**A terrestrial record of climate variation during MIS 11: multi-proxy palaeotemperature reconstructions from Hoxne, UK**

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**Supplementary Material**

1. **Sample processing**

Ostracod samples were first oven-dried, then soaked for several hours in hot water with a little sodium carbonate, and finally washed through a 75 μm sieve with hand-hot water, the retained residues being dried in an oven and ostracods picked from them under a low-power stereo-microscope. Identification and environmental preferences are based on Meisch (2000) and other sources cited in the text. Samples of monospecific ostracod shells (7 to 10 valves of *Ilyocypris (“bradyi”*-type) or 4 to 6 valves of *Cytherissa lacustris)* destined for stable isotope analysis were brush-cleaned and air dried before loading into Labco glass Exetainer® tubes. Oxygen and carbon isotope analyses were performed on CO2 produced by reaction with phosphoric acid at 45˚C in a ThermoFisher Gasbench II connected to a Delta V mass spectrometer. The results were expressed in standard δ units on the VPDB scale with a mean standard deviation of measurements of 0.05 ‰ and 0.03 ‰ for δ18O and δ13C, respectively.

Chironomid samples were prepared using the paraffin flotation method of Coope (1986) but, instead of a 200 µm mesh sieve, the float was passed through a 90 µm sieve to retain the smallest chironomid taxa. Identification and ecological assessment of the assemblage was made following Brooks et al. (2007).

Beetle data were taken from previously published species lists, e.g. in Coope (1993), where (pp. 156 and 158) sample preparation methods were summarised as follows: “Insect remains were extracted by the standard technique of wet-sieving in the laboratory, kerosene concentration and hand sorting, as described by Coope (1986)... Identification was by direct comparison of the fossils with well-authenticated modern material... The nomenclature is that of *Die Käfer Mitteleuropas* (Lucht, 1987).”

Small vertebrates were obtained from a series of 19 samples (319–301), each between ~7 and 15 kg (totalling 211 kg), from successive 20 cm levels through Stratum C in Area VII. Additional vertebrate specimens were extracted from larger subsamples collected for insect remains (369–374). Samples were wet-sieved and all vertebrate specimens retained by a 1 mm sieve were picked and counted. A note was made of the distribution of reworked Chalk fossils and pre-Quaternary fish remains, and plant remains (seeds and woody fragments) were weighed; ostracods and insect remains were also picked.

Non-marine molluscs were obtained from the same samples processed for other proxies as part of the AHOB excavations (Ashton et al., 2008).

**2. Chironomid assemblages**

Stratum Echironomid assemblages were analysed from BH02/1 core S, 40.0–47.0 cm (61.75 g sediment; 116 heads; 8 taxa) and BH02/1 core AA, 0–5.0 cm (38.32 g sediment; 86 heads; 11 taxa). They are dominated by *Chironomus plumosus*-type (75-85% of the assemblage). The chironomid assemblage is relatively species-poor and all taxa present are typical of warm, eutrophic waters containing submerged aquatic vegetation. The high dominance of *C. plumosus*-type suggests low oxygen conditions, either in a deep, thermally stratified lake or in a shallow lake containing large amounts of decaying vegetation. The presence of *Cricotopus oliveri*-type, *Dicrotendipes, Glyptotendipes pallens-*type and *Polypedilum nubeculosum*-type are indicative of the presence of submerged aquatic vegetation and a warm-temperate climate.

Stratum Cchironomid assemblages were analysed from borehole BH02/1 core B, 5.0–10.0cm (28.3 g of sediment processed; 73 heads; 26 taxa) and core G, 5.0–10.0 cm (10.1 g sediment; 69 heads; 25 taxa), and from Area VII sample 366 (19.83 g sediment; 81 heads; 28 taxa). They are relatively species-rich. Samples from BH02/1 cores B (5.0–10.0cm) and G (5.0–10.0cm) are dominated by *Tanytarsus mendax*-type (25%) and *Procladius* (20%). These two taxa are widespread and eurytopic: they can occur in both warm and temperate waters. However, *Tanytarsus mendax*-type is absent from Area VII sample 366 and *Procladius* is uncommon (< 5%) in the assemblage, which does, however, include the cold stenotherm *Tanytarsus lugens*-type (10%) and the temperate taxon *Paratanytarsus penicillatus*-type (10%), which are both absent from cores B and G. The cold stenothermic taxa *Sergentia coracina*-type (15%) and *Stictochironomus rosenschoeldi*-type (10%) are present in all three Stratum C samples. The presence of *Eukiefferiella, Limnophyes, Pseudosmittia, Smittia* and *Metriocnemus hygropetricus* in Stratum C samples are indicative of relatively shallow waters and/or the influence of a stream inflow. The absence or rarity of *C. plumosus*-type also suggests the waters in this interval were relatively shallow and well-oxygenated. *Tanytarsus lugens*-type typically occurs in deep lakes but can also occur in shallow water in cold lakes. The presence of submerged aquatic vegetation is suggested by the presence of *Cricotopus oliveri*-type, *Dicrotendipes, Glyptotendipes pallens*-type and *Polypedilum nubeculosum*-type. These taxa are typical of temperate and warm lakes. Many taxa indicative of cool climatic conditions are present in Area VII sample 366 and core B, including *Paracladius, Monodiamesa, Pseudodiamesa, Paracladopelma*, *Sergentia coracina*-type, *Stictochironomus rosenschoeldi*-type, *Corynocera ambigua* and *Tanytarsus lugens*-type. Of these taxa, only *Sergentia coracina*-type, *Stictochironomus rosenschoeldi*-type and *Corynocera ambigua* are present in core G. The assemblages of all three Stratum C samples are not dominated by cold stenothermic taxa, however, and the presence of many temperate taxa in similar abundance suggests the climate was cool-temperate rather than cool.

1. **Ostracod assemblages**

Stratum F ostracods were recovered from boreholes BH03/1 (46–47.5 cm and 47.8–50.0 cm) and BH02/1 (core EE, 20.0–25.0cm). Although labelled "Stratum G", the lower of the two above-mentioned BH03/1 samples was taken immediately below the lowermost Stratum F sample; since Stratum G is actually the underlying Anglian till, this sample is here considered to belong to Stratum F.

Stratum E results are from borehole BH02/1 (core Q, 20.0–30.0cm; core W, 25.0–30.0cm; core AA, 20.0–25.0cm) and Area IV trench Column 1 (samples 39, 40) and Column 2 (samples 2, 3).

Stratum C ostracod assemblages were obtained from continuous sampling in Area VII.

Stratum B results were obtained from Area IV trench Column 1 (sand/silt filled fluvial channel; samples 63, 61, 64) and Column 2 (fluvial channel; samples 13, 14).

Notes on the palaeoenvironmental and palaeoclimatic significance of selected species are given below, based on Meisch (2000) except where other works are cited (\* denotes extinct species).

*Candona candida* occurs in a wide range of waterbody types, with a preference for permanent fresh waters, and tolerates brackish water up to around 6 o/oo ; it has a shorter life-cycle in high latitudes than in low latitudes and is considered to be adapted to the climate of arctic regions.

*Cyclocypris ovum* is found in almost every kind of freshwater habitat including temporary as well as permanent waterbodies; it is common in the littoral zone of lakes and tolerates salinity up about 6 o/oo*.*

*Cypridopsis vidua* lives in a wide range of freshwater environments with a preference for vegetated permanent habitats such as the littoral zone of lakes and is also found in temporary ponds and in springs; tolerant of salinities up to 8 o/oo.

*Cytherissa lacustris* is usually regarded as a cold stenothermal freshwater form, found in sublittoral to profundal depths of lakes with a preference for oligo-mesotrophic waters, but is also found in the shallower parts of lakes and in ponds where it experiences warm summer temperatures, so it is probably best considered as a eurythermal species with a preference for cold water; it tolerates slightly brackish water up to 1.5 o/oo.

*Darwinula stevensoni* inhabits a wide variety of permanent freshwater environments including lakes (to depths of about 12m), ponds and rivers; it tolerates brackish water up to to 15 o/oo.

*Fabaeformiscandona levanderi* lives in freshwater lakes and ponds (found at a depth of 62m in Lake Constance) and is tolerant of slightly brackish waters up to 6 o/oo. Wetterich et al. (2005) recorded fossils of this species on the Bykovsky Peninsula bordering the Laptev Sea (approx. 72oN, 129oE) in deposits of the Karginian Interstadial (48-34 ka BP), considered to be a warm and dry interval; the habitat was small, cold, oligotrophic pools located in ice-wedge polygon centres or thermokarst depressions, set in a landscape with shrubby tundra vegetation experiencing dry and relatively warm summers. They considered it to be suggestive of arid climatic conditions with higher evaporation rates than today in this region. Wetterich et al. (2009) found it in Eemian Interglacial assemblages in NE Siberia.

*Fabaeformiscandona protzi* is an inhabitant of permanent freshwater bodies (lakes, ponds, swampy and muddy ditches, dead arms of rivers) and is tolerant of slightly brackish water (up to about 6 o/oo); it is considered to be a cold stenothermal species.

*Herpetocypris reptans* inhabits a wide variety of freshwater environments but shows a preference for richly vegetated permanent waters and muddy bottoms, and in lakes it is usually restricted to the littoral but has been recorded down to 15 m depth (it is also known from springs, swamps and temporary waterbodies); it can tolerate brackish waters up to 6 o/oo.

*\*Leucocythere batesi* and *\*Limnocythere falcata* are considered to be a freshwater cold-climate indicator by association with other taxa (Whittaker and Horne, 2009). The latter species was recorded it in Late Quaternary assemblages of the Siberian Arctic by Wetterich et al. (2005), in association with ostracod taxa characteristic of European cold-stage lake deposits. They found it on the Bykovsky peninsula bordering the Laptev Sea (approx. 72oN, 129oE) in deposits of the Karginian Interstadial (48-34 ka BP), considered to be a relatively warm and dry interval, where it inhabited small, cold, oligotrophic pools located in ice-wedge polygon centres or thermokarst depresssions, set in a landscape with shrubby tundra vegetation experiencing dry and relatively warm summers. In the same area they also found it in late Holocene deposits (3 ka BP) considered to be representative of cool, wet climate reflecting recent conditions of the Arctic tundra. Wetterich et al. (2009) found it very common in Eemian Interglacial assemblages of Oyogos Yar in NE Siberia.

*Limnocytherina sanctipatricii* inhabits oligotrophic lakes and small permanent ponds and ditches, is tolerant of slightly brackish water up to 3 o/oo and wasfound down to 250m depth in Lake Constance (Meisch, 2000). Löffler (1975) considered it to be a cold-water indicator but Meisch (2000) questioned this because it has also been reported from the littoral zone which warms up in summer. Wetterich et al. (2005) found this species to be abundant in deposits of the Zyrianian Stadial (58-53 ka BP), interpreting it as indicative of cold, arid conditions (associated pollen and plant macrofossils indicated an open, treeless landscape with cold, dry summers). Habitat was small, shallow, cold, oligotrophic pools in thermokarst or ice-wedge polygon depressions, which warmed in the summer. They considered it to be an indicator of arid climatic conditions with higher evaporation rates than present day in this region. Wetterich et al. (2009) recorded it in Eemian Interglacial deposits of Oyogos Yar in NE Siberia.

*Neglecandona neglecta* inhabits a wide range of freshwater environments, both permanent and temporary, with a preference for relatively cold waters, and is tolerant of brackish waters up to at least 15o/oo.

*Metacypris cordata* lives among aquatic macrophytes in freshwater meso- to eutrophic lakes and ponds, showing a preference for ion-rich waters with pH >7.

1. **Beetle assemblages**

Notes on selected climatically significant species from strata F and C (none of which occurred in strata E or D) are given below (\* indicates species not now living in the British Isles). It is striking that many are common together in later mid-Devensian and late glacial assemblages from the British Isles (e.g. *Diacheila polita*, *Bembidion hasti,* *Pycnoglypta lurida*, *Olophrum boreale*, *Oreodytes alpinus*, *Colymbetes dolabratus*, *Helophorus obscurellus*, *Boreaphilus hennigianus*, *Tachinus caelatus*, *Notaris aethiops*).

\**Diacheila polita* is a terrestrial ground beetle found usually on peaty soils in either rather dry places or occasionally at the margins of pools with *Carex*; its true habitat is the present-day tundra (Lindroth, 1961). In arctic Fennoscandia it is found exclusively on the tundra but in northeastern Russia and Siberia its range also includes the northern fringe of the taiga (Böcher, 1995; Lindroth, 1945). In Alaska and the Northwest Territories of Canada it is similarly found on the open tundra. It occurred in Stratum F.

*\*Bembidion mckinleyi* is a small terrestrial ground beetle that occurs on gravelly or sandy banks in the mountains where it lives beside very cold water often emanating from glaciers (Lindroth, 1963). It is known only from northernmost Fennoscandia and from North-west North America (Lindroth, 1985). It occurred in both Stratum F and Stratum C.

*\*Bembidion hasti* is often found in company with the previous species and in similar habitats. Its range is circumpolar. In Fennoscandia it is widespread in the far north but usually confined to alpine areas further south (Lindroth, 1985). It occurred in both Stratum F and Stratum C.

*Agonum chalconatum* (formely *sahlbergi*) is a riparian species, living at the edges of sandy banks and stones (Hyman, 1992). Today, it is likely a glacial relict, being found on banks of the Clyde and elsewhere in Scotland (Hyman, 1992), but also eastern Fennoscandia and theWhite Sea coast of Siberia (Lindroth, 1986). It occurred in Stratum F.

*Oreodytes alpinus* is a Palearctic small predatory water-beetle that was only added to the British Isles species list in 1986 (Foster and Spirit, 1986), where it occurs on wave washed shores of base-rich lochs in the extreme north-east of Scotland (Caithness and Sutherland) (Foster, 2000). In Fennoscandia, it is widespread in the north but is most common in western Lappland; eastwards it ranges as at least as far as north-western Siberia (Böcher, 1995). It is likely that it also occurs in North America but under a different name. It occurred in Stratum F.

\**Colymbetes dolabratus* is a moderately large predatory water-beetle with a circumpolar distribution at all high latitudes ranging across Eurasia to North America and Greenland (Lindroth et al*.,* 1973). Its main habitat is shallow pools above the tree line. It occurred in Stratum C.

*\*Helophorus obscurellus* has (in contrast to most of the species of this genus which are aquatic) terrestrial adults, living in sandy places under stones and vegetation where they probably feed on decomposing plant matter (Angus, 1970). Its geographical range is northern and montane; in Europe is only known from the northern coast of the Kanin Peninsula in arctic Russia (Coope, 2004). It is widespread in eastern Asia from the Tibetan plateau to the north of Siberia (Angus, 1970). It occurred in both Stratum F and Stratum C.

*\*Pycnoglypta lurida* is found mostly in damp locations under plant debris such as *Salix* leaves (Bocher, 1995); it is a circumpolar species, widespread in northern Europe, Asia and North America. In Fennoscandia it has been found chiefly in the northern areas though reaching as far south as Denmark (Böcher, 1995; Gusarov, 1995). It occurred in both Stratum F and Stratum C.

\**Olophrum boreale* is a hygrophilous species associated with damp decaying vegetation, widespread in the northern half of Fennoscandia and northern Asia (Böcher, 1995). It has a relict outpost in the High Tauern Mountains of Austria (Koch, 1989). It occurred in Stratum C.

*\*Boreaphilus hennigianus* is another small predator with a wide distribution across northernmost Fennoscandia, Norway, north Russia and northern Siberia (Mani 1968; Ostbye and Hagvar, 1966). There is a relict population in the Rhön Mountains of central Germany (Koch, 1989). Its habitat requirements are similar to those of the previous species. It occurred in both Stratum F and Stratum C.

*\***Holoboreaphilus nordenskioeldi* is another small predatorwith a circumpolar geographical distribution. Its nearest locality today is on Novaya Zemlaya from where it ranges eastward to northern Alaska. It is found under moss and stones (Coope, 1982). It occurred in both Stratum F and Stratum C.

\**Tachinus caelatus* is a predator, known today only from Mongolia where it lives in the mountains near Ulan Bator and is found under moss and leaves in the birch woodland at altitudes between 1150m and 2000m (Ullrich, 1975). This species has been found as a fossil in a variety of Quaternary deposits in both Britain and Switzerland - mostly early Devensian and Late glacial in date - and always in company with arctic beetle species. Its present-day restricted distribution may thus not reflect the full climatic potential of this species. It occurred in Stratum F.

\**Simplocaria metallica* is a species that feeds exclusively on tightly matted mosses on sandy-granular soils in boreal and alpine habitats (Böcher, 1995). It has a boreo-montane distribution in Europe, being widespread in the far north of Fennoscandia but also living on the high mountains of central Europe. It is also recorded from Greenland (Böcher, 1995). There may be some confusion between this species and other similar northern species such as *Simplocaria elongata* Sahl*.* As a fossil it is frequently abundant in Quaternary deposits where it is always associated with numerous other northern species. It occurred in both Stratum F and Stratum C.

*\*Hippodamia arctica* is a ladybird that feeds on aphids on small *Salix* or *Betula nana* bushes (Brundin, 1934). It lives today in northern Fennoscandia and northern Russia (Pechora) (Brundin, 1934). There is a subspecies in the Caucasus Mountains. It occurred in Stratum C.

*Notaris aethiops* is a boreo-montane weevil that feeds on reedy vegetation in marshy habitats beside ponds (Koch, 1992). Its wide geographical range covers northernmost Europe, including northern Britain and it also extends across northern Asia to Alaska (Lindroth, 1957). It is also found in the mountains of central Europe (Koch, 1992). It is very common fossil in Quaternary beetle assemblages (frequently: Devensian and late glacial) where it is found with numerous other northern species. It occurred in both Stratum F and Stratum C.

1. **Mollusc assemblages**

Molluscan data for Stratum F were derived from the quantified faunal list provided by Sparks (1956), recovered from a bulk sample taken from section no. 100 of the 1953 season of the R.G. West excavations. This has been included in Fig. 6 to give an impression of the complete Hoxne molluscan succession, but it should be noted that it was obtained from a more marginal part of the lake than the material from overlying strata. A series of nine samples (9–16, 18) from Stratum E was recovered during the 2000 season (AHOB excavations) from an exposure in Area I. Only two samples (91, 89) from Stratum D yielded limited molluscan assemblages, both collected in 2001 from Area III. Mollusc shells from Stratum C were recovered from the same series of 19 samples (301–319) processed for vertebrate remains (Fig. 2). Stratum B2 was excavated in 2001 in Area III, yielding a sequence of 17 samples (68, 69, 71, 74–79, 81–88) with a further 8 samples from Stratum B1 excavated in 2002 from a section in Area IV, exposed in a narrow trench previously excavated in 1978.

1. **Stratum C small vertebrate assemblages**

The presence of *Dicrostonyx* is particularly noteworthy since this genus is a valuable environmental indicator. In broad terms it is taken to indicate regionally cold and open conditions, similar to the modern tundra and Pleistocene mammoth steppe (Guthrie, 1968). Today *Dicrostonyx* has a circumpolar distribution confined to the tundra and forest-tundra with a chain of closely related species distributed from the Kanin Peninsula in western Russia, across northern Siberia to Alaska, northern Canada and Greenland. Ecologically, the North American and Eurasian species are alike and they exhibit similar adaptations for life in extreme northern climates (Stenseth and Ims, 1993). These specializations include the ability to grow white pelage in winter and greatly enlarged claws of the forefoot, enabling them to claw through compacted snow. The various species of *Dicrostonyx* also occupy a similar range of high-arctic habitats, with preference for dry slopes and river valleys with patchy vegetation; marshy areas and woodland are avoided. As winter approaches they congregate in places with early snow cover, such as hill slopes and dry river banks, where they overwinter in burrows under the snow. In summer their runways extend through grass tussocks and thickets of birch and willow; they also dig underground burrows above the permafrost. Winter food consists of twigs and bark of birch and willow; in summer, grasses, sedges, berries and leaves of dwarf trees are the main food sources.

In Europe, several Pleistocene *Dicrostonyx* species have been described. A succession of chronospecies – Middle Pleistocene *D*. *simplicior*, Late Pleistocene *D*. *gulielmi* and the modern *D*. *torquatus* – has been established using morphological characters of the teeth, notably an increase in the complexity of the molar occlusal pattern (Nadachowski, 1982). The relatively simple form of the M2 from Stratum C falls within the range of morphotypes that characterize ‘*D*. *simplicior*’. Although the specific identity of Middle and Late Pleistocene *Dicrostonyx* is debated (Ponomarev and Andreicheva, 2019), it appears that the specialized ecology and habitat requirements of *Dicronstonyx* can be traced at least as far back as the early Middle Pleistocene. For the Late Pleistocene, this is illustrated by ancient DNA analyses of AMS-dated collared lemmings from Belgium and South West England (Brace et al. 2012). This study shows that collared lemmings in western Europe were acutely sensitive to climatic instability, particularly short-term climatic warming events, which resulted in population declines and local extinctions. During ecologically challenging periods, lemming ranges contracted to refugial areas, from which they recolonized areas of their former range when favourable conditions returned (Palkopoulou et al., 2016).

A particularly informative ecological record associated with Middle Pleistocene *Dicrostonyx* comes from the early Anglian (MIS 12) ‘Arctic Fresh-water Bed’ at Ostend, Norfolk (Parfitt et al., 2010). Here, the biota suggests a distinctly high boreal/arctic environment and an open landscape with occasional dwarf shrubs and conifers. The associated beetle fauna includes at least two species that currently have their closest occurrences on either the Kola or Kanin peninsulas in arctic Russia. Palaeotemperature reconstructions (MCR) on the Ostend beetle fauna suggest that the mean July air temperature lay somewhere between +9 °C and +11°C, and mean January air temperature between –36 °C and –10°C. The associated ostracod assemblage yielded consistent MOTR results with mean July and January air temperatures between +10 °C and +13 °C and between –21 °C and –20 °C, respectively, a possible modern climate analogue region being the Bolshezemelskaya Tundra in the northeastern European Russian Arctic (Horne et al., 2012). Elsewhere in the British Pleistocene, arctic lemmings are invariably associated with faunal or palaeobotanical evidence for tundra or steppe-tundra conditions (Sutcliffe and Kowalski, 1976).

1. **Full taxonomic names of species found at Hoxne and mentioned in the text, tables, figures and Supplementary Material**

**Chironomidae**

*Chironomus anthracinus* Zetterstedt 1860-type

*Chironomus* 1st instar larva

*Chironomus plumosus* (Linnaeus 1758)-type

*Cladatanytarsus mancus* (Walker 1856)-type

*Cladopelma lateralis* (Goetghebuer 1934)-type

*Corynocera ambigua* Zetterstedt 1838

*Cricotopus bicinctus* (Meigen, 1818)-type

*Cricotopus laricomalis* Edwards 1932-type

*Cricotopus oliveri* Soponis 1977-type

*Eukiefferiella claripennis* (Lundbeck 1898)-type

*Dicrotendipes notatus* (Meigen, 1818)-type

*Endochironomus impar* (Walker, 1856)-type

*Endochironomus albipennis* (Meigen, 1830)-type

*Glyptotendipes pallens* (Meigen 1804)-type

*Glyptotendipes severini* Goetghebuer, 1923-type

*Limnophyes*

*Metriocnemus eurynotus* (Holmgren, 1883)-type

*Metriocnemus hygropetricus* (Kieffer, 1911)-type

*Microtendipes pedellus* (De Geer, 1776)-type

*Monodiamesa*

*Nanocladius branchicolus* Saether, 1977-type

*Parachironomus varus* (Goetghebuer, 1921)-type

*Paracladius conversus* (Walker, 1856)-type

*Paracladopelma nais* (Townes, 1945)-type

*Parakiefferiella bathophila* (Kieffer, 1912)-type

*Paratanytarsus penicillatus* (Goetghebuer, 1928)-type

*Paratendipes albimanus* (Meigen, 1919)-type

*Phaenopsectra flavipes* (Meigen, 1818)-type

*Polypedilum nubeculosum* (Meigen, 1804)-type

*Polypedilum pedestre* (Meigen, 1830)-type

*Procladius*

*Propsilocerus jacuticus* (Zvereva, 1950)-type

*Psectrocladius (Allopsectrocladius) flavus* (Johannsen, 1905)-type

*Psectrocladius (Mesopsectrocladius) barbatipes* Kieffer 1923-type

*Psectrocladius (Monopsectrocladius) septentrionalis* Chernovskij, 1949-type

*Psectrocladius (Psectrocladius) sordidellus* (Zetterstedt, 1838)-type

*Pseudochironomus prasinus* Meigen, 1818-type

*Pseudodiamesa*

*Pseudosmittia*

*Sergentia coracina* (Zetterstedt, 1850)-type

*Smittia*

*Stempellina bausei* (Kieffer, 1911)-type

*Stempelinella* - *Zavrelia*

*Stictochironomus rosenschoeldi* (Zetterstedt, 1838)-type

*Tanytarsus lugens* (Kieffer in Thienemann & Kieffer, 1916)-type

*Tanytarsus mendax* Kieffer, 1925-type

*Tanytarsus pallidicornis* (Stephens in Walker, 1856)-type

**Coleoptera**

*Agonum chalconatum* Faldermann, 1836

*Bembidion guttula* (Fabricius, 1792)

*Bembidion hasti* Sahlberg, 1827

*Bembidion mckinleyi* Fall, 1926

*Boreaphilus hennigianus* Sahlberg, 1832

*Colymbetes dolabratus* (Paykull, 1798)

*Colymbetes fuscus* (Linnaeus, 1758)

*Diacheila polita* (Faldermann, 1835)

*Donacia aquatica* (Linnaeus, 1758)

*Donacia cinerea* Herbst, 1784

*Donacia semicuprea* Panzer, 1796

*Donacia thalassina* Germar, 1811

*Helophorus obscurellus* Poppius, 1907

*Hippodamia arctica* Schneider, 1792

*Holoboreaphilus nordenskioeldi* (Mäklin, 1878)

*Notaris aethiops* (Fabricius, 1792)

*Olophrum boreale* (Paykull, 1792)

*Oreodytes alpinus* (Paykull, 1798)

*Plateumaris affinis* (Kunze, 1818)

*Pycnoglypta lurida* (Gyllenhal, 1813)

*Simplocaria metallica* (Sturm, 1807)

*Stenoscelis submuricatus* (Schönherr, 1832)

*Tachinus caelatus* Ullrich, 1975

*Xestobium rufovillosum* (De Geer, 1774)

**Ostracoda**

*Candona candida* (O.F. Müller, 1776)

*Candona neglecta* Sars, 1887

*Cyclocypris* sp.

*Cyclocypris obunca* Fuhrmann, 1991

*Cyclocypris ovum* (Jurine, 1820)

*Cypridopsis vidua* (O.F. Müller, 1776)

*Cytherissa lacustris* (Sars, 1863)

*Darwinula stevensoni* (Brady & Robertson, 1870)

*Fabaeformiscandona levanderi* (Hirschmann, 1912)

*Fabaeformiscandona protzi* (Hartwig, 1898)

*Herpetocypris reptans* (Baird, 1835)

*Ilyocypros spp.*

*Ilyocypris bradyi* Sars, 1890

*Ilyocypris decipiens* Masi, 1905

*Ilyocypris gibba* (Ramdohr, 1808)

*\*Ilyocypris quinculminata* Sylvester-Bradley, 1973

*Leucocythere batesi* Whittaker & Horne, 2009

*Limnocythere falcata* Diebel, 1968

*Limnocythere suessenbornensis* Diebel, 1968

syn. *Limnocythere friabilis* Benson & McDonald, 1963

*Limnocytherina sanctipatricii* (Brady & Robertson, 1869)

*Metacypris cordata* Brady & Robertson, 1870

*Paralimnocythere compressa* (Brady & Norman, 1889)

*Pseudocandona* sp.

*Scottia browniana* (Jones, 1850)

**Mollusca**

*Ancylus fluviatilis* Müller, 1774

*Anisus leucostoma* (Millet, 1813)

*Bathyomphalus contortus* (Linnaeus, 1758)

*Bithynia tentaculata* (Linnaeus, 1758)

*Galba truncatula* (Müller, 1774)

*Gyraulus crista* (Linnaeus, 1758)

*Gyraulus laevis* (Alder, 1838)

*Hippeutis complanatus* (Linnaeus, 1758)

*Lymnaea stagnalis* (Linnaeus, 1758)

*Myxas glutinosa* (Müller, 1774)

*Pisidium* spp

*Pisidium amnicum* (Müller, 1774)

*Pisidium casertanum* (Poli, 1791)

*Pisidium clessini* Neumayr, 1875

*Pisidium henslowanum* (Sheppard, 1825)

*Pisidium milium* Held, 1836

*Pisidium moitessierianum* Jenyns, 1832

*Pisidium nitidum* Jenyns, 1832

*Pisidium obtusale* (Lamarck, 1818)

*Pisidium subtruncatum* Malm, 1855

*Pisidium tenuilineatum* Stelfox, 1918

*Planorbis planorbis* (Linnaeus, 1758)

*Radix balthica* (Linnaeus, 1758)

*Sphaerium corneum* (Linnaeus, 1758)

*Stagnicola palustris* agg.(Müller, 1774)

*Valvata cristata* Müller, 1774

*Valvata piscinalis* (Müller, 1774)

**Pisces**

*Alburnus alburnus* (Linnaeus, 1758)

*Esox lucius* Linnaeus, 1758

*Phoxinus phoxinus* (Linnaeus, 1758)

*Pungitius pungitius* (Linnaeus, 1758)

*Perca fluviatilis* Linnaeus, 1758

*Gymonocephalus cerna* (Linnaeus, 1758)

**Mammalia**

*Dicrostonyx* sp.

**Plantae**

*Azolla filiculoides* Lamarck, 1783

*Betula nana* Linnaeus & Klase, 1743

*Ceratophyllum demersum* Linnaeus, 1753

*Hedera helix* Linnaeus, 1753

*Ilex aquifolium* (Linnaeus, 1753)

*Miriophyllum spicatum* Linnaeus, 1753

*Sanguisorba officinalis* Linnaeus, 1753

*Typha latifolia* Linnaeus, 1753

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