

Interlaboratory Proficiency Test 10/2020

Taxonomic identification of macroinvertebrates

**Henrik Nygård, Kimmo Tolonen, Heikki Mykrä,
Katarina Björklöf and Mirja Leivuori**



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ABSTRACT

Interlaboratory Proficiency Test ZOO 10/2020

Profstest SYKE organized the proficiency test ZOO 10/2020 on taxonomic identification of macroinvertebrate. The test consisted of three parts: 1) lake profundal taxa, 2) lake littoral and lotic taxa and 3) brackish water taxa. The test material represented macroinvertebrates typically occurring in Fennoscandia and the Northern Baltic Sea. In total 26 analysts from 13 organisations and four countries took part in the test. Participants could choose which parts they wanted to participate in.

Overall, 81 % of the test scores reached 90 % taxa correctly identified. In the lake profundal taxa part the average score of taxa correctly identified was 89 %. In the lake littoral and lotic taxa part and the brackish water taxa part the average scores of taxa correctly identified were 93 % and 94 %, respectively. The majority of the participants showed good identification skills and proficiency to perform taxonomic identification of macroinvertebrates.

Warm thanks to all the participants of this proficiency test!

Keywords: proficiency test, interlaboratory comparison, benthic macrofauna, macroinvertebrates, lake profundal, lake littoral, lotic fauna, the Baltic Sea, species identification, benthos analysis

TIIVISTELMÄ

Laboratorioiden välinen pätevyyskoe ZOO 10/2020

Profstest SYKE järjesti pohjaeläinlajien tunnistus -pätevyyskokeen ZOO 10/2020. Koe sisälsi kolme osiota: 1) järvien syvänpohjaeläimet, 2) järvien litoraalin ja virtavesien pohjaeläimet sekä 3) Pohjoisen Itämeren pohjaeläimet. Koemateriaalissa käytettiin lajeja, jotka esiintyvät yleisesti Fennoskandian ja Pohjoisen Itämeren alueella. Yhteensä kokeeseen osallistui 26 pohjaeläinmäärittäjää 13 organisaatiosta ja neljästä maasta. Osallistujat pystyivät osallistumaan yhteen tai useisiin koeosioihin halutessaan.

Osatuloksista 81 % ylsi vähintään tulokseen 90 % taksoneista oikein määritetty. Järvien syväneläinlajiston osalta keskimääräinen tulos oli 89 % taksoneista oikein määritetty. Vastaava luku järvien litoraalin ja virtavesien lajiston osalta oli 93 % ja Pohjoisen Itämeren lajiston osalta 94 %. Enemmistö osallistujista osoitti hyvää määrittäytaitoa ja pätevyyttä suorittaa pohjaeläinten tunnistustöitä.

Kiitos pätevyyskokeen osallistujille!

Avainsanat: pätevyyskoe, vertailumittaus, pohjaeläimet, järvet, syväneläinlajisto, litoraalinlajisto, virtavedet, Itämeri, lajintunnistus, pohjaeläinanalyysi

SAMMANDRAG

Provningsjämförelse ZOO 10/2020

Profstest SYKE genomförde bottenfaunaprovningsjämförelsen ZOO 10/2020. Provet bestod av tre delar: 1) sjöars profundalfauna, 2) sjöars litoral- och lotisk fauna, 3) norra Östersjöns fauna. Provet basera sig på allmänt förekommande arter i Fennoskandien och norra Östersjön. Sammanlagt deltog 26 experter från 13 organisationer och fyra europeiska länder i provningsjämförelsen. Deltagarna kunde välja vilka provdelar de deltog i.

Totalt sett nådde 81 % av delprovns resultat 90 % korrekt identifierade taxa. I delprovet för sjöars profundalfauna var medelresultatet 89 % korrekt identifierade taxa, medan motsvarande siffra var 93 % i delprovet för sjöars litoral- och lotisk fauna och 94 % i delprovet för norra Östersjöns fauna. Majoriteten av deltagarna visade god artkännedom och färdighet att utföra artbestämning av bottenfauna.

Ett varmt tack till alla deltagarna i testet!

Nyckelord: provningsjämförelse, interkalibrering, bottenfauna, sjöars profundal och litoral, lotiska miljöer, Östersjön, artbestämning, bottenfaunaanalys

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1 Introduction

Finnish Environment Institute (SYKE) is appointed National Reference Laboratory in the environmental sector in Finland. The duties of the reference laboratory include providing interlaboratory proficiency tests and other comparisons for analytical laboratories and other producers of environmental information. This interlaboratory comparison provides an external quality evaluation between laboratory results, and mutual comparability of analytical reliability. The proficiency test was carried out in accordance with the international standard ISO/IEC 17043 [1] and applying ISO 13528 [2] and IUPAC Technical report [3]. Profest SYKE is accredited by Finnish Accreditation Service as a proficiency testing provider (PT01, ISO/IEC 17043, www.finass.fi/sites/en). This interlaboratory comparison has not been carried out under the accreditation scope of Profest SYKE.

Profest SYKE carried out this proficiency test, Profest ZOO 10/2020, for marine and freshwater macroinvertebrate taxonomic identification in November 2020. The test consisted of three parts covering different habitats: 1) lake profundal taxa, 2) lake littoral and lotic taxa, and 3) brackish water taxa from the Northern Baltic Sea. The test material represented macroinvertebrate taxa that typically occur in freshwaters of Fennoscandia and in the northern part of the Baltic Sea. The macroinvertebrate proficiency test Profest ZOO 10/2020SYKE is the fifth macroinvertebrate proficiency test organized by SYKE since 2003. The previous test was organized in 2016 [4].

1.1 Aims and scope of the proficiency test

The Profest ZOO 10/2020 test was organized to assess the proficiency and reliability of professional and semi-professional identification of macroinvertebrate taxa routinely encountered in biomonitoring of boreal lakes and rivers, as well as in biomonitoring of the Northern Baltic Sea. The test material included taxa used in ecological and environmental status assessments following the requirements of the EU Water Framework Directive (WFD) and Marine Strategy Framework Directive (MSFD). Participants could choose to take part in one or several parts of the test (lake profundal taxa, lake littoral and lotic taxa, and/or brackish water taxa).

The tests are in line with the WFD's demand for quality assurance of biological data and SYKE's aim to broaden the scope of its accredited methods towards biological proficiency testing. As taxonomic identification of macroinvertebrates is routinely done only by a single analyst, Profest SYKE conducted the macroinvertebrate proficiency test for individual taxonomists rather than the organization they represent. Therefore, participants received personal diplomas indicating the percentage of correctly identified taxa for the test they participated in while organizations were not certified.

2 Organizing the proficiency test

2.1 Responsibilities

Organizer

Profest SYKE, Finnish Environment Institute (SYKE), Laboratory Centre
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2.2 Participants

The proficiency test was targeted at consultants and environmental authorities who analyze macroinvertebrate samples from inland waters or the Baltic Sea as well as macroinvertebrate analysts working in research institutes and universities. In total 26 participants participated in the test (Table 1). In the previous test 22 participants from four countries took part [4].

Table 1. List of test participants and organization/laboratory they represent.

Name of participant	Organization/Laboratory
Ola Svensson	DEEP, Stockholms universitet, Sweden
Malin Dahlgren	DEEP, Stockholms universitet, Sweden
Ellen Schagerström	DEEP, Stockholms universitet, Sweden
Natalja Kolesova	Department of Marine Systems, Tallinn University of Technology, Estonia
Sabina Solovjova	Environmental Protection Agency, Lithuania
Greta Reialu	Estonian Marine Institute, Estonia
Fabio Ercoli	Estonian University of Life Sciences, Estonia
Terhi Lensu	Eurofins Ahma Oy, Finland
Jaana Lahdenniemi	KVVY Tutkimus Oy, Finland
Johanna Salmelin	KVVY Tutkimus Oy, Finland
Annette Lindell-Jokinen	Lounais-Suomen vesi- ja ympäristötutkimus Oy, Finland
Vesa Saarikari	Lounais-Suomen vesi- ja ympäristötutkimus Oy, Finland
Mikaela Sandgathe	Medins Havs och Vattenkonsulter AB, Sweden
Karin Johansson	Medins Havs och Vattenkonsulter AB, Sweden
Simon Tylor	Medins Havs och Vattenkonsulter AB, Sweden
Jenny Palmkvist	Medins Havs och Vattenkonsulter AB, Sweden
Andrea Johansson	Medins Havs och Vattenkonsulter AB, Sweden
Tommy Odelström	Naturvatten i Roslagen AB, Sweden
Mats Uppman	Pelagia Nature & Environment AB, Sweden
Helena Lorendotter	Pelagia Nature & Environment AB, Sweden
Ludvig Hagberg	Pelagia Nature & Environment AB, Sweden
Martin Johansson	Pelagia Nature & Environment AB, Sweden
Edward Westwood	Pelagia Nature & Environment AB, Sweden
Rickard Degerman	Pelagia Nature & Environment AB, Sweden
Mikael Peedu	Umeå marina forskningscentrum, Sweden
Nina Rosenback-Holmström	ÅLR-ÅMHM Laboratoriet, Finland

2.3 Samples and their delivery

The three parts in this proficiency test were (1) fresh water lake profundal taxa with 15 individuals to be identified from photographs, (2) fresh water littoral and lotic taxa with 30 preserved individuals and (3) brackish water taxa from the Northern Baltic Sea with 30 individuals to be identified from photographs. Individuals used in the test were picked from samples from regular monitoring or research projects. Lists of included taxa were provided with the tests and based on the taxonomic requirements in Finnish WFD and MSFD assessments:

- The taxonomic resolution required for freshwater macroinvertebrate identification is based on the requirements of the Finnish national freshwater macroinvertebrate monitoring [5].
- Northern Baltic Sea macroinvertebrate identification is based on the requirements of the BQI and BBI indexes, which are used in Sweden and Finland, respectively [6,7,8].

The test material was sent during week 45, 2020. The participants confirmed that they had received the test material at latest the 6 November 2020 and all test answers were returned by

the set dead-line 13 November 2020. The participants were informed about their success in the proficiency test accompanied by a preliminary result report. The participants were asked to check their results and provide comments if they disagree with the results at latest on 14 December 2020. The received comments were mainly general feedback on the test, but also three cases of wrongly calculated results and two questionings of the identity of test material. These cases are included in the discussion of this report.

2.3.1 Comments sent by the participants

Feedback on the proficiency test was received from eight participants. The comments mainly dealt with identification based on photographs and quality of the photographs. In most cases, the identification done by the participant giving the feedback was however correct. More detailed photographs of e.g. mouthparts of crustaceans was suggested as a means to assure the identification. The feedback is more specifically dealt with in the discussion part of this report. All feedback is valuable and will be considered to improve future tests.

3 Results

3.1 Test results

The participants individual test results in the different test parts are given as percent correctly identified individuals in Table 2. There was a high variation in individual results, ranging from 60 to 100 % correctly identified. Although five out of eight participants in the lake profundal test part identified all individuals correctly, the average score for this part was the lowest in the test (89.2 %). Three participants identified all individuals correctly in the lake littoral and lotic taxa test part, whereas the average score in this part was 92.4 %. In the brackish water taxa test, the average score was 93.9 %, with five participants identifying all individuals correctly.

Table 2. Correctly identified taxons (%) of each participant per test part. Participant numbers have been given in random order.

Participant number	Lake profundal	Lake littoral and	Northern Baltic
1			90
2		83.3	
3			100
4			100
5		100	
6	100		
7			96.7
8			100
9		96.7	
10			100
11	100		
12			90
13	100		
14	100	100	93.3
15			96.7
16		96.7	
17			96.7
18		86.7	93.3
19			90
20	60	100	
21		96.7	
22			96.7
23	60	66.7	80
24	93.3	96.7	100
25			83.3
26	100	96.7	90
Number of participants	8	11	17
Average score	89.2	92.7	93.9
Standard deviation	17.0	9.7	5.9
*Note: The lake profundal part consisted of 15 samples, others parts 30 samples			

3.2 Taxa identification

In total, less than half (~47 %) of the included taxa were correctly identified by all participants (Table 3). The performance was quite similar in the different parts in the tests with 47 % always correctly identified in the lake profundal taxa part, 43 % in the lake littoral and lotic taxa part and 50 % in the brackish water taxa part. There were no clear patterns in misidentifications as misidentifications occur widely among the taxonomic groups. However, isopods and polychaetes were always correctly identified to species level.

In the lake profundal part of the test, *Pisidium* spp., *Slavina appendiculata*, *Chironomus salinarius*, *Prosilocerus jacuticus* and *Zalutschia zalutschicola* were misidentified by 25 % of the participants (Table 4). Other profundal taxa were misidentified only by one participant of the test or were correctly identified in all cases.

In the lake littoral and lotic taxa part of the test, *Aphinemura sulcicollis* was quite frequently (36 % of cases) misidentified to different species of the same genus (*A. borealis* and *A. standfussi*) (Table 5). Other taxa were correctly identified in all cases or misidentified by one or two participants of the test. Two participants reported *Nemoura* spp., the answer following taxonomic requirements, on species level as *Nemoura cinerea*, when the correct species was actually *Nemoura avicularis*. These answers were approved, as the identification requirement was on genus level.

In the Northern Baltic Sea brackish water taxa part, the nemertean *Cyanophthalma obscura* was frequently misidentified, most often to the closely related *Prostoma graecense*, but to more distant taxa such as *Halicryptus spinulosus* and Hirudinea (Table 6). Vice versa, *Halicryptus spinulosus* was mistaken as a nemertean (*Prostoma graecense*) in one case. The oligochaete (*Stylaria lacustris*) was mistaken as a polychaete (*Manayunkia aesturina*), but also here *Prostoma graecense* was suggested. The group among which most mistakes occurred was amphipods (in total 11 misidentifications among 5 species). Most often specimens of the genus *Gammarus* were mistaken. For *Gammarus salinus*, also *Gammarus tigrinus* was approved as due to the quality of pictures it could not definitely be ruled out that it would not have been a female of *G. tigrinus*.

Table 3. Summary of taxa in each proficiency test part: Lake profundal, lake littoral/lotic and Baltic Sea taxa. Relative proportions of correct identifications are given in brackets.

Lake profundal taxa	Lake littoral/lotic taxa	Baltic taxa
BIVALVIA	GASTROPODA	BRYOZOA
<i>Pisidium</i> spp. (0.75)	<i>Gyraulus</i> spp. (0.91)	<i>Einhornia crustulenta</i> (1.00)
OLIGOCHAETA	BIVALVIA	NEMERTEA
<i>Slavina appendiculata</i> (0.75)	<i>Pisidium</i> spp. (0.91)	<i>Cyanophthalma obscura</i> (0.53)
<i>Spirosperma ferox</i> (1.00)	CRUSTACEA	PRIAPULIDA
CRUSTACEA	<i>Asellus aquaticus</i> (1.00)	<i>Halicryptus spinulosus</i> (0.94)
<i>Mysis relicta</i> (1.00)	EPHEMEROPTERA	ANNELIDA
<i>Pallasea quadrispinosa</i> (0.88)	<i>Acentrella lapponica</i> (1.00)	<i>Bylgides sarsi</i> (1.00)
DIPTERA	<i>Baetis niger</i> gr. (1.00)	<i>Fabricia stellaris</i> (1.00)
<i>Chaoborus flavicans</i> (1.00)	<i>Baetis rhodani</i> (1.00)	Oligochaeta (0.82)
<i>Chironomus anthracinus</i> gr. (1.00)	<i>Baetis vernus</i> gr. (0.82)	GASTROPODA
<i>Chironomus plumosus</i> gr. (1.00)	<i>Caenis horaria</i> (1.00)	<i>Theodoxus fluviatilis</i> (1.00)
<i>Chironomus salinarius</i> gr. (0.75)	<i>Caenis luctuosa</i> (0.91)	<i>Bithynia tentaculata</i> (1.00)
<i>Heterotissocladus marcidus</i> (0.88)	<i>Ephemerella aroni (aurivillii)</i> (0.82)	<i>Physa fontinalis</i> (0.94)
<i>Procladius</i> spp. (1.00)	<i>Leptophlebia</i> spp. (0.91)	Lymneidae (1.00)
<i>Propillocerus jacuticus</i> (0.75)	PLECOPTERA	BIVALVIA
<i>Sergentia coracina</i> (1.00)	<i>Amphinemura sulcicollis</i> (0.64)	<i>Dreissena polymorpha</i> (1.00)
<i>Stictochironomus rosenschoeldi</i> (0.88)	<i>Diura</i> spp. (0.91)	<i>Mya arenaria</i> (1.00)
<i>Zalutschia zalutschicola</i> (0.75)	<i>Isoperla</i> spp. (0.91)	<i>Cerastoderma glaucum</i> (0.94)
	<i>Leuctra</i> spp. (1.00)	<i>Limecola balthica</i> (0.88)
	<i>Nemoura</i> spp. (1.00)	CRUSTACEA
	<i>Nemurella pictetii</i> (0.91)	<i>Amphibalanus improvisus</i> (0.94)
	<i>Taeniopteryx nebulosa</i> (0.91)	<i>Mysis relicta</i> (1.00)
	TRICHOPTERA	<i>Neomysis integer</i> (0.94)
	<i>Hydropsyche angustipennis</i> (0.82)	<i>Saduria entomon</i> (1.00)
	<i>Hydroptila</i> spp. (1.00)	<i>Idotea balthica</i> (1.00)
	<i>Lepidostoma hirtum</i> (1.00)	<i>Asellus aquaticus</i> (1.00)
	<i>Micrasema gelidum</i> (0.91)	<i>Pontoporeia femorata</i> (0.94)
	<i>Oxyethira</i> spp. (0.91)	<i>Gammarus locusta</i> (0.82)
	<i>Polycentropus flavomaculatus</i> (0.91)	<i>Gammarus salinus</i> (0.82)*
	<i>Rhyacophila nubila</i> (1.00)	<i>Gammarus oceanicus</i> (0.82)
	COLEOPTERA	<i>Gammarus zaddachi</i> (0.94)
	<i>Elmis aenea</i> (adult) (0.91)	EPHEMEROPTERA (1.00)
	<i>Hydraena</i> spp. (1.00)	ODONATA (0.94)
	<i>Limnius volcmari</i> (larva) (1.00)	TRICHOPTERA (0.94)
	DIPTERA	DIPTERA
	Ceratopogonidae spp. (1.00)	Chironomidae (1.00)
	<i>Dicranota</i> spp. (0.82)	

**Gammarus tigrinus* was also approved. See text for further explanations.

Table 4. List of the misidentified lake profundal taxa in the test material. Relative proportions of misidentified specimens of each taxon are given in brackets. The false taxa identities assigned to the misidentified species are also provided.

Taxa	Misidentified	False taxa identities
OLIGOCHAETA		
<i>Slavina appendiculata</i>	2 (0.25)	<i>Pristina</i> spp.
BIVALVIA		
<i>Pisidium</i> spp.	2 (0.25)	<i>Sphaerium</i> spp.
CRUSTACEA		
<i>Pallasea quadrispinosa</i>	1 (0.13)	<i>Gammarus lacustris</i>
DIPTERA		
<i>Chironomus salinarius</i>	2 (0.25)	<i>C. anthracinus</i> , <i>Dicrotendipes</i> spp.
<i>Heterotrissocladius marcidus</i>	1 (0.13)	<i>H. grimshawi</i>
<i>Propilocerus jacuticus</i>	2 (0.25)	<i>Heterotrissocladius subpilosus</i>
<i>Stictochironomus rosenschoeldi</i>	1 (0.13)	<i>Endochironomus</i> spp.
<i>Zalutschia zalutschicola</i>	2 (0.25)	<i>Microtendipes pedellus</i> , <i>Polypedilum nubeculosum</i>

Table 5. List of the misidentified lotic/lake littoral taxa in the test material. Relative proportions of misidentified specimens of each taxon are given in brackets. The false taxa identities assigned to the misidentified species are also provided.

Taxa	Misidentified	False taxa identities
GASTROPODA		
<i>Gyraulus</i> spp.	1 (0.09)	Unidentified
BIVALVIA		
<i>Pisidium</i> spp.	1 (0.09)	<i>Sphaerium</i> spp.
EPHEMEROPTERA		
<i>Amphinemura sulcicollis</i>	4 (0.36)	<i>A. borealis</i> , <i>A. standfussi</i>
<i>Baetis vernus</i> group (<i>vernus</i> , <i>subalpinus</i> , <i>macani</i>)	2 (0.18)	<i>Baetis</i> sp., <i>Baetis niger</i> group
<i>Caenis luctuosa</i>	1 (0.09)	Unidentified
<i>Ephemerella aroni</i> (<i>aurivillii</i>)	2 (0.18)	<i>Seratella</i> (<i>Ephemerella</i>) <i>ignita</i>
<i>Leptophlebia</i> spp.	1 (0.09)	<i>Paraleptophlebia</i> spp.
PLECOPTERA		
<i>Diura</i> spp.	1 (0.09)	<i>Isogenus nubecula</i>
<i>Isoperla</i> spp.	1 (0.09)	<i>Siphonoperla burmeisteri</i>
<i>Nemurella pictetii</i>	1 (0.09)	Unidentified
<i>Taeniopteryx nebulosa</i>	1 (0.09)	<i>Isoperla</i> spp.
TRICHOPTERA		
<i>Hydropsyche angustipennis</i>	2 (0.18)	<i>H. bulgaromanorum</i> , <i>H. saxonica</i>
<i>Micrasema gelidum</i>	1 (0.09)	<i>Notidobia ciliaris</i>
<i>Oxyethira</i> spp.	1 (0.09)	<i>Agraylea</i> spp.
<i>Polycentropus flavomaculatus</i>	1 (0.09)	Unidentified
COLEOPTERA		
<i>Elmis aenea</i> (adult)	1 (0.09)	<i>Oulimnius tuberculatus</i>
DIPTERA		
<i>Dicranota</i> spp.	2 (0.18)	Pediciidae

Table 6. List of the misidentified Northern Baltic Sea brackish water taxa in the test material. Relative proportions of misidentified specimens of each taxon are given in brackets. The false taxa identities assigned to the misidentified species are also provided.

Taxa	Misidentified	False taxa identities
NEMERTEA		
<i>Cyanophthalma obscura</i>	8 (0.47)	<i>Prostoma graecense</i> (6), <i>Halicryptus spinulosus</i> , Hirudinea
PRIAPULIDA		
<i>Halicryptus spinulosus</i>	1 (0.06)	<i>Prostoma graecense</i>
ANNELIDA		
Oligochaeta	3 (0.18)	<i>Manayunkia easturina</i> (2), <i>Prostoma graecense</i>
GASTROPODA		
<i>Physa fontinalis</i>	1 (0.06)	Lymnaeidae
BIVALVIA		
<i>Cerastoderma glaucum</i>	1 (0.06)	<i>Parvicardium hauniense</i>
<i>Limecola balhica</i>	2 (0.12)	<i>Pisidium</i> spp. (2)
CRUSTACEA		
<i>Amphibalanus improvisus</i>	1 (0.06)	<i>Cordylophora caspia</i>
<i>Neomysis integer</i>	1 (0.06)	<i>Mysis mixta</i>
<i>Pontoporeia femorata</i>	1 (0.06)	<i>Monoporeia affinis</i>
<i>Gammarus locusta</i>	3 (0.18)	<i>Gammarus duebeni</i> , <i>G. oceanicus</i> , Unidentified
<i>Gammarus salinus</i> *	3 (0.18)	<i>G. locusta</i> , <i>Monoporeia affinis</i> , <i>Calliopius laeviusculus</i>
<i>Gammarus oceanicus</i>	3 (0.18)	<i>Gammarus locusta</i> (3)
<i>Gammarus zaddachi</i>	1 (0.06)	<i>Gammarus zaddachi</i>
ODONATA	1 (0.06)	Ephemeroptera
TRICHOPTERA	1 (0.06)	Unidentified

**Gammarus tigrinus* was also approved. See text for further explanation.

4 Discussion

Although the average result in this proficiency test showed good taxonomic skills, the high variability in the results of this proficiency test clearly indicates that quality assurance of taxonomic identification is needed. While many participants identified all individuals correctly, also less prominent results were found in all test parts (60-80 % correctly identified depending on test part). Compared to the test carried out in 2016 [4], where the average score was 93-97 %, the overall performance of the participants was lower now. There may be several reasons for this, obviously in this test the group of participants was different from that 2016, but it also highlights the need for continuous maintenance of taxonomic identification skills. In the lake profundal test part, the average score was now 89 % compared to 95 % in 2016. In this test part identification based on photographs was now introduced for a first time, which might be unusual for the participants regularly working with physical samples. It also needs to be noted that the lake profundal test in this round consisted of 15 individuals (33 individuals in 2016). Thus, a single mistake in the identification has a quite large impact on the percent correctly identified.

Identification based on photographs was introduced to the proficiency test on Northern Baltic Sea brackish water taxa in 2016. In this test, the lake profundal taxa was also to be identified based on photographs. The main advantage by organizing the test based on photographs is that it assures identical test material for all participants and thus allows equal treatment of the

participants. Identification of species based on photographs, however, does not coincide with the microscopic identification of preserved specimens, a comment that was also provided as feedback of the test. High quality photographs, where the important features are visible, is a prerequisite to allow species identification. In this test, we got feedback stating that the quality of the photographs of some taxa were not sufficient for reliable species identifications. However, in most cases, participants had identified these specimens correctly. Only in one case (*Gammarus salinus* in the brackish water taxa part), the photographs did not certainly rule out that the specimen was not a female of *Gammarus tigrinus* and thus, *G. tigrinus* was also approved (this concerned two participants). Feedback was also received on that it would be helpful to have photographs of mouthparts to ensure the determinations of the crustaceans, a thing worth considering in future tests.

Amphipods, and especially *Gammarus* spp., were groups that were frequently misidentified in Northern Baltic Sea brackish water taxa part. This was also case in the test in 2016 [4]. Most often the misidentification were related to other *Gammarus* species, but also other genera were suggested (*Monoporeia*, *Calliopius*), indicating that it may be challenging to even get the genus correct. The majority of the *Gammarus* individuals were, however, correctly identified, indicating that identification based on photographs was not the major restriction in the identification. As already mentioned, dissecting the individuals and providing photographs of mouthparts, could be useful in the identification process. The most frequently misidentified species in the brackish water taxa part, *Cyanophthalma obscura*, was most often mistaken as another nemertean *Prostoma graecense*, but also taxa from other phyla were suggested. In the index calculations, Nemertea is used at group level, but identifications to other phyla are concerning.

Pisidium spp., *Slavina appendiculata*, *Chironomus salinarius*, *Prosilocerus jacuticus* and *Zalutschia zalutschicola* were the taxa most frequently misidentified (25 % of the participants) in the lake profundal test. The lake profundal test was now for the first time based on photographic material. Although majority of the participants (five out of eight participants) attained perfect 100 % identification score, several comments highlighted that photographic test does not coincide with the microscopic identification of their daily work. Moreover, the participants commented that more detailed photographs of e.g. Chironomidae mouthparts are needed. In addition, the photographic identification test of profundal macroinvertebrates probably also included too few taxa, since a single mistake in the current test containing a total of 15 taxa resulted in a 7 % decrease in the total result of participant. Future options for the development of lake profundal test may include 1) return to the test with microscopic identification of preserved test material or 2) photographic identification test with higher number of taxa and more detailed photographs e.g. on the mouthparts of invertebrates.

In the identification test of lake littoral and lotic invertebrates, *Amphinemura sulcicollis* was clearly the species that was most frequently misidentified (by 4 out of 11 participants). Other taxa of the test material were either identified by all the participants or misidentified by one or two of the participants. Regarding the lake littoral/lotic part of the test, low number of comments and lack of critique received from the participants may reflect that participants were generally satisfied with the test material.

5 Summary

Profest SYKE organized the proficiency test ZOO 10/2020 on taxonomic identification of macroinvertebrate. The test consisted of three parts: 1) lake profundal taxa, 2) lake littoral and lotic taxa and 3) brackish water taxa. The test material represented macroinvertebrates typically occurring in Fennoscandia and the Northern Baltic Sea. In total 26 analysts from 13 organisations and four countries took part in the test. Participants could choose which parts they wanted to participate in.

In the lake profundal taxa and brackish water taxa parts the test material consisted of photographs of 15 and 30 individuals, respectively. The material for the lake littoral and lotic taxa part consisted of 30 preserved specimens. An answering sheet including a list of the required level of identification was provided to the participants with the test material.

Overall, 81 % of the test scores reached 90 % taxa correctly identified. In the lake profundal taxa part the average score of taxa correctly identified was 89 %. In the lake littoral and lotic taxa part and the brackish water taxa part the average scores of taxa correctly identified were 93 % and 94 %, respectively. The majority of the participants showed good identification skills and proficiency to perform taxonomic identification of macroinvertebrates.

6 Summary in Finnish

Profest SYKE järjesti pohjaeläinlajien tunnistus -pätevyyskokeen ZOO 10/2020. Koe sisälsi kolme osiota: 1) järvien syvänpohjaeläimet, 2) järvien litoraalin ja virtavesien pohjaeläimet sekä 3) Pohjoisen Itämeren pohjaeläimet. Koemateriaalissa käytettiin lajeja, jotka esiintyvät yleisesti Fennoskandian ja Pohjoisen Itämeren alueella. Yhteensä kokeeseen osallistui 26 pohjaeläinmäärittäjää 13 organisaatiosta ja neljästä maasta. Osallistujat pystyivät itse valitsemaan mihin koeosioihin he halusivat osallistua.

Järvien syväne- ja Pohjoisen Itämeren pohjaeläinosioissa koemateriaali koostui valokuvatuista yksilöistä. Järvien syväneosiossa määritettävänä oli 15 pohjaeläintaksonia, kun taas Pohjoisen Itämeren osiossa taksonia oli 30. Järvien litoraalin ja virtavesien pohjaeläinosiossa puolestaan käytettiin 30 säilöttyä yksilöitä. Materiaalin mukana lähetettiin vastauslomake, jossa myös ilmeni vaadittu määritystarkkuus.

Osatuloksista 81 % ylsi vähintään tulokseen 90 % taksonista oikein määritetty. Järvien syvänelajiston osalta keskimääräinen tulos oli 89 % taksonista oikein määritetty. Vastaava luku järvien litoraalin ja virtavesien lajiston osalta oli 93 % ja Pohjoisen Itämeren lajiston osalta 94 %. Enemmistö osallistujista osoitti hyvää määritystaitoa ja pätevyyttä suorittaa pohjaeläinten tunnistustöitä.

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