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Bats from Kunashir and Iturup Islands

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Abstract Recent extensive bat surveys between 2010 and 2013 in Kunashir Island and the middle part of Iturup Island have brought about new important contributions on the bat fauna in islands. In Kunashir Island, we found 7 of the 8 species (*Barbastella leucomelas*, *Plecotus sacrimontis*, *Myotis gracilis*, *My. ikonnikovi*, *My. macrodactylus*, *My. petax* and *Murina ussuriensis*), which were previously reported, and 2 additional species (*Eptesicus nilssonii* and *Myotis nattereri*), which has been not reported. In the middle part of Iturup Island, we found all of the 4 species (*Eptesicus nilssonii*, *Plecotus sacrimontis*, *Myotis gracilis* and *My. petax*), which were previously reported. Our surveys show that Kunashir Island harbors at least 6 bat species more than Iturup Island.

Key words: bat, Chiroptera, fauna, Itrup Island, Kunashir Island

Introduction

Kunashir and Iturup islands are located east off Hokkaido. It has been known that the flora and fauna in these islands is different from each other. Kunashir Island has an area of approx. 1,499 square kilometers. The shortest distance between Hokkaido and Kunashir is 16 km. Terrestrial mammals in the island, including introduced species, had been reported as15 to 16 species (*Sorex unguiculatus*, *S. gracillimus*, *S. caecutiens*, *S. minutissimus*, *Lepus timidus*, *Apodemus speciosus*, *Mus musculus*, *Rattus norvegicus*, *Myodes sikotanensis* (*M. rex*), *Vulpes vulpes*, *Ursus arctos*, *Martes zibellina*, *Mustela erminea*, *Mustela nivalis*, *Mustela lutreola*, *Tamias sibricus*) and 8 bat species (Kostenko et al. 2004, Oshida 2009). Iturup Island is located northeast of Kunashir Island, being separated by a 22 km wide channel. This island has an area of approx. 3,184 square kilometers and the length of the island is 203 km. Terrestrial mammals including introduced species in the island have been reported to be 8 species (*Lepus timidus*, *Mus musculus*, *Rattus norvegicus*, *Myodes rufocanus*, *Vulpes vulpes*, *Ursus arctos*, *Martes zibellina*, *Mustela lutreola*), and 4 bat species (Kostenko et al. 2004).

Bat surveys in eastern part of the Hokkaido has been conducted extensively, and 15 species from east Hokkaido have been reported (Sano et al. 2009; Kondo 2013). On Kunashir and Iturup islands, bat surveys in had been conducted several times by Russian researchers (Tiunov 1997; Selezneva and Tiunov 2007). These authors have documented 8 species (*Barbastella darjelingensis*, *Plecotus sacrimontis*, *Myotis gracilis*, *My. ikonnikovi*, *My. macrodactylus*, *My. petax*, *Murina hilgendorfi* and *Mu. ussuriensis*) from Kunashir Island (Tiunov 1997; Selezneva and Tiunov 2007), and 4 species (*Eptesicus nilssonii*, *Plecotus sacrimontis*, *Myotis gracilis* and *My. petax*) from Iturup Island (Tiunov 1997). However, bat surveys on these islands had been insufficient and can not explain their bat fauna.

In this paper, we report recently published (Kawai et al. 2011, 2013; Kondo et al. 2011, 2013) and unpublished bats' capture records in Kunashir Island and the middle part of Iturup Island from 2010 to 2013.

Methods

We surveyed bats in Kunashir and Iturup islands from 2010 to 2013 during the summer season. Bats were captured by mist nets (5-9m width, 3-5m hight; Sagami Gyomou, Tokyo) or harp traps (Austbat two bank; Faunatech, Australia) when active outside their roosts. Mist nets or harp traps were set on forest trails or roads, inside forests or on the surface of water bodies for two to three hours from sunset. Bats were captured in their roost with a hand-net.

Captured bats were identified to species based on Sano et al. (2009), and sex, age, maturity and reproductive status were noted. Age categories were defined as; "juvenile": from first flight to the

end of their year of birth; “adult”: beginning after their first year following birth. Age was determined from the degree of epiphyseal fusion (ossification of the finger bones; Mitchell-Jones and McLeish, 1999) or reproductive status. Body weight and forearm length were measured using a digital balance (Custom, Japan) and a slide caliper (Mitutoyo Corporation, NTD12 15PMX), respectively. For individual identification, numbered aluminum bands (Lambournes Ltd., U. K.) were placed on the forearm before release. Skin and skull specimens were prepared, and external and cranial morphology was measured from these.

Results and Discussions

We recorded a total of 695 individuals comprising 9 bat species at 22 sites in the Kunashir and Iturup Islands (Table 1, 2; Fig. 1).

1. Northern bat

***Eptesicus nilssonii* (Keyserling & Blasius, 1839)**

This species are usually treated as the genus “*Amblyotus*” by Russian taxonomist (Tiunov 1997). This species has been recorded in Hokkaido, except for the southern part of the island (Fukui 2009a). It had been known from Iturup Island but not from Kunashir Island (Tiunov 1997).

A total of 2 male bats were captured at site 1 in Kunashir Island and site 14 in Iturup Island in our survey. This is the first record in Kunashir Island, and second record in the Iturup Island. The sizes of the individuals were not remarkably different from those from Hokkaido.

E. nilssonii is known to forage above the forest canopy. We saw several individuals of a middle-sized bat flying above the forest canopy in Kunashir and Iturup islands. It could be this species, however, we could not capture any of these high-flaying bats. We supposed that the abundance of the species is not low.

2. Eastern barbastelle

***Barbastela leucomelas* (Cretzschmar, 1826)**

This species has been recorded from central to eastern Hokkaido, and from limited areas in Honshu and Shikoku. The first record of this species is in Kunashir Island in 2007 (Selezneva and Tiunov 2007). However, it has not been known from Shikotan and Iturup Island.

The Asian barbastelle have been traditionally considered to be the same as “*B. leucomelas*”. However, several researchers have pointed out that the Asian barbastelle is dramatically different from the latter species in morphometry of the skull, its genetics, and have considered “*B. leucomelas*” as endemic to Sinai and Israel (Benda et al., 2008). Researchers have also suggested that the Japanese population and/or “island populations” around Hokkaido should be treated as *Barbastella darjelingensis* Dobsos (1875) (Tiunov 2011; Kruskop 2012). In this report, we followed Sano et al. (2009), and use “*Barbastela leucomelas*” for the Island population.

We recorded one male at site 6 in Kunashir Island (Table 2). This is the second record in the island. The size of this individual (Table 3 and Table 5) is not remarkably different from those of Hokkaido.

3. Japanese long-eared bat

***Plecotus sacrimontis* Allen, 1908**

This species has been recorded from a wide altitudinal range thorough out Hokkaido (Fukui 2009b), and from north part of

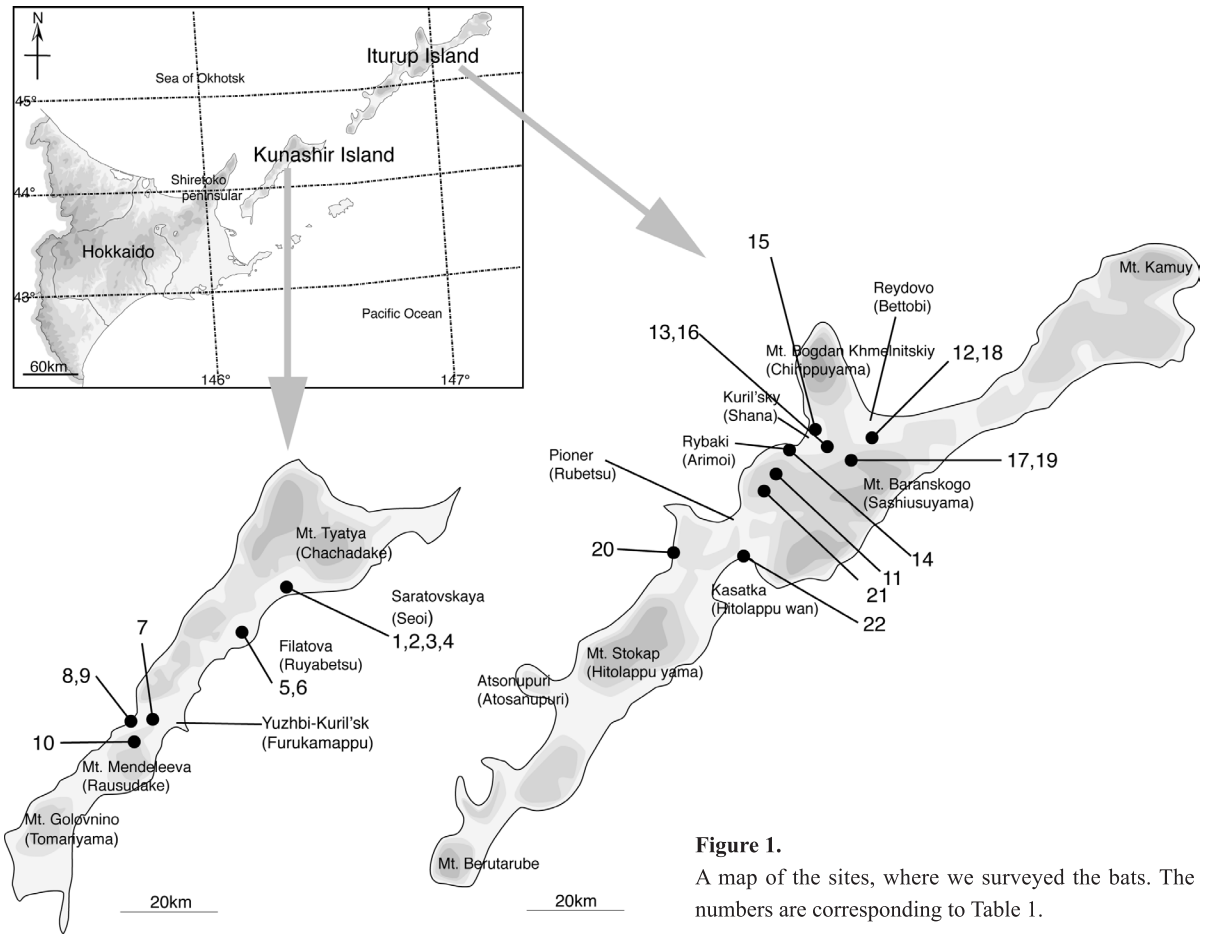

Figure 1.
A map of the sites, where we surveyed the bats. The numbers are corresponding to Table 1.

Table 1. List of capture sites in Kunashir Island and the middle part of Iturup Island.

	Locality number		Latitude	Longitude
Kunashir Is.	1	Around the ranger hut in Saratovskaya (Seoi)	44.266 N	146.107 E
	2	Branch of the Saratovskaya (Seoi) River	44.263 N	146.104 E
	3	Junction with the Saratovskaya (Seoi) River	44.270 N	146.103 E
	4	Around the ranger hut in Saratovskaya (Seoi)	44.266 N	146.106 E
	5	Branch of Filatova (Ruyabetsu) River	44.194 N	146.020 E
	6	Around the ranger hut in Filatova (Ruyabetsu)	44.194 N	146.020 E
	7	Forest road to Serebryanoye (Furukamappu) Lake	44.043 N	145.802 E
	8	Lagunnoye (Nikishoro) Sea Cave1	44.059 N	145.751 E
	9	Lagunnoye (Nikishoro) Sea Cave2	44.056 N	145.749 E
	10	Forest road to the 13 km village (Yaitaikotan	44.028 N	145.716 E
Iturup Is.	11	Branch of Kuybyshevka (Rubetsu) River	45.138 N	147.796 E
	12	Reydovo (Bettobi) Hot spring	45.242 N	148.012 E
	13	Forest road to Mt.Baranskogo (Sashiusuyama)	45.206 N	147.907 E
	14	Mouse of Rybaki (Arimoi) River	45.205 N	147.844 E
	15	Forest road to the Kuril'sky (Shana) observatory	45.234 N	147.882 E
	16	Kuril'sky (Shana) Salmon Hatchery	45.218 N	147.895 E
	17	Branch of the Kuril'sky (Shana) River	45.132 N	147.970 E
	18	Dammed Lake on Branch of Mineral'naya (Onsen) River	45.247 N	148.014 E
	19	Forest road to Mt.Baranskogo (Sashiusuyama)	45.193 N	147.925 E
	20	Osennaya (Roumon) River Salmon Hatchery	45.013 N	145.538 E
	21	Hillside of Mt.Pereval'naya (Noboriyama)	45.126 N	147.759 E
	22	Blagodatnoye (Toshimoi) Bridge	45.010 N	147.707 E

Honshu and Shikoku. It has been reported from Shikotan Island, Kunashir Island and Iturup Island (Tiunov 1997).

We recorded one male at site17 in Iturup Island, and two female (juvenile and adult) from Kunashir and Iturup islands. The size of the individuals (Table 3, Table 5, Table 6, and Table 7) are not remarkably different from those of Hokkaido.

4. Ussuri whiskered bat

***Myotis gracilis* Ognev, 1927**

This species has been recorded in Japan, limited to northern and eastern Hokkaido (Kawai 2009a). It has been also reported from Shikotan, Kunashir and Iturup Islands (Tiunov 1997).

The systematic treatment of this species had been confusing. Several researchers had treated as a subspecies of *M. brandtii*, or as a species *M. mystacinus*. However, recent genetic studies of individuals from Hokkaido suggested that *M. gracilis* should be considered a valid species (Kawai et al. 2003; Kawai 2009a).

We captured a total of 12 individuals (6 males and 6 females) at 5 sites in Kunashir Island, and a total of 16 individuals (8 males and 8 females) at 7 sites in Iturup Island. The capture sites of this species are related to water bodies but half the number of captures happened in the forest. Kostenko et al. (2004) pointed out that the number individuals of this species in Iturup island is smaller than that of Kunashir island. However, in our survey a larger number of individuals were captured in Iturup, where it seems to be common.

5. Ikonnikov's Myotis

***Myotis ikonnikovi* Ognev, 1912**

This species has been recorded throughout Hokkaido. In Honshu, it has been found at relatively high altitudes, with the exception of Aomori prefecture (Kawai 2009b). This species has been reported from Kunashir Island (Tiunov 1997).

We captured a total of 7 individuals at 3 sites in Kunashir island. Capture sites are in the forest or along rivers. We did not record it from Iturup Island.

6. Japanese Large-footed bat

***Myotis macrodactylus* (Temminck, 1840)**

This species has been recorded throughout the Japanese archipelago (Sano 2009a), and from Kunashir Island (Tiunov 1997).

We captured a total of 564 individuals at 6 sites in Kunashir Island (Table 2, Fig 1). We could not capture any individuals in Iturup Island. This species is understood to forage above the water surface. In our surveys, most of the bats were captured near or over streams when active at night (Kawai et al. 2011). This is the most abundant bat species in Kunashir Island.

The species was found to roost at several sea caves (1st and 2nd Nikishoro sea cave; site 8 and site 9, Table1, Fig 1) (Kondo 2013). A total of 546 individuals (292 male and 254 female; Table 2) were captured at these caves by hand-net. Of these, a total number of 524 adults of it were banded from 2011 to 2013 (Table 4).

The measurements' range of the species (Table 4) from Kunashir Island is not distinguishable from that of individuals in Hokkaido (Fukui et al. 2009; Sano 2009a). Forearm and wingspan in females are lager than in males. A similar trend was observed for body weight.

Two albinos of this species were captured at the site 3 in 2010 and the 8 in 2012, respectively. Both were adult males. Those individuals seem to lack melanin from their hairs and membranes. However, eyeballs are visibly black or dark red. The measurements of the albinos are not remarkably different from normal individuals

Table 2. The number of bats capured in Kunashir Island and the middle part of Iturup Island.

Species	Locality number	Date	Number of bats[1] Male	Female
Eptesicus nilssonii	1	20100911	A1	
	14	20120829	A1	
Barbasterlla leucomelas	6	20100915	A1	
Plecotus sacrimontis	4	20100914		J1
	13	20120828		A1
	15	20120830	A2	
	21	20120905		J1
	10	20120804		A1
Myotis gracilis	1	20100911	A1 U1	A2U3
	2	20100912	A1	
	3	20100913	A1	
	4	20100914		J1
	6	20100915	A2	
	11	20120826		A2J1
	14	20120829		A2
	15	20120830	A4	
	12	20120901	A2	
	18	20120901	A2	A1
	20	20120904		A1
	21	20120905		A1
My. ikonnikovi	5	20100915	A1	
	6	20100915	J1	
	6	20100916	A1	A1
	7	20100918	A2	A1
My. macrodactylus	2	20100912	A3	
	3	20100913	A7	A1
	5	20100915	A4J1	
	7	20100918	A1	A1
	8	20110730		A1
	9	20110730	A60J8	A12J1
	9	20110731	A73J8	A54J5
	8	20120804		A51
	9	20120804	A54	A30
	8	20130804	19	71
	9	20130804	70	29
My. nattereri	1	20100911		A1J1
	6	20100915	A1	A1
	6	20100916	J1	
My. petax	2	20100912	A2J3	A2
	3	20100913	A2	A1
	5	20100915	A2J1	J2
	6	20100916		A1
	7	20100918	A3	
	11	20120826	A2J1	
	14	20120829	A2J4	A8J2
	15	20120830	A1	
	16	20120831	A2	J1
	17	20120831	A2	A2
	12	20120901	A1	A1
	18	20120901	A4J3	A7J3
	20	20120904	A2	A3J2
	22	20120907	A2	
Murina ussuriensis	1	20100911	A1	
	4	20100914	A1	J1

[1]A: adult, J: juvenile

of the species (Kondo et al. 2011, 2013).

7. Natterer's bat

***Myotis nattereri* (Kuhl, 1817)**

This species has been recorded in Japan limited to the eastern part of Hokkaido, and several limited areas in Honshu. It had been not reported in the Kurils, including Shikotan, Kunashir, and Iturup Island (Tiunov 1997).

The systematic treatment of this species had been confusing. Japanese researchers have treated it as a subspecies, "*M. nattereri* bombinus" (Sano 2009b). However, researchers from other countries, including Russia, have usually treated it as a different valid species, *M. bombinus* (Tiunov 2011). This is because several researchers have pointed out that the genetic distance between "*M. nattereri bombinus*" and *M. nattereri* is large, suggesting the existence of two valid species (e.g. Kawai et al. 2003, Kruskop et al. 2012).

We captured a total of 5 individuals including 2 juveniles at two sites in Kunashir Island. It means that this species reproduce in the Island. It was the first report of the species in Kunashir Island.

8. Eastern water bat

***Myotis petax* Hollister, 1912**

This species has been recorded in Japan limited to central and eastern Hokkaido (Kawai 2009c). It has been also recorded from Kunashir and Iturup islands (Tiunov 1997).

This species has been formerly included as a subspecies of *M. daubentonii*. However, according to morphological and molecular data, two distinct groups have been identified, the "Western" and "Eastern" (Kawai et al. 2003, Kruskop 2004, Mateev et al. 2005). Based on these results, *M. petax* has been proposed as the valid name for the "Eastern" group (Kruskop 2004, Mateev et al. 2005).

This species is known to forage above the surface of water bodies. In our surveys, most of the bats were captured near or over streams when active at night in Kunashir and Iturup islands. We captured a total 74 individuals from both islands.

This species is the most abundant bat in Iturup Island.

9. Hilgendorf's tube-nosed bat

***Murina hilgendorfi* (Peters, 1880)**

This species has been recorded throughout the Japanese archipelago (Kawai 2009d), and from Kunashir Island (Tiunov 1997). However, we could not capture any individuals at Kunashir and Iturup islands.

Previously, this species was considered as a subspecies of *Murina leucoguster* (Kawai 2009d).

10. Ussurian tube-nosed bat

***Murina ussuriensis* Ognev, 1913**

This species has been recorded throughout Japanese archipelago (Kawai 2009e), and from Kunashir Island (Tiunov 1997).

We captured a total of 3 individuals in Kunashir Island, including one juvenile.

This species has a very unique behavior. Individuals have been found in various structural objects, in tree cavities, under tree bark, in foliage, on the ground, under the leaf litter, in houses, inside a fallen tree, etc. Several individuals have been also found during the day, on the snow in late spring in Hokkaido and Honsyu (Kawai 2009e).

The systematics of the lesser tube-nosed bat in Far East Russia, Sakhalin, East Asia including Japan, has been disputed.

Table 3. Measurements of forearm, body weight, and wing span of the bats in Kunashir Island.

Species	Sex[1]	Age[2]	Total number of measured individuals	Forearm (mm) mean (mini.-max)	Body weight (g) mean (mini.-max)	Wing span (mm) mean (mini.-max)	Note
Myotis macrodactylus[3]	F	A	43	38.24 (32.74-40.30)	9.1 (8.1-10.1)	260.0 (260-260)	BW N=9, FA N=43, WIN N=2
		J					
	M	A	66	37.44 (35.88-39.22)	8.2 (6.7-9.4)	253.8 (243-267)	BW N=52, FA N=66, WIN N=17
		J					
Myotis petax	F	A	4	37.04 (35.58-37.97)	7.95 (7.1-9.1)	255.3 (242-263)	
		J	2	37.51 (36.38-38.64)	9.60 (9.3-9.9)	257.0 (252-262)	
	M	A	8	36.62 (35.36-38.04)	8.44 (7.6-9.7)	250.6 (245-256)	
		J	4	36.17 (34.24-37.34)	6.37 (5.0-7.7)	249.3 (229-264)	BW N=3
Myotis ikonnikovi	F	A	2	33.53 (32.84-34.21)	5.75 (5.3-6.2)	225.0 (222-228)	
		J	0				
	M	A	3	33.75 (32.71-34.33)	6.17 (6.0-6.2)	226.3 (221-226)	
		J	2	34.23 (34.12-34.33)	5.35 (4.7-6.0)	230.0 (228-232)	
Myotis gracilis	F	A	2	34.84 (34.82-34.85)	7.50 (7.5-7.5)	236.0 (234-238)	
		J	4	34.71 (33.74-36.25)	6.18 (5.0-8.0)	230.0 (226-233)	
	M	A	4	33.43 (31.9-34.18)	6.28 (5.1-8.2)	223.8 (216-229)	
		J	1	34.40	5.50	227.0	
Myotis nattereri	F	A	1	40.30	6.8	264.0	
		J	0				
	M	A	1	39.13	6.7	254.0	
		J	1	38.55	5.90	255.0	
Eptesicus nilssonii	F	A	0				
		J	0				
	M	A	1	38.89	15.80	265.0	
		J	0				
Plecotus sacrimontis	F	A	0				
		J	1	43.51	9.1		
	M	A	0				
		J	0				
Barbastella leucomelas	F	A	0				
		J	0				
	M	A	1				
		J	0	40.39	10.4	289.0	
Murina ussuriensis	F	A	1	30.85	6.1	235.0	
		J	0				
	M	A	2	28.71 (28.03-29.38)	5.45 (5.3-5.6)	216.5 (215-218)	
		J	0				

[1] F: female, M: male [2] A: adult, J: juvenile
[3] The individuals of *M. macrodactylus* were measured without distinguishing between adults and juveniles.

Conclusion

In Kunashir Island, 8 bat species had been previously recoded. In our survey, 7 of these 8 species were recorded, and two further species (*Myotis nattereri* and *Eptesicus nilssonii*) are new additions to the bat fauna of Kunashir Island. From the middle part of Iturup Island, 4 bat species had been previously recorded. However, no further species was found during our surveys. In these islands, we captured three types of bats; (1) species that are widely distributed in Hokkaido, (2) species rare in south-western Hokkaido, and common in northern and eastern Hokkaido, (3) and species restricted to northern and eastern Hokkaido. Given that 15 species are known from eastern Hokkaido (Sano et al. 2009, Kondo 2013), and the possibility of a stepping-stone bat dispersal mode between Hokkaido, Kunashir and Iturup islands, differences in species richness suggest that distributional patterns are affected by several factors. To further elucidate these differences, additional bat surveys and the assessment of potential factors limiting the distributions of each species are required.

Table 4. Number of *Myotis macrodactylus* banded at Nikishoro sea cave.

Year	Date	Locality	Male (recapture)	Female (recapture)
2011	30 Jun.	Nikishoro 1st sea cave	0	1
		Nikishoro 2nd sea cave	60	12
	31 Jun.	Nikishoro 2nd sea cave	73	54
2012	4 Aug.	Nikishoro 1st sea cave	0	51(4)
		Nikishoro 2nd sea cave	54(3)	30(1)
2013	4 Aug.	Nikishoro 1st sea cave	19(1)	71(8)
		Nikishoro 2nd sea cave	70(1)	29(1)
Total			276(5)	248(14)

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Table 5. Measurements of cranial and external characters of the bats captured in Kunashir Island.

Species	Locality number	Date	Specimen number	Sex	BW	FA	Wing span	TL	HBL	Tail	Tibia	Ear	Tragus	HFL1	HFL2	GL	CBL
Myotis macrodactylus	3	20100913	2R00495	M	8.1	38.74	267	87.0	46.8	40.2	17.4	16.2	6.2	12.2	13.2		
Myotis macrodactylus	3	20100913	2R00501	M	8.0	38.00	257	90.0	44.8	45.2	17.3	14.2	6.2	12.0	13.0		
Myots petax	3	20100913	2R00504	F	7.4	36.85	254	90.0	46.8	43.2	17.4	16.2	5.2	12.2	13.2	14.27	13.35
Myotis ikonnikovi	5	20100915	H2063	M	6.0	34.33	232	84.0	47.8	36.2	16.9	11.2	5.2	6.0	7.0	13.12	12.82
Myotis gracilis	2	20100912	H2058	M	6.0	33.67	224									13.75	13.38
Myotis nattereri	1	20100911	2R00484	F	8.5	40.47	279									15.10	14.69
Eptesicus nilssonii	1	20100911	2R00483	M	15.8	38.89	265									15.49	14.97
Plecotus sacrimontis	1	20100914	2R00506	F	9.1	43.51		107.0	56.0	51.0	21.4	38.2	18.2	10.0	11.0	17.20	16.00
Barbastella leucomelas	4	20100915	2R00517	M	10.4	40.39	289	120.0	65.3	54.7	16.9	17.2	10.2	7.0	8.0	15.09	14.10
Murina ussuriensis	4	20100914	H2062	M	5.3	29.38	215	80.0		30.2	14.6	14.2	3.6	7.2	7.2	15.16	14.13

Species	Locality number	Date	Specimen number	Sex	IM3	CM3	M3M3	MRW	ZW	BCW	BCWM	BCH	IOW	RL	BL	mCM3	LMD
Myotis macrodactylus	3	20100913	2R00495	M													
Myotis macrodactylus	3	20100913	2R00501	M													
Myots petax	3	20100913	2R00504	F	6.02	5.08	5.70	5.58	9.06	7.47	7.52	6.57	3.64	6.16	8.11	5.27	9.92
Myotis ikonnikovi	5	20100915	H2063	M	6.35	5.15	5.48	4.96	8.02	6.71	7.17	5.85	3.69	6.25	6.87	6.74	9.70
Myotis gracilis	2	20100912	H2058	M	6.19	5.16	5.67	4.77	8.18	7.04	7.03	5.71	3.72	6.47	7.28	5.43	10.00
Myotis nattereri	1	20100911	2R00484	F	7.16	5.85	6.29	5.63	-	7.55	7.69	6.70	3.73	6.78	8.32	6.39	11.10
Eptesicus nilssonii	1	20100911	2R00483	M	6.78	5.57	6.24	6.22	9.83	7.67	8.39	6.98	4.15	6.78	8.71	5.87	10.95
Plecotus sacrimontis	1	20100914	2R00506	F	7.08	5.81	-	5.91	8.91	8.40	9.51	7.67	3.57	6.88	10.32	6.64	11.26
Barbastella leucomelas	4	20100915	2R00517	M	5.65	4.78	5.65	5.71	7.74	7.54	8.52	6.70	3.58	5.41	9.68	5.28	9.18
Murina ussuriensis	4	20100914	H2062	M	5.95	5.09	4.91	4.54	-	7.12	7.14	5.48	4.13	7.58	7.58	5.36	10.10

BW (body weight), FA (length of forearm), TL (total length), HBL (head and body lenght), Tail (length of tail), Tibia (length of tibia), Ear (length of ear), Tragus (length of trugus), HFL1 (length of hind foot with nail), HFL2 (hind foot length without nail), GL(greatest length of skull), CBL (condylobasal length), IM3 (length of upper tooth row from incisor to molar M3), CM3 (length of upper tooth row from canine to molar M3), M3M3 (width between outer margins of molar M3), MRW (maximum rostral width), ZW (zygomatic width), BCW (width of brain case), BCWM (width of brain case at level of mastoid), BCH (height of braincase with auditory bullae), IOW (width of interorbital constriction), RL (length of rostral), BL (length of braincase = GL-RL), mCM3 (length of maxillary tooth row from canine to molar), LMD (lower jaw length from alveole of anterior incisor to articulated process).

Table 6. Measurements of forearm, body weight, and wing span for bats captured in the middle part of Iturup Island.

Species	Sex1	Age2	Number of measured indiciduals	Forearm (mm)		Body weight (g)		Wing span (mm)	
				mean	(mini.-max)	mean	(mini.-max)	mean	(mini.-max)
Myotis gracilis	F	A	6	34.55	(33.58-35.27)	6.2	(5.4-7.2)	234.8	1
		J	1	35.10		5.4		240.0	
	M	A	6	34.89	(32.75-35.77)	5.6	(5.0-5.8)	235.2	(221-241)
		J							
Myotis petax	F	A	14	36.81	(35.29-37.9)	7.8	(6.4-9.8)	253.6	(247-263)
		J	5	36.75		6.6		245.2	(238-250)
	M	A	14	36.97	(36.18-37.66)	8.0	(6.2-10.4)	252.0	(242-256)
		J	4	36.92	(35.54-38.69)	6.5	(5.6-7.2)	251.0	(249-254)
Plecotus sacrimontis	F	A	1	40.58		10.0		278.0	
		J	1	42.14		11.0		280.0	
	M	A	2	40.99	(39.88-42.09)	8.3	(7.4-9.2)	284.5	(278-291)
		J	0						
Eptesicus nilssonii	F	A	0						
		J	0						
	M	A	1	38.67		10.8		271.0	
		J	0						

1 F:female, M: male
2 A: adult, J: juvenile

Table 7. Measurements of cranial and external characters of the bats captured in the middle part of Iturup Island.

Species	Locality number	Date	Specimen number	sex	BW	FA	Wing span	TL	HBL	Tail	Tibia	Ear	Tragus	HFL1	HFL2	GL	CBL
Myots petax	11	20120826	SR00322	M	7.6	37.0	257	85.0	45.0	40.0	18.4	16.0	6.0	10.0	9.0	14.09	13.27
Myots petax	11	20120826	SR00324	M	7.0	36.5	250	86.0	49.0	37.0	18.1	14.0	6.5	10.0	8.5		
Myotis gracilis	11	20120826	H2115	F	5.8	33.6	225	84.0	47.0	37.0	15.2	15.0	7.0	8.0	7.0	13.55	12.68
Myotis gracilis	11	20120826	H2114	F	6.6	34.3	240	83.0	42.0	41.0	15.3	15.0	8.0	7.0	6.0		
Plecotus sacrimontis	19	20120828	SR00325	F	10.0	40.6	278	96.5	45.5	51.0	21.0	36.0	15.0	10.0	10.0	16.32	16.04
Plecotus sacrimontis	15	20120830	SR00352	M	7.4	39.9	278	110.0	59.0	51.0	19.1	36.0	17.0	11.0	10.0		
Eptesicus nilssonii	14	20120829	SR00351	M	10.8	38.7	271	100.0	53.0	47.0	17.3	13.0	12.0	10.0	9.0	15.47	15.21

Species	Locality number	Date	Specimen number	sex	IM3	CM3	M3M3	MRW	ZW	BCW	BCWM	BCH	IOW	RL	BL	mCM3	LMD
Myots petax	11	20120826	SR00322	M	6.15	5.18	5.80	5.22	9.03	7.45	7.53	6.43	3.64	6.22	7.05	5.45	10.29
Myots petax	11	20120826	SR00324	M													
Myotis gracilis	11	20120826	H2115	F	6.00	4.86	5.21	4.87	-	6.89	7.03	5.89	3.73	6.01	6.67	4.96	9.70
Myotis gracilis	11	20120826	H2114	F													
Plecotus sacrimontis	19	20120828	SR00325	F	6.73	5.94	6.89	6.07	9.17	8.20	9.31	5.84	3.62	6.89	9.15	6.62	11.18
Plecotus sacrimontis	15	20120830	SR00352	M													
Eptesicus nilssonii	14	20120829	SR00351	M	6.67	5.55	7.15	6.51	10.23	8.26	8.62	7.05	4.48	6.55	8.66	6.05	11.32

BW (body weight), FA (length of forearm), TL (total length), HBL (head and body lenght), Tail (length of tail), Tibia (length of tibia), Ear (length of ear), Tragus (length of trugus), HFL1 (length of hind foot with nail), HFL2 (hind foot length without nail), GL (greatest length of skull), CBL (condylobasal length), IM3 (length of upper tooth row from incisor to molar M3), CM3 (length of upper tooth row from canine to molar M3), M3M3 (width between outer margins of molar M3), MRW (maximum rostral width), ZW (zygomatic width), BCW (width of brain case), BCWM (width of brain case at level of mastoid), BCH (height of braincase with auditory bullae), IOW (width of interorbital constriction), RL (length of rostral), BL (length of braincase = GL-RL), mCM3 (length of maxillary tooth row from canine to molar), LMD (lower jaw length from alveole of anterior incisor to articulated process).

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河合久仁子[1]・Mikhail P. Tiunov[2]・近藤憲久[3]・Maksim A. Antipin[4], Victor N. Boiko[4], 大泰司紀之[5], 出羽 寛[6]：国後島と択捉島のコウモリ類

我々は，2010 年から 2013 年にかけて行われた国後島および択捉と中部におけるコウモリ類調査によって，695 個体（4 属 9 種）のコウモリ類を捕獲した．国後島ではこれまで記録されていた 8 種のうち 7 種を捕獲し、さらに 2 種の新記録種を捕獲した．また，択捉島中部では，これまで記録されていた 4 種全てを捕獲した．これらの記録により，これまで網羅的に調査が行われてこなかった両島のコウモリ相について新しい見解が示され，それぞれの島で生息するコウモリ種数が異なる事が明確となった．

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