Nat. Hist. Res., Special Issue No. 7: 281–289, March 2000

Bumble Bees (Hymenoptera: Apidae) Occurring in the Kamchatka Peninsula and the North Kuril Islands

Masao Ito[1] and Ryoichi B. Kuranishi[2]

[1] Sapporo Science & Technology College
1–22, Nishi 17, Odori, Chuo-ku, Sapporo 060–0042, Japan
[2] Natural History Museum and Institute, Chiba
955–2, Aoba-cho, Chuo-ku, Chiba 260–8682, Japan

Abstract Ten and three species of bumble bee (*Bombus*) are recorded from the Kamchatka Peninsula and the North Kuril Islands, respectively. The faunas of the regions are characterized by the predominance of the elements showing a wide boreal distribution in the Northern Hemisphere.

Key words: *Bombus*, bumble bees, fauna, key, Kamchatka Peninsula, Kuril Islands.

Bumble bees in the Kamchatka Peninsula have been sporadically recorded (e.g. Skorikov, 1912, 1914, 1925; Bischoff, 1930). As for the Kuril Islands, Ito and Sakagami (1980) reported an outline of the bumble bee fauna, but the specimens from the North Kuril Islands examined by them were very restricted. For a better understanding of the faunas of the regions, further surveys have been awaited.

The Natural History Museum and Institute, Chiba, carried out the Biological Expedition to the Kamchatka Peninsula and North Kuril Islands in 1996 and 1997. This was a part of a project entitled "The Origin and Biogeography of the Northeast Asian Biota", in co-operation with the Institute of Biology and Pedology and the Institute of Marine Biology belonging to the Far Eastern Branch of the Russian Academy of Sciences, Vladivostock. In this paper, a list of the bumble bees (except for the genus *Psithyrus*) is presented based on the material collected during the expedition.

The following list is based on the material collected from 15 sites on the Kamchatka Peninsula, during the periods 3rd to 17th July 1996, 7th to 10th July 1997 and 27th July to 5th August 1997. On the North Kuril Islands, specimens were collected at six sites on Paramushir Island and one site on Shumshu Island during 11th to 24th July 1997. The localities are shown in Figs. 1 and 2 and detailed information is given below.

Kamchatka Peninsula

KP-1: 5 km west of Mt. Vilyuchinsky (52°42′ N,

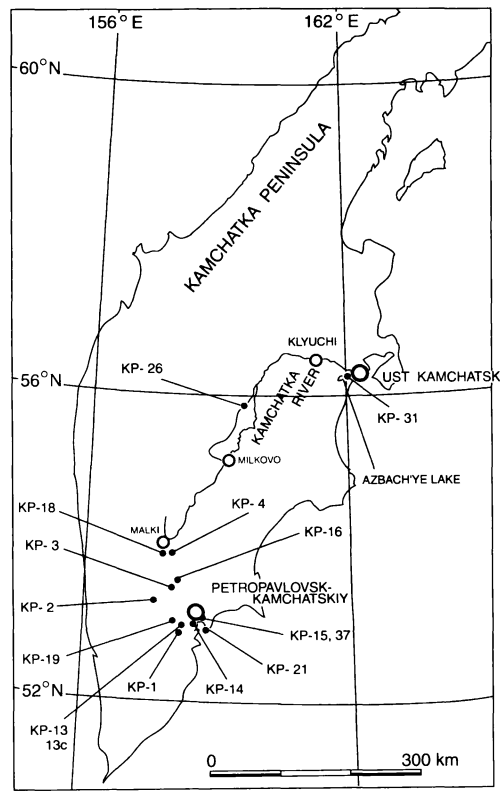

Fig. 1. Map of study sites in the Kamchatka Peninsula. For detailed explanations, see text.

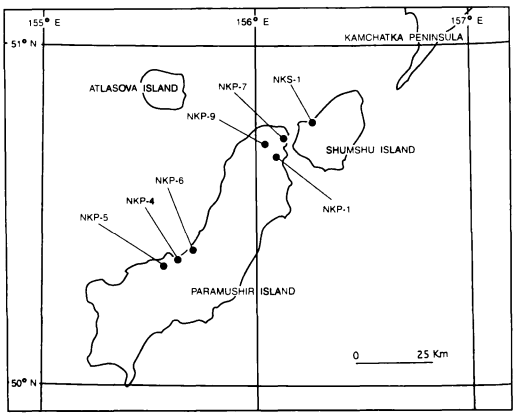

Fig. 2. Map of study sites in the North Kuril Islands. For detailed explanations, see text.

158°10′ E), alt. ca. 150 m.

KP-2: Bystraya River (riverside), 11 km north of Malki (53°26′ N, 157°32′ E), alt. ca. 220 m.

KP-3: Poperechnaya River (upper part), 25 km from Malki Village (53°05′ N, 157°52′ E), alt. ca. 450 m.

KP-13: 10 km south of Paratunka (52°53′ N, 158°11′ E), alt. ca. 100 m.

KP-13b: 5 km south of Paratunka (52°56′ N, 158°14′ E), alt. ca. 100 m.

KP-13c: 14 km south of Paratunka (52°50′ N, 158°09′ E), alt. ca. 100 m.

KP-14: Tikhayia River, about 30 km from Petropavlovsk-Kamchatskiy (53°05'N, 158°22°E), alt. ca. 40 m.

KP-15: Nagornyi, near Petropavlovsk-Kamchatskiy (53°07′ N, 158°29′ E), alt. ca.150 m.

KP-15 b: near Petropavlovsk-Kamchatskiy (53°07′ N, 158°29′ E), alt. ca. 150 m.

KP-16: Poperechnaya River, Bystraya River basin, 17 km from main road (53°23′ N, 157°41′ E), alt. ca. 320 m.

KP-18: Bystraya River basin, 30 km north of Ganaly (53°58′ N, 157°45′ E), alt. ca. 390 m.

KP-19: Mt. Vachkazhets, upper part of Takhkoloch River, basin of Plotnikova (53°05′ N, 157°55′ E), alt. ca. 550 m.

KP-21: Lagernaya Bay, 6 km South East from Petropavlovsk-Kamchatskiy (52°55′ N, 158°41′ E), alt. ca. 10 m.

KP-24: Lotnaya River (Riverside) near Azhabach'ye Lake (56°07'N, 161°50′ E), alt. ca. 20 m.

KP-26: Kozyrevka River (Riverside) 135 km north of Milkovo.

North Kuril Islands: Paramushir Island

NKP-1: Matrosskaya River, near Severo-Kuril'sk (50°39′ N, 156°05′ E), alt. 60 m.

NKP-4: Shelekhovo (50°22′ N, 155°37′ E), alt. 10 m.

NKP-5: Shelekhovo to Shimoyur River (50°22′ N, 155°37′ E⇔50°22′ N, 155°34′ E), alt. 0–100 m.

NKP-6: Shelekhovo to Medvezhiy Waterfall (50°22′ N, 155°37′ E⇔50°22′ N, 155°39′ E), alt.0–10 m.

NKP-7: 4 km north of Severo-Kuril'sk (50°43′ N, 156°08′ E), alt. 100 m.

NKP-8: Mt. Ebeko, (50°41′ N, 156°03′ E) alt. 200–960 m.

North Kuril Islands: Shumshu Island

NKS-1: Lake Bol'shoye (50°46′ N, 156°15′ E), alt. 15 m.

Specimens were collected on flowers or by sweeping with entomological nets in humid subarctic grasslands, tundra and open grasslands. They are deposited in the Natural History Museum and Institute, Chiba (CBM with code of ZI) and in the collections of Graduate School of Environmental Earth Science, Hokkaido University.

Results

A total of 12 species were recognized in the collection composed of 94 individuals. A key and species list given below include three taxa (asterisked) having been recorded from the Kamchatka Peninsula, but not included in our collection. Coloration mentioned in the both sections is of pubescence, not of integument. Terminology mainly follows Williams (1991). World distribution of the species is summarized after several authorized works (e.g. Tkalců, 1974; Løken, 1973; Milliron, 1971; Williams, 1991).

Key to species of *Bombus* known from the Kamchatka Peninsula and North Kuril Islands of (Female)

1 Thoracic dorsum entirely or nearly covered with yellowish or brownish pubescence; black pubescence, if appeared,

quite few and restricted in center of scutum, not forming distinct band or spot 2

— Thoracic dorsum with plenty of black pubescence; black except for collar or both collar and scutellum 6

2 Distoposterior corner of mid basitarsus pointed or acutely angled; malar area longer than distal width (measured following Løken, 1973 Fig. 3) 3

— Distoposterior corner of mid basitarsus rounded or obtuse; malar area as long as or slightly shorter than distal width 5

3 Malar area much elongated, 1.5 times as long as or longer than distal width; antennal segment 3 twice as long as or longer than distal width .....*Bombus* (*Megabombus*) *consobrinus*

— Malar area approximately 1.0–1.3 times longer than distal width; antennal segment 3 distinctly shorter than twice of distal width 4

4 Tergum II entirely yellowish-brown; terga III–V also light-colored, but at least in worker, anterior part black in variable extent; thoracic dorsum with virtually no black pubescence .....*Bombus* (*Thoracobombus*) *schrencki*

— Terga II–V light-colored, with lateral patches of black pubescence; thoracic dorsum sometimes with admixture of black pubescence around center of scutum.....*Bombus* (*Thoracobombus*) *pascuorum flavobarbatus**

5 Punctures of tergum VI rather sparce and tuberculate, with interspace shining at least partly; median furrow of labrum relatively wide, more or less U-shaped .....*Bombus* (*Pyrobombus*) *hypnorum klutschianus*

— Punctures of tergum VI dense and not tuberculate, interspace shagreened and dull; median furrow of labrum relatively narrow, more or less V-shaped..... *Bombus* (*Pyrobombus*) *cingulatus tilingi*

6 Distoposterior corner of mid basitarsus spined; malar area much elongated, twice as long as or longer than distal width ..... *Bombus* (*Megabombus*) *tichenkoi*

— Distoposterior corner of mid basitarsus obtuse; malar area variable, short to much elongated 7

7 Antennal segment 3 longer than twice of segment 4, and distinctly longer than segments 4+5; corbicular area strongly reticulate and dull .....*Bombus* (*Mendacibombus*) *defector**

— Antennal segment 3 shorter than twice of segment 4, and shorter than segments 4+5; corbicular area variable..... 8

8 Second mandibular keel broadened especially in distal part; malar area longer than distal width..... 9

— Second mandibular keel slender; malar area shorter than distal width, quadrate, or only slightly longer..... 10

9 Malar area elongated, distinctly longer than distal width; corbicular area hardly to weakly reticulate, and rather shining ..... *Bombus* (*Alpinobombus*) *balteatus*

— Malar area hardly to slightly longer than distal width; corbicular area strongly reticulate and dull ..... *Bombus* (*Alpinobombus*) *polaris**

10 Labral tubercle prominent; median furrow deep, wide and U-shaped; clypeus relatively flattened; malar area quadrate; corbicular area distinctly reticulate and dull; distal terga (tail) more or less ferruginous; ocello-ocular area small, well-defined, and surrounded with uniform-sized strong punctures ...*Bombus* (*Melanobombus*) *sichelii sichelii*

— Labral tubercle flattened; median furrow shallow and narrow; clypeus swollen or moderately convex, not flattened; corbicular area not or less reticulated, shining to dull; coloration of distal terga (tail) variable; punctation around ocello-ocular area variable..... 11

11 Labral tubercle rather depressed, with inner corner more or less pointed; hind basitarsus with posterior outline rather strongly curved (Løken, 1973, Fig. 12D); corbicular area hardly reticulate and shining..... 12

— Labral tubercle mildly elevated, with inner corner obtuse; hind basitarsus with posterior outline rather straight (Løken, 1973, Fig. 12C); corbicular area hardly to distinctly reticulate, dull to shining 13

12 Malar area distinctly shorter than distal

width, as long as or shorter than antennal segment 3; antennal segment 4 slightly longer than wide (queen) or nearly quadrate (worker); ocello-ocular area laterally to latero-posteriorly margined with strong, large punctures; scutellum entirely black
.....*Bombus* (*Bombus*) *lucorum albocinctus*

— Malar area as long as or slightly shorter than distal width, usually longer than antennal segment 3; antennal segment 4 distinctly longer than wide; ocello-ocular area laterally to lateroposteriorly margined with weaker, smaller punctures; scutellum black, but posterior part usually with variable admixture of light-colored pubescence
.....*Bombus* (*Bombus*) *sporadicus malaisei*

13 Tergum V distinctly shagreened and dull throughout; malar area shorter than distal width
..... *Bombus* (*Pyrobombus*) *jonellus*

— Tergum V hardly to weakly shagreened, and shining at least partly; malar area nearly as long as distal width.....14

14 Ocello-ocular area very large, laterally margined with narrow, ill-defined band of puncture; terga I and II entirely black
..... *Bombus* (*Pyrobombus*) *oceanicus*

— Ocello-ocular area small, laterally margined with relatively wide, well-defined band of punctures; terga I and II light-colored, at least in anterior part...*Bombus* (*Pyrobombus*) *lapponicus karaginus*

Species list of the Kamchatka Peninsula and North Kuril Islands

1. *Bombus* (*Bombus*) *lucorum albocinctus* Smith

Material examined. **KP-15**: 1 queen, 2 workers, 10.VII.1997, CBM-ZI 83158–83159; **KP-26**: 5 workers, 16.VII.1996, CBM-ZI 83156; **KP-19**: 2 queens, 1.VIII.1997; **KP-16**: 2 queens, 27.VII.1997, CBM-ZI 83157; **NKP-1**: 2 queens, 14.VII.1997; **NKP-8**: 1 queen, 14.VII.1997; **NKP-4**: 1 queen , 16.VII.1997, CBM-ZI 83154; 2 queens, 19.VII.1997, CBM-ZI 83152–83153; **NKP-5**: 1 worker, 17.VII.1997; **NKS-1**: 1 queen , 22.VII.1997, CBM-ZI 83155.

Distribution. Boreal Holarctic. Russia: European part, Siberia, Kamchatka Peninsula, Sakhalin, North Kuril Islands.

Europe, central Asia, Mongolia, northeastern China, western China, Kashmir, Nepal, Korea, Alaska, Canada.

Remarks. Queen and worker: Thoracic dorsum black, with yellowish-white anterior band; terga I and III black; tergum II yellowish-white; terga IV–V white.

Rasmont et al. (1986) regarded this form rather closer to *B.* (*B.*) *cryptarum* (Fabricius) than to *B.* (*B.*) *lucorum* (*Linnaeus*). Recently Williams (1998) provisionally synonymized *B. cryptarum* with *B. lucorum* (L.).

2. *Bombus* (*Bombus*) *sporadicus malaisei* Bischoff

Material examined. **KP-1**: 1 queen, 7.VII.1997, CBM-ZI 83160; **KP-13**: 1 worker, 7.VII.1997; **KP-13c**: 1 worker, 7.VII.1997; **KP-21**: 2 workers, 5.VIII.1997; **KP-19**: 1 worker, 1.VIII.1997, CBM-ZI 83161; **KP-15b**: 1 worker, 26.VII.1997; **KP-16**: 1 worker, 27.VI.1997; 1 worker, 29.VI.1997, CBM-ZI 83162.

Distribution. Euro-Siberian. Russia: European part, Siberia, Sakhalin, Kamchatka Peninsula.

Europe, north Central Asia, Mongolia, northeastern China, Korea.

Remarks. Queen and worker: This taxon is similar to *B. lucorum albocinctus* in color, but the yellow pubescence in the former is more brownish than in the latter. Posterior part of scutellum and tergum I sometimes with admixture of yellowish pubescence of various amount; lateral and posterior margin of tergum II occupied with black pubescence, otherwise pale or whitish yellow; tergum III black; terga IV to VI white.

3. *Bombus* (*Pyrobombus*) *hypnorum klutschianus* Bischoff

Material examined. **KP-2**: 1 worker, 5.VII.1996, CBM-ZI 83163; **KP-26**: 2 workers 5 males, 16.VII.1996, CBM-ZI 83164–83166; **KP-21**: 5 workers, 2 males, 5.VIII.1997, CBM-ZI 83167–83171; **KP-15**: 1 worker, 10.VII.1997, CBM-ZI 83172; **KP-16**: 5 workers, 2 males, 27.VII.1997, CBM-ZI 83173–83178; 1 female, 28.VII.1997, CBM-ZI 83179; 1 worker, 29.VII.1997, CBM-ZI 83180.

Distribution. Euro-Siberian. Russia: Siberia, Sakhalin, Kamchatka Peninsula, North Kuril Islands.

Europe, northeastern China, western China, Kashimir, Nepal, Korea, Japan (Hokkaido), Taiwan.

Remarks. Queen and worker: Thoracic dorsum to tergum II yellowish brown with orange tint; tergum III to anterior part of tergum IV black, posterior part of tergum IV to VI white; tergum VI variable, mostly white (in one queen) to mostly black.

Male: as in female, but tergum III variable, predominantly yellowish brown to entirely black.

4. *Bombus* (*Pyrobombus*) *cingulatus tilingi* Morawitz

Material examined. **KP-19**: 1 worker, 1. VIII. 1997, CBM-ZI 83181.

Distribution. Euro-Siberian. Russia: European part, Siberia, Sahkalin, Kamchatka Peninsula.

Europe, northeastern China, Korea.

Remarks. Worker: Thoracic dorsum and terga I and II yellowish brown with orange tint; tergum III black, medio-posteriorly with sparse admixture of brownish pubescence; tergum IV anteriorly black, posteriorly white; terga V and VI white.

5. *Bombus* (*Pyrobombus*) *oceanicus Panfilov*

Material examined. **NKP-1**: 1 queen, 14. VII. 1997; **NKP-7**: 1 worker: 24. VII. 1997, CBM-ZI 83182.

Distribution. Russia: Kuril Islands.

Remarks. Queen and worker: Anterior part of thoracic dorsum and scutellum dirty yellow; black band between wing bases moderately broad and ill-defined; terga I and II black; tergum III entirely black (in worker) or medialy with dirty-white area (in queen); terga IV to VI dirty white.

In many morphological features this Kuril-endemic form is similar to *B. cingulatus*. In addition, the distributional ranges of these two taxa are probably parapatric. They may be conspecific, as suggested by Williams (1998).

6. *Bombus* (*Pyrobombus*) *jonellus* (Kirby)

Material examined. **KP-14**: 1 worker, 9. VII. 1997, CBM-ZI 83183; **KP-26**: 1 male, 16. VII. 1996.

Distribution. Euro-Siberian. Russia: European part, Siberia, Kamchatka Peninsula.

Europe.

Remarks. Worker: Anterior part of thoracic dorsum and scutellum pale yellow; black band between wing bases relatively well-defined; tergum I and medio-anterior part of tergum II pale yellow; terugum II otherwise and tergum III black; latero-posterior margin of tergum III to VI dirty white.

Male: coloration as in worker, but with few black pubescence on tergum II; tergum III black, laterally with admixture of pale yellow pubescence; terga IV to VII whitish; anterior part of tergum IV with adxiture of black pubescence of various amount.

7. *Bombus* (*Pyrobombus*) *lapponicus karaginus* Skorikov

Material examined. **KP-19**: 1 worker, 2. VIII. 1997, CBM-ZI 83184.

Distribution. Circumpolar (according to the provisional synonymization by Williams (1998) with Nearctic population of *B. sylvicola* Kirby): Arctic regions of Euro-Siberia, Kamchatka Peninsula, Alaska, Canada, Rocky Mountains.

Remarks. Worker: Anterior part of thoracic dorsum and scutellum pale yellow; black band between wing bases rather ill-defined; tergum I and anterior margin of tergum II pale yellow; tergum II otherwise and tergum III black; terga IV and V dirty white with faint yellowish tint, medially with admixture of black pubescence; tergum VI black.

8. *Bombus* (*Melanobombus*) *sichelii sichelii* Radoszkowski

Material examined. **KP-2**: 2 queens, 7. VII. 1996, CBM-ZI 83185–83186; **KP-18**: 1 queen, 30. VII. 1997; KP-21: 1 worker, 5. VIII. 1997; **KP-19**: 1 queen, 1. VIII. 1997; 2 queens, 3. VIII. 1997, CBM-ZI 83187–83188; 1 queen, 4. VIII. 1997, CBM-ZI 83189; **KP-15**: 1 queen, 10. VII. 1997; **KP-16**: 5 workers, 27. VII. 1997, CBM-ZI 83190–83193.

Distribution. Euro-Siberian. Russia: European part of Russia, Siberia, Sakhalin, Kamchatka Peninsula.

Europe, Mongolia, northeastern China,

Korea.

Remarks. Queen and worker: anterior part of thoracic dorsum and scutellum dirty white; black band between wing bases broad and well-defined; terga I and II dirty white; posterior margin of tergum II and tergum III black; terga IV to VI pale ferruginous, sometimes very faded.

9. *Bombus* (*Alpinobombus*) *balteatus* Dahlbom

Material examined. **KP-19**: 2 workers, 1. VIII. 1997, CBM-ZI 83194.

Distribution. Circumpolar. Russia: northern Euro-Siberia, Kamchatka Peninsula.

Mongolia, Alaska, Arctic Canada, the Rocky Mountains.

Remarks. Worker: anterior part of thoracic dorsum pale yellow; black band between wing bases broad and rather ill-defined. Anterior part of scutellum pale yellow with black pubescence half-mixed; posterior part of scutellum, terga I and II largely pale yellow; posterior part of tergum II, III, and anterior extremity of tergum IV black; tergum IV otherwise to tergum VI dirty white.

10. *Bombus* (*Thoracobombus*) *schrencki* Morawitz

Material examined. **KP-23**: 1 queen, 12. VII. 1996; KP-26: 4 workers, 16. VII. 1996; **KP-13c**: 1 queen, 7. VII. 1997, CBM-ZI 83195; **KP-18**: 1 queen, 1 worker, 30. VII. 1997, CBM-ZI 83196–83197; **KP-16**: 1 worker, 28. VII. 1997, CBM-ZI 83198; KP-14: 2 queens, 9. VII. 1997, CBM-ZI 83199.

Distribution. Euro-Siberian. Russia: European part of Russia, Siberia, Sakhalin, Kamchatka Peninsula, South Kuril Islands.

Eastern Europe, Mongolia, northeastern China, Korea, Japan (Hokkaido).

Remarks. Queen: thoracic dorsum yellowish brown; abdomen ochrous yellow to brownish yellow; anterior extremity of tergum V with several black pubescence.

Worker: as in queen, but anterior parts of terga III to V black in various extent.

Subspecific recognition is provisionally avoided, because the intraspecific variation of this species has not been investigated except for Hokkaido and its adjacent islands.

11. *Bombus* (*Megabombus*) *consobrinus* Dahlbom

Material examined. **KP-13**: 1 queen, 7. VII. 1997, CBM-ZI 83200; **KP-19**: 1 queen, 3. VIII. 1997; **KP-3**: 1 queen, 27. VII. 1997, CBM-ZI 83201.

Distribution. Euro-Siberian. Russia: European part of Russia, Siberia, Kamchatka Peninsula, Sakhalin.

Europe, Mongolia, northeastern China, Korea, Japan (Honshu).

Remarks. Queen and worker: thoracic dorsum yellowish brown to ochrous yellow; terga I to VI ochrous yellow, virtually no black pubescence.

Several subspecies may occur in Kamchatka (Skorikov, 1914). However, subspecific recognition is avoided until more information on the intraspecific variation becomes available.

12. *Bombus* (*Megabombus*) *tichenkoi* (Skorikov)

Material examined. **NKP-4**: 2 queens, 19. VII. 1997, CBM-ZI 83202; **NKP-6**: 1 worker, 18. VII. 1997, CBM-ZI 83203; **NKS-1**: 1 queen, 22. VII. 1997.

Distribution. Russia: Kamchatka Peninsula, Karagin Island, North Kuril Islands.

Remarks. Queen and worker: anterior part of thoracic dorsum and scutellum pale ochrous yellow, otherwise entirely black. Black band between wing bases relatively narrow and well-defined.

Sakagami (1954) treated the taxon *B. tichenkoi* as a subspecies of *B. tersatus* (=*B. yezoensis*). Ito and Sakagami (1980) raised *B. tichenkoi* to the specific rank, retaining *B. yezoensis* as a good species. However, Williams (1998) provisionally regarded *B. yezoensis* as a junior synonym of *B. tichenkoi*. Leaving controversy for future studies, we retain here the opinion of Ito and Sakagami (1980).

13. *Bombus* (*Mendacibombus*) *defector* Skorikov*

Distribution. Russia: Transbaical, Altai, Turkestan, Kamchatka Peninsula.

Remarks. This species was first recorded from Kamchatka as *B. mendax* based upon one worker (Bischoff, 1930). However, Skori-

kov (1931) regarded it as *B. altaicus* Skorikov. Recently Williams (1998) provisionally placed *B. altaicus* under *B. defector* as a junior synonym.

14. *Bombus* (*Alpinobombus*) *polaris* Curtis*

Distribution. Circumpolar. Russia: Arctic region of Euro-Siberia.

Arctic Canada, Greenland.

Remarks. We could not find any previous report describing the coloration of *B. polaris* in the Kamchatka Peninsula. In both Europe and North America, typical coloration is as follows: thoracic dorsum with black band between wing bases; thoracic dorsum otherwise, terga I and II ochrous yellow; tergum III black; terga IV to VI either black or ferruginous; the black and ferruginous pubescence variably intermixed in terga III to VI. (Løken, 1973: p. 101; Milliron, 1971: p. 100).

15. *Bombus* (*Thoracobombus*) *pascuorum flavobarbatus* Morawitz*

Distribution. Euro-Siberian. Russia: northern regions of central Asia, Siberia, Kamchatka Peninsula.

Europe, western China, northeastern China, Korea.

Remarks. Queen and worker: thoracic dorsum yellowish brown, sometimes with sparce to dense black pubescence in the middle of scutum; terga II to V laterally with black spots or tufts, otherwise yellowish (Panfilov 1956, p. 1332).

Male: as in female (Sakagami, 1975: p. 298).

Discussion

Ito and Sakagami (1980) enumerated 14 species from Kamchatka Peninsula and three species from the North Kuril Islands (15 species in total). We confirmed the occurrence of the ten species in the Kamchatka Peninsula and all the three species in the North Kuril Islands (12 species in total). This consistency suggests that the fauna of the bumble bee is well documented in the regions, although further collecting efforts may find a few circumpolar species, such as *Bombus* (*Alpinobombus*) *hyperboreus* and *Bombus* (*Alpinobombus*) *neoboreus* (cf. Milliron, 1971; Maps. 7 and 10). Judging from both the number of the individuals collected and the extent of the collection records, the following taxa are probably abundant in the Kamchatka Peninsula: *B. lucorum albocinctus*, *B. sporadicus malaisei*, *B. sichelii sichelii*, *B. hypnorum klutschianus*, and *B. schrencki*.

It is noteworthy that 12 of the 14 species recorded in the Kamchatka Peninsula are common to northern Europe; eight species are Euro-Siberian, though *B. schrencki* does not have typical distributional pattern; and four species are circumpolar. Two species, *B. defector* and *B. tichenkoi*, do not occur in Europe. The former is an alpine species in north-eastern region of central Asia, and the latter is sub-endemic to the Kamchatka Peninsula. Consequently, the bumble bee fauna of the Kamchatka Peninsula is characterized by the predominance of boreo-arctic elements. It should be also emphasized that most of the species possess very wide ranges in the northern part of Eurasian Continent or Holarctic region.

In Scandinavia, Løken (1973) recognized 29 bumble bee species, including many temperate elements. Compared with the Scandinavian fauna, the poverty and simplicity of the Kamchatka Peninsula fauna is striking. It is presumed that the fauna was formed mainly by postglacial immigrants from a boreal refuge, which would also delivered nearly the same set of components to Scandinavia. Multiple immigration of bumble bees to Scandinavia was discussed by Løken (1973).

On the other hand, the number of species common to Japan are very restricted: *B. schrencki* and *B. hypnorum* are known from Hokkaido, and *B. consobrinus* only from Honshu. Chorolgical history of Japan is much more complicated (Ito and Sakagami, 1980; Ito, 1985).

Acknowledgments

We express our cordial thanks to all the members of the Far-Eastern Branch of Russian Academy of Sciences, especially Dr. A. S. Lelej, who kindly gave us heartful supports through the joint survey.

References

Bischoff, H. 1930. Entomologische Ergebnisse der schwedischen Kamchatka-Expedition 1920–1922. 29. Bombinae (Hymenoptera). Ark. Zool. 21A 19: 1–6.

Ito, M. 1985. Additional notes on the bumblebee fauna of North Korea (Hymenoptera, Apidae). Folia Entom. Hung. 46: 5–22.

Ito, M. and S. F. Sakagami. 1980. The bumblebee fauna of the Kuril Islands (Hymenoptera: Apidae). Low Temp. Sci., Hokkaido Univ., ser. B 38: 23–51.

Løken, A. 1973. Studies on Scandinavian bumble bees (Hymenoptera, Apidae). Norsk. Entom. Tidssk. 20: 1–218.

Milliron, H. E. 1971. A monograph of the Western Hemsphere bumble-bees (Hymenoptera: Apidae; Bombinae). I. The genera *Bombus* and *Megabombus* subgenus *Bombias*. Mem. Entom. Soc. Can. 82: 1–80.

Panfilov, d. V. 1956. Contribution to the taxonomy of bumble bees (Hymenoptera, Bombinae), including description of new forms. Zool. Zh. 35: 1325–1334. (In Russian)

Rasmot, P., A. Scholl, J. d. Roland, E. Obrecht and A. Adamski. 1986. Identité et variabilité des mâle de bourdons du genre *Bombus* Latreille sensu stricto en Europe occidental et centrale (Hymenoptera, Apidae, Bombinae). Rev. Suisse Zool. 93: 661–682.

Sakagami, S. F. 1954. Über einige Hummelarten von Hokkaido und Kurils Inseln (systematische Studien der Hummeln 5). Konchû 21: 84–92.

Sakagami, S. F. 1975. Some bumblebees from Korea with remarks on the Japanese fauna (Hymenoptera, Apidae). Ann. Hist. Nat. Mus. Nat. Hungarici 67: 293–316.

Skorikov, A. S. 1912. *Bombus lapponicus* (F.) et ses formes (Hymenoptera, Bombinae). Rev. Rus. Entom. 12(1): 95–102. (In Russian)

Skorikov, A. S. 1914. *Hortobombus consobrinus* (Dahlb.) et ses variations (Hymenopetera, Bombidae). Rus. Entom. Obozr. 14(2–3): 283–286. (In Russian)

Skorikov, A. S. 1925. Neue Hummel-Formen (Hymenopetera, Bombidae) VII. Rus. Entom. Obozr. 19: 115–118. (In Russian).

Skorikov, A. S. 1931. Die Hummelfauna Turkestans und ihr Beziehungen zur zentralasiatischen Fauna (Hymenoptera, Bombinae). Abhandlungen der Pamir-Expedition 1928. 8: 175–247.

Tkalců, B. 1974. Ergebnisse der 1. und 2. mongolisch tschechoslowakischen entomologisch-botanischen Expedition in der Mongolei. No. 29: Hymenoptera, Apoidea, Bombinae. Acta Faun. Ent. Mus. Nat. Pragae 15: 25–58.

Williams, P. H. 1991. The bumble bees of the Kashimir Himalaya (Hymenoptera: Apidae, Bombini). Bull. Brit. Mus. (Nat. Hist.), Ent. 60: 1–204.

Williams, P. H. 1998. An annotated checklist of bumble bees with an analysis of patterns of description (Hymenoptera: Apidae). Bull. Nat. Hist. Mus. Lond. (Ent.) 67: 79–152.

カムチャツカ半島と北千島のマルハナバチ類

伊藤誠夫[1)]・倉西良一[2)]

[1)]札幌科学技術専門学校
〒060–0042 札幌市中央区大通西 17 丁目 1 番地 22
[2)]千葉県立中央博物館
〒260–8682 千葉市中央区青葉町 955–2

1996 年と 1997 年に，カムチャツカ半島と北千島で千葉県立中央博物館とロシア科学アカデミーの生物学共同調査が行われた．カムチャツカ半島と北千島において採集された材料に基づいてマルハナバチ（ヤドリマルハナバチ属を除く）相を報告する．各種につき，分布と毛色の概要を記載するとともに，メスの検索表を提示した．今回採集された合計 94 個体中に，カムチャツカ半島からは 10 種，北千島からは 3 種，両地域を合わせて 12 種（1 種共通）を確認した．本報告には未記録の種は含まれていないが，この調査により両地域のマルハナバチ相の概要は把握されたものと思われる．過去にカムチャッカ半島で記録された 2 種を含めて種構成を見ると，ヨーロッパ・シベリアに広域分布している種（ユーロサイベリアン）が第一の要素で 8 種を占め，第二の要素は環北極分布する 4 種である．それ以外の要素と見られるものは 2 種にすぎず，この半島を中心とした狭い分布圏を持つ種は 1 種にすぎない．これら構成要素を，スカンジナビアのマルハナバチ相と比較すると，北方系種の共通種の多さと温帯系要素の欠如が際立っている．

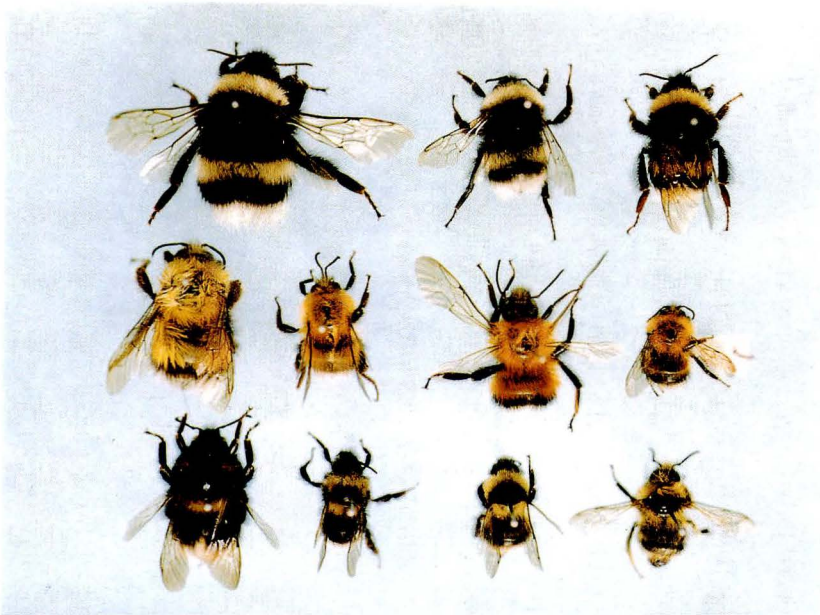

Fig. 3. Bumble bees occurring in the Kamchatka Peninsula and North Kuril Islands (1). Top row: *Bombus lucorum albocinctus* (left: queen; middle: worker) and *B. sporadicus malaisei* (right: worker). Middle row: *B. hypnorum klutschianus* (left: queen; middle-left: worker; middle-right: male), and *B. cingulatus tilingi* (right: worker). Bottom row: *B. oceanicus* (left: queen; middle-left: worker), and *B. jonellus* (middle-right: worker; right: male).

Fig. 4. Bumble bees occurring in the Kamchatka Peninsula and the North Kuril Islands (2). Top row: *Bombus balteatus* (left: worker) and *B. schrencki* (middle: queen; right: worker). Middle row: *B. lapponicus karaginus* (left: worker) and *B. sichelii sichelii* (middle: queen; right: worker). Bottom row: *B. consobrinus* (left: queen), and *B. tichenkoi* (middle: queen; right: worker).