# On the aquatic invertebrate fauna in feeder drains in fields in Hausjärvi, southern Finland.

Mauri Hirvenoja

Hirvenoja, M. 2001: Observations of the aquatic invertebrate fauna in feeder drains in fields in Hausjärvi, southern Finland. — Sahlbergia 6: 1-8. Helsinki, Finland, ISSN 1237-3273.

Aquatic invertebrates from a few feeder drains of the fields with a permanent water stand or water flow were netted and if necessary (the chironomids) reared to the adult stage. The water chemistry showed high amounts of plant nutrients and soil improvers (e.g. Ca). 18 invertebrates including the xenosaprobic spring species and species with at most a lower beta-mesosaprobic indication value were found.

Key words: Agriculture, epirhithral, feeder drains, chemical loading, aquatic invertebrates, saprobity, biodiversity.

*Mauri Hirvenoja, Sotilaskorventie 13, FIN 01730 Vantaa, Finland*

## Introduction

Because of underground drainage open feeder drains are today rare in Finnish fields. Most feeder drains, usually about 0.5 m broad and deep, are in the summer dry periodical aquatic habitats. The vernal aquatic fauna in such drains resembles vernal snow melting pools and their easily visible macrofauna includes especially vernal culicid midges. According to some tentative samples of the author, the species in a “drain pool” are not necessarily the same as in another pool on an uncultivated site on the same soil. So for instance the R4 acid pool (conductivity 5.4 mS/m, $\gamma 25$) on an open raised bog (Hirvenoja 1962) was inhabited by *Aedes punctor* (Kirby) and *A. hexodontus* Dyar. The feeder drains in the open field (conductivity 10.0-21.3 mS/m, $\gamma 25$) at a distance of 20-30 m from R4 were inhabited by *A. communis* (De Geer) (unpubl. material), which is usually found in shaded forest pools. In the mineral bottom the relations of the species were sometimes reversed. The feder drains in the fields are loaded with plant nutrients and other substances for soil improvement; this can roughly be seen for instance from the high conductivity and higher pH of their waters.

It has now been understood for about 150 years (Cohn 1853) that different aquatic organisms show different grades of tolerance against variable water quality. Accurate studies of the aquatic communities in Finland are scanty or lacking from this point of view in spite of the lively discussion about the influence of the agriculture on nature.

The present tentative samples are from fields with drainage by open ditches, which had a small, but obviously a permanent water content and at least occasionally a small flow of water. The feeder drains studied belong to the epirhithral zone, but opposite to the normal spring brooks may have high daily temperature fluctuations. The sites studied were visited only occasionally, why the temperature fluctuations are unknown.

## The study area

The study area is in the commune of Hausjärvi about 5 km NE of the town of Riihimäki near the Lahti - Forssa main road. At the time of the sampling the fields were quite newly ploughed and the most drains obviously also recently opened. The sites are indicated below by a uniform grid system (Grid 27°E; Heikinheimo & Raatikainen 1971, 1981).

**St. 1** – 67422:33829 (Korpela). The field was inclined and the water had a continuous current (approximately ?10-20 cm/sec) of a very thin water layer in a narrow (<20cm) clay bottom. The origin of the water was unknown, but it obviously was coming from a spring. The water chemistry in 1991 is given in Table 1; besides this on September 1992 a value of conductivity of 13.1 mS/m (γ25) was measured (N=1).

**St. 2** – 67422:33827 (Kokkarinen) was similar, but on 2nd September no current was observed. The water chemistry in 1991 is given in Table 1. Besides this on September 1992 a value of conductivity 11.1 mS/m (γ25) was measured (N=1).

**St. 3** – 67424:33823. This site resembled a clay pool (diameter <1 m; depth < 30 cm) without vegetation and distinct observable flow of current. The same water was, however, running from St. 3 in a narrow drain through the

**St. 4** - 67426:33824 (Liinaharjanmäki), where the bottom was covered by leaves and grass. The water obviously originated from a spring, but was coming to St. 3 from a pond, where it obviously became warmer. The measurements of the water chemistry (Table 1) for both these sites in 1991 originate from the feeder drain between these two sites, which were thought to have a quite similar water quality at both ends. In addition to the values in Table 1 values of the very variable conductivity between 18.4 and 37.5 mS/m (γ25) were observed 1991-92 (N=4).

Table 1. Measurements of the water chemistry in the feeder drains of the fields studied in Hausjärvi 1991 by the laboratory of Viljavuuspalvelu Oy;method: ICP (induction coupled plasma measurement). Included are the author´s measurements of the temperature. The air temprature on 2nd September 1991 at the moment of collecting the animal and water samplings was +21°C.

Taulukko 1. Tuloksia Hausjärvellä v. 1991 tutkittujen sarkaojien veden kemiasta; analyysit on tehnyt Viljavuuspalvelu Oy:n laboratorio. Mukaan on liitetty myös kirjoittajan vesinäytteitä ottaessaan mittaamat veden lämpötilat 2.9.1991.

| **Site** | | **St. 1** | **St. 2** | **St. 3-4** | |
|---|---|---|---|---|---|
| Date | | 02.09 | 02.09 | 02.09 | 19.09 |
| Temp. °C | | +16 | +18 | +19 | ? |
| Ptot | mg/l | <0.2 | 0.70 | <0.20 | <0.20 |
| K | mg/l | 2.1 | 6.8 | 2.5 | 4.9 |
| Ca | mg/l | 10.4 | 14.6 | 27.5 | 25.1 |
| Mg | mg/l | 3.3 | 4.6 | 7.5 | 6.3 |
| Na | mg/l | 5.2 | 10.0 | 9.1 | 20.6 |
| Fe | mg/l | 1.1 | 1.7 | 1.1 | 0.23 |
| Cu | mg/l | 0.01 | <0.01 | <0.01 | 0.02 |
| Zn | mg/l | <0.01 | 0.10 | <0.01 | 0.02 |
| Mn | mg/l | 0.05 | 0.05 | 0.20 | 0.05 |
| Al | mg/l | 0.59 | 1.1 | 0.49 | 0.07 |
| S | mg/l | 4.3 | 2.3 | 2.2 | 5.4 |
| Si | mg/l | 8.9 | 10.0 | 6.8 | 7.1 |
| pH | | 6.8 | 7.1 | 7.7 | 7.0 |
| Cond.mS/m (γ25) | | 11.0 | 21.0 | 26.0 | 34.0 |

## Methods

Roughly 1-1.5 l of substrate was netted (hand net, mesh 0.4 mm). The sample was only slightly sieved in the same net to avoid losing the smallest larvae. The animals, which were readily observable were removed from small amounts of mud using a preparation microscope and subsequently preserved in ethyl alcohol (75%). The remaining individuals still in the mud were reared to adult stage at the room temperature in an aerated vessel. The method was the same as the author used in handling samples from the river Vantaanjoki and from some springs (Hirvenoja 2000, 2001). The results are given in Table 2.

## Notes on the species found in the feeder drains

### Crustacea

*Ceriodaphnia megops* G.O.Sars — The species inhabits small water bodies (Enckell 1980)

Table 2. The numbers of invertebrates in 1-1.5 l sediment of some feeder drains of fields in Hausjärvi 1991. In more or less pelagial components + = present, ++ = abundant in a sample.
Taulukko 2. Pohjaeläinlajiston yksilömäärät Hausjärvellä 1991 haavituista muutamien sarkaojien 1-1.5 litran suuruisista sedimenttinäytteistä. Näytteisiin mukaan tulleista enemmän tai vähemmän vapaan veden (pelagiaalisista) lajeista + = on läsnä, ++ = runsaslukuinen näytteessä.

| Site | St.1 | St.2 | St.3 | St.4 |
|---|---|---|---|---|
| Date | 2.9 | 2.9 | 12.8 | 12.8 |
| **Crustacea** | | | | |
| *Ceriodaphnia megops* | - | - | + | - |
| *Candona* sp. | - | + | ++ | - |
| *Eucyclops serrulatus* | - | - | ++ | - |
| *Macrocyclops fuscus* | - | - | + | - |
| **Acarina, Oribatidae** | | | | |
| *Hydrozetes lacustris* | - | + | - | - |
| **Plecoptera** | | | | |
| *Nemurella picteti* | - | 1 | - | - |
| **Trichoptera** | | | | |
| *Limnephilus* sp. (larvula) | - | - | - | 1 |
| **Diptera, Culicidae** | | | | |
| *Culex territans* | - | - | ++ | - |
| **Diptera, Chironomidae** | | | | |
| *Zavrelimyia* sp. (larvula) | - | - | 1 | - |
| *Parametriocnemus* sp. (♀) | - | - | - | 1 |
| *Chironomus piger* | - | - | - | 85 |
| *Micropsectra bidentata* | - | 2 | - | - |
| *M. notescens* | - | 1 | - | - |
| *Paratanytarsus tenellula* | - | - | - | 1 |
| *P. tenuis* | - | - | - | 4 |
| *Cladotanytarsus difficilis* | - | - | - | 2 |
| *Tanytarsus inaequalis* | - | - | - | 1 |
| *T. pallidicornis* | 1 | 1 | 6 | 2 |
| Number of taxa (18) | 1 | 6 | 7 | 8 |

and according to Sládeček (1973) it indicates oligosaprobity (S=1.3).

*Eucyclops serrulatus* (Fischer) — The species is one of the most common cyclopids (Enckell 1980) and according to Sládeček (1973) it most likely indicates beta-mesosaprobity (S=1.85).

*Macrocyclops fuscus* Jurine - A common species (Enckell 1980). According to Sládeček (1973) it indicates beta-meso - oligosaprobity (S=1.6).

**Acarina, Oribatei**

*Hydrozetes lacustris* Michael. — According to Willmann (1931), this species is in Germany a common member of the kinon (Fittkau 1976). In Finland the species has obviously been overlooked in the aquatic field studies. For instance in the 1960s and 1970s it was very abundant on the floating remnants of vegetation and excrements of the fishes in the coldwater aquaria in the Zoological Institute in Helsinki.

**Plecoptera**

*Nemurella picteti* Klapálek — According to Sládeček (1973) the species characterizes xenosaprobity (index S=0.2),

**Trichoptera**

*Limnephilus* sp. — According to Sládeček (1973) some species of this genus indicate oligo- or beta-mesosaprobic waters.

**Diptera**

**Culicidae:** *Culex territans* Walker (Syn. *Neoculex apicalis* Adams). — An adult of this holarctic species emerged on 14th August 1953 in a tent trap from a pond (M1 in Hirvenoja 1960) on a birch-spruce-hardwood peat moor in Riihimäki, southern Finland (cf. Utrio 1976:135). In August 1992 in Vantaa, the larvae of *C.territans* occurred together (about 1:1) with *C. pipiens* L. in a permanent garden pool (of concrete), whose water originated from a well. Some of the water was pumped every day to the garden and substituted from a well; the purpose was to keep the water of the pool as clean as possible to observe the qualitative development of the fauna in conditions, which was hoped to be suitable for the oligosaprobity tolerating fauna.

**Chironomidae:** *Zavrelimyia* sp. — The larvae are according to Fittkau & Roback (1983) "primarily inhabitants of sandy or detritus rich sediments of lentic habitats of stream sections close to springs or of springs themselves".

*Parametriocnemus* sp. — According to Cranston *et al.* (1989) the larvae are found in springs and relatively fast flowing, cold streams and rivers. Lindegaard (1995) considers two species of European *Parametriocnemus* as lotic spring species.

*Chironomus piger* Strenzke. — According to Frank (1983) for some common species of the genus *Chironomus* one can show the following order to the resistance of anoxia: *C. plumosus* > *C. anthracinus* > *C. tentans* > *C. thummi* >*C. piger*. *C. piger* has been found in Finland in a small permanent garden pool of concrete, in one shallow permanent forest pool as well as in one temporary vernal snow melting pool (Hirvenoja 1962:65-67, sub *Chironomus* sp.), all in Riihimäki. *C. piger* also coexisted in the community of a permanent garden pool in Vantaa 1992 together with *Culex torrentium* discussed before. Furthermore, *C. piger* emerged in June 1999 in a funnel trap in the lower part of the Siikakoski rapids in Konnevesi, Central Finland.This site was downstream from the rapids in the slack water but near an additional water fall forming the outlet of the waters from a local fishfarm on the side of the river bed. The remains of the fish food and plant nutrients had obviously spread to the site concerned; this site also received water from the direction of the Siikakoski rapids. The water originated from the oligotrophic Lake Konnevesi. A current 70 cm/sec was measured in some sites of the rapids. At the sites of the funnel traps the current was near the surface 20 cm/sec, at the depth of 2 m about 15cm/sec, but in the bottom (3 m) the current-meter was not rotating; the direction of the bottom vegetation (algae and *Sparganium* sp.) showed, however, the existence of a weak current.

*Micropsectra bidentata* (Goetghebuer). — Common in the authors (unpubl.) materials from the brooks of the study area in Hausjärvi and Riihimäki. According to the literature cited in Becker (1994) this species occurs in springs, running waters and lakes. Lindegaard (1994) considers it as a lotic spring species.

*M. notescens* Walker. — Common in the springs and brooks of the study area (Hirvenoja 2001). It is, according to Säwedal (1976: 124), a coldstenothermous and polyoxybiont species known from springs and the epirhithral zone of streams. On the basis of the European literature Lindegaard (1994) considers *M.notescens* as a crenobiont and crenophilous species.

*Paratanytarsus tenellulus* (Goetghebuer). — The finds cited in Brundin (1949), Säwedal & Langton (1977), Reiss & Säwedal (1981) or Langton (1991) indicate a species of the eutrophied conditions in the littoral of the lakes or other shallow waters.

*P. tenuis* (Meigen). — An eurythermous species which lives in shallow waters (Reiss & Säwedal 1981).

*Cladotanytarsus difficilis* Brundin. — Brundin (1947, 1949) reports this species from the Shwedish and Finnish lakes between depths of 0.5 - 8 m. It occurred in all shallow lakes of the Sompio area and in a small river in Sodankylä, northern Finland studied by the author 1959-61 (unpubl.).

*Tanytarsus inaequalis* Goetghebuer — One partially emerged male specimen available from the site St.4 has a too low AR but a too high LR value in comparison to those given in Reiss & Fittkau (1971). The pupa agrees with *T. inaequalis* in the key of Langton (1991). According to Reiss & Fittkau (1971) *T.inaequalis* prefers the profundal and sublittoral of lakes, Langton (1991) mentions as habitats also pools and streams. In the author´s material it is common in the lakes in northern Finland.

*T. pallidicornis* (Walker). — The occurrence in all drains studied indicates that *T. pallidicornis* may be an eucoen species in such biotopes like the studied feeder drains. The species has been recorded also from the littoral of the lakes but it prefers according to Reiss

& Fittkau (1971) running waters. Lehmann (1971) reports *T. pallidicornis* from the crenal to the epipotamal zones in Fulda, Germany. Lindegaard (1994) considers it on the basis of the European literature as a lotic and lentic species, which occurs especially in the limnocrenes. In Finland in Siikakoski mentioned above, it coexisted in June 1996 with *Chironomus piger*.

## Discussion

In the early phases of the classical typology of the stratified lakes the Tanytarsini were given as indicators of the oligotrophy in contrast to the Chironomini which indicated the eutrophy. Many species of *Tanytarsus* especially inhabit the littoral of the lakes preferring obviously good oxygenated waters, which prevail there at least in the summer. Also some of the fauna found in the feeder drains studied is present perhaps since they are sufficiently oxygenated, at least sometimes, by running waters.

The running of the water together with the low temperature especially at site St. 1 indicate that the water in the sites studied originates for the most part from springs, but is loaded according to the standard analyses used (Table 1) by the local agricultural nutrients and soil improvers. An unexpected (summer!) Na content was measured in St. 3-4 on 19th September1991 (Table 1).

Some of the present species belong to the known fauna of the springs (*Nemurella picteti*, *Zavrelimyia*, *Parametriocnemus*, *Micropsectra bidentata*, *M. notescens*, *Tanytarsus pallidicornis*) or those of the brooks. Only species with a low saprobity index are present in the material. So far it is permitted to do an approximation on the basis of the sparse saprobity indices of the species found in the literature to interpret the quality of the sites studied, a beginning beta-mesosaprobic state might come close to the conditions in the feeder drains studied. The only species of the genus *Chironomus* is found from the site (St. 3-4), where organic material is abundantly present, because that drain was not opened recently; the fauna in the biotope St. 4 (Liinaharjanmäki) (Table 2) prefers probably more biotopes with (in this case allochton) organic substances. The amount of the dissolved nutrients, which must originate from the fields, does not seem to have a toxic effect on those species found in the drains. In the present material only *Eucyclops serrulatus* occurred, for instance, also in the fauna found in the River Vantaa (Hirvenoja 2000), which is to a certain extent polluted by the municipal waste waters.

In Finland the studies of Järnefelt (1924, 1926) had already shown that the plant nutrients influence the quantitative production of the chironomid species present in his experiments. Similar results, the increasing population densities of *Cricotopus bicinctus* (Meigen) and *C. mackenziensis* Oliver as responses to the crude oil contamination were presented by Rosenberg *et al.* (1977). Particularly important for the monitoring of the grades of the water quality is to observe the succession of the various species of the community – not the species groups (see Kownacki 1989; Hirvenoja 2000, Table 4).

The number of the species found in the feeder drains studied is very small probably because of the age of the drains. Most of them, except site St. 4 (Liinaharjanmäki) contain only clay ooze. The biodiversity is at the same level as it is for instance in the authors materials in some snow melting pools, showing perhaps the low number of merotopes (for instance the Shannon diversity index is 0.506 in St.4).

In discussions concerning nature conservation, opinions have often been presented, without scientific zoological evidence, on the deleterious grade of the supposed consequences of certain activities undertaken by farmers (e.g. Salonen 1999). Also the water administrators in Finland have diligently measured water chemistry, but usually not given information about its influence on the fauna present on the sites.

Often also the toxicity of certain chemicals or the water quality has been tested by a single animal species such as *Daphnia pulex* DeGeer (Index S = 2.8) or *Chironomus riparius* Meigen (syn. *C.thummi* Kieffer) from which the latter according to Bazerque *et al.* (1989:31) is the most pollution tolerating chironomid species. Therefore such studies can by no means indicate the influence on the entire aquatic communities. Accurate and reliable studies on aquatic invertebrate species are urgently needed also to estimate the influence of plant nutrients on the aquatic animal communities.

*Acknowledgement*: A contribution from Ympäristönseuranta ry. (Association for environmental policy monitoring, Riihimäki) is acknowledged with gratitude.

## Literature

Bazerque, M.F., Laville, H. & Brouquet, Y. 1989: Biological quality assesment in two rivers of the northern plain of France (Picardie) with special reference to chironomid and diatom indices. — Acta Biol. Debr. Oecol. Hung. 3:29-39.

Becker, C. 1995: Ein Beitrag zur Zuckmückenfauna des Rheins (Diptera: Chironomidae). — (Berichte aus der Biologie) Shaker, Aachen, 265 pp. ISBN3-8265-0696-0.

Brundin, L. 1947: Zur Kenntnis der schwedischen Chironomiden. — Arkiv Zool. 39A(3):1-95.

Brundin, L.1949: Chironomiden und andere Bodentiere der südschwedischen Urgebirgseen. Ein Beitrag zur Kenntnis der bodenfaunistischen Charakterzüge schwedischer oligotropher Seen. — Inst. Freshw. Res. Drottningholm Rep. 30:1-914.

Cohn, F. 1853: Über lebende Organismen im Trinkwasser. — Zeitschr. Klin. Med. 4:229-237.

Cranston, P. S., Oliver, D. R. & Sæther, O. A. 1989:9. The adult males of Orthocladiinae. Keys and diagnoses. In: Wiederholm, T. (ed.), Chironomidae of the Holarctic region. Keys and diagnoses. Part 3. Adult males. — Entomol. Scand. Suppl. 34:165-352.

Enckell, P. H. 1980: Kräftdjur. — 685 pp. Lund.

Fittkau, E. J.1976: Kinal und Kinon. Lebensraum und Lebensgemeinschaf der Oberflächendrift am Beispiel amazonischer Fließgewässer. — Biogeographica 7:101-113.

Fittkau, E.-J. & Roback, S. S. 1983: The larvae of Tanypodinae (Diptera: Chironomidae) of the Holarctic region – Keys and diagnoses. — Entomol. Scand. Suppl. 19:33-110.

Frank, C. 1983: Ecology, production and anaerobic metabolism of Chironomus plumosus L. larvae in a shallow lake. II. Anaerobic metabolism. — Arch. Hydrobiol. 96:353-362.

Heikinheimo, O. & Raatikainen, M. 1971: Paikan ilmoittaminen Suomesta talletetuissa biologisissa aineistoissa. (Ortbeteckning för biologiskt material tillvarataget i Finland. The recording of localities of biological finds in Finland.) — Ann. Entomol. Fennici 37, 1a:1-27.

Heikinheimo, O. & Raatikainen, M. 1981: Ruutukoordinaattien ja paikannimienkäyttö Suomessa, (Grid reference and names of localities in the recording of biological finds in Finland.) — Notulae Entomol. 61:133-154.

Hirvenoja, M. 1960: Ökologische Studien über die Wasserinsekten in Riihimäki (Südfinnland). I. Chaoboridae (Dipt., Culicidae). — Ann. Entomol. Fennici 26:31-44.

Hirvenoja, M. 1962: Ein Vergleich der Culiciden-Fauna einiger süd- und nordfinnischen Schmelzwasserlachen. — Ann. Entomol. Fennici 28:97-107.

Hirvenoja, M. 2000: Macroscopic bottom fauna in the slack water and rapids of Pitkäkoski in the river Vantaanjoki (southern Finland). — Memor. Soc. Fauna Flora Fennici 76:27-39.

Hirvenoja, M. 2001: The fauna in two cold springs and in a hypocrenal pool in southern Finland. — Memor. Soc. Fauna Flora Fennici (in press).

Järnefelt, H. 1924: Untersuchungen über die Einwirkung einiger Dungstoffe auf die Production von Chironomiden-Larven. — Verh. Int. Ver. Theor. Angew. Limnologie 1923-1924, 2:341-356.

Järnefelt, H. 1926: Beiträge zur Frage der Produktionserhöhung des Wassers durch Düngung. — Ann. Soc. Zool. Bot. Fennicae

Vanamo 4:191-212, 7 Tables and 5 diagrams.
Kownacki, A. 1989: Taxocenes of Chironomidae as an indicator for assessing the pollution of rivers and streams. — Acta Biol. Debr. Oecol. Hung. 3:219-213.
Langton, P. 1991: A key to pupal exuviae of West Palearctic Chironomidae. — Mimeography, 386 pp.
Lehmann, J. 1971: Die Chironomiden der Fulda. Systematische, ökologische und faunistische Untersuchungen. — Arch. Hydrobiol. Suppl. 37:466-555.
Lindegaard, C. 1995: Chironomidae (Diptera) of European cold springs and factors influencing their distribution. — J. Kansas Entomol. Soc. 68(2) Suppl.:108-131.
Reiss, F. & Fittkau, E.-J.1971: Taxonomie and Ökologie europäisch verbreiteter Tanytarsus-Arten (Chironomidae, Diptera). — Arch. Hydrobiol. Suppl. 40:75-200.
Reiss, F. & Sävedal,L. 1981: Keys to males and pupae of the Palaearctic (excl. Japan) Paratanytarsus Thienemann & Bause, 1913, n. comb., with descriptions of three new species (Diptera: Chironomidae). — Entomol. Scand. Suppl.15:73-104.
Rosenberg, D. M., Wiens, A. P. & Sæther, O. A. 1977: Responses to crude oil contamination by Cricotopus (Cricotopus) bicinctus and C.(C.) mackenziensis(Diptera: Chironomidae) in the Fort Simpson Area, Northwest Territories. — J. Fish. Res. Board Canada 34:254-261.
Salonen, J. 1999: Tukileikkurilla vesistöjen pilaajat kuriin. — Suomen Luonto 2/99:17.
Sládeček, V. 1973: System of water quality from the Biological point of view. — Arch. Hydrobiol. Beih. Ergebn. Limnol. 7: 1-218 + 64 Tables.
Säwedal, L. 1976: Revision of the notescens-group of the genus Micropsectra Kieffer, 1909 (Diptera: Chironomidae). — Entomol. Scand. 7:109-144.
Säwedal, L. & Langton, P. 1977: Redescription of Paratanytarsus tenullulus (Goetghebuer, 1921) (Diptera, Chironomidae). — Entomol. Scand. 8:167-171.
Utrio, P. 1976: Identification key to Finnish mosquito larvae (Diptera,Culicidae). — Ann. Agricult. Fenniae 15:128-136.
Willmann, C. 1931: Moosmilben oder Oribatiden (Cryptostigmata). — In: Dahl, Dahl & Bischoff (eds), Die Tierwelt Deutschlands und der angrenzenden Meeresteile 22:79-200.

## Selostus

Kirjoituksessa tarkastellaan muutamista haavintanäytteistä saatua virtaavien vesien ylimpiin osiin (epirhithraali) kuuluvien avointen savimaan sarkaojien selkärangattomien lajistoa. Kysymyksessä ovat harvinaisehkot, ehkä jopa poikkeuksellisina pidettävät, erittäin vähävetiset, mutta ilmeisesti melko pysyvät elinympäristöt lähteiden läheisyydessä. Ilman pysyvyyttä (tavalliset sarkaojat) lajikoostumus olisi toisenlainen. Näytteiden oton aikana tutkitut pellot olivat kynnöksellä, juuri kalkittuina ja ojat aurattuina vailla havaittavia määriä orgaanisia aineksia neljättä näytepaikkaa lukuunottamatta. Kyseisten vesien lämpötiloissa näkyy (Taulukko 1) vaihtelevasti enää heikohkosti lähdevesille luonteenomainen matala lämpötila. Veden kemiallisista (standardi-) analyysituloksista näkyy m.m. korkea ravinnepitoisuus. Lajisto edustaa tästä huolimatta suureksi osaksi m.m. lähteiden ja lähdepurojen faunaa, johon Euroopassa kuuluu noin 1000 lajia; näistä noin puolet on hyönteisiä.

Tavattujen lajien biologisessa luonnehdinnassa on käytetty, jos mahdollista, niiden kirjallisuudesta tunnettua ilmentäjäarvoa 5-asteisessa saprobijärjestelmässä (xeno-, oligo-, b-meso-, a-meso- ja polysaprobia). Sen kehittämisen aloittivat Kolkwitz ja Marsson 1900-luvun alussa. Mainittakoon, että sen perustana on mitattavissa oleva biologisen hapenkulutuksen (BHK) kulloinenkin taso, johon tarjolla oleva eliöstö suhtautuu ominaisuuksiensa mukaan. Tämä tarkoittaa sitä, että BHK-arvon noustessa esimerkiksi happea paljon vaativat (tai hapettomuutta huonosti kestävät) eliölajit jäävät yhteisöstä pois. Orgaaninen aines saattaa hajotessaan aiheuttaa esim. hapen vähenemistä, mutta koska se on monille erittäin mieluisa elinympäristö,vähäisempää happipitoisuutta sietäviä lajeja puolestaan tulee lisää.

Saprobijärjestelmä on asteikoltaan karkea, suunnilleen Suomen vesiviranomaisten käyttämän järjestelmän kaltainen, mutta eroaa siitä siten, että tuloksesta nähdään myös miten käytetyn organismiryhmän lajeille on käynyt tarkastelluissa olosuhteissa. Suomalainen ympäristöluokitus ei perustu esimerkiksi pohjaeläinlajiston koostumukseen miltään osin, emmekä sen perusteella tiedä tästä eläimistöstä mitään.

Suomen ympäristöviranomaiset ovat virallisessa lausunnossaan ilmaisseet käsityksenään, että saprobijärjestelmään perustuva pohjaeläinseuranta ei sovellu Suomen, vaan ainoastaan Keski-Euroopan suurten jokien olosuhteisiin. Kirjoittajan vastaus tähän väitteeseen on julkaistu toisaalla: Vantaanjoen Pitkäkosken ja siihen liittyvän suvannon vuosien 1982-1991 havaintoaineistoista saatuna saprobisuusluokituksena (Hirvenoja 2000). Tulos vastaa Suomen vesiviranomaisten käyttämän menetelmän antamia arvoja veden laatuluokasta samasta paikasta. Erotuksena on kuitenkin se, että koskessa saprobiluokitus antaa samasta vedestä yhtä luokkaa "paremman" (?todellisemman tuloksen eläinten kannalta) niin Vantaanjoesta kuin Keski-Euroopan vesistäkin. Siellä viimeksi mainittu asia on kuitenkin ollut tunnettu kohta puolisen sataa vuotta; monet eläinlajit kykenevät hyödyntämään veden nopeaa virtausta hengityspinnan yli.

Eliöstön ja veden laadun välisissä suhteissa hengitys on vain yksi osatekijä. On luultavaa, että tehtyyn saprobiluokitukseenkin on vaikuttanut ainakin jonkin verran erilaisten kemiallisten aineiden, esimerkiksi puhdistuslaitosten käyttämän raudan suora myrkyllisyys sinänsä. Näiden tekijöiden erottaminen pitäisi myös kuulua tutkimuksen tavoitteisiin. On esimerkkejä, että kemiallisiin tekijöihin nimenomaan yksittäiset lajit suhtautuvat eriasteisesti.

Saprobijärjestelmän vaikeutena on sen vaatima erittäin suuri lajintuntemuksen hallinta. Sen vuoksi sitä on yritetty korvata vesistöluokituksissa asteikoilla, joiden ilmentäjinä on lajia korkeampia helpommin hallittavia systemaattisia yksiköitä. Niinpä esimerkiksi surviaissääskien, lähteiden ja lähdepurojen lajirunsaimman ryhmän, esiintyminen saattaa olla tarjotussa luokituksessa saastuneimpien olosuhteiden ilmentäjä!