

ZOOGEOGRAPHICAL ANALYSIS OF THE BYELORUSSIAN POLESYE  
BEETLE FAUNA (*INSECTA, COLEOPTERA* )

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**A b s t r a c t .** Until the present times the Byelorussian Polesye there are 2107 species belonging to 87 families one of which 219 species are can be found only here. The beetle fauna of the Polesie is of a mixed origin, with the predominance of species descending from the Ancient Mediterranean District (65,4 %). The species from the East-European Boreal District are less numerous (33,2 %). The beetle fauna can be used to allocate the Polesie as an independent zoogeographical region of the East European Province of the European-Ob Subarea of the European-Siberian Area of the Palaearctic Subkingdom of the Holarctic Kingdom.

**Keywords:** *Coleoptera*, zoogeography, Byelorussian Polesye

INTRODUCTION

The species diversity and the number of the specimens made beetles the main group among animals. This group occupies all biocenosis and takes part in the functioning of water and ground ecosystems. Until the present times in the territory of the Byelorussian Polesye 2107 species belonging to 87 families out of which 219 species are found out only are known [1].

MATERIAL AND METHODS

This research is an investigation of fauna (1975-2000 years), carried out in the territory of Byelorussia and the Bryansk district of Russia. Moreover, we investigated collections of the Zoological Institute, Russian Academy of Sciences (St. Petersburg), Institute of Zoology, National Academy of Sciences of Ukraine, and the Zoological Museum of the Kiev University.

Terminology quoted by Gorodkov [3] was used for the description of areal types. We think, that the scope of investigation of areal species is not sufficient. It is especially time of the largest families of beetles: *Staphylinidae* and *Curculionidae*. However, distribution of the representatives of families: *Carabidae*, *Scarabaeidae*, *Elateridae*, *Tenebrionidae*, *Chrysomelidae*, and *Cerambycidae* has been examined. These data are traditionally using for the zoogeographical demarcation of Europe and for the reconstruction of faunogenesis [5-8].

## RESULTS AND DISCUSSION

Twenty-nine types of areals in total were found in the fauna of Byelorussian Polesye. They were divided into 5 groups: Cosmopolite (1.4%), Holarctic (7.8%), Trans-Palaeartic (25.4%), West-Central-Palaeartic (21.9%) and West-Palaeartic (43.5%).

The cosmopolite complex includes 30 species, living on several continents. Among them on the territory of the Polesye, synanthropic species are prevailing: (*Atholus bimaculatus* (Linnaeus, 1758), *Carcinops pumilio* (Erichson, 1834), *Cryptophagus acutangulus* Gyllenhal, 1827, *Cartodere constricta* (Gyllenhal, 1827), *Corticaria elongata* (Gyllenhal, 1827), *Corticaria pubescens* (Gyllenhal, 1827), *Corticaria serrata* (Paykull, 1798), *Corticarina fuscula* (Gyllenhal, 1827), *Dienerella filum* (Aube, 1850), *Lathridius minutus* (Linnaeus, 1767), *Typhaea stercorea* (Linnaeus, 1758), *Alphitobius diaperinus* (Panzer, 1797), *Alphitophagus bifasciatus* (Say, 1824)); the store pests *Anthrenus verbasci* (Linnaeus, 1767), *Attagenus unicolor* (Brahm, 1791), *Anobium punctatum* (De Geer, 1774), *Stegobium paniceum* (Linnaeus, 1758), *Ptinus latro* (Linnaeus, 1775), *Tenebroides mauritanicus* (Linnaeus, 1758), *Ahasverus advena* (Waltl, 1834), *Cryptolestes pusillus* (Schoenherr, 1817), *Oryzaephilus surinamensis* (Linnaeus, 1758), *Tenebrio molitor* Linnaeus, 1758, *Tribolium confusum* (Jacquelin du Val, 1862), *Acanthoscelides obtectus* (Say, 1831), *Bruchus pisorum* (Linnaeus, 1758), *Sitophilus granarius* (Linnaeus, 1758) and the field species *Agriotes lineatus* (Linnaeus, 1767).

The Holarctic complex contains the species with Circumpolar Boreal-Alpine: (*Miscoderma arctica* (Paykull, 1898), *Serropalpus barbatus* (Schaller, 1783), *Gonioctena decemnotata* (Marsham, 1802)); and with Circumboreal (*Atheta elongatula* (Gravenhorst, 1802), *Auleutes epilobii* (Paykull, 1800), *Upis cerambycidae* (Linnaeus, 1758), *Hylurgops palliatus* (Gyllenhal, 1813) and with Circumtemperal (155 species from 29 families: *Curculionidae* - 28, *Carabidae* - 23, *Chrysomelidae* - 16, *Dytiscidae* - 12, *Staphylinidae* - 11, *Hydrophilidae* - 10, *Scarabaeidae* - 7-

*Elateridae*, *Coccinellidae* - 6, *Nitidulidae* - 5, *Silphidae* - 4, *Byrrhidae*, *Cerambycidae*, *Scolytidae* - 3, *Histeridae*, *Ptinidae*, *Lathridiidae* - 2, *Gyrinidae*, *Cholevidae*, *Platypsyllidae*, *Trogidae*, *Lycidae*, *Cantharidae*, *Dermestidae*, *Cryptophagidae*, *Endomychidae*, *Oedemeridae*, *Tenebrionidae*, *Apionidae* - 1) types of areals occupying the forest zone of Northern Hemisphere.

The Transpalaeartic complex (25.4 %) includes the Transpalaeartic and the Transeurasian types of areals, which are dividing in zone aspect on the Boreal-Transpalaeartic (*Cassida nebulosa* Linnaeus, 1758), *Crepidodera aurata* (Marsham 1802), *Crepidodera fulvicornis* (Fabricius, 1792), *Phratora laticollis* (Suffrian, 1851) and on the Polyzoal-Southern-Siberian 80 species: *Curculionidae* - 19, *Chrysomelidae* - 15, *Staphylinidae* - 14, *Apionidae* - 6, *Coccinellidae* - 4, *Buprestidae*, *Cerambycidae* - 3, *Carabidae*, *Cryptophagidae*, *Elateridae*, *Scarabaeidae*, *Scolytidae* - 2, *Byrrhidae*, *Ciidae*, *Lathridiidae*, *Monotomidae*, *Silphidae*, *Tenebrionidae* - 1); and on the Boreal Transeurasian *Agonum dolens* (Sahlberg, 1827), *Denticollis linearis* (Linnaeus, 1758), *Selatosomus cruciatus* (Linnaeus, 1758), *Hippodamia septemmaculata* (De Geer, 1775), *Rhopalodontus perforatus* (Gyllenhal, 1813), *Mycetophagus multipunctatus* (Fabricius, 1792), *Necydalis major* Linnaeus, 1758, *Nivellia sanguinosa* (Gyllenhal, 1827), *Asiorestia interpunctata* (Motschulsky, 1859), *Galerucella tenella* (Linnaeus, 1761), *Phratora vitellinae* (Linnaeus, 1758), *Phyllotreta flexuosa* (Illiger, 1794), *Rhynchaenus jota* (Fabricius, 1787), *Ips typographus* (Linnaeus, 1758), and on the Temperate Southern-Siberian-Transeurasian 404 species: *Staphylinidae* - 127, *Curculionidae* - 31, *Carabidae*, *Chrysomelidae* - 30, *Histeridae* - 25, *Apionidae* - 24, *Cerambycidae* - 16, *Scolytidae* - 15, *Coccinellidae* - 14, *Scarabaeidae* - 11, *Elateridae* - 7, *Hydrophilidae*, *Tenebrionidae* - 6, *Attelabidae*, *Nitidulidae* - 5, *Ciidae*, *Mordellidae*, *Silphidae* - 4, *Cantharidae*, *Cryptophagidae*, *Dytiscidae* - 3, *Anobiidae*, *Buprestidae*, *Byrrhidae*, *Byturidae*, *Dermestidae*, *Lathridiidae*, *Lycidae*, *Phalacridae* - 2, *Anaspidae*, *Anthicidae*, *Anthribidae*, *Cerylonidae*, *Cucujidae*, *Erotylidae*, *Eucnemidae*, *Gyrinidae*, *Heteroceridae*, *Lampyridae*, *Lymexylidae*, *Melandryidae*, *Ptiniidae*, *Ptinidae*, *Scirtidae* - 1), and on the Subboreal Transeurasian (33 species: *Curculionidae* - 9, *Carabidae* - 4, *Cerambycidae*, *Chrysomelidae*, *Scarabaeidae* - 3, *Attelabidae* - 2, *Anobiidae*, *Bruchidae*, *Buprestidae*, *Coccinellidae*, *Heteroceridae*, *Histeridae*, *Kateretidae*, *Oedemeridae*, *Staphylinidae* - 1).

The West-Central Palaeartic complex (21.9 %) included the European-Siberian types of areals which are different on the degree of their occurrence area from the European-Ob 27 species: *Chrysomelidae* - 8, *Curculionidae* - 5, *Carabidae*, *Dytiscidae* - 4, *Coccinellidae* - 2, *Anthicidae*, *Elateridae*, *Eucnemidae*, *Staphylinidae* -

dae - 1), and to the European-Lena 86 species: *Curculionidae* - 19, *Chrysomelidae* - 6, *Elateridae*, *Histeridae*, *Hydrophilidae* - 5, *Buprestidae* - 4, *Carabidae*, *Coccinellidae* - 3, *Cryptophagidae*, *Cucujidae*, *Erotylidae*, *Nitidulidae*, *Oedemeridae*, *Tenebrionidae*, *Trogossitidae* - 2, *Bothrideridae*, *Bruchidae*, *Cantharidae*, *Clambidae*, *Hydraenidae*, *Lagriidae*, *Lathridiidae*, *Lycidae*, *Lymexylidae*, *Monotomidae*, *Mycetophagidae*, *Pythidae*, *Scirtidae*, *Scolytidae*, *Sphindidae* - 1, to the European-Baikal 47 species: *Carabidae* - 23, *Curculionidae* - 4, *Cerambycidae* - 3, *Chrysomelidae*, *Dytiscidae*, *Silphidae* - 2, *Boridae*, *Elateridae*, *Histeridae*, *Hydrophilidae*, *Leiodidae*, *Lucanidae*, *Melyridae*, *Mordellidae*, *Oedemeridae*, *Staphylinidae*, *Tenebrionidae* - 1), and to the Southeast: European-Kazakhstan 62 species: *Carabidae* - 23, *Curculionidae* - 12, *Chrysomelidae* - 9, *Apionidae*, *Scarabaeidae* - 3, *Cryptophagidae*, *Phalacridae*, *Staphylinidae* - 2, *Cerambycidae*, *Elateridae*, *Eucinetidae*, *Lucanidae*, *Tenebrionidae*, *Trogidae* - 1, and to the European-Siberian-Middle Asian 23 species: *Curculionidae* - 8, *Meloidae* - 4, *Carabidae* - 3, *Chrysomelidae* - 2, *Coccinellidae*, *Dytiscidae*, *Lathridiidae*, *Malachiidae*, *Scolytidae*, *Silphidae* - 1, European-Siberian-Central Asian 112 species: *Carabidae* - 39, *Chrysomelidae* - 21, *Curculionidae* - 10, *Dytiscidae* - 8, *Haliplidae* - 5, *Nitidulidae*, *Staphylinidae* - 4, *Elateridae*, *Tenebrionidae* - 3, *Cantharidae* - 2, *Buprestidae*, *Byrrhidae*, *Cerambycidae*, *Ciidae*, *Hydrophilidae*, *Leiodidae*, *Malachiidae*, *Mordellidae*, *Mycetophagidae*, *Noteridae*, *Oedemeridae*, *Scarabaeidae*, *Silphidae* - 1.

With West-Central Palearctic type of the areal were revealed 104 species: *Staphylinidae* - 26, *Carabidae* - 23, *Chrysomelidae* - 11, *Curculionidae* - 10, *Buprestidae* - 6, *Coccinellidae* - 5, *Elateridae* - 4, *Apionidae*, *Dytiscidae*, *Tenebrionidae* - 2, *Atellabidae*, *Bostrichidae*, *Bruchidae*, *Byrrhidae*, *Cerambycidae*, *Cerylonidae*, *Colydiidae*, *Gyrinidae*, *Histeridae*, *Hydrophilidae*, *Melandryidae*, *Meloidae*, *Noteridae* - 1.

The greatest part of species diversity is concentrated in the West-Palearctic complex (43.5%). This complex include species distributed in Europe, the Mediterranean and in the Caucasus.

The European type of areals is widely known: the East-European (*Hoplia zaitzevi* (Jakobson, 1913), *Mycetophagus fulvicollis* (Fabricius, 1792), *Cryptcephalus planifrons* (Weise, 1822), *Marmaropus besseri* (Gyllenhal, 1837), the Middle-European 68 species: *Curculionidae* - 23, *Chrysomelidae* - 9, *Cerambycidae* - 5, *Dytiscidae*, *Pselaphidae*, *Cryptophagidae* - 4, *Apionidae*, *Carabidae*, *Elateridae*, *Ptiliidae*, *Scarabaeidae* - 3, *Hydrophilidae*, *Leiodidae*, *Staphylinidae* - 2, *Bruchidae*, *Cantharidae*, *Cholevidae*, *Cucujidae*, *Colydiidae*, *Dermestidae*, -

*draenidae, Lucanidae, Limnichidae, Malachiidae, Melandryidae, Mycetophagi - dae, Tenebrionidae - 1, the West-European (Bembidion fluviatile (Dejean, 1831), Carabus coriaceus (Linnaeus, 1758), Meligethes fulvipes (Brisout de Barneville, 1863), Corticaria alleni (Johnson, 1974), the North-European 37 species: Curculionidae - 5, Carabidae, Melandryidae - 3, Dytiscidae, Hydrophilidae, Scirtidae, Cucujidae, Cryptophagidae, Chrysomelidae - 2, Hydraenidae, Cholevidae, Staphylinidae, Sphaeritidae, Scarabaeidae, Heteroceridae, Elateridae, Trogossitidae, Nitidulidae, Rhizophagidae, Cerylonidae - 1, the European Boreal-Alpine (Agathidium discoideum (Erichson, 1845), Lacon fasciatus (Linnaeus, 1758), Corticeus suturalis (Paykull, 1800), Cryptocephalus punctiger (Paykull, 1799), Donacia brevitarsis (Thomson, 1884), European mountain: (Cratosilis denticollis (Schummel, 1844), Rhagonycha atra (Linnaeus, 1767), Phaedon laevigatus (Duftschmid, 1825), Phratora tibialis (Suffrian, 1851), Apion hoffmanni Wagner, 1930, Otiorhynchus repletus (Boheman, 1843).*

The Pan-European types of areals 364 species were found: (*Staphylinidae - 88, Chrysomelidae - 40, Curculionidae - 34, Carabidae - 23, Scarabaeidae - 21, Dytiscidae - 14, Pselaphidae - 11, Tenebrionidae - 8, Scirtidae - 7, Cryptophagidae, Ciidae, Mordellidae - 6, Hydrophilidae, Ptiliidae, Leiodidae, Cantharidae, Nitidulidae, Melandryidae - 5, Cleridae, Rhizophagidae, Mycetophagidae, Oederidae, Anthicidae - 4, Dermestidae, Coccinellidae, Cerambycidae, Apionidae - 3, Hydraenidae, Histeridae, Elateridae, Anobiidae, Melyridae, Kateretidae, Phalacridae, Lathridiidae, Salpingidae, Anaspididae, Anthribidae - 2, Cholevidae, Dasciidae, Dryopidae, Heteroceridae, Buprestidae, Byrrhidae, Trogossitidae, Sphindidae, Cucujidae, Erotylidae, Cerylonidae, Endomychidae, Corylophidae, Biphyllidae, Pyrochroidae, Meloidae - 1.*

In Europe and in the Caucasus 179 European-Caucasian species can be distinguished: (*Curculionidae - 41, Carabidae - 27, Staphylinidae - 15, Chrysomelidae - 12, Scarabaeidae - 8, Dytiscidae - 7, Cerambycidae - 7, Histeridae - 6, Nitidulidae - 5, Cantharidae, Elateridae, Tenebrionidae - 4, Silphidae, Buprestidae, Lathridiidae, Apionidae - 3, Leiodidae, Ptinidae, Endomychidae - 2, Gyrinidae, Microsporidae, Hydrophilidae, Cholevidae, Dryopidae, Limnichidae, Heteroceridae, Byrrhidae, Dermestidae, Lyctidae, Anobiidae, Lymexylidae, Malachiidae, Rhizophagidae, Cucujidae, Erotylidae, Ciidae, Colydiidae, Mordellidae are distributed, Tetratomidae, Anthribidae, Scolytidae, Dytiscidae, Ptiliidae, Ptinidae, Scolytidae - 1.*

Such species as: *Bidessus unistriatus* (Scharnk, 1781), *Polydrusus pilosus* (Gredler, 1866), *Ptilium minuissimum* (Weber and Mohr, 1804), *Ptinus rufipes*

(Olivier, 1790), *Xyleborus cryptographus* (Ratzeburg, 1837) can be found in the Northern Europe and in the mountains of the Caucasus.

In the West-European-Caucasian type of areal is *Nebria brevicollis* (Fabricius, 1792).

The areals of 228 species are distributed in Europe, in the Caucasus and in the Mediterranean. They can be described properly as West-Palaeartic: *Curculionidae* - 46, *Chrysomelidae* - 36, *Apionidae* - 17, *Scarabaeidae*, *Cerambycidae* - 16, *Carabidae* - 13, *Staphylinidae* - 8, *Coccinellidae* - 7, *Histeridae* - 6, *Cantharidae*, *Elateridae* - 5, *Dytiscidae*, *Rhizophagidae*, *Cryptophagidae*, *Scolytidae* - 4, *Silphidae*, *Malachiidae*, *Tenebrionidae* - 3, *Lucanidae*, *Nitidulidae*, *Phalacridae*, *Lathridiidae*, *Mordellidae* - 2, *Haliplidae*, *Ptiliidae*, *Cholevidae*, *Clambidae*, *Buprestidae*, *Trogossitidae*, *Erotylidae*, *Ciidae*, *Mycetophagidae*, *Pyrochroidae*, *Salpingidae*, *Meloidae*, *Anaspididae*, *Bruchidae*, *Melandryidae*, *Anthribidae*, *Attelabidae*, *Platypodidae* - 1.

The fauna of the Byelorussian Polesye consists predominately of species descendant from the Ancient Mediterranean district: West-Palaeartic and, probably, West-Central-Palaeartic (65.4 %). They survived the Pleistocene glaciations in the Mediterranean area and they recently started to occupied the territory of the Polesye, in Holocene period. Species from the East-European Boreal area: Circumboreal, Transpalaeartic and Transeurasian are less numerous - 33,2 %. They started to occupy the Polesie from the East earlier, probably at the end of the Pleistocene. As it is known [4], the lowland of the Polesie was released from the glaciation approximately 250 thousand years ago, whereas other territory - 140 thousand years later.

In the Late Pleistocene (Ancient Drias), in the territory of the Polesye, the pine forests prevailed. They occupied sandy soil released from the glacial waters [2]. Cold snap in the Late Drias (10-11 thousand years ago) caused the occurrence of wood-tundra and of boreal taiga forests with populations of beetles specific for them. Probably then, the circumboreal *Miscodera arctica*, *Upis ceramboides*, Trans-Eurasian Boreal *Asiolestia interpunctata* (Motschulsky, 1859), *Denticollis linearis* (Linnaeus, 1758) and other species could expand their areals up to the Polesye.

We can to assume, that the territory of the Polesye was the Late Pleistocene shelter for many species with modern Middle-European and European areals: *Carabus nitens* (Linnaeus, 1758), *Carabus metetriesi* (Hummel, 1827), *Chlaenius quadrisulcatus* (Paykull, 1790) (*Carabidae*), *Colymbetes paykulli* (Erichson, 1837) (*Dytiscidae*), *Catops tristis* (Panzer, 1793) (*Catopidae*), *Cercyon impressus* (Sturm, 1807) (*Hydrophilidae*), *Aphodius conspurcatus* (Linnaeus, 1758) (*Scara-*

*baeidae*), *Antherophagus pallens* (Linnaeus, 1758) (*Cryptophagidae*), *Anaspis thoracica* (Linnaeus, 1758) (*Anaspididae*) and others.

Geological history, duration and ecological originality of the Polesye landscapes could probably promote processes of species origin. *Hoplia golovjankoi* (Jacobson, 1914) (*Scarabaeidae*) living only within the borders of East Polesye, in the meadows, on the alluvion sands, on the coast of Pripiat and its inflows the Uza and Dnieper, in the borders of the Ukrainian Polesye. It can be attributed to the endemic of the Polesie.

From our point of view, distribution of species, in the borders of areals is of greatest interest, among them: West-European and West-European-Caucasian species, European-Kazakhstan steppe species, Holarctic Circumboreal and Boreal-Alpine species.

The main characteristic of the Polesye beetles fauna is a wide representation of boreal and steppe species. The Boreal species occupy mainly bogs, the steppe ones sandy coast, dry meadows and fields.

The Polesye is the southern border of plain areals for boreal and boreal-alpine species: *Epahius rivularis* (Gyllenhal, 1810), *Chlaenius quadrisulcatus*, *Miscodera arctica* (*Carabidae*), *Agathidium discoideum* (Erichson, 1845) (*Anisotomidae*), *Ampedus elongatulus* (Fabricius, 1787) (*Elateridae*), *Upis ceramboides* (*Tenebrionidae*), *Abdera flexuosa* (Paykull, 1799), *Zilora ferruginea* (Paykull, 1798) (*Melandryidae*), *Cryptocephalus pallifrons* (Gyllenhal, 1813) (*Chrysomelidae*). The East or Mozyr Polesye is the Northern border of distribution of steppe species: *Calosoma denticolle* (Gebier, 1833), *Harpalus honestus* (Duftschmid, 1812) (*Carabidae*), *Zonites praeusta* (Fabricius, 1792) (*Meloidae*), *Pedinus femoralis* (Linnaeus, 1767) (*Tenebrionidae*), *Cryptocephalus laetus* Fabricius, 1792, *Exosoma collare* (Hummel, 1825), *Cassida lineola* (Creutzer, 1799) (*Chrysomelidae*), *Cyphocleonus dealbatus* (Gmelin, 1790) (*Curculionidae*).

The unicity of the geological history and the unique mosaic of intrazonal sites, overflow lands oak forests, and upland pine forest on sandy heights have probably, interfered with penetration of West-European forest species in the Polesye forests. The unique West-European-Caucasian species *Nebria brevicollis* formed local populations in Mozyr Polesie and it is absent in Pinsk Polesye. The West-European species probably came from the Alpine and Carpathian shelters, and penetrated north and northeast of the Baltic coast and the pool of Western Dvina. Their way of migrations to the east passed a strip of upland oakerys. These oakerys bordered the south Polesye lowland up to Dnieper. A similar way of moving of the

European mountain (West-European) plant species in the territory of the Middle Europe was modelled created by Szafer [9].

### CONCLUSION

Thus, the beetles fauna of Polesye is of a mixed origin caused by the geological history of Late Pleistocene and Holocene.

So, we think, that on the basis of the beetle analysis areals borders the fauna of Polesye can be used to allocate Polesye as independent zoogeographical region of East European Province of the European-Ob Subarea of the European-Siberian area of the Palaearctic Subkingdom of the Holarctic Kingdom.

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ANALIZA ZOOGEOGRAFICZNA FAUNY CHRZ SZCZY  
(*INSECTA COLEOPTERA*) POLESIA BIAŁORUSI

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**S t r e s z c z e n i e** Dla Polesia Białorusi wykazano 2107 gatunków chrząszczy, należących do 87 rodzin. 219 z nich występuje tylko na tym terenie. Fauna chrząszczy Polesia jest mieszanego pochodzenia, z dominacją gatunków pochodzących z obszaru Starożytnego Śródziemnomorza (razem 65,4%) oraz z obszaru Wschodnioazjatyckiego Borealnego (razem 33,2%). Na podstawie analizy granic arealów chrząszczy, Polesie może być wydzielone jako samodzielny Poleski obszar zoogeograficzny wchodzący do prowincji Wschodnioeuropejskiej podobowodu Europejsko-Obłokowego obwodu Europejsko-Syberyjskiego podkrólestwa Palearktycznego królestwa Holarktycznego.

**Słowa kluczowe** *Coleoptera*, zoogeografia, Polesie Białorusi