

# Far Eastern Entomologist

Дальневосточный энтомолог

Journal published by Far East Branch  
of the Russian Entomological Society  
and Laboratory of Entomology,  
Institute of Biology and Soil Sciences,  
Vladivostok

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Number 109: 1-28

ISSN 1026-051X

January 2002

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## INSECT BIODIVERSITY OF THE RUSSIAN FAR EAST

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The insect fauna of Russian Far East (RFE) is represented by about 31500 estimated species from 629 recorded families of 31 orders. The largest orders are Hymenoptera (72 families, 9000 estimated species), Diptera (119 families, 8000 estimated species), Coleoptera (114 families, 5500 estimated species), Lepidoptera (81 families, 5000 estimated species). The list of recorded insect families as the estimated number of species for each RFE region are given firstly. The distribution of some families in Russia is restricted by RFE only. Among 93 insect species included in Red Data Book of Russian Federation 43 occur in RFE only. The most rich insect fauna associated with mixed broad-leaved-coniferous forests in the south of RFE. Eastern Palaearctic species are dominated here (more than 50 %). There are two hot insect biodiversity spots in RFE: Primorskii krai and Kuril Islands. Comparison of species number in the RFE with other Holarctic regions is given.

KEY WORDS: Biodiversity, Insects, Russian Far East.

**С. Ю. Стороженко, А. С. Лелей, Н. В. Курзенко, Ю. А. Чистяков, В. С. Сидоренко. Разнообразие насекомых (Insecta) Дальнего Востока России // Дальневосточный энтомолог. 2002. N 109. С. 1-28.**

На Дальнем Востоке России (ДВР) зарегистрировано 629 семейств, относящихся к 31 отряду насекомых. Прогнозируемое число видов – 31500. Наиболее многочисленные отряды: Hymenoptera (72 семейства, 9000 прогнозируемых видов),

Diptera (119 семейств, 8000 прогнозируемых видов), Coleoptera (114 семейств, 5500 прогнозируемых видов), Lepidoptera (81 семейство, 5000 прогнозируемых видов). Распространение ряда семейств в России ограничено только ДВР. Впервые дан список всех известных семейств и распределение прогнозируемого числа видов по регионам ДВР. Среди 93 видов насекомых, включенных в Красную Книгу Российской Федерации, 43 встречаются только на ДВР. Наиболее богатая фауна насекомых связана со смешанными хвойно-широколиственными лесами юга ДВР. В фауне ДВР доминируют восточно-палеарктические виды (более 50 %). Выявлено 2 региона с наибольшим разнообразием насекомых: Приморский край и Курильские острова. Дается сравнение числа видов насекомых на ДВР с другими регионами Голарктики.

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## INTRODUCTION

The problem of biodiversity of the World and its regions is widely discussed now. Insects are much more abundant than other living organisms together. Excellent arguments have been made for 5-15 million (Stork, 1997), 12.5 million (Hammond, 1992), but Erwin (1982) have been proposed that estimated number even may be up to 30 millions extant insect species.

In 1981 fourteen taxonomists of Laboratory of Systematic and zoogeography of terrestrial arthropods (now Entomology Laboratory) prepared unpublished report about the insect biodiversity of RFE. After detail accounting for each order and family the estimated number of the species has been proposed as "no less than 30000 species". Later such number has been increased to 50000-60000 species (Lehr, 1986). Following update data this number reduce almost twice and according to current paper it estimates in 31500 species. The main aim of this paper is to summarize our knowledge on insect biodiversity of RFE as the distribution of orders, families and species for each region.

Russian Far East (RFE) (Fig. 1) occupies the square 3016 thousand sq. km. and extends from Wrangel Il. (71° N) southwards to Khasan Lake (42° N) and from Dezhnev Cape (170° W) westwards to Stanovoj range (120° E). The forests occupy 39% of this square and dominate in Primorskii krai, Amurskaya oblast, Sakhalin Il. and Khabarovskii krai. The vast territory of RFE is occupied by the tundra and marshes. The most rich and interesting insect fauna associated with mixed broad-leaved-coniferous forests in the south of RFE. The steppe is absent now in RFE, its small squares existed somewhere in Amurskaya oblast and south-west of Primorskii krai are cultivated now, but a few number of steppe species scarcely distributed throughout the south of RFE.

The main component of RFE insect fauna is East Palaearctic species (more than 50%), whereas boreal (holarctic, transpalearctic, euro-siberian and related) species are less numerous. The distribution of some families in Russia is restricted by RFE only (see: Taxonomic patterns). Among 93 species included in the "Red Data Book of Russian Federation" (2001) 43 occur in RFE only.

This work was supported in part by the Russian Fund of Fundamental Investigations, Grants No. 96-04-48065, A.S. Lelej, principal investigator; No. 98-04-48102, S.Yu. Storozhenko, principal investigator; and No. 01-04-96915, S.Yu. Storozhenko, principal investigator.

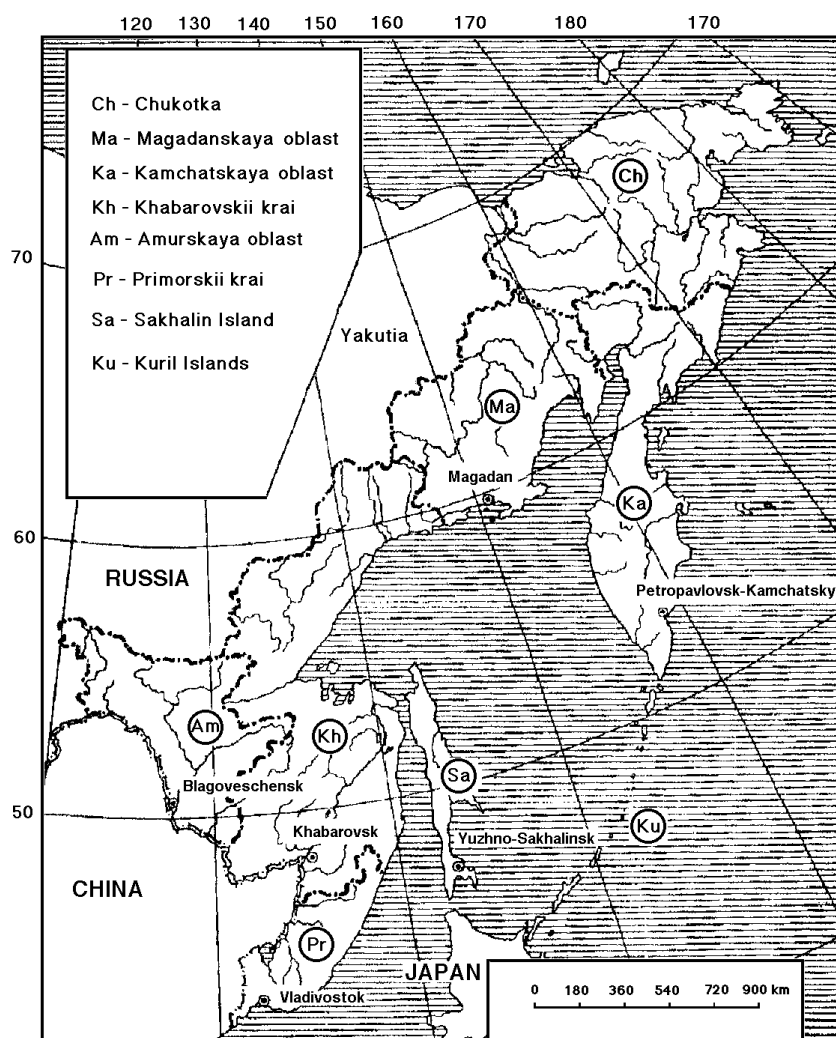


Fig. 1. Map of the Russian Far East.

## MATERIAL AND METHODS

When the series of "Key to the insects of Russian Far East" was starting we received complete data for some orders of RFE fauna and it was the base for creating computer catalogue. The catalogue has been produced with database application for IBM ("Visual FoxPro", version 3.0 for Windows 95). Up to now the database includes more than 17000 entries from the first eight published books, as well as other references (Soboleva, 1987; Kirpichnikova & Lehr, 1988; Storozhenko & Kuznetsov, 1995). Each entry includes 35 fields with specific name, taxonomy, synonymy, distribution, ecology, economic importance, reference data.

Because the series of Key-books not completed yet we enforced to use estimated number of RFE species for such large insect orders as Hymenoptera, Lepidoptera, and Diptera. We selected the model insect orders numbering more than 75 species each, well-studied, widely distributed, and include as terrestrial (Coleoptera, Heteroptera, Homoptera, Neuroptera, Orthoptera) so aquatic (Ephemeroptera, Odonata, Plecoptera, Trichoptera) species. Summarised data of nine model insect orders (Table 1) have been used for the accounting of regional fauna percentage among RFE fauna. According to such percentage we account the estimated species number for Lepidoptera, Hymenoptera, Diptera and other 25 orders together for each RFE region (Table 2). For orders Homoptera and Heteroptera we enlarge the recorded species number for each region by 12% and 5% correspondingly (estimated percents of non-described and non-recorded species together). As regards the order Coleoptera we added to 4021 recorded species 600 estimated Staphylinidae species and enlarged the result by 20% of non-described and non-recorded species and accounted the number for each region according to Coleoptera percentages.

## TAXONOMIC PATTERNS

The study insects by the orders and by RFE regions is quite non-uniform. There are detail data for the higher taxa (orders, families) which included in the "Key to the insects of Russian Far East". Fourteen books from eighteen ones of this series are published (Lelej et al., 1986, 1988; Krivolutskaya et al., 1989, 1992; Lelej et al., 1995; Kupianskaya et al., 1995; Lafer et al., 1996; Kononeko et al., 1997; Lelej et al., 1998; Kononenko et al., 1999; Sidorenko et al., 1999; Lelej et al., 2000; Sidorenko et al., 2001; Ponomarenko et al., 2001). But even in these books for some families generic key or catalogue of the species are given only.

**Coleoptera** (beetles) is one of the well-known large insect order. Three books of "Key to insects of Russian Far East" are devoted to Coleoptera (Krivolutskaya et al., 1989, 1992, Lafer et al., 1996), and computer catalogue recorded on CD (Lelej et al., 1999). Computer catalogue includes 7872 entries and contains data about 5101 species, 127 families and 1559 genera. Among them 4021 species distributed in RFE, others inhabit neighbouring territories and countries and quite probably could be found in RFE. Family Staphylinidae not treated by Key-books and not included in computer catalogue. Beetles habits all zones and biotops except polar area and sea water. There are 114 recorded families and 5500 estimated species in RFE. Families Siphonariidae and Decliniidae are endemic for RFE. Among 36 Coleoptera species

Table 1

Number of recorded insect species of model orders in the Russian Far East

N	Orders	Regions								Far East
		Ch	Ma	Ka	Kh	Am	Pr	Sa	Ku	
1.	Coleoptera	124	556	407	1441	1526	2794	1077	1029	4021
2.	Ephemeroptera	8	6	17	74	23	91	24	14	129
3.	Heteroptera	33	157	106	357	340	612	209	226	807
4.	Homoptera	21	111	182	235	274	1030	254	309	1337
5.	Neuroptera	1	11	18	40	33	59	29	32	77
6.	Odonata	2	8	21	45	38	77	26	29	84
7.	Orthoptera	2	16	9	77	65	101	25	25	129
8.	Plecoptera	18	33	23	49	24	73	36	31	123
9.	Trichoptera	37	53	52	170	45	215	76	83	326
Total:		246	951	835	2488	2368	5052	1730	1778	7033
% of total:		3.5	13.5	11.9	35.4	33.7	71.8	24.6	25.3	100

Table 2

Number of estimated insect species in the Russian Far East

N	Orders	Regions								Far East
		Ch	Ma	Ka	Kh	Am	Pr	Sa	Ku	
1.	Coleoptera*	170	760	560	1970	2090	3830	1480	1410	5500
2.	Lepidoptera*	180	680	600	1770	1680	3590	1230	1260	5000
3.	Hymenoptera*	320	1220	1070	3190	3030	6460	2210	2280	9000
4.	Diptera*	280	1080	950	2830	2700	5740	1970	2020	8000
5.	Homoptera*	20	130	210	270	320	1200	300	360	1550
6.	Heteroptera*	40	160	110	380	360	640	220	240	850
7.	Other 25 orders*	60	220	190	570	540	1150	390	410	1600
Total**:		1100	4200	3700	11000	10700	22600	7800	8000	31500
% of total:		3.5	13.5	11.9	35.4	33.7	71.8	24.6	25.3	100
square (thousand sq. km.)		737.7	461.4	472.3	824.6	363.7	165.9	71.5	15.6	3016
species/1000 sq. km.		1.5	9.1	7.8	13.3	29.4	136.2	108.9	512.8	10.4

\* The number rounded to ten

\*\* The number rounded to hundred.

Table 3

## The insect families number in the Russian Far East

N	Orders	Regions								Far East
		Ch	Ma	Ka	Kh	Am	Pr	Sa	Ku	
1.	Protura	3	3	3	3	3	3	3	3	3
2.	Collembola	11	12	9	10	9	13	11	9	14
3.	Diplura	0	1	0	1	0	1	0	0	1
4.	Thysanura	1	1	2	1	1	2	1	2	2
5.	Ephemeroptera	4	3	6	13	7	11	6	6	14
6.	Odonata	2	4	4	6	6	8	6	6	9
7.	Blattoptera	1	2	2	2	1	4	1	1	4
8.	Mantoptera	0	0	0	1	1	1	1	0	1
9.	Isoptera	0	0	0	0	0	1	0	0	1
10.	Plecoptera	4	5	5	8	8	8	8	7	8
11.	Grylloblattida	0	0	0	0	0	1	0	0	1
12.	Phasmatoptera	0	0	0	0	0	1	0	0	1
13.	Orthoptera	1	3	3	8	7	8	3	6	9
14.	Dermaptera	0	0	3	3	1	4	2	3	4
15.	Psocoptera	3	5	4	3	2	12	10	9	13
16.	Mallophaga	19	19	19	19	19	19	19	19	19
17.	Anoplura	5	5	5	5	5	5	5	5	5
18.	Thysanoptera	0	2	1	2	2	3	3	2	3
19.	Homoptera	4	11	16	24	29	43	27	30	43
20.	Heteroptera	8	18	18	29	28	35	22	27	37
21.	Coleoptera	19	49	49	85	78	104	72	78	114
22.	Strepsiptera	0	1	1	1	1	4	1	3	4
23.	Megaloptera	0	1	1	1	1	2	1	1	2
24.	Raphidioptera	0	1	0	2	2	2	1	0	2
25.	Neuroptera	1	1	2	6	6	9	4	6	9
26.	Mecoptera	0	0	1	3	1	2	1	1	3
27.	Hymenoptera	23	40	38	58	55	71	54	48	72
28.	Trichoptera	9	11	10	23	12	24	20	17	25
29.	Lepidoptera	19	30	35	55	60	78	59	59	81
30.	Siphonaptera	6	6	6	6	6	6	6	6	6
31.	Diptera	52	55	66	94	90	117	84	87	119
Total:		195	289	309	472	441	602	431	441	629
% of total:		31.0	45.9	49.1	75.0	70.1	95.7	68.5	70.1	100

Abbreviations of regions as in Fig. 1.

included in the "Red Data Book of Russian Federation" (2001) eleven species occur in RFE only.

**Lepidoptera** (butterflies and moths) is one of the largest and world-wide distributed insect order, including no less than 250 000 species from 124 families. There are about 8000 species in Russia. Taxa composition within RFE is rather close to complete inventory, in three published books of the "Key to the Insects of Russian Far East" 62 families and 2448 species have been included (Kononenko et al., 1997, 1999; Ponomarenko et al., 2001). Some other groups, such as butterflies (Diurna, Rhopalocera), and moths of the superfamilies Noctuoidea, Geometroidea and Zygaenoidea, still remain to be unpublished in this series and represented in FRE by more than 300, 1000, 700 (Geometroidea + Zygaenoidea) species correspondingly. Thus, about 4500 species from 81 families are registered in RFE up to now and their total number is accounted near to 5000 species (including 10% of estimated non-described and non-recorded species together).

Lepidoptera inhabit all climatic zones. Of them no more than 20 species from 4 families are indicated to be occurring in arctic desert, about 150-200 species from 20 families - in zonal tundra, more than 600 species from 50 families is taiga zone, but the most reach Lepidoptera fauna associated with mixed broad-leaved-coniferous forests in the south of RFE, where about 90% of all known species are located. Of them more than 50% are the species with East Palaearctic type of range, the overwhelming majority of those are associated with nemoral vegetation. Number of endemic species in local Lepidoptera fauna varies essentially in different systematic groups, reaching in the average of 4-5%. Rather many Lepidoptera including the representatives of the relict for Palaearctic fauna families such as Callidulidae, Epicopeiidae, Uraniidae, Epiplemidae, Bombycidae, Brahmaeidae and Saturniidae are associated with mixed broad-leaved-coniferous forests. Among 33 Lepidoptera species included in the "Red Data Book of Russian Federation" (2001) 23 are known to be spread within RFE only.

**Hymenoptera** (sawflies, parasitic wasps, ants, wasps, and bees) is the largest insect order in RFE, and numbered 72 families and no less than 9000 species. Such number has been received after account of recorded and estimated species for each family. For most Hymenoptera families the data are taken from published four Key-books (Lelej et al., 1995, 1998, 2000; Kupianskaya et al., 1995). There are detail data for Aculeata, especially wasps and ants while the study of Ichneumonidae and Cynipoidea still far from to be completed. Even not completed list of RFE braconids numbered more than 2500 species and we can expect that estimated number of ichneumonids (usually more abundant than braconids) may be about 2800 species. The family Proctorenyxidae is endemic of RFE. The distribution such families as Ctenoplectridae, Roproniidae, Vanhorniidae and Sierolomorphidae in Russia is restricted by RFE only. Nine Hymenoptera species are included in the "Red Data Book of Russian Federation" (2001).

**Diptera** (flies) is one of the dominating insect group in the recent fauna. Estimated species number in the World is 150000-250000, in the Russia – 20000-25000 species (Narchuk, 1999). The flies can use any kinds of food substrates and

practically in habit all kinds of biotops. The most abundant families in RFE are known as phytophagous – Chloropidae, Agromyzidae, Tephritidae and Cecidomyiidae; predators – Empididae s. l., Asilidae and Dolichopodidae; insect parasites – Tachinidae, Acroceridae, Conopidae and Bombyliidae; blood-suckers – Ceratopogonidae, Culicidae, Simuliidae and Tabanidae; mycetophagous – Mycetophiloidea, Sciaridae, Drosophilidae and Phoridae; saprophagous – Lauxaniidae, Limoniidae, Tipulidae, Muscidae and others. Some relict and rare families (Hesperinidae, Axymyiidae, Pachyneuridae, Hilarimorphidae, Systropodidae) are associated with mixed broad-leaved-coniferous forests in the south of RFE. Other Oriental families (Diopsidae, Pyrgotidae etc.) have the northern limit of their distribution in this zone also. Biting midges, black flies, horse flies and gad flies are very common in taiga zone of RFE. Culicidae, Limoniidae, Tipulidae, various Calyptratae, Heleomyzydae are abundant saprophagous and blood-suckers in tundra zone. Many species of Stratiomyidae, Chloropidae, Agromyzidae, Milichiidae, some Syrphidae, Therevidae are common in steppe-like biotops. Our knowledge on many Diptera families of RFE are very pure, for some families such data are absent in total and we could propose their presence only. There are 119 recorded Diptera families in RFE (Narchuk, 1999). As regards the number of species for RFE it has been proposed as more than 5000 (Narchuk, 1999). After comparison of Diptera with Hymenoptera and Coleoptera in the well-known insect European fauna (Table 5) we estimate Diptera number for RFE up to 8000 species.

**Ephemeroptera** (mayflies) is well-studied order of aquatic insects. There are 129 species from 14 families (Tables 1, 3, 4) in RFE (Chernova et al., 1986).

**Heteroptera** (bugs) is well-studied order of terrestrial or aquatic insects. There are 807 species from 37 families (Tables 1, 3, 4) in RFE (Vinokurov et al., 1988).

**Homoptera** includes suborders Cicadinea (cicadas and hoppers), Psyllinea (psyllids), Aleyrodinea (whiteflies), Aphidinea (aphids) and Coccinea (scale insects). There are 1337 species from 43 families of these five suborders (Tables 1, 3, 4) in RFE (Anuffriev et al., 1988).

**Neuroptera** is represented by nine families and 77 species (Makarkin, 1995). The Chrysopidae (green lacewings) and Hemerobiidae (brown lacewings) are the dominant groups in RFE.

**Odonata** (dragonflies) is well-studied insect order with aquatic larvae. There are 84 species from nine families (Tables 1, 3, 4) in RFE (Kharitonov, 1986).

**Orthoptera**. There are 129 species from nine families of suborders Ensifera and Caelifera in RFE (Storozhenko, 1986).

**Plecoptera** (stoneflies) is well-studied order of aquatic insect. There are 123 species from eight families (Tables 1, 3, 4) in RFE (Zhiltzova & Zapekina-Dulkeit, 1986).

**Trichoptera** (caddishflies) is well-studied insect order with aquatic larvae. There are 326 species from 25 families (Tables 1, 3, 4) in RFE (Arefina et al., 1997).

The data on the small orders **Diplura** (10 species), **Thysanura** (6), **Blattoptera** (7 species), **Mantoptera** (2), **Isoptera** (1 introduced species), **Grylloblattida** (4), **Phasmatoptera** (1), **Dermaptera** (10), **Anoplura** (34), **Megaloptera** (7), **Raphidioptera** (4), and **Mecoptera** (14 species) are taken from the proper volumes of the Key-books (Lelej et al., 1986, 1995).



Table 4

## Insect distribution in the Russian Far East by families

N	Families	Regions							
		Ch	Ma	Ka	Kh	Am	Pr	Sa	Ku
<b>1. Order Protura</b>									
1	Acerentomidae	+	•	+	+	+	+	+	+
2	Eosentomidae	+	+	+	+	+	+	+	+
3	Protentomidae	+	+	+	+	+	+	+	+
<b>2. Order Collembola</b>									
1	Bourletiellidae	+	+	+	+	+	+	+	+
2	Cyphoderidae	+	+	+	+	+	+	+	+
3	Entomobryidae	+	•	+	+	+	+	+	+
4	Isotomidae	+	•	+	+	+	•	+	+
5	Hypogastruridae	+	•	+	+	+	+	+	+
6	Neanuridae	+	•	+	+	+	•	+	+
7	Neelidae	+	+	+	+	+	+	+	+
8	Odontellidae	-	-	-	-	-	•	-	-
9	Oncopoduridae	+	+	+	+	+	+	+	+
10	Onychiuridae	•	•	-	-	-	•	•	-
11	Paronellidae	-	-	-	-	-	+	-	-
12	Poduridae	•	•	-	-	-	-	-	-
13	Sminthuridae	+	+	+	•	•	•	+	+
14	Tomoceridae	-	-	-	•	-	•	•	-
<b>3. Order Diplura</b>									
1	Campodeidae	-	•	-	•	-	•	-	-
<b>4. Order Thysanura</b>									
1	Lepismatidae	•	•	•	•	•	•	•	•
2	Machilidae	-	-	•	-	-	•	-	•
<b>5. Order Ephemeroptera</b>									
1	Ametropodidae	-	-	-	•	-	-	-	-
2	Baetidae	•	•	•	•	•	•	•	•
3	Behningiidae	-	-	-	•	-	-	-	-
4	Caenidae	-	-	-	•	•	•	-	-
5	Ephemerellidae	-	-	•	•	•	•	•	•
6	Ephemeridae	-	-	-	•	•	•	•	•
7	Heptageniidae	•	•	•	•	•	•	•	•
8	Leptophlebiidae	-	-	•	•	-	•	•	•
9	Metretopodidae	•	-	•	-	-	•	-	-
10	Oligoneuriidae	-	-	-	•	-	-	-	-
11	Palingeniidae	-	-	-	•	-	•	-	-
12	Polymitarcyidae	-	-	-	•	-	•	-	-
13	Potamanthidae	-	-	-	•	•	•	-	-
14	Siphonuridae	•	•	•	•	•	•	•	•
<b>6. Order Odonata</b>									
1	Aeschnidae	•	•	•	•	•	•	•	•
2	Calopterygidae	-	-	-	•	•	•	-	-
3	Coenagrionidae	-	•	•	•	•	•	•	•
4	Cordulegastridae	-	-	-	-	-	•	•	•
5	Corduliidae	•	•	•	•	•	•	•	•
7	Lestidae	-	-	-	•	•	•	•	•
8	Libellulidae	-	•	•	•	•	•	•	•
9	Platycnemidae	-	-	-	-	-	•	-	-

Table 4 (continued)

N	Families	Regions							
		Ch	Ma	Ka	Kh	Am	Pr	Sa	Ku
<b>7. Order Blattoptera</b>									
1	Blattellidae	•	•	•	•	•	•	•	•
2	Blattidae	-	•	•	•	-	•	-	-
3	Cryptocercidae	-	-	-	-	-	•	-	-
4	Polyphagidae	-	-	-	-	-	•	-	-
<b>8. Order Mantoptera</b>									
1	Mantidae	-	-	-	•	•	•	•	-
<b>9. Order Isoptera</b>									
1	Rhinotermitidae	-	-	-	-	-	•	-	-
<b>10. Order Plecoptera</b>									
1	Capniidae	•	•	•	•	•	•	•	•
2	Chloroperlidae	•	•	•	•	•	•	•	•
3	Leuctridae	-	•	•	•	•	•	•	•
4	Nemouridae	•	•	•	•	•	•	•	•
5	Perlidae	-	-	-	•	•	•	•	•
6	Perlodidae	•	•	•	•	•	•	•	•
7	Pteronarcyidae	-	-	-	•	•	•	•	-
8	Taeniopterygidae	-	-	-	•	•	•	•	•
<b>11. Order Grylloblattida</b>									
1	Grylloblattidae	-	-	-	-	-	•	-	-
<b>12. Order Phasmatoptera</b>									
1	Phasmatidae	-	-	-	-	-	•	-	-
<b>13. Order Orthoptera</b>									
1	Acrididae	•	•	•	•	•	•	•	•
2	Gryllidae	-	-	-	•	•	•	-	•
3	Gryllotalpidae	-	-	-	•	•	•	-	•
4	Haglidae	-	-	-	•	-	-	-	-
5	Pamphagidae	-	-	-	-	•	•	-	-
6	Rhaphidophoridae	-	-	-	•	-	•	-	•
7	Tetrigidae	-	•	•	•	•	•	•	•
8	Tettigoniidae	-	•	•	•	•	•	•	•
9	Tridactylidae	-	-	-	•	•	•	-	-
<b>14. Order Dermaptera</b>									
1	Anisolabiidae	-	-	•	•	-	•	-	•
2	Forficulidae	-	-	-	•	-	•	•	•
3	Labiduridae	-	-	•	•	•	•	•	•
4	Labiidae	-	-	•	-	-	•	-	-
<b>15. Order Psocoptera</b>									
1	Amphipsocidae	-	-	-	-	-	•	•	•
2	Caeciliidae	•	•	•	-	-	•	•	•
3	Elipsocidae	-	-	-	-	-	-	-	•
4	Lachesillidae	-	-	-	-	-	•	•	-
5	Liposcelidae	-	-	-	-	-	•	-	-
6	Mesopsocidae	-	•	-	-	-	•	•	•
7	Myopsocidae	-	-	-	-	-	•	-	-
8	Peripsocidae	-	-	-	-	-	•	•	•
9	Philotarsidae	-	-	-	-	-	•	•	-
10	Psocidae	-	•	•	-	-	•	•	•
11	Psyllipsocidae	•	•	•	-	•	•	•	•
12	Stenopsocidae	-	-	-	•	-	•	•	•
13	Trogiidae	•	•	•	•	•	•	•	•

Table 4 (continued)

N	Families	Regions							
		Ch	Ma	Ka	Kh	Am	Pr	Sa	Ku
<b>16. Order Mallophaga</b>									
1	Ancistroridae	+	+	+	+	+	+	+	+
2	Boopiidae	+	+	+	+	+	+	+	+
3	Bovicolidae	+	+	+	+	+	+	+	+
4	Colpocephalidae	+	+	+	+	+	+	+	+
5	Degeeriellidae	+	+	+	+	+	+	+	+
6	Esthiopteridae	+	+	+	+	+	+	+	+
7	Gliricolidae	+	+	+	+	+	+	+	+
8	Goniodidae	+	+	+	+	+	+	+	+
9	Gypoidae	+	+	+	+	+	+	+	+
10	Lipeuridae	+	+	+	+	+	+	+	+
11	Menoponidae	+	+	+	+	+	+	+	+
12	Philopteridae	+	+	+	+	+	+	+	+
13	Pseudonirmidae	+	+	+	+	+	+	+	+
14	Rallicolidae	+	+	+	+	+	+	+	+
15	Ricinidae	+	+	+	+	+	+	+	+
16	Somaphantidae	+	+	+	+	+	+	+	+
17	Trichodectidae	+	+	+	+	+	+	+	+
18	Trimenoponidae	+	+	+	+	+	+	+	+
19	Trinotonidae	+	+	+	+	+	+	+	+
<b>17. Order Anoplura</b>									
1	Echinophthiriidae	•	•	•	•	-	•	•	•
2	Haematopinidae	•	•	•	•	•	•	•	•
3	Hoplopleuridae	•	•	•	•	•	•	•	•
4	Linognathidae	•	•	•	•	•	•	•	•
5	Pediculidae	•	•	•	•	•	•	•	•
<b>18. Order Thysanoptera</b>									
1	Aeolothripidae	-	•	-	-	-	•	•	-
2	Phlaeothripidae	-	-	-	•	•	•	•	•
3	Thripidae	-	•	•	•	•	•	•	•
<b>19. Order Homoptera</b>									
1	Achilidae	-	•	-	-	•	•	•	-
2	Adelgidae	-	-	-	-	-	•	•	•
3	Aleyrodidae	-	-	-	-	-	•	•	•
4	Anoeciidae	-	-	-	-	•	•	•	-
5	Aphalaridae	-	-	•	•	•	•	•	•
6	Aphididae	-	•	•	•	•	•	•	•
7	Aphrophoridae	-	-	•	•	•	•	•	•
8	Asterolecaniidae	-	-	-	-	-	•	•	•
9	Cercopidae	-	-	-	-	-	•	-	•
10	Chaitophoridae	-	•	•	•	•	•	•	•
11	Cicadellidae	•	•	•	•	•	•	•	•
12	Cicadidae	-	-	-	•	•	•	•	•
13	Cixiidae	-	•	•	•	•	•	-	•
14	Coccidae	-	-	-	•	•	•	•	•
15	Delphacidae	•	•	•	•	•	•	•	•
16	Derbidae	-	-	-	-	•	•	-	•
17	Diaspididae	-	-	-	•	•	•	•	•
18	Dictyopharidae	-	-	-	-	•	•	-	-
19	Drepanosiphidae	-	•	•	•	•	•	•	•
20	Eriococcidae	-	-	-	•	•	•	•	•

Table 4 (continued)

N	Families	Regions							
		Ch	Ma	Ka	Kh	Am	Pr	Sa	Ku
21	Fulgoridae	-	-	-	-	-	•	-	-
22	Greenideidae	-	-	-	-	•	•	-	•
23	Hormaphididae	-	-	•	-	-	•	•	-
24	Issidae	-	•	-	•	•	•	•	•
25	Kermesidae	-	-	-	-	-	•	-	-
26	Lachnidae	-	•	•	•	•	•	•	•
27	Ledridae	-	-	-	-	•	•	-	-
28	Liviidae	-	-	•	•	•	•	•	•
29	Machaerotidae	-	-	-	-	-	•	-	-
30	Margarodidae	-	-	-	•	-	•	•	•
31	Meenoplidae	-	-	-	-	-	•	-	-
32	Membracidae	-	-	-	•	•	•	•	•
33	Mindaridae	-	-	-	-	-	•	-	-
34	Ortheziidae	-	-	•	•	•	•	•	•
35	Pemphigidae	-	-	•	•	•	•	•	-
36	Phloeomyzidae	-	-	-	-	-	•	-	-
37	Phylloxeridae	-	-	-	-	-	•	-	-
38	Pseudococcidae	-	-	•	•	•	•	•	•
39	Psyllidae	•	•	•	•	•	•	•	•
40	Tettigometridae	-	-	-	-	•	•	-	-
41	Thelaxidae	-	-	-	-	•	•	-	•
42	Triozidae	•	•	•	•	•	•	•	•
43	Tropiduchidae	-	-	-	-	-	•	-	•
<b>20. Order Heteroptera</b>									
1	Acanthosomatidae	-	•	•	•	•	•	•	•
2	Anthocoridae	•	•	•	•	•	•	•	•
3	Aphelocheiridae	-	-	-	•	-	•	-	-
4	Aradidae	•	•	•	•	•	•	•	•
5	Belostomatidae	-	-	-	-	•	•	•	-
6	Berytidae	-	•	•	•	•	•	•	•
7	Cimicidae	•	•	•	•	•	•	•	•
8	Coreidae	-	•	•	•	•	•	•	•
9	Corixidae	-	•	•	•	•	•	•	•
10	Cydnidae	-	-	-	•	•	•	-	•
11	Dipsocoridae	-	-	-	•	•	•	-	•
12	Enicocephalidae	-	•	-	-	-	•	-	-
13	Gerridae	-	•	•	•	•	•	•	•
14	Hebridae	-	-	-	-	-	•	-	-
15	Hydrometridae	-	-	-	-	•	•	-	•
16	Lygaeidae	•	•	•	•	•	•	•	•
17	Mesoveliidae	-	-	-	-	-	•	•	•
18	Microphysidae	-	-	-	•	•	•	•	•
19	Miridae	•	•	•	•	•	•	•	•
20	Nabidae	•	•	•	•	•	•	•	•
21	Naucoridae	-	-	-	-	-	•	-	-
22	Nepidae	-	-	-	-	-	•	-	•
23	Notonectidae	-	-	-	•	•	•	•	•
24	Ochteridae	-	-	-	-	-	-	-	•
25	Pentatomidae	-	•	•	•	•	•	•	•
26	Piesmatidae	-	-	-	•	•	•	-	-
27	Plataspidae	-	-	-	•	•	-	-	-
28	Pleidae	-	-	-	-	-	•	-	-

Table 4 (continued)

N	Families	Regions							
		Ch	Ma	Ka	Kh	Am	Pr	Sa	Ku
29	Pyrrhocoridae	-	-	-	•	•	•	-	•
30	Reduviidae	-	•	•	•	•	•	•	•
31	Rhopalidae	-	•	•	•	•	•	•	•
32	Saldidae	•	•	•	•	•	•	•	•
33	Scutelleridae	-	•	•	•	•	•	-	-
34	Stenocephalidae	-	-	-	-	-	•	-	-
35	Tingidae	•	•	•	•	•	•	•	•
36	Urostylidae	-	-	-	•	•	•	•	•
37	Veliidae	-	-	•	•	•	•	•	•
<b>21. Order Coleoptera</b>									
1	Aderidae	-	-	-	-	-	•	-	-
2	Alleculidae	-	•	•	•	•	•	•	•
3	Anobiidae	-	•	•	•	•	•	•	•
4	Anthicidae	•	-	-	•	•	•	•	-
5	Anthribidae	•	•	•	•	•	•	•	•
6	Apionidae	-	-	-	•	•	•	•	•
7	Attelabidae	•	•	•	•	•	•	•	•
8	Biphyllidae	-	-	-	-	-	•	-	-
9	Boridae	-	-	-	•	•	•	•	-
10	Bostrichidae	-	•	•	•	•	-	-	-
11	Bothrideridae	-	-	-	•	-	•	-	-
12	Brathinidae	-	-	-	-	-	-	•	•
13	Brentidae	-	-	-	-	-	•	-	•
14	Bruchidae	-	•	•	•	•	•	•	•
15	Buprestidae	-	•	•	•	•	•	•	•
16	Byrrhidae	•	•	•	•	•	•	•	•
17	Byturidae	-	•	•	•	•	•	•	•
18	Cantharidae	•	•	•	•	•	•	•	•
19	Carabidae	•	•	•	•	•	•	•	•
20	Catopidae	-	•	•	•	•	•	•	•
21	Cephaloidea	•	•	•	•	•	•	•	•
22	Cerambycidae	-	•	•	•	•	•	•	•
23	Cerylonidae	-	-	-	•	•	•	•	•
24	Chrysomelidae	•	•	•	•	•	•	•	•
25	Clambidae	-	-	-	•	-	•	-	-
26	Cleridae	-	•	-	•	•	•	•	•
27	Coccinellidae	•	•	•	•	•	•	•	•
28	Colydiidae	-	-	-	•	•	•	-	•
29	Corylophidae	-	-	-	•	-	•	-	-
30	Cryptophagidae	-	•	•	•	•	•	•	•
31	Cucujidae	-	-	-	•	•	•	•	•
32	Cupedidae	-	-	-	-	-	•	-	-
33	Curculionidae	•	•	•	•	•	•	•	•
34	Dascillidae	-	•	•	•	•	-	-	-
35	Dasyceridae	-	-	-	-	-	-	-	•
36	Decliniidae	-	•	-	•	•	•	-	-
37	Dermestidae	-	•	•	•	•	•	•	•
38	Derodontidae	-	•	-	•	-	•	-	•
39	Drilidae	-	-	-	-	-	-	-	•
40	Dryophthoridae	-	-	-	•	-	•	•	•
41	Dryopidae	-	-	-	-	-	•	-	-
42	Dytiscidae	•	•	•	•	•	•	•	•

Table 4 (continued)

N	Families	Regions							
		Ch	Ma	Ka	Kh	Am	Pr	Sa	Ku
43	Elateridae	•	•	•	•	•	•	•	•
44	Elmidae	-	-	•	-	-	•	•	•
45	Endomychidae	-	-	-	•	•	•	•	•
46	Erotylidae	-	-	-	•	•	•	•	•
47	Eucinetidae	-	-	-	-	-	•	-	-
48	Eucnemidae	-	-	-	-	•	•	•	•
49	Georissidae	-	-	-	-	-	-	-	-
50	Gyrinidae	•	•	•	•	•	•	•	•
51	Haliplidae	•	•	•	•	•	•	•	-
52	Helodidae	-	-	•	•	•	•	•	•
53	Helotidae	-	-	-	-	-	•	-	-
54	Heteroceridae	-	•	•	•	•	•	•	-
55	Histeridae	-	-	•	•	•	•	•	•
56	Hydraenidae	-	•	-	•	•	•	-	•
57	Hydrophilidae	•	•	•	•	•	•	•	•
58	Ischaliidae	-	-	-	-	-	•	-	•
59	Kateretidae	-	•	•	•	•	•	•	•
60	Lagriidae	-	-	-	•	•	•	•	•
61	Lampyridae	-	-	-	-	•	•	•	•
62	Languriidae	-	-	-	-	-	•	-	•
63	Lathridiidae	•	•	•	•	•	•	•	•
64	Leiodidae	-	•	•	•	•	•	•	•
65	Limnichidae	-	-	-	-	-	-	•	-
66	Lucanidae	-	-	-	•	•	•	•	•
67	Lycidae	-	•	-	•	•	•	•	•
68	Lymexylonidae	-	-	•	•	•	•	•	-
69	Melandryidae	-	•	•	•	•	•	•	•
70	Meloidae	-	•	•	•	•	•	•	•
71	Melyridae	-	•	-	•	•	•	•	•
72	Mordellidae	-	-	-	•	•	•	•	•
73	Mycetophagidae	-	-	-	•	•	•	•	•
74	Mychothenidae	-	-	-	-	-	-	-	-
75	Nemonychidae	-	-	-	-	•	-	-	-
76	Nitidulidae	•	•	•	•	•	•	•	•
77	Nosodendridae	-	-	-	-	-	-	-	•
78	Noteridae	-	-	-	-	-	•	-	-
79	Oedemeridae	-	•	•	•	•	•	•	•
80	Othniidae	-	-	-	-	-	•	-	•
81	Peltidae	-	-	•	•	•	•	•	-
82	Phaenocephalidae	-	-	-	-	-	-	-	-
83	Phalacridae	-	-	-	•	•	•	•	•
84	Pilipalpidae	-	-	-	•	•	•	-	-
85	Platypodidae	-	-	-	-	-	•	-	•
86	Prostomidae	-	-	-	•	-	•	-	-
87	Pselaphidae	-	-	-	•	•	•	-	•
88	Psephenidae	-	-	-	-	-	•	-	-
89	Ptilodactylidae	-	-	-	-	-	-	-	•
90	Ptinidae	-	•	•	•	•	•	•	-
91	Pyrhidae	-	•	•	•	•	•	•	-
92	Pyrochroidae	-	•	•	•	•	•	•	•
93	Rhipiphoridae	-	-	-	-	-	•	•	•
94	Rhizophagidae	-	-	-	•	•	•	•	•

Table 4 (continued)

N	Families	Regions								
		Ch	Ma	Ka	Kh	Am	Pr	Sa	Ku	
95	Rhynchitidae	-	•	•	•	•	•	•	•	
96	Rhysodidae	-	-	-	•	•	•	-	•	
97	Salpingidae	-	-	•	•	•	•	•	•	
98	Scaphidiidae	-	-	-	•	•	•	•	-	
99	Scarabaeidae	-	•	•	•	•	•	•	•	
100	Scolytidae	-	•	•	•	•	•	•	•	
101	Scydmaenidae	-	-	-	•	•	•	-	-	
102	Sikhotealiniidae	-	-	-	-	-	•	-	-	
103	Silphidae	•	•	•	•	•	•	•	•	
104	Sphaeritidae	-	-	-	•	•	•	-	-	
105	Sphindidae	-	-	-	•	-	•	•	•	
106	Staphilinidae	•	•	•	•	•	•	•	•	
107	Synchroidae	-	-	-	-	-	•	-	•	
108	Synteliidae	-	-	-	-	-	-	-	•	
109	Tenebrionidae	-	•	•	•	•	•	•	•	
110	Tetratomidae	-	-	•	•	-	•	•	•	
111	Throscidae	-	-	-	•	•	•	-	•	
112	Trachypachidae	-	•	-	•	•	•	•	-	
113	Trogositidae	-	-	-	•	•	•	-	-	
114	Zopheridae	-	-	-	•	-	•	-	-	
<b>22. Order Strepsiptera</b>										
1	Corioxenidae	-	-	-	-	-	+	-	+	
2	Elencnidae	-	-	-	-	-	+	-	-	
3	Halictophagidae	-	-	-	-	-	+	-	+	
4	Stylopidae	-	+	+	+	•	•	+	+	
<b>23. Order Megaloptera</b>										
1	Corydalidae	-	-	-	-	-	•	-	-	
2	Sialidae	-	•	•	•	•	•	•	•	
<b>24. Order Raphidioptera</b>										
1	Inocellidae	-	•	-	•	•	•	•	-	
2	Raphidiidae	-	-	-	•	•	•	-	-	
<b>25. Order Neuroptera</b>										
1	Ascalaphidae	-	-	-	•	•	•	-	-	
2	Chrysopidae	-	-	•	•	•	•	•	•	
3	Coniopterygidae	-	-	-	•	•	•	-	•	
4	Dilaridae	-	-	-	-	-	•	-	-	
5	Hemerobiidae	•	•	•	•	•	•	•	•	
6	Mantispidae	-	-	-	-	-	•	-	-	
7	Myrmeleontidae	-	-	-	•	•	•	•	•	
8	Osmylidae	-	-	-	•	-	•	•	•	
9	Sisyridae	-	-	-	-	•	•	-	•	
<b>26. Order Mecoptera</b>										
1	Bittacidae	-	-	-	•	-	•	-	-	
2	Boreidae	-	-	•	•	-	-	-	-	
3	Panorpidae	-	-	-	•	•	•	•	•	
<b>27. Order Hymenoptera</b>										
1	Andrenidae	-	•	•	•	•	•	•	•	
2	Anthophoridae	-	-	-	•	•	•	•	-	
3	Aphelinidae	-	-	-	•	•	•	•	•	
4	Aphidiidae	•	•	•	•	•	•	•	•	
5	Apidae	•	•	•	•	•	•	•	•	

Table 4 (continued)

N	Families	Regions							
		Ch	Ma	Ka	Kh	Am	Pr	Sa	Ku
6	Argidae	•	•	•	•	•	•	•	•
7	Aulacidae	-	•	-	•	•	•	•	-
8	Bethylidae	-	•	•	•	•	•	•	•
9	Blasticotomidae	•	•	•	•	•	•	•	•
10	Braconidae	•	•	•	•	•	•	•	•
11	Cephalidae	•	•	•	•	•	•	•	•
12	Ceraphronidae	-	-	-	•	•	•	•	•
13	Chalcididae	-	-	-	•	•	•	•	•
14	Chrysididae	-	•	•	•	•	•	•	•
15	Cimbicidae	•	•	•	•	•	•	•	•
16	Colletidae	-	•	•	•	•	•	•	•
17	Crabronidae	-	•	•	•	•	•	•	•
18	Ctenoplectridae	-	-	-	-	-	•	-	-
19	Cynipidae	•	•	•	•	•	•	•	•
20	Diapriidae	•	•	•	•	•	•	•	•
21	Diprionidae	•	•	•	•	•	•	•	•
22	Dryinidae	-	-	-	•	•	•	•	•
23	Elasmidae	-	-	-	-	-	•	-	-
24	Embolemidae	-	-	-	-	-	•	-	-
25	Encyrtidae	•	•	•	•	•	•	•	•
26	Eucharitidae	-	-	-	-	•	•	-	-
27	Eulophidae	-	•	•	•	•	•	•	•
28	Eupelmidae	-	-	-	-	-	•	-	-
29	Eurytomidae	-	-	•	•	•	•	•	•
30	Figitidae	•	•	•	•	•	•	•	•
31	Formicidae	-	•	•	•	•	•	•	•
32	Gasteruptiidae	-	•	-	-	•	•	•	•
33	Halictidae	-	•	•	•	•	•	•	•
34	Heloridae	-	•	•	•	•	•	•	-
35	Ibaliidae	-	-	-	-	-	•	•	-
36	Ichneumonidae	•	•	•	•	•	•	•	•
37	Leucospidae	-	-	-	•	•	•	-	-
38	Liopteridae	-	-	-	-	-	•	-	•
39	Megachilidae	-	•	•	•	•	•	•	•
40	Megalodontidae	-	-	-	•	•	•	-	-
41	Megaspilidae	-	•	•	•	•	•	•	-
42	Melittidae	-	-	-	•	-	•	-	-
43	Mutillidae	-	-	-	•	•	•	•	•
44	Mymaridae	-	-	•	-	-	•	-	•
45	Mymarommatidae	-	-	-	-	-	•	-	-
46	Ormyridae	-	-	-	•	-	•	-	•
47	Orussidae	-	-	-	•	•	•	•	-
48	Pamphiliidae	•	•	•	•	•	•	•	•
49	Paxyloommatidae	-	-	-	•	-	•	•	-
50	Perilampidae	-	-	•	•	•	•	•	-
51	Platygastridae	•	•	•	•	•	•	•	•
52	Pompilidae	•	•	•	•	•	•	•	•
53	Proctorenyxidae	-	-	-	•	-	•	-	-
54	Proctotrupidae	•	•	•	•	•	•	•	•
55	Pteromalidae	•	•	•	•	•	•	•	•
56	Roproniidae	-	-	-	-	-	•	•	•
57	Sapygidae	-	•	-	•	-	•	•	-



Table 4 (continued)

N	Families	Regions								
		Ch	Ma	Ka	Kh	Am	Pr	Sa	Ku	
58	Scelionidae	-	•	-	•	•	•	•	•	
59	Scoliidae	-	-	-	•	•	•	-	•	
60	Sierolomorphidae	-	-	-	-	-	•	-	-	
61	Siricidae	•	•	•	•	•	•	•	•	
62	Sphecidae	-	•	•	•	•	•	•	•	
63	Tenthredinidae	•	•	•	•	•	•	•	•	
64	Tetracampidae	-	-	-	-	-	-	-	-	
65	Tiphiidae	-	-	-	•	•	•	-	-	
66	Torymidae	-	-	-	•	•	•	•	•	
67	Trichogrammatidae	-	•	-	•	•	•	•	-	
68	Trigonalidae	-	-	-	-	•	•	-	-	
69	Vanhorniidae	-	-	-	-	-	•	-	-	
70	Vespidae	•	•	•	•	•	•	•	•	
71	Xiphydriidae	•	•	•	•	•	•	•	•	
72	Xyelidae	•	•	•	•	•	•	•	•	
<b>28. Order Trichoptera</b>										
1	Apataniidae	•	•	•	•	•	•	•	•	
2	Arctopsychidae	-	•	•	•	•	•	•	•	
3	Brachycentridae	•	•	•	•	•	•	•	•	
4	Calamoceratidae	-	-	-	-	-	•	-	-	
5	Ecnomidae	-	-	-	•	-	•	•	•	
6	Glossosomatidae	•	•	•	•	-	•	•	•	
7	Goeridae	-	-	-	•	-	•	•	•	
8	Hyalopsychidae	-	-	-	•	-	-	•	-	
9	Hydrobiosidae	-	-	-	-	-	•	•	•	
10	Hydropsychidae	•	•	•	•	•	•	•	-	
11	Hydroptilidae	-	-	•	•	-	•	•	•	
12	Lepidostomatidae	-	-	-	•	•	•	•	•	
13	Leptoceridae	•	•	•	•	•	•	•	•	
14	Limnephilidae	•	•	•	•	•	•	•	•	
15	Molannidae	-	•	-	•	•	•	•	•	
16	Odontoceridae	-	-	-	-	-	•	-	-	
17	Philopotamidae	-	-	-	-	-	•	•	•	
18	Phryganeidae	•	•	•	•	•	•	•	•	
19	Phryganopsychidae	-	-	-	-	-	•	-	-	
20	Polycentropodidae	•	•	•	•	•	•	-	-	
21	Psychomyiidae	-	-	-	-	-	•	•	-	
22	Rhyacophilidae	•	•	-	•	•	•	•	•	
23	Sericostomatidae	-	-	-	•	-	•	-	-	
24	Stenopsychidae	-	-	-	•	-	•	•	•	
25	Uenoidae	-	-	-	•	•	•	•	•	
<b>29. Order Lepidoptera</b>										
1	Acrolepiidae	-	-	•	•	•	•	-	•	
2	Adelidae	•	•	•	•	•	•	•	•	
3	Agaristidae	-	-	-	-	-	•	-	•	
4	Agonoxenidae	-	-	-	-	-	•	-	-	
5	Alucitidae	-	-	-	-	•	•	•	•	
6	Arctiidae	•	•	•	•	•	•	•	•	
7	Argyresthiidae	-	-	-	-	•	•	•	-	
8	Batrachedridae	-	-	-	-	-	•	-	-	
9	Blastobasidae	-	-	•	•	-	•	-	-	
10	Bombycidae	-	-	-	•	•	•	-	-	

Table 4 (continued)

N	Families	Regions							
		Ch	Ma	Ka	Kh	Am	Pr	Sa	Ku
11	Brahmaeidae	-	-	-	•	•	•	•	•
12	Bucculatricidae	-	-	-	-	-	•	-	-
13	Callidulidae	-	-	-	•	•	•	-	-
14	Carposinidae	-	-	-	•	•	•	•	•
15	Choreutidae	-	-	-	•	•	•	•	•
16	Chrysopeleiidae	-	-	-	-	-	•	-	-
17	Coleophoridae	-	-	-	•	•	•	•	•
18	Cosmopterigidae	-	-	•	•	•	•	•	•
19	Cossidae	-	-	-	•	•	•	•	•
20	Crambidae	-	•	•	•	•	•	•	•
21	Ctenuchidae	-	-	-	•	•	•	•	•
22	Danaidae	-	-	-	-	-	•	•	•
23	Depressariidae	•	•	•	•	•	•	•	•
24	Douglasiidae	-	-	-	-	•	•	-	-
25	Drepanidae	-	•	•	•	•	•	•	•
26	Elachistidae	-	-	•	•	•	•	•	•
27	Endromidae	-	-	-	•	•	•	-	-
28	Epermeniidae	-	•	•	-	•	•	-	•
29	Epicopeiidae	-	-	-	-	-	•	-	-
30	Epiplemidae	-	-	-	•	•	•	•	•
31	Eriocraniidae	-	-	-	-	-	•	•	•
32	Ethmiidae	-	-	-	•	•	•	-	-
33	Gelechiidae	•	•	•	•	•	•	•	•
34	Geometridae	•	•	•	•	•	•	•	•
35	Glyphipterigidae	-	-	-	-	-	•	•	•
36	Gracillariidae	-	•	-	•	•	•	•	•
37	Heliozelidae	-	-	-	-	-	•	•	•
38	Hepialidae	•	•	•	•	•	•	•	•
39	Hesperiidae	-	•	•	•	•	•	•	•
40	Heterogynidae	-	-	-	-	-	•	-	-
41	Lasiocampidae	-	•	•	•	•	•	•	•
42	Lecithoceridae	-	-	-	-	-	•	-	-
43	Lemoniidae	-	-	-	-	•	-	-	-
44	Limacodidae	-	-	-	•	•	•	•	•
45	Lycaenidae	•	•	•	•	•	•	•	•
46	Lymantriidae	•	•	•	•	•	•	•	•
47	Lyonetiidae	-	-	-	•	•	•	•	-
48	Micropterigidae	-	-	-	-	-	-	•	•
49	Momphidae	•	•	•	•	•	•	•	•
50	Nepticulidae	-	-	-	-	-	•	•	•
51	Noctuidae	•	•	•	•	•	•	•	•
52	Nolidae	-	-	-	•	•	•	•	•
53	Notodontidae	-	-	•	•	•	•	•	•
54	Nymphalidae	•	•	•	•	•	•	•	•
55	Ochsenheimeriidae	-	-	-	-	-	-	-	-
56	Oecophoridae	-	•	•	•	•	•	•	•
57	Opostegidae	-	-	-	-	•	•	•	•
58	Papilionidae	•	•	•	•	•	•	•	•
59	Peleopodidae	-	-	-	-	-	•	-	-
60	Pieridae	•	•	•	•	•	•	•	•
61	Plutellidae	-	•	•	•	•	•	•	•
62	Psychidae	-	•	-	•	•	•	•	-

Table 4 (continued)

N	Families	Regions							
		Ch	Ma	Ka	Kh	Am	Pr	Sa	Ku
63	Pterophoridae	-	-	•	•	•	•	•	•
64	Pyralidae	•	•	•	•	•	•	•	•
65	Pyraustidae	•	•	•	•	•	•	•	•
66	Roeslerstammiidae	-	-	-	-	-	•	-	•
67	Saturniidae	-	-	-	•	•	•	•	•
68	Satyridae	•	•	•	•	•	•	•	•
69	Scythrididae	•	•	•	•	•	•	•	+
70	Schreckensteiniidae	-	-	-	-	-	-	•	-
71	Sesiidae	-	•	•	•	•	•	•	•
72	Sphingidae	-	•	•	•	•	•	•	•
73	Stathmopodidae	-	-	-	-	-	•	-	-
74	Thyatiridae	-	-	•	•	•	•	•	•
75	Thyrididae	-	-	-	•	•	•	•	•
76	Tineidae	•	•	•	•	•	•	•	•
77	Tischeriidae	-	-	-	-	-	•	•	-
78	Tortricidae	•	•	•	•	•	•	•	•
79	Uraniidae	-	-	-	•	•	•	-	-
80	Yponomeutidae	-	-	-	•	•	•	•	•
81	Zygaenidae	-	-	-	•	•	•	•	•
<b>30. Order Siphonaptera</b>									
1	Ceratophyllidae	•	•	•	•	•	•	•	•
2	Hystrichopsyllidae	•	•	•	•	•	•	•	•
3	Ischopsyllidae	+	+	+	+	+	+	+	+
4	Leptopsyllidae	•	•	•	•	•	•	•	•
5	Pulicidae	•	•	•	•	•	•	•	•
6	Vermipsyllidae	•	•	•	•	•	•	•	•
<b>31. Order Diptera</b>									
1	Acartophthalmidae	-	-	-	•	•	•	-	-
2	Acroceridae	-	-	-	•	•	•	-	-
3	Agromyzidae	•	•	•	•	•	•	•	•
4	Anisopodidae	-	-	-	-	-	•	•	•
5	Anthomyiidae	•	•	•	•	•	•	•	•
6	Anthomyzidae	-	-	-	•	•	•	•	•
7	Asilidae	•	•	•	•	•	•	•	•
8	Asteiidae	-	-	-	-	-	•	-	-
9	Atelestidae	-	-	-	-	-	•	-	-
10	Athericidae	-	-	-	-	-	•	-	-
11	Aulacigastridae	-	-	-	•	•	•	-	-
12	Axymyiidae	-	-	-	-	-	•	-	-
13	Bibionidae	•	•	•	•	•	•	•	•
14	Blephariceridae	•	•	•	•	•	•	•	•
15	Bolitophilidae	-	-	-	•	-	•	•	•
16	Bombyliidae	•	•	•	•	•	•	•	•
17	Braulidae	-	-	-	•	•	•	•	•
18	Calliphoridae	•	•	•	•	•	•	•	•
19	Campichoetidae	-	-	-	•	•	•	-	-
20	Canthylloscelidae	-	-	-	•	-	•	-	-
21	Carnidae	•	-	-	-	•	•	•	-
22	Cecidomyiidae	•	•	•	•	•	•	•	•
23	Ceratopogonidae	•	•	•	•	•	•	•	•
24	Chamaemyiidae	-	•	•	•	•	•	•	•
25	Chaoboridae	•	•	•	•	•	•	•	•

Table 4 (continued)

N	Families	Regions							
		Ch	Ma	Ka	Kh	Am	Pr	Sa	Ku
26	Chironomidae	•	•	•	•	•	•	•	•
27	Chloropidae	•	•	•	•	•	•	•	•
28	Chyromyidae	-	-	-	-	-	•	-	-
29	Clusiidae	-	-	-	•	•	•	-	-
30	Coelopidae	•	•	•	•	•	•	•	•
31	Coenomyiidae	-	-	-	•	•	•	•	•
32	Conopidae	•	•	•	•	•	•	•	•
33	Cramptonomyiidae	-	-	-	-	-	•	-	-
34	Cryptochetidae	-	-	-	-	-	•	-	-
35	Culicidae	•	•	•	•	•	•	•	•
36	Curtonotidae	-	-	-	•	•	•	-	-
37	Cylindrotomidae	-	-	-	-	-	-	•	•
38	Deuterophlebiidae	•	•	-	•	-	•	-	•
39	Diadocidiidae	-	-	-	-	-	•	•	-
40	Diastatidae	-	-	-	•	•	•	-	•
41	Diopsidae	-	-	-	-	-	•	-	-
42	Ditomyiidae	-	-	-	•	-	•	•	•
43	Dixidae	-	-	•	-	-	-	-	-
44	Dolichopodidae	•	•	•	•	•	•	•	•
45	Drosophilidae	-	-	•	•	•	•	•	•
46	Dryomyzidae	-	-	•	•	•	•	•	•
47	Empididae	•	•	•	•	•	•	•	•
48	Ephydriidae	•	•	•	•	•	•	•	•
49	Fanniidae	•	•	•	•	•	•	•	•
50	Gasterophilidae	•	•	•	•	•	•	•	•
51	Helcomyzidae	•	•	•	•	-	•	•	•
52	Heleomyzidae	•	•	•	•	•	•	•	•
53	Hesperinidae	-	-	-	•	•	•	-	-
54	Hilarimorphidae	-	-	-	-	-	•	-	-
55	Hippoboscidae	-	-	•	•	•	•	•	•
56	Hybotidae	•	•	•	•	•	•	•	•
57	Hypodermatidae	•	•	•	•	•	•	•	•
58	Keroplastidae	-	-	-	•	•	•	•	•
59	Lauxaniidae	•	•	•	•	•	•	•	•
60	Limoniidae	•	•	•	•	•	•	•	•
61	Lonchaeidae	•	•	•	•	•	•	•	•
62	Lonchopteridae	-	-	•	•	•	•	•	•
63	Megamerinidae	-	-	-	•	•	•	•	•
64	Micropezidae	-	•	•	•	•	•	•	•
65	Microphoridae	-	-	-	•	•	•	-	•
66	Milichiidae	•	•	•	•	•	•	•	•
67	Muscidae	•	•	•	•	•	•	•	•
68	Mycetobiidae	-	-	-	-	-	•	-	•
69	Mycetophilidae	•	-	•	•	•	•	•	•
70	Nemestrinidae	-	-	-	-	-	•	-	-
71	Nycteribiidae	-	•	-	•	-	•	-	•
72	Nymphomyiidae	•	•	-	•	•	•	•	•
73	Odiniidae	-	-	-	•	•	•	-	-
74	Oestridae	-	•	-	•	•	•	•	-
75	Opetiidae	-	-	-	-	-	•	-	-
76	Opomyzidae	-	-	-	-	-	•	-	-
77	Pachyneuridae	-	-	-	•	•	•	•	•

Table 4 (continued)

N	Families	Regions							
		Ch	Ma	Ka	Kh	Am	Pr	Sa	Ku
78	Pallopidae	-	-	-	-	•	•	•	•
79	Pelecorhynchidae	-	-	-	-	-	•	•	-
80	Phoridae	•	•	•	•	•	•	•	•
81	Piophilidae	•	•	•	•	•	•	•	•
82	Pipunculidae	-	-	•	•	•	•	•	•
83	Platypezidae	-	-	-	-	•	•	•	•
84	Platystomatidae	-	-	-	-	-	•	-	•
85	Pleciidae	-	-	•	•	•	•	•	-
86	Pseudopomyzidae	-	-	-	•	•	•	-	•
87	Psilidae	-	-	•	•	•	•	•	•
88	Psychodidae	•	•	•	•	•	•	•	•
89	Pyrgotidae	-	-	-	-	-	•	•	-
90	Rhagionidae	-	-	•	•	•	•	-	•
91	Rhinophoridae	-	-	-	•	•	•	•	•
92	Sarcophagidae	•	•	•	•	•	•	•	•
93	Scathophagidae	•	•	•	•	•	•	•	•
94	Scatopsidae	•	•	•	•	•	•	•	•
95	Scenopinidae	•	•	•	•	•	•	•	•
96	Sciaridae	•	•	•	•	•	•	•	•
97	Sciomyzidae	•	•	•	•	•	•	•	•
98	Sepsidae	-	-	•	•	•	•	•	•
99	Simuliidae	•	•	•	•	•	•	•	•
100	Siphonellopsidae	•	•	•	•	•	•	•	•
101	Sphaeroceridae	•	•	•	•	•	•	•	•
102	Stratiomyidae		•	•	•	•	•	•	•
103	Strongylophthalmyiidae	-	-	-	•	•	•	-	•
104	Synneuridae	-	-	•	•	•	•	-	-
105	Syrphidae	•	•	•	•	•	•	•	•
106	Systropodidae	-	-	-	-	-	-	-	-
107	Tabanidae	•	•	•	•	•	•	•	•
108	Tachinidae	•	•	•	•	•	•	•	•
109	Tanyderidae	-	-	-	-	-	•	-	-
110	Tanypezidae	-	-	-	•	-	•	-	-
111	Tephritidae	•	•	•	•	•	•	•	•
112	Tethinidae	-	-	-	•	•	•	•	•
113	Therevidae	•	•	•	•	•	•	•	•
114	Tipulidae	•	•	•	•	•	•	•	•
115	Trichoceridae	•	•	•	•	•	•	•	•
116	Trixoscelididae	-	-	•	•	•	•	•	•
117	Ulidiidae	-	-	•	•	•	•	•	•
118	Xylomyidae	-	-	-	•	•	•	•	•
119	Xylophagidae	-	-	•	-	•	•	•	•

(•) – recorded; (+) – not recorded, but surely represented; (-) – absent. Abbreviations of regions as in Fig. 1.

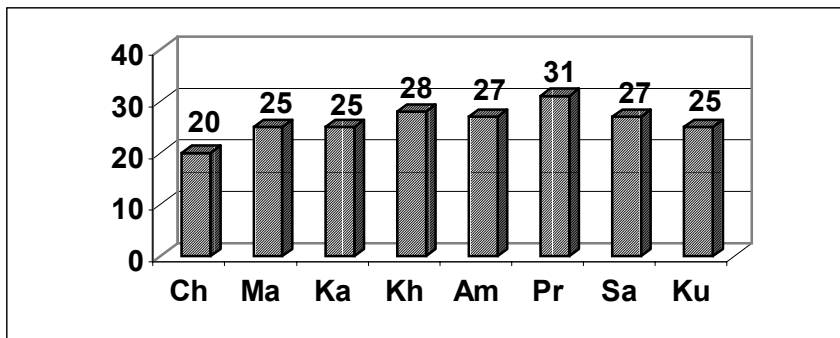


Fig. 2. Number of orders in the Russian Far East. Abbreviations of regions as in Fig. 1.

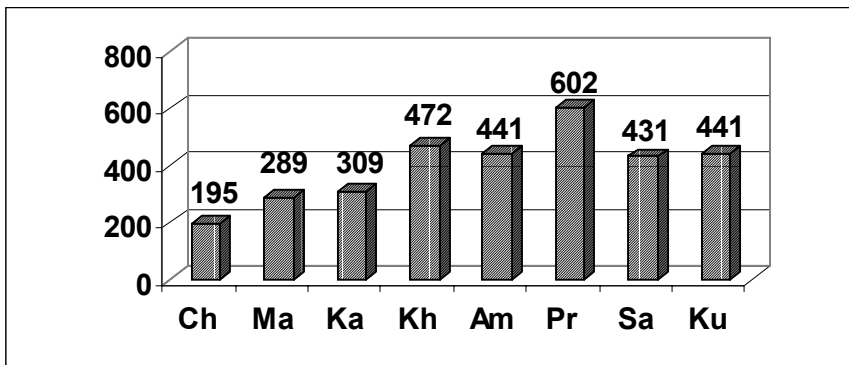


Fig. 3. Number of families in the Russian Far East. Abbreviations of regions as in Fig. 1.

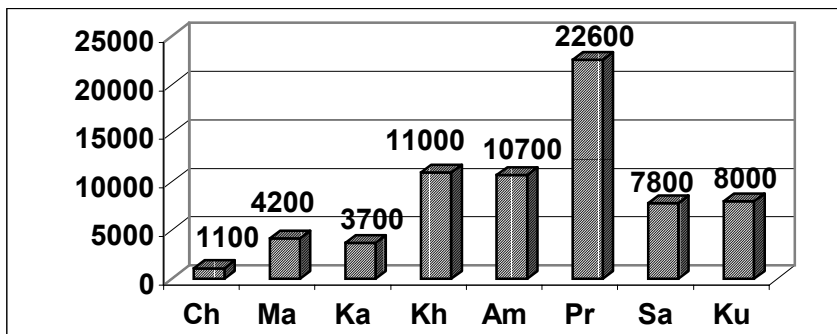


Fig. 4. Number of estimated species in the Russian Far East. Abbreviations of regions as in Fig. 1.

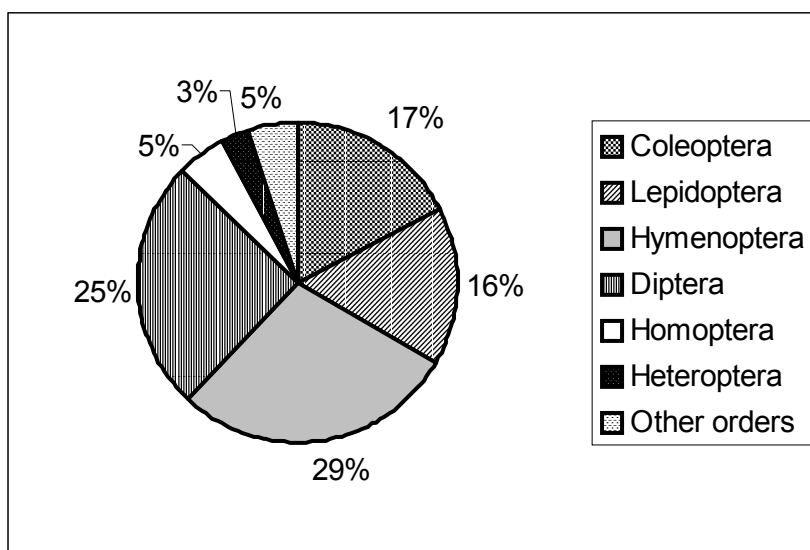


Fig. 5. The percentages of main orders in insect fauna of the Russian Far East.

The data on the next orders are still incomplete: **Psocoptera** (37 recorded species for RFE), **Mallophaga** (70 recorded species, but 150-200 estimated ones), **Thysanoptera** (58 recorded species), **Protura** (3 recorded species, but estimated species much more), **Collembola** (150 recorded species for Chukotka and Magadanskaya oblast; about 180 species for Primorskii krai and Sakhalin), **Strepsiptera** (about 30 estimated species), and **Siphonaptera** (more than 60 recorded species).

Summarizing the results for Coleoptera, Lepidoptera, Hymenoptera, Diptera, Homoptera, Heteroptera and other 25 insect orders we received 629 recorded families (Table 3) and 31500 estimated species of insects distributed in RFE (Table 2). The percentages of main insect orders are illustrated in Fig. 5.

## DISCUSSION

The most insects orders are well represented in each RFE regions except Chukotka (Fig. 2). The analyses of insect fauna on family level is very important part of biodiversity study. Insect family distribution is summarized for RFE firstly (Tables 3, 4). There are at least four levels of insect family diversity in RFE (Fig. 3): around 200 families (Chukotka), around 300 (Magadanskaya oblast and Kamchatskaya oblast), around 450 (Amurskaya oblast, southern part of Khabarovskii krai, Sakhalin and Kuril Islands), and 600 families (Primorskii krai). Insects are best and well represented at the family level in Primorskii krai (mostly in its extremal southern part).

Analyzing the insect species distribution for different RFE regions (Fig. 4) we discovered two hot biodiversity spots: Primorskii krai (first of all its most southern part) and Kuril Islands (mainly Kunashir Il.), but species number per square unit considerably differs. It is impossible to estimate and compare the real species repletion of the typical landscapes or biomes incidental to different regions of the RFE because of absence the local faunas lists for any territory of Far East. Being understanding we have a deal with not the local faunas, but with the species lists for incomparable territories due to its differences in square, study degree and climatic conditions, however, we have thought it could be effectual to account a number of species for square unit for each region (Table 2). In spite of relativity of this index we consider that its measures are adequate to species richness degree of separate zonal landscapes: less than 10 species/1000 sq.km indicates zonal and mountain tundras of Chukotka (1.5), Magadanskaya oblast (9.1) and Kamchatskaya oblast (7.8), less than 100 species/1000 sq.km – taiga landscapes of Khabarovskii krai (13.3) and Amurskaya oblast (29.4), more than 100 species/1000 sq.km – the nemoral cenoses of Primorskii krai (136.2), Sakhalin (108.9) and Kuril Islands (512.8).

The position of insect fauna of RFE among other Palaearctic regions and North America and the World as well is given in Table 5. Three regions in Holarctic have the same number of species: RFE, Japan and Canada. Russian Far East and Canada belong to temperate zone of Holarctic. Southern borders of these vast regions have the same latitude (42° N), which result in similarity of climatic and vegetation zones (these factors have strong influence for distribution and diversity of animals). Therefore total number of insect species in both regions is almost equal, and percentages of Lepidoptera (16%) and Diptera (24-25%) are the same, but the beetles are more numerous in Canada (Table 5). The number of recorded insect species for Japan in spite of its rather small square is approximately the same as for RFE and Canada. The reason of such similarity depends on more southern position of Japan (up to 23° N). Coleoptera are represented in Japanese fauna much better (32%) than in Canada (25%) or RFE (17%). Probably it results of the increasing of beetle percentage for subtropical faunas, as well as Hymenoptera and Diptera in Japan are studied not so well as Coleoptera.

This paper is first review of insect biodiversity of RFE. In general, the percentages of the main insect orders for RFE well correspond to those for temperate Holarctic zone (British Islands, Finland, former USSR, Canada). The insect fauna of Russian Far East is represented by about 31500 estimated species from 629 recorded families of 31 orders. The largest orders are Hymenoptera (72 families, 9000 estimated species), Diptera (119 families, 8000 estimated species), Coleoptera (114 families, 5500 estimated species), Lepidoptera (81 families, 5000 estimated species).



Table 5

**Insect species number in the Russian Far East (RFE) and other regions.**

Region	Species number					Total
	Coleoptera	Lepidoptera	Hymenoptera	Diptera	Other orders	
World <sup>1</sup>	400000 (42%)	200000 <sup>2</sup> (21%)	150000 <sup>3</sup> (16%)	75000 <sup>4</sup> (8%)	125000 (13%)	950000
British Islands <sup>5</sup>	3800 (17%)	2300 (10%)	6700 (30%)	6000 (27%)	3300 (15%)	22100
Finland <sup>5</sup>	3600 (18%)	2300 (11%)	6700 (33%)	5200 (26%)	2500 (12%)	20300
Germany	?	3500 <sup>6</sup>	8900 <sup>7</sup>	9200 <sup>7</sup>	?	?
former USSR <sup>5</sup>	22000 (18%)	13000 (11%)	37000 (31%)	32000 (27%)	15000 (13%)	119000
Russian Far East	5500 (17%)	5000 (16%)	9000 (29%)	8000 (25%)	4000 (13%)	31500
Japan <sup>8</sup>	9100 (32%)	5100 (18%)	4300 (15%)	5200 (18%)	5100 (18%)	28800
Canada <sup>9</sup>	7400 (25%)	4700 (16%)	6000 (20%)	7100 (24%)	4800 (16%)	30000
North America <sup>9</sup>	23800 (26%)	11300 (12%)	17400 (19%)	19600 (22%)	18100 (20%)	90200

Percentage from total number is given in the brackets (%).

Data sources:

<sup>1</sup> According to Solis (1997) based on Stork (1977), described species;

<sup>2</sup> According to Kuznetsov & Stekolnikov (2001) – 255000 estimated species;

<sup>3</sup> According to Grissell (1999) – 115000 species;

<sup>4</sup> According to Narchuk (1999) – 150000-250000 estimated species;

<sup>5</sup> According to Kerzhner (1994), estimated species;

<sup>6</sup> According to Karsholt & Razowski (1996), recorded species;

<sup>7</sup> According to Dathe et al. (2001), recorded species;

<sup>8</sup> According to Nakatani (1999) based on Hirashima (1989, 1990), recorded species;

<sup>9</sup> According to Danks et al. (1997), recorded species.

## REFERENCES

- Anufriev, G.A., Emeljanov, A.F., Konovalova, Z.A., Danzig, E.M. & Pashtshenko, N.F. 1988. [20. Order Homoptera]. – In: Lelej, A. S., Kanyukova E. V., Konovalova Z. A. & Storozhenko S. Yu. (eds.). [Key to the insects of Soviet Far East. Vol. II. Homoptera, Heteroptera]. Leningrad: Nauka: 9-727. (In Russian).
- Arefina, T.I., Ito, T., Ivanov, V.D., Levanodova, I.M., Morse, J.C., Nimmo, A.P., Vshivkova, T.S. & Yang, L. 1997. [10. Order Trichoptera – Caddishflies]. – In: Kononenko V. S., Arefina, T. I., Beljaev, E. A., Kupianskaya, A. N., Nemkov, P. G., Ponomarenko M. G., Storozhenko S. Yu. & Tshistjakov Yu. A. (eds.). 1997. [Key to the insects of Russian Far East. Vol. V. Trichoptera, Lepidoptera. Pt. 1]. Vladivostok: Dal'nauka: 10-206. (In Russian).
- Chernova, O.A., Kluge N.D., Sinichenkova, N.D. & Belov, V.V. 1986. [5. Order Ephemeroptera – Mayflies]. – In: Lelej, A.S., Kanyukova E.V., Konovalova Z.A. & Storozhenko S.Yu. (eds.). [Key to the insects of Soviet Far East. Vol. I. Apterygota, Polyneoptera, Hemimetabola]. Leningrad: Nauka: 99-142. (In Russian).
- Danks, H.V., Downes, J.A., Larson, D. J. & Scudder G.G. E. 1997. Insects of the Yukon: Characteristics and History. – In: Danks, H.V. & Downes, J.A. (eds.). Insects of the Yukon. Biological Survey of Canada (Terrestrial Arthropods). Ottawa: 963-1013.
- Dathe, H.H., Taeger, A. & Blank, S.M. (eds.). 2001. Verzeichnis der Hautflügler Deutschlands (Entomofauna Germanica 4). – Entomologische Nachrichten und Berichte (Dresden) 7: 1-178.
- Erwin, T. 1982. Tropical forests: their richness in Coleoptera and other arthropod species. *Coleopterists Bulletin*. 36: 74-75.
- Grissell, E.E. 1999. Hymenoptera Biodiversity: Some Alien Notions. – *American Entomologist* 45(4): 235-244.
- Hammond, P. 1992. Species inventory. – In: Groombridge B. (ed.). *Global biodiversity. Status of the earth's living resources*. London: 17-39.
- Hirashima, Y. (supervisor), Entomological Laboratory, Faculty of Agriculture, Kyushu University and Japan Wild Life Research Center (eds.). 1989, 1990. A Check List of Japanese Insects. Fukuoka. XIII+1767 p., Addenda and Corrigenda, 37 p. (In Japanese).
- Karsholt, O. & Razowski, J. (eds.). 1996. *The Lepidoptera of Europe*. Stenstrup. Apollo Books. 380 p.
- Kerzhner, I.M. 1994. Results and perspectives of insect fauna study of former USSR. – In: *Biodiversity. Patterns of taxonomic study*. Moscow: Nauka: 65-69. (In Russian).
- Kharitonov, A.Yu. 1986. [6. Order Odonata – Dragonflies]. – In: Lelej, A.S., Kanyukova E.V., Konovalova Z.A. & Storozhenko S.Yu. (eds.). [Key to the insects of Soviet Far East. Vol. I. Apterygota, Polyneoptera, Hemimetabola]. Leningrad: Nauka: 142-162. (In Russian).
- Kirpichnikova, V.A. & Lehr, P.A. (eds.). 1988. *Lepidoptera-pest of agriculture and forestry of the Russian Far East*. Vladivostok. 288 p. (In Russian).
- Kononenko V.S., Arefina, T.I., Beljaev, E.A., Kupianskaya, A.N., Nemkov, P.G., Ponomarenko M.G., Storozhenko S.Yu. & Tshistjakov Yu.A. (eds.). 1997. [Key to the insects of Russian Far East. Vol. V. Trichoptera, Lepidoptera. Pt. 1]. Vladivostok: Dal'nauka. 540 p. (In Russian).
- Kononenko V.S., Beljaev, E.A., Nemkov, P.G., Ponomarenko M.G., & Kupianskaya, A.N. (eds.). 1999. [Key to the insects of Russian Far East. Vol. V. Trichoptera, Lepidoptera. Pt. 2]. Vladivostok: Dal'nauka. 671 p. (In Russian).
- Krivolutskaya, G.O., Egorov, A.B. & Lafer, G. Sh. (eds.). 1992. [Key to the insects of Soviet Far East. Vol. III. Coleoptera, Pt. 2]. St. Petersburg: Nauka. 704 p. (In Russian).

- Krivolutskaya, G.O., Egorov, A.B., Lafer, G.Sh. & Azarova, N.A. (eds.). 1989. [Key to the insects of Soviet Far East. Vol. III. Coleoptera, Pt. 1]. Leningrad: Nauka. 572 p. (In Russian).
- Kupianskaya, A.N., Lelej, A.S. & Storozheva, N.A. (eds.). 1995. [Key to the insects of Russian Far East. Vol. IV. Neuropteroidea, Mecoptera, Hymenoptera. Pt. 2]. Vladivostok: Dal'nauka. 600 p. (In Russian).
- Kuznetsov, V.I. & Stekolnikov, A.A. 2001. New approaches to the system of the Lepidoptera of World fauna. St. Petersburg: Nauka. 462 p. (In Russian).
- Lafer, G.Sh., Egorov, A.B., Krivolutsкая, G.O., Kupianskaya, A.N., Lelej, A.S. & Nemkov, P.G. (eds.). 1996. [Key to the insects of Russian Far East. Vol. III. Coleoptera, Pt. 3]. Vladivostok: Dal'nauka. 556 p. (In Russian).
- Lehr, P.A. 1986. [Preface]. – In: Lelej, A.S., Kanyukova E.V., Konovalova Z.A. & Storozhenko S.Yu. (eds.). [Key to the insects of Soviet Far East. Vol. I. Apterygota, Polyneoptera, Hemimetabola]. Leningrad: Nauka: 3-8. (In Russian).
- Lelej, A.S., Kanyukova E.V., Konovalova Z.A. & Storozhenko S.Yu. (eds.). 1986. [Key to the insects of Soviet Far East. Vol. I. Apterygota, Polyneoptera, Hemimetabola]. Leningrad: Nauka. 452 p. (In Russian).
- Lelej, A.S., Kanyukova E.V., Konovalova Z.A. & Storozhenko S.Yu. (eds.). 1988. [Key to the insects of Soviet Far East. Vol. II. Homoptera, Heteroptera]. Leningrad: Nauka. 972 p. (In Russian).
- Lelej, A.S., Kupianskaya, A.N., Kurzenko, N.V. & Nemkov, P.G. (eds.). 1995. [Key to the insects of Russian Far East. Vol. IV. Neuropteroidea, Mecoptera, Hymenoptera. Pt. 1]. St. Petersburg: Nauka. 606 p. (In Russian).
- Lelej, A.S., Kupianskaya, A.N., Nemkov, P.G., & Kholin, S.K. (eds.). 1998. [Key to the insects of Russian Far East. Vol. IV. Neuropteroidea, Mecoptera, Hymenoptera. Pt. 3]. Vladivostok: Dal'nauka. 708 p. (In Russian).
- Lelej, A.S., Kupianskaya, A.N., Nemkov, P.G., & Kholin, S.K. (eds.). 2000. [Key to the insects of Russian Far East. Vol. IV. Neuropteroidea, Mecoptera, Hymenoptera. Pt. 4]. Vladivostok: Dal'nauka. 651 p. (In Russian).
- Lelej, A.S., Storozhenko, S.Yu. & Kholin, S.K. 1999. [Insects of Russian Far East: Coleoptera. Computer catalogue. Version 1.01]. (In Russian).
- Makarkin, V.N. 1995. [25. Order Neuroptera]. – In: Lelej, A.S., Kupianskaya, A.N., Kurzenko, N.V. & Nemkov, P.G. (eds.). [Key to the insects of Russian Far East. Vol. IV. Neuropteroidea, Mecoptera, Hymenoptera. Pt. 1]. St. Petersburg: Nauka: 37-68. (In Russian).
- Nakatani M. 1999. Concluding remarks. – In: Insects of Nemuro Peninsula. Sylvicola 3: 137-142.
- Narchuk, E.P. 1999. [Diptera – flies. Introduction]. – In: Sidorenko V.S., Kupianskaya, A.N., Lelej, A.S., Nemkov, P.G. & Kholin, S.K. (eds.). [Key to the insects of Russian Far East. Vol. VI. Diptera, Siphonaptera. Pt. 1]. Vladivostok: Dal'nauka: 8-41. (In Russian).
- Ponomarenko M.G., Beljaev, E.A., Lelej, A.S. & Nemkov, P.G. (eds.). 2001. [Key to the insects of Russian Far East. Vol. V. Trichoptera, Lepidoptera. Pt. 3]. Vladivostok: Dal'nauka. 621 p. (In Russian).
- Red Data Book of Russian Federation. Animals. 2001. Astrel': Balashikha. 862 p.
- Sidorenko V.S., Kupianskaya, A.N., Lelej, A.S., Nemkov, P.G. & Kholin, S.K. (eds.). 1999. [Key to the insects of Russian Far East. Vol. VI. Diptera, Siphonaptera. Pt. 1]. Vladivostok: Dal'nauka. 665 p. (In Russian).
- Sidorenko V.S., Kupianskaya, A.N., Lelej, A.S., Nemkov, P.G. & Kholin, S.K. (eds.). 2001. [Key to the insects of Russian Far East. Vol. VI. Diptera, Siphonaptera. Pt. 2]. Vladivostok: Dal'nauka. 641 p. (In Russian).

- Soboleva, R.G. (ed.). 1987. Medical and veterinary importance insects and mites of the Russian Far East. Leningrad: Nauka. 309 p. (In Russian).
- Solis, M.A. 1999. Insect Biodiversity: Perspectives from the Systematist. – *American Entomologist* 45(4): 204-205.
- Stork, N.E. 1997. Measuring global biodiversity and its decline. – In: Reaka-Kudla, M., Wilson, D.E. & Wilson E.O (eds.). *Biodiversity II: understanding and protecting our biological resources*. Washington D. C.: 41-68.
- Storozhenko, S.Yu. & Kuznetsov, V.N. (eds.). 1995. *Pest insects of the Russian Far East*. Vladivostok: Dalnauka. 276 p. (In Russian).
- Storozhenko, S.Yu. 1986. [14. Order Orthoptera (Saltatoria)]. – In: Lelej, A.S., Kanyukova E.V., Konovalova Z.A. & Storozhenko S.Yu. (eds.). [Key to the insects of Soviet Far East. Vol. I. Apterygota, Polyneoptera, Hemimetabola]. Leningrad: Nauka: 241-317. (In Russian).
- Vinokurov, N.N., Golub, V.B., Kanyukova E.V., Kerzhner, I.M. & Chervova, G.P. 1988. [21. Order Heteroptera (Hemiptera) – Bugs]. – In: Lelej, A.S., Kanyukova E.V., Konovalova Z.A. & Storozhenko S.Yu. (eds.). [Key to the insects of Soviet Far East. Vol. II. Homoptera, Heteroptera]. Leningrad: Nauka: 727-930. (In Russian).
- Zhiltzova, L.A. & Zapekina-Dulkeit, Yu.I. 1986. [10. Order Plecoptera – Stoneflies]. – In: Lelej, A.S., Kanyukova E.V., Konovalova Z.A. & Storozhenko S.Yu. (eds.). [Key to the insects of Soviet Far East. Vol. I. Apterygota, Polyneoptera, Hemimetabola]. Leningrad: Nauka: 172-234. (In Russian).

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© **Far Eastern entomologist (Far East. entomol.)** Journal published since October 1994.

Editor-in-Chief: S.Yu. Storozhenko

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