NORBAF intercalibration 2016

Coordinator: Maria Kahlert, SLU

Auditors:

Amelie Jarlman, Jarlman Konsult AB, and

Bart Van de Vijver, Botanic Garden Meise

Mo pm: sample 1
Tue am: sample 3
Tue pm: sample 2
Wed am: discussion about deformation counting, and if we have time other questions
Evenings are "free" but I hope you will attend

Middag: 18?
Lunch: 12

Sample description, nutrients, pH

- Sample 1: **Brännesgropen**, small stream in Höganäs kommun, 2015.
  TN: 10000 µg/l, N-NH4: 11 µg/l, N-NO3: 2300 µg/l, TP: 400 µg/l, O_2: 106 %
- Sample 2: **Holjeån** point 12, (Skräbeåns catchment), 2015.
  pH mean: 7.0, minimum: 6,8; 7,0, TN (mean): 1342 µg/l, N-NH4: 139 µg/l, N-NO3: 563 µg/l TP: 19 µg/l, TOC 15 mg/l
- Sample 3: **Stridbäcken**, E4:an (IKEU), 2015.
  pH mean: 6,7, minimum 5,9; N-NH4: ~8 µg/l TP 4,7 µg/l, cond 2,75 mS/m25

Taxa ≥ 10% of total counts in one sample

Sample 1:

EOMI 15,8% Eolimna minima (Grunow) Lange-Bert.

ESBM 22,5% Eolimna subminuscula (Manguin) Moser, Lange-Bert. & Metzeltin

PLFR 16,4% Planothidium frequentissimum (Lange-Bert.) Lange-Bert.

SSEM 16,2% Sellaphora seminulum (Grunow) D.G.Mann

Sample 2:

ALBL 15% Adlafia langebertalotii O. Monnier & L. Ector

PABD 9,5% Psammothidium abundans (Manguin) Bukht. & Round

ADM23 47,5% Achnanthidium minutissimum group II (mean width 2,2-2,8µm) /
Achnanthidium minutissimum group III (mean width >2,8µm)

Sample 3:

FGRA 40,7% Fragilaria gracilis Østrup

GEXLsl 21,6% Gomphonema exilissimum s.lat. (Grunow) Lange-Bert. & E.Reichardt

ADM12 30,1% Achnanthidium minutissimum group II (mean width 2,2-2,8µm)
Achnanthidium minutissimum group I (mean width <2,2µm)

Taxa pooled before similarity analysis

Achnanthidium minutissimum group on threshold between 2 groups:

- Sample 2: A. minutissimum group mean width 2,74 µm, groups 2 & 3 pooled
- Sample 3: A. minutissimum group mean width 2,24 µm, groups 1 & 2 pooled

Adlafia langebertalotii O. Monnier & L. Ector dominant in sample 2, but not yet in compulsory Swedish identification litteratur
-> could be mistaken for A. suchlandtii, thus pooled

(index: IPS 4.5/1, whereas A. suchlandtii has 5/1)
Monnier: "Moreover, the two species seem to be ecologically distinct, N. suchlandtii being aerophilous (Gesierich & Rott 2004) and A. langebertalotii rheophilous."
According to Rimet/Monnier, Adlafia langebertalotii should occur in "oligotrophic headwater streams with neutral pH, low carbonate hardness and well oxygenated waters" – so why 4.5 when A. suchlandtii has 5?

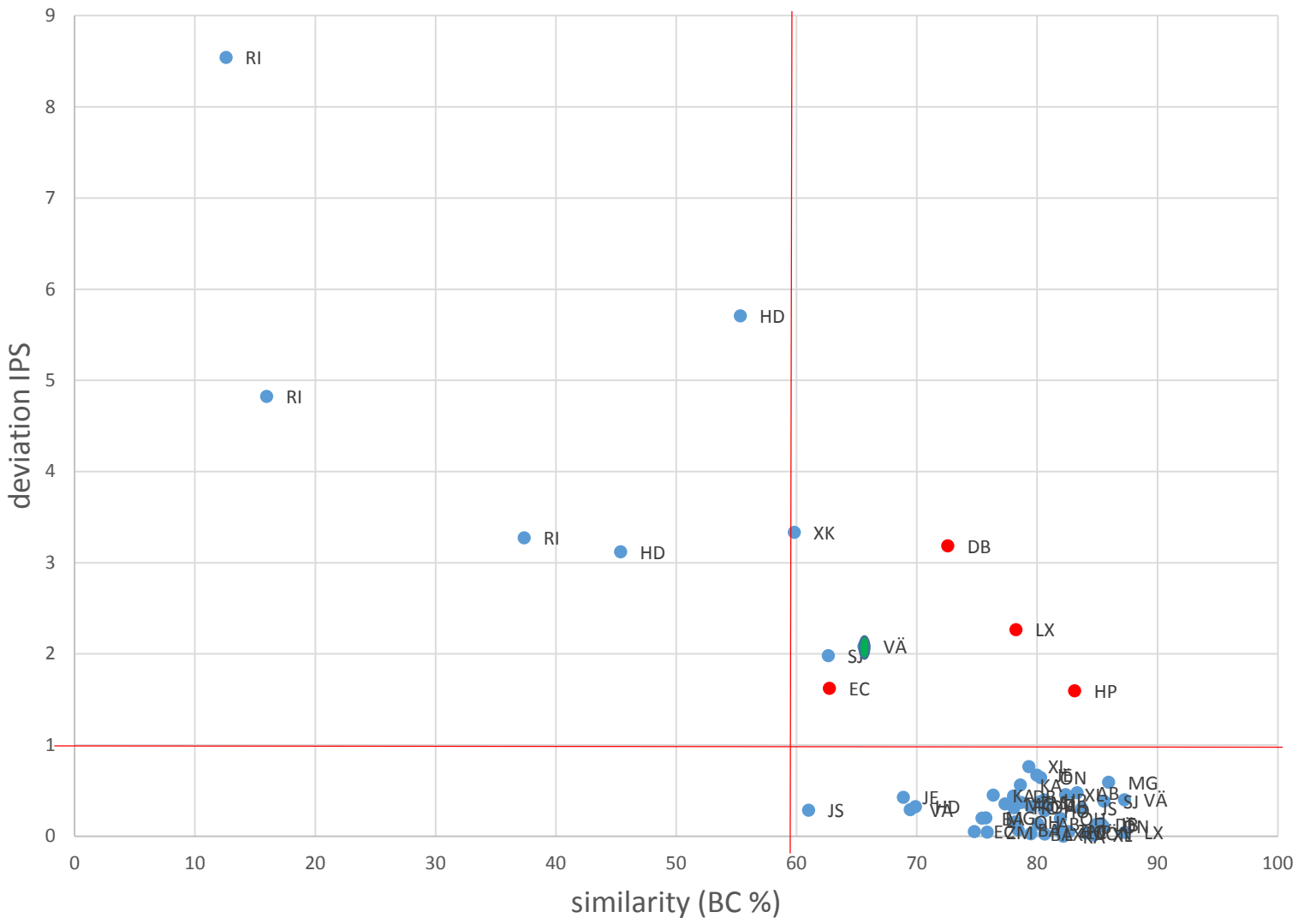
- *Amelie: Adlafia lange-bertalotii finns i Sverige inte i helt rena vatten - här kallar nog fransmännen något för oligotroft som inte vi skulle kalla för rent oligotroft. Om du ser i provet från Holjeån (i norra Skåne) så förekommer en del mer eller mindre näringskrävande arter där också (CPLA, ADKR, ALFR, FPUL, AAMB, FcfRUM). Man ser det också på medelbredden hos ADMI. Det är därför jag har ett litet problem med att kalla ADMI för ADM2 i detta fallet, för jag tycker att IPS blir lite för högt. (Men det känns inte heller bra med ADM3, för då blir nog IPS lite lågt.)*

Similarity to auditors

Kelly 2001: The results can be seen as replicates of the auditors if the Bray-Curtis similarity (BC) is at least 60 %.

For samples with a low diversity (Hill's N2 diversity value < 3), BC must be ≥ 70%.

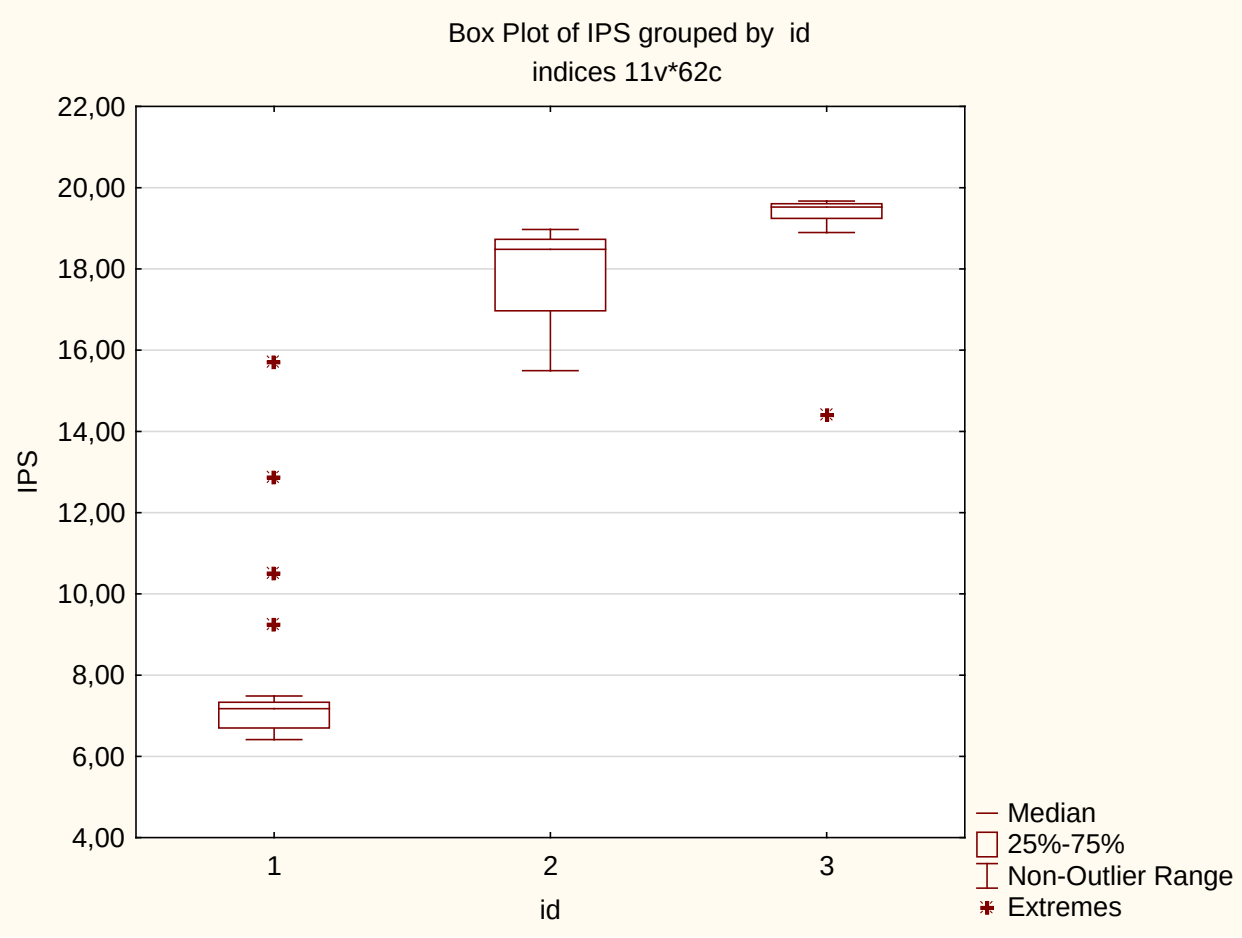
	sample 1	sample 2	sample 3
Hills N2	*7,5*	*3,8*	*3,6*
AB	83	80	81
BA	79	78	75
DB	85	73	78
EC	82	63	75
HD	55	45	70
HO	78	82	81
HP	83	83	81
JE	80	69	85
JS		61	84
KA	79	82	76
LX	87	78	81
MG	86	76	77
OH	78	82	79
RI	13	37	16
SJ	80	63	86
VÄ	66	69	87
XK	*60*		
XL	79	82	85
ZM	82	76	79
ÖN	80	84	85

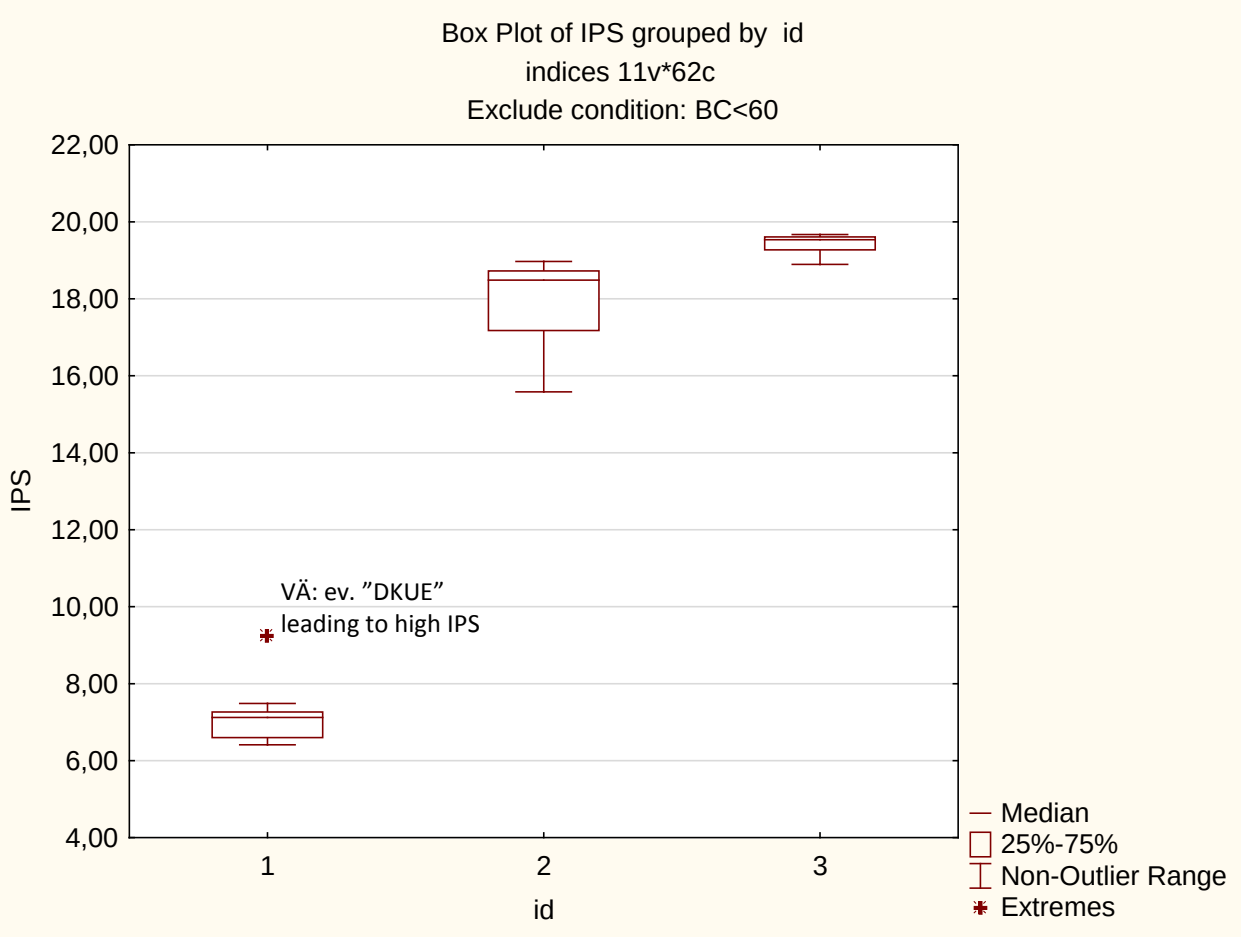


Which taxa cause trouble in IPS/ACID calculations and should therefore get special attention when identifying?

- Red points: participants with many ADM3 in sample 2 (rest had ADM2)
- Green point: indentification of DKUE probably not in sample 1, but rel. high IPS (4/1)

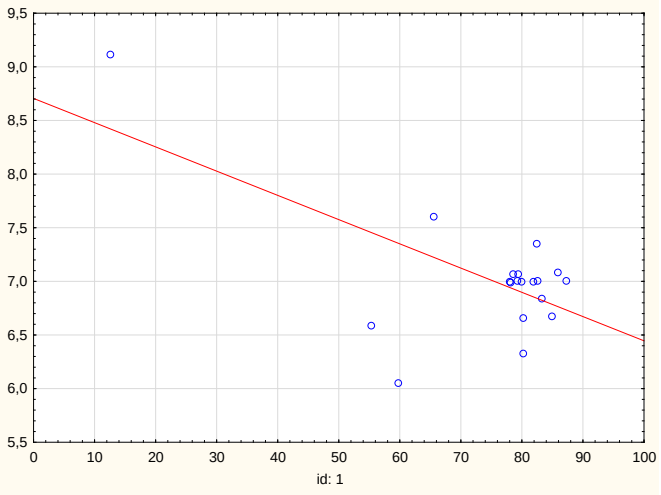
Deviation (in IPS units) vs. similarity with auditors (Bray-Curtis). All samples, all participants.
Result: If deviating, usually in more than one sample.
Threshold of 60% removes results with highest deviations.





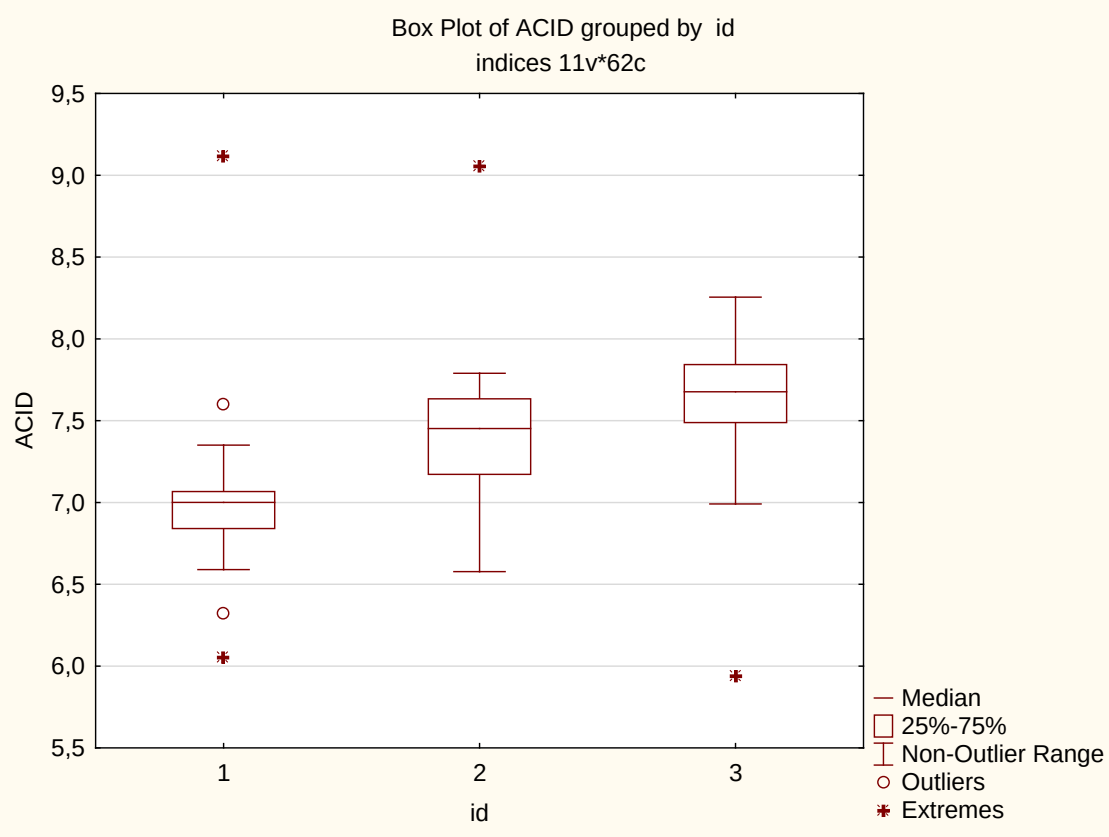
TP: 400 µg/l TP: 19 µg/l TP: 4,7 µg/l

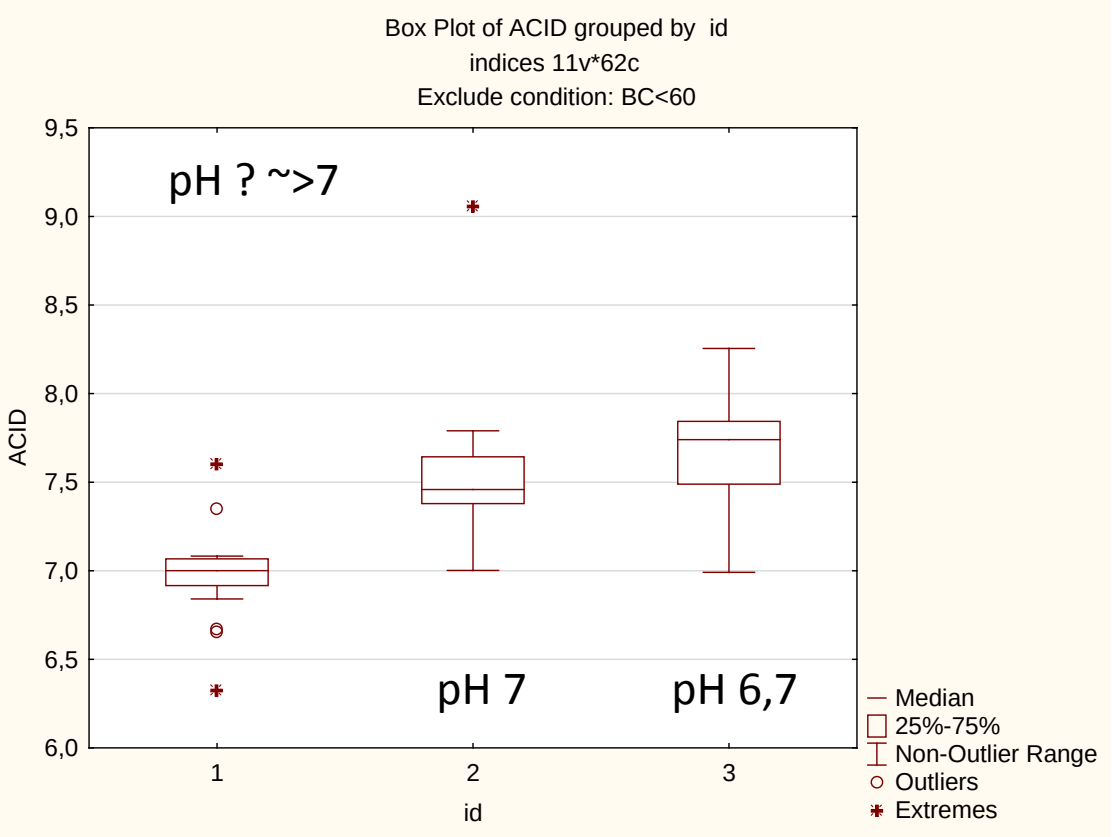
Participants with BC < 60% removed



Surhetsklasser	ACID	pH mean12	pH minimum12
Alkaliskt	≥ 7,5	≥ 7,3	-
Nära neutralt	5,8-7,5	6,5-7,3	-
Måttligt surt	4,2-5,8	5,9-6,5	< 6,4
Surt	2,2-4,2	5,5-5,9	< 5,6
Mycket surt	< 2,2	< 5,5	< 4,8

Participants with BC < 60% removed



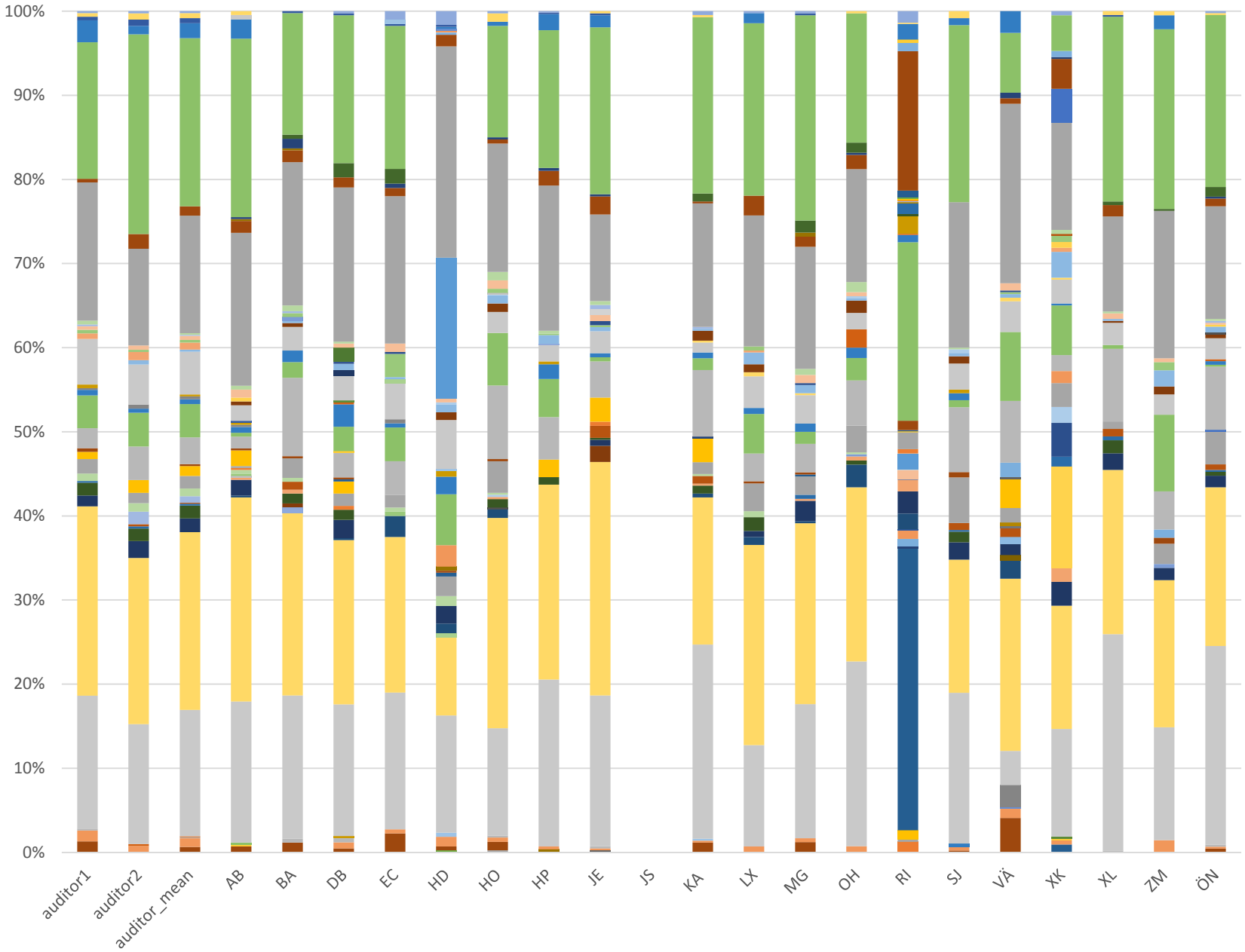


Sample 1: **Brännesgropen**

Öresund i bakgrunden, dit dagvattnet förs från nya bostadsområden kring Viken. Mest vatten kommer från åkrarna.

Har ni hört talas om Brännesgropen? Det är det dike som vattnar av åkrarna kring Brännan och Äsperöd. Brännesgropen rinner ut i Öresund och går i kulvert under kustvägen mellan Lerberget och Svanebäck.

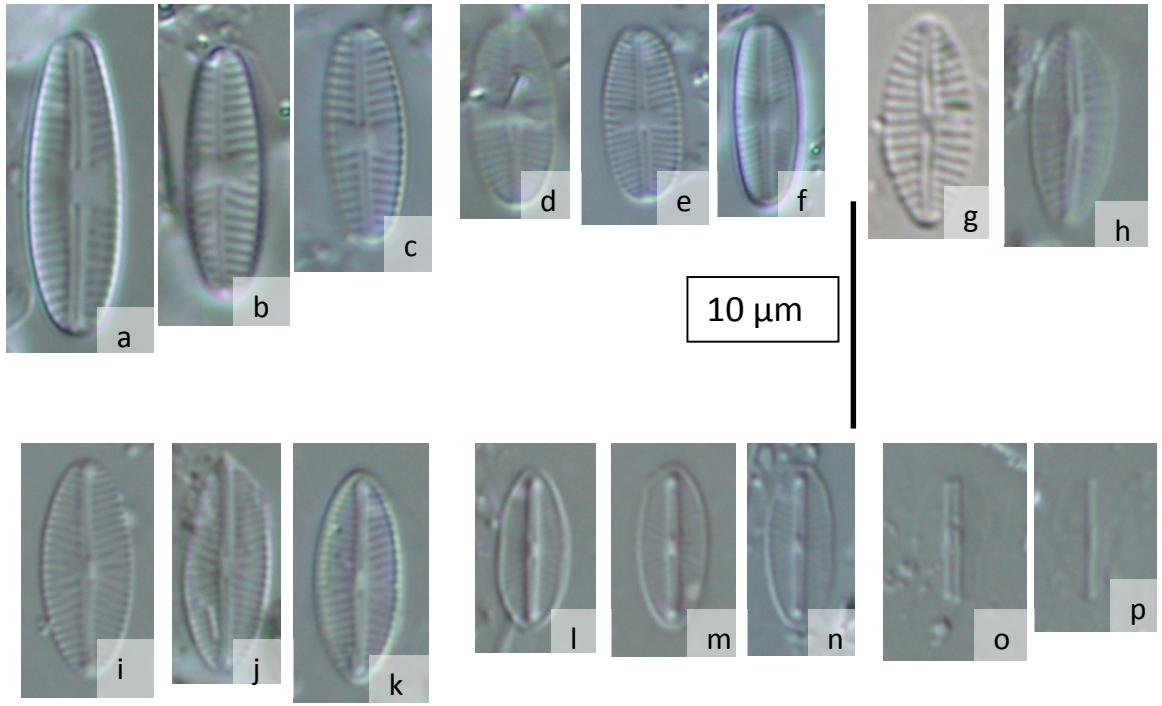
sample 1



		%
EOMI	Eolimna minima	15
ESBM	Eolimna subminuscula	21
FCVA	Fragilaria capucina var. vaucheriae	2
FFAM	Fragilaria famelica var. famelica	2
MAPE	Mayamaea atomus var. permitis	3
MVAR	Melosira varians	4
NGRE	Navicula gregaria	5
PLFR	Planothidium frequentissimum	14
SSEM	Sellaphora seminulum	20
SUMI	Surirella minuta	2

Message from Amelie Jarlman:

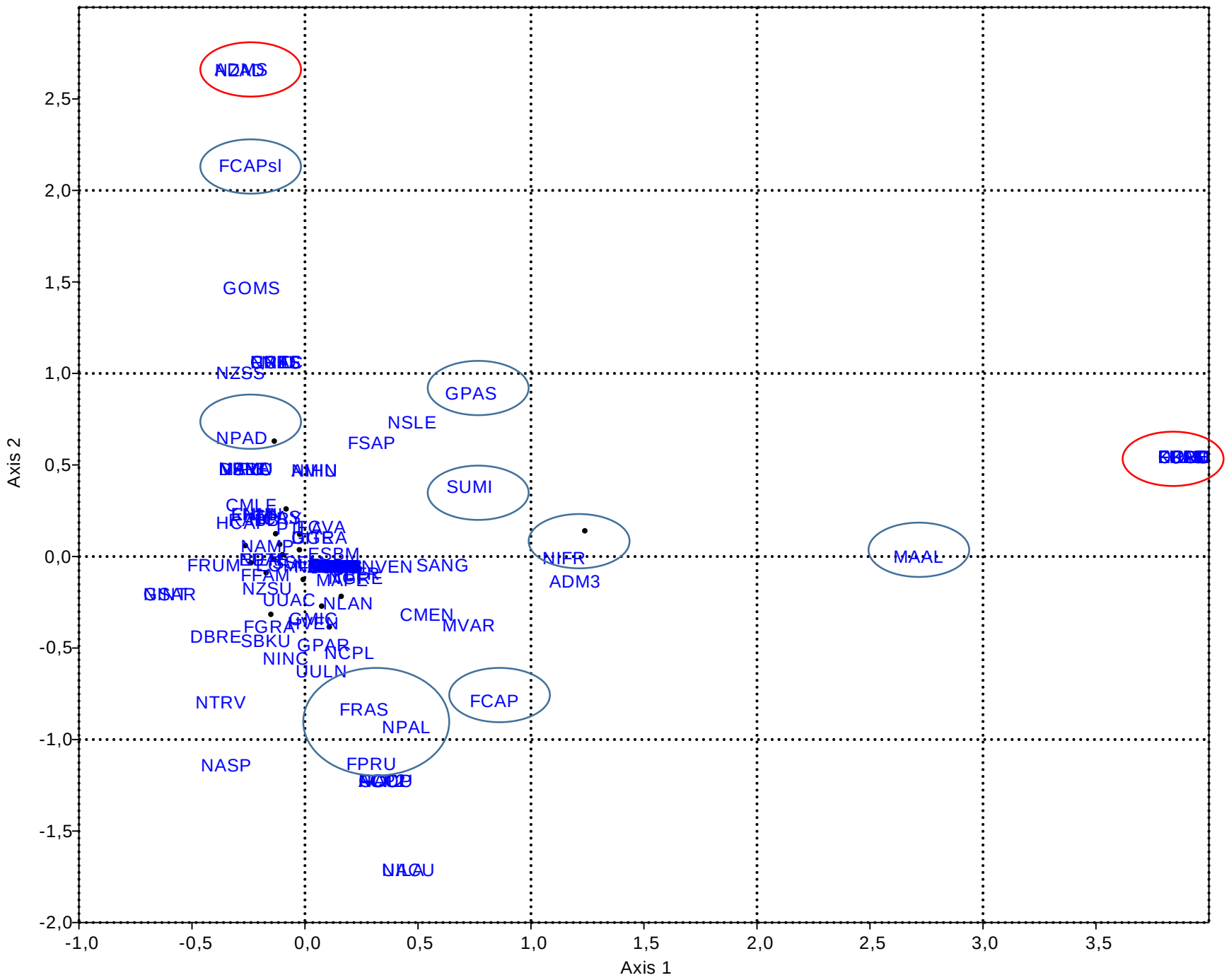
- Don’t do force fitting!
  In case of single valves, be 100% sure of the species, otherwise set as genus. It is often not possible to identify a species from one single valve (and/or girdle view)
  Your results are ending up in databases, and the presence of a species will be used for geographical and ecological research, and statements about species occurrences.
- Read always about a species’ ecology and geographical distribution, and ask yourself if you still believe in your identification. Take size carefully, and pictures.
- Sample 1: NO
  FVTR (Fallacia vitrea - oligo/acid), NEXI (Navicula exilis - oligo-meso/weakly acid), NILA (Nitz. lacuum - oligo), NRAD (Nav. radiosa - more meso), PGRI (Psamm. grischuna - Wassergüteklass I alt. I-II), PTHA (Planothid. hauckianum - oligo).



Small taxa of *Navicula* s.l..: *N. seminulum* Grunow (a-c), *N. minima* Grunow (d-f), *N. subminuscula* Manguin (g,h), *N. atomus* var. *alcimonica* Reichardt (i-k), *N. atomus* var. *permitis* (Hustedt) Lange-Bertalot (l-n), *N. saprophila* Lange-Bertalot & Bonik (o, p) (NORBAF intercalibration 2007; sample 1, Bobr River, PL).

Dominant taxa in sample 1:
small Navicula s.l.

EOMI 15,8% Eolimna minima (Grunow) Lange-Bert.
ESBM 22,5% Eolimna subminuscula (Manguin) Moser, Lange-Bert. & Metzeltin
PLFR 16,4% Planothidium frequentissimum (Lange-Bert.) Lange-Bert.
SSEM 16,2% Sellaphora seminulum (Grunow) D.G.Mann

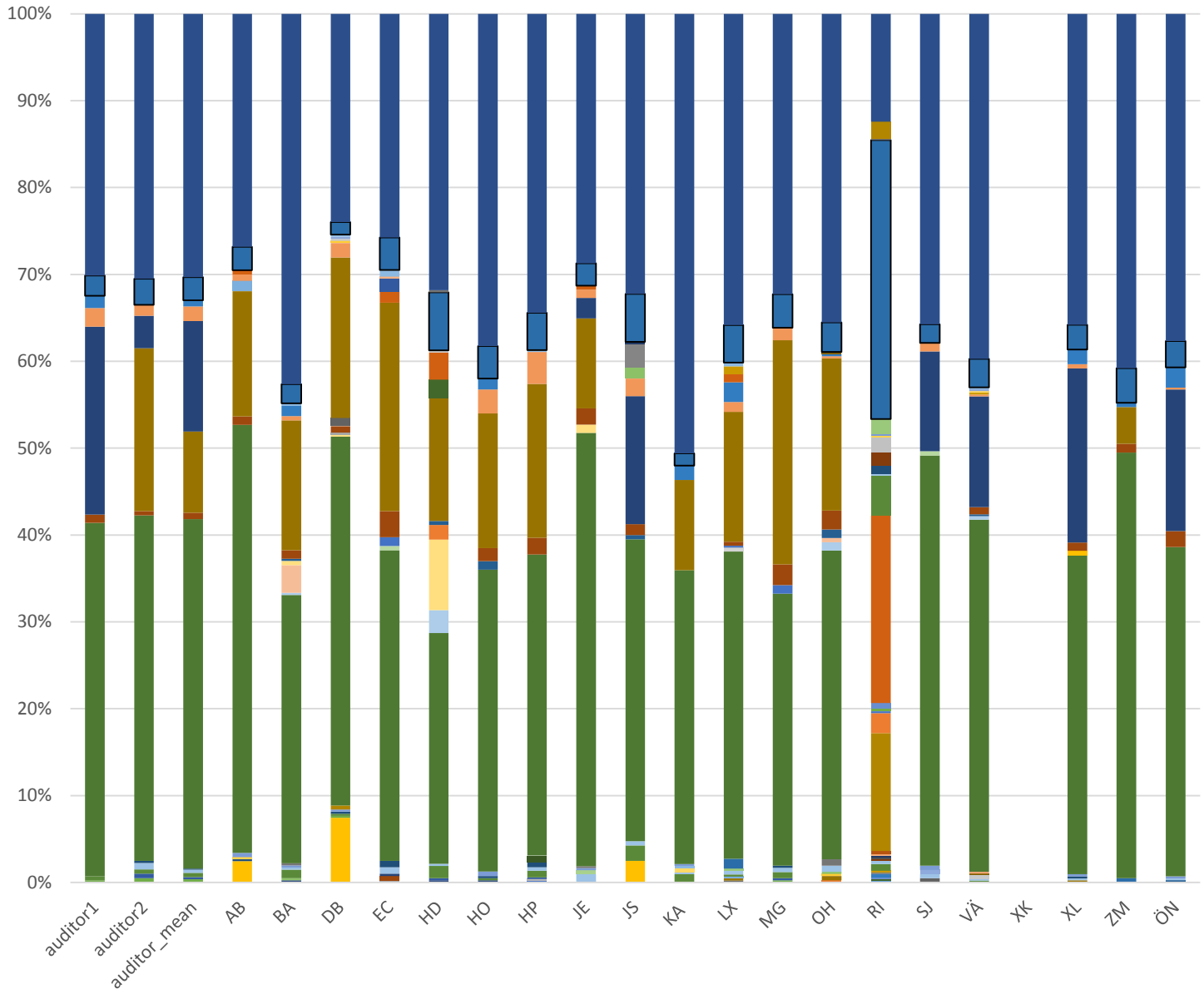


No obvious misidentified taxa among the dominant taxa leading to index errors among those participants with > 60% BC
(but deviations, in Nitzschia, Fragilaria, Surirella, Gomphonema)

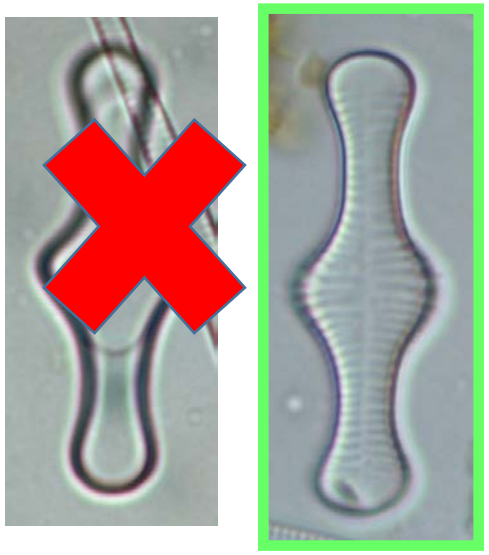
Sample 3: **Stridbäcken**, E4:an

Bild 1. Trumman ovan doseraren kördes sönder av en bulkbil och ersattes under 2000 med en halvtrumma av galva

Sample 3



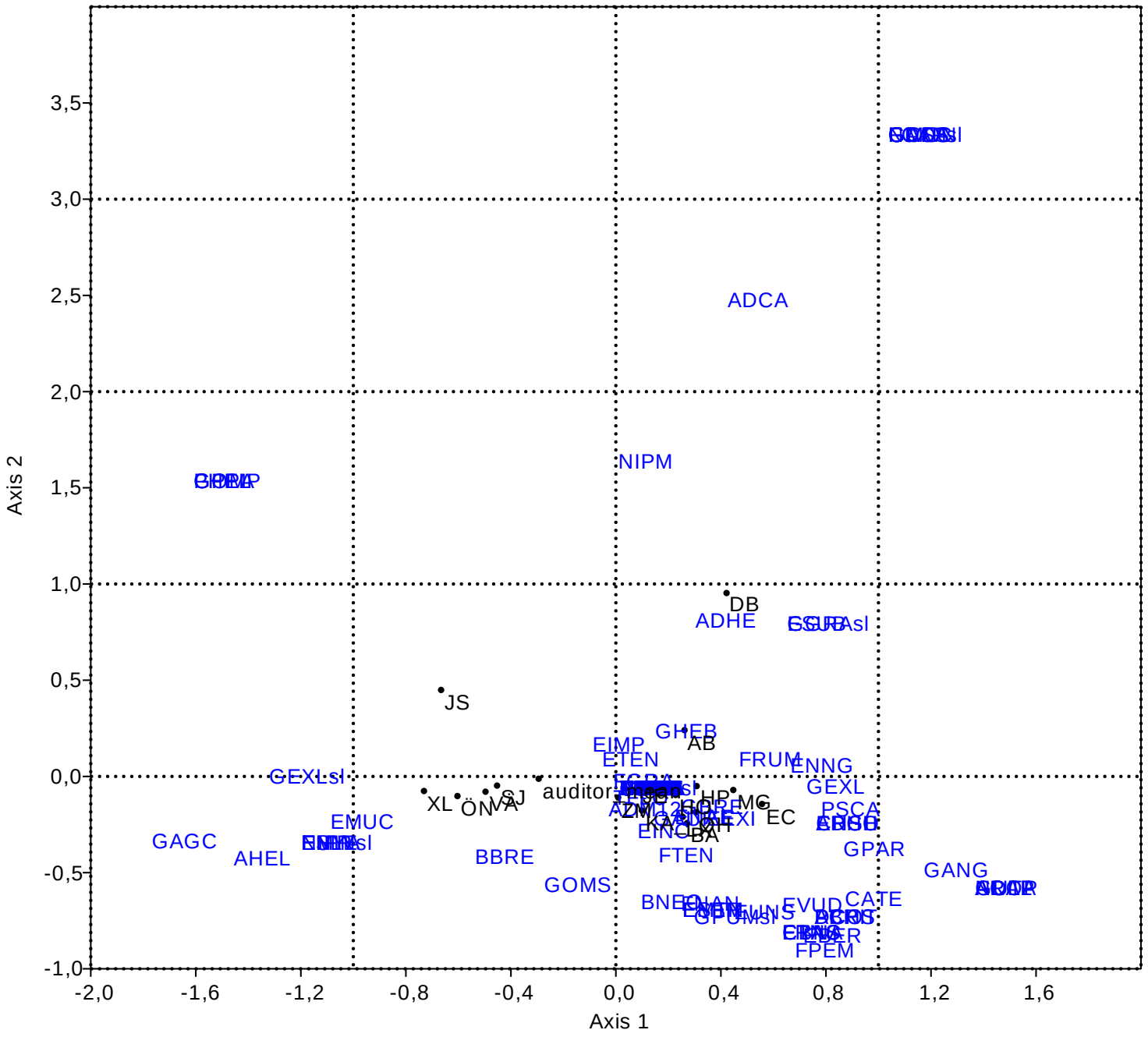
		%
ADHE	Achnanthidium helveticum	0,2
EIMP	Eunotia implicata	0,5
FGRA	Fragilaria gracilis	40,7
GBRE	Gomphonema brebissonii	0,9
GEXLsl	Gomphonema exilissimum s.lat.	21,6
GHEB	Gomphonema hebridense	2,1
GOMS	Gomphonema sp.	1,4
TFLO	Tabellaria flocculosa	2,3
ADM12	Achnanthidium minutissimum	30,1



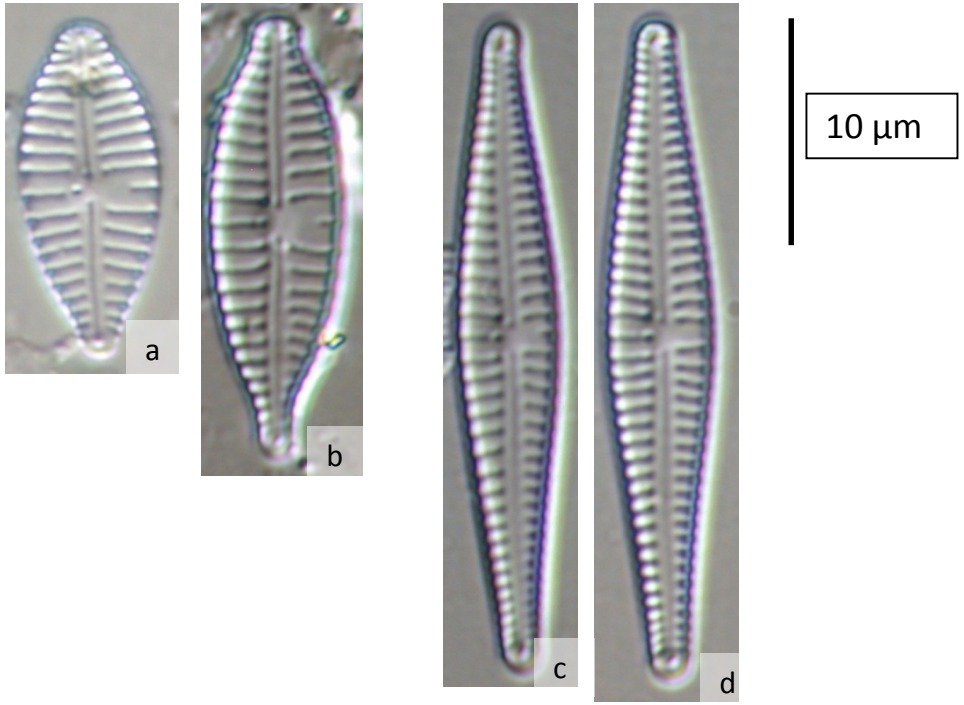
A reminder for *Tabellaria flocculosa* : Do NOT count girdle bands!!!

Amelies message

- Again: Don’t do force fitting.
  No:
  CBACsl (=CLCT - men den är eutrof), ENVE (eutrof), GOLI (eutrof), GPAR ? - pga av mått?, HAMP (eutrof), NNAN (Nitz. nana - brack!), NPAR (Nitz. parvula är förmodligen också brack), UUAC (eutrof), UULN (eutrof).
- Amelies experience says that ESEM, ESUB, ETNC, EUPA (very acid) usually don´t occur together with FGRA (less acid).



Gomphonema acidoclinatum
Gomphonema acuminatum
Gomphonema angustatum
Gomphonema angusticephalum
Gomphonema augur var. augur
Gomphonema auritum
Gomphonema brebissonii
Gomphonema clavatum
Gomphonema exilissimum ?
Gomphonema exilissimum s.lat.
Gomphonema gracile
Gomphonema gracile s.lat.
Gomphonema hebridense
Gomphonema interpositum
Gomphonema montanum
Gomphonema olivaceum
Gomphonema parvulius
Gomphonema parvulum
Gomphonema pumilum s.lat.
Gomphonema utae
Gomphonema sp.

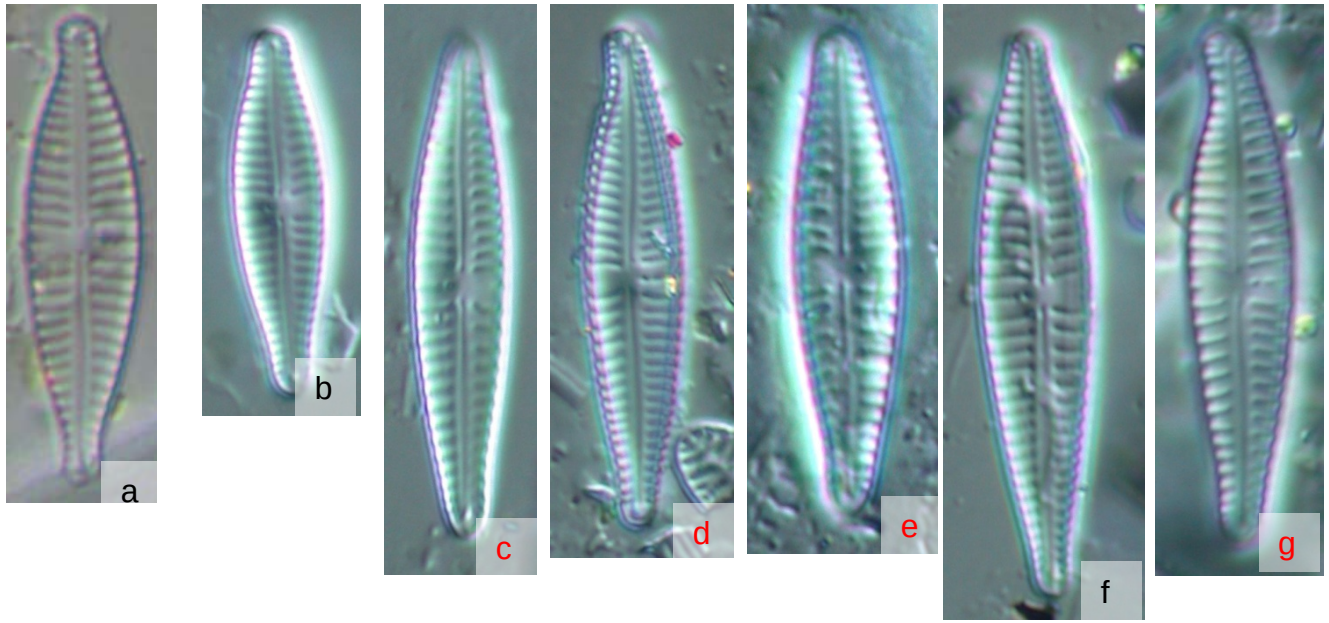


Gomphonema parvulum Kützing (a, b) (Örupsån, SE) vs. *G. cf. exilissimum* (Grunow) Lange-Bertalot & Reichardt (c, d). (Mälskarbäcken, SE).

Amelie 2017: c/d are G. aff. exilissimum (counts as GEXLsl). They are so long and slender, no typical GEXL s.str.)

From: Suggestions to solve identification problems, NORBAF workshop 2007; www.norbaf.net

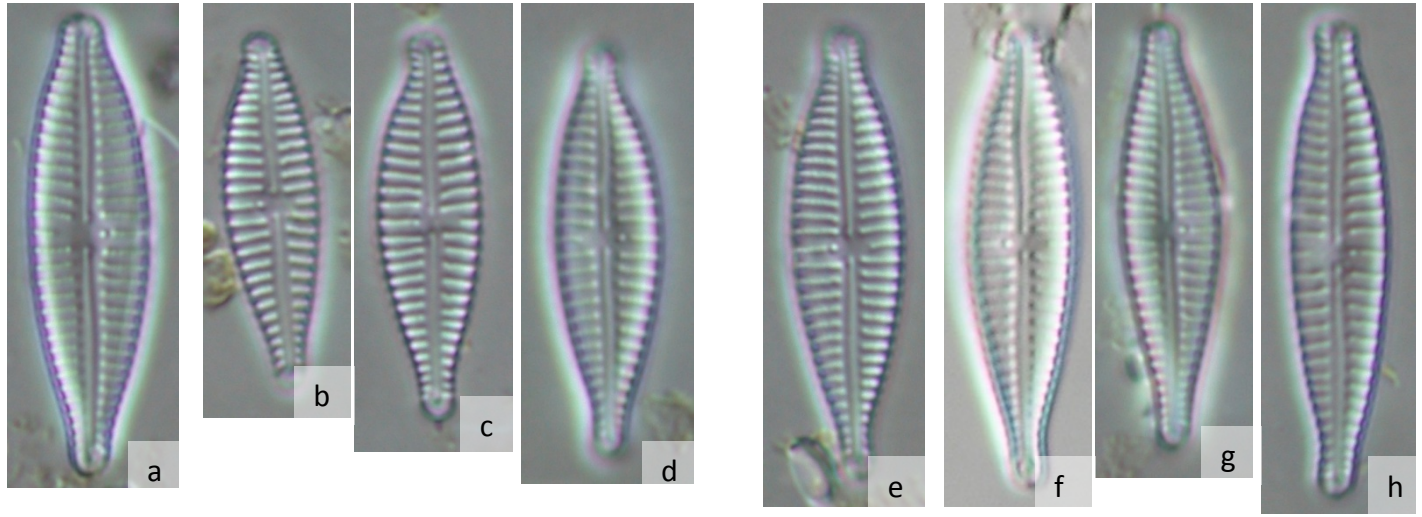
In the intercalibration workshop, we suggested that valves with a length to breadth ratio > 4 and a breadth < 6 µm should be counted as GEXL (or *G.* cf. *exilissimum*), while valves with a length to breadth ratio ≤ 4 or a breadth ≥ 6 µm should be counted as GPAR (*G. parvulum* (var. *parvulum*)). We are aware that this separation does not solve all questions, but it should help when analysing diatoms for biomonitoring.



10 µm

Amelie 2017:
c, d, e och g
Gomphonema varioreduncum
(GVDR, often curved, foot and head broader than in GEXL)
f GEXL

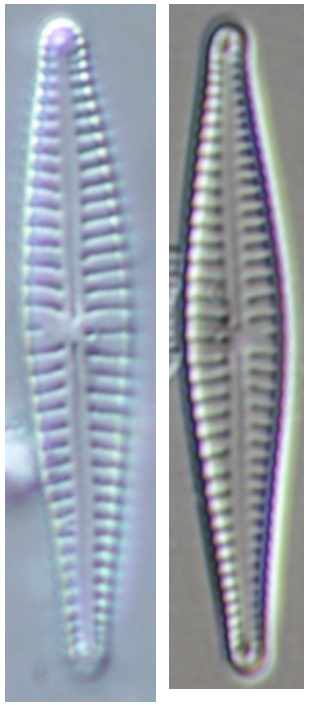
Gomphonema parvulum Kützing (a) vs. *G. exilissimum/G.* cf. *exilissimum* (Grunow) Lange-Bertalot & Reichardt (b-g) (sample 3 Rökeån, SE).



10 µm

Gomphonema parvulum Kützing (a), *G.* aff. *parvulum* (b-d) and *G.* aff. *exilissimum* (e) according to separation suggestion of intercalibration exercise, *Gomphonema exilissimum* (Grunow) Lange-Bertalot & Reichardt (f-h) (sample 2, Martimojoki, FI).

Gomphonema	author	Figures	Questionable figs.	Length/width	width	Str/10µm	notes
exilissimum	Lange-Bertalot & Reichardt	SWF4 76/14-20; ICO2/62 22		Pictures: 4,5-5,7. SE Suggestion: > 4	Pictures: 4,7-6 SE Suggestion: ≤ 6	Pictures: 13-18	heads
exilissimum/aff.exilissimum		ICO2/62 23-27		Pictures: 5,5-7,2 SE Suggestion: > 4	Pictures: 4,7-5,3 SE Suggestion: ≤ 6	Pictures: 14-15	heads; Slender ”neck & legs” – probably new taxon now (or several??)
parvulum	(Kützing) Kützing	SWF4 76/1-7		Pictures: 2,8-6 SE Suggestion: ≤ 4 (Amelie 2017. Not 4.5 as written earlier)	Pictures: 5,3-6,6 (Amelie 2017: not necessarily ≥6 as stated earlier)	Pictures: 15-17	heads
gracile	Ehrenberg	ICO2/62 20-21; SWF4 79 1-7	ICO2/98 4;		Pictures: 6,7-8	Pictures: 11-15 very parallel and punctated	strictly rhombic, quite fat
hebridense	Gregory	ICO2/64 18-25; SWF1 156 12-14; SWF4 79 13-17	ICO2/98 1		SWF: 4-8	Pictures: 13-14(15) (SWF: 10-14)-18	”shoulders” ± rhombic
auritum	A. Braun & Kützing	ICO2/98 2-3, 5- 6; SWF4 79 10-12	ICO2/98 4; 7-8; 64/26-27; SWF4 79 8-9	Pictures: 5,8-6,3	Pictures: 5,3-6	Pictures: 12-13(14)	Acute ends, ± ”shoulders” ± rhombic (i.e. thickest part in the ”Mitte”)
angustatum		Hofmann 2011		Length: 16 – 48 Width: 5,3 – 6,7	Width: 5,3 – 6,7	10 - 14	Symmetry: Thickest part above ”Mitte”
lagerheimii	A. Cleve	ICO2/64 5-8; SWF1 155 22-24			SWF: 4-8	Pictures: 9-11 (SWF: 8-12)	”shoulders”, dreiwellig and ± linear
lagerheimii	A. Cleve	ICO8/41 18-29		Length: 40-54	5-6,4	12,5-16	All characters like hebridense, but that one not even mentioned



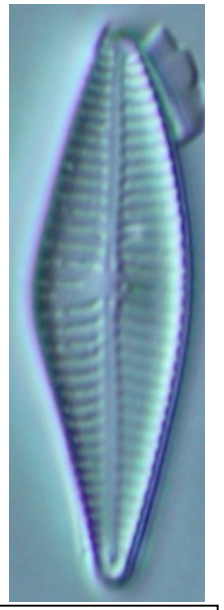
26,3x4,3
LB=6,1 14str
4882

exilissimum

aff. exilissimum

4882

parvulum



4826

gracile

38,7x5
LB=7
14str
2568

hebridense

4862
12

auritum

4858
12

angustatum

angustatum

No picture for lagerheimii

varioreduncum

Amelie 2017: Jag vill nog att G. auritum har spetsigare ändar, men detta får ni diskutera. De två sista G. angustatum känner jag mig osäker på - skulle nog inte kalla dem det.

parvulius in acid waters

Amelie 2017: Påpeka gärna att G. parvulius finns i sura vatten - den bör alltså inte vara så svår att skilja ut (även om jag inte tror att den är så vanlig).

Norbaf recommendations ?

Gomphonema parvulius (Lange-Bertalot & Reichardt) and *Gomphonema varioreduncum* Jüttner, Ector, E. Reichardt, Van de Vijver & E.J. Cox?

Amelie: separates GEXL/GPVL by form: GPVL must have very small foots (and heads), almost looking as if somebody had pinched them)

Gomphonema	author	Figures		Length/width	Width	Str/10µm	notes
parvulius	Lange-Bertalot & Reichardt	Hofmann 2011, 99:21-24, ICO2 64:9-12 (same as in Hofmann) , SWF 2/4 76:22-29		Hofmann L: 10-22	Hofmann: 3-4,5 Jüttner: 3.5–4.5	Hofmann: 13-16 Jüttner: 12–14	Hofmann: no heads (only rostrate) GEXL longer and wider prefers acid water (?)
varioreduncum	Jüttner, Ector, E. Reichardt, Van de Vijver & E.J. Cox	Jüttner et al. 2013, Diatom Research, DOI:10.1080/0269249X.2013.797924		Jüttner: 3.3–5.5, L: 13.5–28.4	Jüttner: 4.1–5.2	Jüttner: 14–18 striae in 10µm near valve centre, 16–20 striae in 10µm near apices	Often slightly cymbelloid with head pole and/or foot pole deflected towards the secondary side of the valve. Often unequal curvature of valve margins of the same valve with margin sometimes almost straight in the central third of the valve. Apices rostrate to subrostrate. The most similar taxon with respect to valve shape is *G. cymbelliclinum* (Reichardt 1999, pl. 40, figs 1–31, pl. 41, figs 10–17) which differs in the shape of its areolae.
exilissimum	Lange-Bertalot & Reichardt	SWF4 76/14-20; ICO2/62 22		Pictures: 4,5-5,7. SE Suggestion: > 4	Pictures: 4,7-6 SE Suggestion: ≤ 6	Pictures: 13-18	heads
exilissimum/aff.exilissimum		ICO2/62 23-27		Pictures: 5,5-7,2 SE Suggestion: > 4	Pictures: 4,7-5,3 SE Suggestion: ≤ 6	Pictures: 14-15	heads; Slender ”neck & legs” – probably new taxon now (or several??)
parvulum	(Kützing) Kützing	SWF4 76/1-7		Pictures: 2,8-6 SE Suggestion: l/w <4 or w>6	Pictures: 5,3-6,6 SE Suggestion: l/w <4 or w>6	Pictures: 15-17	heads

Phycology Section, Patrick Center for Environmental Research

ANSP Algae Image Database

Phycology Section

Algae Images

- Find Images
- Information
  - Taxa Names
  - Finding Images
  - Viewing Images
  - Source of Images
  - Database Origins
  - Posting Comments
  - Citing the Database
  - Contacts
  - Links

Taxa Names

USGS NAWQA Co-op

Diatom Paleolimnology Data Cooperative

Autecological Data

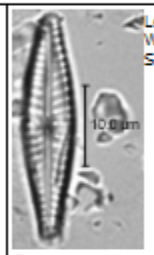
Internal Links

WikiPhyc

Thumbnail Image Search Results: 3 Thumbnail Images

Length(um): 19
Width(um): 4.8
Stria/10um: 15

Gomphonema parvulius (Lange-Bertalot et Reichardt) Lange-Bertalot et Reichardt in Lange-Bertalot and Metzeltin



Length(um): 28
Width(um): 6
Stria/10um: 9

Gomphonema parvulius (Lange-Bertalot et Reichardt) Lange-Bertalot et Reichardt in Lange-Bertalot and Metzeltin

Length(um): 24
Width(um): 5.5
Stria/10um: 14

Gomphonema parvulius (Lange-Bertalot

Metzeltin

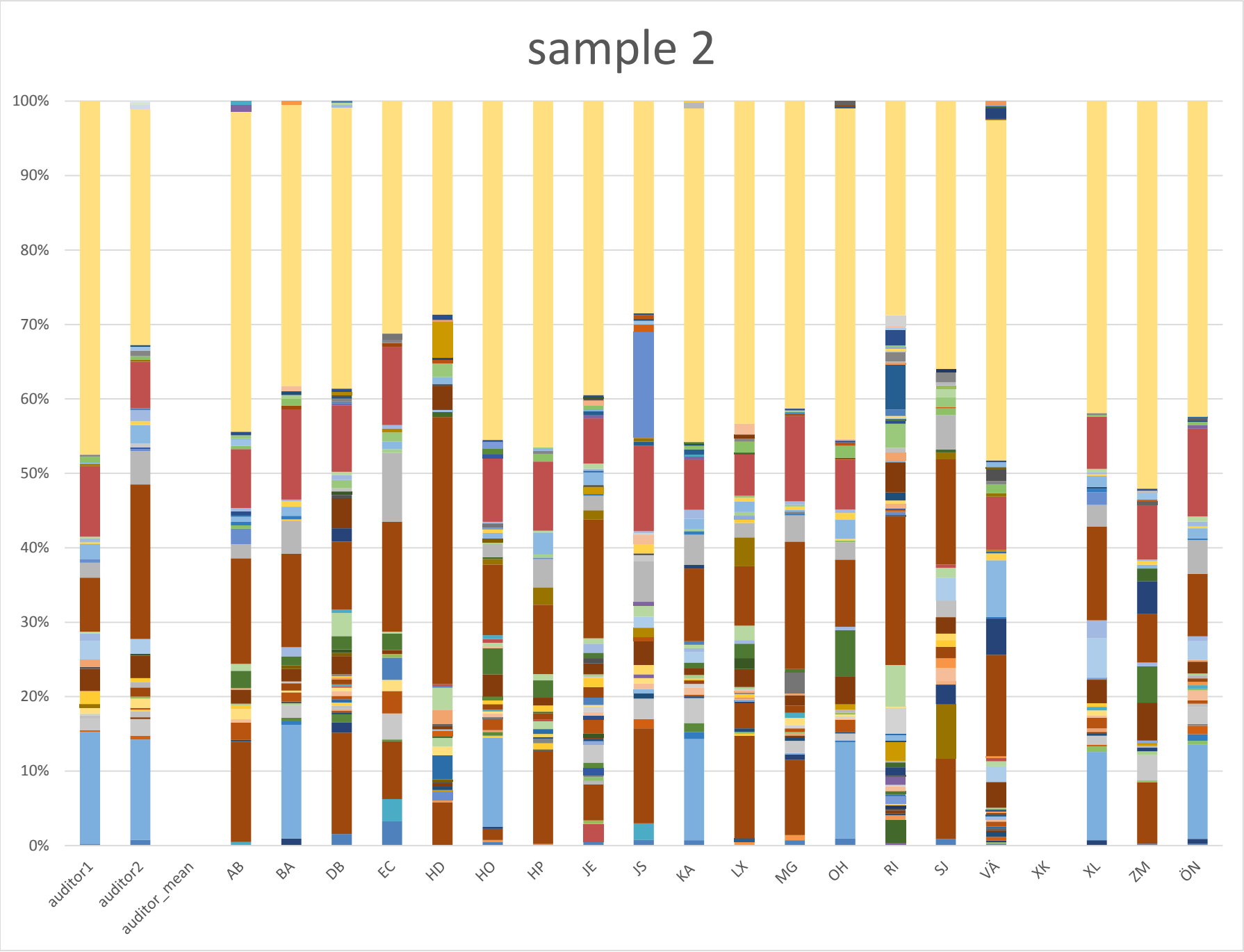
New Search

The Academy of Natural Sciences, 1900 Benjamin Franklin Parkway, Philadelphia, PA 19103
Email: charles@ansp.org

Sample 2: **Holjeån** point 12

Holjeåleden – "en tidlös känsla"

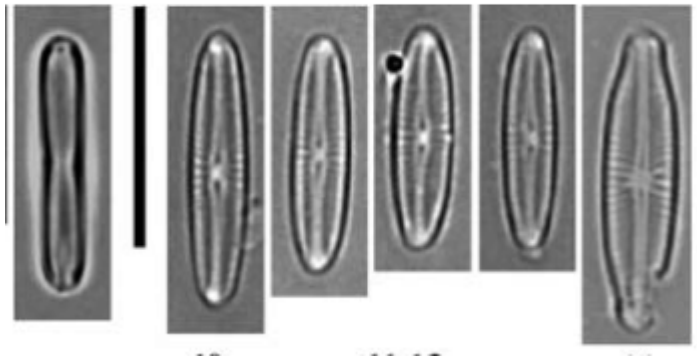
Holjeåleden är en vattenled som sträcker sig från Östafors i norr till Ivösjön i söder. Du paddlar sakta fram genom orörd natur nedsänkt i Holjeåns dalgång, vilket ger dig en känsla av att tiden står still.



		%
ALBL	Adlafia langebertalotii	15
CHEV	Chamaepinnularia evanida	1,5
EUNS	Eunotia sp.	1,75
FGRA	Fragilaria gracilis	3
GEXLsl	Gomphonema exilissimum s.lat.	2,5
KOBG	Karayevia oblongella	7,2
NACD	Nitzschia acidoclinata	2
NIPM	Nitzschia perminuta	2
PABD	Psammothidium abundans	9,5
ADM23	Achnanthidium minutissimum	47,5

Amelies comments

- Amelie had the impression some took sample 2 as competition to find as many species as possible ☺. We are doing monitoring – it is more important to get the dominant species right.
- For Achnanthes s.l. for example, you always need 2 valves (raphe- and rapheless) to identify a species.
- NOT:
  DVUL (eutrof), EBVC (Encyonopsis brevicap - acid!), ENMI (eutrof), ENVE (eutrof), ERHO (acid), ESUB (acid), FCRO (eutrof), FCVA (eutrof), FFAM (eutrof), FSAP (nej!), GMIN (Gomph. minutum - eutrof), GOLI (eutrof), HCOS (Hipp. costulata - eu/brack), LHUN (eu/påverkat), MAPE, NCPL (förorenat), NDVA (Nav. vaucheriae - auf Gartenerde), NGRE (eutrof), NPAL (bör vara NPAD i detta fallet), NSCL (Nav. salinicola - brack/salt!), SSEM (eu/förorenat), STSB (S. berolinensis - eutrof), TQUA (acid), UACU (eutrof), UULN (eutrof).
- Probably not (do you have pictures?):
  AIHE (Aulac. islandica var helvetica), AUGR, CLCT, CNID (Cymbellonitzschia diluviana), CWEI (Cavinula weinzierlii - ovanlig), EAUE, EMUC (more acid), GCBC, NDIS, NLMN (Nitz. lanceola var. minutula bör vara Nitz angustatula!), NSOC, PLAU (mer eutrof), PTDE (eutrof), PTHA, SMED, SPAV.



Adlafia langebertalotii O. Monnier & L. Ector dominant in sample 2, but not yet in compulsory Swedish identification litteratur
-> could be mistaken for A. suchlandtii, thus pooled

Adlafia langebertalotii	no heads; W: 2-2.6µm; L: 7.3-11.9µm; 30-32 str/10µm; rheophilous
Adlafia suchlandtii	heads; W: 2.5-3µm; L: 12-15µm; 26-28 str/10µm; aerophilous

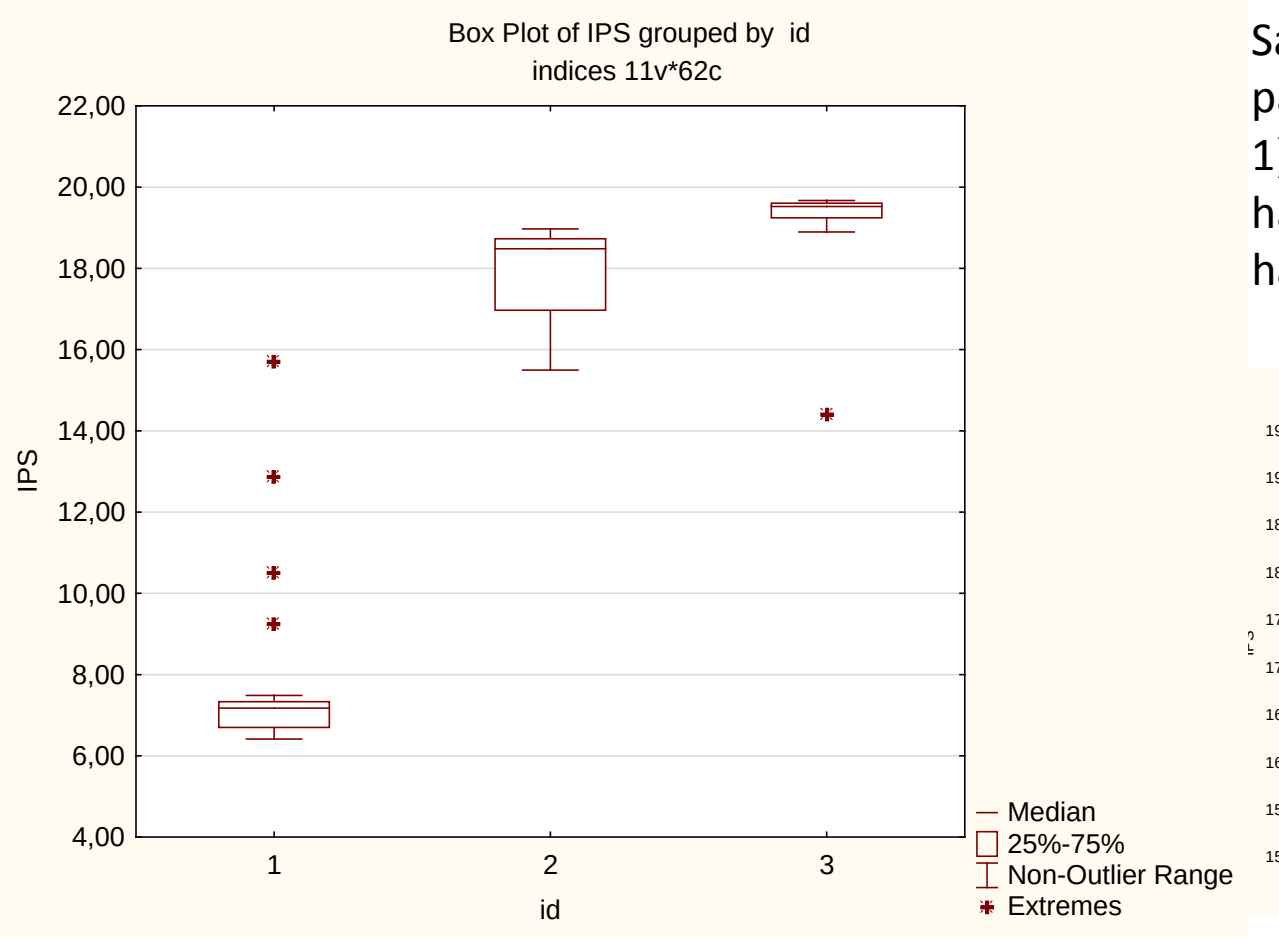
Amelie: Adlafia lange-bertalotii finns i Sverige inte i helt rena vatten - här kallar nog fransmännen något för oligotroft som inte vi skulle kalla för rent oligotroft. Om du ser i provet från Holjeån (i norra Skåne) så förekommer en del mer eller mindre näringskrävande arter där också (CPLA, ADKR, ALFR, FPUL, AAMB, FcfRUM). Man ser det också på medelbredden hos ADMI. Det är därför jag har ett litet problem med att kalla ADMI för ADM2 i detta fallet, för jag tycker att IPS blir lite för högt. (Men det känns inte heller bra med ADM3, för då blir nog IPS lite lågt.)

Index: A. langebertalotii IPS 4.5/1, whereas A. suchlandtii has 5/1 ???
Monnier: “Moreover, the two species seem to be ecologically distinct, N. suchlandtii being aerophilous (Gesierich & Rott 2004) and A. langebertalotii rheophilous.”
According to Rimet/Monnier, Adlafia langebertalotii should occur in “oligotrophic headwater streams with neutral pH, low carbonate hardness and well oxygenated waters” – so why 4.5 when A. suchlandtii has 5?

W: 2.5-3µm; L: 6-10µm;
24-28 str/10µm;
Rhombic-elliptical

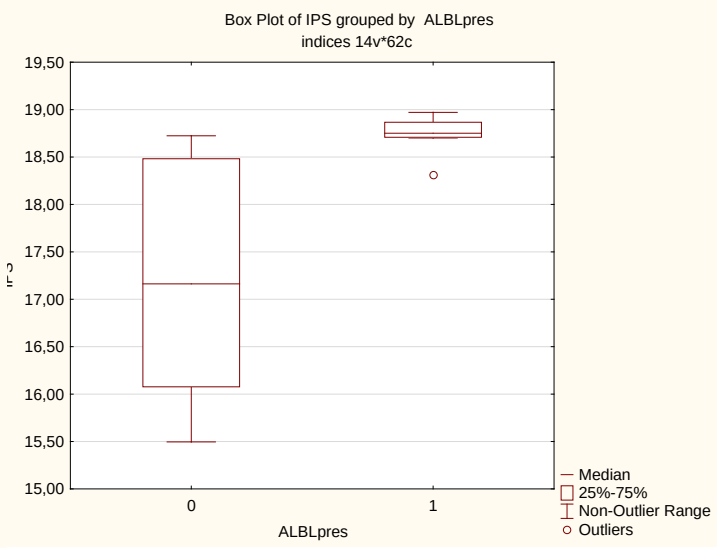
Chamaepinnularia evanida
http://huey.colorado.edu/diatoms/taxa/taxon_summary.php?pageNum_rsTaxa=28&totalRows_rsTaxa=285&taxon_ID=119

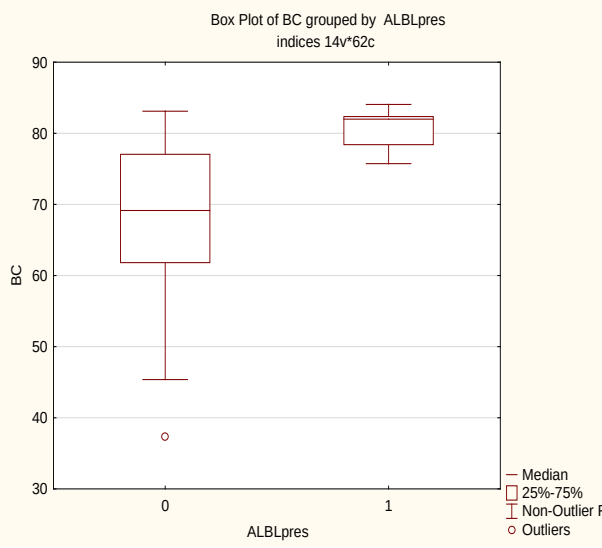
http://huey.colorado.edu/diatoms/taxa/taxon_summary.php?pageNum_rsTaxa=28&totalRows_rsTaxa=284&taxon_ID=281
???



Sample 2 has quite a large variation of IPS between participants. Why?

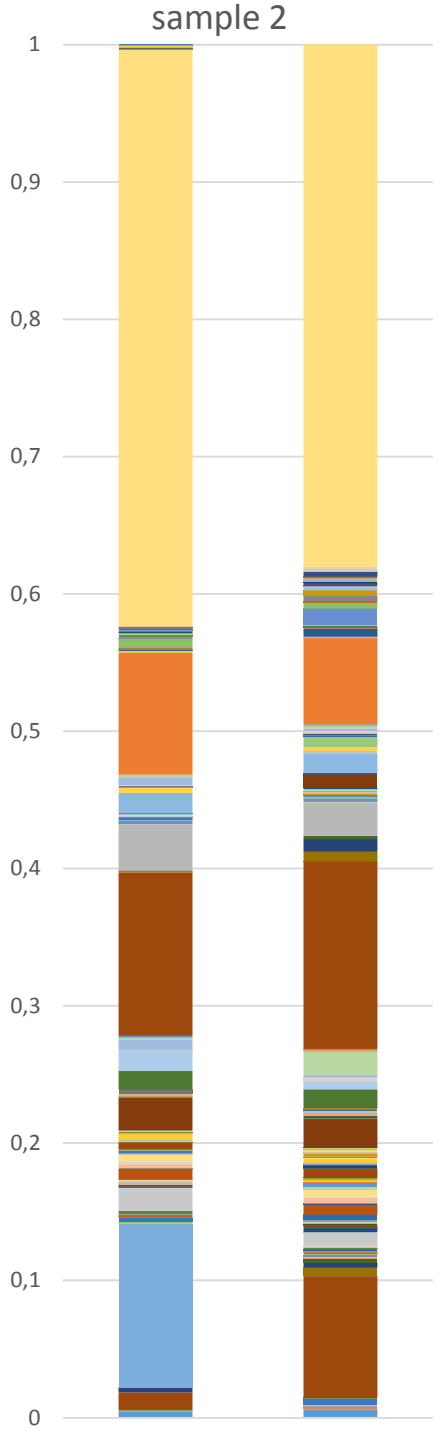
1) IPS Adlafia langebertalotii 4.5/1, A. suchlandtii has 5/1 -> participants with A.langebertalotii should have lower IPS. BUT they don't. Why?

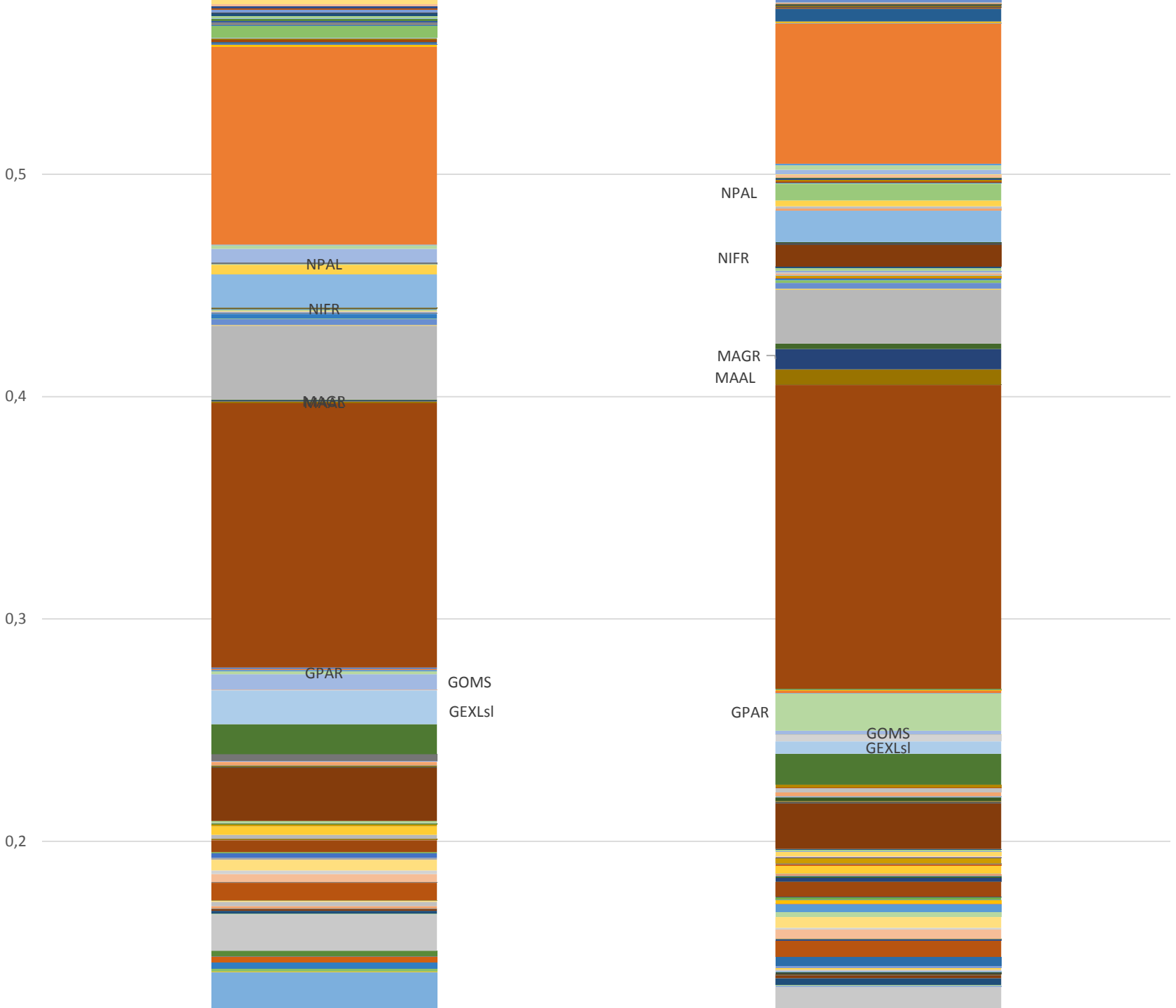


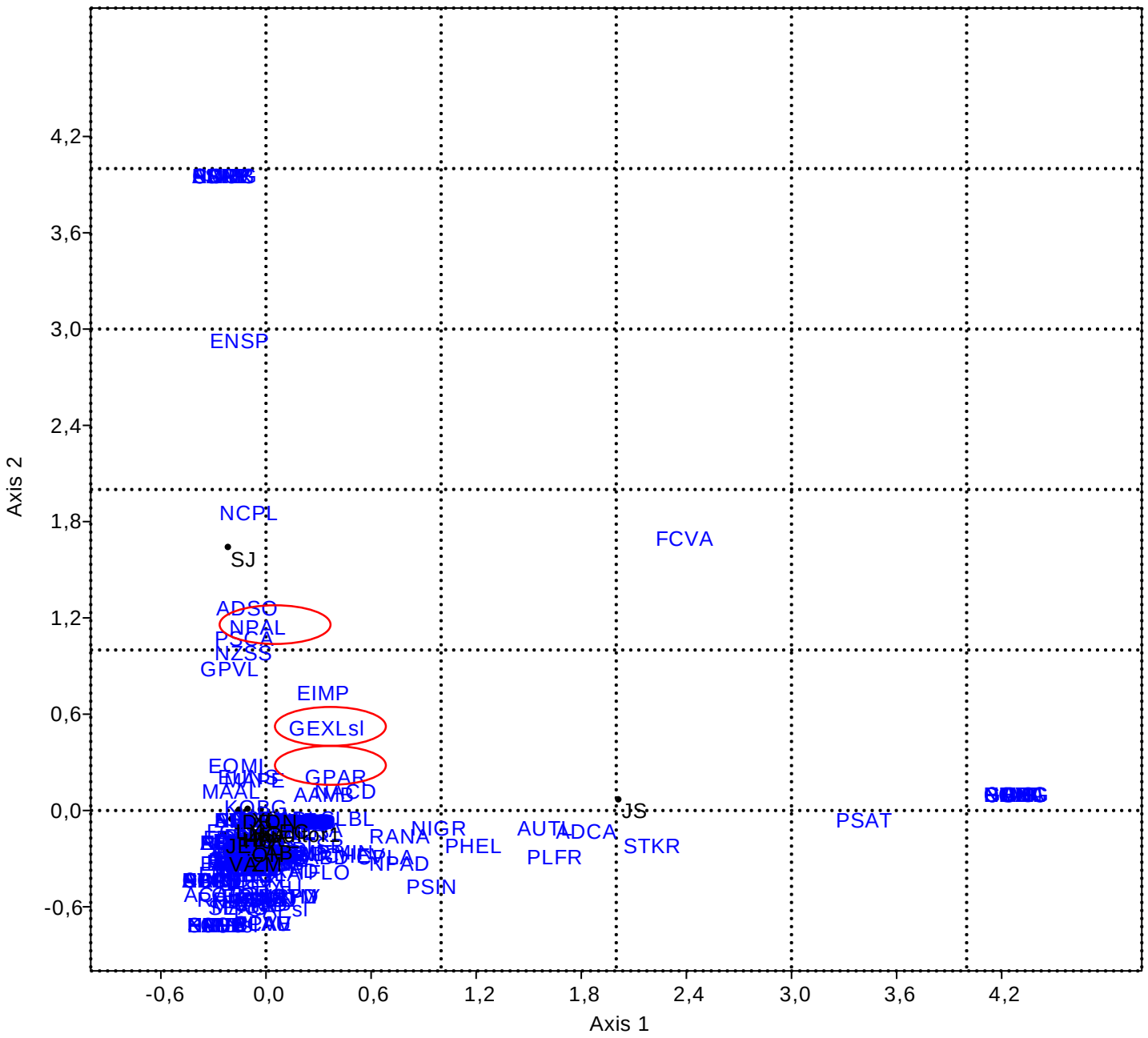


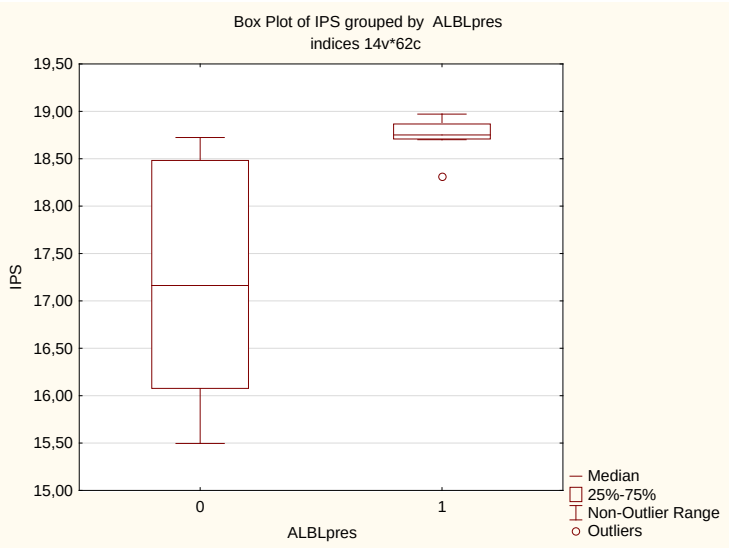
N=12 N=9

Participants without A.langebertalotii also had many other deviations from auditors: probably other taxa with lower IPS counted different from auditors: NPAL, NIFR, MAAL, GPAR etc.


sample 2
1
0,9
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0


0,5
0,4
0,3
0,2
NPAL
NIFR
MAGR
GPAR
GOMS
GEXLsl
NPAL
NIFR
MAGR
MAAL
GPAR
GOMS
GEXLsl





GPAR: IPS 2/1 GEXL: IPS 5/1

NPAL: IPS 1/3 NPAD: IPS 3/1

NIFR: IPS 2/1

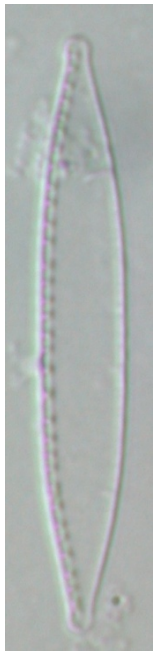
MAGR: IPS 3/1 CHVE: IPS 4.6/1

MAAL: IPS 3.5/1

Nitzschia	Width [µm]	Length [µm]	Fibulae/10µm	Str/10 µm	Lengt/width ratio	IPS/notes
archibaldii	2-3	15-40	14-19	46-55		3,8/2
palea var. debilis	3* < 3,5**	25-100* (SWF: 15-70)	14-17[f]	≥ 37[f]	≤ 15* (7-14[f])	3/1
palea var. palea	≥ 3,5	15-70	9-14	28-40[t]	≤ 10[f]	1/3
gracilis NIGR	2,5-4	30-110[t] if > 70*: = NIGR ≠ N. palea	12-18[t]		> 15f*	3/2, parallel
palea var. tenuirostris	Habitus overlap of NPAD and NIGR					unclear
acidoclinata	2,5-3	8-45	10-16	26-32(36)		ZK! As perminuta; oligotrophic, fine
perminuta	2,5-3	8-45	10-16	26-32(36)		No ZK! Linear-lanceolate; weakly subcapitate, somewhat concave middle. Oligotrophic
frustulum	3-4	5-60	10-16	19-30		ZK, wide/big lanceolate, very thick, heavy, thick striae, always convex??
liebetruthii	2-4,5	5-60	10-16	19-30		No ZK, narrowly lanceolate, you can see always areola (points), more gross than supralittorea, brackish
soratensis (abbreviata) NAME??? SE taxalist??	2.6–3.2	6.8–13.7	7.9–13.8	27.1–28.7		Linear–lanceolate, very slightly protracted, broad, strictly freshwater
inconspicua	2.3–3.1	4.1–15.3	8.9–17.0	23.7–30.4		Linear–lanceolate, very slightly protracted, narrow, brackish–marine/euryhaline
supralittorea	2,5-4	10-25	14-18(20)	25-34, visible in LM		No ZK, Linear-lanceolate, Bart: parallel; eutrophic, finer than lieberthrutii and very regular
agnita	2,9-4,6	18-40	13-20	>35		No ZK, lanceolate, you don't see striae, the valves are very tightly together, fibulae on both valves, very convex, high elecrolyte
aequorea	2,9-4,6	18-40	13-20	32-35		No ZK, lanceolate, striae visible, very convex, brackish

9427 archibaldi

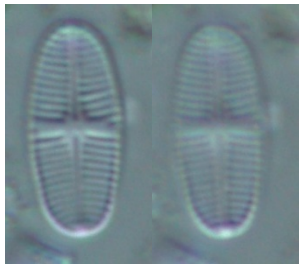
debilis



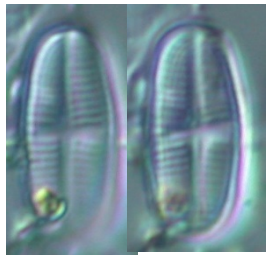
9410 palea

Shall we take them up in SE list? If so, which and which index values?

Lemnicola hungarica
Achnanthes carissima
Planothidium daui
Platessa conspicua
Psammothidium helveticum
Achnanthidium caledonicum
Psammothidium subatomoides
Achnanthidium kranzii
Psammothidium levanderi
Psammothidium ventrale
Psammothidium rossii
Psammothidium marginulatum
Psammothidium lauenburgianum
Karayevia suchlandtii
Psammothidium altaicum
Psammothidium grischunum



A.cf abundans
9x4 31str
2731_2



A.abundans
9,3x3,7 30str
2703_2

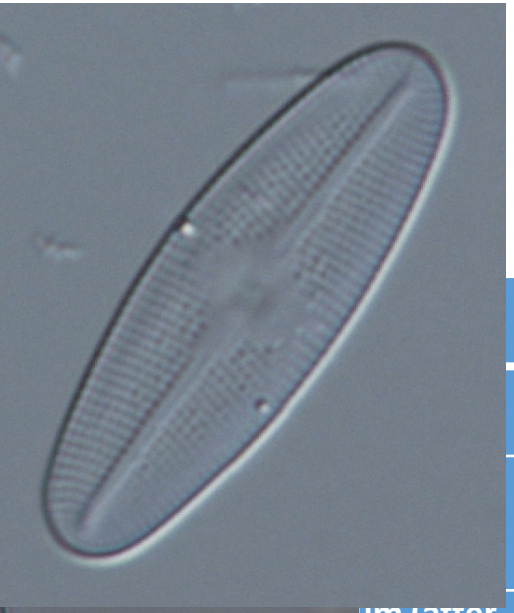
A.Abundans
12,5x3,5 28str
2769_2

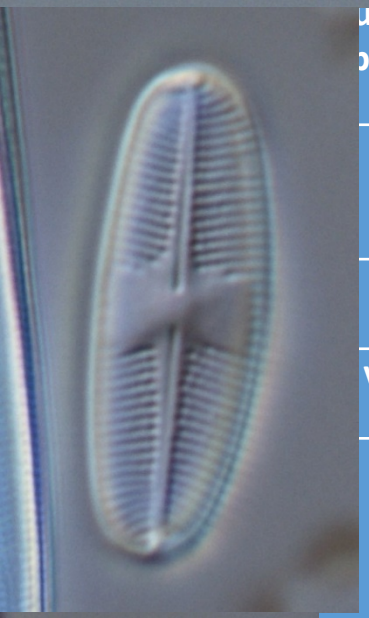
Psammothidium abundans

SWF 2/4 T. 37:1-40

Rossithidium pusillum	18-23 str/10µm
Rossithidium anastasiae syn. Achnanthes linearioides	24-28 str/10µm
Rossithidium petersenii	26-36 str/10µm

additionally differences in central area





	pictures	Probably pictures	str	L	W	form	ecology
	Icon2 Taf 21, 113	SWF 13:7-10				Round, short str. on RL valve	acid
		SWF 13:3-6 (1-2?) Icon2 21:25-29				Different outline & RL valve; typical pictures are 5x12 µm	
um (after otions)	DSBM 27:38-39 (nr 40 maybe not)	SWF 13:11-16	27-30?			Again different outline & RL valve; typical pictures are 5x12 µm	More acid
						Smaller than the former 3 (7-11x4-5; 26-30), central area of R valve typical butterfly form	
			23-28	7-28	5-7.5	Elongated valve form, round central area on RL	
var. minor						Smaller than helveticum, but same central area	
			28-32	12-22	5-7.5	More str than helveticum, central area on RL is not round but ±rectangular, i.e. looks as that on R valve; both areas smaller/thinner than of helveticum	More acid than helveticum; probably not very common
e			27-32	10-26	5-8	Different str than	Only in very

Achnanthidium minutissimum group

Suggestions how to deal with groups on a threshold?

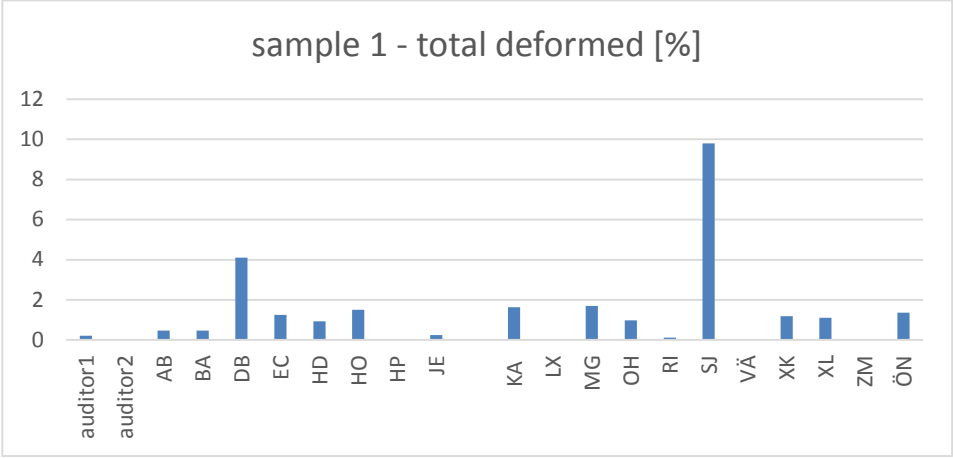
Suggestion:

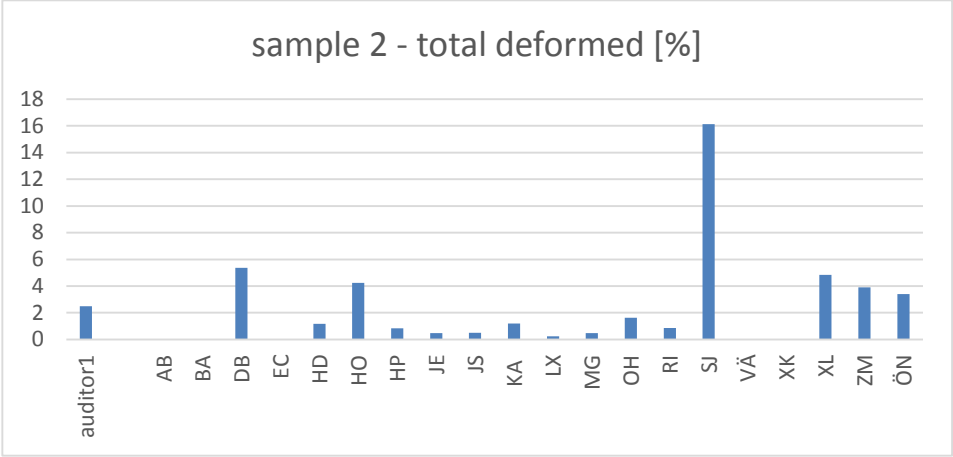
- Have an ADM23 with IPS 4.5/1. But where to set the boundaries? (2,70? 2,75? To 2,85? 2,90?)
- Remove ADM1? (no, is a strong indicator of mountain areas)
- PS: Check your calibration scale: ADM3 in sample 1…

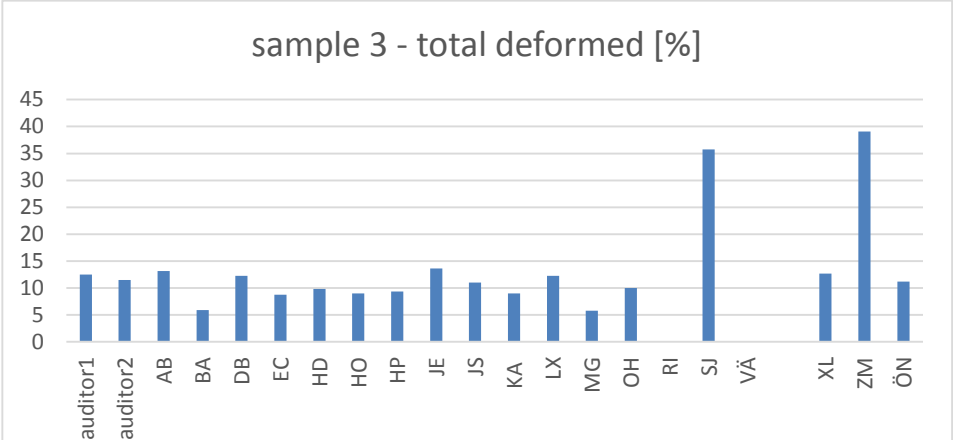
Achnanthidium minutissimum group on threshold between 2 groups:

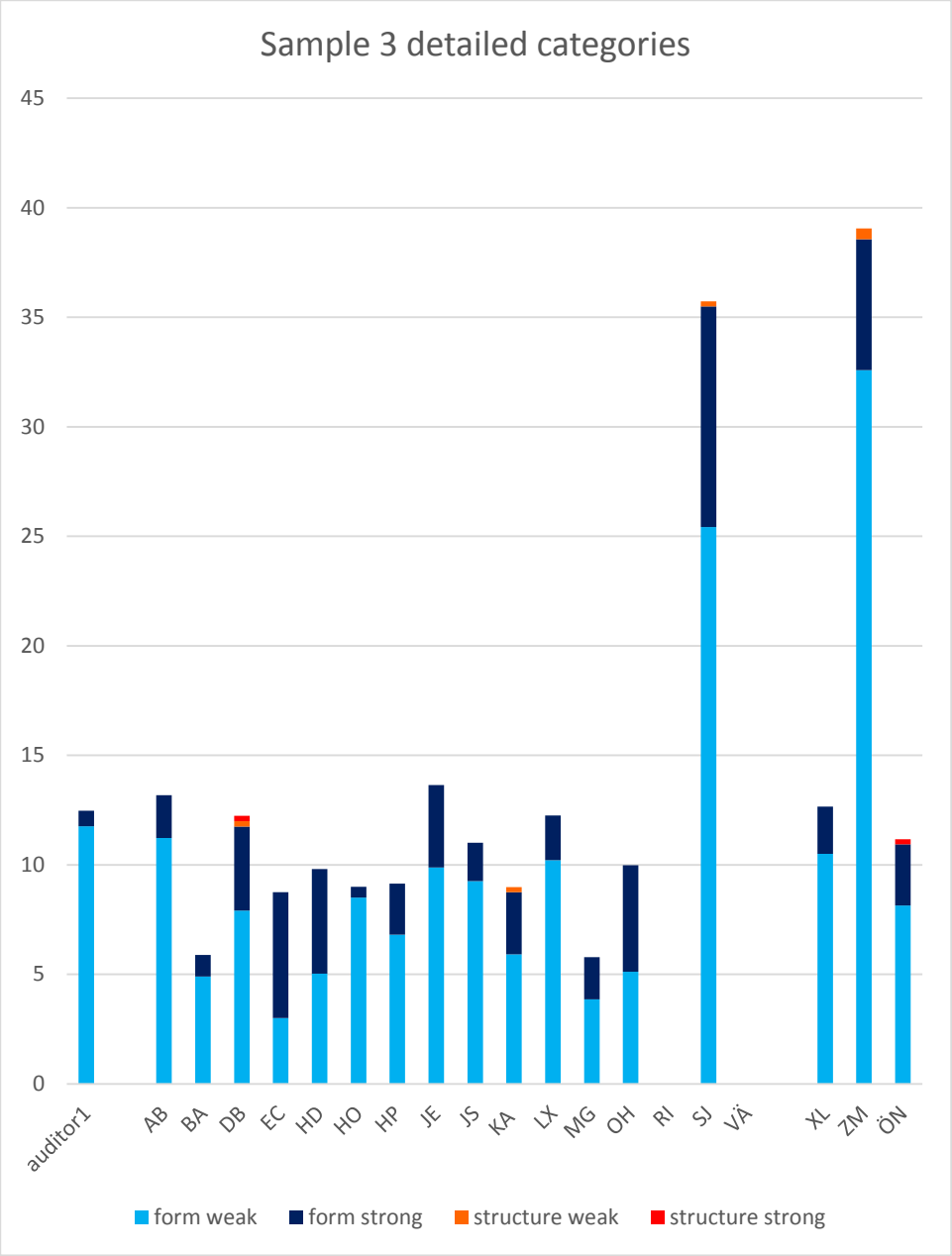
- Sample 2: A. minutissimum group mean width 2,74 µm, groups 2 & 3 pooled
- Sample 3: A. minutissimum group mean width 2,24 µm, groups 1 & 2 pooled

Deformations

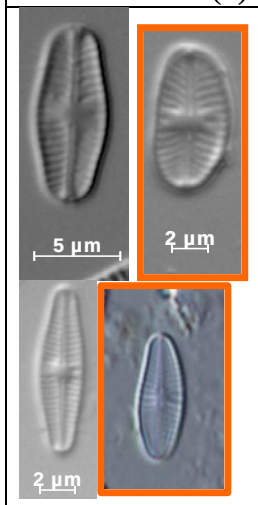

sample 1 - total deformed [%]
12
10
8
6
4
2
0
auditor1
auditor2
AB
BA
DB
EC
HD
HO
HP
JE
KA
LX
MG
OH
RI
SJ
VÄ
XK
XL
ZM
ÖN


sample 2 - total deformed [%]
18
16
14
12
10
8
6
4
2
0
auditor1
AB
BA
DB
EC
HD
HO
HP
JE
JS
KA
LX
MG
OH
RI
SJ
VÄ
XK
XL
ZM
ÖN


sample 3 - total deformed [%]
45
40
35
30
25
20
15
10
5
0
auditor1
auditor2
AB
BA
DB
EC
HD
HO
HP
JE
JS
KA
LX
MG
OH
RI
SJ
VÄ
XL
ZM
ÖN

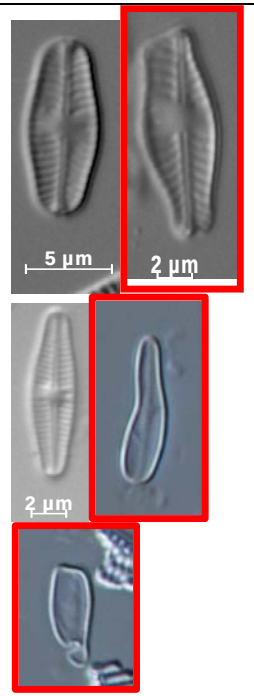

Sample 3 detailed categories
45
40
35
30
25
20
15
10
5
0
auditor1
AB
BA
DB
EC
HD
HO
HP
JE
JS
KA
LX
MG
OH
RI
SJ
VÄ
XL
ZM
ÖN
form weak
form strong
structure weak
structure strong

Onormal form (1)



1As
Svag asymmetrisk
Exempel:
Släkte *Sellaphora*,

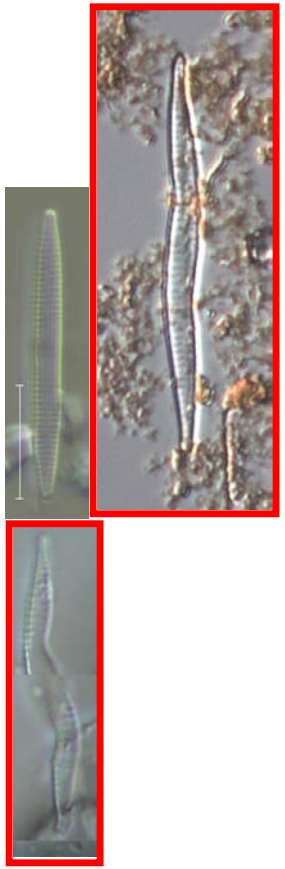
A. minutissimum



1At
Tydlig
Asymmetrisk
Exempel:
Släkte *Sellaphora*,

A. minutissimum

1Bs
Svag böjd
Exempel:
Släkte *Fragilaria*., *A. minutissimum*



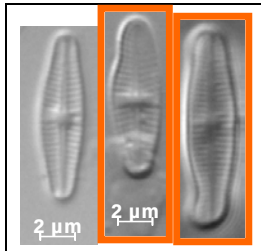
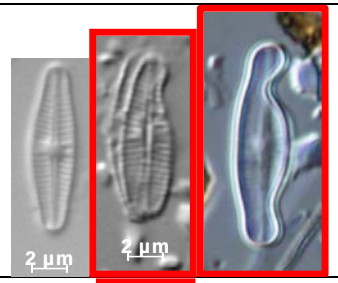
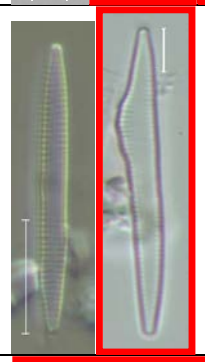
1Bt
Tydlig böjd
Exempel:
Släkte *Fragilaria*.,

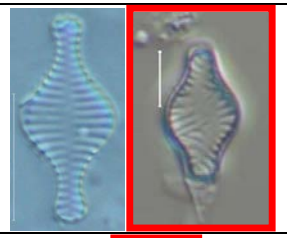
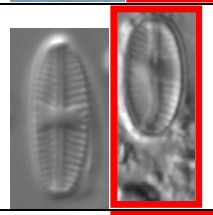
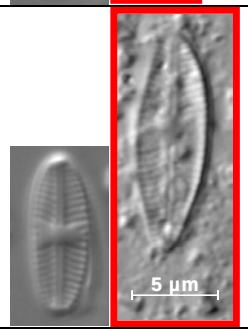
1Cs
Svag inbuktad

Exempel:
Släkte Eunotia

1Ct
tydlig inbuktad

Exempel:
Släkte Eunotia

	1Cs Svag inbuktad Exempel: Släkte Achnanthidium		1Ct tydlig inbuktad Exempel: Släkte Achnanthidium
			1Ds tydlig utbuktad Exempel: Släkte *Fragilaria*.,
			1Et tydlig övrig

Onormalt mönster (2)			
			2At Tydlig avvikande striering Exempel: Släkte *Fragilaria*.,sl
			2Bt tydlig avvikande raf Exempel: Släkte *Eolimnia*
			2Ct Tydlig övrig (exempel: mönster rätt, men asymmetriskt) Exempel: Släkte *Eolimnia*