in swampy pine forests and at bog edges.

*S. squarrosum* Crome – C; in eutrophic bogs, swampy forests and at bog edges, more often in birch and spruce forests.

** S. subsecundum** Nees – R; in eutrophic willow-grass-moss mire (7).

** S. tenellum** (Brid.) Pers. ex Brid. – R; on slope of hummock in pine-cottongrass-Sphagnum community of Sphagnum bog (14).

** S. teres** (Schimp.) Ångstr. – R; in eutrophic willow-grass-moss mire (7).

S. wulfianum Gîr. – R; in mossy spruce forest with Vaccinium myrtillus on Sapsho Lake shore on the road to Sapshanka river (Abramova et al., 2010); in swampy spruce forest (12).

** S. pinchii** (Hedw.) Loeske – R; near Petrakovo village (coll. M.S. Ignatov, MHA).

** S. pinchii** (Hedw.) Loeske – R; in a watered rut on a forest road to bog «Vorob’inyi Mosso» (Abramova et al., 2010); in the water between high hummocks in eutrophic mire (7).

Weissia controversa Hedw. – R; on the northern shore to Sapsho Lake (Abramova et al., 2010).

** LITERATURE RECORDS NOT CONFIRMED BY HERBARIUM COLLECTIONS**

The following species were listed by Kosenkov (2012) without any information on their distribution and ecology. Campylopus flexuosus is currently unknown in Russia. However, findings of other species in the territory of the National Park “Smolenskoe Poozerye” are possible. Atrichum tenellum (Röhll.) Bruch & Schimp.

Dickranum flexiculme Brid.

Campylopus flexuosus (Hedw.) Brid.

FissidentexilisHedw.

Leptobryum pyriforme (Hedw.) Wilson

Sarmentypnum exannulatum (Schimp.) Hedenäs

Warnstorfia exannulata (Schimp.) Loeske

Sphagnum obtusum Warnst.

S. palustre L.

** DISCUSSION**

In total, 171 species of mosses were identified in collections from the National Park “Smolenskoe Poozerye”, including 21 species of Sphagnum.

About 50% of the species are rare in the territory of the National Park, 30% occur sporadically and 20% are frequent.

In general, moss flora of the National Park “Smolenskoe Poozerye” is characterized by a quite high species diversity compared to other protected areas located in similar environments in hemiboreal and southern boreal forests. In the northern section of the National park “Ugra” 149 moss species were listed (Teleganova, 2003); in Central Forest State Nature Reserve 150 species (Ignatov et al., 1998); in National Park “Sebezhysky” 157 species (Andreeva, 2005); in Polistovsky Reserve 140 species (Teleganova, 2020b); and in Prioksko-Terrasnyi Reserve 156 species (Ignatov et al., 2019).

Rare moss species in the National Park “Smolenskoe Poozerye” comprise several ecological groups in five types of habitats.

1. Old-growth zonal spruce-broad-leaved forests are the habitat of basiphilous epiphytes (Dickranum viride, Leucodon sciuroides, Anomodon longifolius, A. viticullosus, Neckera pennata, Isothecium alpecepureus, Alnienella complanata), which were severely declined in Central Russia in 20th century (Ignatov & Ignatova, 2003, 2004). This group is well represented in three areas of the National Park: south of Petrakovo, between rivers Skryteyka and Sermyatka, and in Paporoynya and Sapsanka (locs. 11, 12, and 13 in Fig. 1). Two species, Alniella complanata and Isothecium alpecepureus, have in the National Park the easternmost localities in lowland of Central European Russia: they occur in Europe-
an Russia in the North-West (rare), common in Caucasus, and Alenniella has few isolated populations in Ural mountains.

2. Damp spruce and mixed forests of spruce with Betula alba, B. pendula and Populus tremula are characterized by a high species diversity of mosses, including rare species: Fissidens adiantoides, Hlycomias-trum umbratum, Stereodon pratensis, and Schistostega pennata. This group is well represented at southern shore of Bakanovskoe Lake (loc. 6) and eastern shore of Rytoe Lake (loc. 5a).

3. Minerotrophic grass-moss and sedge-moss mires are the habitat for Tomentumnium nitens, Hamatocalculus vernicosus, Calliergon giganteum, Helodium blandowii, Campylium stellatum, Scorphidium cossonii, and Drepano-cladus sendtleri. These are mostly more northern species. Many of them have strongly declined in Central European Russia in 20th century due to peat mining and peatland irrigation (Ignatov & Ignatova, 2003, 2004). In the National part they occur on the shore of Mutnoe Lake (loc. 3), floodplain extension of Polovya River to the north-east of Poboishche village (loc. 7), and in a grass swamp in the lower part of Vileika River.

4. Rocky substrates are represented in the National Park by moraine boulders, mostly granitic, where acidophilous epilithic mosses occur: Hedwigia ciliata, Paraleu-cobryum longfolium, Grimmia muehlenbeckii, Campylium tenuirostre, Seligeria jilinae, and Schistidium papillosum. These species are rather common in North-West- ern European Russia, being very rare in its Central part. The most diverse asrea for these species is island in Dgo Lake (loc. 8), and near Petrkovo village (loc. 11).

5. Areas near carbonate water springs at the northern shore of Sapsho Lake (loc. 1) are the habitat of calciphilous species: Fissidens osmundoides, Palustriella commutata, Encalypta vulgaris, Suelania glaucescens, and Amblyodon dealbatus. In the lowland part of Central Russia they are known from a few localities.

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