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BIODIVERSITY STUDIES

Mosses in plant communities on the plateau of Devon Island (Canadian Arctic Archipelago)

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ABSTRACT

Devon Island, one of the largest islands of the Canadian Arctic Archipelago (CAA). Most of its area consists of a plateau at 300–700 m elevation. In 1970–1973, comprehensive studies of biota, including investigations of mosses, were carried in the vicinity of Truelove Lowland but only in the coastal lowlands. In 1991, studies were conducted at the same site but on the plateau, resulting in the identification of 49 moss species. The most frequent species are *Distichium capillaceum*, *Drepanocladus brevifolius*, *Flexitrichum flexicaule*, *Orthothecium chryseon*, *O. strictum*; dominants in wet habitats are *Catoscopium nigritum* and *Cinclidium arcticum*. Fifteen species are recorded for Devon Island for the first time, ten of which (*Bryoerythrophyllum ferruginascens*, *Bryum pallens*, *B. rutilans*, *B. teres*, *Drepanocladus polygamus*, *Hymenostylium recurvirostrum*, *Orthothecium retroflexum*, *Pogonatum urnigerum*, *Pohlia beringiensis*, *Timmia sibirica*) are proposed for addition to the island's moss list, while five (*Didymodon* sp., *D.* cf. *brachyphyllus*, *Flexitrichum gracile*, *Schistidium andreaeopsis* and *Tortella splendida*) remain taxonomically uncertain.. The data obtained in 1991 provide the first documented evidence of moss diversity in the extrazonal high-altitude variant of polar deserts in the CAA.

Keywords: Canadian Arctic Archipelago, Devon Island, Truelove Lowland, plateau, plant stands, mosses

РЕЗЮМЕ

Матвеева Н.В., Афонина О.М. Мхи в растительных сообществах на плато острова Девон (Канадский арктический архипелаг). Остров Девон, один из крупнейших островов Канадского Арктического архипелага (КАА). Его бóльшая часть – плато высотой 300–700 м. В 1970–1973 гг. в районе Truelove Lowland были выполнены комплексные исследования биоты, включая изучение мхов, но только на приморской низменности. В 1991 году в результате работы на плато найдены 49 видов мхов. Наиболее частые виды – *Distichium capillaceum*, *Drepanocladus brevifolius*, *Flexitrichum flexicaule*, *Orthothecium chryseon*, *O. strictum*; доминанты в мокрых биотопах – *Catoscopium nigritum* и *Cinclidium arcticum*. На плато обнаружены 15 видов, не найденных ранее, их них 10 (*Bryoerythrophyllum ferruginascens*, *Bryum pallens*, *B. rutilans*, *B. teres*, *Drepanocladus polygamus*, *Hymenostylium recurvirostrum*, *Orthothecium retroflexum*, *Pogonatum urnigerum*, *Pohlia beringiensis*, *Timmia sibirica*) увеличивают число видов мхов острова, а 5 (*Didymodon* sp., *D.* cf. *brachyphyllus*, *Flexitrichum gracile*, *Schistidium andreaeopsis* и *Tortella splendida*) остаются пока таксономически недостаточно ясными. Полученные в 1991 году данные – первое документированное свидетельство разнообразия мхов в условиях экстразонального высотного варианта полярных пустынь в КАА.

Ключевые слова: Канадский Арктический Архипелаг, остров Девон, Truelove Lowland, плато, растительные сообщества, мхи

Devon Island, one of the largest (55 247 km²) islands of the Canadian Arctic Archipelago (CAA), is located in Baffin Bay (Fig. 1). Almost the entire territory of the island is occupied by a plateau with elevations from 300–350 to 600–700 m, with a huge ice cap (the largest outside Greenland) located 17–20 km from the plateau edge at its highest part (about 450 m).

A research station was established in 1960 in Truelove Lowland (Fig. 2), on the northeast coast of the island (75.6667°N 84.5833°W). It was maintained by the Arctic Institute of North America and operated for over 30 years. In 1970–1973, within the framework of the International Biological Program (IBP) and under the leadership of L.C. Bliss, comprehensive ecosystem studies were carried out in the coastal lowlands. The results are presented in a large (714 pages) collective monograph (Bliss 1977b), which summarizes 33 research projects conducted under the IBP auspices.

Botanical research in Truelove Lowland (43 km²) and Valley (3.6 km²) included the study of different plant groups (96 vascular plants, 30 hepatics, 132 mosses, 92 fungi, and 181 lichens are recorded), data on vegetation diversity, and assessment of biological productivity. Mosses were studied in 1971 and 1972 in the vicinity of the Truelove Lowland Research Station and in the neighboring eastern lowlands of Skogn and Sparbo-Hardy. Detailed information (including a key and an annotated list of 132 species in 72 genera) was published by D.H. Vitt (1975). In the collective

monograph, information on moss vegetation in the coastal lowlands (Vitt & Pakarinen 1977) is provided, and a list (in alphabetical order, with no data on species abundance or frequency) is given in appendix 5.

No information was available on the flora and vegetation of the plateau.

In the summer of 1989, N.V. Matveyeva, at the invitation of L.C. Bliss, visited the island together with zoologist Yu.I. Chernov. They worked in the coastal lowland and climbed to the barren plateau, which rises to 300 m at a distance of 2 km from the seashore. Russian biologists had already conducted fieldwork at Cape Chelyuskin (Taymyr Peninsula) in the polar desert zone of the Russian Arctic, so the idea of working on the plateau was tempting. This became the basis for proposing to American colleagues a project for a comprehensive study of the plateau biota.

The idea was positively received, and upon securing funding from an NSF project two years later (1991), three Russian scientists (zoologists Yuri I. Chernov and Anatoly B. Babenko, and geobotanist Nadezhda V. Matveyeva) managed to work for three weeks in July (3–20, 24–27) on the plateau within a model area of approximately 4 km². Botanical work included routes within a 2 km radius from the field tent camp, which was established on a flat part of the plateau at 350 m elevation, 200–300 m from the steep slope descending to the coastal lowland, near the edge of the northern slope of the Truelove River valley. It also included the study of several community types on the horizontal surface near the cliff.

The results of the botanical research, presented at the time in the project report, were never published. Data from the zoological study were reflected in papers by Babenko (1993, 1994a,b,c) on *Collembola* and by Chernov (2004a,b) on the polar desert fauna of the Devon Island plateau.

There are no placors (flat interfluves) with corresponding zonal conditions, and thus no classical zonal vegetation. However, the plant cover of small (tiny compared to the plateau size) fragments of coastal lowlands on the island, including Truelove Lowland, where a plant cover study and vegetation map were made (Muc & Bliss 1977), indicates that the zonal position of Devon Island is the northern subzone of the tundra zone (arctic tundra subzone in the Russian zonal division (Chernov & Matveyeva 1997, Matveyeva 1998, 2015); subzone B in CAVM (CAVM Team 2003, 2024, Walker et al. 2018), or semi-desert according to Bliss (1977a). The study was conducted without replicate relevés, so only the names of a few species (dominants and constants) are given in text format, with no tables (Muc & Bliss 1977).

The extremely sparse (from <1 % to 10–15 %) plant cover on the plateau, both in physiognomy and horizontal and vertical structure, as well as in species composition (including the absence of woody vascular plants, sedges, and sphagnum mosses), and the ratio of mosses to vascular plants (Matveyeva 2015) correspond to the vegetation of the polar desert zone. This allows us to classify the plateau plant cover as an extrazonal altitudinal type of polar desert landscape. The environmental specificity is further enhanced by the fact that the prevailing substrate on the plateau is dolomite, which reinforces the extrazonal character of the cover.

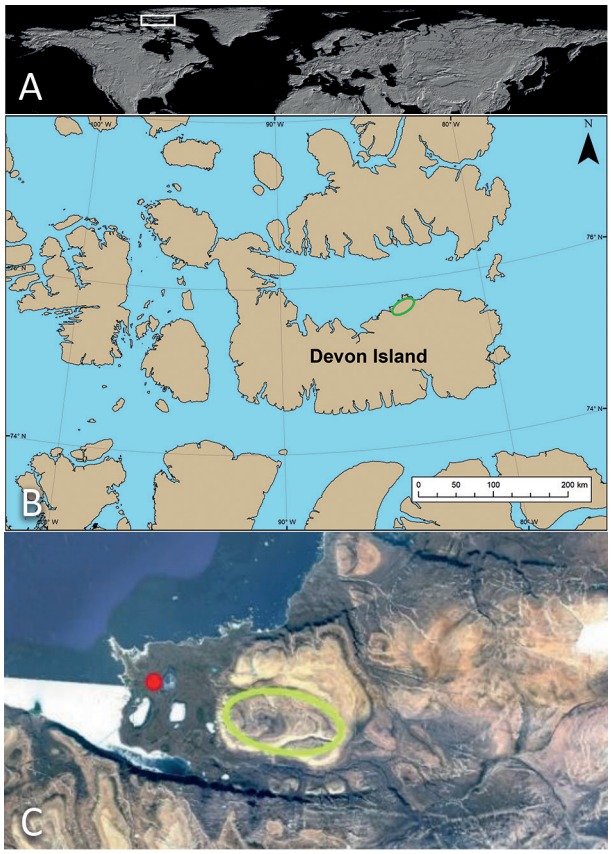


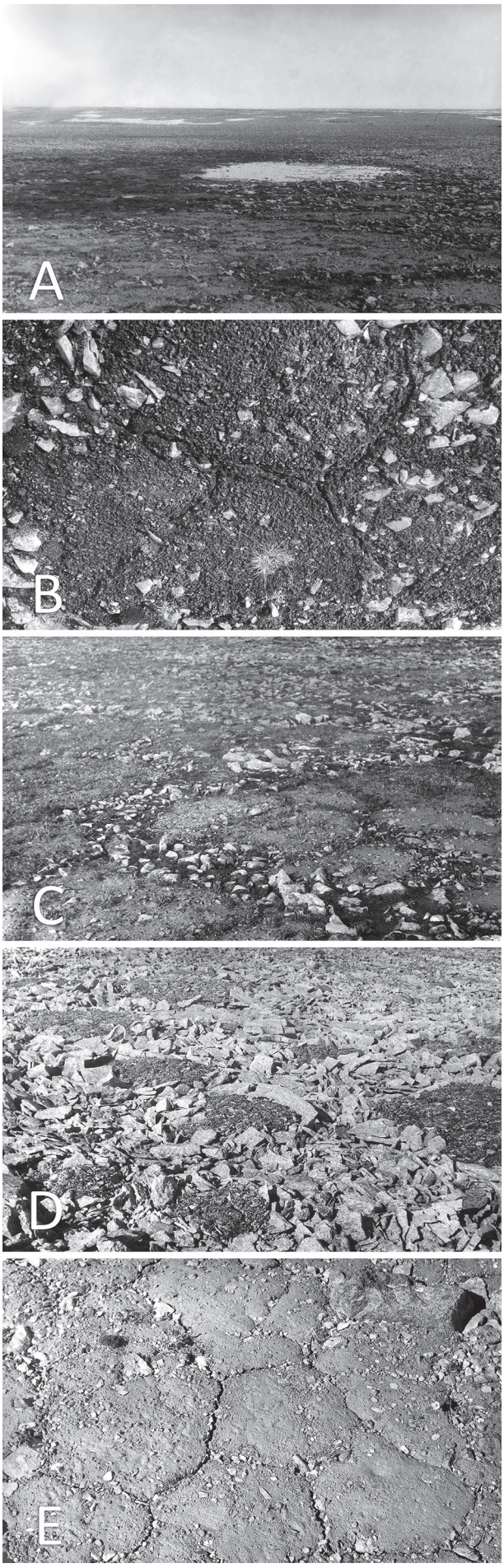
Figure 1 Study area. A – position of study area on global map; B – Devon Island in Canadian Arctic Archipelago with green oval showing study area, the Truelove Lowland; C – green oval shows the location of 21 relevés made during the study; red point – position of the Research Station in the coastal lowland

The polar desert zone in the CAA includes several northwestern islands: Amund Ringnes, Ellef Ringnes, King Christian, Lougheed, Mackenzie King, Meighen, and the northern part of Ellesmere Island (CAVM Team 2003, 2024, Matveyeva 2015).

MATERIAL AND METHODS

Study area

General extreme climatic conditions are typical for all islands of the CAA. In terms of total annual precipitation (169, 178, 190, 208, 210 mm), the western part of the archipelago is the "driest" (170–190 mm) of all polar desert regions (200–300 mm in the Russian Arctic), comparable to the hot deserts of Africa and the Gobi. Similar precipitation regimes within the Russian Arctic are found only on the De Long Islands. The radiation balance and thermal regime during the growing season in the Canadian and Eurasian sectors are similar: in July, temperatures in the former are slightly higher (2–4°C) than in the latter (up to 2°C); in August, they are the same (up to 2°C); cloudiness is below 80 % in the former and slightly higher in the latter. The most general conclusion is that the Canadian polar deserts are somewhat warmer and drier, whereas the Eurasian ones are slightly colder and wetter. All CAA weather stations are located at sea level. Therefore, it is obvious that climatic conditions on the plateau are more severe in terms of air temperatures during the growing season, its length, pre-



cipitation patterns, and lighting. The project participants experienced this in July 1991, when they spent three days on the plateau within a large cloud with snowfall and learned via radio that the weather was fine and sunny on the seashore. The plateau is composed of dolomites. Rubble grounds are common, often in the form of a network, between which there are patches of extruded sands or light loams. Soils are not developed.

Data sampling and processing

In July 1991, 21 relevés were performed by N.V. Matveyeva on a model area: in each stand, on a 25 m² sample plot, complete lists of species (vascular plants, mosses, lichens) were recorded, and their abundance was assessed according to the scale used in the Zürich-Montpellier school (the Braun-Blanquet (BB) approach): r – solitary; + – >1 %; 1 – 1–5 %; 2 – 6–25 %; 3 – 26–50 %; 4 – 51–75 %; 5 – 76–100 % (Becking 1957). In addition to the cover/abundance assessments for the entire plot area, the composition and abundance of each species were assessed on 1 m² in 10 replicates. Moss samples, collected from each square meter – 262 sachets in total, in which more than one species was subsequently identified by O.M. Afonina – are stored in the bryological herbarium (LE) at the Komarov Botanical Institute RAS, Saint-Petersburg, Russia. Thus, the moss collection was obtained during the study of several plant community types for which a preliminary classification was attempted, but the results have not been published so far.

RESULTS

Characteristic of communities where moss samples were collected

The preliminary classification of the described stands was carried out according to the BB approach; however, the results have not yet been published, both due to the absence of a developed classification system for the vegetation of the polar desert zone (including the highest units: class, order, alliance), as well as the lack of good differentiating species and, even more so, of character species. The polar desert zonal class Drabo corymbosae–Papaveretea dahliani Daniëls, Elvebakk et Matveyeva in Daniëls et al. 2016 (with the order Saxifrago oppositifoliae–Papaveretalia dahliani Daniëls, Elvebakk et Matveyeva in Daniëls et al. 2016 and the alliance Papaverion dahliani Hofmann ex Daniëls, Elvebakk et Matveyeva in Daniëls et al. 2016) was established relatively recently. According to the features of higher syntaxonomical units, the vegetation on the plateau might be placed within these, but the rank of the basic unit (association) has not yet been determined. The verbal field working names of communities used below give some idea of their physiognomy, horizontal and vertical structure. Also useful is the set of most common

Figure 2 Community types: A – **I**. Herb-moss wetlands; B – **II**. Grass–moss–lichen stands with high cover of dark crust of blue-green algae and crustose lichens (code name in field "Black crusts"); C – **III**. Grass–moss-lichen stands with light-gray lichen crusts; D – **IV**. Herb–moss-lichen stands with "brain" surface of crustose lichen crust (code name in field "Brains"); E – **V**. Scarce herb cover

Table 1. Moss species ranging within the studied stands.

Community type	**I**			**II**								**III**				**IV**				**V**		Constancy
Moss cover:	100	100	100	30	15	2	20	+	10	1	15	10	10	10	+	1	+	1	1	1	+	
Moss species number	19	18	17	27	28	16	28	16	16	19	23	23	20	16	14	17	19	15	9	20	6	
Author' relevé N	13	15	14	7	4	6	1	18	17	16	5	2	19	20	7"	10	3	9	11	8	12	
Table N	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	
Orthothecium chryseon	+	+	+	**2**	**1**	+	+	+	**1**	**1**	**1**	**1**	**1**	**1**	+	+	+	+	+	+	+	21
Flexitrichum flexicaule	+	+	+	+	**2**	+	+	+	**1**	**1**	**2**	**2**	**2**	**2**	+	+	+	+	+	+	·	20
Distichium capillaceum	+	+	+	**1**	**1**	+	+	+	**1**	**1**	**1**	**1**	**1**	**1**	+	+	+	+	+	+	·	20
Drepanocladus brevifolius	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	·	20
Orthothecium strictum	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	·	20
Bryum pseudotriquetrum	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	·	·	+	·	18
Encalypta alpina	+	+	+	+	+	·	+	·	·	+	+	+	+	+	·	+	+	+	+	+	·	16
Blindiadelphus polaris	·	+	+	+	·	+	+	+	+	+	+	·	·	+	·	+	+	+	·	+	+	15
Bryum rutilans	+	·	·	+	·	+	+	·	·	·	·	+	+	·	·	+	+	·	·	+	·	9
Cinclidium arcticum	**3**	**3**	**3**	+	+	·	·	·	·	+	·	·	·	+	·	+	·	·	·	·	·	8
Catoscopium nigritum	**3**	**3**	**3**	+	·	·	·	·	·	+	·	+	·	·	·	·	·	·	·	·	·	6
Bryum neodamense	**1**	**1**	**1**	+	+	+	+	+	+	+	+	·	+	·	·	·	·	·	·	·	·	12
Scorpidium revolvens	**1**	**1**	**1**	+	·	+	+	·	+	·	+	·	·	·	·	·	·	·	·	·	·	8
Drepanocladus aduncus	**1**	**1**	**1**	+	+	·	+	·	·	·	+	·	·	·	·	·	·	·	·	·	·	7
Timmia sibirica	+	+	+	+	+	·	r	·	·	+	+	·	·	·	·	·	·	·	·	·	·	8
Timmia austriaca	+	+		+	**1**	+	+	·	·	·	+	·	·	·	·	·	·	·	·	+	+	9
Syntrichia ruralis	·	+	+	+	+	+	+	+	·	·	+	+	+	+	·	+	+	·	·	·	·	13
Drepanocladus turgescens	·	+	+	+	+	+	+	+	·	·	+	+	+	·	+	·	·	·	·	·	·	11
Campylium bambergeri	·	·	·	**2**	**1**	**1**	+	+	**1**	**1**	**1**	**1**	**2**	**2**	+	+	+	+	+	+	·	17
Bryoerythrophyllum recurvirostrum	+	·	·	+	+	+	+	·	·	·	+	+	+	+	+	+	+	+	·	+	+	15
Bryum teres	·	+		+	+	+	+	+	+	+	+	·	+	·	·	+	·	·	·	+	·	12
Sanionia uncinata	·	·	·	+	+	·	+	+	+	+	+	+	+	+	+	+	·	+	·	·	·	13
Tortula mucronifolia	·	·	·	·	+	·	+	·	·	·		+	·	·	+	+	+	·	·	·	+	7
Encalypta procera	·	·	·	·	+	·	+	·	+	+	+	·	·	·	·	·	·	·	·	+	·	6
Pohlia cruda	·	·	·	+	·	·	·	·	+	+		·	·	·	·	·	·	+	·	+	·	5
Tortella splendida	·	·	·	·	+	·	+	+	·	·	+	+	+	+	·	·	·	·	·	·	·	7
Tortella fragilis	·	·	·	·	+	·	+	+	·	·		+	+	·	·	·	·	·	·	·	·	5
Bryoerythrophyllum ferruginascens	·	·	·	·	·	·	+	·	+	·		+	·	+	+	·	·	·	·	·	·	5
Myurella julacea	·	·	·	·	+	·	+	·	·	·		+	·	·	·	·	+	·	+	·	·	5
Schistidium andreaeopsis	·	·	·	·	·	·	·	·	·	·	+	**1**	+	+	·	·	r	·	·	+	+	7
Flexitrichum gracile	·	·	·	·	+	·	·	·	·	·	·	·	+	·	·	·	·	+	·		·	4
Myurella tenerrima	·	·	·	·	·	·	r	·	·	·	·	+	·	·	·	·	+	·	·	r	·	4
Distichium inclinatum	·	·	·	·	·	·	·	·	·	·	·	+	·	·	·	·	+	+	·	+	·	4
Cyrtomnium hymenophyllum	·	·	·	+	·	·	·	·	·	·	·	·	·	·	·	·	+	+	+	·	·	4
Bryum arcticum	·	·	·	·	·	·	·	·	·	+	·	·	·	·	·	·	+	+	·	·	·	3
Hymenostylium recurvirostrum	·	·	·	·	+	·	+	·	·	·	·	+	·	·	·	·	·	·	·	·	·	3
Ceratodon purpureus	·	·	·	·	+	·	·	·	+	·	·	·	·	·	·	+	·	·	·	·	·	3
Bryum pallens	+	·	·	·	·	·	·	·	·	+	·	·	·	·	·	·	·	·	·	·	·	2
Platydictya jungermannioides	+	·	·	·	+	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	2
Meesia triquetra	+	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
Orthothecium retroflexum	·	·	·	+	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	+	·	2
Drepanocladus polygamus	·	·	·	+	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
Pohlia beringiensis	·	·	·	+	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
Polytrichastrum alpinum	·	·	·	·	+	·	·	·	·	·	+	·	·	·	·	·	·	·	·	·	·	2
Encalypta rhaptocarpa	·	·	·	·	·	·	·	+	·	·	·	·	+	·	·	·	·	·	·	·	·	2
Didymodon sp.	·	·	·	·	·	·	·	·	·	·	·	·	·	·	r	·	·	·	·	·	·	1
Didymodon cf. *brachyphyllus*	·	·	·	·	·	·	·	·	·	·	·	·	·	·	r	·	·	·	·	·	·	1
Tortula leucostoma	·	·	·	·	·	·	·	·	·	·	·	·	·	·		·	·	·	·	+	·	1
Pogonatum urnigerum	·	·	·	·	·	·	·	·	·	·	·	·	·	·		·	·	·	·	·	·	0

vascular plants. The list of mosses in the Table is given according to their community type differentiating function. Information on the whole species composition, including vascular plants and lichens, is forthcoming as part of the vegetation classification process.

Most of the plateau surface in the studied area is flat, with frost cracks (usually filled with stones) that form a polygonal network with patches of bare loam ground; the ratio of crack to patch module elements is 10–20 / 80–90. Mosses growing in cracks form a closed cover on loam fragments between pebbles, so overall it looks mosaic. There are two types of cover on the loamy patches: sparse (<1 %) with isolated individuals or small clumps of vascular plants, and dense (up to 100 %) due to a continuous organogenic crust of either smooth black blue-green algae and cyanolichens of the genera *Collema* and *Leptogium* (with a blue-green photobiont), or a gray soil crust composed of lichen thalli of the genera *Cladonia*, *Mycobilimbia*, and *Pertusaria*. Vascular plants grow as isolated individuals or small clumps. The most common are the grass *Phippsia algida* and the forbs *Cerastium alpinum*, *C. regeli*, *Draba corymbosa*, *Minuartia rossi*, *M. rubella*, *Papaver dahlianum*, *Saxifraga caespitosa*, and *S. oppositifolia*. Such communities (18) with different physiognomy are similar in composition both overall and in the most abundant species. There are small groups of differentiating species responding to partly unequal environmental conditions that cause differences in species composition and abundance, allowing the distinction of four groups, which so far have not been classified. Most likely, one association with a few (3–4) subassociations and/or variants will be established later.

Distinct in composition, structure and appearance are three stands in sites with a concave surface that is highly wet throughout the growing season, where a continuous moss cover is formed by species that are absent on flat surfaces that are conditionally dry in summer. In terms of excess moisture, such small wet fragments are close to lowland tundra mires. However, the absence of peat as well as of the moss and vascular plant species that dominate in those mires does not allow these wetlands to be placed in any mire classification units.

Stand characteristics in the text, as well as relevés in the Table 1, are arranged according to the moisture gradient, from sites constantly damp during the growing season to relatively dry ones.

Community type I. Herb–moss wetlands (Table 1, author's rel. no. 13, 14, 15; Table no. 1–3; Fig. 2)

A slightly concave surface of rocky ground gently sloping towards the cliff down to the coastal lowland, where not only snow cover duration is the longest (indirect assessment), but moisture is retained throughout the growing season; small water bodies occur in two stands. Continuous moss cover up to 10 cm thick is formed by the dominant *Cinclidium arcticum* and *Catoscopium nigritum*; with more or less noticeable abundance grow *Bryum neodamense*, *Drepanocladus aduncus*, *Scorpidium revolvens*, plus 12 more species. There is no peat under the moss layer, only dead but not decomposed lower parts of stems with leaves below the living moss turf. A total of 24 moss species were identified in the three stands of this community type. Large (up to 5–10 cm in diameter) dense turfs of the grass *Alopecurus alpinus* form the herb layer in two communities (abundance 4 and 2), with single stems in one. Relatively abundant are the graminoids *Phippsia algida* and *Juncus biglumis* and the forbs *Cerastium alpinum*, *Saxifraga caespitosa*, plus 17 herb species growing as single individuals.

Community type II. Grass–moss–lichen stands with high cover of dark crust of blue-green algae and crustose lichens (field code name "Black crusts") (Table 1, author's rel. no. 1, 4, 5, 6, 7, 16, 17, 18; Table no. 4–11; Fig. 3)

The slightly concave horizontal surface of loamy, moderately gravelly substrate is dissected by frost cracks filled with crushed stones, forming a network. The cracks, concave relative to the patch surface, are filled with relatively large (up to 10 cm) debris. The ratio of rocky cracks to loamy patches is 20/80. In early spring (phenologically), these are rather wet sites, becoming dry later in the absence of rain or snow during the short summer. The patch surface is covered by a dark organogenic crust (broken into small pentagons by narrow (up to 1 cm) drying cracks) of blue-green algae (no data on their composition), cyanolichens of the genera *Collema* and *Leptogium*, as well as crustose lichens *Mycobilimbia*, *Pertusaria*, *Rinodina*, and *Solorina*. Vascular plants in the form of small (up to 5 cm in diameter) clumps grow both among the dark crust and in stone cracks, while mosses in small clusters of mixed composition occur mainly in the latter. The thickness of the moss cover is up to 6 cm, the height of vascular plants is 2–3 cm, with poppy flower peduncles up to 10 cm. The more or less abundant vascular plants are *Draba corymbosa*, *Cerastium alpinum*, *Minuartia rossi*, *M. rubella*, *Papaver dahlianum*, *Phippsia algida*, *Saxifraga cespitosa*, and *S. oppositifolia*. The most abundant moss is *Campylium bambergeri*; less abundant but common are *Distichium capillaceum*, *Flexitrichum flexicaule* and *Orthothecium chryseon*. Altogether, 43 moss species were noted in eight stands of this community type. The absence of macrolichens, both fruticose and foliose, is striking.

Community type III. Grass–moss–lichen stands with light-gray lichen crusts (Table 1, author's rel. no. 2, 7", 19, 20; Table no. 11–15; Fig. 4)

A gentle slope (western exposition) at the very edge of the plateau. The cracks (concave relative to the ground patch surface) filled with relatively large (up to 10 cm) debris form a network. Loamy patches 1–3 m in diameter (also with a high content of crushed stones), with a surface convex relative to the cracks, look like low hummocks (20 cm in height), their surface broken into small (up to 10–13 cm in diameter) polygons by narrow (1–2 cm wide) shallow (2–3 cm deep) cracks. The ratio of rocky cracks to loamy patches is 20/80. The ground is relatively drained throughout the entire growing season. The patch surface is covered with a light-gray crust composed of lichen thalli of the genera *Lecanora*, *Mycobilimbia*, *Megaspora*, *Pertusaria*, *Rinodina*, and *Solorina*, and small fragments of black crusts formed by *Lecidea* spp. The small (up to 5 cm in diameter) tussocks of vascular plants grow both among the crusts on the loamy patches and in rubble cracks. Large (up to 15 cm in diameter) cushions with 50 to 90 generative stems are formed by *Saxifraga oppositifolia*. Small clusters of mosses of mixed composition occur mainly in cracks. The height of vascular plants is up to 3 cm, including poppy flower peduncles; the thickness of moss turf is 3–4 cm. The most common vascular plants are *Draba corymbosa*, *Cerastium alpinum*, *Papaver dahlianum*, *Saxifraga oppositifolia* and *S. cespitosa*. The most abundant mosses are *Campylium bambergeri*, *Distichium capillaceum*, *Flexitrichum flexicaule*, and *Orthothecium chryseon*. A total of 31 moss species were identified in four stands of this community type. Among the studied stands, this type occupies a middle position in all features, both of habitat and vegetation.

Community type IV. Herb–moss–lichen stands with "brain" surface of crustose lichen crust (field code name "Brains") (Table 1, author's rel. no. 3, 9, 10, 11; Table no. 16–19; Fig. 5)

Patches of loamy ground covered with a light-gray wrinkled lichen crust resembling brains, among clusters of large rubble. Plants grow only on patches, where the total plant cover is about 20 %; vascular plants and mosses together account for less than 1 %. Vascular plants form very small clumps and tufts and, except for *Saxifraga oppositifolia*, do not have generative shoots. Mosses occur only in small cracks in loamy fragments. Vertical layering is not expressed, with all plants pressed to the substrate. The height of vascular plants and the thickness of moss turfs are 1–2 cm. Vascular plants with very low abundance are *Cerastium alpinum*, *Draba corymbosa*, *Minuartia rubella*, *Papaver dahlianum*, *Phippsia algida*, *Saxifraga cespitosa*, *S. oppositifolia*, and *Stellaria longipes*. A total of 25 moss species were identified in four stands of this community type. All mosses have low abundance, and their composition is the same as in stands of other types (II–III); the most constant are *Campylium bambergeri*, *Distichium capillaceum*, *Flexitrichum flexicaule*, *Orthothecium chryseum* and *O. retroflexum*. Crustose lichens of the genera *Mycobilimbia*, *Pertusaria*, *Rinodina*, and *Solorina* form a light-gray crust on the ground surface. There are no macrolichens.

Community type V. Scarce herb cover (Table 1, author's rel. no. 8, 12; Table no. 20, 21; Fig. 6)

Small polygonal loamy, slightly stony surface, wet after relatively late (indirect data) snowmelt, drying in the upper layers during the growing season. Loamy ground is broken by cracks of three types – permanent 5–6 cm wide with large (3–5 cm in diameter) stones and 3–5 cm wide with small (1–2 cm) stones, and vertical narrow (up to 1 cm) drying cracks up to 7 cm deep, not fixed by stones, which become closed during periods of high ground moisture. The distinguishing feature of the vegetation structure is the extremely sparse (1–5 %) cover composed of grasses and forbs (*Cerastium alpinum*, *Minuartia rossii*, *Papaver dahlianum*, *Phippsia algida*, plus 11 more species), which at the peak of flowering form a yellow-white aspect with rare purple-pink cushions of *Saxifraga oppositifolia* flowers. A total of 21 moss species were identified in two stands of this community type. Thalli of crustose lichens (7 species) form thin crusts. Plants grow in stone clusters (mosses) or close to cracks (herbs and crustose lichens); the center of the polygons is bare. Such

cover is typical for large plateau areas already at a short distance (200–300 m) from the cliff to the coastal lowland. The already low herb species number and abundance decrease towards the ice cap. The plateau surface is visually free of plants already at a distance of 1 km.

From the verbal descriptions, it is obvious that all communities are very similar in composition, differing mainly in the abundance of the same species and in physiognomy (horizontal structure), determined by the environment – due to the ratio and configuration of stony cracks and loam patches, the size of the stones, as well as substrate humidity. The latter depends on snow cover duration, which varies by only a few days or little more than a week; in the extremely short growing season, this is sufficient to cause differences in wetness conditions.

Annotated list

The annotated list of mosses includes 49 species. The nomenclature generally follows the "Moss flora of Russia" (Ignatov et al. 2017, 2018, 2020a, b, 2022, 2025). In brackets, after the species name, in some cases necessary synonyms are cited. The subsequent information on each species follows in certain order – the belonging to a geographical element; a link to the community type (**I**, **II**, **III**, **IV**, **V**) with the authors' relevé numbers in Table; abundance (in scale points) and constancy (in number of records) in studied stands.

Information on the species presence/absence, abundance, constancy in the coastal lowlands is always after Vitt (1975). Species not previously reported on Devon Island are marked with an asterisk, and explanation for its absence is given, if possible. For some species, taxonomic comments are provided.

Geographical elements: latitudinal – Arctic, Arctomontane, Arctoborealmontane; longitudinal – Asian-North American, Circumpolar; general – Cosmopolitan, Bipolar – according to Konstantinova (2000) and Ochyra (Ochyra 1998, Ochyra et al. 2008).

Community types: **I** – Herb-moss wetlands; **II** – Grass–moss-lichen communities with high coverage of dark crust of blue-green algae and crustose lichens; **III** – Grass–moss-lichen communities with light-gray lichen crusts; **IV** – Herb–moss-lichen communities with "brain" surface of crustose lichens; **V** – Scarce herb cover (see descriptions above).

***Blindiadelphus polaris* (Berggr.) Fedosov & Ignatov** (*Seligeria polaris* Berggr.). Arctic. Circumpolar. **I** (13, 15), **II** (1, 5, 6, 7, 16, 17, 18), **III** (20), **IV** (3, 9, 10), **V** (8, 12). Low (+) abundance, high (15) constancy. Based on morphological and molecular studies, a number of species from the genus *Seligeria*, including *S. polaris*, were isolated into genus *Blindiadelphus* (Lindb.) Fedosov & Ignatov (Fedosov et al. 2017). Under this name, the species is given for the coastal lowlands in frost-boil sites, growing attached to the small pebbles.

******Bryoerythrophyllum ferruginascens* (Stirt.) Giacom.** Arctoborealmontane. Circumpolar. **II** (1, 17), **III** (2, 7", 20). Low (+) abundance, low (5) constancy. Although the species is widely distributed worldwide, including the North America, it is quite rare in most areas (Ignatov et al. 2025), so it is possible that previously it was just missed that explains its absence in the coastal lowlands.

***Bryoerythrophyllum recurvirostrum* (Hedw.) P.C. Chen.** Bipolar. **I** (13), **II** (1, 4, 5, 6, 7), **III** (2, 7", 19, 20), **IV** (3, 9, 10), **V** (8, 12). Low (+) abundance, high (15) constancy. Being widely distributed in cold regions of both the Northern and Southern Hemispheres this is a typical bipolar species (Ochyra et al. 2008).

***Bryum arcticum* (R.Br.) Bruch, Schimp. & W. Gümbel.** Arctic. Circumpolar. **II** (16), **III** (3, 9). Low (+) abundance, the very low (3) constancy. Widely distributed species both in the Arctic and in the north of boreal belt (Ignatov et al. 2018).

***Bryum neodamense* Itzigs. I** (13, 14, 15), **II** (1, 4, 5, 6, 7, 16, 17, 18), **III** (19). Arctomontane. Circumpolar. Mid (1, +) abundance, mid (12) constancy. Vitt (1975) cited for the coastal lowlands *B. neodamense* var. *ovatum* Lindb. & Arn. as "rare member of the wet sedge-moss and hummocky sedge-moss meadow communities". There is no consensus on this taxon understanding. Some authors distinguish it as an independent species like *Ptychostomum pseudotriquetrum* (Hedw.) J.R. Spence & H.P. Ramsay in annotated checklist of bryophytes of Europe, Macaronesia and Cyprus (Hodgetts et al. 2020). So, there are certain taxonomic problems with this species. In our case, we focused on "Moss Flora of Russia" (Ignatov et al. 2018).

******Bryum pallens* Sw. I** (13), **II** (16). Arctoborealmontane. Circumpolar. A widespread species in the Holarctic, on plateau collected only twice with low (+) abundance; not recorded in the coastal lowlands, where probably was missed in the field study process.

***Bryum pseudotriquetrum* (Hedw.) G. Gaertn., B. Mey. & Scherb.** Bipolar. **I** (13, 14, 15), **II** (1, 4, 5, 6, 7, 16, 17, 18), **III** (2, 7", 19, 20), **IV** (3, 10), **V** (8). Low (+) abundancy, the very high (18) constancy. A common, frequent species on the Devon Island, both on the plateau and in the coastal lowlands.

******Bryum rutilans* Brid.** (*Ptychostomum rutilans* (Lindb.) J.R. Spence). Arctic. Circumpolar. **I** (13), **II** (1, 6, 7), **III** (2, 19), **IV** (3, 10), **V** (8). Low (+) abundance, mid (9) constancy. Not recorded in the coastal lowlands. Although species is known in the arctic part of the North America, as well in Greenland (Flora of North America, 2014), probably it is rare in American Arctic.

******Bryum teres* Lindb.** (*Ptychostomum nitidulum* (Brid.) J.R. Spence). Arctic. Presumably Asian-North Ameican (although longitudinal range is not quite clear). **I** (15), (II (1, 4, 5, 6, 7, 16, 17), **III** (19), **IV** (10), **V** (8). Low (+) abundance, mid (12) constancy. Not recorded in the coastal lowlands. The species is fairly widespread in Arctic regions, especially on islands, but is uncommon and usually occurs in very small numbers in mixed turf. For the CAA (Ellef Ringnes Island), it is reported by Kuc (1969) and Afonina (2015, based on collections by N.V. Matveyeva and D.A. Walker). For the North America (Northwest Territories, Yukon, Nunavit, Alaska) was cited as *P. nitidulum* (Lindb.) J.R. Spence (Flora of North America 2014).

***Campylium bambergeri* (Schimp.) Hedenäs, Schlesak, D. Quandt** (*Hypnum bamdergeri* Schimp., *Stereodon bambergeri* (Schimp.) Lindb.). Arctic. Circumpolar. **II** (1, 4, 5, 6, 7, 16, 17, 18,) **III** (2, 7", 19, 20), **IV** (3, 9, 10, 11), **V** (8, 12). High (+, 1, 2) abundance, high (17) constancy. Based on molecular phylogenetic data (Schlesak et al. 2018) the species, formerly known as *Hypnum bambergeri* Schimp., was recently transferred to the genus *Campylium*. Species is widely distributed in arctic regions, and as already Vitt (1975) noted, that being the very common in the coastal lowlands, it is one of the dominants on the calcareous plateau area on Devon Island.

***Catoscopium nigritum* (Hedw.) Brid.** Arctomontane. Circumpolar. **I** (13, 14, 15), **II** (7, 16), **III** (2). Dominant (3) in wetland stands, low (6) constancy. Common species in the coastal lowlands forming cushions (together with *Cam-*

pylium bambergeri, *Cinclidium arcticum*, *Distichium capillaceum*, *Drepanocladus brevifolius*, *D. turgescens*, *Scorpidium revolvens*) in late snow melt localities.

***Ceratodon purpureus* (Hedw.) Brid.** Cosmopolitan. **II** (4, 17), **IV** (10). Low (+) abundance, the very low (3) constancy. Not common in the coastal lowlands.

***Cinclidium arcticum* (Bruch, Schimp. & W. Gümbel) Schimp.** Arctomontane. Circumpolar. **I** (13, 14, 15), **II** (4, 7, 16), **III** (20), **IV** (10). Dominant (3) in wetland stands, low (8) constancy. The very common species in the coastal lowlands.

***Cyrtomnium hymenophyllum* (Bruch & Schimp. & W. Gümbel) Holmen.** Arctic. Circumpolar. **II** (7), **IV** (3, 9, 11). Low (+) abundance, low (4) constancy. The very common species in the coastal lowlands.

******Didymodon* **sp. III** (7"). The range is not known. Due to the scarcity of material in the only sample, accurate identification of species is impossible. Low (+) abundance, the very low (1) constancy. Not recorded in the coastal lowlands.

******Didymodon* **cf.** ***brachyphyllus* (Sull.) R.H. Zander.** Bipolar. Due to the scarcity of material in the sample, accurate identification of species is impossible. **III** (7"). Low (+) abundance, the very low (1) constancy. Not recorded in the coastal lowlands. According to Ohyra et al. (2008) *D. brachyphyllus* is a bipolar species being arctic-alpine in Holarctic (Zander & Ochyra 2001) with its main center of presence in the west of North America.

***Distichium capillaceum* (Hedw.) Bruch, Schimp. & W. Gümbel.** Bipolar with circumpolar range in Holarctic. **I** (13, 14, 15), **II** (1, 4, 5, 6, 7, 16, 17, 18), **III** (2, 7", 19, 20), **IV** (3, 9, 10, 11), **V** (8). Relatively high (+, 1) abundance, the very high (20) constancy. Common in the coastal lowlands.

***Distichium inclinatum* (Hedw.) Bruch, Schimp. & W. Gümbel.** Bipolar with circumpolar range in Holarctic. **III** (2), **IV** (3, 9), **V** (8). Low (+) abundance, the very low (4) constancy. Not common in the coastal lowlands where was recorded on coarse sand and on gravelly beach ridges. Species is known in many areas, being generally very rare everywhere.

***Drepanocladus aduncus* (Hedw.) Warnst.** Bipolar with circumpolar range in Holarctic. **I** (13, 14, 15), **II** (1.4, 5, 7). Mid (1, +) abundance, relatively low (7) constancy;. the same in the coastal lowlands.

***Drepanocladus brevifolius* (Lindb.) Warnst.** Arctic (*Pseudocalliergon brevifolium* (Lindb.) Hedenäs). Circumpolar. **I** (13, 14, 15), **II** (1, 4, 5, 7, 16, 17, 18), **III** (2, 7", 19, 20), **IV** (3, 9, 10, 11), **V** (8). Low (+) abundance, high (15) constancy. Together with Scorpidium revolvens are among the most common species in the moss meadows in the coastal lowlands.

******Drepanocladus polygamus* **(Bruch, Schimp. & W. Gümbel) Hedenäs** (*Campylium polygamum* Bruch, Schimp. & W. Gümbel) Lange & C.E.O. Jensen). Bipolar with circumpolar range in Holarctic. **II** (7). Low (+) abundance, the very low (1) constancy. Not recorded in the coastal lowlands, where it may have been missed during collections, because being widely distributed, it is quite rare in almost all areas (Ignatov et al. 2022).

***Drepanocladus turgescens* (T. Jensen) Broth.** (*Scorpidium turgescens* (T. Jensen) Loeske). Bipolar with circumpolar range in Holarctic. **I** (13, 14, 15), **II** (1, 4, 5, 6, 7, 18), **III** (2, 19, 7"). Low (+) abundance, mid (11) constancy.

Encalypta alpina Sm. Arctomontane. Circumpolar. **I** (13, 14, 15), **II** (1, 4, 5, 7, 16), **III** (2, 19, 20), **IV** (3, 9, 10, 11), **V** (8). Low (+) abundance, high (16) constancy. Common both on the plateau and in the coastal lowlands.

***Encalypta procera* Bruch. II** (1, 4, 5, 16, 17) , **V** (8). Bipolar with circumpolar range in Holarctic. Low (+) abundance, low (6) constancy. Rather rare in the coastal lowlands, althougt species is widely spread in the North America from the arctic regions up to the southern USA states.

***Encalypta rhaptocarpa* Schwägr. II** (18), **III** (19). Bipolar with circumpolar range in Holarctic. Low (+) abundance, the very low (2) constancy. Beeing marked only twice on plateau, common in the coastal lowlands.

***Flexitrichum flexicaule* (Schwägr.) Ignatov & Fedosov** (*Ditrichum flexicaule* (Schwägr.) Hampe). Arctomontane. Circumpolar. **I** (13, 14, 15), **II** (1, 4, 5, 6, 7, 16, 17, 18), **III** (2, 7", 19, 20), **IV** (3, 9, 10, 11), **V** (8). High (+, 1, 2) abundance, the very high (20) constancy. One of the most common, frequent species, both on the plateau and in the coastal lowland where it was given as *Ditrichum flexicaule*. Due to the event based on morphological and molecular phylogenetic studies *D. flexicaule* (as well *D. gracile*) was segregated into the new genus *Flexitrichum* and family Flexitrichaceae (Fedosov et al. 2016).

******Flexitrichum gracile* **(Mitt.) Ignatov & Fedosov** (*Ditrichum gracile* (Mitt.) Kuntze). The range needs to be clarified. **I** (14), **II** (4), **III** (19), **IV** (9). Low (+) abundance, the very low (4) constancy. Not recorded in the coastal lowlands. Based on morphological and molecular phylogenetic studies *D. gracile* (as well *D. flexicaule*) was segregated into the new genus *Flexitrichum* and family Flexitrichaceae (Fedosov et al. 2016). There are certain problems with the species taxonomical status because *Ditrichum gracile* (*Flexitrichum gracile*) for a long time was not accepted as an independent species, being included in *D. flexicaule* (Ignatov et al. 2017). So, this was the likely reason for Vitt (1975) to list only *D. flexicaule*.

******Hymenostylium recurvirostrum* **(Hedw.) Dixon. II** (1, 4), **III** (2). Arctoborealmontane. Circumpolar. Low (+) abundance, the very low (3) constancy. Not recorded in the coastal lowlands. A fairly widespread species, but it is found relatively rarely, mainly where there are limestone outcrops.

***Meesia triquetra* (Jolycl.) Ångstr.** Arctoborealmontane. Circumpolar. **I** (13). Collected only once with low (+) abundance on plateau, while it is one of the commonest moss in the wet meadows (mires) in the coastal lowlands.

***Myurella julacea* (Schwägr.) Bruch, Schimp. & W. Gümbel.** Bipolar with circumpolar range in Holarctic, widespread in cold regions of both the Northern and Southern Hemispheres. **II** (1, 4), **III** (2), **IV** (3, 11). Low (+) abundance, low (5) constancy.

***Myurella tenerrima* (Brid.) Lindb.** Arctoborealmontane (presumably in the arctic regions). Circumpolar. **II** (1), **III** (2), **IV** (3), **V** (8). Low (r, +) abundance, the very low (4) constancy.

***Orthothecium chryseon* (Schwägr.) Bruch et al.** Arctomontane. Circumpolar. **I** (13, 14, 15), **II** (1, 4, 5, 6, 7, 16, 17, 18), **III** (2, 7", 19, 20), **IV** (3, 9, 10, 11), **V** (8, 12). High (+, 1, 2) abundance, the very high (21) constancy. The very common and abundant species in many stands both on the plateau and in the coastal lowlands.

******Orthothecium retroflexum* **Ignatov & Ignatova.** The range needs to be clarified. **II** (7), **V** (8). Recorded twice with low (+) abundance. Species recently described in Yakutia (Ignatov et al. 2020a), highly probably is widespread in the circumpolar Arctic, particularly in its the northernmost regions (Ignatov et al. 2020a,b). Most likely, many of the *O. chryseon* records in the Arctic might be referred to *O. retroflexum*, these species often grow together. As well likely this species is present in the coastal lowlands. It is no coincidence that Vitt (1975), characterizing *O. chryseon*,

noted its high variability associated with the leaf tip. The main diagnostic feature of *O. retroflexum* is strongly revolute, hooked apices in most leaves while apiculus of *O. chryseon* is straight.

***Orthothecium strictum* Lorentz.** Arctomontane. Circumpolar. **I** (13, 14, 15), **II** (1, 4, 5, 6, 7, 16, 17, 18), **III** (2, 7", 19, 20), **IV** (3, 9, 10, 11), **V** (8). Low (+) abundance, the very high (20) constancy. On the plateau quite frequent, but usually as a minor admixture in mixed turfs; rare in the coastal lowlands.

***Platydictya jungermannioides* (Brid.) Cram.** Bipolar with circumpolar range in Holarctic. **I** (13), **II** (4). Recorded twice with low (+) abundance. Rare in the coastal lowlands in rock crevices.

******Pogonatum urnigerum* (Hedw.) P. Beauv.** Arctoboreal-montane. Circumpolar. The only location in a watercourse in granite outcrops. Not recorded in the coastal lowlands, where as very rare only *P. dentatum* (Brid.) Brid. is noted.

******Pohlia beringiensis* A.J. Shaw.** Arctomontane. Asian-North American. **II** (7). Individual plants found mixed with *Didymodon* sp. in community type **II** and in a watercourse in granite outcrops mixed with a small amount of *Pogonatum urnigerum*. Not recorded in the coastal lowlands because the species was described by Shaw (1982) later than Devon Island annotated moss list was published (Vitt 1975).

***Pohlia cruda* (Hedw.) Lindb.** Bipolar with circumpolar range in Holarctic. **II** (7, 16, 17), **IV** (9), **V** (8). Low (+) abundance, low (5) constancy. Most common *Pohlia* in the coastal lowland.

***Polytrichastrum alpinum* (Hedw.) G.L. Sm.** (*Polytrichum alpinum* Hedw.). Bipolar with circumpolar range in Holarctic. **II** (4, 5). Recorded twice with low (+) abundance. In the coastal lowlands common but rarely abundant.

***Sanionia uncinata* (Hedw.) Loeske** (*Drepanocladus uncinatus* (Hedw.) Warnst.). Bipolar with circumpolar range in Holarctic. **II** (1, 4, 5, 7, 16, 17, 18) **III** (2, 7", 19, 20), **IV** (9, 10). Low (+) abundance, high (13) constancy. Common and locally abundant in the coastal lowlands.

******Schistidium andreaeopsis* (Müll. Hal.) Laz.** Arctic. Certain problems with regard to the longitudinal range, so for now, it can be stated that it is distributed in the Asian part of the Arctic with one location on Novaya Zemlya (Ignatov et al. 2017). **II** (5), **III** (2, 19, 20), **IV** (3), **V** (8, 12). Mid (r, +, 1) abundance, low (7) constancy. Not recorded in the coastal lowlands where Vitt (1975) lists *Schistidium holmenianum* Steere et Brassard. These two closely related species are similar in habitat and growth pattern; and their morphological differences are not entirely clear. *S. holmenianum* was even cited as a synonym of *S. andreaeopsis* (Ignatov & Afonina 1992). The two studied specimens collected on the plateau, in our opinion, agree with the features of *S. andreaeopsis* given by Blom (Nyholm 1998).

***Scorpidium revolvens* (Sw.) Rubers.** (*Drepanocladus revolvens* (Sw.) Warnst.). Bipolar with circumpolar range in Holarctic. **I** (13, 14, 15), **II** (1, 5, 6, 7, 17). Mid (+, 1) abundance, low (8) constancy. Common in the coastal lowlands, most abundant in wetlands.

***Syntrichia ruralis* (Hedw.) F. Weber & D. Mohr** (*Tortula ruralis* P. Gaertn., B. Mey. & Scherb.). Almost cosmopolitan. **I** (14, 15), **II** (1, 4, 5, 6, 7, 18), **III** (2, 19, 20), **IV** (3, 10). Low (+) abundance, high (13) constancy. Common in the coastal lowlands in a variety of habitats.

***Timmia austriaca* Hedw.** Arctomontane. Circumpolar. **I** (13, 15), **II** (1, 4, 5, 6, 7), **V** (8, 12). Mid (+, 1) abundance, mid (9) constancy. One of the most common species in the coastal lowlands.

******Timmia sibirica* Lindb. & Arnell.** Arctic. Asian-North American. **I** (13, 14, 15), **II** (1, 4, 5, 7, 16). Low (+) abundance, mid (8) constancy. In Europe, the species is known only on Spitsbergen (Ignatov et al. 2017); in West Hemisphere – North America (Alaska and northern Canada), as well Greenland. Not recorded in the coastal lowlands, that is not entirely clear as it is a fairly large size moss clearly distinguishable from other species of the genus *Timmia*, so it is unlikely to be missed in collection process.

***Tortella fragilis* (Hook. & Wilson) Limpr.** Bipolar. **II** (1, 4, 18), **III** (2, 19). Low (+) abundance, low (5) constancy. Rather common species in the coastal lowland.

******Tortella splendida* Köckinger & Hedenäs.** Arctomontane. The longitudinal range needs to be clarified. **II** (1, 4, 5, 18), **IV** (2, 19, 20). Low (+) abundance, low (7) constancy. According to the latest taxonomic treatment of the genus *Tortella* (Köckinger & Hedenäs 2023, Ignatova et al. 2024), early reports of *Tortella arctica* (Arnell) Crundw. & Nyholm occurrence in the Russian Arctic (islands in the Arctic Ocean, Taymyr Peninsula, Yakutia), as well as in the Magadan Region, mountainous areas in Siberia and the Far East as well as in the Caucasus, should be referred to the recently described species *T. splendida*. In this regard, it may be assumed that data on the presence of *T. arctica* in the coastal lowlands (Vitt, 1975) also apply to *T. splendida*.

***Tortula leucostoma* (R. Br.) Hook. & Grev.** (*Desmatodon leucostoma* (R. Br.) Berggr). Arctomontane. Circumpolar. **V** (8). Low (+) abundance, rare (1). Common species in the coastal lowlands.

***Tortula mucronifolia* Schwägr.** Arctomontane. Circumpolar. **II** (1, 4), **III** (2, 7"), **IV** (3, 10), **V** (12). Low (+) abundance, low (7) constancy. Rare in the coastal lowlands.

Analysis of moss coenoflora

Taxonomy. A total of 49 species of mosses from 29 genera and 19 families were recorded on the plateau, with 48 species occurring within the five community types (21 relevés) and one species (*Pogonatum urnigerum*) found outside them, in a stream on granite outcrops (Table).

Species number. The richest genera in terms of species number are *Bryum* (6 species), *Drepanocladus* (4), *Encalypta* and *Orthothecium* (3 each); 9 genera have two species each, and 15 genera have one species each.

Geographical elements. According to the classification of latitudinal geographical elements, the majority (28) of species have an Arctic range in zonal position, with occurrence in mountains outside the Arctic (in the Holarctic): 9 are Arctic (s. str.), 12 are arctomontane, and 7 are arctoboreal-montane. There are 15 species with a bipolar range and 3 with a cosmopolitan range. In terms of longitudinal distribution, the majority (42) of species are circumpolar, with four exceptions: *Bryum teres*, *Pohlia beringiensis*, *Schistidium andreaeopsis*, and *Timmia sibirica* (with an Asian–North American range), and *Tortella splendida* (for which the longitudinal range needs to be clarified). For three species (*Didymodon* sp., *Flexitrichum gracile*, *Orthothecium retroflexum*), both the latitudinal and longitudinal ranges remain uncertain.

Abundance and constancy. According to occurrence (presence in relevés and occurrence estimates on 1 m^2), the following sequence is formed: the five most frequent species are *Orthothecium chryseon* (in 21 relevés), *O. strictum* (in 20), *Distichium capillaceum* (in 20), *Flexitrichum flexicaule* (in 20), and *Drepanocladus brevifolius* (in 20); another four frequent

species are *Bryum pseudotriquetrum* (in 18), *Campylium bambergeri* (in 17), *Encalypta alpina* (in 16), and *Blindiadelphus polaris* (in 15). Dominants or relatively abundant species in the ground layer are *Catoscopium nigritum* (3) and *Cinclidium arcticum* (3) in wetland stands (community type I); *Scorpidium revolvens* (1), *Drepanocladus aduncus* (1), *Campylium bambergeri* (1, 2), *Bryum neodamense* (1), *Flexitrichum flexicaule* (1, 2), *Orthothecium chryseon* (1, 2), and *Distichium capillaceum* (1) in stands of community types II–V.

Species number per stand. The number of moss species recorded on sample plots ranges from 6 to 28: 17–19 in community type I, 16–28 in type II, 14–23 in type III, 9–17 in type IV, and 6 and 20 in type V.

Constant species. The group of common constant moss species occurring in all five community types includes *Blindiadelphus polaris*, *Bryoerythrophyllum recurvirostrum*, *Bryum pseudotriquetrum*, *Bryum rutilans*, *Distichium capillaceum*, *Drepanocladus brevifolius*, *Encalypta alpina*, *Flexitrichum flexicaule*, *Orthothecium chryseon*, and *O. strictum*. Five moss species differentiate the wetlands (community type I) by their higher abundance: *Catoscopium nigritum* and *Cinclidium arcticum* (abundance 3), and *Bryum neodamense*, *Drepanocladus aduncus*, and *Scorpidium revolvens* (abundance 1); these species also occur (with +) in community type II. Common to community types II–V are *Campylium bambergeri* (with cover 1, 2), as well as *Bryoerythrophyllum recurvirostrum* and *Bryum teres* (+). Types II and III are the closest in moss species composition; the difference lies in cover and species number (type III is poorer), which is explainable by the similarity of the substrate.

DISCUSSION

Compared to the coastal lowland, the number of moss species on the plateau is 2.7 times lower (132 species, including two species with two varieties, vs. 49), and the number of genera is 2.6 times lower (71 vs. 27). This is quite explainable by differences in both ecology and plant cover, and – no less important – by the size of the studied area (on the plateau it is an order of magnitude smaller) and the diversity of community types. However, expanding the survey area further into the plateau would hardly add many species, since the rather scarce plant cover at the plateau edge decreases towards the ice dome, up to the absence of macroscopic species, including mosses (personal observation by N. Matveyeva).

There are no such species that are common in zonal biotopes of polar deserts in the Eurasian sector as *Aulacomnium palustre* (Hedw.) Schwägr., *A. turgidum* (Wahlenb.) Schwägr., *Bartramia ithyphylla* Brid., *Hylocomium splendens* var. *alaskanum* (Hedw.) Schimp., *Racomitrium lanuginosum* (Hedw.) Brid., as well as a number of species of the genera *Calliergon* and *Dicranum*. However, such constant species and dominants in coastal lowland communities as *Distichium capillaceum*, *Drepanocladus brevifolius*, *Encalypta alpina*, *Flexitrichum flexicaule*, *Orthothecium chryseon*, *O. strictum* and *Syntrichia ruralis* are rather common. Quite understandable is the absence of sphagnum mosses on the plateau, which are extremely rare in the polar desert zone, if found at all, and only close to the southern limit of the zone. The only sphagnum species, *Sphagnum orientale* (L.) Savicz, has been recorded in the lowlands as rare (Vitt 1975).

More interesting is the presence of 15 species not recorded in the coastal lowlands. The reasons for this phenomenon are different. Let us offer the following explanations.

As a result of recent taxonomic studies using molecular analysis, the scope of some species or their systematic position has been revised – e.g., *Tortella splendida* – or these have been established as new – e.g., *Orthothecium retroflexum*, recently described from Yakutia, widespread in the Arctic and especially in high Arctic regions (Ignatov et al. 2020a,b), likely present in the coastal lowlands. It is no coincidence that Vitt (1975), characterizing *O. chryseon*, noted its high variability associated with the leaf tip. *Pohlia beringiensis* was described by Shaw (1982) later than the annotated moss list of Devon Island was published.

The taxonomic identification of *Didymodon* sp. and *D.* cf. *brachyphyllus* is doubtful due to the very limited material available from the plateau; *Flexitrichum gracile* for a long time was not accepted as an independent species, being included in *Ditrichum flexicaule*; *Schistidium andreaeopsis* is close to *S. holmenianum* Steere & Brassard recorded in the coastal lowlands, and there are certain difficulties in distinguishing between these two taxa.

Species with a wide range but rarely encountered (*Bryoerythrophyllum ferruginascens*, *Bryum pallens*, *B. rutilans*, *B. teres*, *Drepanocladus polygamus*, *Hymenostylium recurvirostrum*, *Pogonatum urnigerum*) may have been missed during collection in the coastal lowlands.

The absence of *Timmia sibirica* is not entirely clear.

Thus, we think that 10 species (*Bryoerythrophyllum ferruginascens*, *Bryum pallens*, *B. rutilans*, *B. teres*, *Drepanocladus polygamus*, *Hymenostylium recurvirostrum*, *Orthothecium retroflexum*, *Pogonatum urnigerum*, *Pohlia beringiensis*, *Timmia sibirica*) might be added to the Devon Island moss list, while four taxa (*Didymodon* sp., *D.* cf. *brachyphyllus*, *Flexitrichum gracile*, *Schistidium andreaeopsis*) are not recommended for this purpose due to the current uncertainty of their identification. Likewise, we do not propose to add *Tortella splendida* as an additional unit, suggesting that *T. arctica*, cited by Vitt (1975) for the coastal lowlands, is most likely this species, but its name deserves to be on the island's general list.

Comparison and comparative assessment of moss species richness on the dolomite plateau with various areas of the polar desert zone having zonal positions on plains is problematic. The available information from 24 localities (Matveyeva 2015) is poorly comparable both with each other (different survey areas – local and regional floras; obviously different completeness of study) and with the moss coenoflora on the carbonate substrate of the Devon Island plateau.

Data on moss species richness for three large islands of the Arctic Ocean within the polar desert zone: Bolshevik Island – 121 species, 71 genera (Afonina & Matveyeva 2003); North-Eastern Land – 147 species, 65 genera (Belkina & Likhachov 2013); Ellef Ringnes Island – 96 species, 60 genera (Afonina 2015). The closest variant in terms of study area, type of data acquisition (collections for geobotanical relevés) and substrate (carbonates) is Cape Chelyuskin, Taymyr Peninsula, where mosses were collected during a plant cover

survey (Matveyeva 1979), and 74 species (from 44 genera) were identified (Blagodatskikh et al. 1979). In both cases, this is a moss taxocoenosis (coenoflora) of several community types. However, the diversity of communities at Cape Chelyuskin is noticeably greater, with significantly higher cover density. Yet, taking into account numerous herbarium samples by other collectors, 90 species from 55 genera are known over many years (Afonina 2015) from this northernmost continental polar desert region.

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