The beetle fauna (Insecta: Coleoptera) of the Svetlogorsk Forest (Russia: Kaliningradskaya Oblast) at the beginning of the XXI century: high biodiversity and protection necessity

Фауна жесткокрылых (Insecta: Coleoptera) Светлогорского леса (Россия: Калининградская область) в начале XXI века: высокое биоразнообразие и необходимость охраны

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Key words: Western Russia, the Sambian peninsula, biodiversity, local fauna, nature preservation.

Ключевые слова: запад России, Самбийский полуостров, биоразнообразие, локальная фауна, охрана природы.

Abstract. 800 species (in 71 families) of the order Coleoptera are registered for a forested area of c. 8 km² in the northern Sambian Peninsula during a 20-year study (2001–2021). A preliminary list of beetles’ species of the Svetlogorsk Forest is presented which includes the only known locality in Kaliningradskaya Oblast for 12 coleopteran species (Hylis olexai, Denticollis rubens, Pyropterus nigroruber, Dryophilus pusillus, Pityophagus ferrugineus, Conopalus testaceus, Phryganophilus auritus, Curtimorda maculosa, Ommorphus concolor, Phaedon laevigatus, Cotaster cuneipennis and Dendroctonus micans). Six beetle species included in the Red Data Book of Kaliningradskaya Oblast (Calosoma inquisitor, Carabus coriaceus, Dendroxena quadrimaculata, Protaetia marmorata, Gnorimus nobilis, and Prionus coriarius) regularly occur in the Svetlogorsk Forest. Considering the high diversity of the associated fauna, as demonstrated by the Coleoptera, as well as presence of rare beetle populations, the Svetlogorsk Forest bears a great conservation value and can contribute to preserving the insect fauna in Kaliningradskaya Oblast. Taking in consideration of the high diversity and unique nature of the territory, the establishment of a large complex nature reserve or even national park «Warnicken Forest» in the northern coastal area of the Sambian peninsula is recommended.

Резюме. В период 20-летних исследований (2001–2021 гг.) на облесённой территории севера Семьицкого полуострова площадью приблизительно в 8 кв. км отмечено 800 видов из 71 семейств отряда Coleoptera. Предварительный список жуков Светлогорского леса приведён в работе. Изученный лесной массив — единственное известное место обитания в Калининградской области для 12 видов: Hylis olexai, Denticollis rubens, Pyropterus nigroruber, Dryophilus pusillus, Pityophagus ferrugineus, Conopalus testaceus, Phryganophilus auritus, Curtimorda maculosa, Ommorphus concolor, Phaedon laevigatus, Cotaster cuneipennis и Dendroctonus micans. Также здесь регулярно встречаются шесть видов, внесённых в Красную книгу Калининградской области: Calosoma inquisitor, Carabus coriaceus, Dendroxena quadrimaculata, Protaetia marmorata, Gnorimus nobilis и Prionus coriarius. Высокий уровень биоразнообразия на исследованной территории, продемонстрированный на примере отряда Coleoptera, а также наличие популяций редких жуков указывает на особую важность Светлогорского леса в поддержании биологического разнообразия и охране на- секомых Калининградской области. Принимая во внимание большое количество различных уникальных природных объектов на изучаемой территории, рекомендуется организация единого крупного комплексного ООПТ или даже национального парка «Варникенский лес» на территории северного побережья Светлогорского полуострова.

Introduction

The most part of faunal studies is focused on systematically or methodologically limited groups of animals. The increase of studied geographical area usually leads to constriction of studied group. The more or less complete faunal contribution for any area is possible for geographically limited territory only and thus it has important significance mostly for local conservation measurements of species and habitats, as well for local monitoring of biodiversity. Such research is conducted usually in the case, if the area is already under protection or clearly needs in proposition of protection [e.g.
Local inventories of the coleopterofauna for the local natural areas on the territory of Kaliningradskaya Oblast are scarce: the lists of the order Coleoptera are published for the raised bog Zehlau [Skwara, 1929] and for the national park «Curonian Spit» [Alekseev, 2014] only.

In the time of the present-day anthropogenic loss of species diversity and the so-called «first mass extinction of insects» [Schachat, Labandeira 2021], the up-to-date inventory of animal species inhabiting of Kaliningradskaya Oblast is very actual. Insects have undergone a massive decrease in population abundance and biodiversity in recent decades [Sanchez-Bayo, Wyckhuys, 2019]. Long-term monitoring schemes are essential to understand the causes and current state of biodiversity loss [Thomaes et al., 2021]. Replicable faunal data sampled in limited time period and in limited area can provide starting data for environmental monitoring of faunal patterns and trends during the time in future.

The Svetlogorsk Forest (former «Forst Warnicken») is one of the largest woodlands of the Kaliningrad/Sambian peninsula (former «das Samland»). It is classified as mixed broadleaved-spruce forest with high admixture of nemoral elements. The forest begins from abrasive coast of the Baltic Sea and is strongly transformed by multi-year human activities, although never was completely logged out. The semi-natural narrow patch of humid broadleaved stands on the cliff of the Baltic Sea coast (Tilio-Quercetum or Alnetum) coexists with present-day overgrown park zone and also with the very diverse and long-time managed and partially human-planted forest. The acclimatized tree species (like Larix decidua, Quercus rubra, Acer pseudoplatanus) are presented between natural communities with Betula pendula, Quercus robur, Picea abies, Carpinus betulus, Pinus sylvestris, and Fagus sylvatica. The average age of trees is approximately 70 years [Litvin et al., 1999], but several oaks along the main road in the Lesnoe settlement are approximately 600-years old (natural monument «Oaken alley» at the present time).

The climate of the whole Svetlogorsk area is one of the most maritime in the Kaliningradskaya Oblast, with average annual precipitation about 850 mm, average annual temperature +7.0 °C, average isotherm of July +17.0 °C, and average isotherm of January –3.0 °C [Orlenok, 2002]. The territory is characterized by hilly terrain with height difference about 60 meters.

Svetlogorsk Forest, includes all captured and identified beetles species and also includes several recommendations for possible urgent conservation measurements of regional or even federal level in the Svetlogorsk Forest.

**Materials and methods**

Adult beetles were collected in the northern and north-western part of the Svetlogorsk Forest only (Fig. 1A–B). The studied territory includes approximately eight square kilometers of the rather frequently visited by people and disturbed forest landscape and buffer afforested zones around the present-day settlement Otradnoe. The studied area is situated between following extreme points: western margin of Lesnoe [former Warnicken] (54.946° N, 20.057° E) [west], western suburb of Svetlogorsk [former Rauschen] (54.944° N, 20.132° E) [east], southern margin of the settlement Maiskii (54.923° N, 20.129° E) and Kolomenskoe [former Hirschau] (54.921° N, 20.095° E).

The present material was collected by the author during the years 2001–2021 with the frequency of 3–15 sampling days per year. Most part of material was collected in warm season (March–October) by hand or using entomological net from vegetation. Pitfall traps without bait (plastic containers with 9 % acetic acid) were used in 2002–2003, 2009, 2015, and in 2019. Sampling localities included different forest habitats, forest margin, forest roadsides with partially ruderal vegetation, and the Baltic coastal area (including the surf zone as well as the beach and bottom of the cliff in distance less than 100 meters from forest). Productive samplings of flying-capable beetles were taken by hand in surf zone the Baltic Sea and in breeze accumulations on the sandy beach by appropriate weather in late spring — early summer. The examined material is partially deposited in the private collection of the author (Kaliningrad, Russia). The widely-distributed in Kaliningradskaya Oblast and determinable in field taxa, as well as protected in the region species were registered without specimen collecting.

By comparison of the coleopteran fauna, two simple similarities indexes were calculated:

\[ S_j = a/(a + b + c), \]

\[ S_s = 2a/(2a + b + c), \]

\[ S_c = \text{Jaccard similarity coefficient,} \]

\[ S_s = \text{Sørensen similarity coefficient,} \]

\[ a = \text{number of common species,} \]

\[ b = \text{number of species unique to the Curonian Spit,} \]

\[ c = \text{number of species unique to the Svetlogorsk Forest,} \]

The specimens were identified by the author based on the standard European identification key [Freude et al., 1965–1989; 2004]. The order used in the checklist...
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Fig. 1A — map of Europe (the territory of the Kaliningradskaya Oblast is blue coloured); B — the map of forest cover in Kaliningradskaya Oblast and location of the Svetlogorsk Forest (forests are grey, the Svetlogorsk Forest is blue); C — studied area in the northern part of the Svetlogorsk Forest (limited by blue dots).

Fig. 1А — карта Европы (территория Калининградской области отмечена синим цветом); В — карта лесного покрова Калининградской области и местоположение Светлогорского леса (лесные покрытые площади — серый цвет, Светлогорский лес — синий цвет); С — исследованная территория в северной части Светлогорского леса (ограничена синими точками).
is systematic for families and is given according to [Bouchard et al., 2011]. Genera and species collected or observed during the field activities are arranged alphabetically (according to the scientific name).

Results

During examination and identification of the materials from the studied territory, a list of 800 species (71 families) was compiled. Of these, 12 species of Coleoptera are known in Kaliningradskaya Oblast in this territory only. These locally distributed (or badly known species) are marked in the list with two asterisks (**). Other 23 sporadically distributed in the region beetles as well as 6 regionally protected in Kaliningradskaya Oblast species are marked with one asterisk (*).

1. Gyrinidae Latreille, 1810

- Gyrinus natator (Linnaeus, 1758) (2 species)
- Acupalpus exiguis Dejean, 1829; A. flavicolis (Sturm, 1825); A. meridianus (Linnaeus, 1761); Agonum afrum (Duftschmid, 1812); A. dolens (Sahlberg, 1827); A. fuliginosum (Panzer, 1809); A. gracilipes Sturm, 1824; A. gracilipes (Duftschmid, 1812); A. micans Nicolai, 1822; A. sexpunctatum (Linnaeus, 1758); Amara aenea (De Geer, 1774); A. brunnea (Gyllenhal, 1810); A. eurynota (Panzer, 1796); A. familiaris (Duftschmid, 1812); A. fulva (Müller, 1776); A. similata (Gyllenhal, 1810); A. spreta Dejean, 1831; Anachromus dorsalis (Pontoppidan, 1763); Anisodactylus binaurus (Fabricius, 1877); Asaphidion flavipes (Linnaeus, 1761); Badister bullatus (Schrank, 1798); B. dilatatus Chauduir, 1837; B. pellus (Panzer, 1796); Bembidion assimile Gyllenhal, 1810; B. biguttatum (Fabricius, 1779); B. cruciatum Dejean, 1831; B. dentellum (Thunberg, 1787); B. doris (Panzer, 1797); B. femoratus Sturm, 1825; B. gattula (Fabricius, 1792); B. illigeri Netolitzky, 1914; B. lampros (Herbst, 1784); B. obliquum Sturm, 1825; B. octomaculatum (Goeze, 1777); B. semipunctatum (Donovan, 1806); B. tetracentra Say, 1823; B. varium (Olivier, 1795); B. quinmaculatum (Linnaeus, 1761); Blemus discus (Fabricius, 1792); Bletidia multipunctata (Linnaeus, 1758); Brosus cephalotes (Linnaeus, 1758); Calathus ambiguus (Paykull, 1790); C. erratus (Sahlberg, 1827); C. fuscipes (Goeze, 1777); C. melanocephalus (Linnaeus, 1758); Calodromus spinolatus (Illiger, 1798); Calosoma inquisitor (Linnaeus, 1758)*; Carabus cancellatus Illiger, 1798; C. convexus Fabricius, 1775; C. coriaceus Linnaeus, 1758*; C. glabritus Paykull, 1790; C. granulatus Linnaeus, 1758; C. hirsutus Linnaeus, 1758; C. tenuicollis Muller, 1764; C. violaceus Linnaeus, 1758; Cicindela campestris Linnaeus, 1758; C. hybrida Linnaeus, 1758; Chlaenius nigricornis (Fabricius, 1778); Chlorina fossor (Linnaeus, 1758); Curtonotus aulicus (Panzer, 1796); Cychrus caraboides (Linnaeus, 1758); Demetrias monostigma Samouelle, 1819; Drotnius agilis (Fabricius, 1778); D. quadrinaculatus (Linnaeus, 1758); Dyschirius thoracicus (Rossi, 1790); Elatophilus ca-
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H. tuberculatus Gyllenhal, 1808; Hydrobius fuscipes (Linnaeus, 1758); Hydrochara caraboides (Linnaeus, 1758); Hydrochus elongatus (Schall.); Laccobius minutus (Linnaeus, 1758); Sphaeridium bipustulatum Fabricius, 1781; S. marginatum Fabricius, 1787; S. scarabaeoides (Linnaeus, 1758).

7. Histeridae Gyllenhal, 1808
(11 species)

Atholus duodecimstriatus (Schrank, 1781); Dendrophiulus punctatus (Herbst, 1791); Hister funestus Erichson, 1834; H. unicolor Linnaeus, 1758; Margaritornis brunneus (Fabricius, 1775); M. purpurascens (Herbst, 1792); Paromalus flavicornis (Herbst, 1792); P. parallelepipeds (Herbst, 1792); Plegaderus caesus (Herbst, 1791); P. vulneratus (Panzer, 1797), Saprinus aeneus (Fabricius, 1775).

8. Hydraenidae Mulsant, 1844
(3 species)

Hydraena riparia Kugelann, 1794; Linnebus trunctatus (Thunberg, 1794); Ochthebius minimus (Fabricius, 1792).

9. Ptiliidae Erichson, 1845
(2 species)

Acotrichis intermedia (Gillmeister, 1845); A. thoracica (Walck, 1838).

10. Leiodidae Fleming, 1821
(9 species)

Agathidium nigripenne (Fabricius, 1792); A. seminulum (Linnaeus, 1758); Anisotoma castanea (Herbst, 1792); A. humeralis (Fabricius, 1792); Catops fuliginosus Erichson, 1837; C. nigrita Erichson, 1837; E. cipices (Fabricius, 1787); Choleva glauca Britten, 1918; Sciodrepoides watsonii (Spence, 1815).

11. Silphidae Latreille, 1807
(8 species)

Dendroxena quadrimaculata (Scopoli, 1772)*; Nicrophorus humator (Olivier, 1791); N. vespario (Linnaeus, 1758); N. vespilloides Herbst, 1784; Oiceptoma thoracica (Linnaeus, 1758); Phosphuraha arata (Linnaeus, 1758); Silpha carinata Herbst, 1783; Thanatophilus simillimus (Fabricius, 1775).

12. Staphylinidae Latreille, 1802
(45 species)

Acidota crenata (Fabricius, 1793); Aleochara curtula (Goeze, 1777); Anotylus rugosus (Fabricius, 1775); A. tetracarinatus (Block, 1799); Anthidium atrocephalum (Gyllenhal, 1827); Bissius finetarius (Gravenhorst, 1802); Bledius gallicus (Gravenhorst, 1806); Bolitobius castaneus (Stephens, 1832); Coprophilus striatus (Fabricius, 1793); Drusilla canaliculata (Fabricius, 1787); Eutheia plicata (Gyllenhal, 1813); Gyrphaela affinis Mannherm, 1830; Lathrobium fulvipes Gravenhorst, 1806; Lordithon lunulatus (Linnaeus, 1761); Megarthus depressus (Paykull, 1789); Ocypus brunni (Fabricius, 1781); Omalium rivulare (Paykull, 1789); Ontholestes marinus (Linnaeus, 1758); Othius punctatus (Goeze, 1777); Oxythorax maxillosus Fabricius, 1793; Paederus littoralis Gravenhorst, 1802; Polionus splendidus (Fabricius, 1792); Platydacus stercorarius (Olivier, 1795); Proteinus brachypterus (Fabricius, 1792); Quedius santhopius Erichson, 1839; Rugillus rufipes Germain, 1836; Scaphidium quadrimaculatum Olivier, 1790; Scaphidium carnicum (Linnaeus, 1758); Scymnoraphes minutus (Chaudoir, 1845); Sepedophilus marshami (Stephens, 1832); S. testaceus (Fabricius, 1793); Stenichinus collaris (Müller et Kunze, 1822); Stenichinus scutellaris (Müller & Kunze, 1822); Stenus binaculatus Gyllenhal, 1810; S. clavicornis (Scopoli, 1763); S. similis (Herbst, 1784); Tachinus basalis Erichson, 1840; T. subterraneus (Linnaeus, 1758); Tachyporus chrysomelus (Linnaeus, 1758); T. obtusus (Linnaeus, 1767); T. solutus Erichson, 1839; Velletius dilatatus (Fabricius, 1787)*; Xantholinus longiventris Heer, 1839; Zyra humeralis (Gravenhorst, 1802); Zyrus limbatus (Paykull, 1789).

13. Geotrupidae Latreille, 1806
(2 species)

Anoplotrupes stercorosus (Scriba, 1751); Geotrupes stercorarius (Linnaeus, 1758).

14. Lucanidae Latreille, 1806
(4 species)

Dorcus parallelepipeds (Linnaeus, 1758); Platycerus caprea (De Geer, 1774); P. caraboides (Linnaeus, 1758); Sinodendron cylindricum (Linnaeus, 1758).

15. Scarabaeidae Latreille, 1802
(20 species)

Amphimallon solstitiale (Linnaeus, 1758); Anomala dubia (Scopoli, 1763); Aphodius ater (De Geer, 1774); A. fimetarius (Linnaeus, 1758); A. fossor (Linnaeus, 1758); A. granarius (Linnaeus, 1767); A. rufipes (Linnaeus, 1758); Cetonia aurata (Linnaeus, 1758); Protactia marmorata (Fabricius, 1792)*; Gnorimus nobilis (Linnaeus, 1758)*; Hoplia graminicolor (Fabricius, 1792); Melolontha melolontha (Linnaeus, 1758); Onthophagus nuchicornis (Linnaeus, 1758); Oxymus sylvestris (Scopoli, 1763); Oxythyrea funesta (Poda, 1761); Phyllopertha horticola (Linnaeus, 1758); Potosia metallic (Herbst, 1782); Serica brunnea (Linnaeus, 1758); Trichius fasciatus (Linnaeus, 1758); Valgus hemipterus (Linnaeus, 1758).

16. Eucinetidae Lacordaire, 1857
(1 species)

Eucinetus haemorrhoidalis (Germar, 1818)

17. Clambidae Fischer von Waldheim, 1821
(1 species)

Clambus punctulatus (Beck, 1817).

18. Scirtidae Fleming, 1821
(5 species)

Cyphon padi (Linnaeus, 1758); C. pubescens (Fabricius, 1792); C. variabilis (Thunberg, 1787); Microcara testacea (Linnaeus, 1767); Scirtes hemisphaericus (Linnaeus, 1758).

19. Buprestidae Leach, 1815
(5 species)

Agrius laticornis (Illiger, 1803); A. viridis (Linnaeus, 1758); Anthaxia quadripunctata (Linnaeus, 1758); Chrysochroistus affinis (Fabricius, 1794); Trachys minutus (Linnaeus, 1758).

20. Byrrhidae Latreille, 1804
(5 species)

Byrrhus fasciatus (Forster, 1771); B. pilula (Linnaeus, 1758); B. postulatus (Forster, 1771); Cythius sericus (Forster, 1771); Lamprobyrrhus nitidus (Schaller, 1873).
21. **Dryopidae** Billberg, 1820
(1 species)
*Dryops auriculatus* (Geoffroy, 1785).

22. **Heteroceridae** MacLeay, 1825
(1 species)
*Heterocerus fenestratus* (Thunberg, 1784).

23. **Eucnemidae** Eschscholtz, 1829
(4 species)
*Eucnemis capucina* Ahrens, 1812; *Hylis olexai* (Palm, 1955)**; *Microrhagus lepidus* Rosenhauer, 1847; *M. pygmaeus* (Fabricius, 1793).

24. **Throscidae** Laporte de Castelnau, 1840
(2 species)
-A. subfuscus* (Linnaeus, 1758);
-P. subpillosus* (Fabricius, 1793).

25. **Elateridae** Leach, 1815
(25 species)
*A. obscurus* (Linnaeus, 1758); *A. sputator* (Linnaeus, 1758); *Agrypnus marinus* (Linnaeus, 1758); *Ambedus balteatus* (Linnaeus, 1758); *A. pomorum* (Herbst, 1784); *A. sanguineus* (Linnaeus, 1758); *Anostinus castaneus* (Linnaeus, 1758); *Athena haemorrhoidalis* (Fabricius, 1801); *A. subfuscus* (Muller, 1764); *A. vittatus* (Fabricius, 1792); *Cardiophorus ruficollis* (Linnaeus, 1758); *Cinodus aurigonus* (Olivier, 1790); *Ctenicera pectinicornis* (Linnaeus, 1758); *Dalopus marginatus* (Linnaeus, 1758); *Denticollis linearis* (Linnaeus, 1758); *D. rubens* Pillér & Mitterpacher, 1783**; *Hemicrepidius niger* (Linnaeus, 1758); *Melanotus villosus* (Geoffroy, 1785); *Prosternon tessellatum* (Linnaeus, 1758); *Selatosomus aeneus* (Linnaeus, 1758); *S. cruciatus* (Linnaeus, 1758); *S. impressus* (Fabricius, 1792)*; *Ectinus aterrimus* (Linnaeus, 1761).

26. **Lycidae** Laporte de Castelnau, 1836
(4 species)
*Dictyoptera aurora* (Herbst, 1784); *Lygistopterus sanguineus* (Linnaeus, 1758); *Malachius bipustulatus* (Chevrolat, 1827)**; *Pyropteris nigroruber* (De Geer, 1774)**.

27. **Lampyridae** Latreille, 1817
(2 species)
*Lampyris noctiluca* (Linnaeus, 1758); *Phasphaeus hemipterus* (Goeze, 1777).

28. **Cantharidae** Imhoff, 1856
(17 species)
-Cantharis flavilabris* Fallen, 1807; *C. fusca* Linnaeus, 1758; *C. livida* Linnaeus, 1758; *C. nigricans* (Muller, 1776); *C. obscura* Linnaeus, 1758; *C. pallida* Goeze, 1777; *C. paludosae* Fallen, 1807; *C. pellucida* Fabricius, 1792; *C. rufa* Linnaeus, 1758; *Malthisus bugatus* (Linnaeus, 1758); *Malthodes guttiifer* Kiesenwetter, 1852; *M. marginatus* (Latreille, 1806); *Podabrus alpinus* (Paykull, 1798); *Rhagonycha fulva* (Scopoli, 1763); *R. limbata* Thomson, 1864; *R. lutea* (Muller, 1764); *R. testacea* (Linnaeus, 1758).

29. **Dermestidae** Latreille, 1804
(3 species)
*Anthereus museorum* (Linnaeus, 1761); *Attagenus pellio* (Linnaeus, 1758); *Dermestes laniarius* Illiger, 1801.

30. **Ptinidae** Latreille, 1802
(11 species)
*Dorcatoma dresdensis* Herbst, 1792; *Dryophillus pusillus* (Gyllenhal, 1808)**; *Erobrus mollis* (Linnaeus, 1758); *Hodobregmus confusus* (Kraatz, 1881); *H. pertinax* (Linnaeus, 1758); *Ptinus fuscus* Geoffroy, 1785; *P. pectinicornis* (Linnaeus, 1758); *Ptinus fur* (Linnaeus, 1758); *P. subpilillus* Sturm, 1837; *Xestobium rufivillosum* (De Geer, 1774).

31. **Lymexylidae** Fleming, 1821
(2 species)
*Hylecoetus dermestoides* (Linnaeus, 1761); *Lymexylon navale* (Linnaeus, 1758).

32. **Trogossitidae** Latreille, 1802
(3 species)
*Grynochus oblonga* (Linnaeus, 1758); *Ostomus ferrugineus* (Linnaeus, 1758); *Peltis grossa* (Linnaeus, 1758).

33. **Cleridae** Latreille, 1802
(2 species)
*Thanasisimus formicarius* (Linnaeus, 1758); *Tillus elongatus* (Linnaeus, 1758).

34. **Melyridae** Leach, 1815
(10 species)
*Anthocomus equestris* (Fabricius, 1781); *A. rufus* (Herbst, 1784); *A. rufofuscus* (Fabricius, 1775); *Charopus granimacula* (Djean, 1833); *Cordylypherus viridis* (Fabricius, 1787); *Dasytes caeruleus* (De Geer, 1774); *D. fusculus* (Illiger, 1801); *D. niger* (Linnaeus, 1761); *Dolichosoma lineare* (Rossi, 1792); *Malachius bipustulatus* (Linnaeus, 1758).

35. **Byturidae** Gistel, 1848
(2 species)
*Byturus ochraceus* (Scriba, 1791); *B. tomentosus* (De Geer, 1774).

36. **Sphindidae** Jacquelin du Val, 1861
(1 species)
*Aspidiphorus orbiculatus* (Gyllenhal, 1808).

37. **Erotylidae** Latreille, 1802
(3 species)
*Dacne bipustulata* (Thunberg, 1781); *Triplax russica* (Linnaeus, 1758); *Tritoma bipustulata* Fabricius, 1775.

38. **Monotomidae** Laporte, 1840
(6 species)
*Monotoma conicollis* Aubé, 1837; *Rhizophagus bipustulatus* (Fabricius, 1793); *Rh. depressus* (Fabricius, 1793); *Rh. dispar* (Paykull, 1800); *Rh. parallelocollis* Gyllenhal, 1827; *Rh. parvulus* (Paykull, 1800).
39. Cryptophagidae Kirby, 1826 (8 species)
   Antherophagus pallens (Linnaeus, 1758); Atomaria atricapilla Stephens, 1830; A. basalis Ericson, 1846; A. fusca (Schönher, 1808); Cryptophagus badius Sturm, 1845; C. lycoperdi (Scopoli, 1763); C. pilosus Gyllenhal, 1827; Telmatophilus typhe (Fallén, 1802).

40. Silvanidae Kirby, 1837 (4 species)
   Dendrophagus crenatus (Paykull, 1799); Silvanus bidentatus (Fabricius, 1792); S. unidentatus (Olivier, 1790); Uleita planata (Linnaeus, 1761).

41. Phalacridae Leach, 1815 (4 species)
   Phalacrus nigrius (Marsham, 1802); Olibrus bicolor (Fabricius, 1792); O. milelfoli (Paykull, 1800); Stilbus testaceus (Panzer, 1797).

42. Kateretidae Kirby, 1837 (4 species)
   Brachypterolus pulcarius (Linnaeus, 1758); Brachypterus urticae (Fabricius, 1792); Heterhelea scutellaris (Heer, 1841); Kateretes pedicularius (Linnaeus, 1758).

43. Nitidulidae Latreille, 1802 (21 species)
   Amphistis marginata (Fabricius, 1781); Cryptarcha striata (Fabricius, 1787); Cylindrus luteus (Fabricius, 1787); Cylodes ater (Herbst, 1792); Epuraea florea Ericson, 1845; E. guttata (Olivier, 1811); E. longula Ericson, 1845; E. melanocephala (Marsham, 1802); E. terminalis (Mannerheim, 1843); E. unicolor (Olivier, 1790); Glischrochilus grandid (Tournier, 1872); G. hortensis (Geoffroy, 1785); G. quadriguttatus (Fabricius, 1777); G. quadrinpectatus (Linnaeus, 1758); Ipidia binotata Reitter, 1875; Meligethes aeneus (Fabricius, 1775); M. viridescens (Fabricius, 1787); Pityophagus ferrugineus (Linnaeus, 1761)**; Pocadius adustus Reitter, 1888; Soronia grisea (Linnaeus, 1758); S. punctatissima (Illiger, 1794)**.

44. Cerylonidae Billberg, 1820 (2 species)
   Cerylon ferrugineum Stephens, 1830; C. histeroides (Fabricius, 1793).

45. Endomychidae Leach, 1815 (2 species)
   Endomychus coccineus (Linnaeus, 1758); Mycetina cruciata (Schaller, 1783).

46. Coccinellidae Latreille, 1807 (25 species)
   Adalia bipunctata (Linnaeus, 1758); A. decempunctata (Linnaeus, 1758); Anatis ocellata (Linnaeus, 1758); Antosia decempunctata (Linnaeus, 1758); Aphidecta obliterata (Linnaeus, 1758); Calvia decempunctata (Linnaeus, 1767); C. quatuordecimguttata (Linnaeus, 1758); Chlorocerus renipustulatus (Scriba, 1790); Coccidula rufa (Herbst, 1783); C. scutellata (Herbst, 1783); Coccinella hieroglyphica Linnaeus, 1758; C. semitempunctata Linnaeus, 1758; C. quintquepunctata Linnaeus, 1758; Halyzia sedecimguttata (Linnaeus, 1758); Harmonia axyridis (Pallas, 1773); H. quadrivinculata (Ponoppidian, 1763); Hippodamia notata (Laicharting, 1781); H. tredecimguttata (Linnaeus, 1758); Hyperaspis campestris (Herbst, 1773); Myrrha octodecimguttata (Linnaeus, 1758); Myzia oblongogastrata (Linnaeus, 1758); Propylea quatuordecimpunctata (Linnaeus, 1758); Psylllobora vigintiduopunctata (Linnaeus, 1758).

47. Corylophidae Le Conte, 1852 (3 species)
   Corylophus cassisoides (Marsham, 1802); Orthoporus atomus (Gyllenhal, 1808); Sericoderus lateralis (Gyllenhal, 1827).

48. Latridiidae Ericson, 1842 (11 species)
   Aridius nodifer (Westwood, 1839); Corticaria elongata (Gyllenhal, 1827); C. longicollis (Zetterstedt, 1838); Corticaria fuscula (Gyllenhal, 1827); Corticicara gibbosa (Herbst, 1793); Dierenerella elongata (Curtis, 1830); Enicmus rarius (Herbst, 1793); E. transversus (Olivier, 1790); Latridius minutus (Linnaeus, 1767); Melanophailma coccinellida (Mannerheim, 1844); Stephostethus angusticolli (Gyllenhal, 1827).

49. Mycetophagidae Leach, 1815 (4 species)
   Litargus connexus (Geoffroy, 1785); Mycetophagus quadrirugatus Müller, 1821; M. quadrirugulatus (Linnaeus, 1761); Triphyllus bicolor (Fabricius, 1777)**.

50. Ciidae Leach, 1819 (7 species)
   Cis boleti (Scopoli, 1763); C. castaneus Mellé, 1848; C. hirsutus (Paykull, 1799); C. jacquemartii Mellé, 1848; C. micans (Fabricius, 1792); Ennearthron cornatum (Gyllenhal, 1827); Sulcacies affinis (Gyllenhal, 1827).

51. Tetratomidae Billberg, 1820 (2 species)
   Hallomenus axillaris (Illiger, 1807); Tetratomia fungorum Fabricius, 1790.

52. Melandryidae Leach, 1815 (6 species)
   Abdera flexuosa (Paykull, 1799)**; Conopalus testaceus (Olivier, 1790)**; Hypalus bifasciatus (Fabricius, 1792)**; Orchesia micans (Panzer, 1794); O. undulata Kraatz, 1853; Phryganophilus auritus Motschulsky, 1860**.

53. Mordellidae Latreille, 1802 (6 species)
   Curtimorda maculosa (Naevzen, 1794)**; Mordellochroa abdominalis (Fabricius, 1775); Mordellistena humerals (Linnaeus, 1758); M. neualveggiannae (Panzer, 1796); Tomoxia bucephala Costa, 1824; Varinthora villosa (Schrink, 1871).

54. Zopheridae Solier, 1834 (3 species)
   Bitoma crenata (Fabricius, 1775); Colydium filiforme Fabricius, 1792**; Synchita humeralis (Fabricius, 1793).
55. Tenebrionidae Latreille, 1802
(11 species)
Bolitophagus reticulatus (Linnaeus, 1767); Cortices unicolor Piller & Mitterpacher, 1783; Crypticus quisquisillus (Linnaeus, 1761); Diaperis boleti (Linnaeus, 1758); Eleodona agricolana (Herbst, 1783); Lagria hirta (Linnaeus, 1758); Melanimon tibialis (Fabricius, 1781); Mycetochara linearis (Illiger, 1794); Opatrum sabulosum (Linnaeus, 1761); Priononychus ater (Fabricius, 1775); Uloma culinaris (Linnaeus, 1758).

56. Oedemeridae Latreille, 1810
(5 species)
Chrysanthia genticulata (W. Schmidt, 1846); Nacerdes melanura (Linnaeus, 1758); Oedemera femorata (Scopoli, 1763); O. lurida (Linnaeus, 1758); O. virescens (Linnaeus, 1767).

57. Pyrochroidae Latreille, 1807
(2 species)
Pyrochroa coccinea (Linnaeus, 1761); Schizotus pectinicornis (Linnaeus, 1758).

58. Salpingidae Leach, 1815
(1 species)
Rhinosimus planirostris (Linnaeus, 1761).

59. Anthicidae Latreille, 1819
(4 species)
Anthicus antherinus (Linnaeus, 1761); A. flavipes (Panzer, 1797); A. sellatus (Panzer, 1797); Notoxus monoceros (Linnaeus, 1761).

60. Aderidae Csiki, 1909
(2 species)
Anidorus nigrinus (Germar, 1831)*, Euglenes pygmaeus (De Geer, 1775)*.

61. Scaptidae Gistel, 1848
(3 species)
Anapsis frontalis (Linnaeus, 1758); A. rufilabris (Gyllenhal, 1827); A. thoracica (Linnaeus, 1758).

62. Cerambycidae Latreille, 1802
(36 species)
Agapanthia villosoviridescens (De Geer, 1775); Alosterina tabaciicolor (De Geer, 1775); Anaglyptus mysticus (Linnaeus, 1758)*; Anoplophora dubia reyi (Heyden, 1889); A. sexguttata (Fabricius, 1775); Aromia moschata (Linnaeus, 1758); Callidium aeneum (De Geer, 1775)*; Carilla virginea (Linnaeus, 1758); Dinoptera collaris (Linnaeus, 1758); Gramoptera ruficornis (Fabricius, 1781); Judolia sexmaculata (Linnaeus, 1758); Leiopus linderi Wallin, Nylander et Kwanme, 2009; Leptura annularis Fabricius, 1801; L. quadripunctata Linnaeus, 1758; Morchorus minor (Linnaeus, 1758); Monochamus aotor (Linnaeus, 1758); Oberea ocultata (Linnaeus, 1758); Oberea brunneum (Fabricius, 1792); Oxymerus curvor (Linnaeus, 1758); Pachyta quadrimaculata (Linnaeus, 1758); Pachytydes cerambyciformis (Schrank, 1781); Paracyrtorhina maculicornis (De Geer, 1775); Prionus coriarius (Linnaeus, 1767)*; Pseudovadonia livena (Fabricius, 1776); Rhagium inquisitor (Linnaeus, 1758); R. mordax (De Geer, 1775); Rutpela maculata (Poda, 1761)*; Saperda scalaris (Linnaeus, 1758); Spondylus huprestoides (Linnaeus, 1758); Stenostola dubia (Laicharting, 1784); Stenurella melanura (Linnaeus, 1758); S. nigra (Linnaeus, 1758); Stictoleptura rubra (Linnaeus, 1758); Strangalia attenuata (Linnaeus, 1758); Tetrups praeneta (Linnaeus, 1758); Xylotrechus rusticus (Linnaeus, 1758).

63. Megalopodidae Latreille, 1802
(2 species)
Zeugophora subspinosa (Fabricius, 1781); Z. turneri Power, 1863*.

64. Orsodacnidae Thomson, 1859
(1 species)
Orsodacne cerasi (Linnaeus, 1758).

65. Chrysomelidae Latreille, 1802
(92 species)
Aeglastica altae (Linnaeus, 1758); Alita carinthiaca Weise, 1888; A. chamaenerii (Lindberg, 1926); Aphthona lutescens (Gyllenhal, 1813); A. nonstriata (Goze, 1777); Batophila rubi (Paykull, 1799); Bromius obscurus (Linnaeus, 1758); Bruchus affinis Frölich, 1799; B. atomarius (Linnaeus, 1761); B. loti Paykull, 1800; Cassida flavella Thunberg, 1794; C. nebulosa Linnaeus, 1758; C. nobilis Linnaeus, 1758; C. prasina Illiger, 1798; C. vibex Linnaeus, 1775; C. viridis Linnaeus, 1758; Chaetocnema aridula (Gyllenhal, 1827); Ch. concina (Marsham, 1802); Chrysolina fastuosa (Scopoli, 1763); Ch. graminis (Linnaeus, 1758); Ch. marginata (Linnaeus, 1758); Ch. oricalcia (Müller, 1776); Ch. polita (Linnaeus, 1758); Ch. sanguinolenta (Linnaeus, 1758); Ch. staphylaea (Linnaeus, 1758); Ch. sturmi (Westhoff, 1882); Chrysomela populi Linnaeus, 1758; Ch. tremula Fabricius, 1787; Clytra quadripunctata (Linnaeus, 1758); Cryptocephalus fulvus (Goze, 1777); C. labiatus (Linnaeus, 1761); C. janthinus Germar, 1824; C. nitidulus Fabricius, 1778; C. sericeus (Linnaeus, 1758); Colaphus sophiae (Schaller, 1783)*; Crepidodera aurata (Marsham, 1802); C. aurea (Geoffroy, 1785); C. fulvicornis (Fabricius, 1792); Donacia aquatica (Linnaeus, 1758); D. cinerea Herbst, 1784; D. crucipes Fabricius, 1775; D. impressa Paykull, 1799; D. semicuprea Panzer, 1796; Epitrix pubescens (Koch, 1803); Galantera tanaceti (Linnaeus, 1758); Galericula calmarioriata (Linnaeus, 1767); G. nymphaeae (Linnaeus, 1758); G. pusilla (Dufschmid, 1825); G. tenella (Linnaeus, 1761); Gastrophysa viridula (De Geer, 1775); G. polygoni (Linnaeus, 1758); Goniotoma decemnotata (Marsham, 1802); G. intermedia (Helliesen, 1913); G. viminalis (Linnaeus, 1758); Hermaeophaga mercurlialis (Fabricius, 1792); Hippuriphila moderii (Linnaeus, 1761); Labidostomis longimanata (Linnaeus, 1761); Lema cyanella (Linnaeus, 1758); Lepinototarsa decimlineata (Say, 1824); Liloiocerus meridiger (Linnaeus, 1758); Lochmaea caprea (Linnaeus, 1758); L. crataegi (Paykull, 1799); L. flexuosa (Illiger, 1794); L. nemorum (Linnaeus, 1758); L. quadrimaculata (Linnaeus, 1758); L. rubra (Linnaeus, 1758); L. submarginalis (Linnaeus, 1758); L. triplus (Linnaeus, 1758); L. vittata (Linnaeus, 1758); Otiorrhynchus unicolour (Linnaeus, 1758)*; Ph. armoraciae (Marsham, 1802); Phoebis picta (Carus, 1822); Ph. thomasa (De Geer, 1775); P. violacea (Linnaeus, 1758); Planonotus hippuris (Fabricius, 1792)*; Polystictus linearis (Linnaeus, 1758); P. lineola (Fabricius, 1792); P. quadrimaculata (Linnaeus, 1758)*; Pseudodictya javana (Say, 1824); Xylotrechus rusticus (Linnaeus, 1758)*.
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66. Anthribidae Billberg, 1820 (4 species)

Anthurius nebulosus Forster, 1770; Choragus sheppardi Kirby, 1819*; Platyrhinus resinous (Scopoli, 1763); Platytomos albinus (Linnaeus, 1758).

67. Attelabidae Billberg, 1820 (12 species)

Apoderus coryli (Linnaeus, 1758); Attelabus niten (Scopoli, 1763)*; Byctiscus betulae (Linnaeus, 1758); B. populi (Linnaeus, 1758); Cenorrhinus mannerheimi (Hummel, 1823)*; Dorytomus rectirostris (Linnaeus, 1758); Involvulus cupeus (Linnaeus, 1758); Lasiorhynchites cavifrons (Gyllenhal, 1833)*; Neocoenorrhinus germanicus (Herbst, 1797); Tatianaeryrhynctes aequatus (Linnaeus, 1767); Tenmocerus coeereus (Fabricius, 1798); T. longiceps (Thomson, 1888).

68. Brentidae Billberg, 1820 (17 species)

Apion frumentarium Linnaeus, 1758; Capatop siniculus (Kirby, 1808); Elaphropus iicius (Herbst, 1797); Holotrichus ebenium (Kirby, 1808); Involvulus cupeus (Linnaeus, 1758); Ischnoptera loti Kirby, 1808; Nanophyes marmoratus (Goeze, 1777); Omphalopion kookerorum (Kirby, 1808); O. laevigatum (Paykull, 1792); Oxytoma pomeranae (Fabricius, 1798); Peropar curtirostre (Germar, 1817); P. violaceum (Kirby, 1808); Protapion apricans (Herbst, 1797); P. assimilis (Kirby, 1808); P. fulvipes (Geoffroy, 1785); Stegoptera tenue (Kirby, 1808); Taeniapion urticarium (Herbst, 1784).

69. Dryophthoridae Schonherr, 1825 (1 species)

Dryophthoros corticalis (Paykull, 1792).

70. Brachyderidae Billberg, 1820 (6 species)

Grypus equisetis (Fabricius, 1775); Notaris aciculatus (Linnaeus, 1758); N. aethiops (Fabricius, 1792); N. scripi (Fabricius, 1792); Tannysphyrus lemae (Paykull, 1792); Thryogenes nereis (Paykull, 1800).

71. Curculionidae Lateville, 1802 (111 species)

Acalles camelus (Fabricius, 1792); A. setulosus Kirsch, 1870; Anthonomus pomorum (Linnaeus, 1758); Archarchus callicorus (Paykull, 1792); Bagous tubulus Caldar et O’Brien, 1994; Baris armestianus (Herbst, 1795); Barynotus moerens (Fabricius, 1792); B. obscurus (Fabricius, 1775); Cecthrornchnus barbarea Suefen, 1847; C. coelestae (Gyllenhal, 1813); C. erysini (Fabricius, 1787); C. obtusatus (Marsham, 1802); C. typhae (Herbst, 1795); Cionus hortulatus (Geoffroy, 1785); C. tuberculatus (Scopoli, 1763); Charagmus gressorius (Fabricius, 1792); Chlorophorus viridis (Linnaeus, 1758); Cleonis nigra (Scopoli, 1763); Cossus n. parallelepipedus (Herbst, 1795); Cotaster cuneispennis (Aubé, 1850)**; Cryptopus asperatus Gyllenhal, 1813; Cryptopus pusillus (Gyllenhal, 1813); Curculio glandium Marsh, 1802; C. venosus (Geavenhorst, 1807); C. villosus Fabricius, 1778; Dendroctonus micans (Kugelann, 1794)**; Dryomyzus teniatus (Fabricius, 1781); D. tortrix (Linnaeus, 1761); Dryocoetes autographus (Ratzeburg, 1837); D. villosovus (Fabricius, 1792); Eremotes ater (Linnaeus, 1758); Eutrichapion bartoni (Linnaeus, 1758); Gromops inaequalis Boheman, 1842; Hylastes ater (Fabricius, 1792); Hylesinus crenatus (Fabricius, 1787); H. varius (Fabricius, 1775); Hylobius abietis (Linnaeus, 1758); H. pinastri (Gyllenhal, 1813); Hylurgops palliatus (Gyllenhal, 1813); Hylurgus ligniperda (Fabricius, 1787); Hymarata arator (Linnaeus, 1758); H. meles (Fabricius, 1792); H. nigrigaster (Fabricius, 1775); H. viciae (Gyllenhal, 1813); H. rumicis (Linnaeus, 1758); Ips typographus (Linnaeus, 1758); Isochamus flagellum (Erichson, 1902); Larinus turbatus Gyllenhal, 1835; Lepyrus palustris (Scopoli, 1763); Linnobarius doloroza (Goeze, 1777); Liolepis tenuis (Gemmell, 1776); Lixus iridis Olivier, 1807; Magdalis armiger (Geoffroy, 1785); M. ruficornis (Linnaeus, 1758); M. violacea (Linnaeus, 1758); Mecinus pyraster (Herbst, 1795); Micropterus triangulum (Bohemian, 1845); Mononchus punctualus (Herbst, 1784); Naphys quadrirameolatus (Linnaeus, 1758); Orthotomicus laricis (Fabricius, 1792); O. sutoralis (Gyllenhal, 1827); Otiurhynchus ovatus (Linnaeus, 1758); O. raeus (Fabricius, 1777); O. singularis (Linnaeus, 1767); O. tristis (Scopoli, 1763); Pellenomus velarisis (Gyllenhal, 1827); Phyllobius argentinatus (Linnaeus, 1758); Ph. glaucus (Scopoli, 1763); Ph. maculicornis Garm, 1824; Ph. oblongus (Linnaeus, 1758); Ph. pomaceus Gyllenhal, 1834; Ph. pyri (Linnaeus, 1758); Pityogenes chalcographus (Linnaeus, 1761); Polydrusus morganis (Ström, 1768); P. picus (Fabricius, 1792); P. tereticoloris (De Geer, 1775); P. undatus (Fabricius, 1781); Polygraphus polygraphus (Linnaeus, 1758); Rhamphus oxyacanthae (Marsham, 1802); Rh. pulicarius (Herbst, 1795); Rh. subaeneus (Illiger, 1807); Rhinonecus bruchoides (Herbst, 1784); Rh. pericarpus (Linnaeus, 1758); Rhinusa antirrhini (Paykull, 1800); Rhynchaoeus iota (Fabricius, 1787); Rutidosoma globulus (Herbst, 1795); Scaphillus asperatus (Bonsdorff, 1785); Scolytus intricatus (Ratzeburg, 1837); S. scolytus (Fabricius, 1775); S. ratzeburgi Janson, 1856; Sibinia pellucens (Scopoli, 1772); Sitta lineata (Linnaeus, 1758); S. macarius (Marsham, 1802); S. puncticolus Stephens, 1831; S. sutoralis Stephens, 1831; Stereonychus fraxini (De Geer, 1775); Strophosoma capi- tatum (De Geer, 1775); S. melanogramum (Forster, 1771); Tachyerges rufitarsis (Germain, 1821); T. stigma (Germain, 1821); T. salicis (Linnaeus, 1758); T. tenuisculus (Fabricius, 1794); Tomicus piniperda (Linnaeus, 1758); Trachodes hispidus (Linnaeus, 1758); Trachyplopus bifoveolatus (Beck, 1817); Trichostichodes sabulosus (Fabricius, 1787); Trypodendron domesticum (Linnaeus, 1758); T. lineatum (Olivier, 1795); T. signatum (Fabricius, 1792); Tychnus stephensi Gyllenhal, 1836; Zadulus germari (Paykull, 1800).

Discussion

1. Beetles of the Svetlogorsk Forest. The Svetlogorsk Forest supports an astonishing diversity of coleopteran fauna. Representatives of 71 families (800 species listed, i.e. 0.25–0.3 of full beetles’ fauna of Kaliningradskaya Oblast) were captured or observed in the forested area of approximately 8 km² in the northern Sambian peninsula during twenty-year period at the
beginning of the XXI century. Current faunal knowledge about different groups of beetles varies and depends on the taxonomic group, so research could be continued in this area and the methodology of Coleoptera inventoring could be additionally extended. All beetles' fauna of the Svetlogorsk Forest could consist of double species number (i.e. approximately 1500 species), which could be collected by careful and more targeted research. The presented species list is provisional and represents the general picture of the fauna, including mostly numerous, common and widely distributed taxa. Several beetles groups not sampled in research time (e.g. Ptinophila, Trogidae) would be added by continuing of researches. The most species-rich family (Staphylinidae) should be represented by no less than 120–150 species in studied territory (in contrast to revealed 45) and might be an aim of additional collecting efforts. The water beetles (primarily Dytiscidae and Hydrophilidae) are underrepresented in the list, what should be corrected by additional and focused sampling.

The obtained preliminary results should and could be interpreted by comparison. E.g. the faunistic study in the national park «Curonian Spit» [Alekseev, 2014] revealed 909 species from 72 families during 15 years of sampling. That research is methodically similar, made in territory situated 22 km away from the Svetlogorsk Forest and more or less comparable in different respects, however the territory of the national park «Curonian Spit» is 8 times larger than the studied area in the Svetlogorsk Forest. The sampled faunas differ in details, but are comparable in general species richness. The Jaccard similarity coefficient ($S_J$) between the faunal species lists for the Curonian Spit and the Svetlogorsk Forest is 0.473, the Sørensen similarity coefficient ($S_S$) is 0.642. The major differences in species composition (the Jaccard index is less than 0.3; the Sørensen index is less than or equal to 0.4) are observed in families Ptiniidae, Staphylinidae, Eucnemidae, Lycidae, Ptinidae, Monotomidae, Nitidulidae, Mycetophagidae, Melandryidae, and Mordellidae.

Differences in species composition of the lists are significant and are primarily resulted from subjective incompleteness of both studies, active use of a light trap by faunal survey on the Curonian Spit (not used in the Svetlogorsk Forest) and objective differences of two studied territories in set of ecosystems: the Curonian Spit almost lacks broad-leaved stands (oak, lime, hornbeam), while the open biotopes of the Svetlogorsk Forest area were not included in faunal study.

During examination and identification of the materials from the studied territory of the Svetlogorsk Forest, a list of 800 species was compiled. Among these registered beetles, 12 species are actually known in Kaliningradskaya Oblast in this territory only. These locally distributed (or very badly known) species are following: Hylis oleaust, Denticollis rubens (Fig. 2E), Pyroperus nigroruber, Dryophillus pusillus, Pityophagus ferrugineus, Conopalus testaceus, Phryganophilus auritus, Curtimorda maculosa, Oomorphus concolor, Phaedon laevigatus, Cotaster cuneipennis, and Dendroctonus micans. Majority of these species are xylomycetophagous.

Twenty three species of the Svetlogorsk Forest are regionally rare, known from 2-4 restricted geographical points in Kaliningradskaya Oblast only. There are: Brosanus cephalotes (Fig. 2B), Lionychus quadrillum, Nebria livida, Velleius dilatatus, Selastosomus impressus, Platyceps cosnardi, Soronia punctatissima, Triphyllus bicolor, Abdera flexuosa, Hypulus bifasciatus, Cylindium filiforme, Anidorus nigricans, Euglenes pygmaeus, Anaglyptus mysticus, Callidium aeneum, Rutpela maculata (Fig. 2F), Zeugophora turneri, Colaphus sophiae, Lochmaea crataegi, Choragus sheppardi, Attelabus nitens, Caenorhinus mannerheimi, and Lasiorhynchites cayrion. Three of them are inhabitants of sandy and open cliff habitat (B. cephalotes, L. quadrillum, N. livida), and other beetles are connected with forest habitats. Xylomycetophagous species dominate among this group of beetles too.

Geographically small studied forest site maintains populations of diverse officially protected species. Six beetles of the Svetlogorsk Forest (Callusoma inquisitor (Fig. 2C), Carabus coriaceus (Fig. 2A), Dendroxena quadrimaculata, Protaetia marmorata, Gnorimus nobilis (Fig. 2D), and Prionus coriarius) are listed in the current issue of Red Data Book of Kaliningradskaya Oblast [Dedkov, Grishanov, 2010] and one species (Dorcus parallelepidus) is mentioned in appendix I («need of special attention and control»). Seven species inhabiting the Svetlogorsk Forest are included in the actual Red Data Book of Lithuania [Rašomavičius, 2021]. These protected in the neighboring territory beetles and its corresponding IUCN categories are following: Callusoma inquisitor (NT i.e. «near threatened»), Carabus coriaceus (NT), Dendroxena quadrimaculata (NT), Peltis grossa (EN i.e. «endangered»), Protaetia marmorata (NT), Prionus coriarius (EN), and Xestobium rufovillosum (NT).

The Svetlogorsk Forest hosts four saproxylic species indicating primeval forests in Central Europe [Eckelt et al., 2018], e.g. Grynocharis oblonga, Peltis grossa, Colydium filiforme, and Phryganophilus auritus. These species are considered «primeval forest relic beetles» and are included in a set of 168 umbrella species for the protection of European primeval forest remnants.

Additionally, 37 species of the revealed Svetlogorsk Forest fauna are listed in European Red List of saproxylic beetles [Nieto, Alexander, 2010]. There are: Anaglyptus mysticus, Aromia moschata, Callidium aeneum, Clytus arietis, Molochus minor, Obrum brunneum, Plagionotus arcuatus, Plagionotus detritus, Prionus coriarius, Saperda scalaris, Xylotrechus rusticus, Protaetia marmorata, Gnorimus nobilis, Valgus hemipterus, Ampedus balteatus, A. pomorum, A. sanguineus, Cardiophilus ruficollis, Denticollis linearis, D. rubens, Melanotus villosus, Daene bipustulata, Triplax rusti-
The beetle fauna of the Svetlogorsk Forest at the beginning of the XXI century

Fig. 2. Nature photos of several regionally rare beetles in the studied area: A — *Carabus coriaceus* (Otradnoe, «Wolfskessel», 1.09.2020); B — *Broscus cephalotes* (Otradnoe, sandy beach of the Baltic Sea, 6.09.2021); C — *Calosoma inquisitor* (forest edge in west suburb of Sverlogorsk, 3.06.2021); D — *Gnorimus nobilis* (Lesnoe, «Wolfsschlucht», 29.06.2011); E — *Denticollis rubens* (Lesnoe, «Fuchsschlucht», 3.06.2021); F — *Rutpela maculata* (forest edge in west suburb of Sverlogorsk, 18.07.2020).

Fig. 2. Фотографии некоторых регионально редких жуков в природе на территории исследования: A — *Carabus coriaceus* (Оtradное, «Wolfskessel», 01.09.2020); B — *Broscus cephalotes* (Оtradное, песчаный пляж Балтийского моря, 6.09.2021); C — *Calosoma inquisitor* (приток леса на западной окраине Светлогорска, 3.06.2021); D — *Gnorimus nobilis* (Лесное, «Wolfsschlucht», 29.06.2011); E — *Denticollis rubens* (Лесное, «Fuchsschlucht», 3.06.2021); F — *Rutpela maculata* (опушка леса на западной окраине Светлогорска, 18.07.2020).
ca, Tritoma bipustulata, Eucnemis capucina, Microrhagus pygmaeus, Dorcus parallelepipedus, Platycerus caprea, P. caraboides, Sinodendron cylindricum, Litar-gus connexus, Mycetophagus quadriguttatus, M. quadripustulatus, Triphyllus bicolor, Grynocharis oblonga, Ostoma ferruginea, and Peltis grossa.

Abovementioned 70 coleopteran species (approximately 9% of identified fauna) are regionally rare or, in
varying degrees, at risk, showing the important role of the studied territory for conservation of regional biodiversity. The Svetlogorsk Forest provides important habitat for the populations of diverse protected beetles, as well as relatively large number of other regionally rare beetles. The part of this forest in possible international nature conservation projects or programs would be a mistake to underestimate. The future of these species depends on targeted conservation measures. Many of the above listed species depend on deadwood or suitable forest or intact cliff habitat; their conservation should be the central task of nature protection in the Svetlogorsk Forest.

A reference should be made to the fact, that the insect fauna of any area is not stable and is changing over a time. Usually, such processes are poorly documented. Especially dramatic, accelerating and sometimes structural faunal changes are currently experiencing due to modern human economical activities. The determination of precise time of appearance or of definitive disappearance regarding an insect in an area is very difficult. Numerous recently unconfirmed reports of beetles from Rauschen [now Svetlogorsk], Warnicken [Lesnoe], Herschau [Kolomenskoe], Kraam [Grachevka] and Georgenswalde [Otradnoe], i.e. in approximate territory of interest, are mentioned in the comprehensive old catalogues of the regional fauna [Lentz, 1879; Bercio, Folwaczny, 1979]. The actual presence of such peculiar beetles as M. arctica (Paykull, 1798, L. depressus (Paykull, 1790), Cymindis spp., Pha. splendida (Linnaeus, 1767), Drilus concolor (Ahrens, 1812, O. fracticornis (Preysler, 1790), Lycoperdina spp., L. linearis (Goze, 1777), P. lamed (Linnaeus, 1758), and Chlorophorus figuralis (Scopoli, 1763) seem still probable here, but not verified during the study in the XXI century. The five following species, registered in the XIX or in the XX centuries before 1945, are probable extinct in the Svetlogorsk Forest at present: Calosoma sycophanta (Linnaeus, 1758), Nicrophorus germanicus (Linnaeus, 1758), L. cerasus (Linnaeus, 1758), C. schreberi (Linnaeus, 1767), and Cerocoma schaefferi (Linnaeus, 1758). In the contrary, two species, O. funesta and H. axyridis, are recent (the beginning of the XXI century) invaders in the studied territory. The first registered in the Svetlogorsk Forest specimens of these species with recently expanding distribution are known in 2018–2019 years only. Four following species are also migrants for the studied territory, appeared here in the second half of the XX century after 1945: Tachyta nana, L. quadrillum, Leptinotarsa decemlineata, and Charagmus gessorius.

2. Nature conservation recommendations. A narrow coastal area of the Svetlogorsk/Warnicken Forest together with the Baltic Sea cliff was under protection as the part of nature reserve (Naturschutzgebiet «Samlandischer Küstenhain») in Eastern Prussia during 1934–1945. The resort area under federal jurisdiction «Svetlogorsk-Otradnoe» was the status of protection for the territory during the Soviet time in the XX century. Formally, the territory also possessed this status at least until 2013. Modern economic activities increasingly transform the area without any nature protection status in the last ten years. Commercial logging in the studied territory is absent, but the forested area is under strong anthropogenic pressure, gradually reduced and fragmented as a result of the new building of houses (Svetlogorsk suburb, Maiskii parish, Otradnoe), extending of the network of the electric power transmission lines through the forest, widening of old roads and creation of new roads, opening of the amusement park near Otradnoe and not regulated tourism. Present-day status cannot ensure any nature protection and also any conservation of historical heritage for posterity (Fig. 3A, B), nesessitating immediate and coordinated preservation efforts on the territory of the Svetlogorsk Forest.

Unfortunately, present-day nature preservation in Kaliningradskaya Oblast is completely formal and virtual, having a very complicate bureaucratic and administrative character. There are no places untouched from human influence and non-transformed in the region. Several little transformed natural territories without an economic importance and usually distant from current economic interest are declared «protected». Such declaration usually remains only a concept on paper: no efforts of real protection, no economic limitation or even investigation are carried out, probably because the area is outside of current economic importance and distant. If the territory enters the area of interest (building, land use, exploitation of resources, improvements of infrastructure), the status of protection for the territory disappears. The ten present-day protected natural reserves on the Sambian Peninsula are geological, that seem to be meaningless for protection of living nature existing in the form of integrated ecosystems of living organisms. All conflicts between nature protection and economic activity resolve in in favour of immediate proceeds under cover of motto «benefits and wellbeing for people». Preservation of biodiversity is not practised in the region, even in the national park «Curonian Spit». The substitution of broad-leaved or conifer native veteran trees by any seedlings (including introducents) with the relationship one-to-one is legitimate and official practice of «compensatory greening» in whole area of Kaliningradskaya Oblast.

The strategy of nature habitat protection in Kaliningradskaya Oblast should completely differ: the seminatural territories (with high biodiversity and natural value, like the Svetlogorsk Forest) near economically interesting areas (and thereby at risk of disappearing) must be primarily protected. The protected areas in the region should primarily include old parks, old alleys and different forests as well other seminatural ecosystems; the protection of these territories should exclude change of their borders and status for economical purposes. The spatial planning of land use should include expertise connected with nature protection and conservation. The forest management should consider the importance of
Fig. 3. Several landscape photos from the studied area as examples of nature with aesthetic value for the recommended national park «Warnicken Forest»: A — mixed forest (eastward of Maiskiy settlement, 20.10.2018); B — cliff and seaside of the Baltic Sea (between Lesnoe and Otradnoe, 10.08.2021); C — seaside of the Baltic Sea with the ferruginized sandstones of the Eocene Krant facies in Zipfelberg (NE Primorye, 26.05.2020); D — natural monument «Oaken alley» with 600-years old trees (Lesnoe, 1.09.2020); E — forested ravine «Wolfsschlucht» (Lesnoe, 2.10.2020); F — the northern seacoast of the Sambian Peninsula, view from «Jägerspitze» (Lesnoe, 06.09.2021).

Fig. 3. Ойãîòîãðàôèè ïðèðîäû â íåêîòîðûõ òî÷êàõ èçó÷å ííîé òåððèòîðèè êàê ïðèìåðû ýñòåòè÷íîé ïðèðîäû â ðåêîìåíäóåìîì íàöèîíàëüíîì ïàðêå «Âàðíèêåíñêèé ëåñ»: A — ñìåøàííûé ëåñ (ê âîñòîêó îò ïîñ. Ìàéñêèé, 20.10.2018); B — êëèô è ïîáåðåæüå Áàëòèéñêîãî ìîðÿ (ìåæäó ïîñ. Ëåñí îå è Îòðàäíîå, 10.08.2021); C — áåðåã Áàëòèéñêîãî ìî ðÿ ñ ýîöåíîâûì îæåëåçí¸ííûì ïåñ÷àíèêîì ôàöèè Êðàíò äþíû Öèïô åëüáåðã (Ñ ïîñ. Ïðèìîðüå, 26.05.2020); D — ïàìÿòíèê ïðèðîäû «Äóáîâàÿ àëëåÿ» ñ äåðåâüÿìè âîçðàñòîì 600 ë åò (ïîñ. Ëåñíîå, 1.09.2020); E — îáëåñí¸ííûé îâðàã «Âî ë÷üå óùåëüå» [Wolfsschlucht] (ïîñ. Ëåñíîå, 2.10.2020); F — ñåâåðíî å ïîáåðåæüå Ñàìáèéñêîãî ïîëóîñòðîâà, âèä ñ «Êåãðåêòîðîñêèé» [Jägerspitze] (ïîñ. Ëåñíîå, 06.09.2021).
local deadwood availability and prevent forest degradation occurring through the loss of key ecological structures, such as dying trees and deadwood.

Considering the high species richness of the beetles, the Svetlogorsk Forest bears a great conservation value and can contribute to preserving the insect fauna in the region. The listed in Red Data Book and different red lists beetles species are flagships for territory conservation. Measure taken to protect these beetles and its habitats can also benefit other threatened wildlife, including other insects and plants. It is worth noting; only two transformed by human activity forests are currently present in the coastal area of the Baltic Sea in Kaliningradskaya Oblast: (1) a larger, mixed Svetlogorsk Forest in the northern coast of the Sambian Peninsula and (2) a smaller, broad-leaved forested area near Baltisk in the south-western coast of the Sambian Peninsula. Both forest fragments include partially surviving insect community of European broad-leaved temperate forest zone and merit nature protection and aimed diversity preservation. Three circumstances (habitat for set of protected species, locality of high general biodiversity, and unique last refugium for broad-leaved ecosystems on the Sambian Peninsula) especially underline the importance of the Svetlogorsk Forest in regional nature preservation. Taking in consideration the high number of diverse (geomorphological, botanical) and unique nature objects on the territory as well as sites of particular ecological, historical and aesthetic value (see e.g. Fig. 4), the establishment of a large-area (approximately 60 square kilometers) complex state nature reserve «Warnicken Forest» or even federal national park in the northern coastal area of the Sambian peninsula, extended from Primorye towards western suburb of Svetlogorsk (including the Zipfelberg dune, forested area and cliff of the Baltic Sea coast, coastal parks of Lesnoe and Otradiano, «Oaken alley» along road in Lesnoe, forested area with burial mounds in Otradiano vicinity, and the Svetlogorsk Forest) is proposed (Fig. 3C). Aesthetic, cultural, historical, and natural arguments for such project as second national park on the territory of Kaliningradskaya Oblast seem to be no feebler than for the existing Curonian Spit national park. The Svetlogorsk Forest needs in strict protection and urgent conservation measurements in order to preserve biodiversity. The form of this protection and the status of the territory should be discussed by diverse experts, but a decision should be arrived within the next few years.

Acknowledgements

I am very thankful also to two anonymous referees for their critical and helpful comments on an earlier version of the manuscript.

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