

BIODIVERSITY OF SELECTED INVERTEBRATE GROUPS IN OAK-HORNBEAM FOREST ECOSYSTEM IN SW SLOVAKIA

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Abstract

Holecová M., Krumpál M., Országh I., Krumpálová Z., Fedor P.: Biodiversity of selected invertebrate groups in oak-hornbeam forest ecosystem in SW Slovakia. *Ekológia (Bratislava)*, Vol. 24, Supplement 2/2005, p. 205–222.

The paper summarizes analyses of 4-year long coenological research on micro- and macrofauna in oak-hornbeam forest ecosystems in SW Slovakia. The studied forest ecosystems, 40–100 years of age, are situated in the orographic units of the Malé Karpaty Mts. and Trnavská pahorkatina hills and may be classified into 3 vegetation types: *Carpinion betuli*, *Quercion confertae-cerris* and *Quercion pubescentis-petraeae*. In total we determined 39,987 invertebrates (except for Protozoa) and thus recorded 575 species of 4 phyla (Ciliophora, Rhizopoda, Tardigrada, Arthropoda). Twelve taxocoenoses of ciliates, naked amoebae, water bears, pseudoscorpions, spiders, mesostigmatid mites, terrestrial isopods, centipedes, millipedes, earwigs, bugs, weevils were analysed more in detail. Apart from forest epigeon we were focused on some other microhabitats, such as decaying wood mater, mosses and dendrotelmae. Of the studied microfauna just the community from decaying wood possessed affinity to soil. In the other microhabitats (dendrotelmae and mosses) species are predominantly interacted with aquatic environment. There are stronger bonds onto soil at arthropods, represented particularly by epigeic, partially by typically edaphic species. Of the 15 analysed variables just age of a stand, depth of leaf litter, undergrowth coverness of canopy and sporadically pollution (dust from the quarry) appeared as significantly influencing the studied arthropod communities.

Key words: invertebrates, coenoses, oak-hornbeam forest, epigeon, mosses, decaying wood, tree-holes, SW Slovakia tree-holes, SW Slovakia

Introduction

Oak-hornbeam forests used to be the most frequent forest climatically zone formation at lower altitudes in Slovakia. In past they continually covered large areas particularly in lowlands from the altitude of 100 m a.s.l. In hills they spread up to 600 m a.s.l. and occurred in all Carpathian basins. For a long time these forest stands have been under intensive anthropogenous impact in Slovakia as well as in other European regions. Nowadays they have survived in fragments attacked and impacted by humans. However in cultural land they provide refugium for many animal species.

Animals in such the forest type have not yet been intensively studied. Relevant papers dealing with fauna of oak-hornbeam forests are usually focused on pests (e.g. Patočka et al., 1999), or are limited by partial taxocoenoses of certain invertebrates (for example naked amoebae: Mrva, Matis, 2000; Mrva, 2003; ciliates: Tirjaková, 2002; Tirjaková et al., 2002; water bears: Nelson et al., 1979; Guoth, 1986; Dastyh, 1988; Degma et al., 2004, 2005a; terrestrial isopods: Gulička, 1960; Krumpál, 1973, 1976; Flasarová, 1980, 1986; Flasar, Flasarová, 1989; millipedes: Gulička, 1986; Branquart et al., 1995; Korsós, 1997; David et al., 1999; centipedes: Wytwer, 1990; Tajovský, 2001; spiders: Žitňanská, 1981; Gajdoš, 1992; Gajdoš, Krumpál, 1986, 1988; Jedličková, 1988; Noflatscher, 1991; Esjunin et al., 1994; Krumpálová, Bartoš, 2002; Krumpálová, Szabová, 2003, 2005; mites: Kalúz, 1981, 2005; Ambros, Kalúz, 1985, 1987; Mašan et al., 1994; Kalúz, Fend'a, 2005; bugs: Štepanovičová, Kovačovský, 1971; Bianchi, 1991; Rédei, Hufnagel, 2003a, b; Bakonyi et al., 2002; beetles: Korbél, 1966, 1973; Drdul, 1973; Czechowski, 1989; Majzlan, 1986, 1991; Majzlan, Hošťák, 1996; Majzlan et al., 2000; Holecová, Sukupová, 2002; Holecová et al., 2002 etc.).

General and complex view on arthropod fauna in Central-European oak-hornbeam forest has been included in just a few of papers (e.g. Balogh, Loksa, 1948; Verner, 1959; Loksa, 1966, 1968; partially Nosek, 1986).

This study has been focused to analyse the structure and biodiversity of soil micro- and macrofauna in oak-hornbeam forest ecosystem more complexly. The research hinted at stands of different age and anthropogenous impact. Impacts of forest fragmentation as well as some ecological and environmental factors have been taken into account.

The research was realised during 4 vegetation seasons (1999–2002) at 10 regularly studied sites in central and northern part of the Malé Karpaty Mts and nearby Trnavská pahorkatina hills. Apart from intensive analyses of soil fauna we were focused on some other microhabitats, such as mosses, decayed wood mater (in various decay degree) and dendrotelmae, which have not been intensively studied yet, particularly from the microfauna point of view.

Material and methods

To study epigeic and soil macrofauna we applied almost all the available collecting methods, such as sieving the leaf litter and upper part of soil, direct sampling of soil (leaf litter, soil) as well as formaldehyde ground traps. From samples of mosses, wood and tree-holes the microfauna was studied by direct analyses of sampled

material and modifications of non-flooded Petri-dish method. Material was collected in regular monthly intervals at the same study plots and periods.

Results and discussion

General characterization of oak-hornbeam invertebrate assemblages seems to be very disputable due to the rich material of various systematic groups, often from many types of microhabitats. However this paper will project a certain synthesis.

In total we determined 39,987 invertebrates (except for Protozoa) of 575 species from 4 phyla (Ciliophora, Rhizopoda, Tardigrada, Arthropoda). Generally the study presents detailed ecological analysis of 12 systematic groups (ciliates, naked amoebae, water bears, pseudoscorpions, spiders, mesostigmatid mites, terrestrial isopods, centipedes, millipedes, earwigs, bugs, weevils) being provided by the authors. In this part we summarize the obtained data, analyse epigeic and soil animal communities from oak-hornbeam forests in the Malé Karpaty Mts. Moreover environmental impact on the studied animals was taken into account.

Protozoa were studied in decaying wood matter dendrotelmae and mosses – in markedly different microhabitats in some degree interacted with soil.

Decaying wood matter often represents refugium for various soil animals and is inhabited by specific communities. The structure of ciliate assemblages with a majority of soil species has proved this fact. Interactions towards a certain tree or shrub species do not appear as significant (Bartošová, Tirjaková, 2005).

In contradiction to decaying wood matter tree-holes represent specific habitats being isolated from soil, what has been actually proved by the communities of Ciliophora. Four indication communities have been established. They are particularly affected by tree and shrub diversity, size and age of a telma as well as by presence of Rotifera and other Metazoa. Moreover time as an important factor has to be taken into account. The communities were represented by aquatic, terrestrial, limnetic and eurypotent species in diverse proportion and were influenced by many factors mentioned above. Low frequency in occurrence of species may hint at diversity and significant impact of environment. Interactions with soil have not been proved (Tirjaková, Vďačný, 2005).

However mosses possess stronger interactions to soil than dendrotelmae do. Therefore the fact that 32 recorded taxa (23 species) of naked amoebae with significant bonds to aquatic environment appears as very disputable. The community of naked amoebae seems to be very similar to aquatic assemblages (Mrva, 2005).

Twenty-one species of Tardigrada obtained from mosses have not shown any significant interactions to soil. Some expressive differences in species diversity refer to individual sites with high mutual similarity at the least-diverse communities. Mostly the differences correspond with accidental records of various species. Distribution and dispersal process at Tardigrada in various strata is supposed to be passive and accidental with insignificant interactions with specificity of environment (Degma et al., 2005b).

In the study area we recorded 7 epigeic terrestrial isopod species. Specific communities were usually formed by 1–6 of them with relatively low average

abundance. *Protracheoniscus politus* and *Porcellium collicola* may be classified as indicative species. The communities were influenced by age of a stand, soil type, content of Ca and pH of soil (Tuf, Tufová, 2005).

Of ten recorded pseudoscorpion species just *Neobisium muscorum* was recorded at all the study sites. Four communities being classified for the study area were not significantly impacted by 15 measured environmental variables. The highest stability refers to the assemblage in 80–100 year old oak-hornbeam forest stands, the lowest values hints at more arid and younger forest (60–80 years) with markedly reduced leaf horizon (Christophoryová, Krumpál, 2005).

One hundred and fifty-eight species and 24 families of spiders were recorded in the study area. Their communities in oak-hornbeam forests were considerably diverse with the indication species of *Trochosa terricola*, *Pardosa lugubris* and *Tenuiphantes menzei*. Of the measured environmental variables the undergrowth appears as the only factor significantly influencing the communities. The other variables seem to be with no important impact on taxocoenoses of spiders (Krumpálová, 2005).

The studied microhabitats were inhabited by 75 mesostigmatid mites. *Holoparasitus calcaratus*, *Veigaia nemorensis*, *Vulgarogamasus kraepelini* and *Zercon peltatus* var. *peltatus* were the eudominant species in forest soil. Temperature, air humidity, soil type, pH and vegetation may be classified as the most significant factors influencing structure and frequency in the communities of mites (Fend'a, Ciceková, 2005).

The centipede (Chilopoda) communities were formed by 10–17 species of the total richness of 24 species recorded in the study area. *Schendyla nemorensis* and *Lithobius muticus* belonged to the category of eudominant species at all the sites. The typical centipede community in the oak-hornbeam forests of the Malé Karpaty Mts consists of the following species: *Schendyla nemorensis*, *Strigamia acuminata*, *Lithobius agilis*, *L. borealis*, *L. lapidicola*, *L. mutabilis*, *L. muticus*, *L. austriacus*; in more southern drier parts of the Malé Karpaty Mts *Henia illyrica* as well. The highest diversity (17 species) refers to the 80–100 year old oak-hornbeam forest, the lowest one to the more arid and younger (60–80 years old) stand with minimal leaf litter. Most species occurred during the whole year, what was actually proved by additional samples from January 2000–2002 being excluded from the paper (Országh, Országhová, 2005).

Eighteen millipede species were recorded in the studied oak-hornbeam forests. Individual communities were formed by 8–14 species. *Cylindroiulus boleti*, *Strongylosoma stigmatosum* and *Ommatoiulus sabulosus* may be classified as indication species. The results of cluster analysis of the similarity of localities showed possible influence of the height of forest growth and also values of pH and sorption complex in leaf litter on the structure of the millipede communities. The tree height could have an indirect effect in the terms of higher litter production (bigger amount of suitable food source for saprophages) by taller trees (Stašiov, 2005).

Fourty-six species of Heteroptera were recorded in the oak-hornbeam forests. The communities at the study sites were formed by 21–28 species, including eudominant *Legnotus limbosus* and *Eurygaster maura*. The following species may be considered as the typical elements: *Drymus brunneus*, *D. ryeii*, *Scolopostethus affinis*, *S. thomsoni*, *Rhyparochromus alboacuminatus*, *Legnotus limbosus*. The geoxenous species such as *Aelia acuminata* or *Eurygaster maura* are common as well. The research has proved the

impact of canopy coverness (E_3) on structure of bug communities. *Tropistethus holosericeus*, *Legnotus limbosus*, *Plinthisus brevipennis*, *Raglius alboacuminatus*, *Trapezonotus arenarius* or *Microporus nigrinus* may be classified as more heliophilous species with preference to scarce cover. Moreover the nearby quarry is supposed to negatively influencing (air pollution) the community of epigeic Heteroptera in oak-hornbeam forests of the Malé Karpaty Mts (Hradil, 2005).

In epigeon of oak-hornbeam forests we recorded 78 species of weevils. Their communities were usually formed by 22–31 species. *Acalles fallax*, *Barypeithes mollicomus*, *Trachodes hispidus*, *Ceutorhynchus pallidactylus*, *C. obstrictus* and *Sitona macularius* may be classified as species with high value of dominance and frequency. Of 13 gradient and 2 categorial variables being analysed in the research there are just several: coverness of canopy and content of exchangeable bases (Ca^{2+} , Mg^{2+} , K^+ , Na^+) in soil with a significant impact on communities of weevils. Fragmentation of stands led to increase in abundance of herbicolous, euryhygric and ubiquitous species. The community at the site being influenced by calcareous dust from the nearby quarry may appear as unstable and quantitatively poor (Holecová et al., 2005).

Apart from the groups studied and mentioned above we include notes on thrip communities (Thysanoptera), which undisputedly form an important part of forest ecosystem and may indicate character and dynamics of ecological conditions. However the thrips being sampled from epigeon predominantly have arboricolous origin and many of them possess strong interactions with soil in some ontogenetical stage. The taxocoenoses consist of approximately 15 species and are significantly equitable in older, more stable forests. For instance in Cajla (site 1) *Hoplandrothrips williamsianus* P r i e s n e r, 1923 may be considered as an indication species of vital oak-hornbeam forests, followed by zoophagous *Aeolothrips versicolor* U z e l, 1895. In more opened forest stands with a real possibility for infiltration of thrips from the nearby ecosystems, such as Horný háj grove, the communities are enriched in several more heliophilous species such as *Limothrips denticornis* H a l i d a y, 1836 and *Frankliniella tenuicornis* (U z e l, 1895).

Of the studied Protozoa and Tardigrada there was only one group in decaying wood matter with affinity towards soil. The other communities possessed interactions to aquatic environment. The observed arthropods were more significantly interacted with soil. The communities were predominantly represented by epigeic species, partially by typical edaphic species. Of the 15 analysed variables just age of a stand, depth of leaf litter, coverness of herbage undergrowth, canopy architecture and sporadically pollution (dust from the quarry) appeared as significantly influencing the studied arthropod communities.

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Holecová M., Krumpál M., Országh I., Krumpálová Z., Stašiov S., Fedor P.: **Biodiverzita vybraných skupín bezstavovcov v ekosystéme dubovo-hrabového lesa v oblasti JZ Slovenska.**

Práca sumarizuje výsledky štvorročného cenologického výskumu mikro- a makrofauny lesného ekosystému dubovo-hrabového vegetačného stupňa v oblasti JZ Slovenska. Študované lesné porasty veku 40–100 rokov sa nachádzajú v orografických celkoch Malé Karpaty a Trnavská pahorkatina. Jedná sa o 3 typy dubovo-hrabových (*Carpinion betuli*), dubovo-cerových (*Quercion confertae-cerris*) a xerothermofilných dubových lesov (*Quercion pubescentis-petraeae*). Za celé obdobie výskumu bolo spolu determinovaných 39 987 exemplárov bezstavovcov (s výnimkou Protozoa). Zistili sme 575 živočíšnych druhov, patriacich do 4 kmeňov (Ciliophora, Rhizopoda, Tardigrada, Arthropoda). Celkove boli spracované synúzie 12 systematických skupín (nálevníky, nahé meňavky, pomalky, štúriky, pavúky, mesostigmátne roztoče, suchozemské rovnakonôžky, stonôžky, mnohonôžky, ucholaky, bzdochy, nosáčiky). Okrem lesného epigeónu, sme venovali pozornosť štúdiu ďalších mikrohabitátov, akými sú rozkladajúca sa drevná hmota, machy a dendrotelmy. Z mikrofauny javila afinitu k lesnej pôde iba skupina študovaná v odumretej drevnej hmote. Pre ostatné mikrohabitáty (dendrotelmy a machy) je charakteristický výskyt druhov viazaných tiež na vodné prostredie. U študovaných skupín Arthropoda je už väzba na pôdu oveľa výraznejšia. Prevládali epigeické druhy a len menej boli zastúpené typicky edafické druhy. Z 15 sledovaných environmentálnych premenných javili vplyv na niektoré spoločenstvá článkonožcov iba vek porastu, hrúbka vrstvy hrabanky, pokryvnosť bylinnej etáže a korunový zápoj, u niektorých skupín tiež znečistenie vápenatým prachom z lomu.

APPENDIX 1.

Review of taxa found in studied oak-hornbeam forest of SW Slovakia in 1999–2002

Phylum: RHIZOPODA

Class: LOBOSEA

Subclass: GYMNAMEBIA

Order: EUAMOEBIDA

Family: Amoebidae

Deuteroamoeba algonquinensis (Baldock, Rogerson et Berger, 1983)

Family: Hartmannellidae

Hartmannella cantabrigiensis Page, 1974

Hartmannella vermiformis Page, 1967

Saccamoeba limax (Dujardin, 1841)

Saccamoeba stagnicola Page, 1974

Family: Thecamoebidae

Dermamoeba granifera (Greeff, 1866) Page et Blakey, 1979

Dermamoeba minor (Pussard, Alabouvette et Pons, 1979)

Paradermamoeba levis Smirnov et Goodkov, 1994

Paradermamoeba valamo Smirnov et Goodkov, 1993

Sappinia diploidea (Hartmann et Nägler, 1908)

Thecamoeba quadrilineata (Carter, 1856)

Thecamoeba sphaeronucleolus (Greeff, 1891)

Thecamoeba striata (Penard, 1890)

Thecamoeba terricola (Greeff, 1866)

Family: Vannellidae

Platyamoeba stenopodia Page, 1969

Vannella sp.

Vannella lata Page, 1988

Vannella platypodia (Gläser, 1912)

Family: Paramoebidae

Korotnevella bulla (Schaeffer, 1926)

Korotnevella diskophora Smirnov, 1999

Korotnevella stella (Schaeffer, 1926)

Mayorella penardi Page, 1972

Mayorella vespertilioides Page, 1983

Order: LEPTOMYXIDA

Family: Flabellulidae

Flamella sp. 1

Flamella sp. 2

Family: Leptomyxidae

Leptomyxa reticulata Goodey, 1914

Rhizamoeba sp.

Unidentified leptomyxid amoeba

Class: ACANTHOPODIDA

Family: Acanthamoebidae

Acanthamoeba sp.1

Acanthamoeba sp.2

Acanthamoeba sp.3

INCERTAE SEDIS

Stygamoeba sp.

Phylum: CILIOPHORA

Class: HETEROTRICHEA

Order: HETEROTRICHIDA

Family: Blepharismidae

Blepharisma hyalinum Perty, 1849

Blepharisma sp.

Order: ARMOPHORIDA

Family: Metopidae

Metopus hasei Sondheim, 1929

Metopus minor Kahl, 1927

Class: SPIROTRICHEA

Subclass: OLIGOTRICHIA

Order: HALTERIIDA

Family: Halteriidae

Halteria grandinella (O. F. Mueller, 1773)

Subclass: HYPOTRICHIA

Order: EUPLLOTIDA

Family: Euplotidae

Euplotes affinis (Dujardin, 1841)

Euplotes muscicola Kahl, 1932

Order: UROSTYLIDA

Family: Urostylidae

Bakuella pampinaria Eigner et Foissner, 1992

Hemicycliostyla sphagni Stokes, 1886

Hemisincirra gellerti (Foissner, 1982)

Hemisincirra interrupta (Foissner, 1982)

Holosticha muscorum (Kahl, 1932)

Holosticha sp.

Holosticha tetracirrata Buitkamp et

Wilbert, 1974

Paraurostyla macrostoma Foissner, 1982

Order: SPORADOTRICHIDA

Family: Oxytrichidae

Cyrtohymena candens Kahl, 1932

Cyrtohymena muscorum (Kahl, 1932)

Cyrtohymena quadrinucleata (Dragesco et Njiné, 1971)

Gastrostyla steini Engelmann, 1862

Gonostomum affine (Stein, 1859)

Appendix 1. (Continued)

Gonostomum kuehnelti Foissner, 1987
Histiculus vorax (Stokes, 1891)
Oxytricha granulifera quadricirrata Blatterer et Foissner, 1988
Oxytricha setigera Stokes, 1891
Oxytricha similis Engelmann, 1862
Oxytricha sp.
Steinia platystoma (Ehrenberg, 1831)
Sterkiella histriomuscorum (Foissner, Blatterer, Berger et Kohmann, 1991)
Stylonychia pustulata (O. F. Mueller, 1786)
Tachysoma pellionellum (O. F. Mueller, 1773)
Urosomoida agiltformis Foissner, 1982
Class: PROSTOMATEA
Order: PRORODONTIDA
Family: Plagiocampidae
Plagiocampa metabolica (Kahl, 1926)
Family: Urotrichidae
Urotricha globosa Schewiakoff, 1892
Family: Colepidae
Coleps hirtus (O. F. Mueller, 1786)
Class: LITOSTOMATEA
Subclass: HAPTORIA
Order: HAPTORIDA
Family: Enchelyidae
Enchelys gasterosteus Kahl, 1926
Enchelys polynucleata (Foissner, 1984)
Family: Acropisthiidae
Acropisthium mutabile Perty, 1852
Family: Tracheliidae
Dileptus breviprobois Foissner, 1981
Order: SPATHIDIIDA
Family: Spathidiidae
Apospathidium atypicum (Buitkamp et Wilbert, 1974)
Arcuospathidium australe Foissner, 1988
Arcuospathidium japonicum Foissner, 1988
Epispathidium amphoriforme (Greeff, 1888)
Epispathidium sp.
Protospathidium vermiforme Foissner, Agatha et Berger, 2002
Spathidium bavariense Kahl, 1930
Spathidium muscicola Kahl, 1930
Spathidium spathula (Müller, 1773)
Spathidium turgitorum Foissner, Agatha et Berger, 2002
Order: PSEDOHOLOPHRYIDA
Family: Pseudoholophryidae
Pseudoholophrya terricola Berger, Foissner et Adam, 1984

Order: PLEUROSTOMATIDA
Family: Litonotidae
Acineria uncinata Tucolesco, 1962
Litonotus muscorum (Kahl, 1931)
Class: PHYLLOPHARYNGEA
Subclass: PHYLLOPHARYNGIA
Order: CHLAMYDODONTIDA
Family: Chilodonellidae
Chilodonella uncinata (Ehrenberg, 1838)
Odontochlamys gouraudi Certes, 1891
Pseudochilodonopsis mutabilis Foissner, 1981
Pseudochilodonopsis sp.
Subclass: SUCTORIA
Order: EXOGENIDA
Family: Podophryidae
Sphaerophrya terricola Foissner, 1986
Class: NASSOPHOREA
Order: SYNHYMENIIDA
Family: Scaphiodontidae
Chilodontopsis muscorum Kahl, 1931
Order: MICROTHORACIDA
Family: Microthoracidae
Drepanomonas dentate Fresenius, 1858
Drepanomonas exigua Penard, 1922
Drepanomonas obtusa Penard, 1922
Drepanomonas pauciciliata Foissner, 1987
Drepanomonas revoluta Penard, 1922
Drepanomonas sphagni Kahl, 1931
Leptopharynx costatus Mermod, 1914
Leptopharynx eurystomus (Kahl, 1931)
Family: Pseudomicrothoracidae
Pseudomicrothorax agilis Mermod, 1914
Class: OLIGOHYMENOPHOREA
Subclass: PENICULIA
Order: PENICULIDA
Family: Frontoniidae
Frontonia angusta Kahl, 1931
Frontonia depressa (Stokes, 1886)
Frontonia leucas (Ehrenberg, 1833)
Family: Parameciidae
Paramecium caudatum Ehrenberg, 1833
Subclass: SCUTICOLITIA
Order: PHILASTERIDA
Family: Philasteridae
Philasterides armatus (Kahl, 1926)
Family: Cinetochilidae
Cinetochilum margaritaceum (Ehrenberg, 1831)
Sathrophilus mobilis (Kahl, 1926)
Sathrophilus muscorum (Kahl, 1931)
Family: Cohnilembidae
Kahlilembus attenuatus (Smith, 1897)

Appendix 1. (Continued)

Family: Pseudocohnilembidae

Pseudocohnilembus pusillus (Quennerstedt, 1869)

Family: Uronematidae

Homalogastra setosa Kahl, 1926

Order: PLEURONEMATIDA

Family: Cyclidiidae

Cyclidium elongatum (Schewiakoff, 1889)

Cyclidium glaucoma O. F. Mueller, 1773

Cyclidium muscicola Kahl, 1931

Subclass: HYMENOSTOMATIA

Order: HYMENOSTOMATIDA

Family: Glaucomidae

Glaucoma scintillans Ehrenberg, 1830

Pseudoglaucoma muscorum Kahl, 1931

Family: Ophryoglenidae

Ophryoglena flava Ehrenberg, 1833

Ophryoglena oblonga Gajevskaja, 1927

Ophryoglena sp.

Family: Tetrahymenidae

Tetrahymena edaphoni Foissner, 1986

Tetrahymena pyriformis complex

Tetrahymena rostrata (Kahl, 1926)

Family: Turaniellidae

Colpidium colpoda (Losana, 1829)

Dexiostoma campylum (Stokes, 1886)

INCERTAE SEDIS

Dexiotrichides centralis (Stokes, 1885)

Hexotricha caudata Lackey, 1925

Pithothorax processus Kahl, 1926

Subclass: PERITRICHEA

Order: SESSILIDA

Family: Opisthonectidae

Opisthonecta henneguyi Faure-Fremiet, 1906

Telotrochidium cylindricum Foissner, 1978

Telotrochidium sp.

Family: Operculariidae

Opercularia arboricolum (Biegel, 1954)

Propyxidium spp.

Family: Scyphidiidae

Scyphidia spp.

Family: Epistylidae

Epistylis entzii Stiller, 1935

Epistylis sp.

Rhabdostyla pyriformis Perty, 1852

Family: Vorticellidae

Vorticella aquadulcis complex

Vorticella astyliformis Foissner, 1981

Vorticella infusionum Dujardin, 1841

Vorticella microstoma Ehrenberg, 1830

Vorticella spp.

Peritrichia gen. sp.

Class: COLPODEA

Order: COLPODIDA

Family: Colpodidae

Bresslausa vorax Kahl, 1931

Colpoda aspera Kahl, 1926

Colpoda cavicola Kahl, 1935

Colpoda cucullus (O. F. Mueller, 1773)

Colpoda edaphoni Foissner, 1980

Colpoda henneguyi Fabre-Domergue, 1889

Colpoda inflata (Stokes, 1884)

Colpoda lucida Greeff, 1888

Colpoda maupasi Enriquez, 1908

Colpoda reniformis Kahl, 1931

Colpoda steinii Maupas, 1883

Family: Hausmanniellidae

Anictostoma terricola Foissner, 1993

Hausmanniella patella (Kahl, 1931)

Family: Maryniidae

Ilisiella elegans Foissner, Agatha et

Berger, 2002

Order: CYRTOLOPHOSIDIDA

Family: Cyrtolophidae

Cyrtolophosis acuta Kahl, 1926

Cyrtolophosis elongata (Schewiakoff, 1892)

Cyrtolophosis mucicola Stokes, 1885

Plesiocaryon elongatum (Schewiakoff, 1892)

Family: Platyophryidae

Platyophrya macrostoma Foissner, 1980

Platyophrya spumacola Kahl, 1927

Platyophrya vorax Kahl, 1926

Phylum: TARDIGRADA

Class: EUTARDIGRADA

Family: Hysibiidae

Hysibius convergens (Urbanowicz, 1925)

Hysibius dujardini (Doyere, 1840)

Hysibius cf. *morikawai* Ito, 1995

Hysibius pallidus Thulin, 1911

Isohysibius lunulatus (Iharos, 1966)

Isohysibius prosostomus Thulin, 1928

Diphascon (*D.*) *brevipes* (Marcus, 1936)

Diphascon (*D.*) *pingue* (Marcus, 1936)

Diphascon (*A.*) *belgicae* Richters, 1911

Diphascon (*A.*) *prorsirostre* Thulin, 1928

Diphascon (*A.*) *scoticum* Murray, 1905

Astatumen bartosi (Weglarska, 1959)

Astatumen trinacriae (Arcidiacono, 1962)

Family: Macrobiotidae

Macrobiotus cf. *harmsworthi* Murray, 1907

Macrobiotus hufelandi C.A.S. Schultze, 1834

Macrobiotus pallarii Maucci, 1954

Macrobiotus cf. *seychellensis* Biserov, 1994

Appendix 1. (Continued)

Macrobotus cf. *vanescens* Pilato et al., 1991
Macrobotus sp. 1
Minibiotus intermedius (Plate, 1889)
Minibiotus sp. 1

Phylum: ARTHROPODA

Subphylum: CHELICERATA

Order: PSEUDOSCORPIONES

Family: Chthoniidae

Chthonius (*Ephippiochthonius*) *boldorii* Beier, 1934

Chthonius (*Ephippiochthonius*) *fuscimanus* Simon, 1900

Chthonius (*Ephippiochthonius*) sp. 1

Chthonius (*Ephippiochthonius*) sp. 2

Family: Neobisiidae

Neobisium (*Neobisium*) *erythroductylum* (C. L. Koch, 1873)

Neobisium (*Neobisium*) *muscorum* (Leach, 1817)

Roncus lubricus C. L. Koch, 1873

Family: Chernetidae

Chernes similis C. L. Koch, 1873

Pselaphochernes scorpioides (Hermann, 1804)

Chernetidae gen. sp.

Order: ARANEAE

Family: Atypiidae

Atypus piceus (Schulze, 1776)

Family: Segestriidae

Segestria senoculata (Linnaeus, 1758)

Family: Dysderidae

Dysdera erythrina (Walckenaer, 1802)

Harpactea rubicunda (C. L. Koch, 1838)

Family: Mimetidae

Ero furcata (Villers, 1789)

Family: Theridiidae

Enoplognatha oelandica (Thorell, 1875)

Enoplognatha ovata (Clerck, 1757)

Enoplognatha thoracica (Hahn, 1833)

Enoplognatha sp.

Episinus angulatus (Blackwall, 1836)

Euryopis flavomaculata (C. L. Koch, 1836)

Robertus lividus (Blackwall, 1836)

Robertus sp.

Steatoda albomaculata (De Geer, 1778)

Steatoda bipunctata (Linnaeus, 1758)

Steatoda phalerata (Panzer, 1801)

Steatoda sp.

Theridion tinctum (Walckenaer, 1802)

Family: Linyphiidae

Abacoproeces saltuum (L. Koch, 1872)

Anguliphantes angulipalpis (Westring, 1851)

Asthenargus paganus (Simon, 1884)

Bathyphantes nigrinus (Westring, 1851)

Centromerus arcanus (O. P. Cambridge, 1873)

Centromerus brevivulvatus Dahl, 1912

Centromerus incilium (L. Koch, 1881)

Centromerus sellarius (Simon, 1884)

Centromerus sylvaticus (Blackwall, 1841)

Centromerus sp.

Ceratinella brevis (Wider, 1834)

Ceratinella major Kulczyński, 1894

Ceratinella scabrosa (O. P. Cambridge, 1871)

Diplocephalus latifrons (O. P. Cambridge, 1863)

Diplocephalus picinus (Blackwall, 1841)

Diplostyla concolor (Wider, 1834)

Drapetisca socialis (Sundevall, 1833)

Moebelia penicillata (Westring, 1851)

Lasiargus hirsutus (Menge, 1869)

Lepthyphantes minutus (Blackwall, 1833)

Linyphia hortensis Sundevall, 1830

Linyphia triangularis (Clerck, 1757)

Linyphia sp.

Macrargus rufus (Wider, 1834)

Megalepthyphantes collinus (L. Koch, 1872)

Meioneta affinis (Kulczyński, 1898)

Micrargus herbigradus (Blackwall, 1854)

Micrargus sp.

Microlinyphia pussila (Sundevall, 1830)

Microneta varia (Blackwall, 1841)

Minicia marginella (Wider, 1834)

Neriere clatrata (Sundevall, 1830)

Oedothis retusus (Westring, 1851)

Palliduphantes alutacius (Simon, 1884)

Palliduphantes pallidus (O. P. Cambridge, 1871)

Panamomops fagei Miller et Kratochvíl, 1939

Pocadicnemis juncea Locket et Millidge, 1953

Pocadicnemis pumila (Blackwall, 1841)

Sintula corniger (Blackwall, 1856)

Tapinocyba biscissa (O. P. Cambridge, 1872)

Tapinocyba insecta (L. Koch, 1869)

Tenuiphantes mengei (Kulczyński, 1887)

Tenuiphantes tenbricola (Wider, 1834)

Tenuiphantes flavipes (Blackwall, 1854)

Tenuiphantes tenuis (Blackwall, 1852)

Tenuiphantes zimmermani (Bertkau, 1890)

Tenuiphantes sp.

Tapinopa longidens (Wider, 1834)

Thyreostenius biovatus (O. P. Cambridge, 1875)

Trichoncus affinis Kulczyński, 1894

Walckenaeria antica (Wider, 1834)

Appendix 1. (Continued)

Walckenaeria atrotibialis (O. P. Cambridge, 1878)

Walckenaeria corniculans (O. P. Cambridge, 1875)

Walckenaeria cucullata (C. L. Koch, 1836)

Walckenaeria cuspidata Blackwall, 1833

Walckenaeria dysderoides (Wider, 1834)

Walckenaeria furcillata (Menge, 1869)

Walckenaeria incisa (O. P. Cambridge, 1871)

Walckenaeria mitrata (Menge, 1868)

Walckenaeria monoceros (Wider, 1834)

Walckenaeria nudipalpis (Westring, 1851)

Walckenaeria obtusa Blackwall, 1836

Walckenaeria vigilax (Blackwall, 1853)

Walckenaeria sp.

Family: Tetragnathidae

Pachygnatha degeeri Sundevall, 1830

Pachygnatha listeri Sundevall, 1830

Family: Araneidae

Araneus diadematus Clerck, 1757

Araneus quadratus Clerck, 1757

Araneus sp.

Cercidia prominens (Westring, 1851)

Family: Lycosidae

Alopecosa aculeata (Clerck, 1757)

Alopecosa pulverulenta (Clerck, 1757)

Arctosa lutetiana (Simon, 1876)

Pardosa agrestis (Westring, 1861)

Pardosa amentata (Clerck, 1757)

Pardosa hortensis (Thorell, 1872)

Pardosa lugubris (Walckenaer, 1802)

Pardosa monticola (Clerck, 1757)

Pardosa sp.

Trochosa ruricola (De Geer, 1778)

Trochosa terricola Thorell, 1856

Trochosa sp.

Family: Pisauridae

Pisaura mirabilis (Clerck, 1757)

Family: Zoridae

Zora nemoralis (Blackwall, 1861)

Zora silvestris Kulczyński, 1897

Zora spinimana (Sundevall, 1833)

Family: Agelenidae

Agelena gracilens C. L. Koch, 1841

Agelena sp.

Histoipona torpida (C. L. Koch, 1837)

Tegenaria campestris C. L. Koch, 1834

Tegenaria ferruginea (Panzner, 1804)

Tegenaria silvestris L. Koch, 1872

Tegenaria sp.

Textrix denticulata (Olivier, 1789)

Family: Cybaeidae

Cybaeus angustiarum L. Koch, 1868

Family: Hahnidae

Hahnia helveola Simon, 1875

Hahnia ononidum Simon, 1875

Family: Dictynidae

Cicurina cicur (Fabricius, 1793)

Dictyna uncinata Thorell, 1856

Family: Amaurobiidae

Coelotes inermis (L. Koch, 1855)

Coelotes terrestris (Wider, 1834)

Coelotes sp.

Family: Liocranidae

Agroeca brunnea (Blackwall, 1833)

Apostenus fuscus Westring, 1851

Scotina celans (Blackwall, 1841)

Family: Corinnidae

Cetona laticeps (Canestrini, 1868)

Phrurolithus festivus (C. L. Koch, 1835)

Family: Zodariidae

Zodarion germanicum (C. L. Koch, 1837)

Family: Clubionidae

Clubiona caerulescens L. Koch, 1867

Clubiona corticalis (Walckenaer, 1802)

Clubiona comta C. L. Koch, 1839

Clubiona terrestris Westring, 1851

Clubiona sp.

Family: Gnaphosidae

Drassyllus praeficus (L. Koch, 1866)

Drassyllus villicus (Thorell, 1875)

Haplodrassus silvestris (Blackwall, 1833)

Micaria dives (Lucas, 1846)

Trachyzelotes pedestris (C. L. Koch, 1837)

Zelotes apricorum (L. Koch, 1876)

Zelotes aurantiacus Miller, 1967

Zelotes erebeus (Thorell, 1871)

Zelotes subterraneus (C. L. Koch, 1833)

Zelotes sp.

Family: Philodromidae

Philodromus dispar Walckenaer, 1826

Philodromus sp.

Thanatus formicinus (Clerck, 1757)

Family: Thomisidae

Diaea dorsata (Fabricius, 1777)

Ozyptila praticola (C. L. Koch, 1837)

Ozyptila simplex (O. P. Cambridge, 1862)

Xysticus cristatus (Clerck, 1757)

Xysticus lanio C. L. Koch, 1835

Xysticus luctator C. L. Koch, 1870

Xysticus sp.

Family: Salticidae

Ballus chalybeius (Walckenaer, 1802)

Appendix 1. (Continued)

Carrhotus xanthogramma (Latreille, 1819)
Euophrys frontalis (Walckenaer, 1802)
Euophrys sp.
Evarcha falcata (Clerck, 1757)
Marpisa sp.
Neon reticulatus (Blackwall, 1853)
Order: ACARINA
Family: Celaenopsidae
Celaenopsis badius (C. L. Koch, 1841)
Family: Ascidae
Aceoseius muricatus (C. L. Koch, 1839)
Arctoseius eremitus (Berlese, 1918)
Arctoseius venustus (Berlese, 1916)
Leiioseius bicolor (Berlese, 1918)
Leiioseius minusculus (Berlese, 1905)
Zerconopsis remiger (Kramer, 1876)
Family: Eviphididae
Eviphis ostrinus (C. L. Koch, 1836)
Family: Laelapidae
Eulaelaps stabularis (C. L. Koch, 1836)
Haemogamasus nidi Michael, 1892
Hypoaspis aculeifer G. Canestrini, 1884
Hypoaspis brevipilis Hirschmann, 1969
Hypoaspis imitata Reitblat, 1963
Hypoaspis oblonga (Halbert, 1915)
Hypoaspis praesternalis Willmann, 1949
Hypoaspis vacua (Michael, 1891)
Hypoaspis spp.
Family: Macrochelidae
Geholaspis longispinus (Kramer, 1876)
Geholaspis mandibularis (Berlese, 1904)
Macrocheles glaber (J. Müller, 1859)
Macrocheles montanus Willmann, 1951
Family: Macronyssidae
Ornithonyssus sylviarum (Canestrini et Fanzago, 1877)
Family: Pachylaelapidae
Olopachys suecicus Sellnick, 1950
Pachylaelaps magnus (Halbert, 1915)
Pachylaelaps resinae Karg, 1971
Pachylaelaps spp.
Pachyseius humeralis Berlese, 1910
Family: Parasitidae
Amblygamasus sp.
Eugamasus monticolus Berlese, 1905
Holoparasitus calcaratus (C. L. Koch, 1839)
Holoparasitus sp.
Leptogamasus succineus Witaliński, 1973
Leptogamasus spp.
Parasitus fimetorum (Berlese, 1903)
Pergamasus barbarus Berlese, 1904
Pergamasus brevicornis (Berlese, 1903)
Pergamasus canestrinii (Berlese, 1884)

Pergamasus crassipes (Linnaeus, 1758) sensu Berlese, 1906
Pergamasus mediocris (Berlese, 1904)
Pergamasus ruhmi Willmann, 1938
Poecilochirus carabi G. et R. Canestrini, 1882
Porrhostaspis lunulata J. Müller, 1869
Vulgarogamasus kraepelini (Berlese, 1904)
Vulgarogamasus remberti (Oudemans, 1912)
Family: Rhodacaridae
Cyrtolaelaps chiropterae Karg, 1971
Cyrtolaelaps mucronatus (G. et R. Canestrini, 1881)
Rhodacarus spp.
Sessiluncus hungaricus Karg, 1964
Stylochirus fimetarius (J. Müller, 1859) sensu Mašán et Kalúz, 2001
Family: Veigaiidae
Veigaia cerva (Kramer, 1876)
Veigaia exigua (Berlese, 1917)
Veigaia kochi (Trägårdh, 1901)
Veigaia nemorensis (C. L. Koch, 1839)
Veigaia transisalae (Oudemans, 1902)
Family: Zerconidae
Prozercon carpathofimbriatus Mašán et Fend'a, 2004
Prozercon tragardhi (Halbert, 1923)
Zercon curiosus Trägårdh, 1910
Zercon hungaricus Sellnick, 1958
Zercon peltatus var. *peltatus* C. L. Koch, 1836
Zercon vacuus C. L. Koch, 1839
Family: Sejidae
Sejus togatus C. L. Koch, 1836
Family: Uropodellidae
Asternolaelaps sp.
Family: Polyaspididae
Polyaspinus schweizeri (Huťu, 1976)
Polyaspis patavinus Berlese, 1881
Family: Trachytidae
Trachytes aegrota (C. L. Koch, 1841)
Trachytes baloghi Hirschmann et Zirngiebl-Nicol, 1969
Family: Trematuridae
Trichouropoda elegans (Kramer, 1882)
Trichouropoda karawaiewi (Berlese, 1904)
Trichouropoda obscurasimilis Hirschmann et Zirngiebl-Nicol, 1961
Trichouropoda orbicularis (C. L. Koch, 1839)
Trichouropoda ovalis (C. L. Koch, 1839)
Trichouropoda penicillata Hirschmann et Zirngiebl-Nicol, 1961
Family: Urodinychidae
Dinychus bincheaearinatus Hirschmann,

Appendix 1. (Continued)

Wagrowska–Adamczyk et
Zirngiebl–Nicol, 1984
Dinychus perforatus Kramer, 1886
Urodiaspis tecta (Kramer, 1876)
Uroobovella pulchella (Berlese, 1904)
Family: Uropodidae
Uropoda misella (Berlese, 1916)
Uropoda orbicularis (O. F. Müller, 1776)
Uropoda splendida Kramer, 1882
Subphylum: BRANCHIATA
Order: ISOPODA
Suborder: Oniscidea
Family: Ligiidae
Ligidium hypnorum (Cuvier, 1792)
Family: Trichoniscidae
Hyloniscus riparius (C. L. Koch, 1838)
Family: Philosciidae
Lepidoniscus minutus (C. L. Koch, 1838)
Family: Agnaridae
Orthometopon planum (Buddé–Lund, 1885)
Protracheoniscus politus (C. L. Koch, 1841)
Family: Trachelipodidae
Trachelipus ratzeburgii (Brandt, 1833)
Porcellium collicola (Verhoeff, 1907)
Subphylum: MYRIAPODA
Class: CHILOPODA
Order: SCOLOPENDROMORPHA
Family: Cryptopidae
Cryptops anomalans Newport, 1844
Order: GEOPHILOMORPHA
Family: Dignathodontidae
Henia illyrica (Meinert, 1870)
Family: Geophilidae
Clinopodes flavidus C. L. Koch, 1847
Geophilus flavus (De Geer, 1778)
Family: Linotaeniidae
Strigamia acuminata (Leach, 1814)
Strigamia transsilvanica (Verhoeff, 1928)
Family: Schendylidae
Schendyla nemorensis (C. L. Koch, 1836)
Order: LITHOBIOMORPHA
Family: Lithobiidae
Lithobius agilis C. L. Koch, 1847
Lithobius borealis Meinert, 1868
Lithobius dentatus C. L. Koch, 1844
Lithobius erythrocephalus C. L. Koch, 1847
Lithobius forficatus (Linnaeus, 1758)
Lithobius lapidicola Meinert, 1872
Lithobius latro Meinert, 1872
Lithobius lucifugus L. Koch, 1862
Lithobius melanops Newport, 1845
Lithobius mutabilis L. Koch, 1862

Lithobius muticus C. L. Koch, 1847
Lithobius pelidnus Haase, 1880
Lithobius piceus L. Koch, 1862
Lithobius aeruginosus L. Koch, 1862
Lithobius austriacus (Verhoeff, 1937)
Lithobius crassipes L. Koch, 1862
Lithobius microps Meinert, 1868
Class: DIPLOPODA
Order: GLOMERIDA
Family: Glomeridae
Glomeris connexa C. L. Koch, 1847
Glomeris hexasticha Brandt, 1833
Family: Trachysphaeridae
Trachysphaera costata (Waga, 1857)
Order: POLYZONIIDA
Family: 48)zoniidae
Polyzonium germanicum Brandt, 1837
Order: JULIDA
Family: Julidae
Cylindroiulus boleti (C. L. Koch, 1847)
Enantiulus nanus (Latzel, 1884)
Julus curvicornis Verhoeff, 1899
Kryphiouulus occultus (C. L. Koch, 1847)
Leptoiulus proximus (Nemeč, 1896)
Megaphyllum projectum (Verhoeff, 1894)
Megaphyllum unilineatum (C. L. Koch, 1838)
Ommatoiulus sabulosus (Linnaeus, 1758)
Unciger foetidus (C. L. Koch, 1838)
Unciger transsilvanicus (Verhoeff, 1899)
Order: CHORDEUMATIDA
Family: Mastigophorophyllidae
Haploporatia eremita (Verhoeff, 1909)
Family: Craspedosomatidae
Craspedosoma rawlinsii Leach, 1815
Order: POLYDESMIDA
Family: Paradoxosomatidae
Strongylosoma stigmatosum (Eichwald, 1830)
Family: Polydesmidae
Polydesmus complanatus (Linnaeus, 1761)
Subphylum: HEXAPODA
Class: INSECTA
Order: DERMAPTERA
Family: Forficulidae
Chelidurella acanthopygia (Géné, 1832)
Order: HEMIPTERA
Suborder: HETEROPTERA
Family: Tingidae
Acalypta musci (Schränk, 1871)
Acalypta spp. nymphae
Campylosteira verna (Fallén, 1826)
Family: Microphysidae
Loricula exilis (Fallén, 1807)

Appendix 1. (Continued)

Family: Miridae

Lygus rugulipennis Poppius, 1911
Deraeocoris lutescens (Schilling, 1837)

Family: Nabidae

Nabis b. brevis Scholz, 1847
Nabis p. pseudoferus Remane, 1949
Nabis rugosus (Linnaeus, 1758)

Family: Anthocoridae

Orius sp.

Family: Aradidae

Aneurus l. laevis (Fabricius, 1775)

Family: Oxyarenidae

Metopoplax origani (Kolnati, 1845)

Family: Rhyparochromidae

Drymus b. brunneus (R. F. Sahlberg, 1848)
Drymus sylvaticus (Fabricius, 1775)
Emblethis verbasci (Fabricius, 1803)
Eremocoris plebejus (Fallén, 1807)
Eremocoris podagricus (Fabricius, 1775)
Megalonotus chiragra (Fabricius, 1794)
Megalonotus sabulicola (Thomson, 1870)
Peritrechus gracilicornis Puton, 1877
Peritrechus nubilus (Fallén, 1807)
Plinthisus brevipennis (Latreille, 1807)
Raglius alboacuminatus (Goeze, 1778)
Taphropeltus hamulatus (Thomson, 1870)
Trapezonotus a. arenarius (Linnaeus, 1758)
Tropistethus holosericus (Scholz, 1846)
Tropistethus sp.

Family: Piesmatidae

Piesma capitatum (Wolff, 1804)
Piesma maculatum (Laporte, 1833)

Family: Pyrrhocoridae

Pyrrhocoris apterus (Linnaeus, 1758)

Family: Coreidae

Ceraleptus gracilicornis (Herrich-Schaeffer, 1835)

Family: Rhopalidae

Rhopalus parumpunctatus (Schilling, 1829)

Family: Cydnidae

Legnotus limbosus (Geoffroy, 1785)
Microporus nigrinus (Fabricius, 1794)
Tritomegas bicolor (Linnaeus, 1758)
Tritomegas sexmaculatus (Rambur, 1839)

Order: COLEOPTERA

Suprafamily: CURCULIONOIDEA

Family: Anthribidae

Anthribus albinus (Linnaeus, 1758)

Family: Apionidae

Catapion seniculus (Kirby, 1808)
Ceratopion gibbirostre (Gyllenhal, 1813)
Cyanapion columbinum (Germar, 1817)

Diplapion confluens (Kirby, 1808)

Eutrichapion punctigerum (Paykull, 1792)

Holotrichapion aestimatum (Faust, 1890)

Holotrichapion pisi (Fabricius, 1801)

Ischnopterapion virens (Herbst, 1797)

Kalcapion pallipes (Kirby, 1808)

Omphalapion hookerorum (Kirby, 1808)

Protapion apricans (Herbst, 1797)

Protapion fulvipes (Geoffroy, 1785)

Protapion trifolii (Linnaeus, 1768)

Protapion nigrirtarse (Kirby, 1898)

Pseudapion rufirostre (Fabricius, 1775)

Synapion ebeninum (Kirby, 1808)

Trichopterapion holosericeum (Gyllenhal, 1833)

Family: Erirhinidae

Tanysphyrus lemnae (Paykull, 1792)

Family: Curculionidae

Acalles camelus (Fabricius, 1782)

Acalles fallax Boheman 1844

Acalles echinatus (Germar, 1824)

Acallobrates colonnellii (Bahr, 2003)

Barypeithes albinae Formanek, 1903

Barypeithes chevrolati (Boheman, 1843)

Barypeithes mollicomus (Ahrens, 1812)

Bradybatus creutzeri Germar, 1824

Bradybatus fallax Gerstaecker, 1860

Bradybatus kellneri Bach, 1854

Brachysomus echinatus (Bonsdorff, 1785)

Brachysomus dispar Penecke, 1910

Brachysomus hirtus (Boheman, 1845)

Brachysomus setiger (Gyllenhal, 1840)

Calosirus apicalis (Gyllenhal, 1727)

Ceutorhynchus alliariae Ch. Brisout, 1860

Ceutorhynchus chalibeus Germar, 1824

Ceutorhynchus erysimi (Fabricius, 1787)

Ceutorhynchus minutus (Reich, 1797)

Ceutorhynchus obstructus (Marsham, 1802)

Ceutorhynchus pallidactylus (Marsham, 1802)

Ceutorhynchus rhenanus Schultze, 1895

Ceutorhynchus scrobicollis Neresheimer et

Wagner, 1924

Ceutorhynchus typhae (Herbst, 1795)

Coeliodes proximus Schultze, 1895

Coeliodes rana (Fabricius, 1787)

Coeliodes transverseoalbofasciatus Goeze, 1777

Coeliodes trifasciatus Bach, 1854

Curculio glandium (Marsham, 1802)

Curculio pellitus (Boheman, 1843)

Curculio venosus (Gravenhorst, 1807)

Furcipes rectirostris (Linnaeus, 1758)

Hypera nigrirostris (Fabricius, 1775)

Appendix 1. (Continued)

Hypera postica (Gyllenhal, 1813)
Kykliaocalles suturatus (Dieckmann, 1983)
Leiosoma cribrum (Gyllenhal, 1834)
Microplontus campestris (Gyllenhal, 1837)
Nedyus quadrimaculatus (Linnaeus, 1758)
Ophrohinus suturalis (Fabricius, 1775)
Otiorhynchus ovatus (Linnaeus, 1758)
Otiorhynchus raucus (Fabricius, 1777)
Phyllobius argentatus (Linnaeus, 1758)
Phyllobius maculicornis Germar, 1824
Polydrusus marginatus Stephens, 1831
Polydrusus viridicinctus Gyllenhal, 1834
Rhinoncusbruchoides (Herbst, 1784)

Rhinoncus perpendicularis (Reich, 1797)
Rhynchaenus pilosus (Fabricius, 1781)
Ruteria hypocrita (Boheman, 1837)
Sciaphilus asperatus (Bonsdorff, 1785)
Simo variegatus (Boheman, 1843)
Sitona humeralis Stephens, 1831
Sitona lineatus (Linnaeus, 1758)
Sitona macularius (Marsham, 1802)
Stenocarus cardui (Herbst, 1784)
Strophosoma melanogrammum (Forster, 1771)
Trachodes hispidus (Linnaeus, 1758)
Trachyphloeus bifoveolatus (Beck, 1817)
Tychius picirostris (Fabricius, 1787)