

Stinging wasps, ants and bees (Hymenoptera: Aculeata) of the Murmansk region, Northwest Russia

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A total of 123 species of aculeate Hymenoptera are reported from the Murmansk region based on museum collections, unpublished datasets and previously published records. Collection localities are provided for each species. Erroneous or doubtful records of additional 19 species are discussed. Noteworthy findings include e.g. *Ammophila campestris*, *Bombus consobrinus*, *B. hyperboreus*, *Crabro maeklini*, *Dipogon vechti*, *Formica suecica*, *Gorytes neglectus*, *Osmia* cf. *disjuncta* and *O. maritima*. The species *Ammophila campestris*, *Bombus veteranus*, *Crossocerus varus*, *Formica polyctena*, *Lindenius albilabris*, *Megachile analis* and *Osmia* cf. *disjuncta* have their northernmost known localities in the Murmansk region. We estimate that approximately 100 additional aculeate species could still be found from the area.

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1. Introduction

The order Hymenoptera has been traditionally divided into three groups, according to the structure and life-style of the species: the sawflies (Symphyta), the parasitic wasps (Parasitica) and the aculeates (Aculeata). Of these groups only the aculeates, which include the stinging wasps, ants and bees, are considered to be monophyletic (Sharkey 2007). Usually the aculeates have been divided into three superfamilies, Chrysidoidea, Vespoidea and Apoidea (Aguiar *et al.* 2013), but recent molecular studies have shown that Vespoidea is paraphyletic with respect to Apoidea (Pilgrim *et al.* 2008).

The aculeates include many easily visible and economically significant taxa. The bees in particular play an essential role in the pollination of flowering plants, while social wasps and ants are important groups of predators. The females of most aculeates have a poisonous sting, which they use to defend themselves and to incapacitate their prey. Some species can sting humans and are therefore also of medical importance. Aculeates are warmth-loving insects, and the number of species decreases strongly towards the north in Europe. However, some species are restricted to the arctic region.

The Murmansk region (or oblast) of the Russian Federation is situated in northwestern Eu-

rope and consists of the Kola Peninsula and some adjacent areas, most importantly Pechenga and Kuolajärvi (formerly Salla) in the west, and a small area south of Kandalaksha bay. The region is an integral part of Fennoscandia, as it has a common geological history with other areas of the physical-geographical area known as the Baltic shield. The insect fauna of the region is still poorly known compared to the rest of Fennoscandia, although detailed reviews have been published of Lepidoptera (Kozlov & Jalava 1994, Kozlov & Kullberg 2011). Several species of aculeate Hymenoptera have been reported in ecological and faunistic publications (e.g. Fridolin 1936, Uvarova & Uvarov 1976, Polevoi & Humala 2011). The only species list of all aculeates of the Murmansk region (Paukkunen & Kozlov 2012) did not provide locality data and was published in Finnish in a low-circulation book, which limits its availability to the scientific community.

2. History of the research

The first preserved samples of aculeate Hymenoptera from the study area were probably collected by Johan (John) Reinhold Sahlberg in 1870. During a joint expedition with his fellow student, Aukusti Juhana Malmberg (later Mela), they collected at least 26 species of aculeates, as can be estimated from the materials deposited in the Finnish Museum of Natural History. Some of these records were published by Sahlberg (1889, 1910a, 1910b). A few species were collected later by Reinhold Enwald in 1880 (Enwald 1881), and by Klas Edgren in 1885.

In 1887, more than 200 specimens of about 35 species of aculeates were collected during the Great Kola Expedition, arranged by Finnish scientists (Rikkinen 1980). Collectors included Klas Edgren, Reinhold Enwald, Alfred Oswald Kihlman, Kaarlo Mainio Levander, Gustaf Nyberg and Johan Axel Palmén. Finnish biologists and entomologists, who collected aculeates from the Kola Peninsula prior to the Soviet revolution, included Bertil Poppius (expeditions in 1897 and 1899) and Justus Montell (one trip in 1899). Finally, Richard Frey and Wolter Hellen collected a large number of aculeate specimens of at least 36 species during their trip in 1913 (Frey 1915). For

more details on collecting trips by Finnish entomologists, consult Silfverberg (1988).

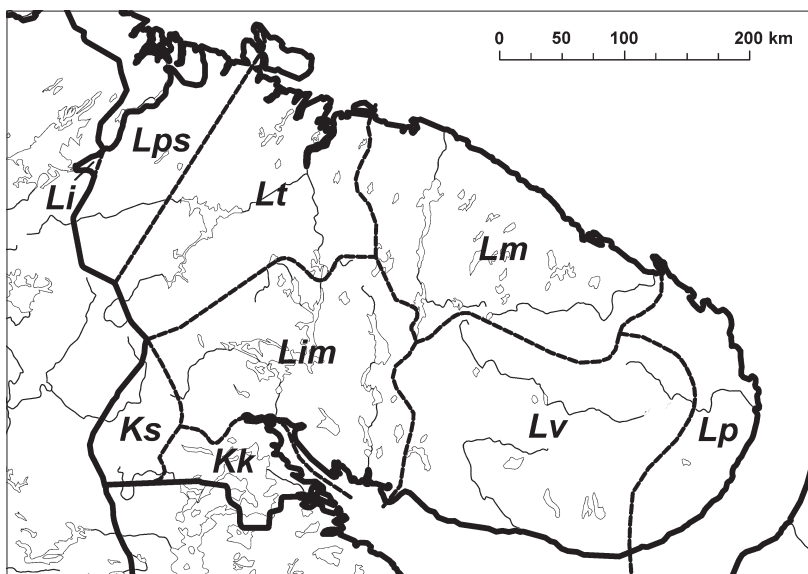
No special research on the aculeate fauna of the Kola Peninsula was performed by Russian scientists in the pre-Soviet period. Although some material had been collected during 1894–1915 by at least ten people, the numbers of both specimens and species (deposited in the Zoological Museum in St. Petersburg) were relatively small. Collecting sites were mostly located near Kola fjord and Pechenga, on the northwestern coast of the peninsula.

As a consequence of the Tartu Peace of 1920, Finland obtained the Pechenga area (Petsamo) northwest of the Kola Peninsula, which became intensively studied during the 1920s and 1930s. During this period, about 1,200 specimens of aculeates belonging to 50 species were collected by nearly 30 entomologists, of which the most significant contributions were made by Wolter Hellén, Olavi Hulkkonen, Erkki Kanervo, Håkan Lindberg and Stephan Platonoff.

In the 1930s, insects of the Khibiny Mountains were studied by the ecologist Vladimir Yulievich Fridolin (Fridolin 1935, 1936). In addition to Fridolin, at least eight people collected aculeate material in the Kola Peninsula prior to the Second World War. This material consists of approximately 200 specimens of about 13 species. Collection localities, besides the Khibiny Mountains, included also the Kola Fjord and Yokanga River region, Svyatoi Nos peninsula and Kildin Island.

Between the Second World War and the breakup of the Soviet Union, collecting of aculeate Hymenoptera in the Kola Peninsula was very limited, although some scattered information was published by the Russian researchers (Striganova 1973, Semenov-Tyan-Shanskiy 1975, Uvarova & Uvarov 1976, Byzova *et al.* 1986). The research intensified in the 2000s, as can be seen from publications on ants and other Hymenoptera of the Pasvik Nature Reserve (Makarova 2005, Mershchiev 2006, Polevoi & Humala 2011), ants of the pollution-damaged forests of the Pechenga area (Mershchiev 2009), aculeates of the Khibiny region (Anufriev *et al.* 2011) and the pollinators of orchids (Blinova 2010, Blinova & Mironov 2012). Also a large-scale study on the environmental impacts of the

Fig. 1. Borders of the Murmansk region and its subdivision into biogeographical provinces (modified after Urbana-vichus *et al.* 2008). *Kk*: Karelia keretina, *Ks*: Regio kuusamoënsis, *Li*: Lapponia inaren-sis, *Lim*: Lapponia iman-drae, *Lm*: Lapponia murmanica, *Lp*: Lappo-nia ponojensis, *Lps*: Lapponia petsamo-ënsis, *Lt*: Lapponia tulomensis and *Lv*: Lapponia varsugae.



emissions of the Monchegorsk smelters, which has been continuing since the 1990s, has included the collection of large amounts of material on ants and bees (Kozlov 1997, Kozlov *et al.* 2009).

3. Material and methods

3.1. Study area

The Murmansk region has an area of 144,900 km² and forms a part of the greater Lapland region that spans over four countries. Historically, it has also been referred to as Russian Lapland (*Lapponia rossica*, *Lr*). The region lies almost completely north of the Arctic Circle and includes the entire Kola Peninsula. The area is generally hilly, with the Khibiny Mountains (altitude 1,201 m) forming the highest point of the region. The climate is mild due to the proximity of the sea and the Gulf Stream. The typical vegetation is northern taiga forest, dominated by Norway spruce (*Picea abies* (L.) Karst.) and Scots pine (*Pinus sylvestris* L.), which are replaced by mountain birch (*Betula pubescens* ssp. *czerepanovii* (N. I. Orlova) Hämet-Ahti) near the northern tree limit. The northernmost parts of the Kola Peninsula are covered by tundra. The study area includes nine biogeographical provinces, six of which are located entirely in the Murmansk region (Fig. 1).

3.2. Collections

The study is largely based on the collections of the Finnish Museum of Natural History, University of Helsinki (MZH, 1483 specimens of 107 species), the Zoological Museum of the University of Turku (ZMTu, 624 specimens of 18 species) and the Zoological Institute of the Russian Academy of Sciences in St. Petersburg (ZISP, approximately 950 specimens of 28 species, excluding ants which were not studied). The collections of MZH and ZMTu were studied and revised by JP, and information from the collections of ZISP was collected by MK. The identifications of most specimens in ZISP were not controlled during the recording of the label data, so their reliability was assessed subsequently based on the commonness and ease of identification of the species.

In addition to the museum collections, we used three unpublished ecological data sets collected by MK and his co-workers. The first set of samples was collected with yellow colour traps (i.e. so-called Russell traps) from 12 sites (located 1–47 km from Monchegorsk) in 2000 and comprised 2,282 aculeates of 17 species, identified by Guy Söderman. The second set, collected using the same methods from ten sites in 2010, was identified by JP and contained 394 individuals of 11 species. Bumblebees comprised approxi-

Table 1. Localities from within or adjacent to which aculeates have been collected in the Murmansk region. Coordinates are given in the wgs84 system (northern latitude, eastern longitude) and error radiuses in kilometers. Number of recorded species is also presented for each locality.

Locality	Province	Coordinates	Radius	Species
Abram-Mys cape	<i>Lt</i>	68.978, 33.026	0.5	1
Ainovy islands (= Heinäsaaret)	<i>Lps</i>	69.838, 31.571	5	2
Ajkuajvenjok river	<i>Lim</i>	67.565, 33.774	3	1
Alakurtti village (= Kurtti)	<i>Ks</i>	66.960, 30.340	5	4
Alluaiv mountain	<i>Lim</i>	67.873, 34.445	2	5
Apatity town	<i>Lim</i>	67.566, 33.391	3	26
Berezovka village	<i>Lim</i>	67.430, 34.280	0.5	4
Bolshaya Bogomolikhia island	<i>Kk</i>	67.072, 32.509	0.5	4
Bolshoe Goltsovoe lake (= Paikunjavr)	<i>Lim</i>	67.852, 33.670	2	2
Bolshoi Lomnishnyi island	<i>Kk</i>	66.970, 32.626	0.5	12
Bolshoi Vudjavr lake	<i>Lim</i>	67.633, 33.674	2	1
Borisoglebskiy village (= Kolttaköngäs, Boris Gleb)	<i>Lps</i>	69.654, 30.134	1	10
Chalmozero lake	<i>Lim</i>	67.655, 31.487	5	1
Chapoma village	<i>Lp</i>	66.103, 38.870	0.5	5
Chavanga village	<i>Lv</i>	66.109, 37.756	0.5	4
Chervyanaya village (= Kervanto)	<i>Lps</i>	69.893, 31.952	0.5	3
Chuna village (Lapland Nature Reserve)	<i>Lim</i>	67.661, 32.647	0.5	2
Chuna-tundra fells	<i>Lim</i>	67.803, 32.438	15	1
Dalnie Zelentsy village	<i>Lm</i>	69.117, 36.062	0.5	2
Devichya Luda island	<i>Kk</i>	66.988, 32.609	0.5	8
Devyatoy cape	<i>Lp</i>	66.880, 41.244	1	1
Dokucheikha island	<i>Kk</i>	66.963, 32.646	0.5	4
Dolgaya Shchel fjord (= Peuravuono, Peuravuoma)	<i>Lps</i>	69.723, 31.209	3	9
Ekaterininskiy island	<i>Lt</i>	69.214, 33.464	1.5	2
Ekostrovski village (= Jokostrov)	<i>Lim</i>	67.606, 33.047	10	7
Elmarajok river	<i>Lim</i>	67.830, 34.718	2	9
Gagarka village (= Kaakkuri)	<i>Lps</i>	69.550, 31.247	0.5	4
Gavrilovo village	<i>Lm</i>	69.181, 35.847	0.5	8
Hakokoski rapids (Paz river)	<i>Lps</i>	69.372, 29.693	0.5	3
Harjuvaara hill (= Harju)	<i>Lps</i>	69.448, 30.124	1.5	3
Haukilampi lake	<i>Lps</i>	69.439, 30.768	0.5	12
Imandra lake	<i>Lim</i>	67.644, 33.067	50	8
Jäniskoski village	<i>Li</i>	68.969, 28.779	0.5	2
Kalkupää fell	<i>Lps</i>	69.293, 29.331	0.5	7
Kandalaksha town (= Kantalahti)	<i>Lim</i>	67.156, 32.402	3	29
Kanozero lake	<i>Lim</i>	67.036, 34.127	12	8
Kapustnoe village	<i>Lim</i>	67.335, 34.185	0.5	5
Karablekk fell (= Korablekk)	<i>Lps</i>	69.239, 29.510	0.5	1
Kashkarantsy village	<i>Lv</i>	66.336, 36.014	0.5	13
Kaskama fell	<i>Lps</i>	69.279, 29.478	1	7
Kaulatunturi fell	<i>Lps</i>	69.404, 30.246	1	2
Khibiny mountains (= Umptek, Hiipinä)	<i>Lim</i>	67.719, 33.657	25	5
Khibiny railway station	<i>Lim</i>	67.673, 33.211	0.5	8
Kiddjaur lake (= Pitkäjärvi)	<i>Lps</i>	69.450, 31.185	3	1
Kildin island (= Kiltinäsaari)	<i>Lt</i>	69.349, 34.178	7	2
Kirovsk botanical garden	<i>Lim</i>	67.648, 33.670	0.5	10
Kirovsk town	<i>Lim</i>	67.615, 33.663	2	4
Kola fjord	<i>Lt</i>	69.065, 33.113	20	2
Kola river	<i>Lt</i>	68.767, 33.149	15	3
Kola town (= Kuola)	<i>Lt</i>	68.881, 33.020	1.5	5
Köngäs rapids (Lotta river)	<i>Lps</i>	68.576, 29.408	0.5	13
Korabelnoe village	<i>Lp</i>	67.000, 41.279	0.5	2
Kuivakoski rapids (Lotta river)	<i>Lps</i>	68.501, 28.733	0.5	2

Locality	Province	Coordinates	Radius	Species
Kukisvumchorr mountain	<i>Lim</i>	67.666, 33.691	1	2
Kunijok river	<i>Lim</i>	67.813, 33.615	5	10
Kuolajärvi village (= old Salla)	<i>Ks</i>	66.968, 29.208	0.5	41
Kuosmoaivi fell	<i>Lps</i>	69.458, 31.500	2	4
Kurichek island	<i>Kk</i>	66.993, 32.580	0.5	5
Kutsa river	<i>Ks</i>	66.711, 30.060	15	2
Kuvernöörinkoski rapids (Kuvernöörinjoki river)	<i>Lps</i>	69.512, 30.464	0.5	10
Kuzomen village	<i>Lv</i>	66.287, 36.865	0.5	16
Kuzreka village	<i>Lv</i>	66.605, 34.811	0.5	7
Lambin island	<i>Kk</i>	67.065, 32.461	0.5	4
Laukkujoki river	<i>Lps</i>	69.289, 29.584	2	2
Liinahamari village	<i>Lps</i>	69.642, 31.358	0.5	2
Longvattn bay	<i>Lps</i>	69.364, 29.726	1	3
Loparskaya valley	<i>Lim</i>	67.681, 33.798	1	7
Lotta river (= Lutto)	<i>Lps</i>	68.576, 29.408	40	15
Loustari village (= Yläluostari)	<i>Lps</i>	69.426, 31.057	0.5	24
Lovozero mountains (= Lujaururt)	<i>Lim</i>	67.825, 34.690	20	5
Maitokoski rapids (Paz river)	<i>Lps</i>	69.402, 29.791	0.5	1
Malaya Belaya river (= Lutamarjok)	<i>Lim</i>	67.680, 33.291	5	14
Maloe Goltsovoe lake	<i>Lim</i>	67.838, 33.672	0.5	9
Malyi Lomnishnyi island	<i>Kk</i>	66.971, 32.607	0.5	5
Malyi Vudjavr lake	<i>Lim</i>	67.668, 33.617	1	41
Marjok river (= lower Afanasiya)	<i>Lm</i>	67.781, 35.344	10	2
Mattert fell (= Matert)	<i>Lps</i>	69.278, 30.877	1	4
Menikkajoki river	<i>Lps</i>	69.390, 29.905	2	7
Monchegorsk town	<i>Lim</i>	67.939, 32.910	3	44
Moncheguba bay	<i>Lim</i>	67.922, 33.053	5	4
Nautsi village	<i>Lps</i>	68.992, 29.031	1	19
Nikel town (= Kolosjoki)	<i>Lps</i>	69.406, 30.210	1.5	15
Njuemmellampjok river (= Njemlomjok, upper Afanasiya)	<i>Lv</i>	67.725, 35.578	10	5
Nota river (= Nuortijoki)	<i>Lt</i>	68.115, 29.908	50	2
Notozero lake/village (= Nuortijärvi)	<i>Lt</i>	68.558, 31.223	20	7
Olenegorsk town	<i>Lim</i>	68.139, 33.274	2	2
Olenitsa village	<i>Lv</i>	66.468, 35.334	0.5	11
Olenya Guba village	<i>Lt</i>	69.213, 33.373	0.5	2
Ora village	<i>Lt</i>	69.290, 32.800	0.5	1
Orshoaivi fell	<i>Lps</i>	69.466, 30.331	2	10
Pak river	<i>Lt</i>	68.773, 32.360	2	6
Pala Guba bay	<i>Lt</i>	69.194, 33.391	1	1
Parkkina village (= Parkkino, Barkino)	<i>Lps</i>	69.555, 31.224	1	19
Pasvik Nature Reserve	<i>Lps</i>	69.141, 29.242	50	12
Paz river (= Paatsjoki, Pasvikelva)	<i>Lps</i>	69.141, 29.242	50	2
Pechenga village / municipality (= Petsamo)	<i>Lps</i>	69.555, 31.224	1	18
Pechengskie tundry fells (= Petsamontunturit)	<i>Lps</i>	69.374, 30.457	15	10
Pitkäjärvi village	<i>Lps</i>	69.297, 29.564	1	10
Pitkäloukko bay	<i>Lps</i>	69.483, 30.281	2	2
Poachjok river	<i>Lim</i>	67.682, 33.603	2	1
Polyarnyy town (= Alexandrovsk)	<i>Lt</i>	69.203, 33.455	1.5	12
Ponoy river	<i>Lv</i>	67.059, 38.605	120	4
Ponoy village	<i>Lp</i>	67.076, 41.126	0.5	12
Porchinikha village	<i>Lm</i>	69.079, 36.248	0.5	3
Port-Vladimir village (= Jeretik)	<i>Lt</i>	69.415, 33.113	0.5	1
Pulonga river	<i>Lp</i>	66.491, 39.733	30	1
Pulozero village	<i>Lt</i>	68.358, 33.298	0.5	1
Pyalitsa village	<i>Lp</i>	66.191, 39.525	0.5	1
Pyhäkuru gorge	<i>Ks</i>	66.781, 29.967	1	10
Rajakoski village	<i>Lps</i>	69.023, 29.005	0.5	1

Locality	Province	Coordinates	Radius	Species
Revda town	<i>Lim</i>	67.942, 34.555	1	3
Ryazhkov island	<i>Kk</i>	67.017, 32.557	2	16
Saarikoski rapids (Paz river)	<i>Lps</i>	69.528, 30.146	0.5	1
Sairaalantunturi fell	<i>Lps</i>	69.561, 31.217	0.5	4
Sallatunturi fell	<i>Ks</i>	66.906, 29.230	1	1
Salmijärvi village	<i>Lps</i>	69.437, 30.125	3	16
Seidozero lake (= Seitjaur)	<i>Lim</i>	67.817, 34.850	5	4
Solovaraka hill (= Solovareka)	<i>Lt</i>	68.873, 33.021	0.5	7
Spasitelnaya Gora fell (= Pelastusvuori)	<i>Lps</i>	69.417, 31.094	0.5	1
Srednyaya Guba bay	<i>Lt</i>	69.141, 33.572	1.5	3
Svetloe lake (= Vavnjarg)	<i>Lim</i>	67.912, 34.956	1	1
Svyatoy Nos cape	<i>Lp</i>	68.096, 39.852	8	2
Tetrino village	<i>Lv</i>	66.064, 38.246	0.5	3
Tri Ostrova village	<i>Lp</i>	67.210, 41.318	0.5	1
Trifonajärvi lake	<i>Lps</i>	69.628, 31.249	3	5
Trifonovo village (= Trifona)	<i>Lps</i>	69.595, 31.266	0.5	9
Tuljok river	<i>Lim</i>	67.719, 33.827	4	6
Tuloma river (= Tuulomajoki)	<i>Lt</i>	68.765, 32.410	40	2
Tumannyy village	<i>Lm</i>	68.882, 35.655	0.5	6
Töllevi village	<i>Lps</i>	69.541, 30.207	1	2
Umba river	<i>Lim</i>	67.171, 34.071	50	2
Umba village	<i>Lim</i>	66.697, 34.347	3	11
Umbozero lake (= Umpjaur)	<i>Lim</i>	67.714, 34.385	30	1
Vaarlam island (= Vaarlamansaari, Niilansaari)	<i>Lps</i>	69.141, 29.247	1	16
Varzino village	<i>Lm</i>	68.359, 38.391	1	1
Varzuga village	<i>Lv</i>	66.393, 36.586	2	5
Vavnbed mountain	<i>Lim</i>	67.920, 35.004	2	3
Vayda-Guba village (= Vaitolahti)	<i>Lps</i>	69.936, 31.970	1	5
Verkhnetulomskiy village (= Ylä-Tuuloma)	<i>Lt</i>	68.605, 31.792	1	11
Verkhniy Nyud village	<i>Lim</i>	67.863, 32.932	0.5	5
Virma river (= Varmjok)	<i>Lm</i>	68.033, 34.921	10	2
Viteguba bay	<i>Lim</i>	67.801, 32.902	5	2
Voronya river	<i>Lm</i>	68.633, 35.654	60	4
Voronye village (= Voroninsk)	<i>Lm</i>	68.455, 35.344	10	6
Voryema village (= Vuoremi)	<i>Lps</i>	69.786, 30.827	0.5	9
Vostochnaya Litsa village (= Litsa)	<i>Lm</i>	68.643, 37.800	1	1
Vudjavrchorr mountain	<i>Lim</i>	67.623, 33.602	1	1
Vudjavrjok river	<i>Lim</i>	67.679, 33.654	5	11
Vuorijärvi village (= Vuorikylä)	<i>Ks</i>	66.789, 30.158	1	16
Yokanga village (= Jokanga, lokanga)	<i>Lm</i>	68.001, 39.701	0.5	4
Zapolyarnyy town	<i>Lps</i>	69.426, 30.820	1	3
Zasheek village	<i>Lim</i>	67.407, 32.558	2	3
Zemlyanoe village (= Pummanki)	<i>Lps</i>	69.786, 31.961	0.5	13

mately 97% of the individuals and 75% of the species in both samples. The third set of samples collected with pitfall traps from ten sites in 2009 was identified by Dmitry A. Dubovikoff and included 1,048 ants belonging to 13 species.

3.3. Publications

We carefully searched all published data on aculeates from the Kola Peninsula, including pa-

pers written in Finnish and Russian. All records were examined for the reliability of identifications by JP. In addition to the literature mentioned in the introduction, records of aculeates were extracted from the following publications: Anufriev *et al.* (2011), Collingwood (1979), Elfving (1968), Forsius and Nordström (1921, 1923), Friese (1911), Grönblom (1916), Hellén (1920a, 1920b, 1953, 1954, 1955), Lomholdt (1975, 1976), Løken (1973), Nordström and Forsius

(1928), Olmi (1994), Pekkarinen and Huldén (1991, 1995), Pekkarinen *et al.* (1981), Pulkkinen (1931), Shutova (2003), Skorikov (1912, 1914), Söderman and Leinonen (2003), Wolf (1967) and Zvereva *et al.* (2010).

3.4. Nomenclature and data presentation

The nomenclature mainly follows the checklist of Finnish aculeates (Paukkunen 2010a). Families and species within the families are listed in alphabetical order. For rare species with not more than five localities we include full data; for common species we only list the collecting localities in alphabetical order (for the coordinates, consult Table 1) within each biogeographical province (also in alphabetical order). The province abbreviation is underlined, if the observation is based on a specimen identified or verified by Juho Paukkunen, Pekka Punttila (Formicidae), Jouni Sorvari (Formicidae) or Veli Vikberg (Dryinidae). References to published data are given for rare species but omitted for common species. Noteworthy species are provided with brief comments on their distribution.

Abbreviations: is. = island, islands; r. = river; l. = lake; st. = railway station; mt. = mountain; mts. = mountains; low. = lower course; mid. = middle course; upp. = upper course; sur. = surroundings; W. = west; E. = east; S. = south; N. = north.

4. Species found from the Murmansk region

4.1. Family Andrenidae

Andrena barbilabris (Kirby, 1802)

Lim: 12 km W. of Tumanny near Voronya river 12.VII.2006 1♀ (Lvovsky).

Andrena clarkella (Kirby, 1802)

Lim: Monchegorsk sur. Lps: Kalkupää; Laukkujoki r.; Loustari; Nikel; Vaarlam is.; Zapolyarnyy sur. Lv: Kuzomen.

Andrena haemorrhoea (Fabricius, 1781)

Lim: 1 km E. of Apatity 29.VI.2012 1♀ (Blinova & Mironov 2012: 80).

Andrena lapponica Zetterstedt, 1838

Ks: Alakurtti; Kuolajärvi. Lim: Bolshoi Vudjavr l.; Kandalaksha; Kirovsk; Malaya Belaya r.; Malyi Vudjavr l.; Monchegorsk sur. (10 localities). Lm: Voronye. Lps: Gagarka; Hakokoski; Haukilampi l.; Kaskama; Lotta r.; Loustari; Nautsi; Nikel; Orshoaiivi; Parkkina; Pitkäjärvi; Trifonajärvi l.; Voryema. Lt: Kola town; Solovaraka; Tuloma r. Lv: Kuzomen; Kuzreka.

Andrena ruficrus Nylander, 1848

Lim: 9 km S. of Monchegorsk 18.VI.2003 1♀ (Kozlov); Malyi Vudjavr l. (Fridolin 1936). Lv: Kuzomen 17.VI.1913 1♂ (Frey).

4.2. Family Apidae

Apis mellifera Linnaeus, 1758

Lv: Varzuga 6.VIII.2011 1 worker (Paukkunen). The honey bee does not survive in the area without the help of beekeepers. According to Semenov-Tyan-Shanskiy (1975), the honey bee was introduced to the Murmansk region in 1949 for the pollination of cucumbers in greenhouses.

Bombus alpinus (Linnaeus, 1758)

Lim: Alluaiv mt.; Imandra l.; Kirovsk; Kirovsk botanical garden; Loparskaya valley; Maloe Goltsovoe l.; Malyi Vudjavr l.; Tuljok r. Lm: Gavrilovo; Porchinikha; Tumanny sur.; Yokanga. Lp: Korabelnoe sur.; Ponoy; Svyatoy Nos. Lps: Borisoglebskiy l.; Dolgaya Shchel; Haukilampi l.; Parkkina; Pechenga; Pechengskie tundry; Trifonajärvi l.; Vayda-Guba; Voryema; Zemlyanoe. Lt: Olenya Guba; Pala Guba; Polyarnyy; Srednyaya guba. The taxon *Bombus alpinus* var. *diabolicus*, described by Friese (1911) from the Kola Peninsula, is currently synonymized with *B. polaris*.

Bombus balteatus Dahlbom, 1832

Ks: Kuolajärvi. Lim: Imandra l.; Kandalaksha; Kukisvumchorr mt.; Lovozero mts.; Malyi Vudjavr l.; Monchegorsk sur. (6 localities). Lm: Gavrilovo; Tumanny sur. Lps: Ainovy is.; Borisoglebskiy; Dolgaya Shchel; Haukilampi l.; Kaulatunturi; Kuosmoaivi; Kuvernöörinkoski; Loustari; Orshoaiivi; Parkkina; Pechenga; Pechengskie tundry; Salmijärvi; Trifonajärvi l.; Trifonovo; Zemlyanoe. Lt: Ekaterininskiy is.;

Murmansk; Notozero l.; Polyarnyy. *Lv*: Njuemmellampjok r.

Bombus bohemicus Seidl, 1837

Lim: Elmarajok r. (Anufriev *et al.* 2011); 29 km S. of Monchegorsk 2000 1 ex. (Kozlov); Umba 27.–30.VI.1887 1♀ (Edgren). *Lv*: Kuzomen 16.–22.VI.1913 2♀♀ (Hellén & Frey). “Lapponia rossica” (Sahlberg 1889: 171, as *Apathus vestalis*).

Bombus cingulatus Wahlberg, 1855

Ks: Kuolajärvi; Pyhäkuru. *Lim*: Imandra l.; Kandalaksha; Malyi Vudjavr l.; Monchegorsk sur.; Moncheguba; Verkhniy Nyud. *Lps*: Kaskama; Parkkina. *Lt*: Verkhnetulomskiy.

Bombus consobrinus Dahlbom, 1832

Lp: Ponoy 15.VII.1913 1♀ (Hellén). *Lv*: Kuzomen 16.VI.1913 1♀ (Hellén). “Lapponia rossica” (Sahlberg 1889: 171). “Kola Peninsula” (Skorikov 1914: 286, as *Hortobombus consobrinus* ssp. *sahlbergi*). The closest populations of this species outside the Kola Peninsula are in Abisko, northern Sweden, and on the north-west coast of Lake Onega in Russian Karelia. In Finland, the species is very rare and has been classified as critically endangered (Paukkunen 2010b). Females collect pollen only from the flowers of *Aconitum lycoctonum* L., Ranunculaceae (Løken 1973).

Bombus distinguendus Morawitz, 1869

Lim: Apatity 30.VI.1999 1 worker (Kozlov).

Bombus flavidus Eversmann, 1852

Ks: Sallatunturi. *Lim*: Kirovsk; Malyi Vudjavr l.; Monchegorsk sur. (5 localities). *Lps*: Borisoglebskiy; Hakokoski; Kuvernöörinkoski; Loustari; Parkkina; Pechenga; Pechengskie tundry; Salmijärvi; Zemlyanoe. *Lt*: Notozero l. *Lv*: Ponoy r. mid.

Bombus hypnorum (Linnaeus, 1758)

Kk: Ryazhkov is. *Ks*: Kuolajärvi. *Lim*: Apatity sur.; Elmarajok r.; Kirovsk botanical garden; Malaya Belaya r.; Maloe Goltsovoe l.; Malyi Vudjavr l.; Monchegorsk sur. (12 localities); Tuljok r. *Lps*: Kuvernöörinkoski; Loustari; Menikkajoki r.; Nautsi; Orshoavi; Parkkina; Pechengskie tundry; Salmijärvi; Vaarlam is. *Lt*: Kola; Polyarnyy.

Bombus hortorum (Linnaeus, 1761)

Lim: Apatity and its sur.; Elmorajok r. upp.; Kirovsk botanical garden; Monchegorsk sur.; Revda; Umba r. upp. *Lps*: Dolgaya Shchel; Trifonovo. *Lt*: Kola.

Bombus hyperboreus Schönherr, 1809

Lim: Malyi Vudjavr l. 81 exx. (various collectors); Elmorajok r. upp. (Anufriev *et al.* 2011). *Lm*: Gavrilovo 27.VII.1913 2♂♂ (Hellén); Gavrilovo 23.VII.1913 1 worker (Frey); Varzino 5.VIII.1887 1♀ (Enwald). *Lp*: Svyatoy Nos 14.–15.VIII.1880 1♀, 2 workers (Enwald) (Enwald 1881: 255, Sahlberg 1889: 171). *Lps*: Pechenga (Løken 1973: 116). In Fennoscandia this rare species is confined to the high alpine and tundra regions. It has been classified as near threatened in Finland (Paukkunen 2010b). The queens usually do not set up their own nests, but lay their eggs in the nests of *B. polaris* or *B. alpinus*, in which the larvae develop as inquilines (Söderman & Leinonen 2003).

Bombus jonellus (Kirby, 1802)

Kk: Ryazhkov is. *Ks*: Kuolajärvi. *Lim*: Alluaiv mt.; Apatity sur.; Ekostrovski; Elmarajok r.; Kandalaksha; Kanozero l.; Kapustnoe; Khibiny st.; Kirovsk botanical garden; Loparskaya valley; Lovozero mts.; Maloe Goltsovoe l.; Malyi Vudjavr l.; Monchegorsk and its sur. (15 localities); Moncheguba; Olenegorsk sur.; Tuljok r.; Umba; Vavnbed; Viteguba; Vudjavrjok r. *Lm*: Gavrilovo; Marjok r. low.; Tumanny sur.; Voronya r.; Voronye; Yokanga. *Lp*: Ponoy. *Lps*: Ainovy is.; Borisoglebskiy; Chervyanaya; Dolgaya Shchel; Haukilampi l.; Kalkupää; Kuosmoaivi; Kuvernöörinkoski; Lotta r.; Loustari; Mattert; Menikkajoki r.; Nautsi; Orshoavi; Parkkina; Pechenga; Pechengskie tundry; Pitkäjärvi; Pitkäloukko; Salmijärvi; Trifonovo; Vayda-Guba; Vaarlam is.; Zemlyanoe. *Lt*: Kildin is.; Kola fjord; Kola r.; Kola town; Murmansk; Notozero l.; Pak r. low.; Polyarnyy; Solovaraka; Verkhnetulomskiy. *Lv*: Chavanga; Kashkarantsy; Kuzomen; Njuemmellampjok r.; Olenitsa; Ponoy r. mid.; Ponoy r. upp.; Tetrino; Varzuga.

Bombus lapponicus (Fabricius, 1793)

Ks: Kuolajärvi. *Lim*: Alluaiv mt.; Chalmozero l.; Ekostrovski; Elmarajok r.; Imandra l.;

Kandalaksha; Kirovsk botanical garden; Kuniyok r.; Loparskaya valley; Lovozero mts.; Malaya Belaya r.; Maloe Goltsovoe l.; Malyi Vudjavr l.; Monchegorsk sur. (10 localities); Moncheguba; Poachjok r.; Seidozero l.; Tuljok r.; Vavnbed; Vudjavrjok r. *Lm.*: Gavrilovo; Porchinikha; Tumanny sur.; Voronya r.; Voronye; Yokanga. *Lp.*: Chapoma; Korabelnoe sur.; Ponoy. *Lps.*: Ainov is.; Borisoglebskiy; Dolgaya Shchel; Gagarka; Harjuvaara; Haukilampi l.; Kalkupää; Kaskama; Kuosmoaivi; Kuvernöörinkoski; Liinahamari; Loustari; Mattert; Menikkajoki r.; Nautsi; Nikel; Orshoaivi; Parkkina; Pechenga; Pechengskie tundry; Pitkäjärvi; Salmijärvi; Trifonajärvi l.; Trifonovo; Vayda-Guba; Vaarlam is.; Voryema; Zemlyanoe. *Lt.*: Abram-Mys; Ekaterininskiy is.; Kildin is.; Kola fjord; Kola r.; Kola town; Olenya Guba; Port-Vladimir; Murmansk; Notozero l.; Ora; Polyarnyy; Solovaraka; Srednyaya guba; Tuloma r. (at “Krivets-Padun”); Verkhnetulomskiy. *Lv.*: Chavanga; Kuzomen; Tetrino. Skorikov (1912) described many new forms (subspecies, varieties and aberrations) of *Bombus lapponicus* from the Kola Peninsula based on slight differences in coat colouration. However, as the colour variation is considerable and continuous in *B. lapponicus*, these forms have little taxonomic value and should be considered as synonyms.

Bombus lucorum group

Ks.: Kuolajärvi. *Lim.*: Alluauv mt.; Apatity sur.; Berezovka; Bolshoe Goltsovoe l.; Ekostrovski; Elmarajok r.; Khibiny st.; Kirovsk botanical garden; Loparskaya valley; Malyi Vudjavr l.; Monchegorsk sur. (13 localities); Revda; Umba; Verkhniy Nyud; Vudjavrjok r. *Lm.*: Yokanga. *Lps.*: Dolgaya Shchel; Kuvernöörinkoski; Nautsi; Loustari; Parkkina; Pechenga; Pechengskie tundry; Salmijärvi; Trifonovo; Zemlyanoe. *Lt.*: Kola town; Pak r. low.; Polyarnyy; Verkhnetulomskiy. *Lv.*: Chavanga; Kashkarantsy; Kuzomen; Kuzreka; Njuemmellampjok r.; Olenitsa; Ponoy r. mid.; Varzuga. We have not been able to discriminate among the cryptic species of the *Bombus lucorum* group, i.e. *Bombus lucorum*, *B. cryptarum* and *B. magnus*. In North Europe, these species are morphologically very similar, and reliable identification is possible only through DNA barcoding or by analyzing labial gland se-

cretions of males (Bertsch 2009). It is possible that both *B. lucorum* and *B. cryptarum* occur in the Kola Peninsula.

Bombus monticola Smith, 1849

Lm.: Gavrilovo. *Lp.*: Ponoy. *Lps.*: Dolgaya Shchel; Liinahamari; Loustari; Orshoaivi; Parkkina; Pechengskie tundry; Pitkäjärvi; Trifonajärvi l.; Zemlyanoe. This species is difficult to distinguish morphologically from *B. lapponicus* (Gjershaug *et al.* 2013), and a more reliable assessment of its distribution on the Kola Peninsula would require the application of molecular methods.

Bombus pascuorum (Scopoli, 1763)

Ks.: Kuolajärvi. *Lim.*: Apatity sur.; Elmarajok r. upp.; Kandalaksha; Khibiny st.; Kirovsk botanical garden; Malaya Belaya r.; Malyi Vudjavr l.; Monchegorsk sur. (6 localities); Olenegorsk sur.; Revda; Seidozero l.; Tuljok r.; Umba; Umba r. upp.; Verkhniy Nyud; Viteguba; Vudjavrjok r. *Lp.*: Ponoy. *Lps.*: Menikkajoki r.; Vaarlam is. *Lt.*: Pak r. low. *Lv.*: Olenitsa sur.; Varzuga.

Bombus pratorum (Linnaeus, 1761)

Ks.: Kuolajärvi. *Lim.*: Apatity sur.; Elmarajok r.; Imandra l.; Khibiny st.; Kirovsk botanical garden; Kuniyok r.; Loparskaya valley; Maloe Goltsovoe l.; Malyi Vudjavr l.; Monchegorsk sur. (8 localities); Moncheguba; Seidozero l.; Umba; Vudjavrjok r. *Lps.*: Borisoglebskiy; Haukilampi l.; Kuvernöörinkoski; Loustari; Mattert; Orshoaivi; Parkkina; Pechenga; Pechengskie tundry; Pitkäloukko; Saarikoski; Salmijärvi; Trifonovo; Vaarlam is.; Zemlyanoe. *Lt.*: Srednyaya guba; Verkhnetulomskiy.

Bombus polaris Curtis, 1835

Lim.: Khibiny mts.; Lovozero mts. *Lm.*: Gavrilovo; Voronya r. *Lps.*: Chervyanaya; Dolgaya Shchel; Haukilampi l.; Kaulatunturi; Loustari; Orshoaivi; Parkkina; Pechenga; Pechengskie tundry; Vayda-Guba; Zemlyanoe.

Bombus sporadicus Nylander, 1848

Kk.: Ryazhkov is. *Lim.*: Apatity sur.; Ekostrovski; Elmarajok r. upp.; Kuniyok r. upp.; Loparskaya valley; Maloe Goltsovoe l.; Monchegorsk and its sur. (7 localities); Seidozero l.; Tuljok r.; Verkhniy Nyud; Malyi Vudjavr l. *Lt.*: Pak r. low. This is the only hymenopteran species included in the Red Book of the Murmansk region, in which it

has been classified as a rare species, found only in the meadows surrounding Kandalaksha (Shutova 2003). However, the species is common and occurs abundantly for example in the Khibiny Mountains (Anufriev *et al.* 2011) and near Monchegorsk, also in severely polluted areas.

Bombus sylvestris (Lepeletier, 1832)

Lim: 20 km S. of Monchegorsk 2000 1 ex, (Kozlov); Malyi Vudjavr l. 52 exx. (Fridolin) (Fridolin 1936: Table 5, as *Psithyrus silvestria*); Kirovsk botanical garden 4.VIII.2011 approximately 8♂♂ (Paukkunen). Lt: Pak r. low. 1.VIII.2011 3♂♂ (Paukkunen).

Bombus veteranus (Fabricius, 1793)

Ks: Kuolajärvi 7.VIII.2011 1♂ (Paukkunen). Lim: Verkhniy Nyud 3.VIII.2011 1♂ (Paukkunen).

Nomada leucophthalma (Kirby, 1802)

Lim: Malyi Vudjavr l. (Fridolin 1936: 128).

Nomada panzeri Lepeletier, 1841

Ks: Kuolajärvi; Pyhäkuru. Lim: Ekostrovski; Kandalaksha; Kunijok r.; Malyi Vudjavr l.; Monchegorsk sur. Lp: Pulonga r. Lps: Gagarka; Lotta r.; Loustari; Nautsi; Nikel; Parkkina; Pitkäjärvi; Sairaalantunturi; Zapolyarnyy sur. Lt: 50 km E of Murmansk; Solovaraka.

4.3. Family Bethylinidae

Bethylus berlandi Arlé, 1929

Lv: Kashkarantsy 20.–25.VII.1887 (Levander) (Hellén 1920b: 279 and 1953: 91, as *B. apteryx*).

Bethylus fuscicornis (Jurine, 1807)

Lv: Kuzomen 22.VI.1913 2♀♀ (Frey) (Hellén 1920b: 280, as *B. fuscicornis* f. *syngenesiae*).

4.4. Family Chrysididae

Elampus panzeri (Fabricius, 1804)

Ks: Kuolajärvi 16.VII.1938 1♂ (Y. Kangas).

Chrysis angustula Schenck, 1856

Ks: Kuolajärvi 26.VI.1938 1♂ (Y. Kangas).

Chrysis fulgida Linnaeus, 1761

Ks: Pyhäkuru 12.VII.1939 1♂ (Lankiala). Lim: Malyi Vudjavr l. 9.VIII.1937 1♀ (Fridolin).

Chrysis schencki Linsenmaier, 1968

Ks: Kuolajärvi 1910s 1♂ (Nordström) (Hellén 1920a: 213, as *C. ignita*); Pyhäkuru 9.VII.1934 1♀ (Hellén); Vuorijärvi 11.VII.1934 1♀ (Hellén). Lps: Vaarlam is. (Humala & Polevoi 2011: 278, as *Chrysis* sp.).

Chrysis sp. *sensu* Paukkunen *et al.* 2014

Lim: Kandalaksha 8.VII.1913 1♂ (Hellén). Lps: Loustari 1♂ (Grönblom). Lt: 45 km E. of Murmansk 16.VII.2006 1♀ (Kozlov). Lv: Kashkarantsy 20.VII.1887 1♀ (Levander). This is an undescribed species, which is closely related to *C. ignita* and *C. impressa* (Paukkunen *et al.* 2014, Soon *et al.* 2014).

Chrysura hirsuta (Gerstaecker, 1869)

Lv: Chavanga 7.VIII.1887 1♀ (Levander) (Sahlberg 1910b: 97, as *Chrysis osmiae*; Hellén 1920a: 210, as *Chrysis hirsuta*).

4.5. Family Colletidae

Hylaeus annulatus (Linnaeus, 1758)

Ks: Kuolajärvi 8.–13.VII.1938 1♂ 1♀ (Y. Kangas), 29.VI.1937 1 ex. (E. Kangas), 20.VI.1938 1♀ (Karvonen). Lim: Kandalaksha 28.VI.1870 1♀ (Sahlberg); Malyi Vudjavr l. (Fridolin 1936).

4.6. Family Crabronidae

Alysson ratzeburgi Dahlbom, 1843

Ks: Kuolajärvi; Vuorijärvi. Lim: Apatity sur.; Monchegorsk sur. Lps: Köngäs; Pechenga; Vaarlam is. Lv: Olenitsa.

Crabro lapponicus Zetterstedt, 1838

Lim: Kandalaksha 5.VII.1913 1♀ (Frey); Khibiny mts. 11.VII.1962 1♂ (Arens). Lv: Kuzreka 6.VII.1887 1♂ (Levander).

Crabro maeklini Morawitz, 1866

Lps: Haukilampi l. 1♂ (Kanervo); Loustari 9.VII.1930 1♂ (Hellén), 10.VII.1930 1♀ (Frey); Pechenga (Lomholdt 1976: 298). This rare species is known from Fennoscandia, Siberia, Mongolia, Ukraine and Kazakhstan (Pulawski 2011). It is classified as near threatened in Finland, Nor-

way and Sweden (Paukkunen 2010b, Hansen *et al.* 2010, Cederberg *et al.* 2010).

Crossocerus barbipes (Dahlbom, 1845)

Ks.: Kuolajärvi 24.IX.1938 1♂ (Y. Kangas).

Crossocerus dimidiatus (Fabricius, 1781)

Lim.: 1 km N. of Monchegorsk 28.VII.2005 1♂ (Kozlov). Lps.: Longvatn (Polevoi & Humala 2011: 278).

Crossocerus leucostoma (Linnaeus, 1758)

Ks.: Kuolajärvi. Lim.: Kandalaksha; Khibiny mts.; Monchegorsk. Lps.: Haukilampi 1.; Loustari; Salmijärvi. Lt.: Kola.

Crossocerus nigrinus Lepeletier & Brullé, 1835

Lim.: Malyi Vudjavr l. 23.VII.1934 1♀ (Fridolin) (Fridolin 1936: 131, as *Crabro pubescens*).

Crossocerus ovalis Lepeletier & Brullé, 1835

Lim.: Apatity sur.; Kandalaksha; Kunijok r.; Malaya Belaya r.; Monchegorsk sur. Lps.: Köngäs.

Crossocerus varus Lepeletier & Brullé, 1835

Lim.: Apatity 12.VIII.2012 2♂♂ 1♀ (Kozlov).

Crossocerus wesmaeli (Vander Linden, 1829)

Lim.: 5 km N. of Monchegorsk 15.VII.2005 2♂♂ (Kozlov); Khibiny mts. 20.VII.1928 1 ex. (Stark); Khibiny st. 27.VIII.1928 1♀ (Cheburova). Lps.: 0,8 km E. of Zapolyarnyy 1.VII.2005 1♂ (Kozlov).

Ectemnius borealis (Zetterstedt, 1838)

Ks.: Vuorijärvi sur. ("Outonjoki") 26.VI.1936, 1♀ (Frey); Vuorijärvi 9.VII.1934 1♀ (Hellén). Lim.: Khibiny st. 27.VIII.1928 1 ex. (Cheburova).

Ectemnius continuus (Fabricius, 1804)

Ks.: Kuolajärvi; Pyhäkuru; Vuorijärvi. Lim.: Malaya Belaya r. Lps.: Loustari; Parkkina. Lv.: Kashkarantsy.

Ectemnius guttatus (Vander Linden, 1829)

Lim.: Khibiny st. 4.–15.VIII.1928 2♀♀ (Cheburova).

Gorytes neglectus Handlirsch, 1895

Lim.: Kandalaksha 7.VII.1913 2♂♂ (Hellén), 8.VII.1913 1♀ (Frey) (Grönblom 1916: 29, Pulkkinen 1931: 63, Hellén 1954: 127, as *G. fallax*, Hellén 1955: 67). Lps.: Lotta r. (at "Rohvinan kenttä") 11.VII.1899 1♀ (Poppius)

(Grönblom 1916: 29, Pulkkinen 1931: 63, Hellén 1954: 127, as *G. fallax*, Hellén 1955: 67). "Lapponia rossica" (Lomholdt 1975: 199). This is a rare, northern species which lives in sandy open areas, e.g. along rivers and on dry meadows. It is classified as near threatened in Finland (Paukkunen 2010b). In addition to Finland and the Murmansk region, it is known from the northern part of the Republic of Karelia, Siberia (Ural, Altai, Ussuri), Korea and Sakhalin (Pulawski 2011).

Lindenius albilabris (Fabricius, 1793)

Ks.: Kuolajärvi 7.VIII.2011 1♀ (Paukkunen).

Mimesa equestris (Fabricius, 1804)

Ks.: Kuolajärvi 16.VII.1938 1♂ (Y. Kangas). Lim.: Apatity (Anufriev *et al.* 2011).

Mimumesa dahlbomi (Wesmael, 1852)

Lim.: 9 km S. of Monchegorsk 24.VII.2004 1♂ (Kozlov).

Passaloecus monilicornis Dahlbom, 1842

Ks.: Kuolajärvi 4.VII.1938 1♀ (Y. Kangas). Lps.: Vaarlam is. (Polevoi & Humala 2011: 278).

Pemphredon inornata Say, 1824

Lim.: Khibiny mts. 20.VII.1925 1 ex. (Stark). Lps.: Karablekk (Polevoi & Humala 2011: 278); 1.2 km E. of Nickel 7.VII.2004 1♂ (Kozlov).

Pemphredon lugens Dahlbom, 1842

Ks.: Vuorijärvi 9.–11.VII.1934 3♂♂ (Hellén).

Pemphredon lugubris (Fabricius, 1793)

Lps.: Haukilampi 1. 2.–8.VII.1937 1♀ (Nordman). Lv.: Kashkarantsy 20.–25.VII.1887 1♂ (Edgren).

Pemphredon montana Dahlbom, 1845

Ks.: Kuolajärvi 1910s 1♀ (Nordström); Kutsa r. 2♀♀ (E. Kangas); Vuorijärvi 10.–11.7.1934 4♀♀ (Hellén).

Rhopalum clavipes (Linnaeus, 1758)

Ks.: Kuolajärvi 1♀ (Ritavuori). Lps.: Vaarlam is. (Polevoi & Humala 2011: 278).

Tachysphex pompiliformis (Panzer, 1805)

Lv.: Kashkarantsy 20.VII.1887 1♀ (Levander).

Trypoxylon medium Beaumont, 1945

Lim.: Imandra l. 18.VI.1911 1♂ (Solovyev).

4.7. Family Dryinidae

Anteon pubicorne (Dalman, 1818)

Ks: Vuorijärvi 10.VII.1934 1♂ (Hellén) (Hellén 1953: 99, as *A. lucidus*). “Lapponia rossica” (Olm 1994: 56, 90).

Anteon subarcticum Hellén, 1953

Lps: Lotta r. near Köngäs 14.VII.1939 1♀ (Platonoff) (Hellén 1953: 97).

Anteon tenuicorne (Dalman, 1823)

Ks: Alakurtti 8.VII.1934 1♂ (Hellén).

Gonatopus clavipes (Thunberg, 1827)

Lim: Kandalaksha 21.VII.1870 1♀ (Sahlberg) (Sahlberg 1910: 14, as *G. borealis*; Hellén 1920b: 289, as *G. pilosus*; Hellén 1953: 94, as *G. sepsoides*). Lp: Devyatoy 5.–8.VIII.1870 1♀ (Sahlberg) (Sahlberg 1910a: 9, as *G. pilosus*; Hellén 1920b: 289, as *G. pilosus*). “Lapponia rossica” (Olm 1994: 83, 90).

Lonchodryinus daos (Walker, 1837)

Lp: Ponoy 17.VII.1913 1♂ (Frey).

Lonchodryinus longicornis (Dalman, 1823)

Lim: Kandalaksha 7.VII.1913 1♂ (Frey) (Hellén 1920b: 285). Lp: Ponoy 13.–19.VII.1913 1♀ (Hellén) (Hellén 1920b: 285). Lps: Salmijärvi 8.VII.1930 2♂♂ (Hellén).

Lonchodryinus ruficornis (Dalman, 1818)

Ks: Vuorijärvi. Lim: Ekostrovski; between Imandra and Kandalaksha; Kandalaksha. Lp: Ponoy. Lps: Borisoglebskiy; Chervyanaya; Kalkupää (identification uncertain); Lotta r.; Loustari; Menikkajoki r. (identification uncertain); Vaarlam is. (identification uncertain). Lt: Kola.

Lonchodryinus subapterus (Kieffer, 1905)

Lim: Ekostrovski 9.VII.1870 1♀ (Sahlberg) (Hellén 1920b: 285, as *Anteon longicornis* f. *subaptera*). “Lapponia rossica” (Hellén 1953: 100, as *Prenanteon ruficornis* f. *subaptera*).

4.8. Family Formicidae

Camponotus herculeanus (Linnaeus, 1758)

Kk: Bolshaya Bogomolikhka is.; Bolshoi Lomnishnyi is.; Devichya Luda is.; Dokucheikhka is.; Kurichek is.; Lambin is.; Malyi Lomnishnyi

is.; Ryazhkov is. Ks: Kuolajärvi. Lim: Apatity sur.; Chuna-tundra; Elmarajok r.; Kandalaksha; Kanozero l.; Kapustnoe; Kunijok r. upp.; Loparskaya valley; Lovozero mts.; Maloe Goltsovoe l.; Malyi Vudjavr l.; Monchegorsk sur. (11 localities). Lps: Nautsi; Lotta r.; Pasvik Nature Reserve. Lv: Kashkarantsy; Olenitsa sur.

Formica aquilonia Yarrow, 1955

Kk: Bolshoi Lomnishnyi is.; Ryazhkov is. Ks: Kuolajärvi; Pyhäkuru. Lim: Kanozero l.; Monchegorsk sur. (3 localities); Umba. Lps: Köngäs; Nautsi (identification uncertain); Pasvik Nature Reserve. Lv: Kuzomen sur.; Olenitsa sur.

Formica exsecta Nylander, 1846

Kk: Bolshoi Lomnishnyi is.; Ryazhkov is. Ks: Kuolajärvi. Lim: Malyi Vudjavr l.; Monchegorsk sur. Lp: Chapoma. Lps: Köngäs; Nickel sur.; Pasvik Nature Reserve; Pechenga; Salmijärvi. Lv: Njuemmellampjok r.; Olenitsa sur.

Formica gagatoides Ruzsky, 1904

Kk: Ryazhkov is. Ks: Kuolajärvi. Lim: Alluaiv mt.; Elmarajok r.; Kandalaksha; Kanozero l.; Malaya Belaya r.; Malyi Vudjavr l.; Monchegorsk and its sur.; Vudjavrjok r. Lim: Dalnie Zelentsy; Virma r. Lp: Chapoma. Lps: Borisoglebskiy; Harjuvaara; in between Salmijärvi and Loustari; Kaskama; Kuvernöörinkoski; Kuivakoski; Loustari; Maitokoski; Nautsi; Nickel and its sur.; Lotta r.; Orshoaivi; Parkkina; Pasvik Nature Reserve; Pechenga; Pitkäjärvi; Sairaalantunturi; Salmijärvi; Trifonovo; Töllevi; Voryema. Lt: Kola. Lv: Kuzomen; Kuzreka.

Formica lemani Bondroit, 1917

Kk: Bolshoi Lomnishnyi is.; Devichya Luda is.; Kurichek is.; Ryazhkov is. Ks: Kuolajärvi; Pyhäkuru. Lim: Apatity and its sur.; Kanozero l.; Kapustnoe; Kunijok r.; Malaya Belaya r.; Monchegorsk sur. (11 localities); Vudjavrjok r. Lim: Voronye. Lp: Ponoy. Lps: Köngäs; Loustari; Nautsi (identification uncertain); Nickel and its sur.; Pechenga; Sairaalantunturi; Salmijärvi (identification uncertain). Lt: Kola; Solovarakka; Verkhnetulomskiy. Lv: Kuzreka; Olenitsa.

Formica lugubris Zetterstedt, 1838

Kk: Bolshaya Bogomolikhka is.; Bolshoi Lomnishnyi is.; Devichya Luda is.; Kurichek is.; Lambin is.; Ryazhkov is. Li: Jäniskoski. Lim:

Elmorajok r. upp.; Kanozero l.; Malaya Belaya r.; Maloe Goltsovoe l.; Monchegorsk sur. Lps: Köngäs; Nikel and its sur.; Pasvik Nature Reserve; Pechenga. Lt: Kola town sur.; Solovaraka. Lv: Kashkarantsy sur.

Formica picea Nylander, 1846

Lim: Malyi Vudjavr l. Lps: Nautsi; Nikel and its sur.; Pasvik Nature Reserve; Pechenga; Salmijärvi.

Formica polyctena Förster, 1850

Kk: Malyi Lomnishnyi is. (Byzova *et al.* 1986: 281). Li: Jäniskoski (Makarova 2005: 62). Lim: 35 km S. of Monchegorsk (Zvereva *et al.* 2010: 614). Lv: Kuzomen 17.VI.1913 1♀ (Hellén); Kuzreka 8.–13.VII.1887 1 worker (Levander).

Formica sanguinea Latreille, 1798

Kk: Bolshoi Lomnishnyi is.; Devichya Luda is.; Ryazhkov is. Lim: Apatity sur.; Berezovka; Kandalaksha; Monchegorsk sur. (2 localities). Lps: Pasvik Nature Reserve.

Formica suecica Adlerz, 1902

Lv: Kuzomen 21.VI.1913 5 workers (Hellén & Frey). The specimens were collected from sand dunes on the eastern side of the Varzuga river. The species is rare in Fennoscandia and has been classified as near threatened in Finland (Paukkunen 2010b).

Formica truncorum Fabricius, 1804

Kk: Bolshoi Lomnishnyi is.; Devichya Luda is.; Ryazhkov is. Ks: Kuolajärvi. Lim: Elmarajok r.; Monchegorsk sur. (5 localities). Lps: Nautsi; Nikel and its sur.; Pasvik Nature Reserve. Lt: Verkhnetulomskiy sur.; Notozero l. Lv: Kashkarantsy.

Formica uralensis Ruzsky, 1895

Ks: Kuolajärvi 12.VII.1935 1 worker (Krogerus). Lps: Lotta r. N. of Köngäs 14.VII.1939 1 worker (Platonoff); Nautsi 1 worker (Kanervo); Parkkina Sairaalantunturi 2.VII.1929 1 worker (Håkan Lindberg); Pasvik Nature Reserve and its sur. (Mershchiev 2006: 164). “Lapponia rossica” (Collingwood 1979: 165).

Harpagoxenus sublaevis (Nylander, 1849)

Lim: 5 km S. of Monchegorsk 2009 1 ex. (Kozlov). Lps: Zemlyanoe 17.–20.VII.1930

2♀♀ 3 workers (Hellén). “Lapponia rossica” (Collingwood 1979: 161).

Leptothorax acervorum (Fabricius, 1793)

Kk: Bolshaya Bogomolikha is.; Bolshoi Lomnishnyi is.; Devichya Luda is.; Dokucheikha is.; Kurichek is.; Lambin is.; Malyi Lomnishnyi is.; Ryazhkov is. Ks: Kuolajärvi. Lim: Apatity sur.; Malyi Vudjavr l.; Monchegorsk sur. (10 localities); Umba; Vudjavrjok r. Lm: Dalnie Zelentsy; Virma r.; Voronye. Lp: Ponoy. Lps: Borisoglebskiy; Dolgaya Shchel; Kuvernöörinkoski; Kuivakoski; Kuosmoaivi; Köngäs; Loustari; Nautsi; Nikel and its sur.; Paz r.; Parkkina; Pasvik Nature Reserve; Pechenga; Voryema; Zemlyanoe. Lt: Kola; Polyarnyy. Lv: Kashkarantsy; Kuzomen; Olenitsa sur.

Myrmica lobicornis Nylander, 1846

Kk: Bolshoi Lomnishnyi is.; Devichya Luda is.; Dokucheikha is.; Malyi Lomnishnyi is.; Ryazhkov is. Ks: Pyhäkuru. Lim: Malyi Vudjavr l.; Monchegorsk sur. (4 localities); Umba.

Myrmica rubra (Linnaeus, 1758)

Kk: Bolshoi Lomnishnyi is.; Ryazhkov is. Ks: Kuolajärvi. Lim: Apatity and its sur.; Malaya Belaya r.; Malyi Vudjavr l.; Monchegorsk sur. (4 localities); Vudjavrjok r.

Myrmica ruginodis Nylander, 1846

Kk: Bolshaya Bogomolikha is.; Bolshoi Lomnishnyi is.; Dokucheikha is.; Kurichek is.; Lambin is.; Malyi Lomnishnyi is.; Ryazhkov is. Ks: Alakurtti; Kuolajärvi. Lim: Apatity sur.; Kanozero; Malaya Belaya r.; Malyi Vudjavr l.; Monchegorsk sur. (11 localities); Umba; Vudjavrjok r. Lps: Borisoglebskiy; Harjuvaara; Kaskama; Nikel sur.; Pasvik Nature Reserve; Pechenga; Salmijärvi; Trifonovo. Lt: Kola.

Myrmica scabrinodis Nylander, 1846

Kk: Bolshoi Lomnishnyi is. and Ryazhkov is. (Byzova *et al.* 1986: 281). Ks: Kuolajärvi 27.VII.1934, 1 worker, 10.VII.1935, 2 workers (Krogerus).

Myrmica sulcinodis Nylander, 1846

Kk: Devichya Luda is. Lim: Apatity sur.; Kunijok r. upp.; Malyi Vudjavr l.; Monchegorsk sur. (5 localities). Lps: Köngäs; Lotta r. (at “Sorvitsjävär”); Pasvik Nature Reserve.

4.9. Family Halictidae

Lasioglossum calceatum (Scopoli, 1763)

Ks: Kuolajärvi 7.VIII.2011 2♀♀ (Paukkunen).
Lim: Apatity 4.VIII.2014 1♂ (Kozlov);
Berezovka 4.VIII.2014 1♂ 1♀ (Kozlov);
Kapustnoe 4.VIII.2014 2♂♂ (Kozlov). The record from *Lps* (Elfving 1968: 25) is probably based on a mislabelled female specimen collected by E. Kanervo from *Lkor*: Sodankylä.

Lasioglossum fratellum (Pérez, 1903)

Ks: Kutsa r. (at “ylimmäinen Jänisköngäs”);
Kuolajärvi; Vuorijärvi. Lim: Berezovka; Imandra l.; Kandalaksha; Kapustnoe; Kirovsk; Monchegorsk sur. (8 localities); Umba. Lps: Gagarka; Hakokoski; Haukilampi l.; Kaskama; Lotta r.; Loustari; Nautsi; Nikel; Parkkina; Pitkäjärvi; Salmijärvi; Spasitelnaya Gora; Töllevi; Voryema. Lt: Pak r. low.; Verkhnetulomskiy.

Lasioglossum rufitarse (Zetterstedt, 1838)

Lim: Apatity 4.VIII.2014 1♂ (Kozlov); province *Li* (Söderman & Leinonen 2003: 155).

Sphecodes hyalinatus Hagens, 1882

Lim: Malyi Vudjavr l. (Fridolin 1936: 131).

4.10. Family Megachilidae

Megachile analis Nylander, 1852

Lv: 8 km W. of Tetrino 2.VII.2004 1♂ (Kozlov).

Osmia cf. *disjuncta* Tkalcù, 1995

Lps: 2 km E. of Nikel 4.VII.2007 1♀ (Kozlov). The specimen resembles the Mongolian species *O. disjuncta*, but it could also belong to an undescribed species. So far, a few similar specimens have been found from northern Finland and Sweden (Niklas Johansson, pers. comm.).

Osmia inermis (Zetterstedt, 1838)

Lt: Kola r. 7.VII.1883 2♀♀ (Enwald) (Sahlberg 1889: 176, as *O. uncinata* [misidentified]).

Osmia laticeps Thomson, 1872

Lps: Nautsi 1♀ (Kanervo) (Elfving 1968: 41, as *O. inermis* [misidentified]).

Osmia maritima Friese, 1885

Lp: 16–17 km NE. of Chapoma 30.VI.2004 1♂ 1♀ (Kozlov). Lv: Kuzomen 16.–22.VI.1913

2♂♂ (Hellén & Frey) (Forsius & Nordström 1921: 72). The closest known populations of this species are in southern Sweden and Norway. In both countries, the species is classified as critically endangered (Cederberg *et al.* 2010, Hansen *et al.* 2010). The distribution area extends also to the coastal areas of Denmark, Germany, the Netherlands, Poland, Mongolia, eastern Siberia, Alaska and Canada’s Northwest Territories (Rightmyer *et al.* 2010, Müller 2011).

Osmia nigriventris (Zetterstedt, 1838)

Ks: Vuorijärvi 11.VII.1934 1♂ (Hellén). Lim: in between Kandalaksha and Zasheek 3.VII.1870 1♀ (Sahlberg) (Sahlberg 1889: 176); Malyi Vudjavr l. (Fridolin 1936); four localities 5 km N. to 20 km S. of Monchegorsk 2000 4 exx. (Kozlov). Lps: Kaskama, 1♂ (Grönblom).

4.11. Family Pompilidae

Anoplius tenuicornis (Tournier, 1889)

Lim: Kunijok r. upp. (Anufriev *et al.* 2011). Lps: Lotta r. (Nordström & Forsius 1928: 3, 8, as *Psammochares piliventris*); Pitkäjärvi (“Kivijärvi and Laukkujoki”) 20.VII.1929 1♀ (Storå) (Wolf 1967: 37); Voryema 13.VII.1929 1f ♂ (Lindberg). Lv: Kashkarantsy 20.VII.1887 1♂ (Levander) (Nordström & Forsius 1928: 8, as *P. piliventris*). The record from *Lps* by Nordström and Forsius (1928) is probably erroneous, because it is based on specimens, which were collected by B. Poppius in August 1899, probably from the Finnish side of the Lotta river, province *Li*.

Arachnospila fumipennis (Zetterstedt, 1838)

Lim: Kandalaksha 8.VII.1913 1♂, 1♀ (Hellén); Khibiny st. 4.–9.VIII.1908 1♂, 1♀ (Cheburova); Malyi Vudjavr r. (Fridolin 1936: 131). Lp: Pyalitsa 28.VIII.1870, 1♀ (Sahlberg) (Wolf 1967: 30). Lps: Lotta r. (Poppius) (Nordström & Forsius 1928: 3, Wolf 1967: 30). The records from *Lps* by Nordström and Forsius (1928) and Wolf (1967) are based on four female specimens collected by B. Poppius in 1899 from the shores of the Lotta river. It is possible that all these specimens have been, however, collected from the province *Li* on the Finnish side of the river.

Arachnospila trivialis (Dahlbom, 1843)

Lim: Apatity sur. (Anufriev *et al.* 2011); between Kandalaksha and Zasheek 3.VII.1870 1♀ (Sahlberg) (Nordström & Forsius 1928: 7, as *Psammochoares unguicularis*); Malaya Belaya r. (Anufriev *et al.* 2011). Lps: Vaarlam is. (Polevoi & Humala 2011).

Ceropales maculata (Fabricius, 1775)

Lim: Malaya Belaya r. (Anufriev *et al.* 2011). Lps: Lotta r. near Kōngäs 14.VII.1939 1♀ (Platonoff) (Wolf 1967: 43).

Dipogon bifasciatus (Geoffroy, 1785)

Lim: Malyi Vudjavr l. (Fridolin 1936: 130).

Dipogon vechti Day, 1979

Ks: Vuorijärvi 9.VII.1934 1♂ (Hellén). Lps: Loustari 14.VII.1938 1♀ (Karvonen). In Fennoscandia *D. vechti* is a rare, cavity-nesting spider wasp species, which has been red listed in Finland and Sweden (Paukkunen 2010b, Cederberg *et al.* 2010).

Evagetes alamannicus (Blüthgen, 1944)

Lim: Kandalaksha 30.VI.1870 1♀ (Sahlberg), 7.–8.VII.1913 3♀♀ (Frey & Hellén) (Nordström & Forsius 1928: 7, as *Psammochoares proximus*).

Evagetes sahlbergi (Morawitz, 1893)

Ks: Kuolajärvi 7.VIII.2011 1♀ (Paukkunen). Lps: Lotta r. near Kōngäs 14.VII.1939 1♂ (Platonoff) (Wolf 1967: 34, as *E. implicatus*). This species was erroneously reported from *Lps* by Nordström and Forsius (1928: 3, 7, as *Psammochoares campestris*) based on a female specimen collected by B. Poppius on 26.VIII.1899 from sand dunes near Kompsiovaarat fells on the shore of the Lotta river in the province *Li*.

Priocnemis parvula Dahlbom, 1845

Lim: Malaya Belaya r. (Anufriev *et al.* 2011). This species was erroneously reported from *Lps* (Nordström & Forsius 1928: 3–4, as *P. minor*, Wolf 1967: 22) on the basis of a female specimen collected by B. Poppius on 26.VIII.1899 from sand dunes near Kompsiovaarat fells on the shore of the Lotta river in the province *Li*.

4.12. Family Sapygidae

Sapyga similis (Fabricius, 1793)

Lim: Kukisvumchorr mt. (Fridolin 1935: 168); Malyi Vudjavr l. (Fridolin 1936: 130).

4.13. Family Sphecidae

Ammophila campestris Latreille, 1809

Lv: Kashkarantsy 25.VII.1887 1♀ (Levander); “Lapponia rossica” (Pulkkinen 1931: 52, Lomholdt 1976: 429). In Fennoscandia this species occurs mainly on sandy shores of the Baltic Sea. It has been classified as endangered in Finland, vulnerable in Norway and near threatened in Sweden (Paukkunen 2010b, Hansen *et al.* 2010, Cederberg *et al.* 2010). Kashkarantsy is the northernmost locality known for the species in Fennoscandia.

4.14. Family Vespidae

Ancistrocerus antilope (Panzer, 1798)

Ks: Vuorijärvi 11.VII.1934 1♀ (Hellén). Lt: Kola 29.VII.1913 1♀ (Hellén) (Forsius & Nordström 1923: 4).

Ancistrocerus oviventris (Wesmael, 1836)

Lim: Malyi Vudjavr l. (Fridolin 1936: 131).

Ancistrocerus parietum (Linnaeus, 1758)

Ks: Kuolajärvi 1♀ (Ritavuori), 18.VI.1937 1♂ (E. Kangas). Lim: Apatity 13.VII.2005 1♀ (Blinova).

Ancistrocerus scoticus (Curtis, 1826)

Lim: Kandalaksha 16.–18.VII.1870 2♀♀ (Sahlberg) (Forsius & Nordström 1923: 7, as *A. trimarginatus*); Malyi Vudjavr l. (Fridolin 1936: 131, as *Odynerus trimarginatus*). Lps: Rajakoski (Polevoi & Humala 2011: 278); Voryema 14.VII.1930 1♂ (Frey); Zemlyanoe 1♀ (Kanervo). Lv (Forsius & Nordström 1923: 7, as *A. trimarginatus*).

Ancistrocerus trifasciatus (Müller, 1776)

Ks: Vuorijärvi 11.VII.1934 1♀ (Hellén). Lim: Apatity 9.VII.2005 1♀ (Kozlov); Malyi Vudjavr l. (Fridolin 1936: 131); Kunijok r. upp. (Anufriev *et al.* 2011). Lt: Kola 6.VII.1906 1 ex. (Soldatov).

Dolichovespula adulterina (Buysson, 1905)

Lim: Ajkuajvenjok r. 31.VII.2007 1 ex. (Blinova); Kandalaksha 25.VI.1913 1♀ (Hellén); Malyi Vudjavr l. 12.VII.1934 2 exx., 9.VIII.1937 1 ex. (Fridolin). Lps: Orshoaiivi 1♀ (Kanervo).

Dolichovespula norwegica (Fabricius, 1781)

Lim: Chuna; Kandalaksha; Kirovsk botanical garden; Malyi Vudjavr l.; Monchegorsk sur. (9 localities); Svetloe l.; Umba; Umbozero l.; Vavnbed; Vudjavrjok r.; Vudjavrchorr; Zasheek. Lm: Marjok r. low.; Porchinikha; Tumanny sur.; Voronye; Vostochnaya Litsa. Lp: Ponoy; Tri Ostrova. Lps: Haukilampi l.; Kalkupää; Kiddjaur l.; Kuvernöörinkoski; Loustari; Mattert; Menikkajoki r.; Nautsi; Parkkina; Pitkäjärvi; Trifonovo; Vayda-Guba; Vaarlam is.; Voryema; Zemlyanoe. Lt: Kola; Nota r.; Notozero l.; Polyarnyy; Pulozero; Solovaraka; Verkhnetulomskiy. Lv: Kuzomen; Kuzreka; Njuem-mellampjok r.

Eumenes pedunculatus (Panzer, 1799)

Ks: Alakurtti 1.VIII.2014 1♀ (Kozlov).

Symmorphus allobrogus (Saussure, 1856)

Ks: Kuolajärvi; Pyhäkuru; Vuorijärvi. Lim: Kandalaksha; Kanozero l. Lps: Nautsi. Lt: Nota r.; Notozero l. Lv: Olenitsa.

Symmorphus angustatus (Zetterstedt, 1838)

Lim: 16 km S. of Monchegorsk 29.VII.1991 1♂ (Shvetsova); Malyi Vudjavr l. (Fridolin 1936: 131, as *Odynerus suecicus*).

Vespula austriaca (Panzer, 1799)

Ks: Pyhäkuru. Lim: Maloe Goltsovoe l. Lp: Chapoma sur. Lps: Longvattn; Menikkajoki r.; Vaarlam is. Lt: Verkhnetulomskiy.

Vespula rufa (Linnaeus, 1758)

Ks: Kuolajärvi; Vuorijärvi. Lim: Bolshoe Goltsovoe l.; Kandalaksha; Malyi Vudjavr l.; Monchegorsk sur. (3 localities). Lps: Kalkupää; Nautsi; Paz r.; Pitkäjärvi; Vaarlam is. Lt: Polyarnyy. Lv: Olenitsa; Varzuga.

Vespula vulgaris (Linnaeus, 1758)

Lim: Apatity; Monchegorsk sur. (2 localities). Lps: Kalkupää; Longvattn; Vaarlam is. Lt: Verkhnetulomskiy.

5. Erroneous and doubtful records

5.1. Family Andrenidae

Andrena helvola (Linnaeus, 1758)

“Lapponia rossica” (Sahlberg 1889: 173). The species has a southern distribution in Fennoscandia and therefore this record is probably erroneous.

5.2. Family Apidae

Anthophora furcata (Panzer, 1798)

Lim: Apatity sur. (Blinova 2010: 10, as *Anthophora* sp.). The specimen was reported as *Anthophora* sp., but if the generic affinity is correct, then apparently the species should be *A. furcata*, as no other species of the genus has been recorded in northern Fennoscandia. The closest verified records of *A. furcata* have been made south of Oulu, Finland.

Bombus norvegicus Sparre Schneider, 1918

Lim: Apatity sur.; Kirovsk botanical garden (Anufriev *et al.* 2011). Lim & Lm (Söderman & Leinonen 2003: 334). Although occurrence of this species in the Murmansk region is probable, the species is often confused with *B. sylvestris*, and therefore these records require confirmation.

Bombus rupestris (Fabricius, 1793)

Lt (Söderman & Leinonen 2003: 327). The record from the Murmansk region on the distribution map of Söderman and Leinonen (2003) most likely represents a mistake or a typographical error, because the closest verified records are from southern Finland.

Bombus terrestris (Linnaeus, 1758)

Lim: Apatity sur. (Anufriev *et al.* 2011). The species has a southern distribution in Fennoscandia, and it is unlikely to find it from the Murmansk region. We suspect that the record is based on dark individuals of the *Bombus lucorum* group, which are easy to confuse with *B. terrestris*.

Nomada alboguttata Herrich-Schäffer, 1839

Lps: Longvattn (Polevoi & Humala 2011: 278, Paukkunen & Kozlov 2012: 194). The record is based on a misidentified specimen of *N. panzeri*.

5.3. Family Chrysididae

Chrysis ignita (Linnaeus, 1758)

Ks: Kuolajärvi (Hellén 1920a: 213). The specimen is misidentified and represents *C. schencki*.

5.4. Family Colletidae

Hylaeus confusus Nylander, 1852

Lim (Söderman & Leinonen 2003: 63). The closest verified records have been made from Tornio, Finland.

5.5. Family Formicidae

Formica cunicularia (Latreille, 1798)

Lim: Monchegorsk sur. (Kozlov 1997: 227–228). The record must be a mistake, as the species is restricted in Fennoscandia to southern parts of Sweden and Norway (Douwes *et al.* 2012).

Formica forsslundi Lohmander, 1949

Lps: Pasvik Nature Reserve and its sur. (Mershchiev 2006: 164). The record is uncertain, because the species is easy to confuse with other closely related species, and it is not known to occur any near to the Pechenga area (Douwes *et al.* 2012).

Formica fusca Linnaeus, 1758

Kk: Bolshaya Bogomolikhka is.; Bolshoi Lomnishnyi is.; Devichya Luda is.; Dokucheikha is.; Kurichek is.; Lambin is.; Malyi Lomnishnyi is.; Ryazhkov is. (Uvarova & Uvarov 1976: 113, Byzova *et al.* 1986: 281). *Li*: Jäniskoski (Makarova 2005: 62). *Lim*: Malyi Vudjavr l. (Fridolin 1936: 134), Monchegorsk sur. (Kozlov 1997: 227–228). *Lps*: Pasvik Nature Reserve and its sur. (Mershchiev 2006: 164), Nikel and its sur., Pechenga (Mershchiev 2009: 127). We consider these records as uncertain, because the species has been commonly confused with *F. lemani* and *F. gagatoides*, and it has currently not been found north of the 66th parallel in the Nordic countries (Douwes *et al.* 2012).

Formica pratensis Retzius, 1783

Kk: Devichya Luda is.; Ryazhkov is. (Uvarova & Uvarov 1976: 114, Byzova *et al.* 1986: 281). *Lim*:

Malyi Vudjavr l. (Fridolin 1936: 135). These records are unreliable, as the species is relatively difficult to identify and the closest verified observations are from southern Finland (Douwes *et al.* 2012).

Formica rufa Linnaeus, 1758

Lim: Chuna (Semenov-Tyan-Shanskiy 1975: 106); Malyi Vudjavr l. (Fridolin 1936: 135); Monchegorsk sur. (Kozlov 1997: 227–228). The records are unreliable, as the species is often confused with other species of the *Formica rufa* group, and verified observations are not known from north of central Fennoscandia (Douwes *et al.* 2012).

Leptothorax muscorum (Nylander, 1846)

Lim (Paukkunen & Kozlov 2012: 193). The record was based on unpublished data received from D. Dubovikoff. We consider it as uncertain, because the closest verified records of *L. muscorum* are from southern Finland (Douwes *et al.* 2012).

Monomorium pharaonis (Linnaeus, 1758)

Lim: Apatity indoors, around 2000 (A. Popova pers. comm.). This species may have been misidentified.

Myrmica rugulosa Nylander, 1849

Lps: Pasvik Nature Reserve and its sur. (Mershchiev 2006: 164). The species has a southern distribution in Fennoscandia (Douwes *et al.* 2012) and it is considered unlikely to occur in the Pechenga area.

5.6. Family Halictidae

Lasioglossum fulvicorne (Kirby, 1802)

Lim: Malyi Vudjavr l. (Fridolin 1936: 128). Apparently, Fridolin used the name “*Halictus fulvicornis*” erroneously for *Lasioglossum fratellum*. The closest verified records of *L. fulvicorne* are from southern Finland.

Lasioglossum subfulvicorne (Blüthgen, 1934)

Lim (Söderman & Leinonen 2003: 152). This record is based on misidentified specimens of *L. fratellum*.

5.7. Family Megachilidae

Osmia uncinata Gerstäcker, 1869

Lim: Malyi Vudjavr I. (Fridolin 1936: 129). *Lt*: Kola r. (Sahlberg 1889: 176). The species is easy to confuse with other closely related species. Both specimens mentioned by Sahlberg (1889) are misidentified and belong to *O. inermis*.

5.8. Family Vespidae

Ancistrocerus nigricornis (Curtis, 1826)

Lim: Malyi Vudjavr I. (Fridolin 1936: 131, as *Odynerus callosus*). The closest verified records of the species have been made in southern Finland (Pekkarinen & Huldén 1991).

Dolichovespula saxonica (Fabricius, 1793)

Lim: Malyi Vudjavr I. (Fridolin 1936: 131). The species is rare in northern Fennoscandia. It is uncertain whether Fridolin's "*V. norvegica* var. *saxonica*" is compatible with *D. saxonica*.

6. Discussion

6.1. Species composition

A total of 123 species of aculeate Hymenoptera are recorded from the Murmansk region. The records of an additional 16 species are considered as uncertain, and the records of three species are erroneous. The majority of the aculeates found in the region has wide distribution areas and are more common in southern Fennoscandia. Several of these species have their northernmost known localities in the Murmansk region. These include the ant *Formica polyctena*, the digger wasps *Ammophila campestris*, *Crossocerus varus* and *Lindeniis albilabris* and the bees *Megachile analis*, *Osmia* cf. *disjuncta* and *Bombus veteranus*. At least *B. veteranus* has probably only recently dispersed to the Kola Peninsula, because it has not been recorded earlier from the area despite its easy detectability.

About ten species found in the Murmansk region are confined to mountainous and/or northern regions in Europe. The bumblebees *Bombus alpinus*, *B. hyperboreus*, *B. monticola* and *B. po-*

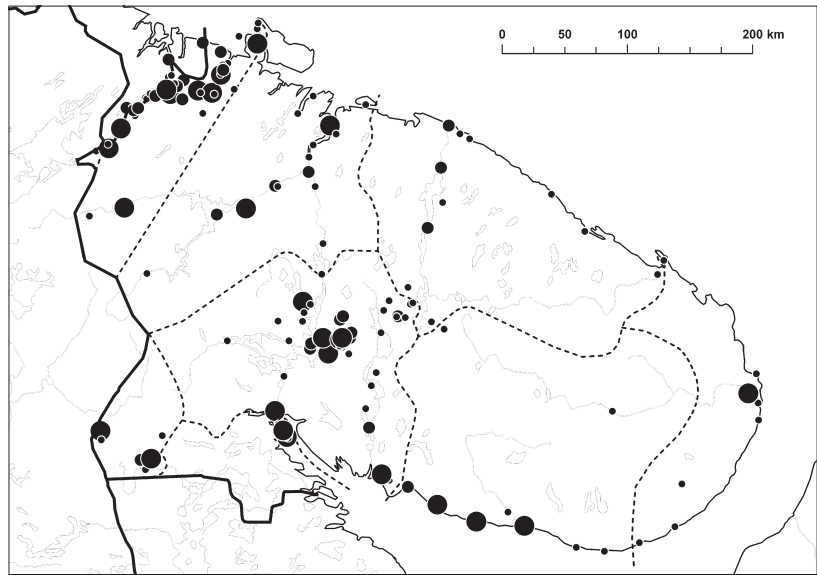
laris, which live in the treeless tundra of northern and eastern Kola Peninsula, and also in the Khibiny mountains, are particularly well adapted to cold conditions. Other northern species include the bumblebees *B. balteatus* and *B. lapponicus*, the digger wasps *Crabro maeklini* and *Gorytes neglectus* and the dryinid wasp *Anteon subarcticum*. Several species, such as *B. cingulatus*, *B. flavidus*, *B. sporadicus* and *Formica gagatooides*, have a wider northern boreal distribution in Fennoscandia.

6.2. Level of knowledge of the fauna

Although the total number of species, confirmed by the examined material, is relatively high for such a northern location, many more species are still expected to be found from the Murmansk region. This suggestion is supported by the high proportion of species that have been collected from the region only once (33 of 123 species, i.e. 27%). According to the checklist of Söderman and Vikberg (2003), a total of 230 aculeate species have been found from the approximately same sized area of northern Finland which includes the following Finnish biogeographical provinces: Ostrobothnia borealis pars borealis (*Obb*), Regio kuusamoënsis (*Ks*), Lapponia kemensis pars occidentalis (*Lkoc*), Lapponia kemensis pars orientalis (*Lkor*), Lapponia enontekiensis (*Le*) and Lapponia inarensis (*Li*). Currently, the species number for northern Finland is even somewhat larger as several new species have been found there, and some species have been split into two or more species during the past decade. Therefore we estimate that about 100 additional species could still be found from the Murmansk region. Knowledge of the distribution and abundance of different species remains also at a relatively low level. This is exemplified by the fact that *Bombus sporadicus* was included as the only hymenopteran in the Red Book of the Murmansk region (Shutova 2003), although it is common and widespread in the area.

Knowledge of the aculeate species composition varies considerably in different parts of the Murmansk region (Fig. 2). Of the biogeographical provinces, the best studied are Lapponia imandrae (*Lim*), from which a total of 86 species

Fig. 2. Collecting sites of aculeate Hymenoptera in the Murmansk region. Number of recorded species is shown by black dots of different size: small dot: 1–5 species, medium-sized dot: 6–10 species, large dot: 11–44 species. Locality names, coordinates and species numbers are presented in Table 1.



have been found. The province Lapponia petsamoënsis (*Lps*) is also fairly well studied, with a total of 65 species. Clearly less well known are Lapponia murmanica (*Lm*), 14 species, and Lapponia ponojensis (*Lp*), 20 species, due to their remote locations. Also the northern part of Karelia keretina (*Kk*) is still poorly studied, with only 18 recorded species. The aculeates of the Russian part of Regio kuusamoënsis (*Ks*) with 55 species, Lapponia varsugae (*Lv*) with 39 species, and Lapponia tulomensis (*Lt*) with 33 species, also remain relatively poorly studied. In the future, more efforts should be made to survey hymenopterans and other insects in these fascinating, but poorly known areas of northern Europe.

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