

Table 2

**Composition of secondary metabolites of studied lichen specimens, their collection sites, coordinates and substrates**

Locality	№ LE L	Chemistry	Coordinate	Substrate
<i>Hypogymnia vittata</i> chemotype I				
Bakuriani (Georgia)	25585	physodic acid (M <sup>*</sup> ), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	41°50'35"N 43°23'02"E	not specified
British Columbia (Canada)	25593	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	50°30'N 120°15'E	among moss on rock
Republic of Buryatia	25532	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	51°20'36"N 105°09'27"E	on moss over rock
Republic of Buryatia	25534	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	51°41'27.8"N 101°40'42.1"E	not specified
Carpati (between Slovakia and Poland)	25565	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	49°08'18"N 20°13'14"E	not specified
Graubunden (Switzerland)	25563	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	46°15'12"N 10°08'21"E	not specified
Gudauta District (Abkhazia)	25577	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	43°30'24.3"N 40°38'58.9"E	on bark of <i>Salix</i> sp.
Halland (Sweden)	25567	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	56°49'10"N 12°52'14"E	not specified
Honshu Island (Japan)	25580	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	36°48'10"N 138°12'42"E	not specified
Republic of Karelia	24972	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	62°17'49"N 34°08'56"E	not specified

Locality	№ LE L	Chemistry	Coordinate	Substrate
Republic of Karelia	25501	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	not specified	not specified
Republic of Karelia	25504	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	62°08'09"N 33°56'57"E	on rock
Republic of Karelia	25505	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	62°13'34"N 34°18'06"E	on rock
Khabarovsk Territory	17047	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	51°43'56.3"N 140°26'00.5"E	deadwood on soil
Khabarovsk Territory	25553	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	48°54'21"N 138°01'37"E	not specified
Kharachay-Cherkessia (Caucasus)	25528	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	43°26'24"N 41°44'38"E	on moss on rock
Komi Republic	25521	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	61°48'03"N 50°33'47"E	on bark of <i>Betula</i> sp.
Leningrad Region	6990	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	58°53'48"N 29°50'31"E	deadwood on soil
Leningrad Region	11084	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (m), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	61°07'50"N 29°53'56"E	on moss
Leningrad Region	21434	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	61°10'30"N 33°52'28"E	on bark of <i>Picea</i> sp.
Leningrad Region	21447	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	61°09'51"N 30°52'47"E	on bark of <i>Betula</i> sp.

Locality	№ LE L	Chemistry	Coordinate	Substrate
Republic of Mari El	25518	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (m), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	56°24'21"N 48°09'19"E	not specified
Moravia-Silesia (Czech Republic)	25570	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	49°50'10"N 18°16'40"E	on bark of <i>Picea</i> sp.
Muranska Vysocina (Slovakia)	25571	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	48°48'12"N 19°47'34"E	on bark
Novgorod Region	10931	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	58°58'34"N 39°09'31"E	on bark of <i>Populus tremula</i> L.
Ostergotland (Sweden)	25566	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	58°33'07"N 16°21'0.05"E	not specified
Ostergotland (Sweden)	25572	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	58°16'40"N 14°38'28"E	not specified
Ostergotland (Sweden)	25573	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	not specified	not specified
Ostergotland (Sweden)	25575	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	not specified	not specified
Polish Western Beskids (Poland)	25569	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	49°32'45"N 18°26'51"E	on bark of a mossy tree
Primorye Territory	17041	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	49°40'28"N 139°27'37"E	on rock
Primorye Territory	18206	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	46°08'56"N 136°38'03"E	on bark of <i>Sorbus</i> sp.

Locality	№ LE L	Chemistry	Coordinate	Substrate
Primorye Territory	18217	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	45°44'42"N 136°36'11"E	on bark of <i>Pinus</i> sp.
Sakhalin Region	7779	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	43°44'06.8"N 146°39'44.8"E	on bark of <i>Larix</i> sp.
Sakhalin Region	15758	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	44°43'40.3"N 147°19'41.2"E	on bark of decayed tree
Satakunta (Finland)	25560	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (m), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	61°39'04"N 21°51'42"E	not specified
Sichuan (China)	25583	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	30°06'N 102°03'E	not specified
Tavastia (south Finland)	25558	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (m), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	61°18'N 25°19'E	not specified
Tavastia (south Finland)	25559	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	61°18'N 25°19'E	not specified
Tirol (Austria)	25561	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	47°08'21"N 10°14'51"E	on moss on rock
Uusimaa (south Finland)	25568	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	60°12'05"N 24°54'42"E	not specified
<i>Hypogymnia vittata</i> chemotype II				
Krasnoyarsk Territory	25549	physodic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	55°32'44"N 94°42'13"E	on rock
Leningrad Region	11086	physodic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	61°07'12"N 29°49'26"E	on moss

Locality	№ LE L	Chemistry	Coordinate	Substrate
Leningrad Region	25503	physodic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	59°55'42"N 34°47'41"E	on bark of <i>Betula</i> sp.
Mtskheta-Mtianeti (Georgia)	25582	physodic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	42°24'N 44°49'E	on soil
Primorye Territory	18184	physodic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	46°07'55"N 136°43'39"E	on bark of <i>Picea</i> sp.
Primorye Territory	18197	physodic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	46°07'11"N 136°41'31"E	on bark of <i>Picea</i> sp.
Sakhalin Region	16489	physodic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	49°35'N 142°38'E	not specified
Sakhalin Region	18609	physodic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	43°44'17"N 146°41'02"E	on bark of <i>Taxus</i> sp.
Sakhalin Region	18639	physodic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	43°50'11.6"N 146°51'58.1"E	on lignum
Sakhalin Region	25550	physodic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	44°20'14"N 146°12'27"E	on bark of decayed tree
<i>Hypogymnia vittata</i> chemotype III				
Chukotka Autonomous Area	25554	physodic acid (M), 2'-O-methylphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	69°19'30"N 165°13'33"E	on soil
Krasnoyarsk Territory	25531	physodic acid (M), 2'-O-methylphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	69°04'N 94°06'E	on soil
Nenets Autonomous Area	23317	physodic acid (M), 2'-O-methylphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	68°48'55"N 54°16'51"E	on soil in rock cracks
Trans-Baikal Territory	12327	physodic acid (M), 2'-O-methylphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	50°38'12"N 117°23'51"E	on moss on rock
Trans-Baikal Territory	15050	physodic acid (M), 2'-O-methylphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	56°39'26.8"N 117°25'33.6"E	on soil
Trans-Baikal Territory	20191	physodic acid (M), 2'-O-methylphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	56°50'11.7"N 117°17'20.6"E	on soil

Locality	№ LE L	Chemistry	Coordinate	Substrate
<i>Hypogymnia subduplicata</i> chemotype I				
Primorye Territory	25530	physodic acid (M), vittatolic acid (M), 3-hydroxyphysodic acid (M), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	49°40'N 139°27'E	not specified
<i>Hypogymnia subduplicata</i> chemotype II				
Republic of Buryatia	25535	physodic acid (M), 3-hydroxyphysodic acid (M), lividic acid (m), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	52°46'13"N 108°19'55"E	on bark
Republic of Sakha (Yakutia)	28328	physodic acid (M), 3-hydroxyphysodic acid (M), lividic acid (m), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	62°57'54"N 137°22'08"E	on bark of <i>Pinus pumila</i>
Republic of Sakha (Yakutia)	28329	physodic acid (M), 3-hydroxyphysodic acid (M), lividic acid (m), atranorin (m), chloroatranorin (m), $\alpha$ -alectoronic acid (m)	63°07'05"N 138°25'40"E	on bark of <i>Pinus pumila</i>

\* Secondary metabolites are arranged in order from highest to lowest content in the thallus. M – major, m – minor.