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Estonian Caddisflies (Insecta: Trichoptera). An annotated checklist

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A checklist of 190 species of Estonian caddisflies is compiled based on literature and voucher material in collections at Estonian University of Life Sciences. 31 species are listed first time for the country while 159 taxa were referred to in literature. Two taxa are rejected as possible misidentifications (*Diplectrona felix* and *Molanna submarginalis*). 25 species are listed in Estonian Red Data book. Geographical distribution of Trichoptera both in Estonia and along the east shore of Baltic Sea is reviewed in brief.

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1. Introduction

Trichoptera are amphibiotic species, mostly studied on the basis of larvae (Haberman 1931, Spuris 1965) and preserved in liquid. In other cases, adults have been collected and treated parallel to most other insects, i.e. mounted on pins, spread like butterflies and moths, and organized into collection drawers (Lackschewitz 1922).

The first major contribution to the knowledge of Estonian caddisflies was due to Paul Lackschewitz (1922, supplement 1928) who collected caddis himself and revised data which were fragmentarily published by earlier investigators (Mühlen 1880, Samsonov 1906, Schneider 1908, Mühlen 1910, Mühlen & Schneider 1920, Ulmer 1926). P. Lackschewitz (1922, 1928) summarized 172 species-level taxa for Estonia and northern Latvia ("Estland and Livland", according to the political geography of XIX century), 119 out of them were associated with localities of the Estonian territory of today. However, since the thirties of the XX century, the majority of faunistic information on Estonian caddisflies have accumulated by hydrobiological studies (Haberman 1931, 1932, 1934a,b,c, 1936a,b, 1937a,b, 1938a,b, Tõlp 1956, 1966, Ristkok & Ruse 1962, Kachalova 1980, Timm 1990, Timm *et al*. 2001, Kangur *et al.* 2009). Haberman added twelve species to the Estonian checklist. Other records have been provided through master theses on Trichoptera by students of Tartu University tutored by prof. H. Riikoja and H. Haberman. Finally, when adding a short communication by prof. H. Remm (1987) and contributions by Latvian specialists O. Kachalova (1980) and Z. Spuris (1965, 1969, 1971), all the printed information about this order of insects in Estonia is hereby provided. In addition,

Finnish trichopterists have intensively studied Estonian fauna during recent years and have contributed a lot of new data and a series of species not recorded here earlier.

2. Material and methods

The first author of the present communication collected Trichoptera along with Lepidoptera during the years 1983–1990, mainly using light trapping with various light sources. The material (including ten species not found earlier) is deposited in the IZBE collection (acronym of the collection at the Institute of Zoology and Botany of the Estonian Academy of Sciences, now housed in the Estonian University of Life Sciences). Collections identified by Lackschewitz (in IZBE) and Spuris (in Tartu University) served as a reference to later studies besides available literature sources from Ulmer (1909) and Lepneva (1966) to Malicky (1983). Further investigations and sporadic collectings by A. Selin, M. Kruus, T. Tammaru, U. Jürivete and M. Talve have yielded further species to the list.

In addition, caddisflies have appeared to be very numerous in the material yielded by light traps of different moth monitoring systems in Estonia (e.g. Spuris 1969). A part of this material is deposited in the IZBE collection and waits to be studied. The data are mapped to clear out the peculiarities of species' geographical distribution in the area and compared to lists of neighboring faunas of Lithuania, Latvia and Finland. Finally, the Centre for Limnology of the Estonian University of Life Sciences has carried out studies of the benthic macroinvertebrate fauna of Estonian lakes and streams. This material, which includes Trichoptera, is deposited in the Centre for Limnology. Last but not least, J. Ilmonen, W. Mahler, V. Mardi, P. Wiberg-Larsen and J. Salokannel have made contributions to the Estonian fauna and generously allowed to use their faunistic data, adding new taxa to the checklist and revising some difficult groups of species.

The presented first checklist of Estonian Trichoptera (Table 1) is provided by a review of all available data. The nomenclature and taxonomy is in conformity with Malicky's (2005) European checklist, which is also referred to concerning synonymies used by older authors up to 1980. Inland distribution of species is given in brief. New faunistical data not published earlier are annotated below.

The list may serve as a template for future faunistic studies. Such studies are especially interesting as Estonia is located in a transitional zone between the European nemoral and the Siberian boreal fauna. Further, such study is relevant due to the expected global climate change.

3. Check-list of Estonian caddisflies (Trichoptera)

Table 1.

3.1. Rejected species

Diplectrona felix McLachlan, 1878. Supposed record from the Emajõgi: Kirt, 1949 (unpubl.); Vaganay, 1955 (unpubl.). The single reference about *D. felix* in Estonia is in a student's diploma project, most probably it is a misidentification.

Molanna submarginalis Mclachlan, 1872. Lackschewitz (1922) doubted the correctness of Mühlen's data from Võrtsjärv and Peipsi. As far as no more records are known from the XX century, *M. submarginalis* is excluded from the Estonian list.

3.2. Comments on selected species of Estonian Trichoptera

Enumeration below refers to that in Table 1.

1. *Rhyacophila obliterata* McLachlan, 1863. Recorded east of Aegviidu-Viljandi line; few records of larvae in springs and small clean streams, on stony bottom. An Estonian Red Data List species.

2. *Glossosoma boltoni* Curtis, 1834. Collected as larvae in the Pärlijõgi (Põlvamaa) 12.VIII.2003 (V. Mahler leg., P. Wiberg-Larsen det.).

3. *Hydroptila angulata* Mosely, 1922. Lake Peipsi, collected as adults, pupae and larvae on stones in littoral zone, 16.VI.2004 (P. Wiberg-Larsen).

4. *Oxyethira falcata* Morton, 1893. Saaremaa, Nakimetsa and Kanna springs, 2002, 2 adults in Malaise trap catches (J. Salokannel det.).

5. *Oxyethira simplex* Ris, 1897. Saaremaa, Nakimetsa and Kanna springs, 2002, some adults in Malaise trap catches (J. Salokannel det.).

6. *Cyrnus fennicus* Klingstedt, 1937. Spuris (1965). A single record in Lake Vaskna.

7. *Lype reducta* (Hagen, 1868). Valgamaa. Puka vicinity, at ditches in June and July, not common; rarely at light (J. Viidalepp). Larvae common (but never abundant) in different types of running waters, sometimes in lake littoral (H. Timm).

8. *Hydropsyche bulgaromanorum* Malicky, 1977 (= *guttata* Pictet *sensu* Lackschewitz, 1922). Võrumaa, Piusa, adults at light in a riverside peatbog, 5.VI.1983 (J. Viidalepp). Data concerning *H. guttata* Pictet in Lackschewitz, 1922 may refer to this species, but material in his collection contains only one Estonian, female specimen with a label "W 76 17/7" by F. Sintenis. Sintenis has often collected in Võru and indicated the corresponding material by the letter "W" in his catalogue of Estonian Lepidoptera. However, dealing with dried *Hydropsyche* females is troublesome (Malicky 1983).

9. *Hydropsyche contubernalis* McLachlan, 1865 (*ornatula* auct.). Collected in larger lakes and in the Narva river.

10. *Hydropsyche saxonica* McLachlan, 1884. Adults rare: Valgamaa, Laanemetsa near the Koiva river, 28.V.1985 and Võrumaa, at the Piusa river 30.V.1985, at light (J. Viidalepp).

11. *Hydropsyche siltalai* Döhler, 1963. Adults rare: Harjumaa, Andineeme, 19.–21.VII.1985 (M. Kruus); Valgamaa, Aakre, 25.VI.1986 (J. Viidalepp).

12. *Oligotricha lapponica* (Hagen, 1864). Mühlen (1880), Lackschewitz (1922). Recorded in Saaremaa by Nolcken in XIX century; new data are lacking. There are recent records of some boreal Lepidoptera known in aged mixed forests and spring bogs in Saaremaa where also *O. lapponica* must be looked for.

13. *Holostomis phalaenoides* (Linnaeus, 1758). Lackschewitz (1922), Ulmer (1926). The species is extinct in South Estonian collecting sites but detected in Harjumaa, Aegviidu-Mustjõe district, imago flying along clean streams in forest. The imago was not rare there in 1950s but was not recorded in 1965–1968 (J. Viidalepp pers. obs.). However, larvae were collected August 2000 in small streams Tarvasjõgi and Mustjõgi with sandy bottom and detritus (K. Mardi leg.). An Estonian Red Data List species.

14. *Micrasema gelidum* McLachlan, 1876. Adults found at Mardiveski in Lahemaa NP, 15.VI.1984 at light (J. Viidalepp).

15. *Crunoecia irrorata* Curtis, 1834. Saaremaa, Nakimetsa and Kanna springs 2002, some adult specimens in Malaise trap catches (J. Salokannel det.).

16. *Lepidostoma basale* (Costa, 1857). Imago locally common in light trap catches at middle course of the Piusa river from June to August, and resting under bridges in daytime (J. Viidalepp). Larvae in running waters of SE Estonia. An Estonian Red Data List species.

17. *Apatania wallengreni* McLachlan, 1871. Larvae found in Meeksi brook (Võrumaa), 16.IX. 1989 and later also in some other mainland localities (H. Timm).

18. *Apatania stigmatella* (Zetterstedt, 1840). Põltsamaa river at Kiltsi, 11.IX.1990, larvae, later also in the Esna river and Saaremaa (H. Timm). Up to Spuris (1971), all *Apatania* records were refered to as *A. zonella* Zett.

19. *Apatania dalecarlica* (Forsslund, 1942) (= *zonella* auct., *arctica* auct). Lackschewitz (1922) (as *A. zonella* Zetterstedt). A parthenogenetic species. Determination verified by J. Salokannel. Larvae in small streams and rheocrenes. An Estonian Red Data List species (listed as *A. zonella*).

20. *Limnephilus femoratus* (Zetterstedt, 1840). Voucher specimens not found in collections of IZBE, but the species is listed by H. Remm in a manuscript and should occur in the collection of the Zoological Museum of Tartu University.

21. *Limnephilus picturatus* McLachlan, 1875. Lackschewitz (1922). Earlier repeatedly found in

Table 1. Check-list with inland distribution of Estonian caddisflies (Trichoptera). The third column refers to faunistical notes in section 3.2.

Species	Distribution	Note
RHYACOPHILIDAE		
Rhyacophila fasciata Hagen, 1859	Mainland	
Rhyacophila nubila (Zetterstedt, 1840)	Mainland	
Rhyacophila obliterata McLachlan, 1865	E Estonia	1
GLOSSOSOMATIDAE		
Agapetus ochripes Curtis, 1834	Mainland	
Glossosoma boltoni Curtis, 1834	SE Estonia	2
HYDROPTILIDAE		
Agraylea multipunctata Curtis, 1834	All over Estonia	
Agraylea sexmaculata Curtis, 1834	S Estonia	
Allotrichia pallicornis (Eaton, 1873)	Mainland	
Hydroptila angulata Mosely, 1922	Peipsi lake	3
Hydroptila cornuta Mosely, 1922	Mainland	
Hydroptila forcipata (Eaton, 1873)	E Estonia	
Hydroptila occulta (Eaton, 1873)	S Estonia	
Hydroptila pulchricornis Pictet, 1834	Mainland	
Hydroptila simulans Mosely, 1920	SE Estonia	
Hydroptila sparsa Curtis, 1834	Mainland	
Hydroptila tineoides Dalman, 1819	E Estonia	
Hydroptila vectis Curtis, 1834	Mainland	
Ithytrichia lamellaris Eaton, 1873	S Estonia	
Orthotrichia costalis (Curtis, 1834)	Mainland	
Oxyethira distinctella McLachlan, 1880	SE Estonia	
Oxyethira falcata Morton, 1893	Saaremaa	4
Oxyethira flavicornis (Pictet, 1834)	Mainland	
Oxyethira simplex Ris, 1897	Saaremaa	5
Oxyethira tenuella Martynov, 1924	S Estonia	
Oxyethira tristella Klapalek, 1895	Mainland	
Tricholeiochiton fagesi (Guinard, 1879)	Mainland	
PHILOPOTAMIDAE		
Chimarra marginata (Linnaeus, 1767)	SW Estonia	
Wormaldia occipitalis (Pictet, 1834)	Mainland	
Wormaldia subnigra (McLachlan, 1865)	N Estonia	
ECNOMIDAE		
Ecnomus tenellus (Rambur, 1842)	Mainland	
POLYCENTROPODIDAE		
Cyrnus crenaticornis (Kolenati, 1859)	All over Estonia	
Cyrnus fennicus Klingstedt, 1937	SE Estonia	6
Cyrnus flavidus McLachlan, 1864	Mainland	
Cyrnus insolutus McLachlan, 1878	SE Estonia	
Cyrnus trimaculatus (Curtis, 1834)	Mainland	
Holocentropus dubius (Rambur, 1842)	All over Estonia	
Holocentropus insignis Martynov, 1924	S Estonia	
Holocentropus picicornis (Stephens, 1836)	All over Estonia	
Holocentropus stagnalis (Albarda, 1874)	SE Estonia	
Neureclipsis bimaculata (Linnaeus, 1758)	Mainland	
Plectrocnemia conjuncta Martynov, 1914	Saaremaa	
Plectrocnemia conspersa (Curtis, 1834)	All over Estonia	
Polycentropus flavomaculatus (Pictet, 1834)	All over Estonia	
Polycentropus irroratus (Curtis, 1835)	All over Estonia	
PSYCHOMYIDAE		
Lype phaeopa (Stephens, 1836)	E Estonia	
Lype reducta (Hagen, 1868)	All over Estonia	7
Psychomyia pusilla (Fabricius, 1784)	All over Estonia	
Tinodes waeneri (Linnaeus, 1758)	All over Estonia	
HYDROPSYCHIDAE		
Cheumatopsyche lepida (Pictet, 1834)	Mainland	
Hydropsyche angustipennis (Curtis, 1834)	All over Estonia	
Hydropsyche bulgaromanorum Malicky, 1977	SE Estonia	8
Hydropsyche contubernalis McLachan, 1865	Mainland	9
Hydropsyche pellucidula (Curtis, 1834)	Mainland	
Hydropsyche saxonica McLachlan, 1884	SE Estonia	10
Hydropsyche siltalai Döhler, 1963	N Estonia	11
PHRYGAENIDAE		
Agrypnetes crassicornis McLachlan, 1876	Seashore	
Agrypnia obsoleta (Hagen, 1864)	All over Estonia	
Agrypnia pagetana Curtis, 1825	All over Estonia	
Agrypnia picta Kolenati, 1848	All over Estonia	
Agrypnia varia (Fabricius, 1793)	All over Estonia	
Hagenella clathrata (Kolenati, 1848)	All over Estonia	
Oligostomis reticulata (Linnaeus, 1758)	All over Estonia	
Oligotrichia lapponica (Hagen, 1864)	Saaremaa	12
Oligotrichia striata (Linnaeus, 1758)	All over Estonia	
Phryganea bipunctata Retzius, 1783	All over Estonia	
Phryganea grandis Linnaeus, 1758	All over Estonia	
Holostomis phalaenoides (Linnaeus, 1758)	N Estonia	13
Trichostegia minor (Curtis, 1834)	All over Estonia	
BRACHYCENTRIDAE		
Brachycentrus subnubilus Curtis, 1834	Mainland	
Micrasema gelidum Mclachlan, 1876	N Estonia	14
Micrasema setiferum (Pictet, 1834)	Mainland	
GOERIDAE		
Goera pilosa (Fabricius, 1775)	Mainland	
Lithax obscurus (Hagen, 1859)	Mainland	
Silo pallipes (Fabricius, 1784)	Mainland	
LEPIDOSTOMATIDAE		
Crunoecia irrorata (Curtis, 1834)	Saaremaa	15
Lepidostoma basale (Costa, 1857)	SE Estonia	16
Lepidostoma hirtum (Fabricius, 1775)	Mainland	
LIMNEPHILIDAE		
Apatania wallengreni McLachlan, 1871	Mainland	17
Apatania stigmatella (Zetterstedt, 1840)	Mainland	18
Apatania dalecarlica (Forsslund, 19429	All over Estonia	19
Limnephilus rhombicus (Linnaeus, 1758)	All over Estonia	
Limnephilus flavicornis (Fabricius, 1787)	All over Estonia	
Limnephilus subcentralis Brauer, 1957	All over Estonia	
Limnephilus borealis (Zetterstedt, 1840)	All over Estonia	
Limnephilus femoratus (Zetterstedt, 1840)	Mainland	20
Limnephilus marmoratus Curtis, 1834	E Estonia	
Limnephilus politus McLachlan, 1865	All over Estonia	
Limnephilus stigma Curtis, 1834	All over Estonia	
Limnephilus xanthodes McLachlan., 1873	All over Estonia	
Limnephilus decipiens (Kolenati, 1848)	Mainland	
Limnephilus germanus McLachlan, 1875	Mainland	
Limnephilus lunatus Curtis, 1834	All over Estonia	
Limnephilus picturatus McLachlan, 1875	SE Estonia	21
Limnephilus externus Hagen, 1861	S Estonia	22
Limnephilus sericeus Say, 1824	All over Estonia	
Limnephilus quadratus Martynov, 1914	Mainland	23
Limnephilus ignavus McLachlan, 1865	Mainland	
Limnephilus pantodapus McLachlan, 1875	Mainland	24

Species	Distribution	Note
Limnephilus fuscinervis (Zetterstedt, 1840)	Mainland	
Limnephilus elegans Curtis, 1834	All over Estonia	
Limnephilus griseus (Linnaeus, 1758)	All over Estonia	
Limnephilus hirsutus (Pictet, 1834)	S Estonia	25
Limnephilus dispar McLachlan, 1875	E Estonia	
Limnephilus fenestratus (Zetterstedt, 1840)	Mainland	
Limnephilus bipunctatus Curtis, 1834	All over Estonia	
Limnephilus affinis Curtis, 1834	All over Estonia	
Limnephilus centralis Curtis, 1834	W Estonia	26
Limnephilus sparsus Curtis, 1834	All over Estonia	
Limnephilus auricula Curtis, 1834	All over Estonia	
Limnephilus vittatus (Fabricius, 1798)	All over Estonia	
Limnephilus extricatus McLachlan, 1865	All over Estonia	
Limnephilus nigriceps (Zetterstedt, 1840)	Mainland	
Limnephilus fuscicornis (Rambur, 1842)	All over Estonia	
Limnephilus diphyes (McLachlan, 1880)	W Estonia	27
Limnephilus coenosus Curtis, 1834	Mainland	
Limnephilus turanus Martynov, 1928	SW Estonia	28
Colpotaulius incisus (Curtis, 1834)	S Estonia	
Ironoquia dubia (Stephens, 1837)	Mainland	
Grammotaulius nigropunctatus (Retzius, 1783)	All over Estonia	
Grammotaulius nitidus (Müller, 1764)	All over Estonia	
Grammotaulius sibiricus McLachlan, 1874	SE Estonia	29
Grammotaulius signatipennis McLachlan, 1876	SE Estonia	
Glyphotaelius pellucidus (Retzius, 1783)	All over Estonia	
Nemotaulius punctatolineatus (Retzius, 1783)	All over Estonia	
Anabolia nervosa (Curtis, 1834)	N Estonia	30
Anabolia laevis (Zetterstedt, 1840)	Mainland	
Anabolia concentrica (Zetterstedt, 1840)	Mainland	
Phacopteryx brevipennis (Curtis, 1834)	Mainland	
Asynarchus contumax McLachlan, 1880	SE Estonia	31
Arctopora trimaculata (Zetterstedt, 1840)	SE Estonia	
Lenarchus bicornis (McLachlan, 1880)	Mainland	
Rhadicoleptus alpestris (Kolenati, 1848)	All over Estonia	
Chaetopteryx villosa (Fabricius, 1798)	Mainland	
Parachiona picicornis (Pictet, 1834)	Mainland	32
Potamophylax latipennis (Curtis, 1834)	S Estonia	
Potamophylax cingulatus (Stephens, 1837)	Mainland	33
Potamophylax nigricornis (Pictet, 1834)	E Estonia	
Potamophylax rotundipennis (Brauer, 1857)	Mainland	
Potamophylax luctuosus (Piller & Mitterpacher, 1783)	Mainland	
Halesus radiatus (Curtis, 1834)	All over Estonia	
Halesus digitatus (Schrank, 1781)	S Estonia	
Halesus tesselatus (Rambur, 18429	Mainland	
Stenophylax permistus Mclachlan, 1895	W Estonia	
Stenophylax lateralis (Stephens, 1837)	All over Estonia	
Stenophylax sequax McLachlan, 1875	Mainland	
Hydatophylax infumatus (McLachlan, 1865)	SE Estonia	
Chilostigma sieboldi McLachlan, 1876	SE Estonia	
BERAEIDAE		
Beraea maurus (Curtis, 1834)	Saaremaa	
Beraea pullata (Curtis, 1834)	Saaremaa	
Beraeodes minutus (Linnaeus, 1781)	S Estonia	
SERICOSTOMATIDAE		
Sericostoma personatum (Kirby & Spence. 1826)	SE Estonia	34
Notidobia ciliaris (Linnaeus, 1761)	Mainland	
ODONTOCERIDAE		
Odontocerum albicorne (Scopoli, 1763)	E Estonia	35
MOLANNIDAE		
Molanna angustata Curtis, 1834	All over Estonia	
Molanna albicans (Zetterstedt, 1840)	All over Estonia	
Molannodes tinctus (Zetterstedt, 1840)	Mainland	
Molanna nigra (Zetterstedt, 1840)	Saaremaa	
LEPTOCERIDAE		
Ceraclea nigronervosa (Retzius, 1783)	Mainland	
Ceraclea fulva (Rambur, 1842)	Mainland	
Ceraclea senilis (Burmeister, 1839)	All over Estonia	
Ceraclea alboguttata (Hagen, 1860)	S Estonia	
Ceraclea annulicornis (Stephens, 1836)	All over Estonia	
Ceraclea perplexa (McLachlan, 1877)	W Estonia	36
Ceraclea aurea (Pictet, 1834)	Mainland	37
Ceraclea dissimilis (Stephens, 1836)	Mainland	
Ceraclea excisa (Morton, 1904)	Mainland	
Ceraclea riparia Albarda, 1874	W Estonia	38
Athripsodes aterrimus (Stephens, 1876)	All over Estonia	
Athripsodes cinereus (Curtis, 1834)	All over Estonia	
Athripsodes albifrons (Linnaeus, 1758)	Mainland	
Athripsodes bilineatus (Linnaeus, 1758)	SE Estonia	
Athripsodes commutatus (Rostock, 1874)	Mainland	
Mystacides niger (Linnaeus, 1758)	All over Estonia	
Mystacides azurea (Linnaeus, 1761)	Mainland	
Mystacides longicornis (Linnaeus, 1758)	All over Estonia	
Triaenodes bicolor (Curtis, 1834)	Mainland	
Triaenodes conspersus (Rambur, 1842)	Mainland	
Trianodes unanimis McLachlan, 1877	S Estonia	
Ylodes detruncatus (Martynov, 1924)	W Estonia	39
Ylodes reuteri (McLachlan, 1880)	W Estonia	
Ylodes simulans (Tjeder, 1929)	Mainland	
Erotesis baltica McLachlan, 1877	W Estonia	
Oecetis ochracea (Curtis, 1825)	All over Estonia	
Oecetis furva (Rambur, 1842)	All over Estonia	
Oecetis lacustris (Pictet, 1834)	All over Estonia	
Oecetis notata (Rambur, 1842)	SE Estonia	
Oecetis testacea (Curtis, 1834)	S Estonia	
Setodes punctatus (Fabricius, 1793)	Mainland	40
Leptocerus tineiformis Curtis, 1834	Mainland	
Leptocerus interruptus (Fabricius, 1775)	SE Estonia	41

the Emajõgi at Tartu, but not in second half of the XX century: probably extinct?

22. *Limnephilus externus* Hagen, 1861. Pärnumaa, Nigula NR, adults common in late autumn light trap catches, 2009 (J. Salokannel det.).

23. *Limnephilus quadratus* Martynov, 1914. Rare, one Estonian specimen collected by A. Selin (Tallinn), another found in light trap collectings from Matsalu, 20.–23.VIII. 2009 (J. Salokannel det.).

24. *Limnephilus pantodapus* Mclachlan, 1875. Remm (1987). One specimen (26.VII.1978) from the Võsu river in H. Remm's collection; recently recorded in SW Estonia, Nigula Nature Reserve.

25. *Limnephilus hirsutus* (Pictet, 1834). Viljandimaa, Penuja, 1 male 06.VII.1979 at lamp (T. Talve leg., J. Viidalepp det.).

26. *Limnephilus centralis* Curtis, 1834. Adults collected in Audako, Saaremaa, 6.VII.1988, at light (J. Viidalepp) and light-trapped in Nigula Nature Reserve area in 2009 (J. Salokannel det.).

27. *Limnephilus diphyes* McLachlan, 1880. Spuris (1971). A single record from Kanaküla (Pärnumaa) at light (H. Remm leg.).

28. *Limnephilus turanus* (Martynov, 1928). Kastna (Tõstamaa vald), 1.–10.VII.2003, light trap (A. Selin leg., J. Salokannel det.). The species is known from Uzbekistan and East Caucasus. An occasional transport of insects by air currents, or an expansion is possible explanation for this record.

29. *Grammotaulius sibiricus* McLachlan, 1874. Lackschewitz 1922; Adults collected earlier near East Estonian lakes. Lackschewitz notes that the imago is bivoltine in Tartu and surroundings.

30. *Anabolia nervosa* (Curtis, 1834). Haberman (1937b). Adults not found but Haberman (1937b) has recorded larvae in Kostivere subterranean water-bodies.

31. *Asynarchus contumax* McLachlan, 1880. Some adult specimens collected in South-Eastern Estonia, Puka (9.VII.1985) and Järvselja (12.VII.1985) (J. Viidalepp; J. Salokannel det.).

32. *Parachiona picicornis* (Pictet, 1834). Lackschewitz (1922), Spuris (1971). The species is associated with ground water brooks with swampy edges (J. Salokannel pers. obs.).

33. *Potamophylax cingulatus* (Stephens, 1837) (= *latipennis* auct. nec (Curtis, 1834)) Adults common at light now but absent in collections by Lackschewitz: possibly a recently invaded species.

34. *Sericostoma personatum* (Spence in Kirby & Spence, 1826). Larvae in clean streams in East and South-East Estonia (H. Timm). Singly flying in daytime (e.g. Valgamaa, Puka, 21.VI.1985; Põlvamaa, Piusa railway st., 3.VII.1987) and in light trap catches in Puka vicinity (J. Viidalepp). The species supposedly has invaded Estonia late in XX century.

35. *Odontocerum albicorne* (Scopoli, 1763). Remm (1987) has recorded the species for the first time at light in Palmse, Lahemaa NP; further records: Aegviidu-Nelijärve, at lake Nikerjärv, 20.VIII.1985, 1 male (M. Kruus) and SE Estonia: Puka, 31.VII.1986, 1 female at light (J. Viidalepp). Recently, the species is spreading and becoming more abundant. Larvae in clean fast-flowing streams. An Estonian Red Data List species.

36. *Ceraclea perplexa* (McLachlan, 1877). Läänemaa: Puhtu peninsula, 13–16.VII.1985, 2 imagines at lamp in deciduous forest near seashore (T. Tammaru leg., J. Viidalepp det.).

37. *Ceraclea aurea* Pictet, 1834. Lackschewitz (1922: 42 as *Leptocerus aureus* Pict.) refers to a specimen from Mühlen's collection identified by McLachlan, and to his own specimen from Koknese (Latvia). The Estonian specimen referred to is labelled as "Krug Juni 1880" with Mühlens handschrift. This locality name is not in use in XXI century, but Lackschewitz (1922: 34) gives for *C. trimaculatus* "Surry-krug bei Pernau" as one of Mühlen's collecting places. There are other specimens of Estonian caddisflies in Mühlen's collection labelled as from "Krug".

38. *Ceraclea riparia* Albarda, 1874. One record of adults from Samliku at the Pärnu river by H. Remm.

39. *Ylodes detruncatus* (Martynov, 1924). One male specimen recorded by J. Salokannel and A. Selin near Märjamaa at the Kasari river, 2010.

40. *Setodes punctatus* (Fabricius, 1793). Recorded at the Piusa river and the Kasari river in 2010 (J. Salokannel *et al*.). A recent newcomer in Estonian fauna.

41. *Leptocerus interruptus* (Fabricius, 1775). Recorded in the Piusa riverside, 2009, 1 ex (J. Salokannel leg. et det.).

3.3. Summary of the checklist

In this paper, 190 caddisfly species are recorded for the Estonian fauna (Table 1), with 31 species recorded as new for the list.

3.3.1. On geography of Estonian caddisflies

Estonia is situated just on the area where the European nemoral fauna and the Siberian taiga fauna meet and blend (Viidalepp 1991). When distributions of species have been mapped, the decline in biological diversity of local faunas from East to West became obvious.

3.3.1.1. Distributions restricted to Saaremaa and western Estonia

At present, eight caddisfly species are recorded for Estonia in Saaremaa only (*Oxyethira falcata*, *O. simplex*, *Plectrocnemia conjuncta*, *Oligotricha lapponica*, *Crunoecia irrorata*, *Beraea maurus*, *B. pullata* and *Molanna nigra*). Characteristically, three of these species are associated with spring mires in Viidumäe Nature Reserve. The distributions of eight species appear to be confined to western coast and islets (*Chimarra marginata*, *Limnephilus centralis*, *Stenophylax permistus*, *Ceraclea perplexa*, *C. riparia*, *Ylodes reuteri*, *Erotesis baltica* and a possible occasional immigrant *Limnephilus turanus*), while *Agrypnetes crassicornus* has a wider distribution along the northern shore, being associated with brackish water as e.g. *Y. reuteri*. This one-tenth of the list of our fauna is opposed by about 120 species which do occur widely all over the Estonian mainland but are absent on islands.

3.3.1.2. Western coast and Finnish Gulf as distribution barriers

While 73 species are recorded both in eastern and western parts of the mainland, fourteen species appear restricted to the southernmost part of Estonia (*Agraylea sexmaculata*, *Hydroptila occulta*, *Ithytrichia lamellaris*, *Oxyethira tenuella*, *Holocentropus insignis*, *Limnephilus externus*, *L.hirsutus*, *Colpotaulius incisus*, *Potamophylax latipennis*, *Halesus digitatus*, *Beraeodes minutus*, *Ceraclea alboguttata*, *Triaenodes unanimis* and *Oecetis testacea*), eighteen species to the continental environment in extreme Southeast (*Glossosoma boltoni*, *Hydroptila simulans*, *Oxyethira distinctella*, *Cyrnus fennicus*, *C. insolutus*, *Holocentropus stagnalis*, *Hydropsyche bulgaromanorum*, *H. saxonica*, *Lepidostoma basale*, *Limnephilus picturatus*, *Grammotaulius sibiricus*, *G. signatipennis*, *Asynarchus contumax*, *Arctopora trimaculata*, *Hydatophylax infumatus*, *Sericostoma personatum*, *Athripsodes bilineatus*, *Oecetis notata* and *Leptocerus interruptus*). There are seven caddisfly species preferring large water-bodies or relatively continental conditions in East Estonia (recorded both south and north of Peipsi Lake, in Võrumaa and Ida-Virumaa): *Rhyacophila obliterata*, *Hydroptila angulata*, *H. forcipata*, *H. tineoides*, *Lype phaeopa*, *Limnephilus marmoratus*, *L. dispar*, *Potamophylax nigricornis* and *Odontocerum albicorne*. Only five species seem confined to northern klint, inhabiting rapids and subterranean waters (*Wormaldia subnigra*, *Hydropsyche siltalai*, *Holostomis phalaenoides*, *Micrasema gelidum* and *Anabolia nervosa*).

The distribution data may be slanted towards faunistically better studied Southern Estonia and Saaremaa, but the decline of faunal richness towards west is recorded both in Finland (Nybom 1960, Laasonen *et al*. 1998) and Lithuania (Višinskiene 2009) and should be real in Estonia as well.

3.3.2. Red Data listed species

Twenty-one caddisfly taxa are listed in the Estonian Red Data Book (Eesti Punane Raamat), grouped as rare, vulnerable species (*C. irrorata*, *L. tineiformis*, *L. phaeopa*, *L. reducta*, *M. tinctus*, *M. azurea*, *N. ciliaris*, *O. albicorne*, *P. nigricor-*

nis, *R. obliterata*, *H. phalaenoides*), near threatened species (*A.* "*zonella*", *C. marginata*, *H. siltalai*, *M. setiferum*, *P. pusilla*, *S. personatum*), and as needing further investigation (*B. minutus*, *C. sieboldi*, *H. clathrata*, *H. infumatus*, *N. punctatolineatus*, *P. brevipennis*, *W. occipitalis* and *W. subnigra*). Actually, *A. zonella* is used here as *nomen collectivum* including all the three Estonian *Apatania* species.

4. Discussion

The distribution of caddisflies along shores of the Baltic Sea is worth to be studied from two aspects. The decline in number of nemoral species towards North in East Baltics is mentioned by Spuris (1971) and a comparison with his data allows to record changes of last fourty years, when the global climate change has turned more obvious. A decline of species with northern contact with their main distribution areas, and northward expansion of more nemoral species inhabiting lowlands of Central Europe are expected. Second, while Baltic countries are hilly lowlands, separated from Fennoscandian greenstone mountainous area by Finnish Gulf, the meaning of the latter as a distribution barrier will be of interest.

There are 173 caddisfly species recorded for Lithuania and 196 given for Latvian fauna (Višinskiene 2009), 190 species known from Estonia (the present list) and 214 from Finland (Salokannel *et al*. 2004). Taking in account that several additional hydroptilids possibly inhabit Estonian waters and are to be discovered in future, the entire fauna seems richer in species towards North.

Only a single caddisfly species (*Apatania fimbriata*) reaches its distribution limit in Lithuania. Others, reaching Latvia but no more Estonia, are more numerous: *Rhyacophila pascoei* McLachlan, 1879, *Allotrichia vilnensis* Raciecka, 1937, *Hydropsyche instabilis* (Curtis, 1834), *Setodes viridis* (Forcroy, 1785) a.o., altogether 23 species. Fourteen species have their northern distribution in Estonia and have not yet reached Finland (Laasonen *et al.* 1998; Salokannel *et al.* 2004): *Oxyethira tenuella*, *Lepidostoma basale*, *Limnephilus turanus*, *Parachiona picicornis*, *Potamophylax luctuosus*, *Lithax obscurus*, *Beraea maurus*, *Odontocerum albicorne*, *Ceraclea riparia*, *C. aurea*, *Athripsodes bilineatus*, *T. conspersus*, *Setodes punctatus* and *Leptocerus interruptus*, while *Crunoecia irrorata* was recorded for the first time in Finland in 1996 (E. Laasonen, pers. comm.). Most of the "new" species for the Estonian checklist (fifteen of them are recorded first time between 1995 and 2010) should be relatively uncommon but "old" inhabitants of the area, but the climate change may have affected the abundance and distribution borders of *Lepidostoma basale*, *Limnephilus hirsutus*, *Setodes punctatus*, *Odontocerum albicorne* and some other species; *Limnephilus turanus* may also be an occasional element of the fauna. On the other hand, such species as *Oligotrichia lapponica*, *Molanna nigra* and *Ceraclea aurea* seem not to have been re-collected in Estonia during the entire XX century.

The Finnish Gulf represents a distribution barrier for fourteen caddisfly species of southern origin, opposed by about thirty species absent in Estonia but inhabiting Finland.

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