Table of Contents:

Annex I: Form 1: Return slip and checklist	**Page 2**
Annex II: Form 2: Enumeration and identification results log sheet	**Page 3**
Annex III: Test Instructions	**Pages 4-13**
Annex IV: Participating laboratories	**Page 14**
Annex V: Statement of performance certificate	**Pages 15-16**
Annex VI: Homogeneity and stability test	**Pages 17-32**
Annex VII: Analysts' results	**Pages 33-34**
Annex VIII: Robust mean + SD iteration ISO13528	**pages 35-42**
Annex IX: Summary of Z-scores for all measurands	**Pages 43-46**
Annex X: Performance statistics for the test	**Page 47**
Annex XI: Qualitative results IPI2021 by Analyst and Measurand	**page 48-49**
Annex XII: Summary of statistical parameters and laboratory means	**pages 50-51**
Annex XIII: Graphical summary of results	**Pages 52-59**
Annex XIV: RLP + RSZ for all measurands	**Pages 60**
Annex XV: Charts of repeatability standard deviations	**Page 61-68**
Annex XVI: Ocean teacher online HAB quiz	**Pages 69-98**
Annex XVII: HABs Ocean teacher analyst results	**Pages: 99-100**

ANNEX I: Form 1 return slip and checklist

IPI2022-OCHABS-1
FORM 1: CHECKLIST CONFIRMATION

Please ensure to complete the table below upon receipt of samples, then scan and e-mail to rsalas@observatoriocanariohabs.com **Tel: +34 623428236**			
Analyst Name:			
Laboratory Name:			
Analyst Code Assigned :			
Contact Tel. No. / e-mail			
CHECKLIST OF ITEMS RECEIVED	**(Please circle the relevant answer)**		
Sample code Numbers: ____ ____ ____ ____		YES	NO
Set of Instructions		YES	NO
Envelope containing 4 x ampoules, droppers, lugols iodine and 4 x 50ml sterilin tubes		YES	NO
Enumeration and identification result log sheet (Form 2)		YES	NO

I confirm that I have received the items as detailed above and that the materials were received in good working conditions.

(If any of the above items are missing, please contact rsalas@observatoriocanariohabs.com) or tel: **+ 34 623428236**

SIGNED: _____

DATE: _____

Form 1: Checklist confirmation

ANNEX II: Form 2 Enumeration and identification results log sheet

IPI2022-OCHABS Phytoplankton Intercomparison Exercise

Analyst Name:	
Laboratory Code:	
Analyst Code :	

Settlement date:			
Volume Chamber (ml)			
Analysis date:			
Sample No:			

Organism	Cell count	Cell count	Cell count	Multiplication factor			Number cells/L	Number cells/L	Number cells/L	Average
										#DIV/0!
										#DIV/0!
										#DIV/0!
										#DIV/0!
										#DIV/0!
										#DIV/0!
										#DIV/0!
										#DIV/0!
										#DIV/0!
										#DIV/0!
										#DIV/0!
										#DIV/0!
										#DIV/0!
										#DIV/0!

Comments:

Form 2: Results logsheet

IPI Phytoplankton Proficiency Test 2022 Instructions

1. **Introduction**
2. **Deadlines, checklists and forms**
3. **Test method**
4. **Equipment**
5. **Sedimentation chambers and sample preparation**
6. **Counting procedure and strategy**
7. **Samples**

1. Introduction

From 2021 to 2025, the IPI Proficiency Testing scheme in abundance and composition of marine microalgae programme moves to the Canary Islands Harmful Algal Observatory (OCHABs) in the University of Las Palmas de Gran Canaria (ULPGC), Spain. The programme continues with the regular collaboration of the IOC UNESCO Centre for Science and Communication of Harmful algae in Denmark (http://hab.ioc-unesco.org). This collaboration involves the use of algal cultures from the Scandinavian Culture Collection of Algae and Protozoa in Copenhagen, the elaboration of a marine phytoplankton taxonomy assessment (online HAB quiz) using the online platform 'Ocean Teacher' Global academy (OTGA), http://classroom.oceanteacher.org/ hosted by the IODE (International Oceanographic Data and information Exchange) www.iode.org/ office based in Oostende, Belgium, a project office of the IOC.

The collaboration also involves the organisation of a training workshop which is held annually to discuss the results of the intercomparison exercise and to provide training on phytoplankton taxonomy. This workshop has become an important forum for phytoplankton taxonomists working on phytoplankton monitoring programmes from around the world to convene and be able to discuss taxonomical matters related to monitoring, new advances and finds, taxonomical nomenclature changes, as well as looking at samples from different geographical areas and listening to relevant stories from other laboratories about harmful algal events in their regions of relevant ecological importance. This workshop has taken the format of a full 3 days training workshop with at least 2 days dedicated to lectures on algal groups in rooms equipped with microscopes and using live cultures and preserved samples from participants and locations across the globe.

The purpose of this exercise is to compare and evaluate the performance of testing laboratories and to monitor the laboratories continuing performance over time on the composition and abundance of marine microalgae in preserved marine samples. We work mainly with laboratories engaged in national official/non-official phytoplankton monitoring programmes, water framework directive, marine strategy framework directive and others (environmental agencies, consultancies, private companies) working in the area of analysis of water samples for marine phytoplankton abundance and composition. The Canary Islands Harmful Algal Observatory (OCHABs) recognises that regular quality control assessments are crucial to ensure a high quality output of phytoplankton data. All our work is carried out following the technical and managerial requirements for PT schemes (ISO17043) and the

data is statistically analysed using the statistical methods as laid out in ISO13528. We use the statistical database software ProLab Plus from QuoData to do the statistical evaluation of the participant's data.

The web platform www.iphyi.org was created to be a single point source of information about the IPI scheme. Registration to the exercise must be completed through this website and all the information required is contained there.

Information about this scheme can also be found through our partners, the IOC (http://hab.ioc-unesco.org) under the heading 'activities and training courses') and associates in the NMBAQC website (www.nmbaqcs.org) under scheme components and phytoplankton, you'll find information on the current timetable schedule for the exercise, the list of participants, previous reports and the workshop agenda from the previous exercises to give you an idea of the range of activities within this intercomparison exercise. There is also information of the other NMBAQC schemes.

Please adhere to the following instructions strictly and note that these instructions are specific to this ring test only.

2. Deadlines, checklists and forms

Upon sample receipt, analysts should ensure that they received everything listed in form 1; checklist confirmation. Make sure that all the samples are intact and sealed properly and check that you have received Form 2; Enumeration and identification results log sheet (Excel workbook).

Please complete Form 1: checklist confirmation form, scan it as a pdf file and send it to me via e-mail to rsalas@observatoriocanariohabs.com . Please name the file as Form 1 followed by the exercise code and your full name **i.e. Form 1: IPI22 Rafael Salas**. This validates the traceability of the samples from origin to the laboratories and ensures that the materials arrive to the performing laboratories in good working conditions.
Analysts must complete and send their test results before or on 30/09/2022 via e-mail to rsalas@observatoriocanariohabs.com ***Please note: Results received after this date will not be included in the final report.***

Form 2 is an Excel workbook named 'Enumeration and identification logsheet' for analysts to input their results. At the top of the form, first fill in your name, analyst and laboratory code. Fill in all the information relevant to the analysis of your samples, for example the settlement date, chamber volume used in 'mls', the analysis date and the sample number in the corresponding cells.

Under the column 'organism' a drop down menu appears with a list of possible species names. You must choose from this list your answers. The list of species is a reduced list and is designed to have more entries than species are in the samples, you must choose which ones you think have been inoculated in the samples and provide a cell count. If is not in the list, is not in the sample.

The number of rows under the column name 'organism' is arbitrary and independent of the number of species in the samples. There are 14 rows but this doesn't necessarily mean that you need to enter 14 names or that there are 14 species in the samples. The number and type of species inoculated in the samples is different from year to year.

In the comments box, you can write information about the test method you used, any deviation from the Utermöhl test method and how you performed your calculations if you think is necessary.

Once you have completed your samples and have reviewed your calculations in form 2, please send your form 2 via e-mail to rsalas@observatoriocanariohabs.com. Please name the file as Form 2 followed by the exercise code and your full name **i.e. Form 2: IPI22 Rafael Salas**

In order to pass the test you must have at least 80% of your results correct. This is, 80% of your identification results and 80% of your enumeration results.

3. Test method

The Utermöhl cell counting method (Utermöhl 1931, 1958) is the standard test method used. We advise the use of 25ml sedimentation chambers for the purpose of this intercomparison exercise if these are available. If not, other sub-sample volumes and/or

chambers may be used. Do not use a different method to the Utermöhl method, please state all this information in your results.

4. Equipment

The following are the equipment requirements to complete this exercise:
Sedimentation chambers 25ml volume if possible but other volume chambers (50 ml or 10ml) can be used.

Inverted Microscope: This should be equipped with long distance working lenses up to 40 x objective or higher and condenser of Numerical Aperture (NA) of 0.3 or similar and capable for bright field microscopy. Other types of reflected or transmitted light capabilities may be helpful depending on the type of organisms in the samples and can be used if required.
Tally counters

5. Sedimentation chambers and sample preparation

Sedimentation chambers consist of a clear plastic cylinder, a metal plate, a glass disposable cover-slip base plate and a glass cover plate. Three sedimentation chambers are required.

5.1 **Storage of ampoules:** If you are not analysing the samples straightaway or if you are analysing them in different dates, please ensure the samples are kept in a fridge at 2-5°C away from direct sunlight and in an upright position.

5.2 **Temperature adaptation:** Vials must be adapted to room temperature before aliquoting and sedimentation takes place. This reduces the risk of air bubbles inside the sedimentation chambers due to temperature differences between room and sample.

5.3 **Preparation of samples for analysis from ampoules:**

5.3.1 Please follow the link here to watch a video on how to prepare your samples for analysis from an ampoule. https://youtu.be/2WgRNGDn4MU

Figure 1: Sample set per participant including sealed vials, lugol's iodine, plastic droppers and 50ml sterilin tubes.

5.3.2 Do not analyse the samples directly from the ampoule. This invalidades the Utermöhl method. The sample must be made to a 50ml volume, homogenised, settled and the cell density calculations must be made from this 50 ml volume.

5.3.3 The sterilin tubes should be prepared in advance of opening the ampoule.

5.3.4 Measure accurately 47ml of sterile seawater containing a few drops of lugol's iodine. The ampoules are already preserved in lugols, but when the sample is aliquot into the tube, it is going to be diluted and pale in colour, so if you wish your sample to have a slightly darker coloration you can add a few drops of lugols iodine to the sterile seawater before you inoculate your ampoule.

5.3.5 The volume can be measured in different ways, using an accurate pipette is one way to do it. However, you can use a gravimetric method also by weighing the amount using a balance. If you use a gravimetric method, remember that the density of Seawater at 33-35ppt is roughly 1.025g, so that 47ml = 48.175g in weight.

5.3.6 The seawater used should be of a salinity of 33-35ppt

5.3.7 Once the sterilin tubes containing 47ml seawater are ready you can start working with the ampoules.

5.3.8 First adapt the ampoule and test tube to room temperature, before aliquoting.

5.3.9 Make sure the ampoule contents are at the bottom of the ampoule. If some contents are trapped on the top, flick the ampoule using your fingers to dislodge any liquid.

5.3.10 Break the ampoule by the neck pre-marked break line using gloves and a wad of paper to avoid cuts and grazes. Avoid losing any sample content. If you think some content is lost, you have an extra sample to work with and if this fails, ask for another set.

5.3.11 Use one dropper per sample, do not mix or use the same dropper. Using the dropper, aspirate the contents from the ampoule into the tube.

5.3.12 Once all the sample has been aliquoted into the tube, using the same dropper, take the 3ml sample from the tube itself and rinse the ampoule with it once, collect the liquid again back into the tube.

5.3.13 Close the lid of the tube, invert the sample 50 times minimum and pour into a sedimentation chamber of your choice.

5.3.14 Once the sample has been taken out of the ampoule into the tube, the sample should be settled and analysed. **Do not keep the sample in the tube for several days as this will invalidate your analysis.**

5.4 **Chamber preparation:**

5.4.1 All sedimentation chambers should be cleaned before you start

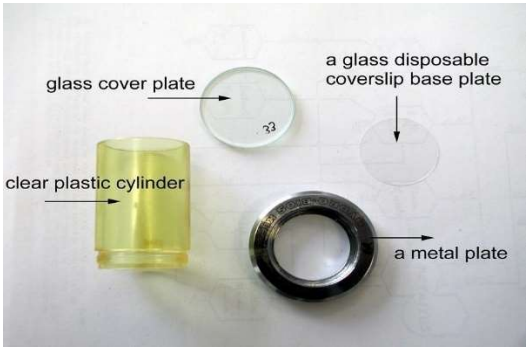


Fig 2: Sedimentation counting chamber

5.4.2 Place a new disposable cover slip base plate inside a cleaned metal plate.

5.4.3 Screw the plastic cylinder into the metal plate until tight. Extra care should be taken when setting up chambers. Disposable cover slip base plates are fragile and break easily causing cuts and grazes.

5.4.4 Once the chamber is set up, it should be tested for the possibility of leaks by filling the completed chamber with sterile filtered seawater and allowing it to rest for a few minutes. If no leakage occurs, pour out the water, dry out completely and proceed with the next step.

5.5 **Sample homogenisation and filling:**

5.5.1 To set up a sample for analysis, firmly invert the sample at least 50 times before pouring the sample to ensure that the contents are homogenised properly. Avoid hard shaking of the samples

5.5.2 Place the chamber in a flat horizontal surface protected from vibration and strong sunlight and gently pour the sample into the counting chamber to the top. Cover the chamber with the glass plate to complete the vacuum, making sure that there are no air bubbles or pockets between the sample and the cover glass.

5.5.3 Label the sedimentation chamber with the sample number from the ampoule.

5.6 **Sedimentation time:**

5.6.1 Settling time is dependent on the height of the chamber. 10ml chambers should be allowed to settle for a minimum of 8 hours, 25ml chambers for a minimum of 12 hours and 50ml chamber for a minimum of 24 hours.

5.6.2 Set the chamber on the inverted microscope and start the analysis.

6. Counting Procedure and strategy

a. Scan the entire chamber at low magnification first to get an initial overview of the density, distribution and composition of phytoplankton in the samples.

b. Assess the random distribution pattern of the organisms in the sample before starting the analysis. Larger organisms tend to sediment towards the edges and smaller ones towards the centre if the temperature of the chamber is higher than the sample and vice-versa if the temperature of the chamber is lower than the sample. A visual inspection is enough to assess these patterns.

c. If the sample is not randomly distributed, then the sample will have to be returned to its original container and settled again after a period of acclimatization. This is particularly important if other counting strategies are to be used in some organisms other than the whole chamber count, in which case, the sample count wouldn't be affected.

d. Make a preliminary list of species and densities to help you choose the best counting strategy for the sample.

e. Choose the correct organism/s from the dropdown species list in the Excel worksheet Form 2.

f. Start at the lower magnification to count the larger species if present, depending on size even x 4 or x 10 objectives could be used. Then, go over the sample again at higher magnifications to count the rest of the species.

g. The smaller species should be counted at a higher objective magnification (x 20) or x 40 if necessary.

h. Each analyst should carry out a whole chamber cell count (WC) where possible.

i. Other counting strategies can also be used where the cell density in the sample for a particular organism is high. Show your calculations if using a half chamber (HC), field of view (FV) or transect (Tr) counting strategy.

j. If half of the chamber is to be counted, analyse every second transect.

k. If a transect counting strategy is used for one or several organisms, count at least three transects and average your results. Be consistent as to which cells lying on which borders are to be counted or omitted.

l. Fields of view should be avoided if possible but if you need to use this counting strategy, count at least ten different randomly selected fields and average your results.

7. Samples

Analysts must analyse three samples in total to complete this part of the exercise. The samples are replicates. A fourth sample is additional and should be used as a replacement in case of one sample leaking or breaking. All the samples are made up in sterile filtered Seawater and spiked with culture material consisting of several species. Participants are asked to carry out a whole sedimentation chamber cell counts (where possible ; see section 6.) on each organism and sample.

The Master mix, have been made up with different aliquots of cell cultures at different concentrations and estimates have been carried out in 1ml lugol's preserved samples and counted in Sedgewick-Rafter chambers for each species. This is done to check the condition and the densities of the cultures prior to inoculating into the Master mix.

Once the master mix have been made up in a 2L brown schott glass bottle with the target species at the required concentrations, this mixture has been homogenised using an automated tumbler mixer (Inversina 2L) that uses the Paul-Schatz movement for 4 minutes at 60 rpm approximately and divided in 4 x 500ml batches. These in turn have been homogenised again at the same speed and time. 3mls of the Master mix have been inoculated using an automated multi-pipette eppendorf into a batch of 10ml brown glass ampoules, containing 100µl of neutral lugols iodine.

The ampoules have been purged using nitrogen gas and sealed using a torch. The ampoules have been checked for leaks by submerging on a water bath and then stored at 2-5°C in the dark. The ampoules have been assigned a random batch number.

Each analyst must **count and identify all phytoplankton species** found in the samples.

ANNEX IV: Participating Laboratories

ANNEX V: Statement of performance certificate

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

IPI INTERNATIONAL PHYTOPLANKTON INTERCOMPARISON

OCHABs Observatorio Canario de algas nocivas

ULPGC Universidad de Las Palmas de Gran Canaria

International Phytoplankton Intercomparison (IPI)
In collaboration with IOC of UNESCO & OCHABS

STATEMENT OF PERFORMANCE
Phytoplankton Component of Community Analysis Year 2022
The participant was successful

Participant details:
Name of organisation:
Country:
Participant:
Year of joining:
Years of participation:

Statement Issue Date: 06/01/2023
Statement Number: OCHABS-IPI-22-0

Summary of results: At least 80% of the analytes in this certificate must be **measured and identified** successfully. Z-scores must be between -2 and +2 STDev. OceanTeacher test pass mark is 70%.

Component Name	Subcontracted	Results Z-score (+/- 2 Sigma limits)		Identification
Phytoplankton abundance and composition IPI-OCHABS-2022	IOC Science and communication Centre on Harmful algae and OCHABS	*Actinoptychus splendens*		
		Synedropsis sp.		
		Lampriscus sp.		
		Guinardia striata		
		Chaetoceros peruvianus		
		Prorocentrum rhathymum		
		Coolia sp.		
		Alexandrium pacificum		
Phytoplankton Taxonomy quiz IPI-OCHABS-2022	IOC Science and communication Centre on Harmful algae and OCHABS			

np: Participant did not return any results for this component; not detected items are given a -3 score.

Details certified by:

Rafael Gallardo Salas
International Phytoplankton Intercomparison (IPI), Programme Manager, Research Scientist
Observatorio Canario de Algas Nocivas (OCHABS)

ANNEX V

Description of Scheme components and associated performance standards

In the table overleaf, for those components on which a standard has been set, 'Proficient', 'Good', and 'Pass' flags indicate that the participants results met or exceeded the standards set by the IPI scheme; 'Participated' flag indicates that the candidate participated in the exercise but did not reach these standards. The Scheme standards are under continuous review.

Component	Annual exercise	Purpose	Description	Standard
Phytoplanktonabundance and composition Exercise IPI2022	1	To assess the performance of participants using the Utermöhl cell counting technique on the analysis of prepared sample/s of Seawater preserved in Lugol's iodine spiked using biological or synthetic materials.	Prepared marine water sample/s distributed to participants for abundance and composition of marine phytoplankton species	At least 80% of the analytes in this certificate must be measured and identified successfully to pass the test. Z-scores must be between -2 and +2 STDev. The STDev is calculated from the consensus values using PROLab Plus software Q/Huber Algorithm and following the assessment criteria as set out in ISO13528:2015 Participants are also required to identify the organisms found in the samples correctly to the required taxon. Flags will be given as correct, incorrect or not detected
Phytoplankton Ocean Teacher online Taxonomic Assessment IPI2022	1	This online assessment allows us to assess participants' marine phytoplankton taxonomic ability and compare those skills across laboratories.	The online taxonomic assessment is produced from scratch in the web platform Oceanteacher and designed to entice participants to study Phytoplankton taxonomic literature. The level of taxonomic proficiency required to perform well is high.	The pass mark for the Phytoplankton taxonomic assessment exercise is 70%. Results above 90% are deemed proficient, results above 80% are deemed good, results above 70% are deemed acceptable, results below 70% are reported as "needs improvement".

ANNEX VI: Homogeneity and stability test using ProLab plus

Actinoptychus splendens homogeneity test

IPI2022

Survey of homogeneity test results

Sample: **Homogeneity** Date: 07/11/2022
Measurand: **Actinoptychus splendens**

Mean:	1154
Analytical standard deviation:	254
Heterogeneity standard deviation s(samples):	412
Standard deviation for proficiency assessment:	0 (Manual)

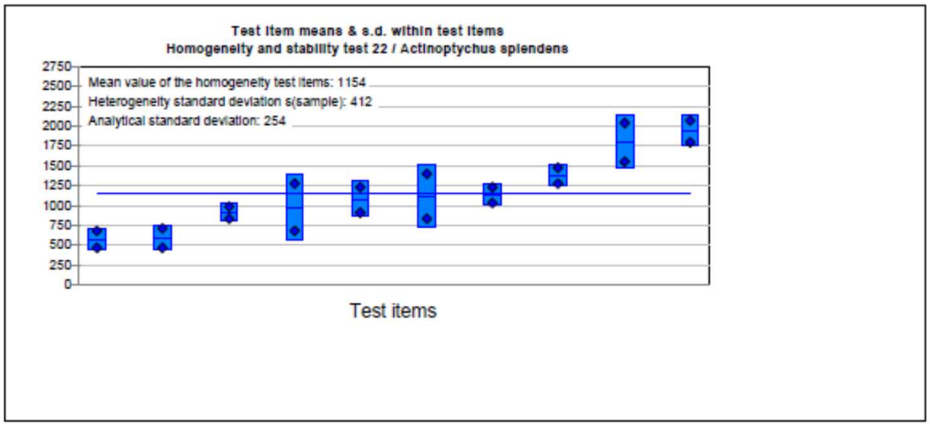
Results of homogeneity analysis (with statistical background)

For the homogeneity test, 10 of the prepared proficiency test items of sample Homogeneity and stability test 22 were randomly selected, and the measurand Actinoptychus splendens was analyzed 2 times. The mean across all 10 proficiency test items is 1154. The standard deviation within proficiency test items s(analytical) (=analytical precision) is 254 , and the standard deviation between proficiency test items s(sample) is 412 .

F test
According to the F test, the heterogeneity standard deviation is significantly different from 0 (significance level 5 %), therefore the proficiency test items should be considered heterogeneous according to this criterion.

ISO 13528:2015 - Test for adequate homogeneity
According to ISO 13528:2015, the heterogeneity standard deviation s(sample) between the proficiency test items should not exceed 30 % of the standard deviation for proficiency assessment.
The heterogeneity standard deviation is greater than 30 % of the standard deviation for proficiency assessment 644 (Manual), therefore the proficiency test items cannot be considered as adequately homogeneous, i.e. they have to be considered heterogeneous.

ISO 13528:2015 - Test for significant heterogeneity
The proficiency test items exhibit significant heterogeneity (5 % significance level). The specified standard deviation for proficiency assessment is 644 (Manual). The heterogeneity standard deviation s(sample) equals 412 and is significantly too high.



ANNEX VI: *Actinoptychus splendens* stability test

Survey of stability test results

Sample: Homogeneity
Measurand: Actinoptychus splendens

Date: 07/11/2022

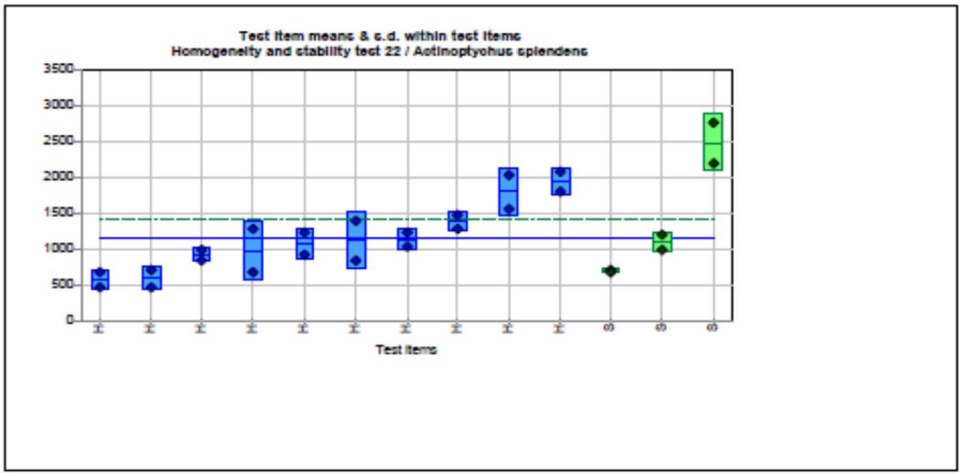
Mean of homogeneity:	1154
Mean of stability:	1427
Uncertainty of mean for homogeneity measurement:	142
Uncertainty of mean for stability measurement:	539
Standard deviation for proficiency assessment:	0 (Manual)

Results of Stability Test

For the test for stability, 3 of the proficiency test items of sample Homogeneity and stability test 22 have been selected randomly and the measurand Actinoptychus splendens has been analyzed 2 times.
The mean value across all proficiency test items of the homogeneity analysis equals 1154, the mean value across all proficiency test items of the stability analysis equals 1427.
Therefore, the mean value of the stability analysis lies 23.6 % above the mean value of the homogeneity analysis.

According to ISO 13528:2015, the absolute difference betw een the mean values of the homogeneity analysis and the stability analysis should not exceed 30 % of the standard deviation for proficiency assessment.
Although for the given standard deviation for proficiency assessment of 644, the proficiency test items may not be considered as adequately stable, the expanded acceptance criterion by adding the uncertainty of the difference to the standard deviation for proficiency assessment is fulfilled. Hence, stability of the proficiency test items is given only according to the expanded criterion of ISO 13528:2015.

By means of the t test it is checked w hether the mean values of the homogeneity analysis and the stability analysis differ significantly (level of significance 5 %).
The difference of the mean values is not statistically significant. Therefore the proficiency test items can be considered stable according to the t test.



ANNEX VI: *Alexandrium pacificum* homogeneity test

IPI2022

Survey of homogeneity test results

Sample: **Homogeneity** Date: 07/11/2022
Measurand: **Alexandrium pacificum**

Mean:	4022
Analytical standard deviation:	636
Heterogeneity standard deviation s(samples):	0
Standard deviation for proficiency assessment:	0 (Manual)

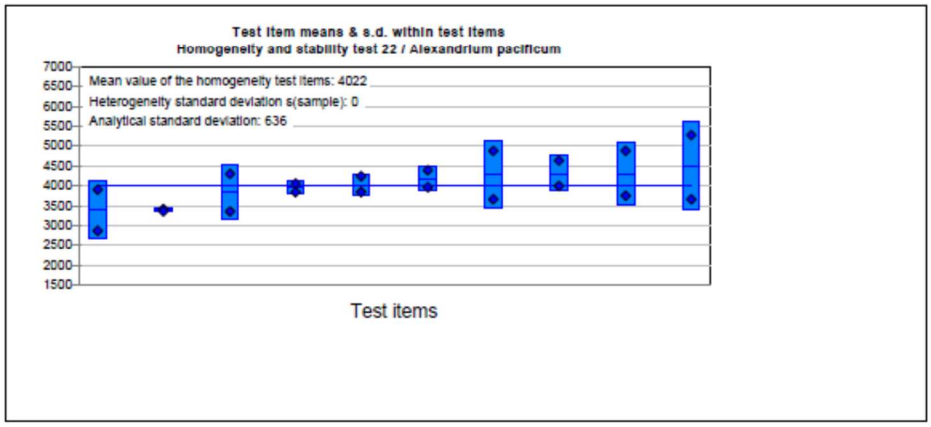
Results of homogeneity analysis (with statistical background)

For the homogeneity test, 10 of the prepared proficiency test items of sample Homogeneity and stability test 22 were randomly selected, and the measurand Alexandrium pacificum was analyzed 2 times. The mean across all 10 proficiency test items is 4022. The standard deviation within proficiency test items s(analytical) (=analytical precision) is 636 , and the standard deviation between proficiency test items s(sample) is 0 .

F test
The heterogeneity standard deviation s(sample) is 0 , and hence no statistically significant difference to 0 can be detected by the F test.

ISO 13528:2015 - Test for adequate homogeneity
According to ISO 13528:2015, the heterogeneity standard deviation s(sample) between the proficiency test items should not exceed 30 % of the standard deviation for proficiency assessment.
The heterogeneity standard deviation is less than 30 % of the standard deviation for proficiency assessment 725 (Manual), therefore the proficiency test items can be considered adequately homogeneous according to ISO 13528:2015.

ISO 13528:2015 - Test for significant heterogeneity
For the proficiency test items, no significant heterogeneity can be identified, therefore they can be considered homogeneous.



ANNEX VI: *Alexandrium pacificum* stability test

IPI2022

Survey of stability test results

Sample: **Homogeneity** Date: 07/11/2022
Measurand: **Alexandrium pacificum**

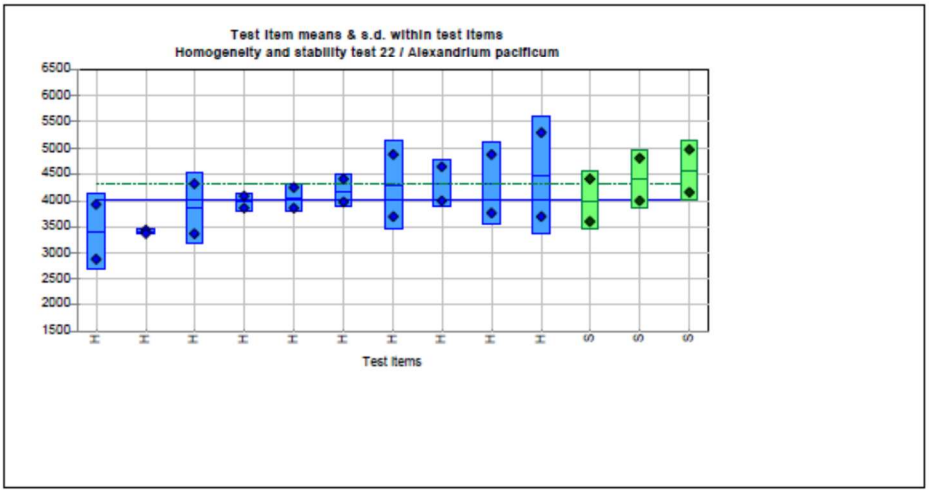
Mean of homogeneity:	4022
Mean of stability:	4320
Uncertainty of mean for homogeneity measurement:	142
Uncertainty of mean for stability measurement:	231
Standard deviation for proficiency assessment:	0 (Manual)

Results of Stability Test

For the test for stability, 3 of the proficiency test items of sample Homogeneity and stability test 22 have been selected randomly and the measurand Alexandrium pacificum has been analyzed 2 times.
The mean value across all proficiency test items of the homogeneity analysis equals 4022, the mean value across all proficiency test items of the stability analysis equals 4320.
Therefore, the mean value of the stability analysis lies 7.4 % above the mean value of the homogeneity analysis.

According to ISO 13528:2015, the absolute difference betw een the mean values of the homogeneity analysis and the stability analysis should not exceed 30 % of the standard deviation for proficiency assessment.
Although for the given standard deviation for proficiency assessment of 725, the proficiency test items may not be considered as adequately stable, the expanded acceptance criterion by adding the uncertainty of the difference to the standard deviation for proficiency assessment is fulfilled. Hence, stability of the proficiency test items is given only according to the expanded criterion of ISO 13528:2015.

By means of the t test it is checked w hether the mean values of the homogeneity analysis and the stability analysis differ significantly (level of significance 5 %).
The difference of the mean values is not statistically significant. Therefore the proficiency test items can be considered stable according to the t test.



ANNEX VI: *Coolia monotis* homogeneity test

IPI2022

Survey of homogeneity test results

Sample: Homogeneity
Measurand: Coolia monotis

Date: 07/11/2022

Mean:	6308
Analytical standard deviation:	966
Heterogeneity standard deviation s(samples):	0
Standard deviation for proficiency assessment:	0 (Manual)

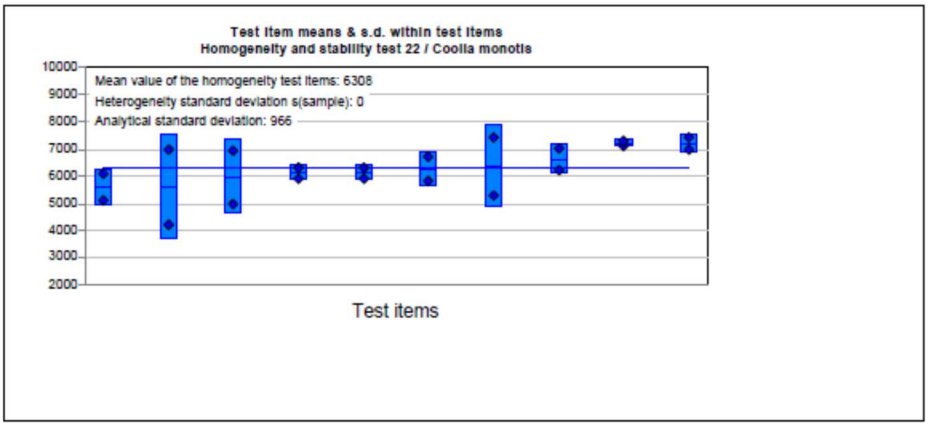
Results of homogeneity analysis (with statistical background)

For the homogeneity test, 10 of the prepared proficiency test items of sample Homogeneity and stability test 22 were randomly selected, and the measurand Coolia monotis was analyzed 2 times. The mean across all 10 proficiency test items is 6308. The standard deviation within proficiency test items s(analytical) (=analytical precision) is 966 , and the standard deviation between proficiency test items s(sample) is 0 .

F test
The heterogeneity standard deviation s(sample) is 0 , and hence no statistically significant difference to 0 can be detected by the F test.

ISO 13528:2015 - Test for adequate homogeneity
According to ISO 13528:2015, the heterogeneity standard deviation s(sample) between the proficiency test items should not exceed 30 % of the standard deviation for proficiency assessment.
The heterogeneity standard deviation is less than 30 % of the standard deviation for proficiency assessment 1115 (Manual), therefore the proficiency test items can be considered adequately homogeneous according to ISO 13528:2015.

ISO 13528:2015 - Test for significant heterogeneity
For the proficiency test items, no significant heterogeneity can be identified, therefore they can be considered homogeneous.



ANNEX VI: *Coolia monotis* stability test

IPI2022

Survey of stability test results

Sample: **Homogeneity** Date: 07/11/2022
Measurand: **Coolia monotis**

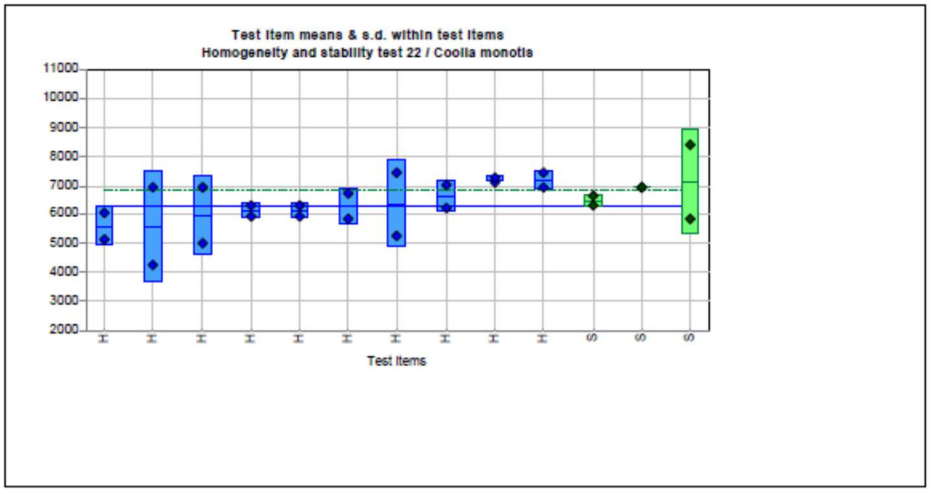
Mean of homogeneity:	6308
Mean of stability:	6853
Uncertainty of mean for homogeneity measurement:	216
Uncertainty of mean for stability measurement:	430
Standard deviation for proficiency assessment:	0 (Manual)

Results of Stability Test

For the test for stability, 3 of the proficiency test items of sample Homogeneity and stability test 22 have been selected randomly and the measurand Coolia monotis has been analyzed 2 times.
The mean value across all proficiency test items of the homogeneity analysis equals 6308, the mean value across all proficiency test items of the stability analysis equals 6853.
Therefore, the mean value of the stability analysis lies 8.6 % above the mean value of the homogeneity analysis.

According to ISO 13528:2015, the absolute difference betw een the mean values of the homogeneity analysis and the stability analysis should not exceed 30 % of the standard deviation for proficiency assessment.
Although for the given standard deviation for proficiency assessment of 1115, the proficiency test items may not be considered as adequately stable, the expanded acceptance criterion by adding the uncertainty of the difference to the standard deviation for proficiency assessment is fulfilled. Hence, stability of the proficiency test items is given only according to the expanded criterion of ISO 13528:2015.

By means of the t test it is checked w hether the mean values of the homogeneity analysis and the stability analysis differ significantly (level of significance 5 %).
The difference of the mean values is not statistically significant. Therefore the proficiency test items can be considered stable according to the t test.



ANNEX VI: *Chaetoceros peruvianus* homogeneity test

IPI2022

Survey of homogeneity test results

Sample: **Homogeneity**
Measurand: **Chaetoceros peruvianus**

Date: 07/11/2022

Mean:	15920
Analytical standard deviation:	1771
Heterogeneity standard deviation s(samples):	1395
Standard deviation for proficiency assessment:	0 (Manual)

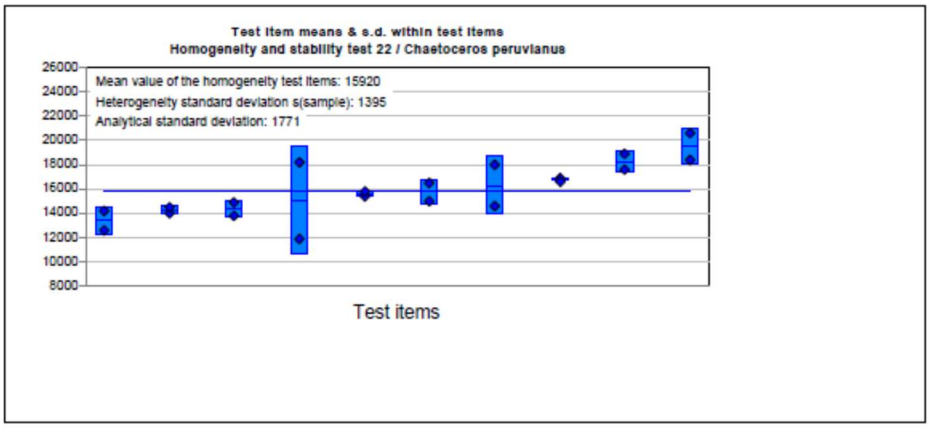
Results of homogeneity analysis (with statistical background)

For the homogeneity test, 10 of the prepared proficiency test items of sample Homogeneity and stability test 22 were randomly selected, and the measurand Chaetoceros peruvianus was analyzed 2 times. The mean across all 10 proficiency test items is 15920. The standard deviation within proficiency test items s(analytical) (=analytical precision) is 1771 , and the standard deviation between proficiency test items s(sample) is 1395 .

F test
According to the F test, the heterogeneity standard deviation is not significantly different from 0 (significance level 5 %), therefore the proficiency test items can be considered sufficiently homogeneous according to this criterion.

ISO 13528:2015 - Test for adequate homogeneity
According to ISO 13528:2015, the heterogeneity standard deviation s(sample) between the proficiency test items should not exceed 30 % of the standard deviation for proficiency assessment.
The heterogeneity standard deviation is less than 30 % of the standard deviation for proficiency assessment 5312 (Manual), therefore the proficiency test items can be considered adequately homogeneous according to ISO 13528:2015.

ISO 13528:2015 - Test for significant heterogeneity
For the proficiency test items, no significant heterogeneity can be identified, therefore they can be considered homogeneous.



ANNEX VI: *Chaetoceros peruvianus* stability test

IPI2022

Survey of stability test results

Sample: **Homogeneity** Date: 07/11/2022
Measurand: **Chaetoceros peruvianus**

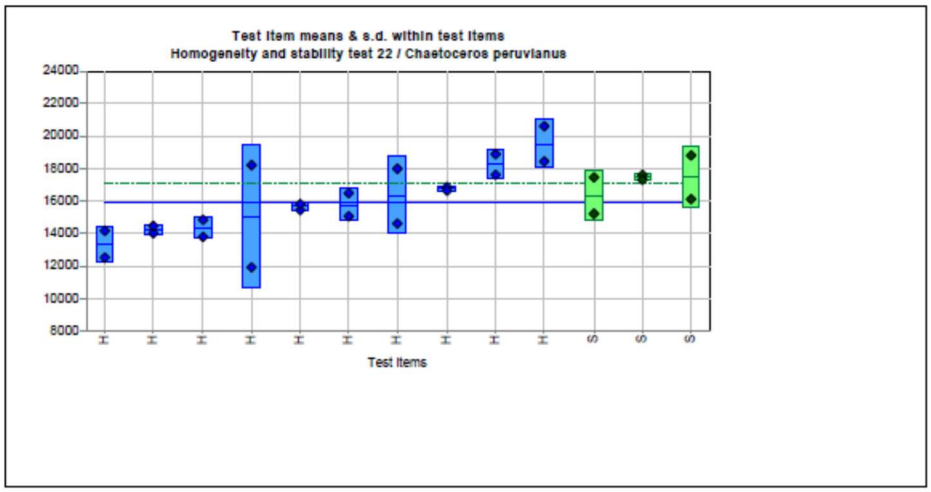
Mean of homogeneity:	15920
Mean of stability:	17067
Uncertainty of mean for homogeneity measurement:	593
Uncertainty of mean for stability measurement:	590
Standard deviation for proficiency assessment:	0 (Manual)

Results of Stability Test

For the test for stability, 3 of the proficiency test items of sample Homogeneity and stability test 22 have been selected randomly and the measurand Chaetoceros peruvianus has been analyzed 2 times.
The mean value across all proficiency test items of the homogeneity analysis equals 15920, the mean value across all proficiency test items of the stability analysis equals 17067.
Therefore, the mean value of the stability analysis lies 7.2 % above the mean value of the homogeneity analysis.

According to ISO 13528:2015, the absolute difference betw een the mean values of the homogeneity analysis and the stability analysis should not exceed 30 % of the standard deviation for proficiency assessment.
Therefore, given the standard deviation for proficiency assessment of 5312, the proficiency test items may be considered as adequately stable.

By means of the t test it is checked w hether the mean values of the homogeneity analysis and the stability analysis differ significantly (level of significance 5 %).
The difference of the mean values is not statistically significant. Therefore the proficiency test items can be considered stable according to the t test.



ANNEX VI: *Guinardia striata* homogeneity test

IPI2022

Survey of homogeneity test results

Sample: **Homogeneity** Date: 07/11/2022
Measurand: **Guinardia striata**

Mean:	7962
Analytical standard deviation:	1523
Heterogeneity standard deviation s(samples):	746
Standard deviation for proficiency assessment:	0 (Manual)

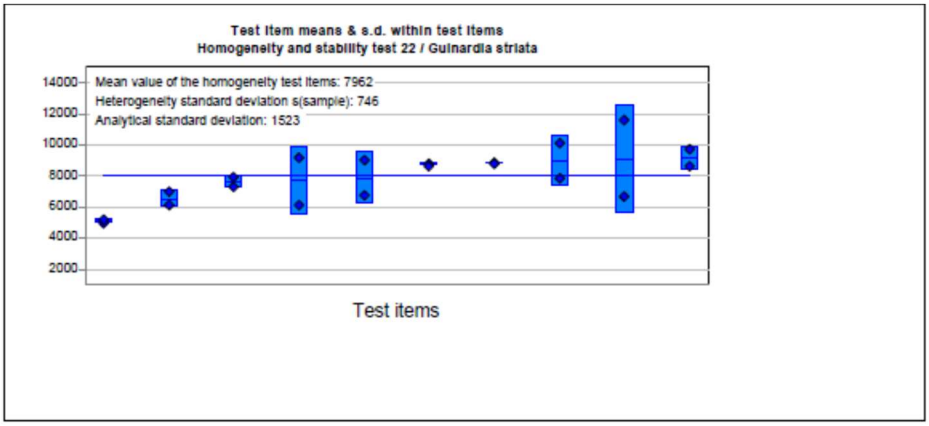
Results of homogeneity analysis (with statistical background)

For the homogeneity test, 10 of the prepared proficiency test items of sample Homogeneity and stability test 22 were randomly selected, and the measurand Guinardia striata was analyzed 2 times. The mean across all 10 proficiency test items is 7962. The standard deviation within proficiency test items s(analytical) (=analytical precision) is 1523 , and the standard deviation between proficiency test items s(sample) is 746 .

F test
According to the F test, the heterogeneity standard deviation is not significantly different from 0 (significance level 5 %), therefore the proficiency test items can be considered sufficiently homogeneous according to this criterion.

ISO 13528:2015 - Test for adequate homogeneity
According to ISO 13528:2015, the heterogeneity standard deviation s(sample) between the proficiency test items should not exceed 30 % of the standard deviation for proficiency assessment.
The heterogeneity standard deviation is greater than 30 % of the standard deviation for proficiency assessment 2112 (Manual), therefore the proficiency test items cannot be considered as adequately homogeneous, i.e. they have to be considered heterogeneous.

ISO 13528:2015 - Test for significant heterogeneity
For the proficiency test items, no significant heterogeneity can be identified, although the heterogeneity standard deviation is greater than 30 % of the standard deviation for proficiency assessment. Hence, the proficiency test items can be considered homogeneous.



ANNEX VI: *Guinardia striata* stability test

IPI2022

Survey of stability test results

Sample: **Homogeneity** Date: 07/11/2022
Measurand: **Guinardia striata**

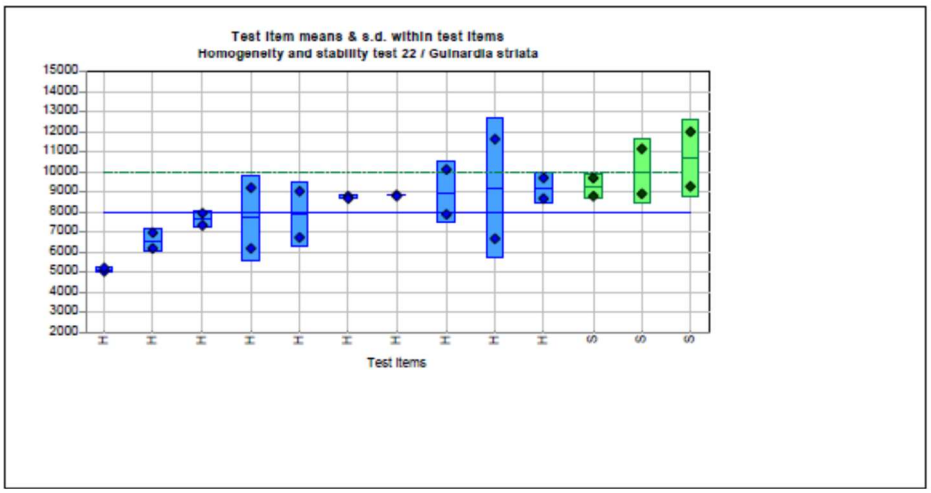
Mean of homogeneity:	7962
Mean of stability:	9960
Uncertainty of mean for homogeneity measurement:	414
Uncertainty of mean for stability measurement:	605
Standard deviation for proficiency assessment:	0 (Manual)

Results of Stability Test

For the test for stability, 3 of the proficiency test items of sample Homogeneity and stability test 22 have been selected randomly and the measurand Guinardia striata has been analyzed 2 times.
The mean value across all proficiency test items of the homogeneity analysis equals 7962, the mean value across all proficiency test items of the stability analysis equals 9960.
Therefore, the mean value of the stability analysis lies 25.1 % above the mean value of the homogeneity analysis.

According to ISO 13528:2015, the absolute difference betw een the mean values of the homogeneity analysis and the stability analysis should not exceed 30 % of the standard deviation for proficiency assessment.
Although for the given standard deviation for proficiency assessment of 2112, the proficiency test items may not be considered as adequately stable, the expanded acceptance criterion by adding the uncertainty of the difference to the standard deviation for proficiency assessment is fulfilled. Hence, stability of the proficiency test items is given only according to the expanded criterion of ISO 13528:2015.

By means of the t test it is checked w hether the mean values of the homogeneity analysis and the stability analysis differ significantly (level of significance 5 %).
There is a statistically significant difference betw een the mean values. Therefore the proficiency test items cannot be considered stable according to the t test.



ANNEX VI: *Lampriscus sp.* homogeneity test

IPI2022

Survey of homogeneity test results

Sample: **Homogeneity** Date: 07/11/2022
Measurand: **Lampriscus sp.**

Mean:	1358
Analytical standard deviation:	315
Heterogeneity standard deviation s(samples):	178
Standard deviation for proficiency assessment:	0 (Manual)

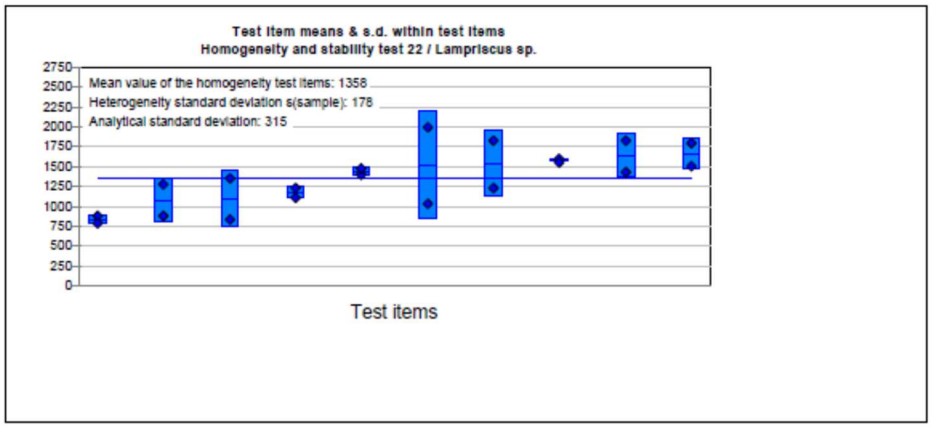
Results of homogeneity analysis (with statistical background)

For the homogeneity test, 10 of the prepared proficiency test items of sample Homogeneity and stability test 22 w ere randomly selected, and the measurand Lampriscus sp. w as analyzed 2 times. The mean across all 10 proficiency test items is 1358. The standard deviation w ithin proficiency test items s(analytical) (=analytical precision) is 315 , and the standard deviation betw een proficiency test items s(sample) is 178 .

F test
According to the F test, the heterogeneity standard deviation is not significantly different from 0 (significance level 5 %), therefore the proficiency test items can be considered sufficiently homogeneous according to this criterion.

ISO 13528:2015 - Test for adequate homogeneity
According to ISO 13528:2015, the heterogeneity standard deviation s(sample) betw een the proficiency test items should not exceed 30 % of the standard deviation for proficiency assessment.
The heterogeneity standard deviation is greater than 30 % of the standard deviation for proficiency assessment 395 (Manual), therefore the proficiency test items cannot be considered as adequately homogeneous, i.e. they have to be considered heterogeneous.

ISO 13528:2015 - Test for significant heterogeneity
For the proficiency test items, no significant heterogeneity can be identified, although the heterogeneity standard deviation is greater than 30 % of the standard deviation for proficiency assessment. Hence, the proficiency test items can be considered homogeneous.



ANNEX VI: *Lampriscus sp.* stability test

IPI2022

Survey of stability test results

Sample: **Homogeneity** Date: 07/11/2022
Measurand: **Lampriscus sp.**

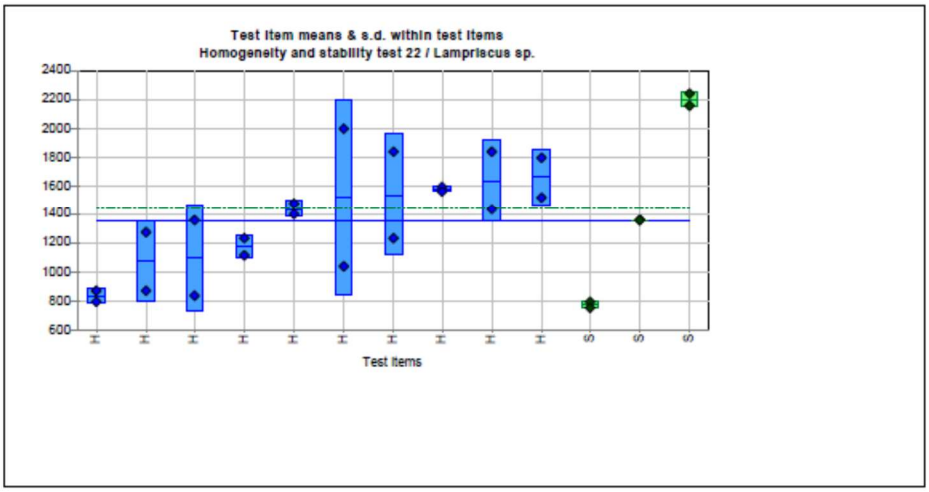
Mean of homogeneity:	1358
Mean of stability:	1447
Uncertainty of mean for homogeneity measurement:	90
Uncertainty of mean for stability measurement:	412
Standard deviation for proficiency assessment:	0 (Manual)

Results of Stability Test

For the test for stability, 3 of the proficiency test items of sample Homogeneity and stability test 22 have been selected randomly and the measurand Lampriscus sp. has been analyzed 2 times.
The mean value across all proficiency test items of the homogeneity analysis equals 1358, the mean value across all proficiency test items of the stability analysis equals 1447.
Therefore, the mean value of the stability analysis lies 6.5 % above the mean value of the homogeneity analysis.

According to ISO 13528:2015, the absolute difference betw een the mean values of the homogeneity analysis and the stability analysis should not exceed 30 % of the standard deviation for proficiency assessment.
Therefore, given the standard deviation for proficiency assessment of 395, the proficiency test items may be considered as adequately stable.

By means of the t test it is checked w hether the mean values of the homogeneity analysis and the stability analysis differ significantly (level of significance 5 %).
The difference of the mean values is not statistically significant. Therefore the proficiency test items can be considered stable according to the t test.



ANNEX VI: *Prorocentrum rhathymum* homogeneity test

Survey of homogeneity test results

Sample: Homogeneity
Measurand: Prorocentrum rathymum

Date: 07/11/2022

Mean:	7570
Analytical standard deviation:	685
Heterogeneity standard deviation s(samples):	543
Standard deviation for proficiency assessment:	0 (Manual)

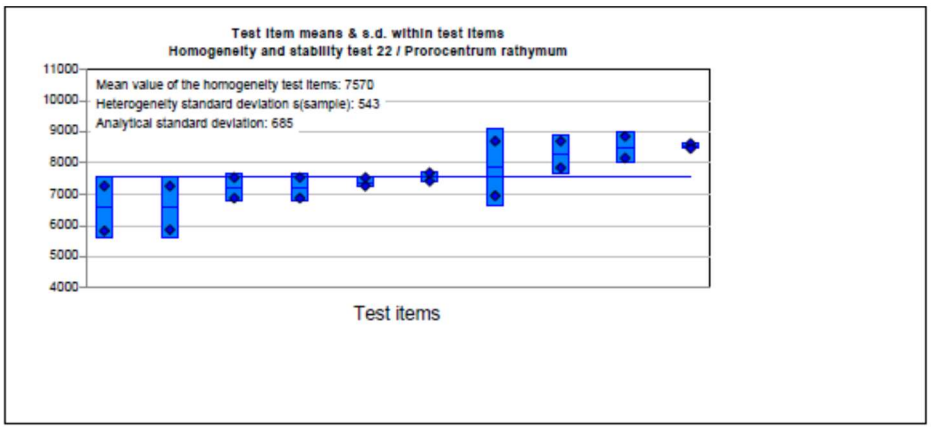
Results of homogeneity analysis (with statistical background)

For the homogeneity test, 10 of the prepared proficiency test items of sample Homogeneity and stability test 22 were randomly selected, and the measurand Prorocentrum rathymum was analyzed 2 times. The mean across all 10 proficiency test items is 7570. The standard deviation within proficiency test items s(analytical) (=analytical precision) is 685 , and the standard deviation between proficiency test items s(sample) is 543 .

F test
According to the F test, the heterogeneity standard deviation is not significantly different from 0 (significance level 5 %), therefore the proficiency test items can be considered sufficiently homogeneous according to this criterion.

ISO 13528:2015 - Test for adequate homogeneity
According to ISO 13528:2015, the heterogeneity standard deviation s(sample) between the proficiency test items should not exceed 30 % of the standard deviation for proficiency assessment.
The heterogeneity standard deviation is greater than 30 % of the standard deviation for proficiency assessment 1574 (Manual), therefore the proficiency test items cannot be considered as adequately homogeneous, i.e. they have to be considered heterogeneous.

ISO 13528:2015 - Test for significant heterogeneity
For the proficiency test items, no significant heterogeneity can be identified, although the heterogeneity standard deviation is greater than 30 % of the standard deviation for proficiency assessment. Hence, the proficiency test items can be considered homogeneous.



ANNEX VI: *Prorocentrum rhathymum* stability test

IPI2022

Survey of stability test results

Sample: **Homogeneity** Date: 07/11/2022
Measurand: **Prorocentrum rathymum**

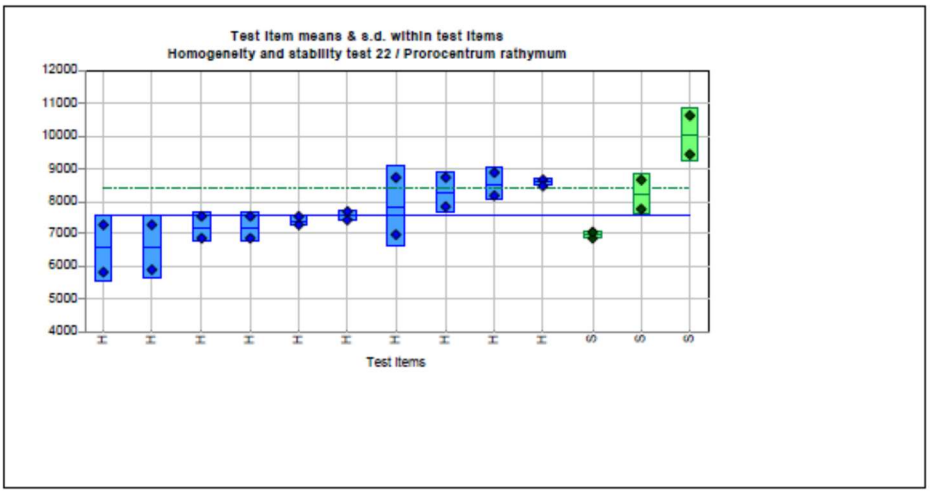
Mean of homogeneity:	7570
Mean of stability:	8400
Uncertainty of mean for homogeneity measurement:	230
Uncertainty of mean for stability measurement:	895
Standard deviation for proficiency assessment:	0 (Manual)

Results of Stability Test

For the test for stability, 3 of the proficiency test items of sample Homogeneity and stability test 22 have been selected randomly and the measurand Prorocentrum rathymum has been analyzed 2 times.
The mean value across all proficiency test items of the homogeneity analysis equals 7570, the mean value across all proficiency test items of the stability analysis equals 8400.
Therefore, the mean value of the stability analysis lies 11.0 % above the mean value of the homogeneity analysis.

According to ISO 13528:2015, the absolute difference betw een the mean values of the homogeneity analysis and the stability analysis should not exceed 30 % of the standard deviation for proficiency assessment.
Although for the given standard deviation for proficiency assessment of 1574, the proficiency test items may not be considered as adequately stable, the expanded acceptance criterion by adding the uncertainty of the difference to the standard deviation for proficiency assessment is fulfilled. Hence, stability of the proficiency test items is given only according to the expanded criterion of ISO 13528:2015.

By means of the t test it is checked w hether the mean values of the homogeneity analysis and the stability analysis differ significantly (level of significance 5 %).
The difference of the mean values is not statistically significant. Therefore the proficiency test items can be considered stable according to the t test.



ANNEX VI: *Synedropsis sp.* homogeneity test

IPI2022

Survey of homogeneity test results

Sample: **Homogeneity**
Measurand: **Synedropsis sp.**

Date: 07/11/2022

Mean:	3062
Analytical standard deviation:	361
Heterogeneity standard deviation s(samples):	331
Standard deviation for proficiency assessment:	0 (Manual)

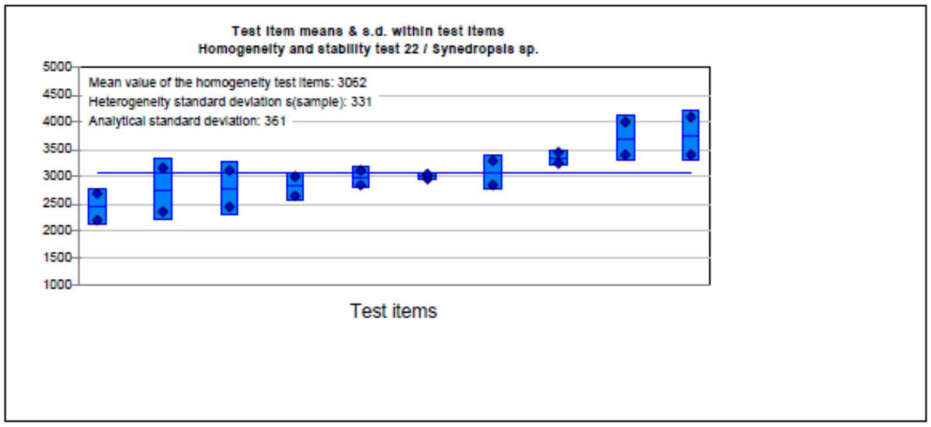
Results of homogeneity analysis (with statistical background)

For the homogeneity test, 10 of the prepared proficiency test items of sample Homogeneity and stability test 22 w ere randomly selected, and the measurand Synedropsis sp. w as analyzed 2 times. The mean across all 10 proficiency test items is 3062. The standard deviation w ithin proficiency test items s(analytical) (=analytical precision) is 361 , and the standard deviation betw een proficiency test items s(sample) is 331 .

F test
According to the F test, the heterogeneity standard deviation is not significantly different from 0 (significance level 5 %), therefore the proficiency test items can be considered sufficiently homogeneous according to this criterion.

ISO 13528:2015 - Test for adequate homogeneity
According to ISO 13528:2015, the heterogeneity standard deviation s(sample) betw een the proficiency test items should not exceed 30 % of the standard deviation for proficiency assessment.
The heterogeneity standard deviation is greater than 30 % of the standard deviation for proficiency assessment 626 (Manual), therefore the proficiency test items cannot be considered as adequately homogeneous, i.e. they have to be considered heterogeneous.

ISO 13528:2015 - Test for significant heterogeneity
For the proficiency test items, no significant heterogeneity can be identified, although the heterogeneity standard deviation is greater than 30 % of the standard deviation for proficiency assessment. Hence, the proficiency test items can be considered homogeneous.



ANNEX VI: *Synedropsis sp.* stability test

IPI2022

Survey of stability test results

Sample: **Homogeneity** Date: 07/11/2022
Measurand: **Synedropsis sp.**

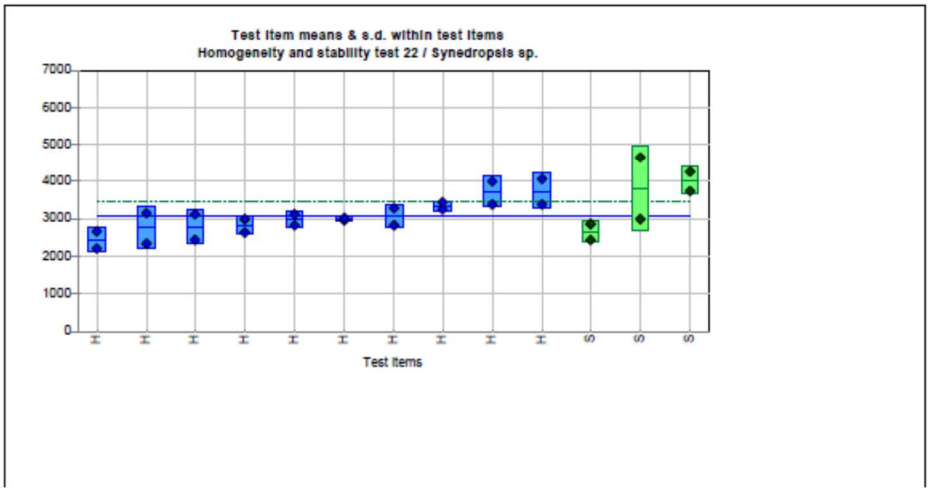
Mean of homogeneity:	3062
Mean of stability:	3500
Uncertainty of mean for homogeneity measurement:	132
Uncertainty of mean for stability measurement:	424
Standard deviation for proficiency assessment:	0 (Manual)

Results of Stability Test

For the test for stability, 3 of the proficiency test items of sample Homogeneity and stability test 22 have been selected randomly and the measurand Synedropsis sp. has been analyzed 2 times.
The mean value across all proficiency test items of the homogeneity analysis equals 3062, the mean value across all proficiency test items of the stability analysis equals 3500.
Therefore, the mean value of the stability analysis lies 14.3 % above the mean value of the homogeneity analysis.

According to ISO 13528:2015, the absolute difference betw een the mean values of the homogeneity analysis and the stability analysis should not exceed 30 % of the standard deviation for proficiency assessment.
Although for the given standard deviation for proficiency assessment of 626, the proficiency test items may not be considered as adequately stable, the expanded acceptance criterion by adding the uncertainty of the difference to the standard deviation for proficiency assessment is fulfilled. Hence, stability of the proficiency test items is given only according to the expanded criterion of ISO 13528:2015.

By means of the t test it is checked w hether the mean values of the homogeneity analysis and the stability analysis differ significantly (level of significance 5 %).
The difference of the mean values is not statistically significant. Therefore the proficiency test items can be considered stable according to the t test.



ANNEX VII: Analysts' results IPI 2022 Pg 1

A. Code	Alexandrium pacificum (cells/L)			Av	Prorocentrum rhathymum (cells/L)			Av	Actinoptychus splendens (cells/L)			Av	Coolia monotis (cells/L)			Av	A. Code
	M1	M2	M3		M1	M2	M3		M1	M2	M3		M1	M2	M3		
1	2300	2800	2400	2500	4300	3700	5200	4400	1800	1000	1700	1500	5200	6300	4200	5233	1
2	3264	3162	3774	3400	10580	11270	10465	10772	720	1600	800	1040	8050	8855	5750	7552	2
3	4720	4880	4640	4747	7160	7960	7480	7533	640	720	640	667	5160	5240	4960	5120	3
4	3760	2800	3880	3480	6840	6520	5120	6160	1720	1200	1040	1320	5720	4640	4800	5053	4
5	2840	3440	3640	3307	5160	7080	5600	5947	1560	1440	1960	1653	3920	4360	5840	4707	5
6	3320	3720	3120	3387	6000	5560	3840	5133	1480	840	880	1067	5880	4600	4320	4933	6
7	3320	3440	3120	3293	6880	5000	5440	5773	1040	1200	1120	1120	5920	6360	6560	6280	7
8	2160	2000	3200	2453	4520	6040	6640	5733	2160	1720	1240	1707	5000	6360	7120	6160	8
9	2760	2840	2680	2760	6680	6440	6920	6680	2360	2440	2280	2360	7320	7560	7360	7413	9
10	3760	3920	3440	3707	7400	7720	6840	7320	1360	2200	6400	3320	5160	5560	4520	5080	10
11	3320	3500	3480	3433	7200	6360	7760	7107	960	1640	2060	1553	5380	5740	6160	5760	11
13	2240	2020	2240	2167	2580	2940	4120	3213	340	900	1560	933	3660	2760	4000	3473	13
14	6540	6420	6160	6373	5520	5620	3820	4987	960	620	1040	873	nd	nd	nd	nd	14
15	2520	2760	2200	2493	5680	5280	5200	5387	1760	1840	1400	1667	5160	6520	5800	5827	15
16	3000	3920	2760	3227	5760	5640	5840	5747	480	1280	680	813	3520	4320	4920	4253	16
17	2920	4120	3240	3427	5800	6800	4600	5733	1040	920	920	960	5440	5400	5360	5400	17
18	4000	4000	2000	3333	6000	3000	3000	4000	3000	1000	2000	2000	4000	2000	6000	4000	18
19	2320	2160	2760	2413	5640	4480	5560	5227	2560	1720	560	1613	4600	3880	3760	4080	19
20	3120	3720	3800	3547	5520	5120	5280	5307	1480	1000	2080	1520	4480	3600	4600	4227	20
21	2600	3960	4000	3520	5200	5120	5200	5173	1120	880	1080	1027	3440	4520	4120	4027	21
22	4600	2200	2520	3107	4840	4600	5640	5027	1920	1400	2160	1827	4200	4640	3680	4173	22
23	2200	2960	3000	2720	5400	4920	5480	5267	640	1520	2680	1613	4080	4360	4720	4387	23
24	3300	2300	3300	2967	7900	4000	8600	6833	1200	1600	900	1233	6900	4800	6200	5967	24
25	4980	4760	4650	4797	7950	7060	6240	7083	528	1272	552	784	7020	6900	4410	6110	25
26	4480	4640	6160	5093	6880	5520	7280	6560	920	1440	1720	1360	3560	4760	4600	4307	26
27	3480	4080	3400	3653	5840	8800	5000	6547	680	2640	2600	1973	4800	7200	4840	5613	27
28	3360	2760	4760	3627	7360	5560	4720	5880	440	760	760	653	5880	5240	5640	5587	28
29	3200	3880	4360	3813	5880	4880	6200	5653	1120	520	880	840	3920	4000	4840	4253	29
30	3000	3304	2972	3092	5429	7445	6582	6485	1536	2508	1097	1714	5500	5733	4494	5242	30
31	3645	3317	4367	3776	5807	7097	5952	6285	1362	617	1121	1033	5687	5902	5449	5679	31
32	3720	2960	2840	3173	6120	4400	4760	5093	480	720	3240	1480	5480	4320	5960	5253	32
33	2480	2320	2760	2520	3840	3880	6480	4733	920	1040	1960	1307	2640	2960	5120	3573	33
34	4314	908	3406	2876	7038	7946	8854	7946	600	2480	2240	1773	4768	9535	5676	6660	34
35	2695	3042	2009	2582	5390	5583	3571	4848	1502	1964	298	1255	5968	6391	3348	5236	35
36	2491	3396	2600	2829	2602	5925	2760	3762	1115	2000	240	1118	4052	5736	3360	4383	36
37	2917	3208	2542	2889	3917	5042	5042	4667	1750	2250	1625	1875	3458	4750	4667	4292	37
43	160	280	320	253	5880	3440	3600	4307	1480	1200	1120	1267	2680	3000	2600	2760	43
44	1400	2240	2280	1973	3280	3280	3680	3413	880	1320	1440	1213	2360	3880	3760	3333	44
45	3040	2800	2400	2747	4680	4880	5760	5107	2040	520	840	1133	4360	4440	4360	4387	45
46	2800	3880	3240	3307	4840	3640	3680	4053	600	2000	360	987	1280	2120	1760	1720	46
47	240	240	120	200	3400	3920	3040	3453	680	640	720	680	5160	4160	4000	4440	47
50	2913	2478	2783	2725	6783	5174	6565	6174	1348	1783	2304	1812	4522	4522	4739	4594	50
51	2261	2522	2826	2536	3391	5000	5218	4536	1217	2609	1696	1841	4305	5565	4305	4725	51
52	2391	2304	3000	2565	5087	5392	6131	5536	696	1435	1913	1348	4131	4739	5392	4754	52
53	3480	3680	3800	3653	5880	4720	5520	5373	1640	1800	2280	1907	4400	4920	5000	4773	53
54	1760	2280	1600	1880	4680	5120	3040	4280	1280	2320	2160	1920	3800	5240	4080	4373	54
55	2440	2520	2680	2547	4240	4640	4920	4600	840	920	1120	960	3080	3320	3440	3280	55
56	2720	2720	3400	2947	4880	4160	6120	5053	1120	1400	960	1160	6320	6320	6520	6387	56
57	2300	2500	3100	2633	3200	4000	3900	3700	1000	1400	1300	1233	2300	4100	3800	3400	57
58	2040	2160	2520	2240	6240	6120	5440	5933	2320	3640	1880	2613	5080	4480	5360	4973	58
59	2739	3735	2960	3145	6225	10707	5360	7431	760	2080	1280	1373	4482	11205	4400	6696	59
60	2960	4560	4200	3907	4600	6800	5000	5467	1960	1240	2240	1813	5240	4800	5200	5080	60
61	2889	2741	2148	2593	8667	7926	5259	7284	2074	1111	667	1284	6222	6889	3852	5654	61
62	500	400	700	533	1300	900	3000	1733	1800	300	1900	1333	1000	1200	1500	1233	62
63	2840	2840	2720	2800	5560	5560	5680	5600	480	480	1560	840	3400	3400	5560	4120	63
64	3080	2680	3080	2947	5280	6680	6240	6067	2640	3360	2200	2733	6280	7520	5560	6453	64
65	3520	4000	3360	3627	3800	4520	3920	4080	1120	960	1120	1067	2840	2720	3240	2933	65
66	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	66
67	2600	2400	1868	2289	3500	1760	2350	2537	1234	556	1426	1072	4400	3560	3800	3920	67
68	4455	4084	4455	4331	8168	12251	10024	10148	1114	2228	1485	1609	5569	8168	7425	7054	68
69	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	69
70	2680	2960	3200	2947	5640	3640	4560	4613	1600	720	1600	1307	3720	3320	3760	3600	70
71	1880	1520	2440	1947	3400	2120	2800	2773	1640	680	2040	1453	1200	880	1280	1120	71
72	2320	4440	2800	3187	3840	5920	4400	4720	560	1080	400	680	3080	6400	5040	4840	72
73	2400	2800	2600	2600	6480	6720	4800	6000	1400	1920	1080	1467	5360	6240	4600	5400	73
74	3000	2560	3320	2960	6040	6560	5760	6120	1120	1040	400	853	3520	3640	4120	3760	74
75	4800	5080	5440	5107	6720	6800	6640	6720	2280	2080	2400	2253	3840	4120	4600	4187	75
76	3560	2720	2320	2867	5720	8120	8280	7373	1200	1920	800	1307	4320	5240	6600	5387	76
77	6600	4960	5240	5600	3560	2920	3000	3160	1760	1720	2160	1880	nd	nd	nd	nd	77
78	2840	2960	3560	3120	5880	6360	6200	6147	2080	1920	1840	1947	3800	3120	4040	3653	78
79	1840	2360	2400	2200	4080	4800	5440	4773	2280	1840	1080	1733	4400	3600	5080	4360	79
82	7001	8320	6418	7246	6418	6680	8168	7089	2040	880	1520	1480	nd	nd	nd	nd	82
83	nd	nd	nd	nd	2780	3400	3640	3273	480	720	1120	773	6200	6100	9040	7113	83
84	2653	3571	3367	3197	2347	4796	4796	3980	1429	816	2755	1667	3980	5204	6837	5340	84
85	1078	1078	2254	1470	2646	1960	5194	3267	882	1470	490	947	4606	4116	5292	4671	85
86	2480	3640	3400	3173	7260	8620	7360	7747	3220	3020	1480	2573	6220	7080	7100	6800	86
90	3120	1720	2080	2307	nd	nd	nd	nd	760	1040	1420	1073	nd	nd	nd	nd	90

ANNEX VII: Analysts' results IPI 2022 Pg 2

A. Code	Chaetoceros peruvianus (cells/L)			Av	Guinardia striata (cells/L)			Av	Lampriscus sp. (cells/L)			Av	Synedropsis sp. (cells/L)			Av	A. Code
	M1	M2	M3		M1	M2	M3		M1	M2	M3		M1	M2	M3		
1	13400	13100	14400	13633	7200	5100	7000	6433	2100	800	2000	1633	3600	3600	2200	3133	1
2	21984	19923	21297	21068	6280	6720	5200	6067	1280	1480	1200	1320	2920	4000	3400	3440	2
3	17720	15560	16400	16560	6400	6200	7200	6600	1480	1640	1560	1560	2720	2800	2760	2760	3
4	19000	18360	21320	19560	8080	8720	9040	8613	1200	1680	960	1280	5080	3400	2960	3813	4
5	21440	19880	17960	19760	6960	5440	6960	6453	1840	1080	1440	1453	4400	4080	3480	3987	5
6	20800	19960	16960	19240	8360	8680	7800	8280	1240	920	1680	1280	3800	2880	4000	3560	6
7	18000	16600	18960	17853	10040	10760	11640	10813	1720	1360	1720	1600	2840	4000	3680	3507	7
8	17880	18480	20640	19000	4160	5680	5680	5173	1880	1960	1480	1773	3400	3760	4280	3813	8
9	18120	18520	18360	18333	4440	5280	4760	4827	2080	2120	2040	2080	3840	3920	3760	3840	9
10	18360	20880	14680	17973	7840	8160	6400	7467	1400	1360	2040	1600	3760	4640	4000	4133	10
11	19020	19240	19300	19187	5380	7920	6360	6553	1060	1400	2060	1507	3600	2860	3220	3227	11
13	10380	7260	12760	10133	7640	6340	4720	6233	1080	2000	1480	1520	1940	2500	2760	2400	13
14	14480	15520	13620	14540	6060	7060	4860	5993	1000	980	1060	1013	2520	2000	2760	2427	14
15	16600	19000	15160	16920	5160	7760	7240	6720	1320	1440	1440	1400	3360	3360	3440	3387	15
16	19480	18680	18840	19000	3120	7000	4880	5000	1040	1360	1400	1267	2560	3760	3160	3160	16
17	20320	18360	22160	20280	8840	10360	7280	8827	1320	1360	1040	1240	2680	2960	2920	2853	17
18	22000	20000	15000	19000	9000	6000	7000	7333	1000	2000	1000	1333	3000	3000	4000	3333	18
19	2520	2400	2880	2600	2200	1480	3800	2493	1560	1680	1400	1547	2920	2480	2560	2653	19
20	23200	20000	15680	19627	5920	6520	9040	7160	1200	1360	2160	1573	3960	2560	3840	3453	20
21	23080	16960	14840	18293	5000	10680	10240	8640	1120	1320	1840	1427	2520	2400	2560	2493	21
22	12680	8640	15560	12293	6240	3560	6240	5347	1960	1040	1320	1440	3840	2680	2840	3120	22
23	23280	22920	20440	22213	4600	4080	1920	3533	920	2200	1800	1640	4000	4360	4800	4387	23
24	26700	21400	20700	22933	7000	700	9000	5567	1600	1600	2000	1733	4000	4600	4100	4233	24
25	22140	19580	18810	20177	7560	6820	7830	7403	1968	1650	888	1502	4272	3144	3096	3504	25
26	19640	19280	15280	18067	5280	3440	10240	6320	1080	920	2000	1333	2760	3800	4400	3653	26
27	16320	20600	9200	15373	4000	3000	8800	5267	1360	1120	2720	1733	2960	4400	4800	4053	27
28	18000	17120	17680	17600	4640	5880	5720	5413	800	1000	1680	1160	3560	3560	3440	3520	28
29	11840	14840	18680	15120	5240	9000	6680	6973	1760	1120	1400	1427	3760	2720	3880	3453	29
30	14786	13218	10863	12956	6357	5852	3751	5320	1929	2190	1309	1809	2964	3344	3220	3176	30
31	16821	17859	15420	16700	6168	7213	7459	6946	1201	1350	1353	1301	2964	3356	3517	3279	31
32	16800	16640	15480	16307	6480	4240	5240	5320	640	1000	1680	1107	3840	3360	3080	3427	32
33	16280	13080	15160	14840	5680	5520	8080	6427	1280	840	1360	1160	1960	1840	3160	2320	33
34	23158	23385	26109	24217	5449	5903	7038	6130	720	1360	2560	1547	2920	2440	3920	3093	34
35	8509	6622	5878	7003	5814	7777	5431	6341	1463	1617	707	1262	3157	3696	2753	3202	35
36	20297	20000	17560	19286	7472	7698	5400	6857	1599	2226	760	1528	3309	3811	2360	3160	36
37	17583	16333	18083	17333	5500	9375	4292	6389	1125	2208	1750	1694	2708	3542	4500	3583	37
43	2600	2840	2920	2787	1280	1800	1520	1533	800	520	760	693	2600	2600	1720	2307	43
44	6160	7160	7400	6907	3280	2880	5000	3720	840	800	1560	1067	3400	4200	3760	3787	44
45	8640	8800	7080	8173	5760	5160	5440	5453	1560	1120	1280	1320	3760	2360	3000	3040	45
46	12040	11440	12280	11920	7200	6120	4920	6080	920	1600	680	1067	2040	2560	2040	2213	46
47	1000	1400	1160	1187	4840	3520	3160	3840	1520	800	1200	1173	1680	1320	2040	1680	47
50	21131	20696	21610	21146	5870	8826	7000	7232	1652	1696	2217	1855	2870	4478	3696	3681	50
51	20088	21088	20870	20682	6087	8000	7305	7131	1696	1652	1957	1768	4478	4565	4652	4565	51
52	19827	18262	19479	19189	5044	8783	6565	6797	1478	2087	2217	1928	3218	4652	4044	3971	52
53	16240	16000	16680	16307	8400	9240	8720	8787	2320	2120	1320	1920	3400	4600	3440	3813	53
54	9880	12200	13520	11867	6520	5680	7280	6493	1880	2120	1520	1840	4640	4440	4520	4533	54
55	18600	19440	20680	19573	4960	5360	5600	5307	1040	1160	1240	1147	3040	3480	3760	3427	55
56	14800	15520	19160	16493	5680	5680	6640	6000	1680	2240	1560	1827	2600	3640	3400	3213	56
57	8400	10900	12700	10667	5700	8100	6500	6767	900	1500	1900	1433	1700	2200	2900	2267	57
58	13764	15438	18177	15793	6640	5880	6720	6413	1680	1920	1840	1813	3240	2960	3680	3293	58
59	27639	26394	21640	25224	8400	8320	8320	8347	1000	1760	1800	1520	2720	4360	2800	3293	59
60	21948	22692	23622	22754	8640	6760	8560	7987	1840	1120	2480	1813	3960	3720	5840	4507	60
61	20519	21185	23259	21654	5926	7926	5037	6296	1778	1778	1037	1531	5185	3926	3704	4272	61
62	7400	4200	10400	7333	9900	4400	6700	7000	1300	1300	2500	1700	3000	3700	2500	3067	62
63	12120	12120	10760	11667	6400	6400	9880	7560	840	840	2200	1293	2040	2040	3440	2507	63
64	16760	15560	18160	16827	6880	5400	5040	5773	2160	2160	2440	2253	4080	3680	6200	4653	64
65	13760	14600	11800	13387	3800	3720	4440	3987	1400	1120	1320	1280	3880	4440	3440	3920	65
66	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	66
67	14000	17400	14200	15200	6580	5260	5700	5847	1530	1096	1862	1496	4160	3120	4000	3760	67
68	20048	20419	20790	20419	9281	10024	11138	10148	1680	2200	1280	1720	4720	5400	5800	5307	68
69	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	69
70	13520	11200	10360	11693	4280	4000	4360	4213	1480	1040	1880	1467	4400	2160	2800	3120	70
71	14240	11680	8480	11467	4920	6400	6000	5773	1200	1160	1720	1360	4880	4200	5280	4787	71
72	10360	9960	9840	10053	1520	3520	3600	2880	720	1840	1200	1253	2600	3760	2680	3013	72
73	18840	19720	12840	17133	6480	9280	5560	7107	2040	1560	1160	1587	4200	3760	2920	3627	73
74	11280	4560	11000	8947	4400	6560	5960	5640	1600	2680	800	1693	4440	3480	4760	4227	74
75	14320	14000	15200	14507	8440	8040	7800	8093	1720	1760	1800	1760	4560	4000	4280	4280	75
76	11160	20880	17920	16653	8400	5080	4080	5853	1200	1560	1080	1280	3000	3840	5600	4147	76
77	6120	5880	5760	5920	4200	3440	2480	3373	1520	1240	2000	1587	3600	3800	2600	3333	77
78	11440	12000	11880	11773	8000	7360	6960	7440	2080	1560	1440	1693	2840	3720	2960	3173	78
79	11840	11120	9400	10787	7440	7000	3000	5813	2520	1640	1320	1827	5120	3680	3760	4187	79
82	5480	15600	11640	10907	7920	6040	5760	6573	1240	1240	2320	1600	3240	3880	3960	3693	82
83	10960	11800	12700	11820	3700	4600	6860	5053	1380	1000	1560	1313	3620	4360	3960	3980	83
84	17245	26327	17551	20374	7449	10000	9796	9082	714	612	918	748	3469	3776	3061	3435	84
85	14308	16856	14504	15223	4704	6860	8134	6566	1372	1862	1078	1437	3626	4998	2646	3757	85
86	19480	21900	20340	20573	7100	8140	8380	7873	2100	1960	2020	2027	4460	4240	3940	4213	86
90	120	220	160	167	2400	2160	1680	2080	820	1000	1140	987	1840	2200	2120	2053	90

Annex VIII: Robust mean and Standard deviation calculation according to algorithm A annex C ISO13528 *Alexandrium pacificum* iteration

IPI2022 Iteration									
Alexandrium pacificum									
CELLS / L									
Date	Sample	M1	M2	sample average		*2		Batch #	Label
13.09.202	water22	2880	3920	3400	1040	1081600		A	106
13.09.202	water22	3960	4400	4180	440	193600		A	166
13.09.202	water22	4080	3840	3960	240	57600		A	211
13.09.202	water22	5280	3680	4480	1600	2560000		B	360
13.09.202	water22	3440	3360	3400	80	6400		B	365
13.09.202	water22	4240	3840	4040	400	160000		C	590
13.09.202	water22	3360	4320	3840	960	921600		C	546
13.09.202	water22	4640	4000	4320	640	409600		C	563
13.09.202	water22	3760	4880	4320	1120	1254400		D	737
13.09.202	water22	4880	3680	4280	1200	1440000		D	792
			Average:	4022	Sum	3899200			
			SD	379	P=	10			
		SD within samples:		442					
		SD between samples:		214					
Date	Sample number	Test portion 1	Test portion 2	sample average	Between test portion range	*2		Batch #	Label
13.10.202	water22	4400	3600	4000	800	640000		A	154
13.10.202	water22	4160	4960	4560	800	640000		B	326
13.10.202	water22	4000	4800	4400	800	640000		D	716
			Average:	4320	Sum	1920000			
			SD	288	P=	3			
		SD within samples:		566					
		SD between samples:		277					
homogeneity criteria			214	114					
stability check criteria			4022	4320	298				

Analysts' iteration for *Alexandrium pacificum*

Average X	3092		3010	3011	3011	3011
SD S	1122		613	611	611	611
robust average X*	2963	new *X**	3010	3011	3011	3011
robust stdev S*	672	new *S**	695	693	692	692
δ= 1.5S*	1008		1042	1039	1039	1039
X*- δ	1955		1967	1971	1972	1972
X*+ δ	3972		4052	4050	4049	4049
no of analysts P	74		74	74	74	74
Between Samples SD	214					
new stdev for APACIF	725					

Annex VIII: Robust mean and Standard deviation calculation according to algorithm A annex C ISO13528 *Prorocentrum rhathymum* iteration

IPI2022 Iteration								
Prorocentrum rhathymum								
CELLS / L								
Date	Sample	M1	M2	sample average		*2	Batch #	Label
13.09.202	water22	7280	7520	7400	240	57600	A	106
13.09.202	water22	5880	7280	6580	1400	1960000	A	166
13.09.202	water22	7520	6880	7200	640	409600	A	211
13.09.202	water22	8720	6960	7840	1760	3097600	B	360
13.09.202	water22	5840	7280	6560	1440	2073600	B	365
13.09.202	water22	8720	7840	8280	880	774400	C	590
13.09.202	water22	7440	7680	7560	240	57600	C	546
13.09.202	water22	8640	8480	8560	160	25600	C	563
13.09.202	water22	8880	8160	8520	720	518400	D	737
13.09.202	water22	7520	6880	7200	640	409600	D	792
			Average:	7570	Sum	7598400		
			SD	727	P=	10		
		SD within samples:		616				
		SD between samples:		582				
Date	Sample number	Test portion 1	Test portion 2	sample average	Between test portion range	*2	Batch #	Label
13.10.202	water22	6880	7040	6960	160	25600	A	154
13.10.202	water22	7760	8640	8200	880	774400	B	326
13.10.202	water22	9440	10640	10040	1200	1440000	D	716
			Average:	8400	Sum	2240000		
			SD	1550	P=	3		
		SD within samples:		611				
		SD between samples:		1488				
homogeneity criteria			582	218				
stability check criteria			7570	8400	830			

Analysts' iteration for *Prorocentrum rhathymum*

Average X	5416		5361	5361
SD S	1580		1290	1290
robust average X*	5340	new *X**	5361	5361
robust stdev S*	1398	new *S**	1463	1463
δ= 1.5S*	2097		2194	2194
X*- δ	3243		3167	3167
X*+ δ	7437		7555	7555
no of analysts P	76		76	76
Between Samples SD	582			
new stdev for PRATH	1574			

Annex VIII: Robust mean and Standard deviation calculation according to algorithm A annex C ISO13528 *Actinoptychus splendens* iteration

IPI2022 Iteration								
Actinoptychus								
CELLS / L								
Date	Sample	M1	M2	sample average		*2	Batch #	Label
13.09.202	water22	2080	1800	1940	280	78400	A	106
13.09.202	water22	480	680	580	200	40000	A	166
13.09.202	water22	720	480	600	240	57600	A	211
13.09.202	water22	1240	920	1080	320	102400	B	360
13.09.202	water22	1280	680	980	600	360000	B	365
13.09.202	water22	840	1000	920	160	25600	C	590
13.09.202	water22	2040	1560	1800	480	230400	C	546
13.09.202	water22	1240	1040	1140	200	40000	C	563
13.09.202	water22	1480	1280	1380	200	40000	D	737
13.09.202	water22	1400	840	1120	560	313600	D	792
			Average:	1154	Sum	638400		
			SD	449	P=	10		
		SD within samples:		179				
		SD between samples:		431				
Date	Sample number	Test portion 1	Test portion 2	sample average	Between test portion range	*2	Batch #	Label
13.10.202	water22	720	680	700	40	1600	A	154
13.10.202	water22	2760	2200	2480	560	313600	B	326
13.10.202	water22	1000	1200	1100	200	40000	D	716
			Average:	1427	Sum	355200		
			SD	934	P=	3		
		SD within samples:		243				
		SD between samples:		918				
homogeneity criteria			431	135				
stability check criteria			1154	1427	273			

Analysts' iteration for *Actinoptychus splendens*

Average X	1420		1376	1376
SD S	523		422	422
robust average X*	1333	new *X**	1376	1376
robust stdev S*	494	new *S**	478	478
δ= 1.5S*	742		718	717
X*- δ	592		658	658
X*+ δ	2075		2093	2093
no of analysts P	77		77	77
Between Samples SD	431			
new stdev for ACTINO	644			

Annex VIII: Robust mean and Standard deviation calculation according to algorithm A annex C ISO13528 *Coolia monotis* iteration

IPI2022 Iteration									
Coolia sp.									
CELLS / L									
Date	Sample	M1	M2	sample average		*2		Batch #	Label
13.09.202	water22	5280	7440	6360	2160	4665600		A	106
13.09.202	water22	5000	6920	5960	1920	3686400		A	166
13.09.202	water22	6320	5920	6120	400	160000		A	211
13.09.202	water22	7120	7280	7200	160	25600		B	360
13.09.202	water22	6080	5120	5600	960	921600		B	365
13.09.202	water22	7040	6240	6640	800	640000		C	590
13.09.202	water22	6960	4240	5600	2720	7398400		C	546
13.09.202	water22	7440	6960	7200	480	230400		C	563
13.09.202	water22	5840	6720	6280	880	774400		D	737
13.09.202	water22	5920	6320	6120	400	160000		D	792
			Average:	6308	Sum	9459200			
			SD	600	P=	10			
		SD within samples:		688					
		SD between samples:		351					
Date	Sample number	Test portion 1	Test portion 2	sample average	Between test portion range	*2		Batch #	Label
13.10.202	water22	6320	6640	6480	320	102400		A	154
13.10.202	water22	6960	6960	6960	0	0		B	326
13.10.202	water22	8400	5840	7120	2560	6553600		D	716
			Average:	6853	Sum	6656000			
			SD	333	P=	3			
		SD within samples:		1053					
		SD between samples:		666					
homogeneity criteria			351	180					
stability check criteria			6308	6853	545				

Analysts' iteration for *Coolia monotis*

Average X	4792		4797	4797	
SD S	1286		933	933	
robust average X*	4754	new *X**	4797	4797	
robust stdev S*	958	new *S**	1058	1058	
δ= 1.5S*	1437		1587	1587	
X*- δ	3316		3210	3210	
X*+ δ	6191		6384	6384	
no of analysts P	73		73	73	
Between Samples SD	351				
new stdev for COOLIA	1115				

Annex VIII: Robust mean and Standard deviation calculation according to algorithm A annex C ISO13528 *Chaetoceros peruvianus* iteration

IPI2022 Iteration								
Chaetoceros peruvianus								
CELLS / L								
Date	Sample	M1	M2	sample average		*2	Batch #	Label
13.09.202	water22	17600	18880	18240	1280	1638400	A	106
13.09.202	water22	20560	18400	19480	2160	4665600	A	166
13.09.202	water22	16880	16640	16760	240	57600	A	211
13.09.202	water22	15040	16480	15760	1440	2073600	B	360
13.09.202	water22	14880	13840	14360	1040	1081600	B	365
13.09.202	water22	15440	15840	15640	400	160000	C	590
13.09.202	water22	18000	14640	16320	3360	11289600	C	546
13.09.202	water22	14000	14480	14240	480	230400	C	563
13.09.202	water22	12560	14160	13360	1600	2560000	D	737
13.09.202	water22	18160	11920	15040	6240	38937600	D	792
			Average:	15920	Sum	9516800		
			SD	1874	P=	10		
		SD within samples:		690				
		SD between samples:		1809				
Date	Sample number	Test portion 1	Test portion 2	sample average	Between test portion range	*2	Batch #	Label
13.10.202	water22	17600	17280	17440	320	102400	A	154
13.10.202	water22	18800	16080	17440	2720	7398400	B	326
13.10.202	water22	15200	17440	16320	2240	5017600	D	716
			Average:	17067	Sum	12518400		
			SD	647	P=	3		
		SD within samples:		1444				
		SD between samples:		791				
homogeneity criteria			1809	562				
stability check criteria			15920	17067	1147			

Analysts' iteration for *Chaetoceros peruvianus*

Average X	15281		15732	15706	15704	15703	15703
SD S	5412		4456	4409	4405	4404	4404
robust average X*	16493	new *X**	15732	15706	15704	15703	15703
robust stdev S*	5246	new *S**	5053	5000	4995	4994	4994
δ= 1.5S*	7870		7580	7500	7492	7491	7491
X*- δ	8624		8152	8206	8211	8212	8212
X*+ δ	24363		23312	23207	23196	23195	23195
no of analysts P	77		77	77	77	77	77
Between Samples SD	1809						
new stdev for PERUV	5312						

Annex VIII: Robust mean and Standard deviation calculation according to algorithm A annex C ISO13528 *Guinardia striata* iteration

IPI2022 Iteration								
Guinardia striata								
CELLS / L								
Date	Sample	M1	M2	sample average		*2	Batch #	Label
13.09.202	water22	8840	8800	8820	40	1600	A	106
13.09.202	water22	8640	9680	9160	1040	1081600	A	166
13.09.202	water22	5000	5200	5100	200	40000	A	211
13.09.202	water22	7320	7920	7620	600	360000	B	360
13.09.202	water22	8800	8640	8720	160	25600	B	365
13.09.202	water22	10080	7840	8960	2240	5017600	C	590
13.09.202	water22	9040	6720	7880	2320	5382400	C	546
13.09.202	water22	6160	6960	6560	800	640000	C	563
13.09.202	water22	6160	9200	7680	3040	9241600	D	737
13.09.202	water22	11600	6640	9120	4960	24601600	D	792
			Average:	7962	Sum	1508800		
			SD	1660	P=	10		
		SD within samples:		275				
		SD between samples:		1649				
Date	Sample number	Test portion 1	Test portion 2	sample average	Between test portion range	*2	Batch #	Label
13.10.202	water22	8880	11120	10000	2240	5017600	A	154
13.10.202	water22	9280	12000	10640	2720	7398400	B	326
13.10.202	water22	8800	9680	9240	880	774400	D	716
			Average:	9960	Sum	13190400		
homogeneity criteria			1649	498				
stability check criteria			7962	9960	1998			

Analysts' iteration for *Guinardia striata*

Average X	6257		6339	6339
SD S	1686		1164	1164
robust average X*	6389	new *X**	6339	6339
robust stdev S*	1251	new *S**	1320	1320
δ= 1.5S*	1876		1980	1980
X*- δ	4513		4359	4359
X*+ δ	8265		8319	8319
no of analysts P	77		77	77
Between Samples SD	1649			
new stdev for GSTRIATA	2112			

Annex VIII: Robust mean and Standard deviation calculation according to algorithm A annex C ISO13528 *Lampriscus sp.* iteration

IPI2022 Iteration								
lampriscus sp.								
CELLS / L								
Date	Sample	M1	M2	sample average		*2	Batch #	Label
13.09.202	water22	1400	1480	1440	80	6400	A	106
13.09.202	water22	1520	1800	1660	280	78400	A	166
13.09.202	water22	1240	1120	1180	120	14400	A	211
13.09.202	water22	1840	1440	1640	400	160000	B	360
13.09.202	water22	1280	880	1080	400	160000	B	365
13.09.202	water22	880	800	840	80	6400	C	590
13.09.202	water22	1840	1240	1540	600	360000	C	546
13.09.202	water22	1600	1560	1580	40	1600	C	563
13.09.202	water22	2000	1040	1520	960	921600	D	737
13.09.202	water22	840	1360	1100	520	270400	D	792
			Average:	1358	Sum	1979200		
			SD	285	P=	10		
		SD within samples:		315				
		SD between samples:		178				
Date	Sample number	Test portion 1	Test portion 2	sample average	Between test portion range	*2	Batch #	Label
13.10.202	water22	800	760	780	40	1600	A	154
13.10.202	water22	2240	2160	2200	80	6400	B	326
13.10.202	water22	1360	1360	1360	0	0	D	716
			Average:	1447	Sum	8000		
			SD	714	P=	3		
		SD within samples:		37				
		SD between samples:		713				
homogeneity criteria			178	85				
stability check criteria			1358	1447	89			

Analysts' iteration for *Lampriscus sp.*

Average X	1481		1485	1484	1485	1485	1485
SD S	297		266	260	259	258	258
robust average X*	1502	new *X**	1485	1484	1485	1485	1485
robust stdev S*	323	new *S**	301	295	293	292	292
δ= 1.5S*	485		452	443	440	439	438
X*- δ	1017		1033	1042	1045	1046	1046
X*+ δ	1987		1937	1927	1924	1923	1923
no of analysts P	77		77	77	77	77	77
Between Samples SD	178						
new stdev for LAMPRI	342						

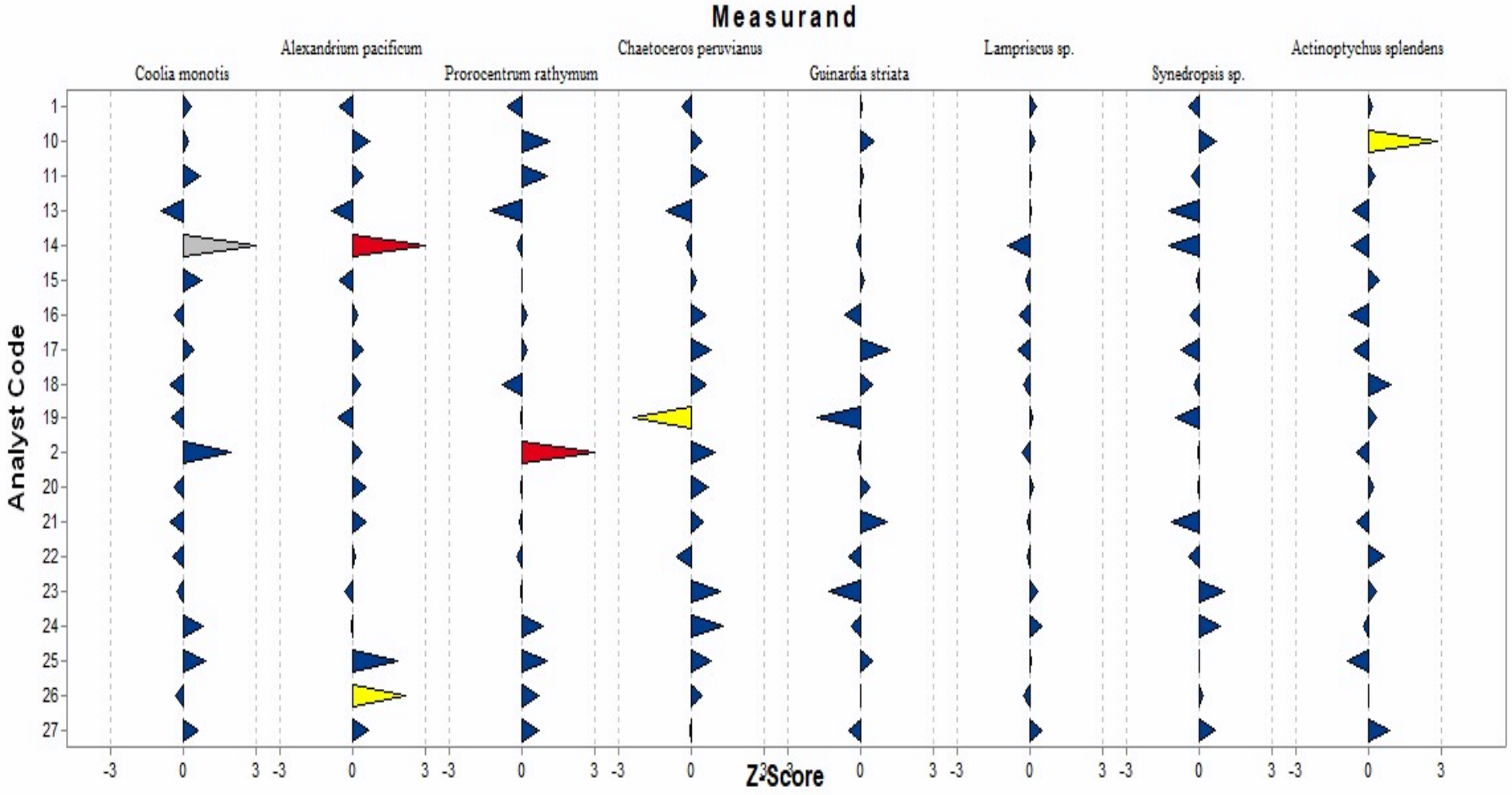
Annex VIII: Robust mean and Standard deviation calculation according to algorithm A annex C ISO13528 *Synedropsis sp.* iteration

IPI2022 Iteration								
Synedropsis sp.								
CELLS / L								
Date	Sample	M1	M2	sample average		*2	Batch #	Label
13.09.202	water22	3000	2640	2820	360	129600	A	106
13.09.202	water22	2960	3040	3000	80	6400	A	166
13.09.202	water22	3160	2360	2760	800	640000	A	211
13.09.202	water22	3440	3240	3340	200	40000	B	360
13.09.202	water22	2440	3120	2780	680	462400	B	365
13.09.202	water22	4080	3400	3740	680	462400	C	590
13.09.202	water22	3120	2840	2980	280	78400	C	546
13.09.202	water22	3400	4000	3700	600	360000	C	563
13.09.202	water22	2840	3280	3060	440	193600	D	737
13.09.202	water22	2680	2200	2440	480	230400	D	792
			Average:	3062	Sum	1278400		
			SD	243	P=	10		
		SD within samples:		253				
		SD between samples:		164				
Date	Sample number	Test portion 1	Test portion 2	sample average	Between test portion range	*2	Batch #	Label
13.10.202	water22	2440	2880	2660	440	193600	A	154
13.10.202	water22	4640	3000	3820	1640	2689600	B	326
13.10.202	water22	4280	3760	4020	520	270400	D	716
			Average:	3500	Sum	3153600		
homogeneity criteria			164	73				
stability check criteria			3062	3500	438			

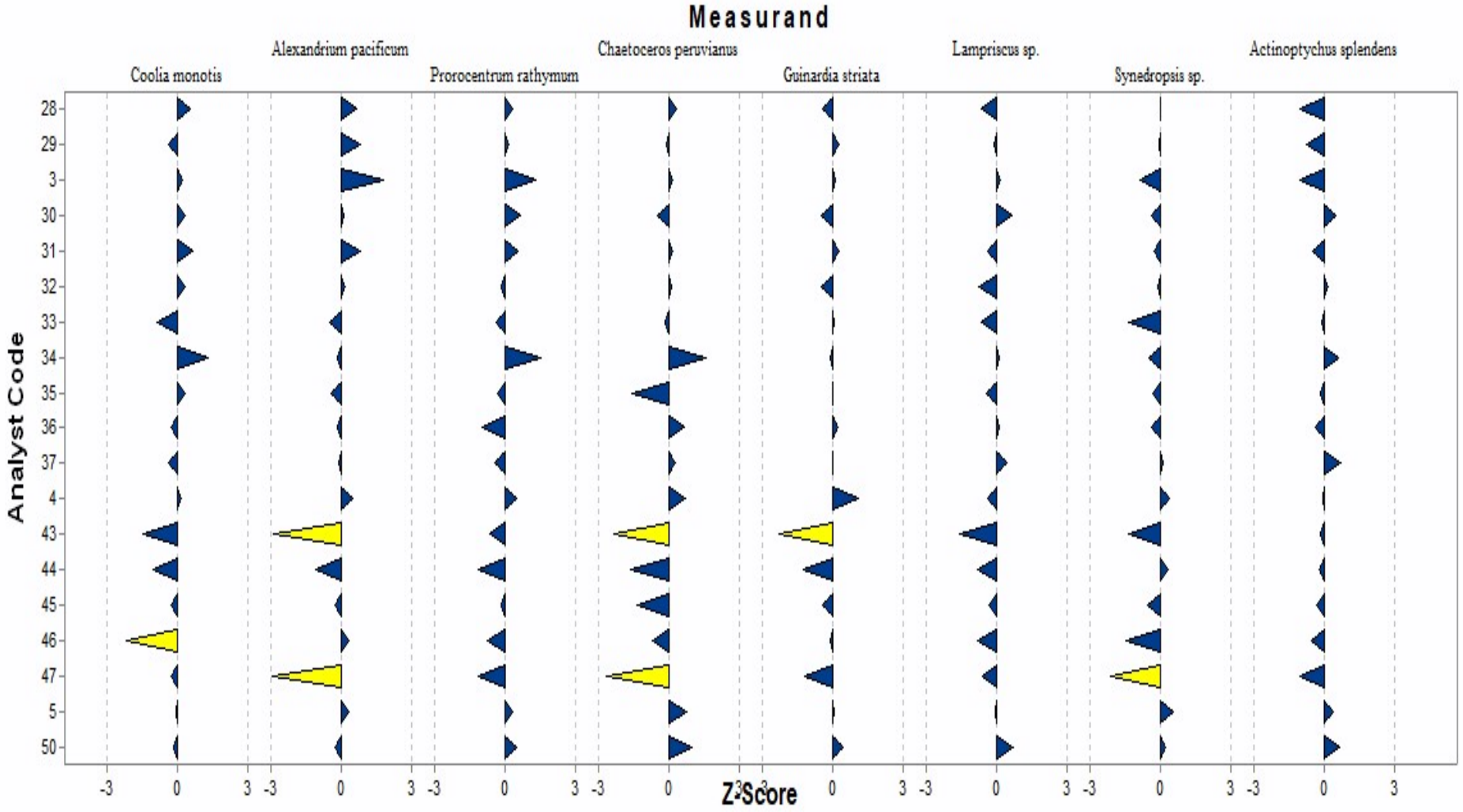
Analysts' iteration for *Synedropsis sp.*

Average X	3491		3501	3501
SD S	695		533	533
robust average X*	3453	new *X**	3501	3501
robust stdev S*	534	new *S**	604	604
δ= 1.5S*	801		906	906
X*- δ	2653		2595	2595
X*+ δ	4254		4407	4407
no of analysts P	77		77	77
Between Samples SD	164			
new stdev for SYNEDROP	626			

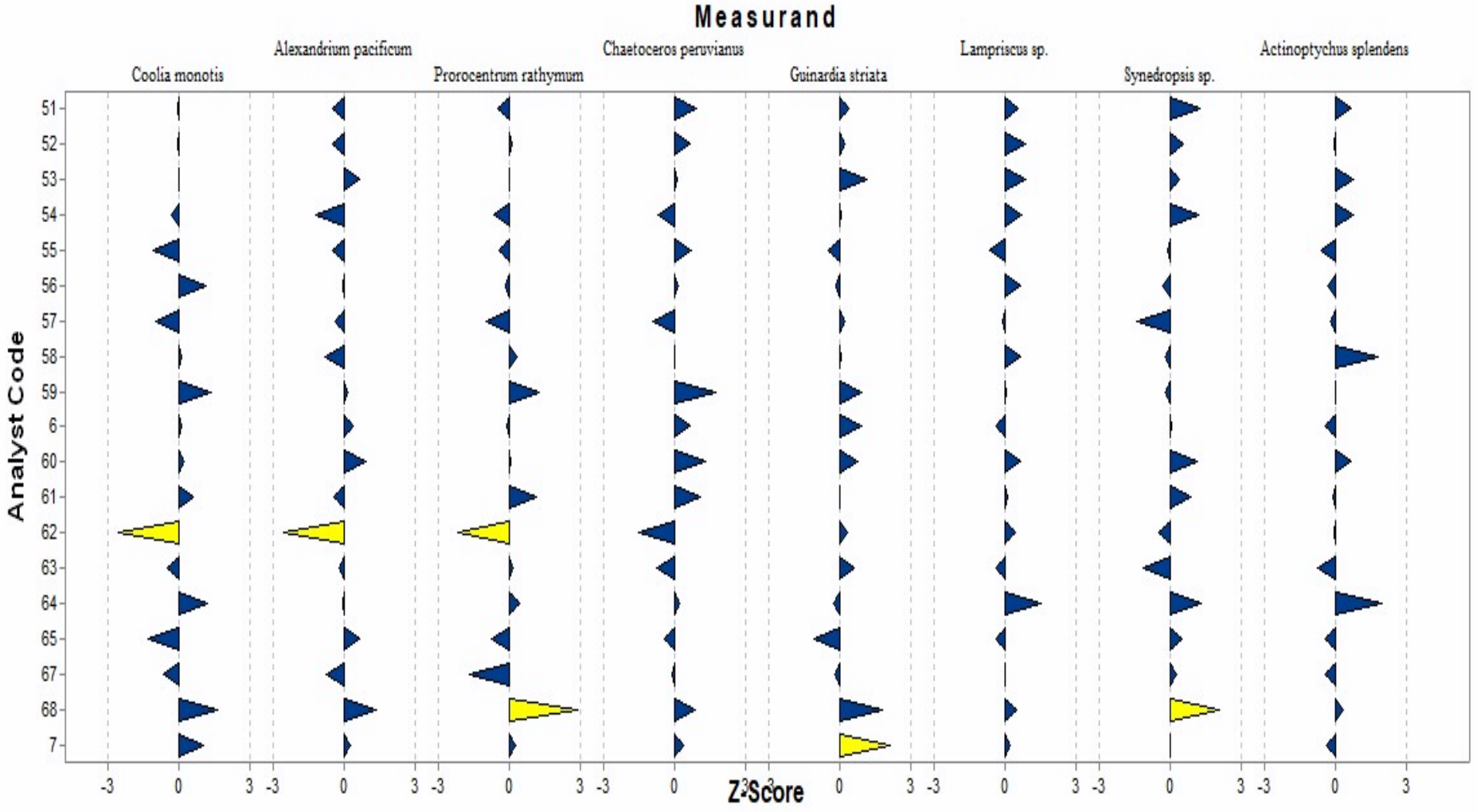
ANNEX IX: Summary of Z-scores IPI202 for all measurands pg1



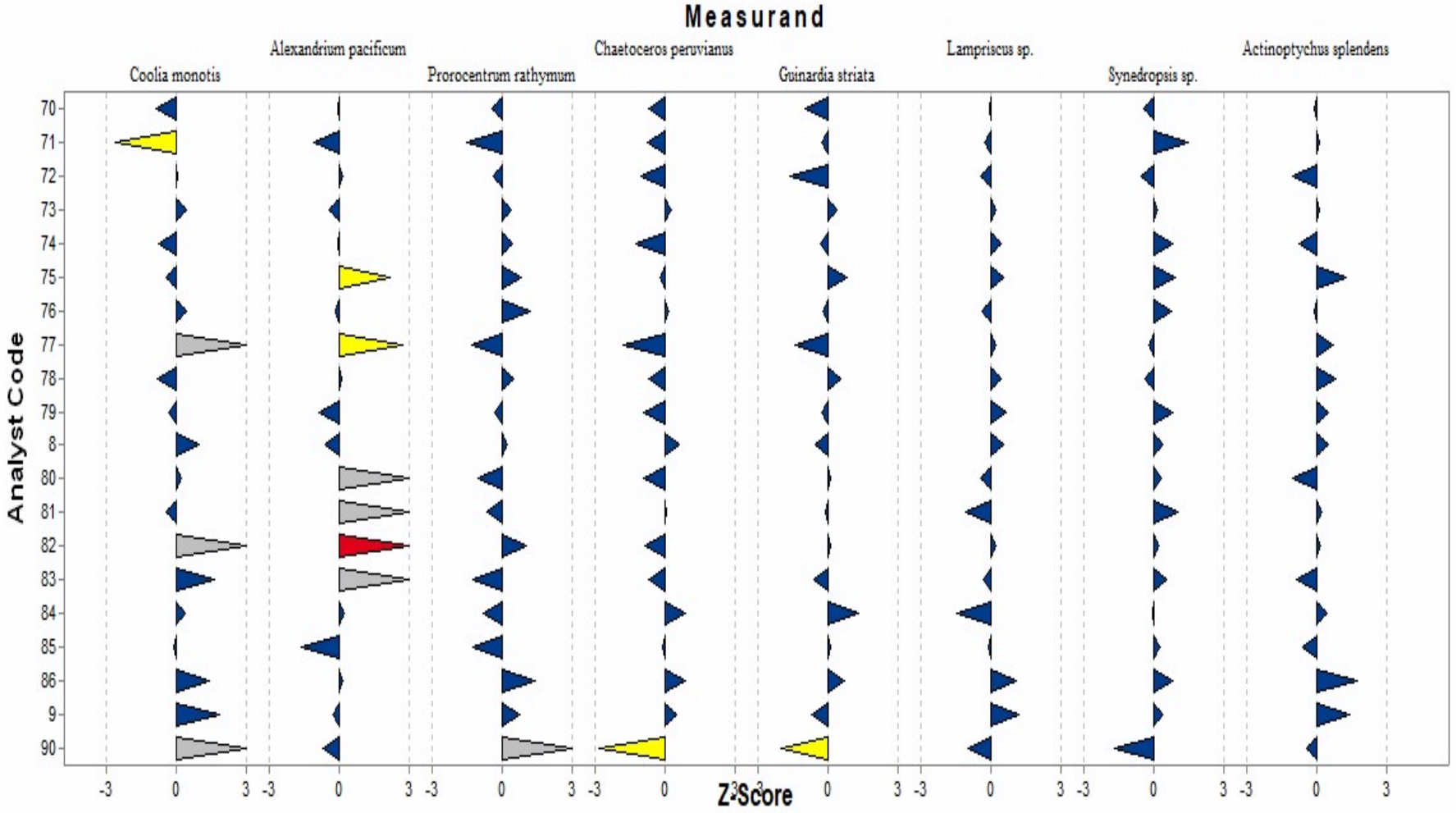
ANNEX IX: Summary of Z-scores IPI202 for all measurands pg2



ANNEX IX: Summary of Z-scores IPI202 for all measurands pg3



ANNEX IX: Summary of Z-scores IPI202 for all measurands pg4



ANNEX X: Performance statistics for the test IPI2022

Analyst code	Measurands	Within tolerance	%	Successful	Analyst code	Measurands	Within tolerance	%	Successful	Analyst code	Measurands	Within tolerance	%	Successful
1	8	8	100	Yes	44	8	8	100	Yes	78	8	8	100	Yes
11	8	8	100	Yes	45	8	8	100	Yes	79	8	8	100	Yes
13	8	8	100	Yes	5	8	8	100	Yes	8	8	8	100	Yes
15	8	8	100	Yes	50	8	8	100	Yes	84	8	8	100	Yes
16	8	8	100	Yes	51	8	8	100	Yes	85	8	8	100	Yes
17	8	8	100	Yes	52	8	8	100	Yes	86	8	8	100	Yes
18	8	8	100	Yes	53	8	8	100	Yes	9	8	8	100	Yes
20	8	8	100	Yes	54	8	8	100	Yes	10	8	7	87.5	Yes
21	8	8	100	Yes	55	8	8	100	Yes	19	8	7	87.5	Yes
22	8	8	100	Yes	56	8	8	100	Yes	2	8	7	87.5	Yes
23	8	8	100	Yes	57	8	8	100	Yes	26	8	7	87.5	Yes
24	8	8	100	Yes	58	8	8	100	Yes	46	8	7	87.5	Yes
25	8	8	100	Yes						7	8	7	87.5	Yes
27	8	8	100	Yes	59	8	8	100	Yes	71	8	7	87.5	Yes
28	8	8	100	Yes	6	8	8	100	Yes	75	8	7	87.5	Yes
29	8	8	100	Yes	60	8	8	100	Yes	80	8	7	87.5	Yes
3	8	8	100	Yes	61	8	8	100	Yes	81	8	7	87.5	Yes
30	8	8	100	Yes	63	8	8	100	Yes	83	8	7	87.5	Yes
31	8	8	100	Yes	64	8	8	100	Yes	14	8	6	75	Yes
32	8	8	100	Yes	65	8	8	100	Yes	68	8	6	75	Yes
33	8	8	100	Yes	67	8	8	100	Yes	77	8	6	75	Yes
34	8	8	100	Yes	70	8	8	100	Yes	82	8	6	75	Yes
35	8	8	100	Yes	72	8	8	100	Yes	43	8	5	62.5	No
36	8	8	100	Yes	73	8	8	100	Yes	47	8	5	62.5	No
37	8	8	100	Yes	74	8	8	100	Yes	62	8	5	62.5	No
4	8	8	100	Yes	76	8	8	100	Yes	90	8	4	50	No

ANNEX XI: Qualitative results IPI202 by Analyst and Measurand

Analyst code	Alexandrium pacificum	Prorocentrum rhathymum	Actinoptychus splendens	Coolia sp.	Chaetoceros peruvianus	Guinardia striata	Lampriscus sp.	Synedropsis sp.	Overall Flag	Number of Measurands correct
51	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
47	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
37	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
80	not detected	Correct	Correct	Correct	Correct	Correct	Correct	Incorrect	Pass	6
9	Correct	Correct	Correct	Correct	Correct	Correct	Incorrect	Correct	Pass	7
82	Correct	Correct	Correct	not detected	Correct	Correct	Correct	Correct	Pass	7
5	Correct	Correct	Correct	Incorrect	Correct	Correct	Correct	Correct	Pass	7
46	Correct	Correct	Correct	Incorrect	Correct	Correct	Correct	Correct	Pass	7
6	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
65	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
63	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
60	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
20	Correct	Correct	Correct	Incorrect	Correct	Correct	Incorrect	Correct	Pass	6
70	Correct	Correct	Correct	Correct	Correct	Correct	Incorrect	Correct	Pass	8
61	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Incorrect	Pass	8
81	not detected	Correct	Correct	Correct	Correct	Correct	Correct	Incorrect	Pass	6
8	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
84	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
85	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
10	Correct	Correct	incorrect	Correct	Correct	Correct	Correct	Correct	Pass	7
66	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr
77	Correct	Correct	Correct	not detected	Correct	Correct	Correct	Correct	Pass	7
54	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
33	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
72	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
13	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Incorrect	Pass	7
73	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
36	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
45	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
57	Correct	Correct	Correct	Correct	Correct	Correct	Incorrect	Correct	Pass	7
79	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
38	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr
29	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
27	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
4	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
28	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
55	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
21	Correct	Correct	Correct	Incorrect	Correct	Correct	Incorrect	Correct	Pass	6
34	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
83	not detected	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	7
7	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Incorrect	Pass	7
56	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
50	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
71	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
53	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8

ANNEX XI: Qualitative results IPI2022 by Analyst and Measurand

Analyst code	Alexandrium pacificum	Prorocentrum rhathymum	Actinoptychus splendens	Coolia sp.	Chaetoceros peruvianus	Guinardia striata	Lampriscus sp.	Synedropsis sp.	Overall Flag	Number of Measurands correct
90	Correct	no detected	Correct	not detected	Correct	Correct	Correct	Correct	Pass	6
35	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
62	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
19	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
14	Correct	Correct	incorrect	not detected	Correct	Correct	Correct	Correct	Pass	6
18	Correct	Correct	Correct	Correct	Correct	Correct	Incorrect	Incorrect	Pass	6
24	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
44	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
59	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
2	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
58	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
22	Correct	Correct	Correct	Incorrect	Correct	Correct	Incorrect	Correct	Pass	6
17	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
16	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Incorrect	Pass	7
41	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr
74	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
75	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
76	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
43	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
15	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
52	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
31	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
23	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
67	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
32	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
11	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
86	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
40	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr
69	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr
64	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
30	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
25	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
78	Correct	Correct	Correct	Correct	Correct	Correct	Incorrect	Correct	Pass	7
3	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
26	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
1	Correct	Correct	Correct	Correct	Correct	Incorrect	Correct	Correct	Pass	7
39	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr
42	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr
68	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Correct	Pass	8
Total Correct	74	76	74	68	77	76	43	71	**559**	
Total Incorrect	0	0	3	5	0	1	34	6	**49**	
Non-Detected	3	1	0	4	0	0	0	0	**8**	
No results	7	7	7	7	7	7	7	7	**56**	

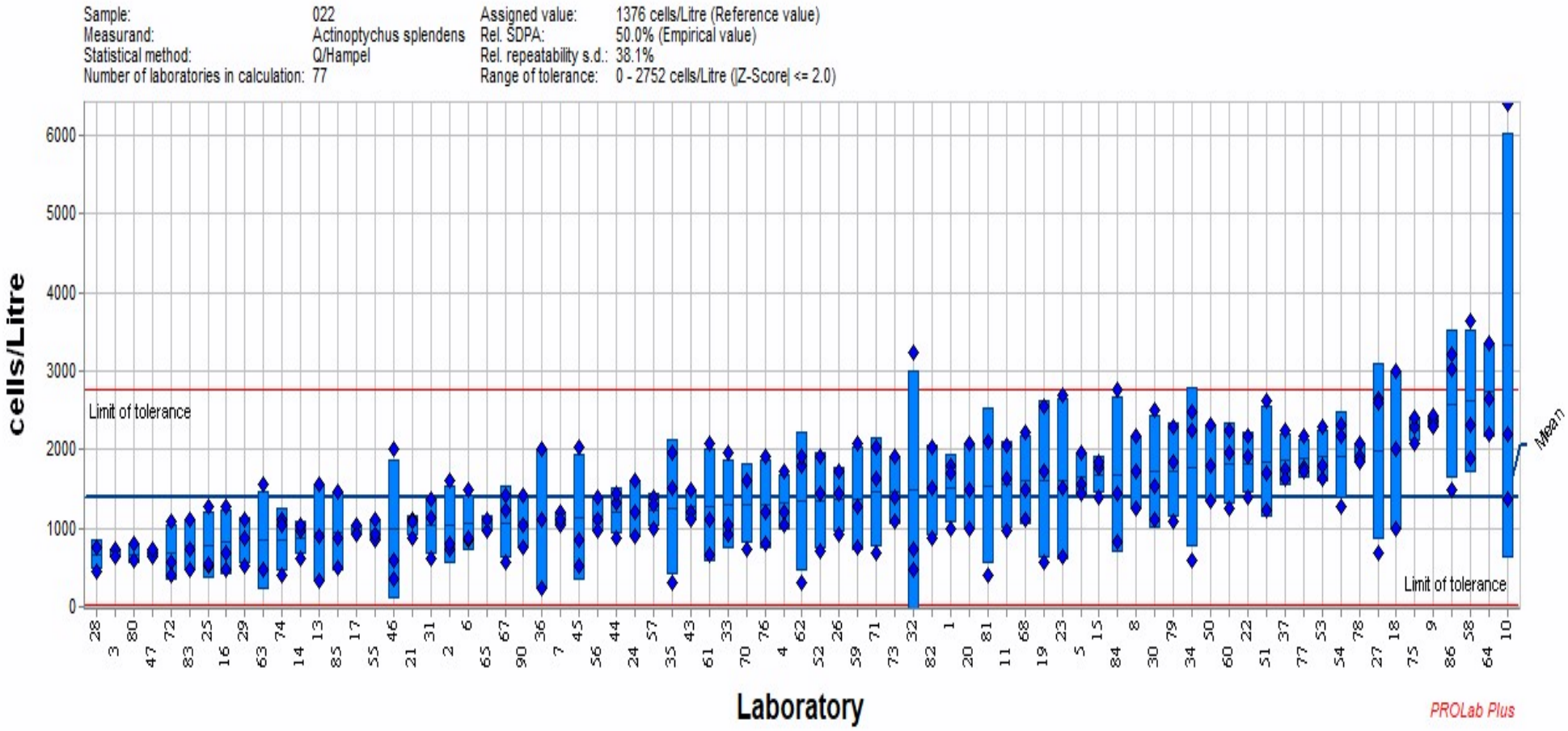
ANNEX XII: Summary of laboratory means + statistical parameters

	A.splendens		Synedropsis sp.		Lampriscus sp.		G.striata		C. peruvianus		P. rhathymum		C. monotis		A. pacificum	
A. Code	Cells/L	Z-score	Cells/L	Z-score	Cells/L	Z-score	Cells/L	Z-score	Cells/L	Z-score	Cells/L	Z-score	Cells/L	Z-score	Cells/L	Z-score
1	1500	0.2	3133	-0.4	1633	0.3	6433	0	13633	-0.4	4400	-0.6	5233	0.3	2500	-0.5
2	1040	-0.5	3440	-0.1	1320	-0.3	6067	-0.1	21068	1	10772	3.2	7552	2	3400	0.4
3	667	-1	2760	-0.9	1560	0.1	6600	0.1	16560	0.2	7533	1.3	5120	0.2	4747	1.8
4	1320	-0.1	3813	0.4	1280	-0.4	8613	1.1	19560	0.7	6160	0.5	5053	0.2	3480	0.5
5	1653	0.4	3987	0.6	1453	-0.1	6453	0.1	19760	0.7	5947	0.4	4707	-0.1	3307	0.3
6	1067	-0.4	3560	0.1	1280	-0.4	8280	0.9	19240	0.6	5133	-0.1	4933	0.1	3387	0.4
7	1120	-0.4	3507	0	1600	0.2	10813	2.1	17853	0.4	5773	0.2	6280	1.1	3293	0.3
8	1707	0.5	3813	0.4	1773	0.6	5173	-0.6	19000	0.6	5733	0.2	6160	1	2453	-0.6
9	2360	1.4	3840	0.4	2080	1.2	4827	-0.7	18333	0.5	6680	0.8	7413	1.9	2760	-0.3
10	3320	2.8	4133	0.7	1600	0.2	7467	0.5	17973	0.4	7320	1.2	5080	0.2	3707	0.7
11	1553	0.3	3227	-0.3	1507	0	6553	0.1	19187	0.6	7107	1	5760	0.7	3433	0.4
13	933	-0.6	2400	-1.3	1520	0.1	6233	-0.1	10133	-1	3213	-1.3	3473	-0.9	2167	-0.9
14	873	-0.7	2427	-1.2	1013	-0.9	5993	-0.2	14540	-0.2	4987	-0.2		3	6373	3.5
15	1667	0.4	3387	-0.1	1400	-0.2	6720	0.2	16920	0.2	5387	0	5827	0.7	2493	-0.5
16	813	-0.8	3160	-0.4	1267	-0.4	5000	-0.6	19000	0.6	5747	0.2	4253	-0.4	3227	0.2
17	960	-0.6	2853	-0.8	1240	-0.5	8827	1.2	20280	0.8	5733	0.2	5400	0.4	3427	0.4
18	2000	0.9	3333	-0.2	1333	-0.3	7333	0.5	19000	0.6	4000	-0.8	4000	-0.6	3333	0.3
19	1613	0.3	2653	-1	1547	0.1	2493	-1.8	2600	-2.4	5227	-0.1	4080	-0.5	2413	-0.6
20	1520	0.2	3453	-0.1	1573	0.2	7160	0.4	19627	0.7	5307	0	4227	-0.4	3547	0.6
21	1027	-0.5	2493	-1.2	1427	-0.1	8640	1.1	18293	0.5	5173	-0.1	4027	-0.6	3520	0.5
22	1827	0.7	3120	-0.4	1440	-0.1	5347	-0.5	12293	-0.6	5027	-0.2	4173	-0.4	3107	0.1
23	1613	0.3	4387	1	1640	0.3	3533	-1.3	22213	1.2	5267	-0.1	4387	-0.3	2720	-0.3
24	1233	-0.2	4233	0.8	1733	0.5	5567	-0.4	22933	1.3	6833	0.9	5967	0.8	2967	0
25	784	-0.9	3504	0	1502	0	7403	0.5	20177	0.8	7083	1	6110	0.9	4797	1.9
26	1360	0	3653	0.2	1333	-0.3	6320	0	18067	0.4	6560	0.7	4307	-0.4	5093	2.2
27	1973	0.9	4053	0.6	1733	0.5	5267	-0.5	15373	-0.1	6547	0.7	5613	0.6	3653	0.7
28	653	-1.1	3520	0	1160	-0.6	5413	-0.4	17600	0.3	5880	0.3	5587	0.6	3627	0.6
29	840	-0.8	3453	-0.1	1427	-0.1	6973	0.3	15120	-0.1	5653	0.2	4253	-0.4	3813	0.8
30	1714	0.5	3176	-0.4	1809	0.6	5320	-0.5	12956	-0.5	6485	0.7	5242	0.3	3092	0.1
31	1033	-0.5	3279	-0.3	1301	-0.4	6947	0.3	16700	0.2	6285	0.6	5679	0.6	3776	0.8
32	1480	0.2	3427	-0.1	1107	-0.7	5320	-0.5	16307	0.1	5093	-0.2	5253	0.3	3173	0.2
33	1307	-0.1	2320	-1.4	1160	-0.6	6427	0	14840	-0.2	4733	-0.4	3573	-0.9	2520	-0.5
34	1773	0.6	3093	-0.5	1547	0.1	6130	-0.1	24217	1.6	7946	1.6	6660	1.3	2876	-0.1
35	1255	-0.2	3202	-0.3	1262	-0.4	6341	0	7003	-1.6	4848	-0.3	5236	0.3	2582	-0.4
36	1118	-0.4	3160	-0.4	1528	0.1	6857	0.2	19286	0.7	3762	-1	4383	-0.3	2829	-0.2
37	1875	0.7	3583	0.1	1694	0.4	6389	0	17333	0.3	4667	-0.4	4292	-0.4	2889	-0.1
43	1267	-0.2	2307	-1.4	693	-1.6	1533	-2.3	2787	-2.4	4307	-0.6	2760	-1.5	253	-2.9
44	1213	-0.2	3787	0.3	1067	-0.8	3720	-1.2	6907	-1.6	3413	-1.2	3333	-1	1973	-1.1
45	1133	-0.4	3040	-0.5	1320	-0.3	5453	-0.4	8173	-1.4	5107	-0.2	4387	-0.3	2747	-0.3
46	987	-0.6	2213	-1.5	1067	-0.8	6080	-0.1	11920	-0.7	4053	-0.8	1720	-2.2	3307	0.3
47	680	-1	1680	-2.1	1173	-0.6	3840	-1.2	1187	-2.7	3453	-1.1	4440	-0.3	200	-2.9
50	1812	0.6	3681	0.2	1855	0.7	7232	0.4	21146	1	6174	0.5	4594	-0.1	2725	-0.3
51	1841	0.7	4565	1.2	1768	0.6	7131	0.4	20682	0.9	4536	-0.5	4725	-0.1	2536	-0.5
52	1348	0	3971	0.5	1927	0.9	6797	0.2	19189	0.6	5537	0.1	4754	0	2565	-0.5
53	1907	0.8	3813	0.4	1920	0.9	8787	1.2	16307	0.1	5373	0	4773	0	3653	0.7
54	1920	0.8	4533	1.2	1840	0.7	6493	0.1	11867	-0.7	4280	-0.6	4373	-0.3	1880	-1.2
55	960	-0.6	3427	-0.1	1147	-0.7	5307	-0.5	19573	0.7	4600	-0.5	3280	-1.1	2547	-0.5
56	1160	-0.3	3213	-0.3	1827	0.7	6000	-0.2	16493	0.1	5053	-0.2	6387	1.1	2947	-0.1
57	1233	-0.2	2267	-1.4	1433	-0.1	6767	0.2	10667	-0.9	3700	-1	3400	-1	2633	-0.4
58	2613	1.8	3293	-0.2	1813	0.6	6413	0	15793	0	5933	0.3	4973	0.1	2240	-0.8
59	1373	0	3293	-0.2	1520	0.1	8347	1	25224	1.7	7431	1.2	6696	1.4	3145	0.1
60	1813	0.6	4507	1.2	1813	0.6	7987	0.8	22754	1.3	5467	0.1	5080	0.2	3907	0.9
61	1284	-0.1	4272	0.9	1531	0.1	6296	0	21654	1.1	7284	1.2	5654	0.6	2593	-0.4
62	1333	-0.1	3067	-0.5	1700	0.4	7000	0.3	7333	-1.5	1733	-2.2	1233	-2.6	533	-2.6
63	840	-0.8	2507	-1.2	1293	-0.4	7560	0.6	11667	-0.7	5600	0.1	4120	-0.5	2800	-0.2
64	2733	2	4653	1.3	2253	1.5	5773	-0.3	16827	0.2	6067	0.4	6453	1.2	2947	-0.1
65	1067	-0.4	3920	0.5	1280	-0.4	3987	-1.1	13387	-0.4	4080	-0.8	2933	-1.3	3627	0.6
67	1072	-0.4	3760	0.3	1496	0	5847	-0.2	15200	-0.1	2537	-1.7	3920	-0.6	2289	-0.8
68	1609	0.3	5307	2.1	1720	0.5	10148	1.8	20419	0.9	10148	2.9	7054	1.6	4331	1.4
70	1307	-0.1	3120	-0.4	1467	0	4213	-1	11693	-0.7	4613	-0.4	3600	-0.9	2947	-0.1
71	1453	0.1	4787	1.5	1360	-0.2	5773	-0.3	11467	-0.8	2773	-1.6	1120	-2.6	1947	-1.1
72	680	-1	3013	-0.6	1253	-0.5	2880	-1.6	10053	-1	4720	-0.4	4840	0	3187	0.2
73	1467	0.1	3627	0.1	1587	0.2	7107	0.4	17133	0.3	6000	0.4	5400	0.4	2600	-0.4
74	853	-0.8	4227	0.8	1693	0.4	5640	-0.3	8947	-1.2	6120	0.5	3760	-0.7	2960	-0.1
75	2253	1.3	4280	0.9	1760	0.5	8093	0.8	14507	-0.2	6720	0.8	4187	-0.4	5107	2.2
76	1307	-0.1	4147	0.7	1280	-0.4	5853	-0.2	16653	0.2	7373	1.2	5387	0.4	2867	-0.2
77	1880	0.7	3333	-0.2	1587	0.2	3373	-1.4	5920	-1.8	3160	-1.3		3	5600	2.7
78	1947	0.8	3173	-0.4	1693	0.4	7440	0.5	11773	-0.7	6147	0.5	3653	-0.8	3120	0.1
79	1733	0.5	4187	0.8	1827	0.7	5813	-0.2	10787	-0.9	4773	-0.4	4360	-0.3	2200	-0.8
80	667	-1	3800	0.3	1267	-0.4	6533	0.1	10533	-0.9	3667	-1	5067	0.2		3
81	1533	0.2	4400	1	933	-1.1	6100	-0.1	16000	0.1	4300	-0.6	4200	-0.4		3
82	1480	0.2	3693	0.2	1600	0.2	6573	0.1	10907	-0.9	7089	1		3	7246	4.4
83	773	-0.9	3980	0.6	1313	-0.3	5053	-0.6	11820	-0.7	3273	-1.3	7113	1.7		3
84	1667	0.4	3435	-0.1	748	-1.5	9082	1.3	20374	0.9	3980	-0.8	5340	0.4	3197	0.2
85	947	-0.6	3757	0.3	1437	-0.1	6566	0.1	15223	-0.1	3267	-1.3	4671	-0.1	1470	-1.6
86	2573	1.7	4213	0.8	2027	1.1	7873	0.7	20573	0.9	7747	1.4	6800	1.4	3173	0.2
90	1073	-0.4	2053	-1.7	987	-1	2080	-2	167	-2.9		3		3	2307	-0.7

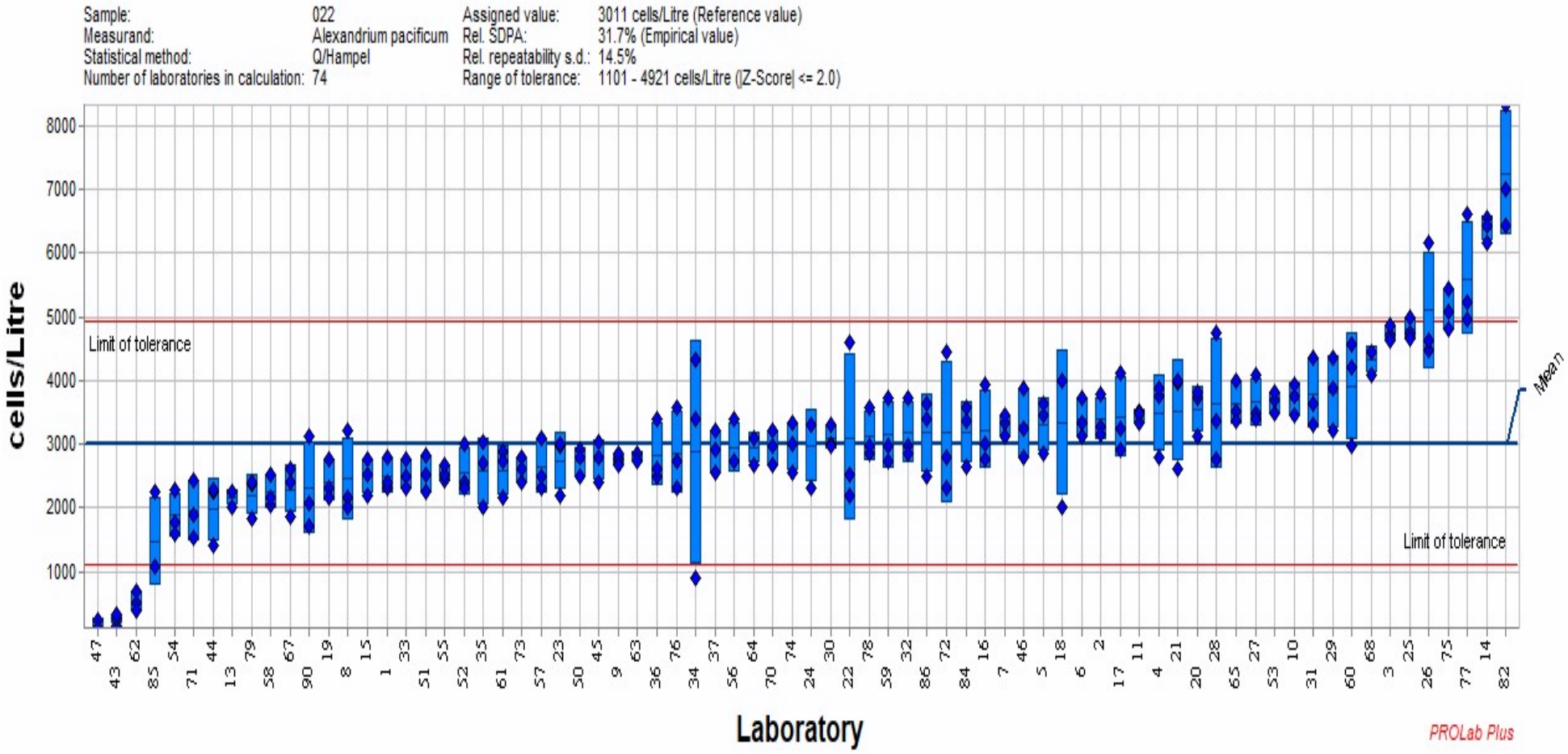
ANNEX XII: Summary of laboratory means + statistical parameters

Statistical method	Q/Hampel	Q/Hampel	Q/Hampel	Q/Hampel	Q/Hampel	Q/Hampel	Q/Hampel	Q/Hampel
Assessment	|Z|<=2.0	|Z|<=2.0	|Z|<=2.0	|Z|<=2.0	|Z|<=2.0	|Z|<=2.0	|Z|<=2.0	|Z|<=2.0
No. of laboratories that submitted results	77	77	77	77	77	76	73	74
No. of participants	77	77	77	77	77	77	77	77
Assigned value	1376	3501	1485	6339	15703	5361	4797	3011
Mean	1400	3493	1482	6275	15587	5361	4829	3013
Reference value	1376	3501	1485	6339	15703	5361	4797	3011
SDPA	688	862	505	2109	5445	1666	1394	955
Reproducibility s.d.	688	862	505	2109	5445	1666	1394	955
Repeatability s.d.	524	612	421	1302	1631	859	711	437
Rel. SDPA	50.0 %	24.6 %	34.0 %	33.3 %	34.7 %	31.1 %	29.1 %	31.7 %
Rel. reproducibility s.d.	50.0 %	24.6 %	34.0 %	33.3 %	34.7 %	31.1 %	29.1 %	31.7 %
Rel. repeatability s.d.	38.1 %	17.5 %	28.3 %	20.5 %	10.4 %	16.0 %	14.8 %	14.5 %
Reference s.d.	644	626	395	2112	5312	1574	1115	725
Limit of reproducibility, R (2.80 X sR)	1926	2414	1415	5906	15246	4666	3904	2674
Limit of repeatability, r (2.80 X sr)	1468	1714	1178	3646	4567	2406	1990	1224
Rel. limit of reproducibility	140.0 %	68.9 %	95.3 %	93.2 %	97.1 %	87.0 %	81.4 %	88.8 %
Rel. limit of repeatability	106.7 %	48.9 %	79.3 %	57.5 %	29.1 %	44.9 %	41.5 %	40.7 %
HORRAT	74.2	42	51.1	62.1	74.2	56.6	52	53
Absolute classical Horwitz s.d.	9	21	10	34	73	29	27	18
Relative classical Horwitz s.d.	0.7 %	0.6 %	0.7 %	0.5 %	0.5 %	0.5 %	0.6 %	0.6 %
Lower limit of tolerance	0	1777	475	2120	4813	2028	2008	1101
Upper limit of tolerance	2752	5225	2495	10558	26593	8694	7586	4921
Standard error	61	80	42	208	602	173	148	103
No. of laboratories	77	77	77	77	77	76	73	74
No. of measurement values and states	231	231	231	231	231	228	219	222
No. of measurement values	231	231	231	231	231	228	219	222
No. of measurement values without outliers	231	231	231	231	231	228	219	222

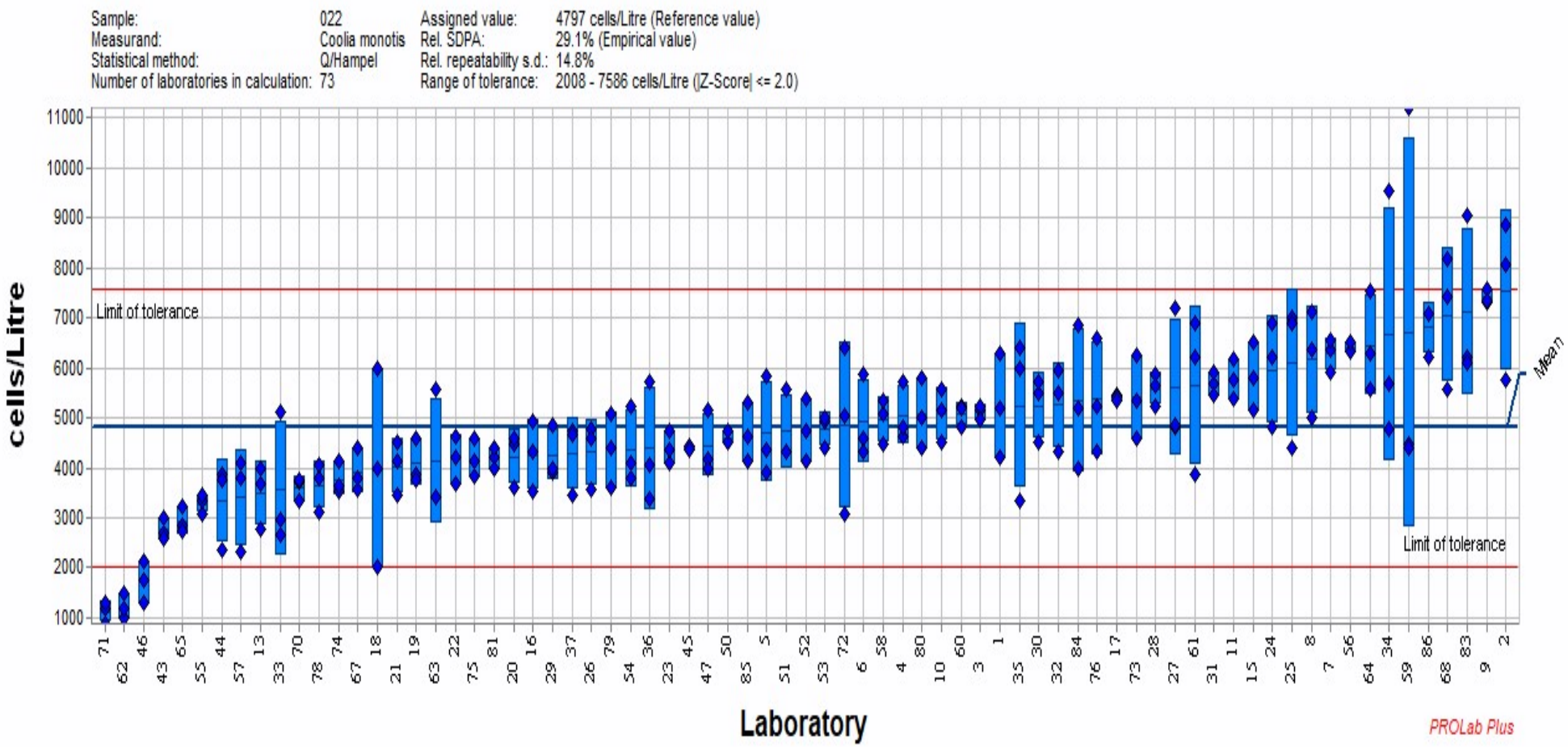
ANNEX XIII: Graphical summary of *Actinoptychus splendens* results by analyst



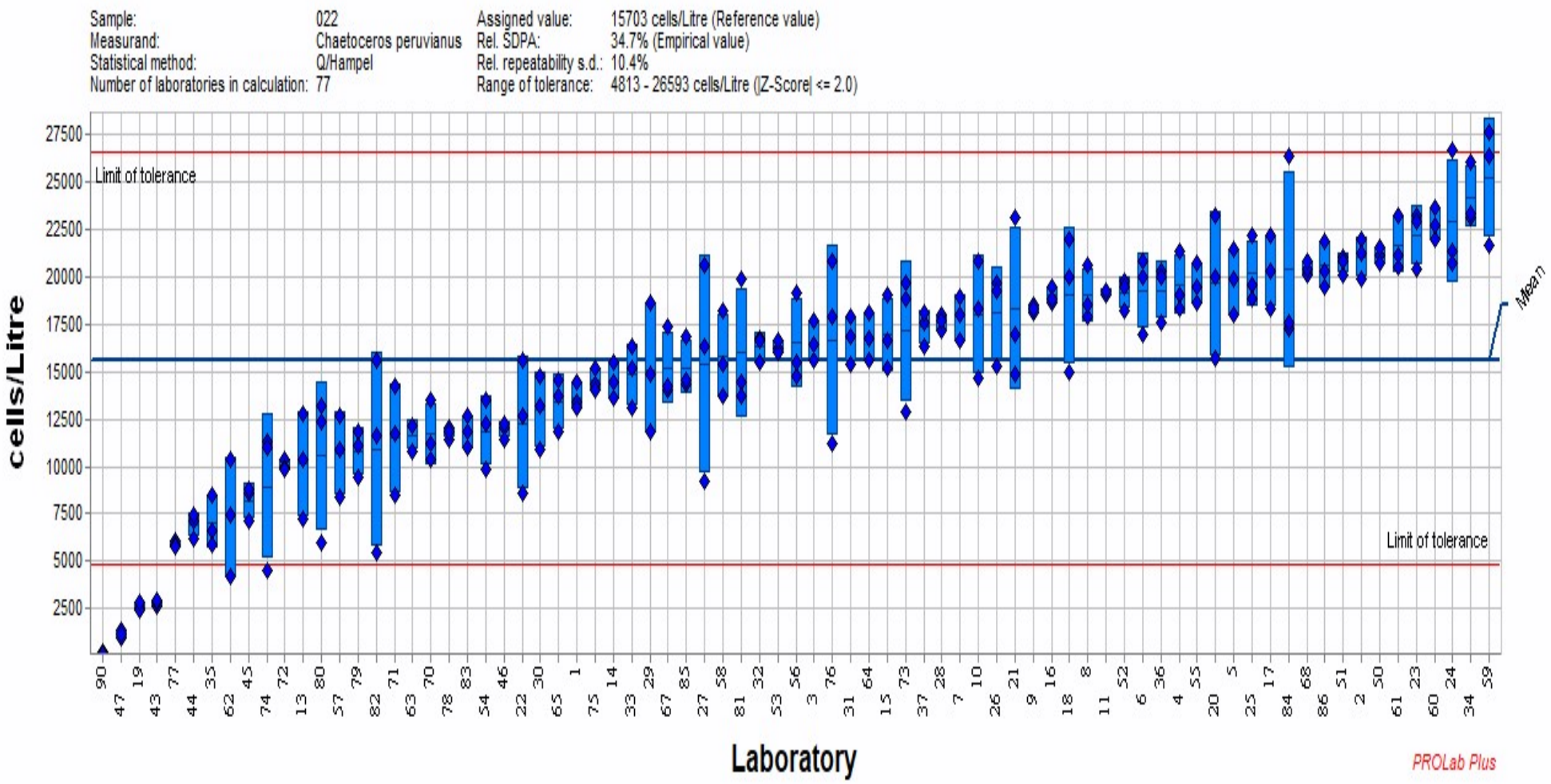
ANNEX XIII: Graphical summary of *Alexabdrium pacificum* results by analyst



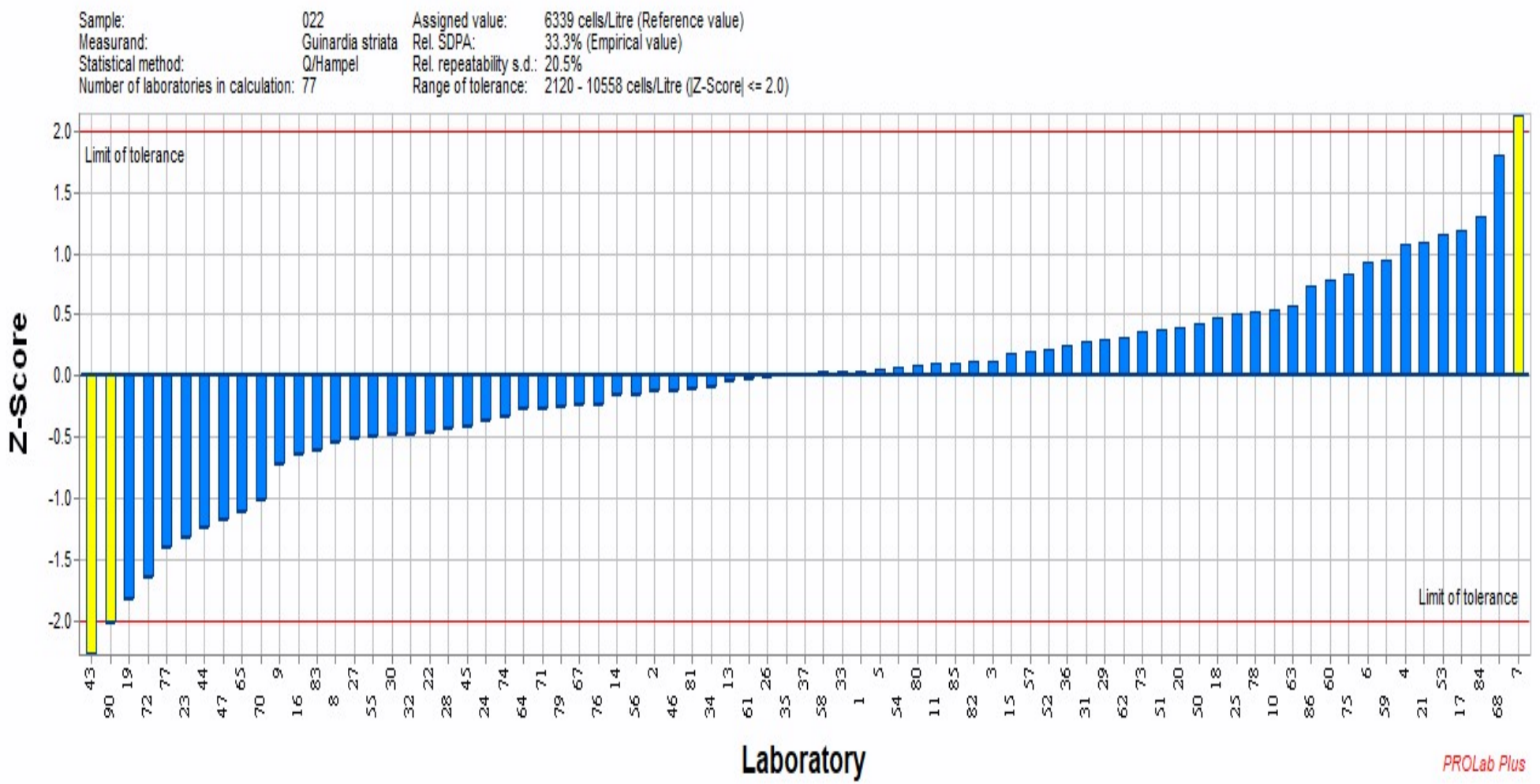
ANNEX XIII: Graphical summary of *Coolia monotis* results by analyst



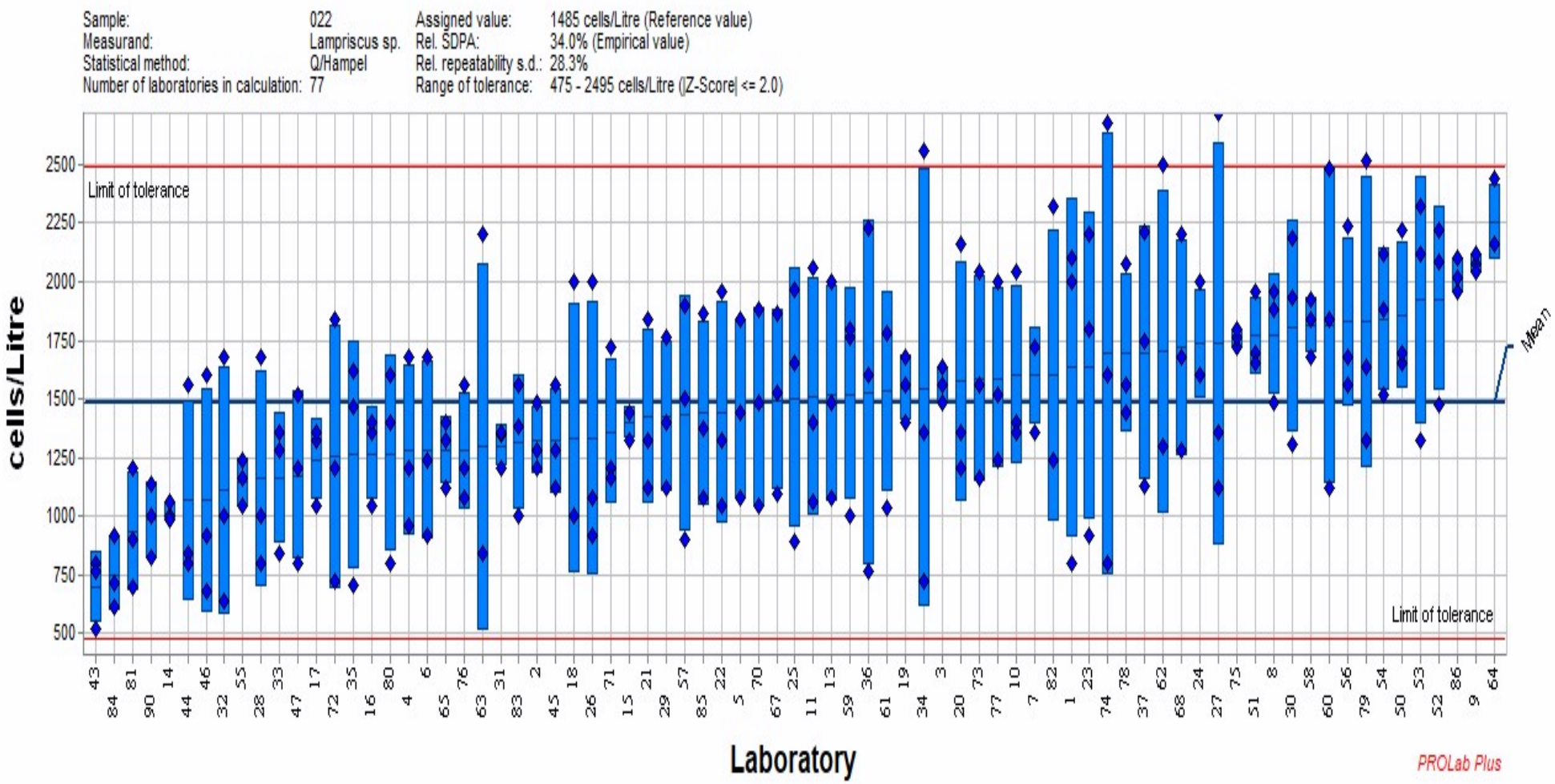
ANNEX XIII: Graphical summary of *Chaetoceros peruvianus* results by analyst



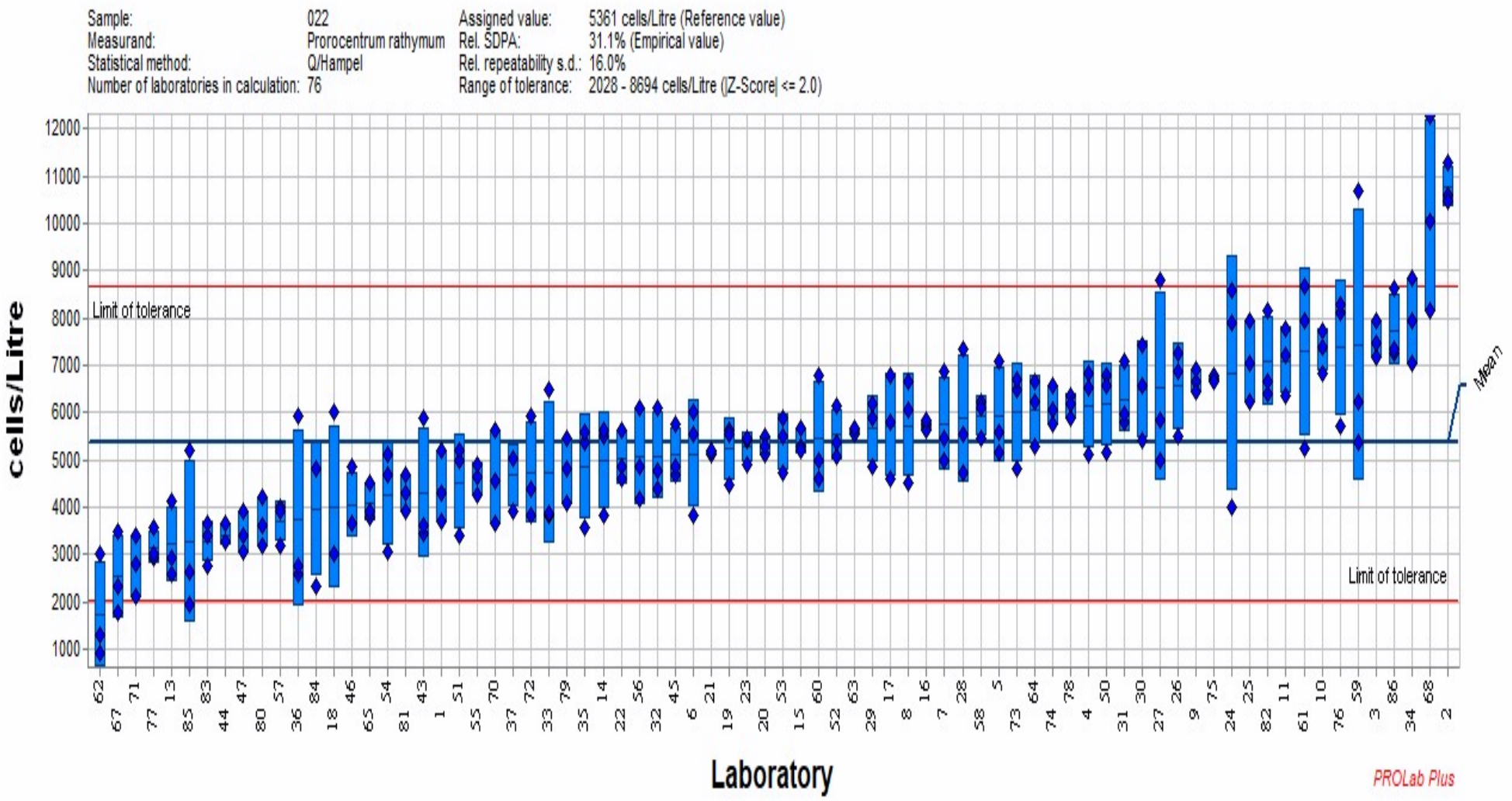
ANNEX XIII: Graphical summary of *Guinardia striata* results by analyst



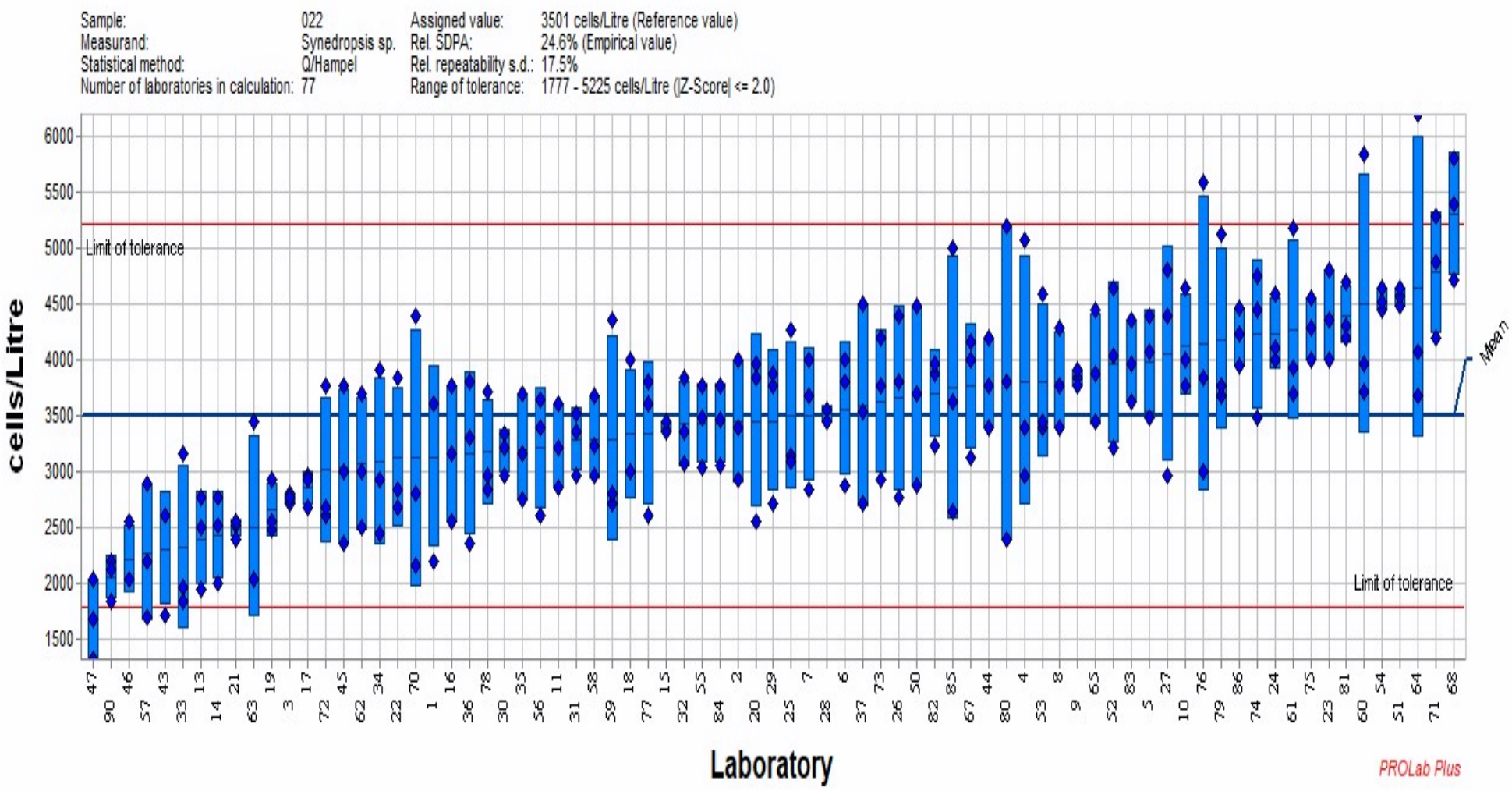
ANNEX XIII: Graphical summary of *Lampriscus sp.* results by analyst



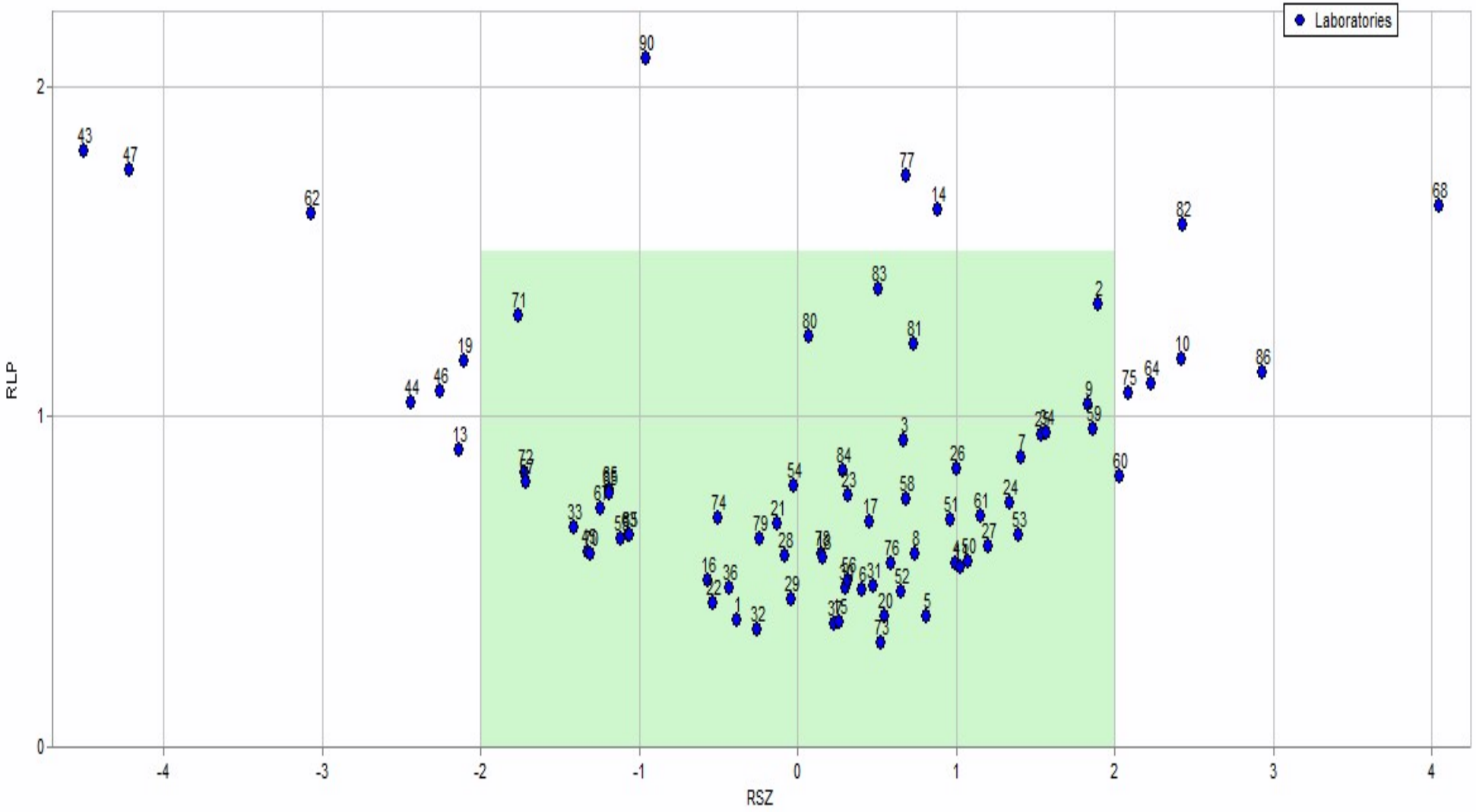
ANNEX XIII: Graphical summary of *Prorocentrum rhathymum* results by analyst



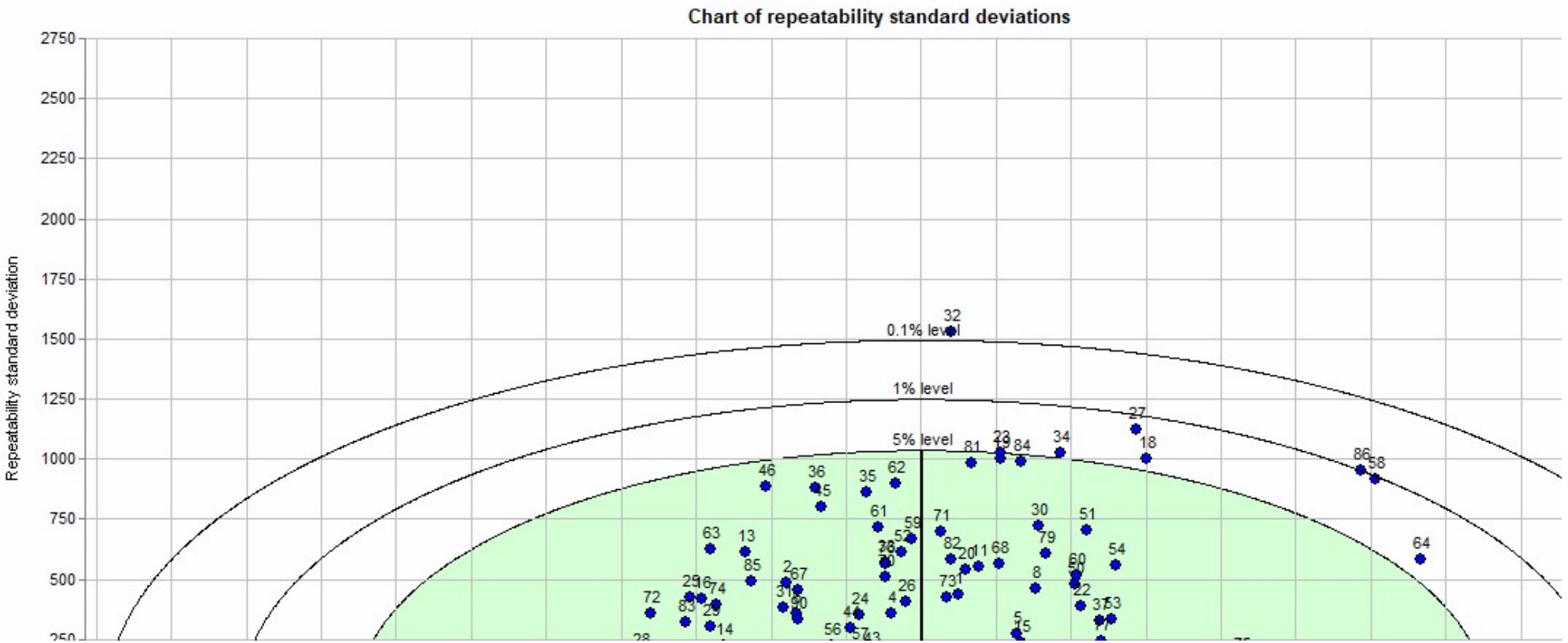
ANNEX XIII: Graphical summary of *Synedropsis sp.* results by analyst



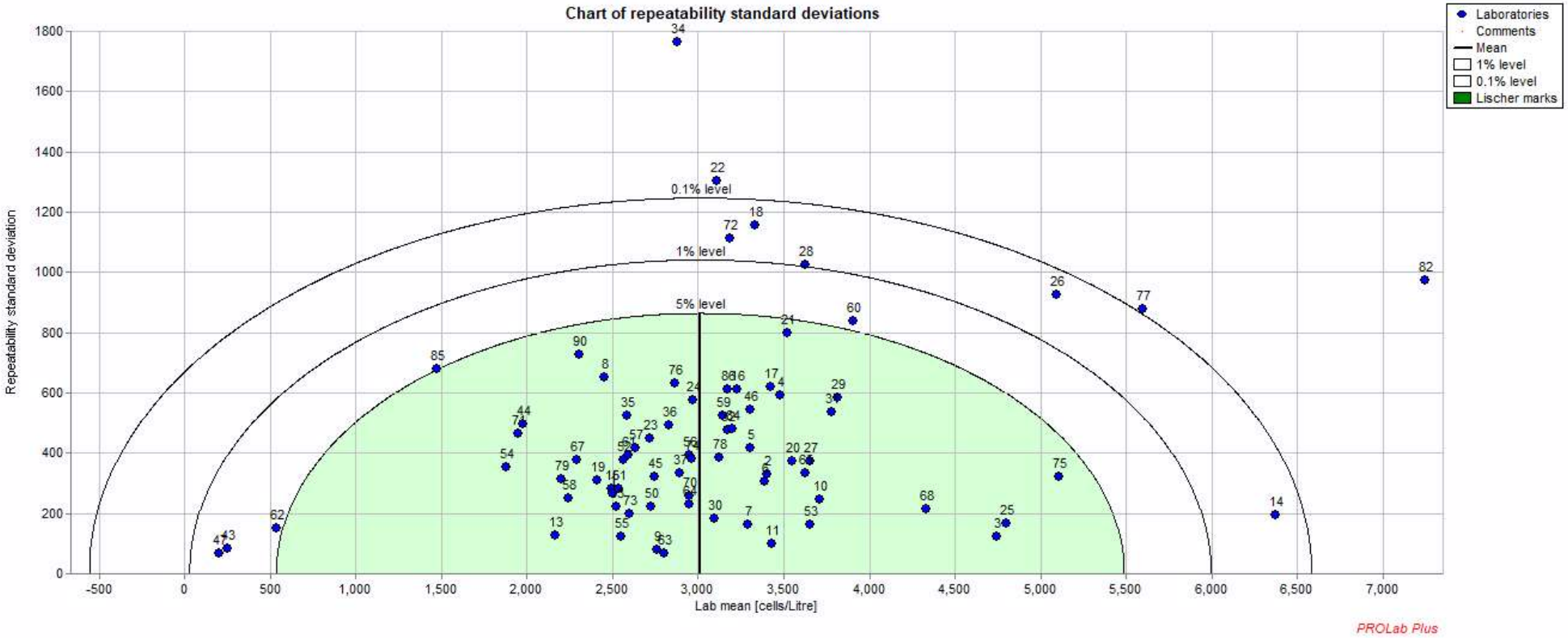
ANNEX XIV: RLP and RSZ for all measurands IPI2022



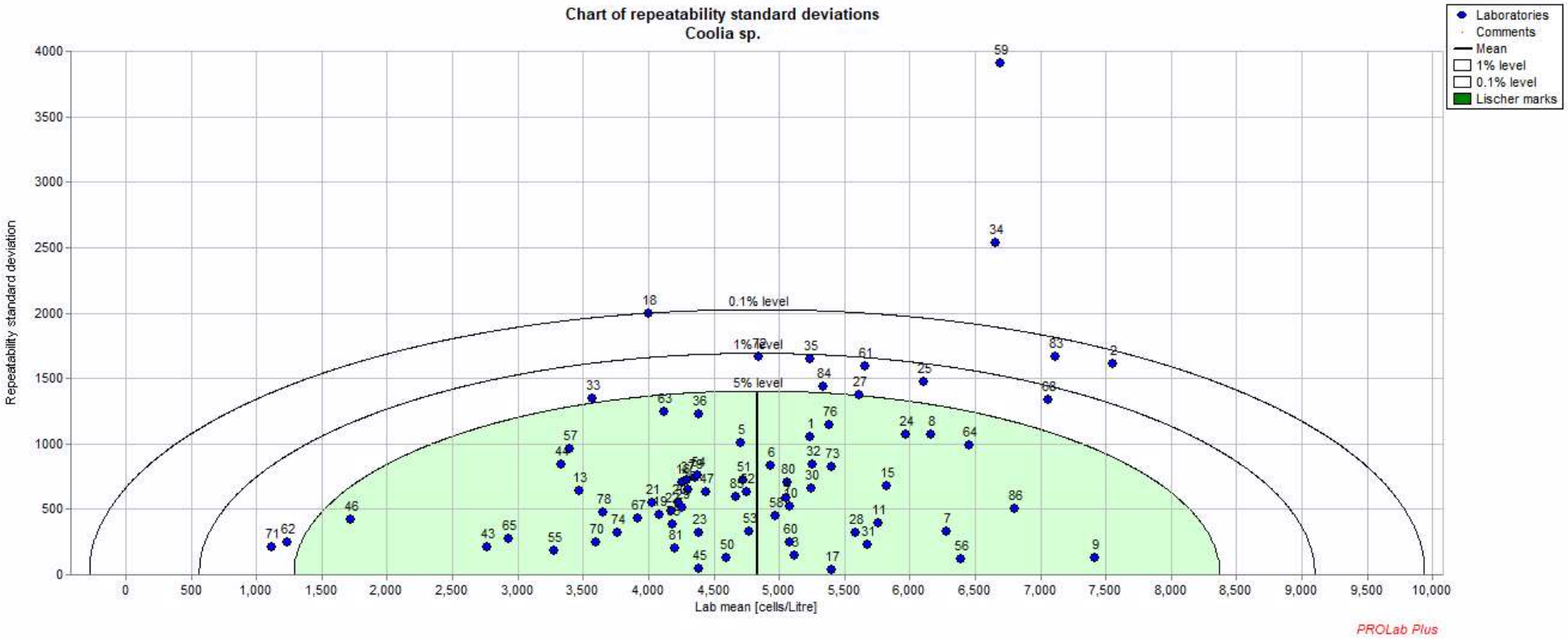
ANNEX XV: Lischer plot *Actinoptychus splendens*



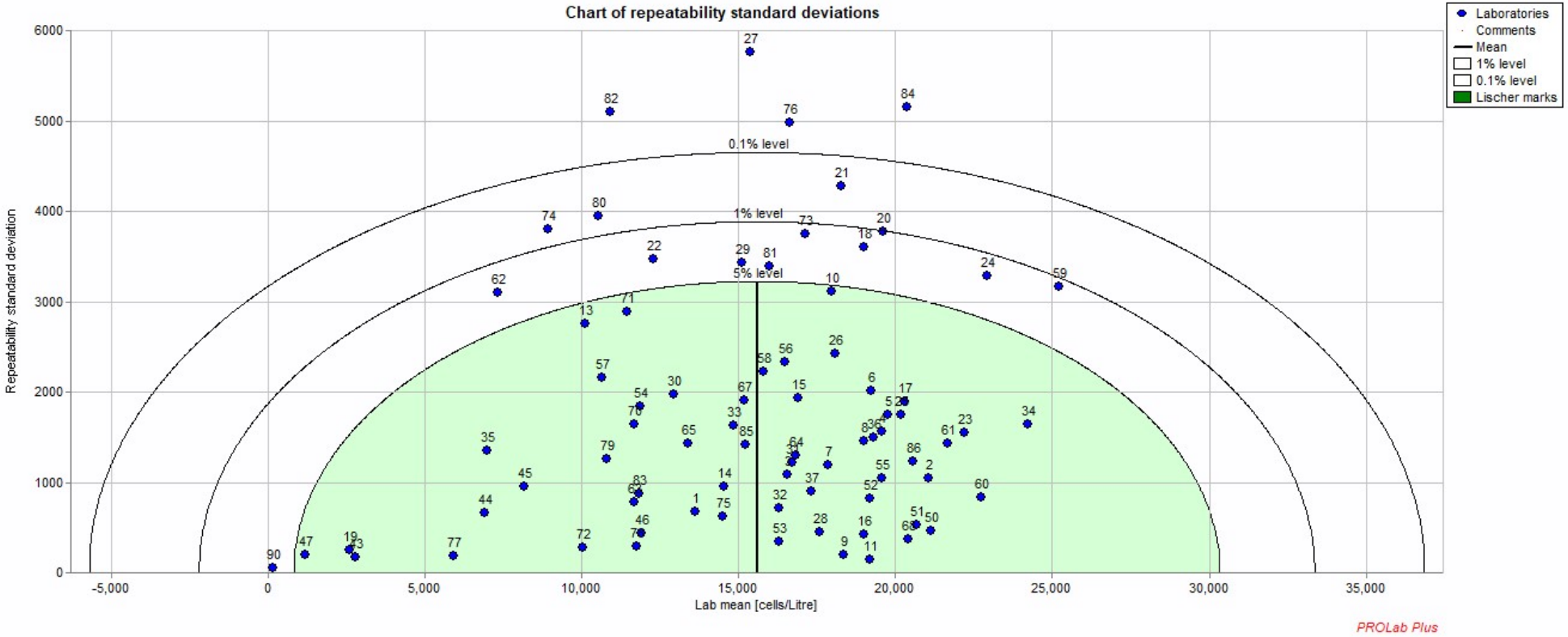
ANNEX XV: Lischer plot *Alexandrium pacificum*



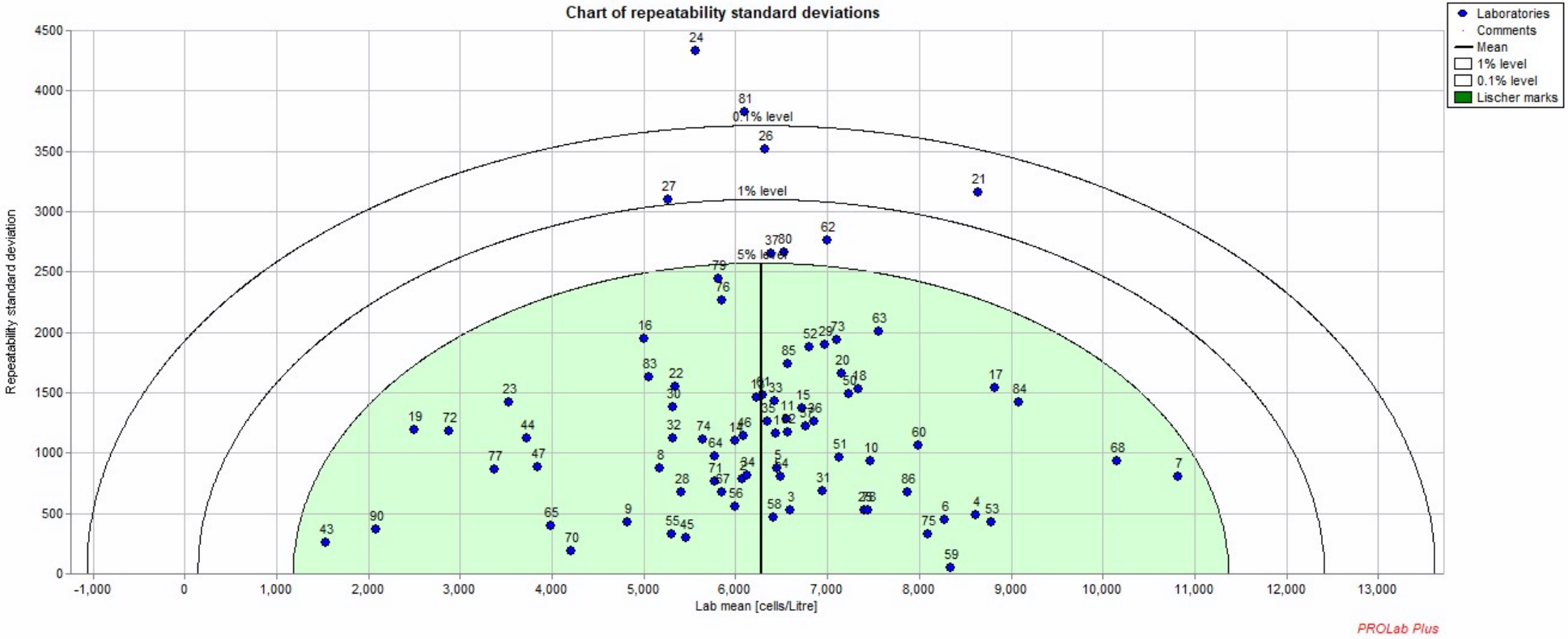
ANNEX XV: Lischer plot *Coolia monotis*



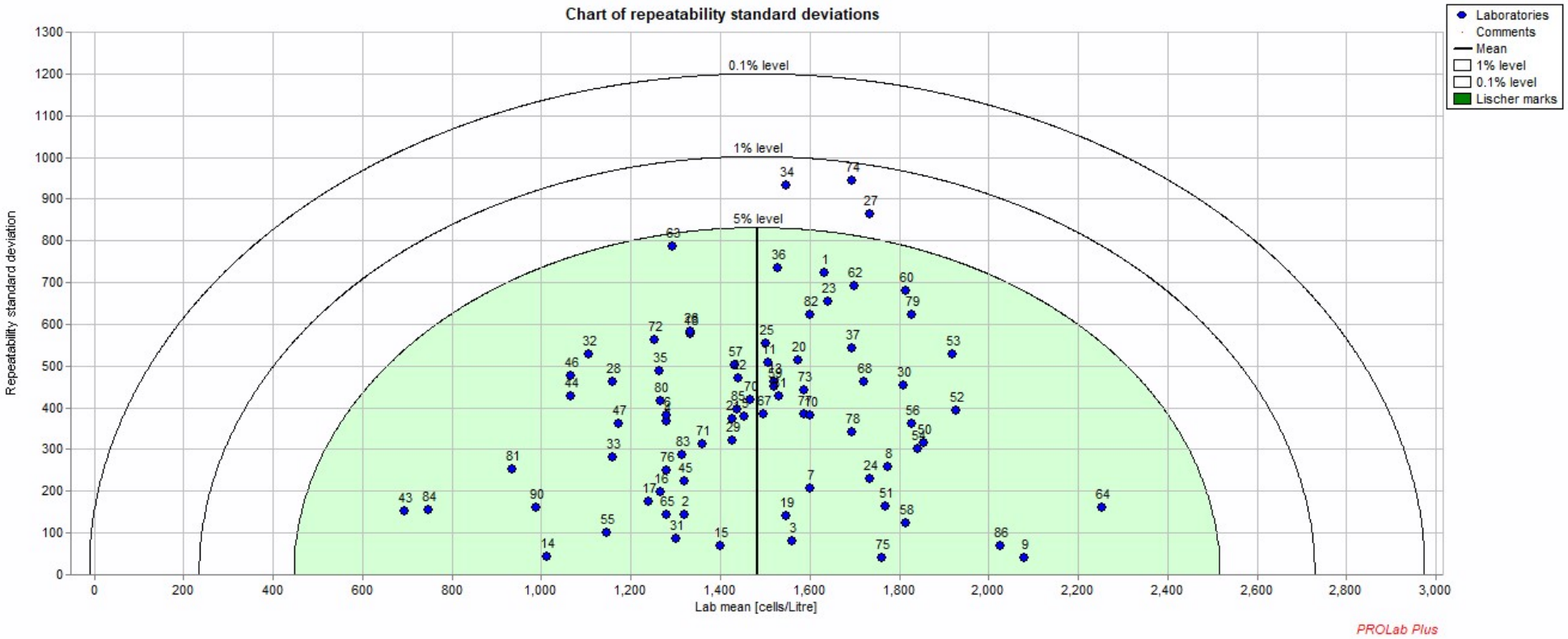
ANNEX XV: Lischer plot *Chaetoceros peruvianus*



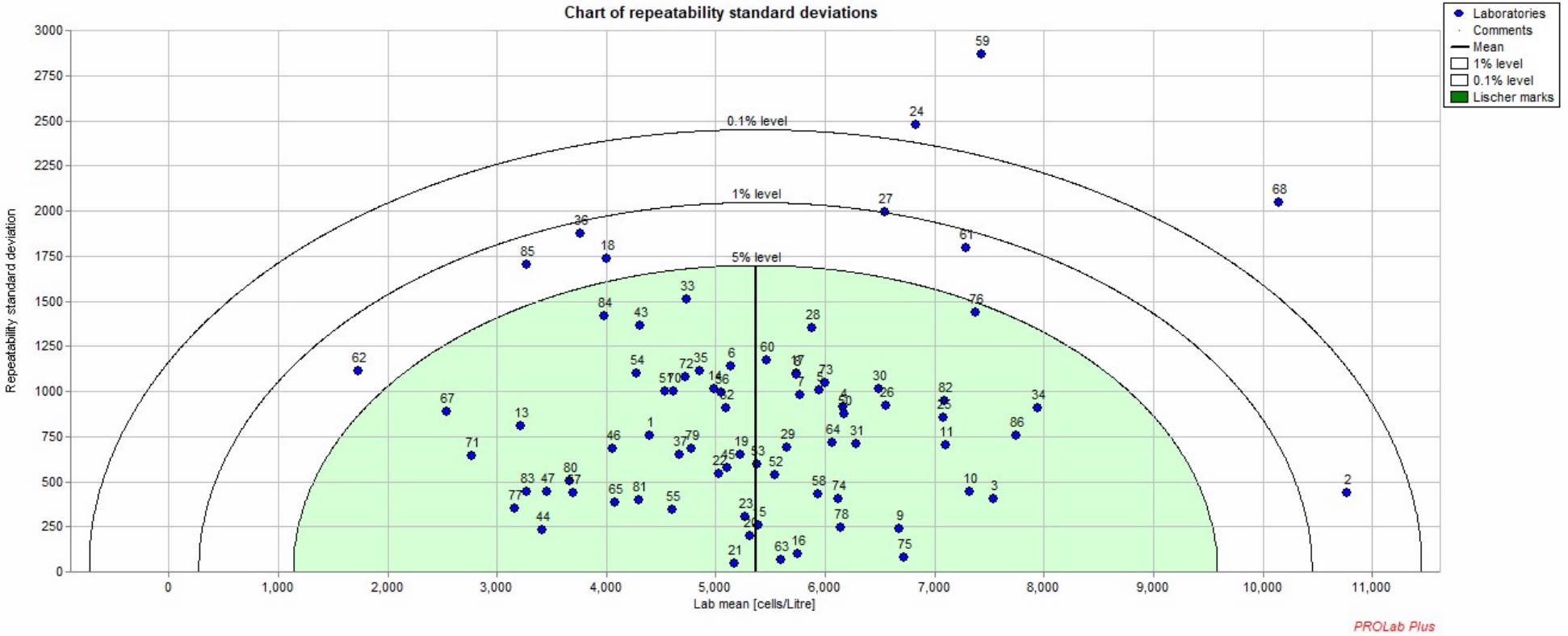
ANNEX XV: Lischer plot *Guinardia striata*



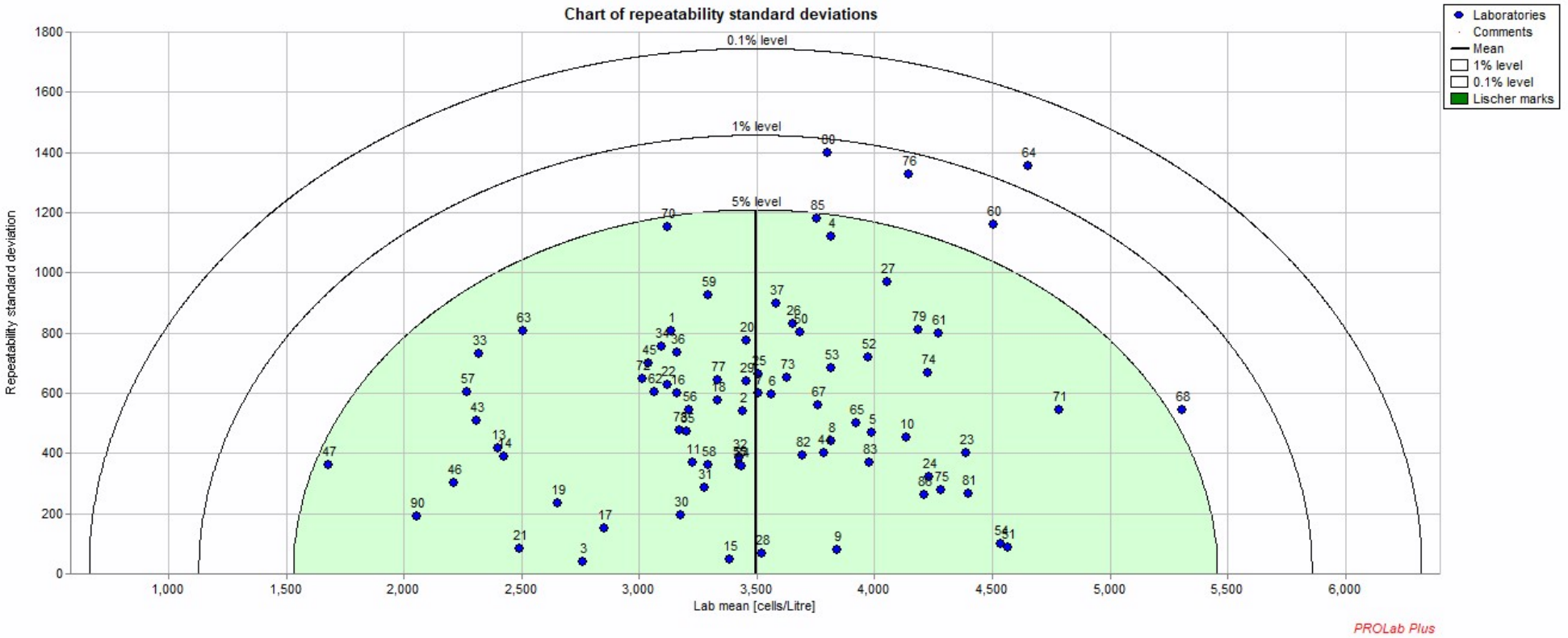
ANNEX XV: Lischer plot *lampriscus sp.*



ANNEX XV: Lischer plot *Prorocentrum rhathymum*



ANNEX XV: Lischer plot *Synedropsis sp.*



Question 1

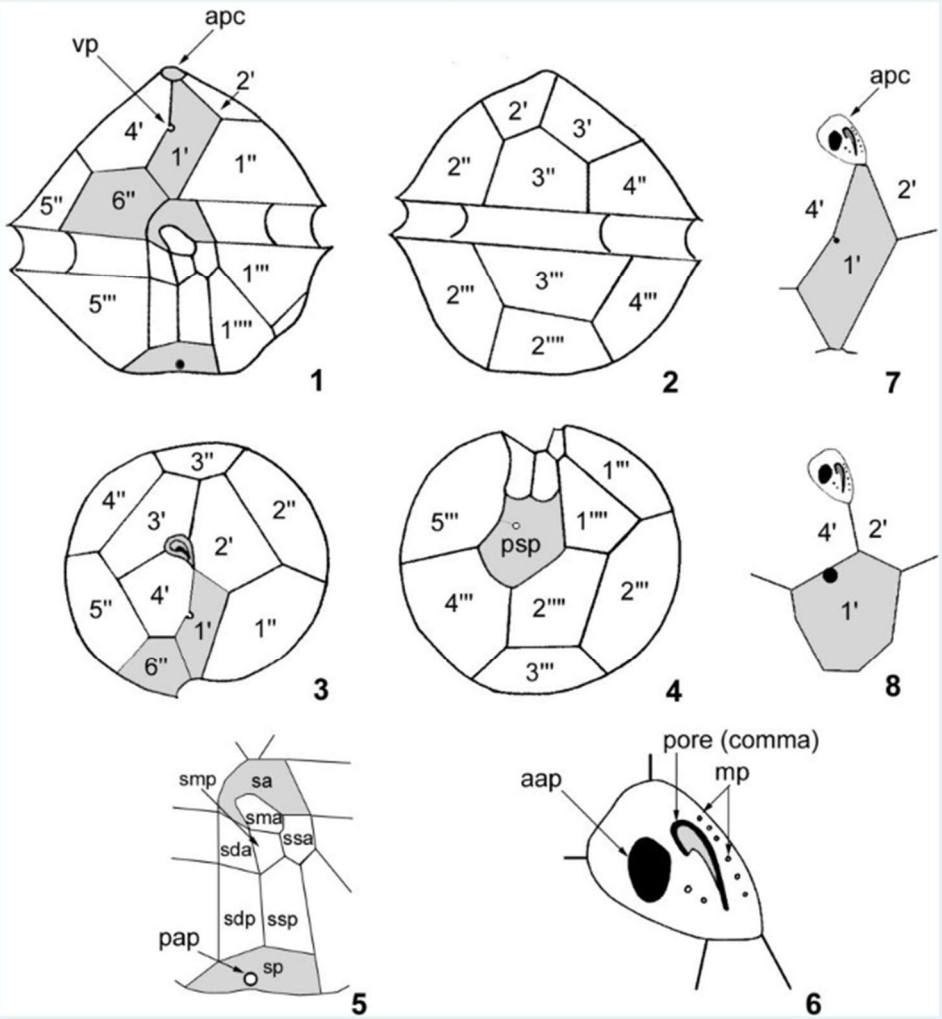
Not yet answered

Marked out of 1.00

Flag question

Edit question

The following diagram shows the plate tabulation of *Alexandrium*. There are several important diagnostic features to identify and differentiate this important genera from other dinoflagellates. Choose the right answer from the drop down menu.



The vp arrow in image 1 points to	Ventral pore
The APC arrow in images 1 and 7 points to	Apical Pore Complex
The smp arrow in image 5 points to	Sulcal median posterior
The psp greyed out plate in image 4 points to	Posterior sulcal plate
The sa greyed out plate in image 5 points to	Sulcal anterior
The aap arrow in image 6 points to	Anterior attachment pore
The 1' plate greyed out in images 1, 3, 7 & 8 points to	First apical plate
The pap arrow in image 5 points to	Posterior attachment pore

ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q1 answers

Q1	Model response	Actual response	Partial credit	Count	Frequency
3016	The APC arrow in images 1 and 7 points to: Apical Pore Complex	Apical Pore Complex	12.50%	83	98.81%
3016	The APC arrow in images 1 and 7 points to: Anterior apical pore	Anterior apical pore	0.00%	1	1.19%
3017	The vp arrow in image 1 points to: Ventral pore	Ventral pore	12.50%	84	100.00%
3018	The pap arrow in image 5 points to: Posterior attachment pore	Posterior attachment pore	12.50%	72	85.71%
3018	The pap arrow in image 5 points to: Posterior sulcal pore	Posterior sulcal pore	0.00%	1	1.19%
3018	The pap arrow in image 5 points to: Posterior apical pore	Posterior apical pore	0.00%	1	1.19%
3018	The pap arrow in image 5 points to: Posterior antapical pore	Posterior antapical pore	0.00%	10	11.90%
3019	The aap arrow in image 6 points to: Anterior attachment pore	Anterior attachment pore	12.50%	78	92.86%
3019	The aap arrow in image 6 points to: Anterior antapical pore	Anterior antapical pore	0.00%	3	3.57%
3019	The aap arrow in image 6 points to: Anterior apical pore	Anterior apical pore	0.00%	3	3.57%
3020	The smp arrow in image 5 points to: Sulcal median posterior	Sulcal median posterior	12.50%	78	92.86%
3020	The smp arrow in image 5 points to: Posterior sulcal plate	Posterior sulcal plate	0.00%	1	1.19%
3020	The smp arrow in image 5 points to: Sulcal median pore	Sulcal median pore	0.00%	1	1.19%
3020	The smp arrow in image 5 points to: Sinister median plate	Sinister median plate	0.00%	4	4.76%
3021	The psp greyed out plate in image 4 points to: Posterior sulcal plate	Posterior sulcal plate	12.50%	79	94.05%
3021	The psp greyed out plate in image 4 points to: Posterior sulcal pore	Posterior sulcal pore	0.00%	5	5.95%
3022	The 1' plate greyed out in images 1, 3, 7 & 8 points to: Ventral pore	Ventral pore	0.00%	1	1.19%
3022	The 1' plate greyed out in images 1, 3, 7 & 8 points to: First apical plate	First apical plate	12.50%	82	97.62%
3022	The 1' plate greyed out in images 1, 3, 7 & 8 points to: First preapical plate	First preapical plate	0.00%	1	1.19%
3023	The sa greyed out plate in image 5 points to: Posterior sulcal plate	Posterior sulcal plate	0.00%	1	1.19%
3023	The sa greyed out plate in image 5 points to: Sulcal anterior	Sulcal anterior	12.50%	78	92.86%
3023	The sa greyed out plate in image 5 points to: Sulcal antapical	Sulcal antapical	0.00%	5	5.95%

Question 2

Not yet answered

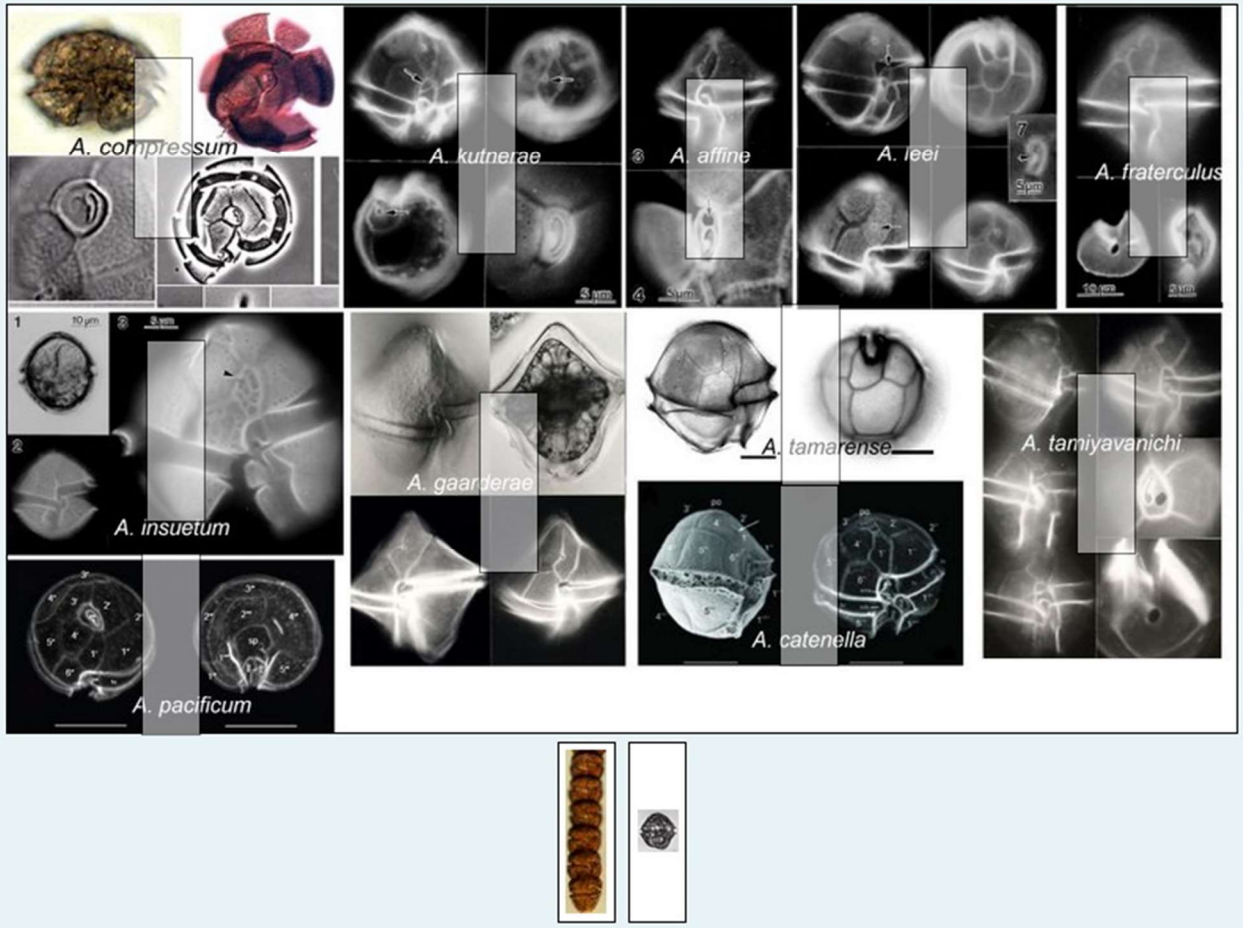
Marked out of 1.00

Flag question

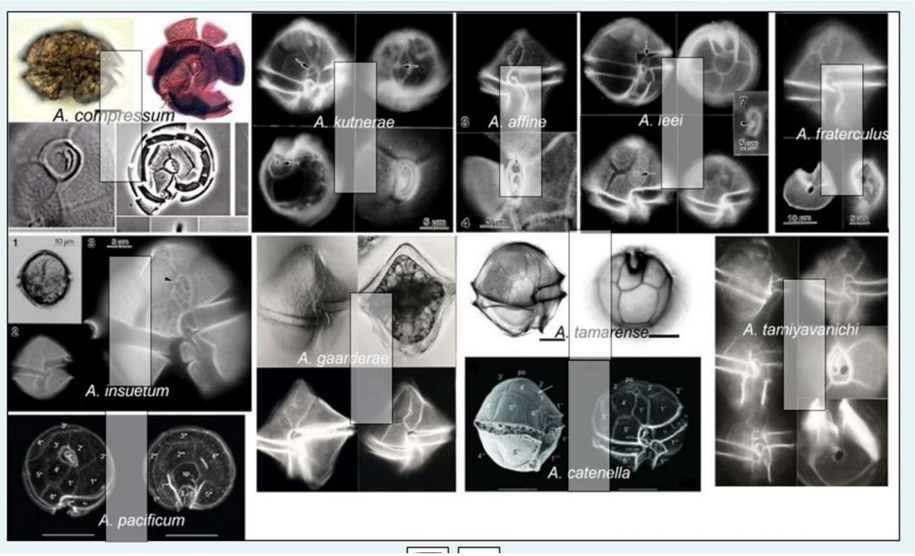
Edit question

The *Alexandrium* genus is known to have several species that produce toxins but also it has the peculiarity that some of its members are able to form large chains.

Drag and drop the chain forming image to the species you consider to be chain-formers and do the same for the non-chain formers.



ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q2 answers



Q2	Species	Model response	Partial credit	Count	Frequency
1	A.compressum	Chain former	100.00%	83	98.81%
1		Non-Chain former	0.00%	1	1.19%
2	A.affine	Chain former	100.00%	84	100.00%
3	A.fraterculus	Chain former	100.00%	81	96.43%
3		Non-Chain former	0.00%	3	3.57%
4	A.tamiyavanichi	Chain former	100.00%	83	98.81%
4		Non-Chain former	0.00%	1	1.19%
5	A.catenella	Chain former	100.00%	81	96.43%
5		Non-Chain former	0.00%	3	3.57%
6		Chain former	0.00%	39	46.43%
6	A.kutnerae	Non-Chain former	100.00%	45	53.57%
7		Chain former	0.00%	3	3.57%
7	A.leei	Non-Chain former	100.00%	81	96.43%
8	A.insuetum	Non-Chain former	100.00%	84	100.00%
9		Chain former	0.00%	1	1.19%
9	A.gaardnerae	Non-Chain former	100.00%	83	98.81%
10		Chain former	0.00%	2	2.38%
10	A.tamarense	Non-Chain former	100.00%	82	97.62%
11	A.pacificum	Chain former	100.00%	71	84.52%
11		Non-Chain former	0.00%	13	15.48%

Question 3

Not yet answered

Marked out of 1.00

Flag question

Edit question

The Gymnodiniales is a group of 'naked dinoflagellates' which are generally quite difficult to identify. One important diagnostic feature of this group is the 'Acrobase' otherwise called 'Apical groove'. Some genera can be differentiated based on this feature.

Match the correct statement to each genus

Karlodinium	Apical groove is straight
Karenia	Apical groove is straight
Gymnodinium	Apical groove is horse shoe shaped
Akashiwo	Apical groove goes around the apex of the cell
Takayama	Apical groove is sigmoid

ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q3 answers

Q3	Model response	Actual response	Partial credit	Count	Frequency
3037	_Karlodinium_: Apical groove is straight	Apical groove is straight	20.00%	53	63.10%
3037	_Karlodinium_: Apical groove goes around the apex of the cell	Apical groove goes around the apex of the cell	0.00%	1	1.19%
3037	_Karlodinium_: Apical groove descends dorsally	Apical groove descends dorsally	20.00%	11	13.10%
3037	_Karlodinium_: Apical groove is narrow and short	Apical groove is narrow and short	0.00%	19	22.62%
3038	_Takayama_: Apical groove is sigmoid	Apical groove is sigmoid	20.00%	82	97.62%
3038	_Takayama_: Apical groove is horse shoe shaped	Apical groove is horse shoe shaped	0.00%	1	1.19%
3038	_Takayama_: Apical groove is arranged around the cingulum	Apical groove is arranged around the cingulum	0.00%	1	1.19%
3039	_Karenia_: Apical groove is straight	Apical groove is straight	20.00%	77	91.67%
3039	_Karenia_: Apical groove is ellipsoid	Apical groove is ellipsoid	0.00%	1	1.19%
3039	_Karenia_: Apical groove descends dorsally	Apical groove descends dorsally	0.00%	6	7.14%
3040	_Gymnodinium_: Apical groove is sigmoid	Apical groove is sigmoid	0.00%	1	1.19%
3040	_Gymnodinium_: Apical groove is horse shoe shaped	Apical groove is horse shoe shaped	20.00%	78	92.86%
3040	_Gymnodinium_: Apical groove goes around the apex of the cell	Apical groove goes around the apex of the cell	0.00%	3	3.57%
3040	_Gymnodinium_: Apical groove reaches the antapex	Apical groove reaches the antapex	0.00%	2	2.38%
3041	_Akashiwo_: Apical groove is horse shoe shaped	Apical groove is horse shoe shaped	0.00%	2	2.38%
3041	_Akashiwo_: Apical groove goes around the apex of the cell	Apical groove goes around the apex of the cell	20.00%	78	92.86%
3041	_Akashiwo_: Apical groove descends dorsally	Apical groove descends dorsally	0.00%	1	1.19%
3041	_Akashiwo: Apical groove reaches the antapex	Apical groove reaches the antapex	0.00%	1	1.19%
3041	_Akashiwo_: Apical groove is arranged around the cingulum	Apical groove is arranged around the cingulum	0.00%	2	2.38%

ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q4

Question 4

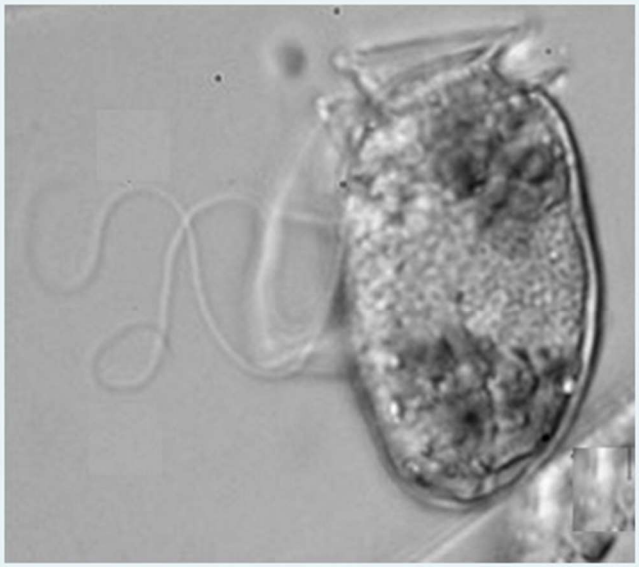
Not yet answered

Marked out of 1.00

Flag question

Edit question

The image shows a.....



Select one:

- a. Planozygote
- b. Hypnozygote
- c. Vegetative cell
- d. Haploid gamete
- e. Cyst

Q4	Partial credit	Count	Frequency
Planozygote	100.00%	75	89.29%
Hypnozygote	0.00%	1	1.19%
Vegetative cell	0.00%	8	9.52%
Haploid gamete	0.00%	0	0.00%
Cyst	0.00%	0	0.00%

ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q5

Question 5

Not yet answered

Marked out of 1.00

Flag question

Edit question

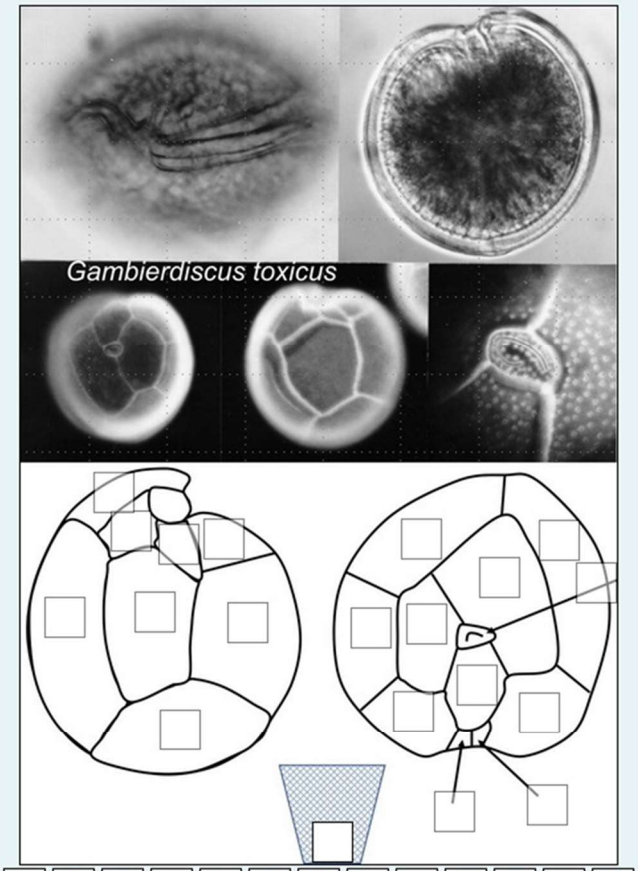
The image shows dinoflagellate gametes fusing during sexual reproduction. When the gamete pair are the same size, this is called.....

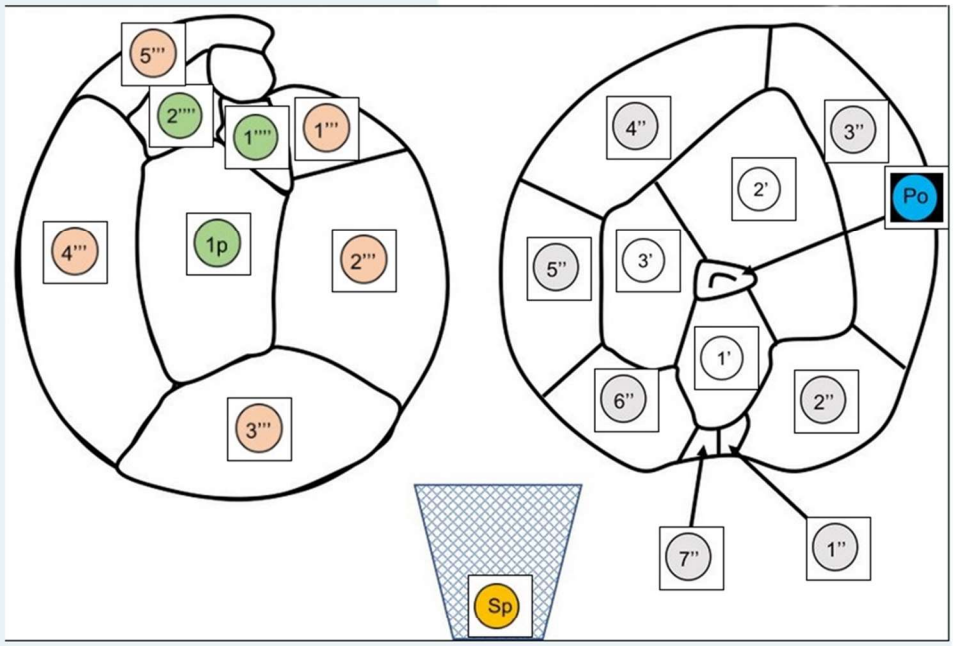
Select one:

- a. Isogamy
- b. Anisogamy
- c. Homothally
- d. Heterothally
- e. Oogamy

Q5	Partial credit	Count	Frequency
Isogamy	100.00%	82	97.62%
Anisogamy	0.00%	2	2.38%
Homothally	0.00%	0	0.00%
Heterothally	0.00%	0	0.00%
Oogamy	0.00%	0	0.00%
[No response]	0.00%	0	0.00%

ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q6





ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q6

Q6	Model response	Partial credit	Count	Frequency
24	Po	100.00%	84	100.00%
1	1'	100.00%	82	97.62%
1	4'	0.00%	1	1.19%
1	7''	0.00%	1	1.19%
6	2'	100.00%	84	100.00%
10	3'	100.00%	84	100.00%
2	1''	100.00%	82	97.62%
2	1'	0.00%	2	2.38%
7	2''	100.00%	82	97.62%
7	1''	0.00%	2	2.38%
11	3''	100.00%	82	97.62%
11	2''	0.00%	2	2.38%
15	4''	100.00%	82	97.62%
15	3''	0.00%	2	2.38%
18	5''	100.00%	82	97.62%
18	4''	0.00%	2	2.38%
20	6''	100.00%	82	97.62%
20	5''	0.00%	2	2.38%
22	7''	100.00%	82	97.62%
22	6''	0.00%	2	2.38%

Q6	Model response	Partial credit	Count	Frequency
3	1'''	100.00%	83	98.81%
3	1''''	0.00%	1	1.19%
9	2'''	100.00%	84	100.00%
12	3'''	100.00%	84	100.00%
17	4'''	100.00%	84	100.00%
19	5'''	100.00%	84	100.00%
4	1''''	100.00%	83	98.81%
4	2''''	0.00%	1	1.19%
8	2''''	100.00%	73	86.90%
8	1'''	0.00%	1	1.19%
8	Sp	0.00%	10	11.90%
5	1p	100.00%	74	88.10%
5	2''''	0.00%	10	11.90%

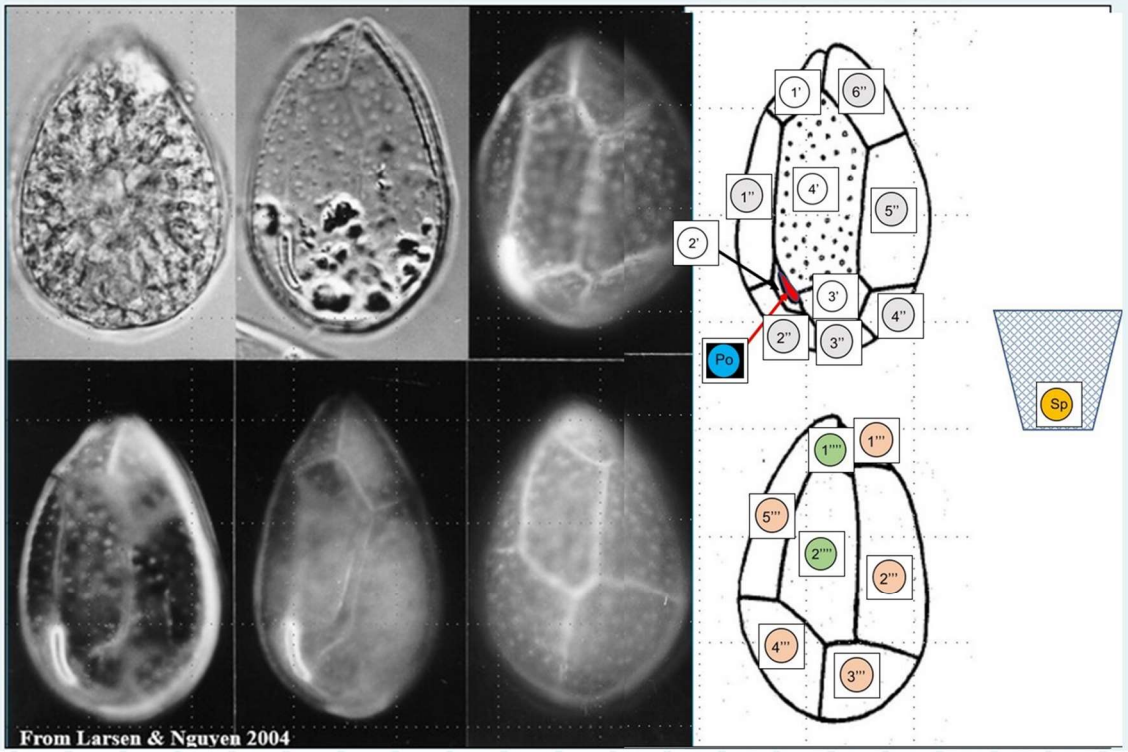
ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q7

Question 7
Not yet answered
Marked out of 1.00
Flag question
Edit question

Benthic dinoflagellates of the genus *Ostreopsis* are one of several causative agents of Ciguatera. The Kofoidean tabulation of this genus differs depending on which authors you follow, which complicate matters.

Following the tabulation according to Besada *et al.* 1982, Fraga *et al. 2011* place the draggable items and place them in their right drop zone in the diagram supplied. There are more items than place holders, the items that you don't need you must place them in the bin provided.

PLEASE NOTE: DO NOT PLACE ITEMS IN THE BIN UNTIL YOU ARE SURE YOU DON'T NEED THEM OTHERWISE YOU WON'T BE ABLE TO RETRIEVE THEM FROM THE BIN. BIN YOUR ITEMS ONLY AFTER YOU ANSWERED YOUR QUESTION



ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q7 answers

Q7	Model response	Partial credit	Count	Frequency
23	Po	100.00%	84	100.00%
1	1'	100.00%	57	67.86%
1	1''	0.00%	27	32.14%
5	2'	100.00%	84	100.00%
9	3'	100.00%	83	98.81%
9	7'''	0.00%	1	1.19%
13	4'	100.00%	57	67.86%
13	1'	0.00%	27	32.14%
2	1''	100.00%	57	67.86%
2	2''	0.00%	27	32.14%
6	2''	100.00%	57	67.86%
6	3''	0.00%	27	32.14%
10	3''	100.00%	57	67.86%
10	4'	0.00%	1	1.19%
10	4''	0.00%	26	30.95%
14	4''	100.00%	57	67.86%
14	5''	0.00%	27	32.14%
17	5''	100.00%	57	67.86%
17	6''	0.00%	27	32.14%
19	6''	100.00%	57	67.86%
19	7''	0.00%	27	32.14%

Q7	Model response	Partial credit	Count	Frequency
3	1'''	100.00%	84	100.00%
7	2'''	100.00%	84	100.00%
11	3'''	100.00%	84	100.00%
15	4'''	100.00%	84	100.00%
18	5'''	100.00%	84	100.00%
4	1''''	100.00%	80	95.24%
4	Sp	0.00%	4	4.76%
8	2''''	100.00%	81	96.43%
8	Sp	0.00%	3	3.57%

ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q8

Question 8

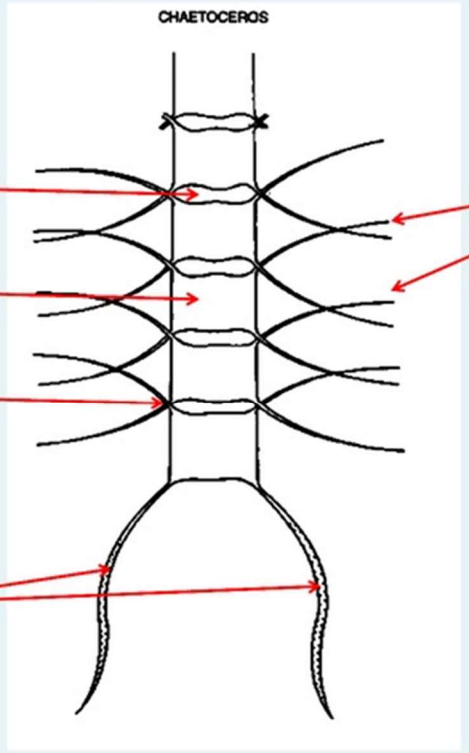
Not yet answered

Marked out of 1.00

Flag question

Edit question

Choose the right taxonomic terminology from the drop down menu to describe the different parts of a Chaetoceros chain.



Arrow 1= Choose...

Arrow 2= Choose...

Arrow 3= Choose...

Arrow 4= Choose...

Arrow 5= Choose...

Arrow 1= Foramen

Arrow 2= Intercalary setae

Arrow 3= Valve mantle in girdle view

Arrow 4= Point of fusion of sibling setae

Arrow 5= Terminal setae

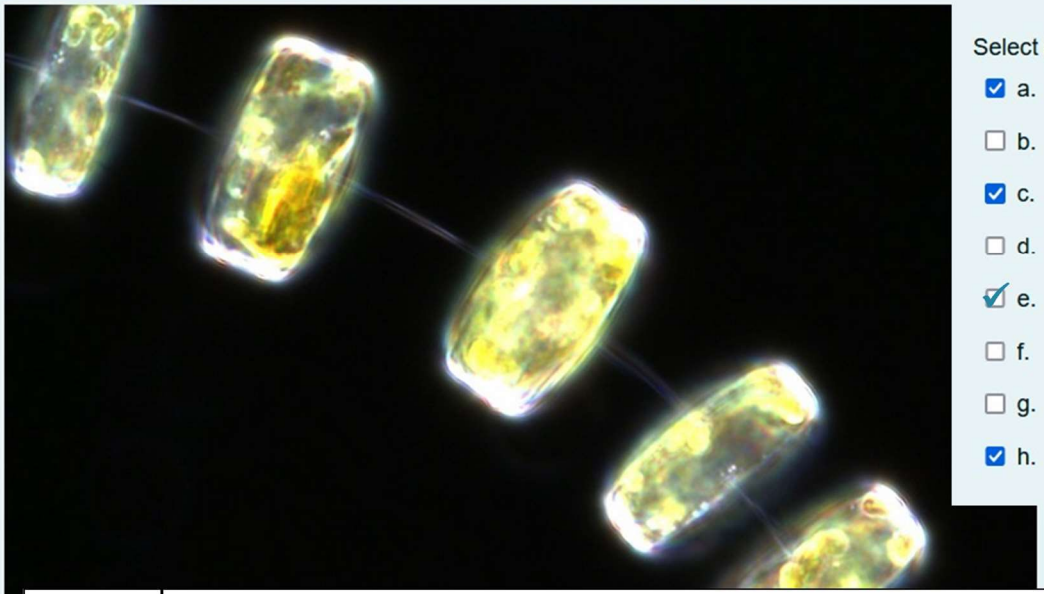
ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q8 answers

Q8	Model response	Actual response	Partial credit	Count	Frequency
955	Arrow 1=: Foramen	Foramen	20.00%	80	95.24%
955	Arrow 1=: Valve view	Valve view	0.00%	1	1.19%
955	Arrow 1=: Central inflation	Central inflation	0.00%	2	2.38%
955	Arrow 1=: Suture	Suture	0.00%	1	1.19%
956	Arrow 2=: Intercalary setae	Intercalary setae	20.00%	83	98.81%
956	Arrow 2=: Terminal setae	Terminal setae	0.00%	1	1.19%
957	Arrow 3=: Valve mantle in girdle view	Valve mantle in girdle view	20.00%	80	95.24%
957	Arrow 3=: Valve view	Valve view	0.00%	2	2.38%
957	Arrow 3=: Suture	Suture	0.00%	1	1.19%
957	Arrow 3=: Valvar plane	Valvar plane	0.00%	1	1.19%
958	Arrow 4=: Point of fusion of sibling setae	Point of fusion of sibling setae	20.00%	84	100.00%
959	Arrow 5=: Intercalary setae	Intercalary setae	0.00%	1	1.19%
959	Arrow 5=: Terminal setae	Terminal setae	20.00%	83	98.81%

ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q9

Question 9
Not yet answered
Marked out of 1.00
Flag question
Edit question

Choose which statements are true about species belonging to the family Thalassiosiraceae? Each wrong answer will deduct 20% from your mark.



Select one or more:

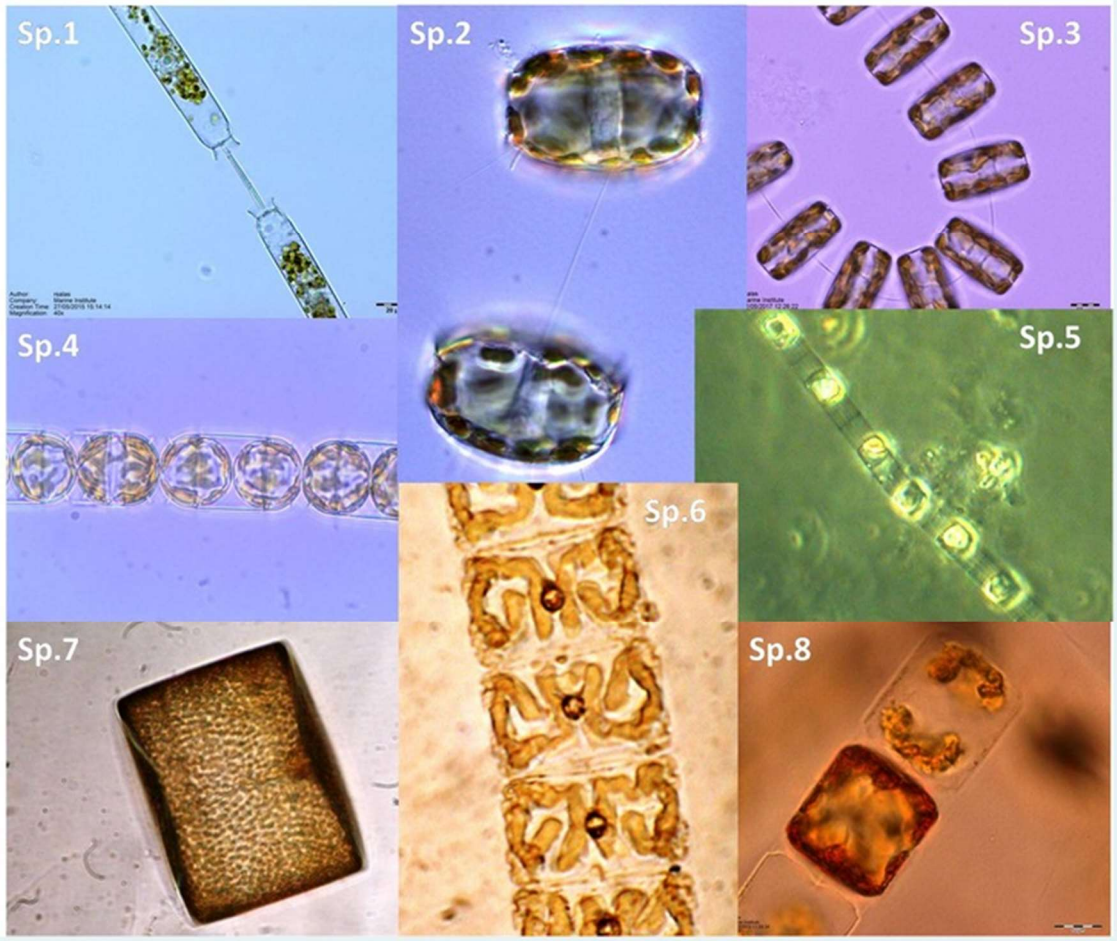
- [x] a. Cells are linked by threads of organic matter from strutted processes
- [ ] b. They are unipolar centrics
- [x] c. Their cell wall is known for having internal cribra and external foramina
- [ ] d. They have no labiate processes
- [x] e. Their cell wall have a marginal ring of smaller labiate processes
- [ ] f. Their cell wall is known for having internal foramina and external cribra
- [ ] g. They have two larger marginal labiate processes
- [x] h. They can have one or more labiate processes

Q9	Response	Partial credit	Count	Frequency
2588	Cells are linked by threads of organic matter from strutted processes	25.00%	81	96.43%
2589	They are unipolar centrics	-20.00%	10	11.90%
2590	Their cell wall is known for having internal cribra and external foramina	25.00%	74	88.10%
2591	They have no labiate processes	-20.00%	1	1.19%
2592	Their cell wall have a marginal ring of smaller labiate processes	25.00%	53	63.10%
2593	Their cell wall is known for having internal foramina and external cribra	-20.00%	6	7.14%
2594	They have two larger marginal labiate processes	-20.00%	1	1.19%
2595	They can have one or more labiate processes	25.00%	81	96.43%

ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q10

Question 10
Not yet answered
Marked out of 1.00
Flag question
Edit question

Choose which of these species belong to the order Thalassiosirales? There are four families in this order: Thalassiosiraceae, Skeletonemataceae, Lauderiaceae and Stephanodiscaceae. Each wrong answer will deduct 20% from your mark.



ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q10 answers

Q10	Response	Order	Partial credit	Count	Frequency
2596	Ditylum sp.	Lithodesmiales	-20.00%	2	2.38%
2597	Thalassiosira sp.	Thalassiosirales	25.00%	82	97.62%
2598	Thalassiosira sp.	Thalassiosirales	25.00%	82	97.62%
2599	Melosira sp.	Melosirales	-20.00%	2	2.38%
2600	Skeletonema sp.	Thalassiosirales	25.00%	77	91.67%
2601	Meuneria sp.	Naviculales	-20.00%	3	3.57%
2602	Coscinodiscus sp.	Coscinodiscales	-20.00%	3	3.57%
2603	Detonula sp.	Thalassiosirales	25.00%	76	90.48%

ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q11

Question **11**

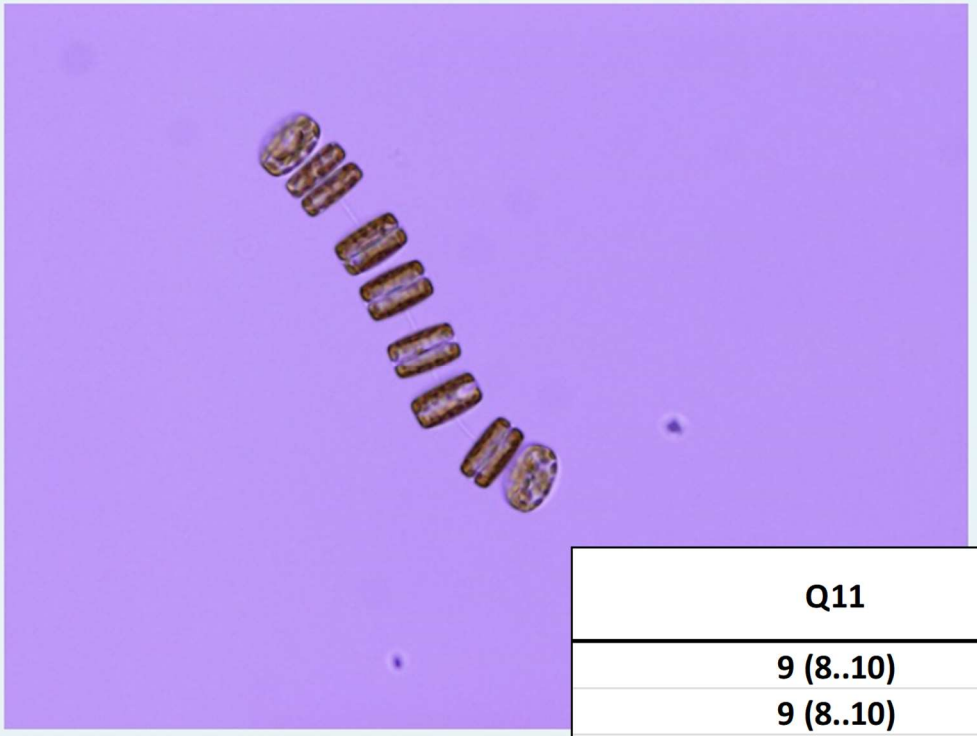
Not yet answered

Marked out of 1.00

Flag question

Edit question

How many cells of Thalassosira are shown (numeric answers, 1,2,3 etc.)



Answer: 9

Q11	Actual response	Partial credit	Count	Frequency
9 (8..10)	9	100.00%	52	61.90%
9 (8..10)	8	100.00%	2	2.38%
9 (8..10)	09	100.00%	1	1.19%
9 (8..10)	10	100.00%	1	1.19%
[Did not match any answer]	13	0.00%	24	28.57%
[Did not match any answer]	12	0.00%	2	2.38%
[Did not match any answer]	14	0.00%	1	1.19%
[Did not match any answer]	16	0.00%	1	1.19%

ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q12

Question **12**

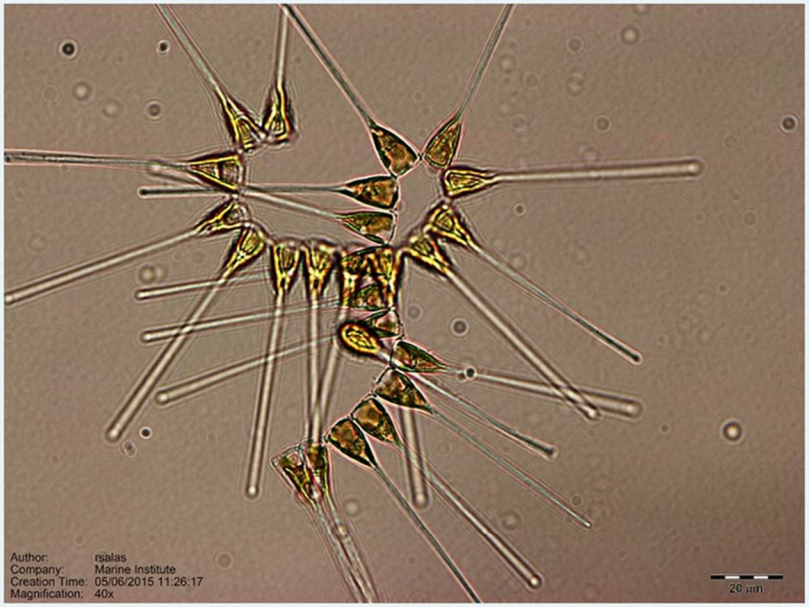
Not yet answered

Marked out of 1.00

Flag question

Edit question

Count all visable cells, even partial cells (numeric answers 1,2,3 etc.)



Answer: 26

Model response	Actual response	Partial credit	Count	Frequency
26 (25..27)	26	100.00%	77	91.67%
26 (25..27)	25	100.00%	6	7.14%
[Did not match any answer]	24	0.00%	1	1.19%

Question 13

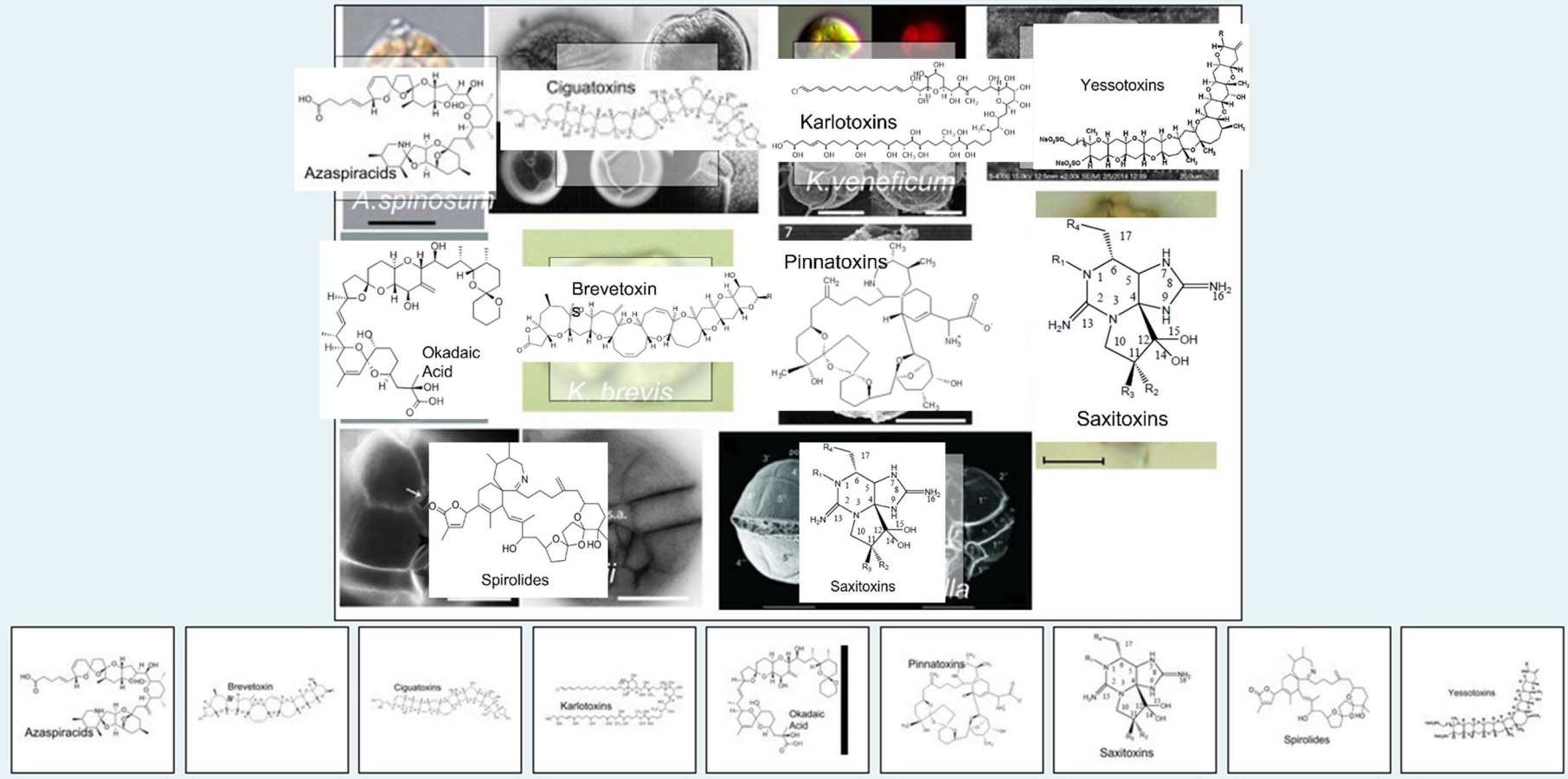
Not yet answered

Marked out of 1.00

Flag question

Edit question

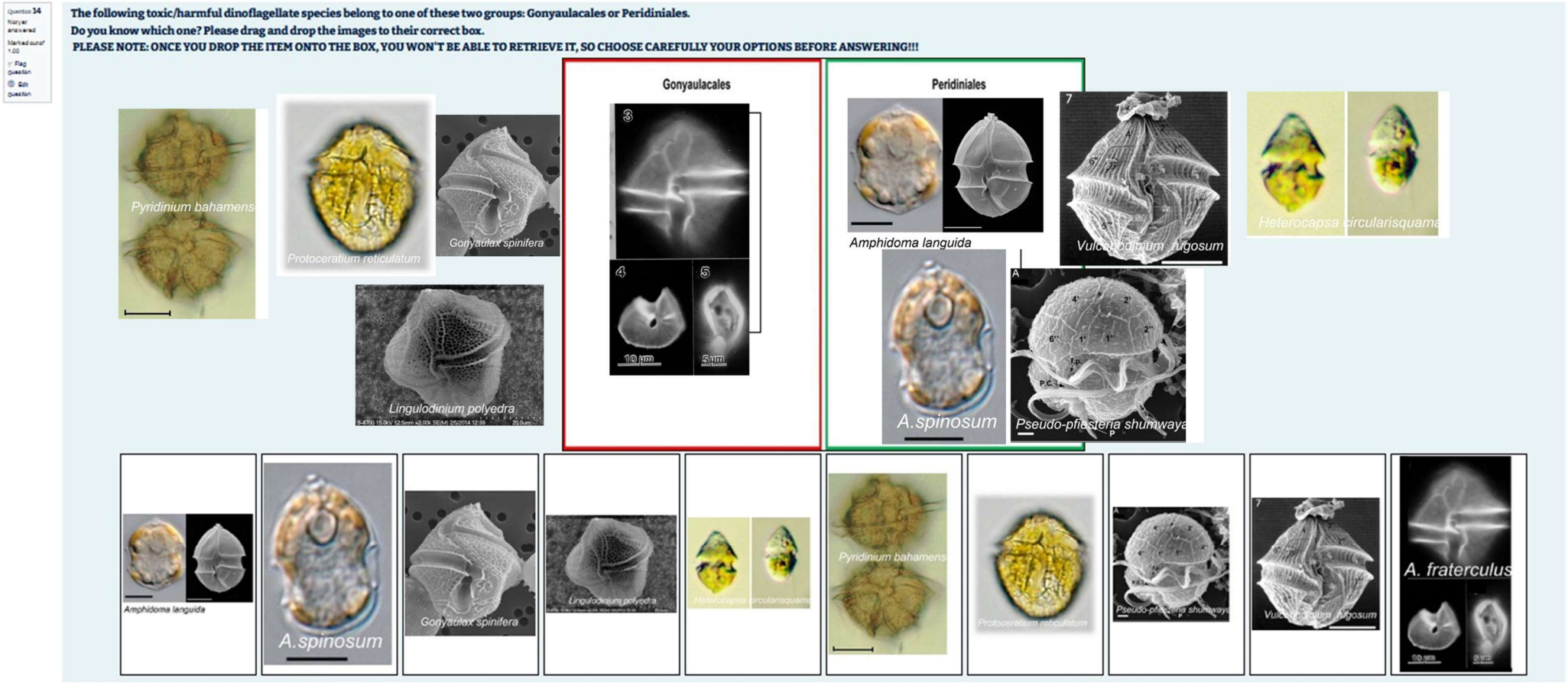
The following dinoflagellates produce a large variety of toxic compounds. Match the toxin to their producer by dragging the toxin items onto the images.



ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q13 answers

Part of question	Model response	Species	Partial credit	Count	Frequency
1	Azaspiracids	A.spinosum	100.00%	83	98.81%
1	Saxitoxins		0.00%	1	1.19%
2	Brevetoxins	K.brevis	100.00%	84	100.00%
3	Ciguatoxins	G.toxicus	100.00%	84	100.00%
4	Karlotoxins	K.veneficum	100.00%	84	100.00%
5	Okadaic Acid	D.acuta	100.00%	84	100.00%
6	Pinnatoxins	V.rugosum	100.00%	82	97.62%
6	Saxitoxins		0.00%	1	1.19%
6	Spirolides		0.00%	1	1.19%
7	Saxitoxins	P.bahamense	100.00%	84	100.00%
8	Saxitoxins		0.00%	7	8.33%
8	Spirolides	A.ostenfeldii	100.00%	77	91.67%
9	Saxitoxins		0.00%	1	1.19%
9	yessotoxins	L.polyedra	100.00%	83	98.81%
10	Saxitoxins	A.catenella	100.00%	84	100.00%

ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q14



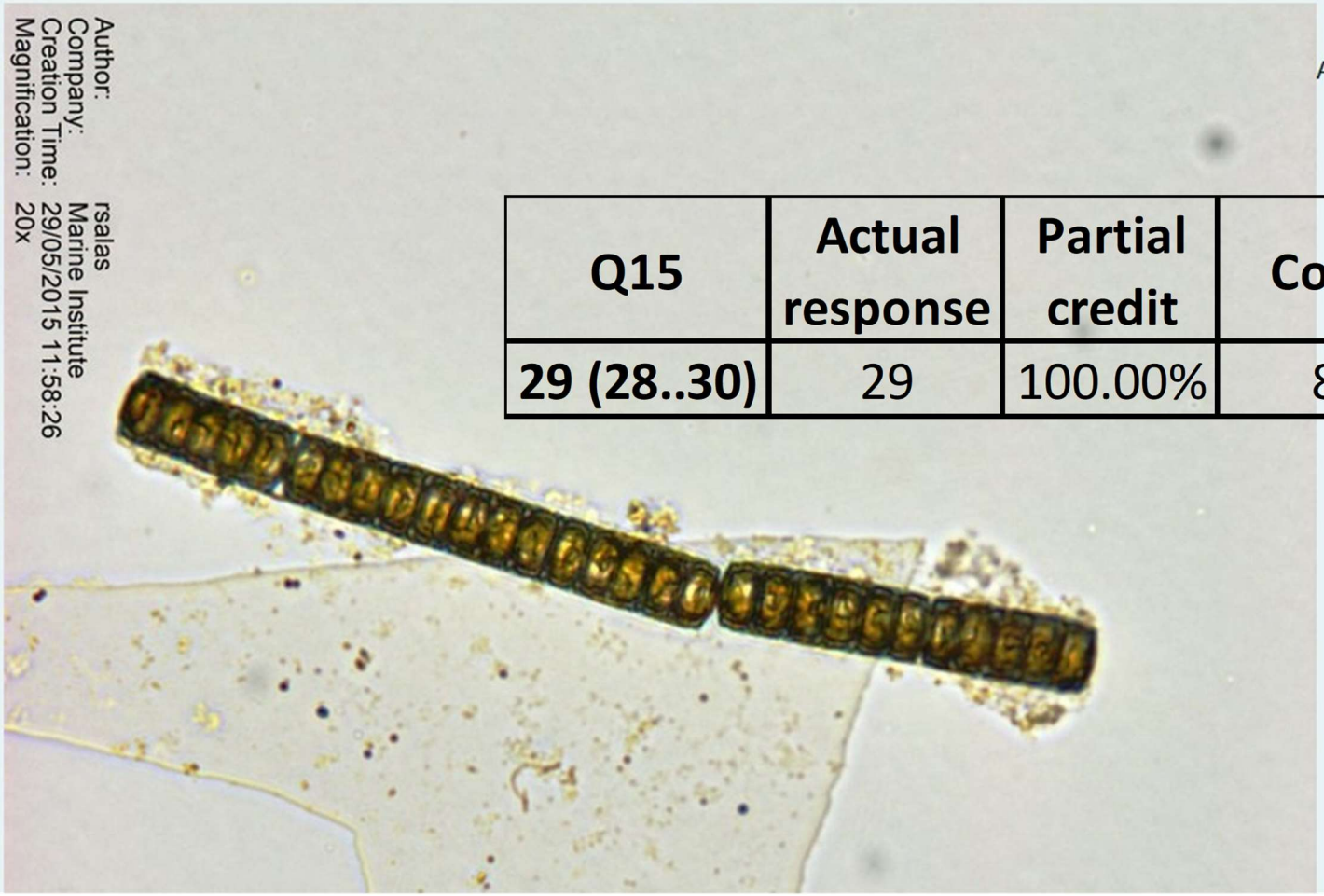
ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q14 answers

Q14	Model response	Partial credit	Count	Frequency (%)
Peridiniales	**Am. Languida**	100%	79	94.0
	Az. spinosum	100%	79	94.0
	H. circularis	100%	84	100.0
	P. shumwayae	100%	81	96.4
	V. rugosum	100%	80	95.2
	Sub-total		**81**	**96.0**
Gonyaulacales	**G. spinifera**	0%	0	0.0
	L. polyedra	0%	3	3.6
	P. bahamense	0%	3	3.5
	P. reticulatum	0%	1	1.2
	A. fraterculus	0%	4	4.7
	Sub-total		**2.2**	**2.6**

Q14	Model response	Partial credit	Count	Frequency (%)
Gonyaulacales	**G. spinifera**	100%	84	100.0
	L. polyedra	100%	81	96.4
	P. bahamense	100%	81	95.3
	P. reticulatum	100%	83	97.6
	A. fraterculus	100%	79	92.9
	Sub-total		**82**	**96.5**
Peridiniales	**Am. Languida**	0%	4	4.8
	Az. spinosum	0%	3	3.6
	H. circularis	0%	0	0.0
	P. shumwayae	0%	1	1.2
	V. rugosum	0%	3	3.6
	Sub-total		**2.2**	**2.6**

ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q15

Enumerate the Phytoplankton cells shown in this image: (Please use a numeral as the answer).



Answer: 29

Q15	Actual response	Partial credit	Count	Frequency
29 (28..30)	29	100.00%	84	100.00%

ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q16

Question **16**

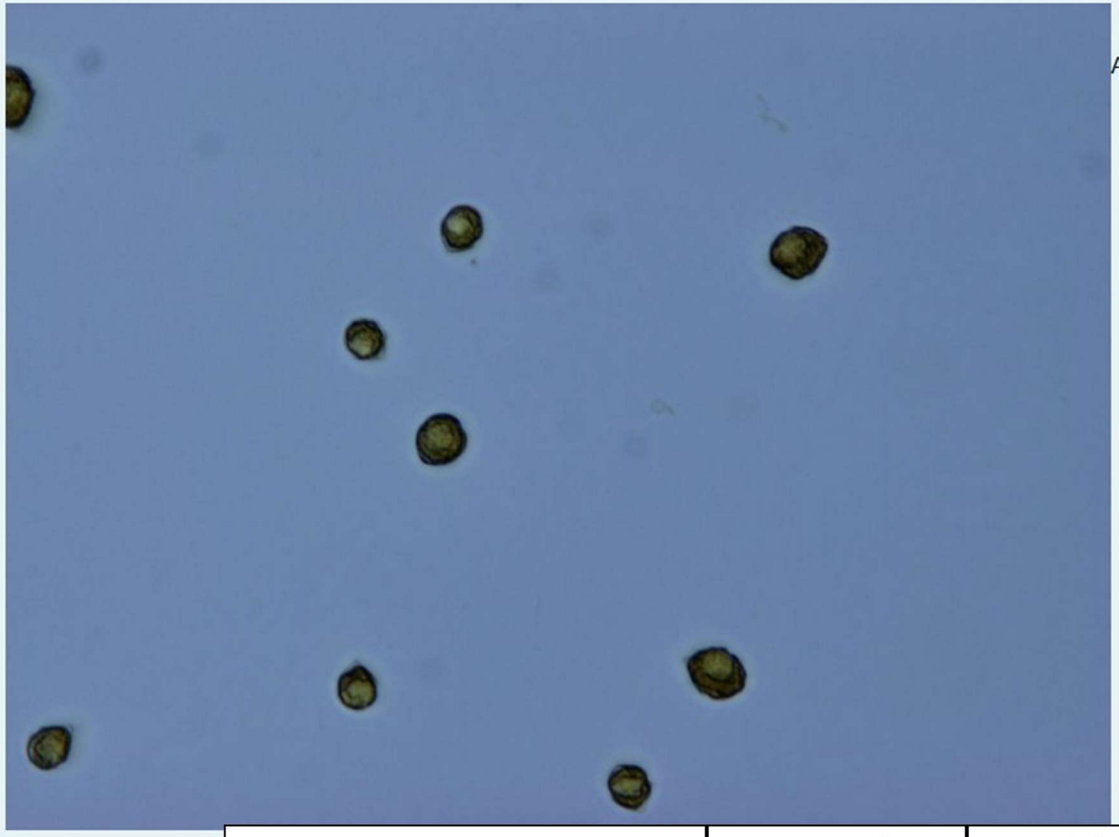
Not yet answered

Marked out of 1.00

Flag question

Edit question

Enumerate the Phytoplankton cells shown in this image including partially visible ones. (Please use a numeral as the answer).



Answer: 9

Q16	Actual response	Partial credit	Count	Frequency
9 (8..10)	9	100.00%	79	94.05%
9 (8..10)	8	100.00%	4	4.76%
[Did not match any answer]	4	0.00%	1	1.19%

ANNEX XVI: Ocean Teacher HAB Quiz IPI202 Q17

Question 17

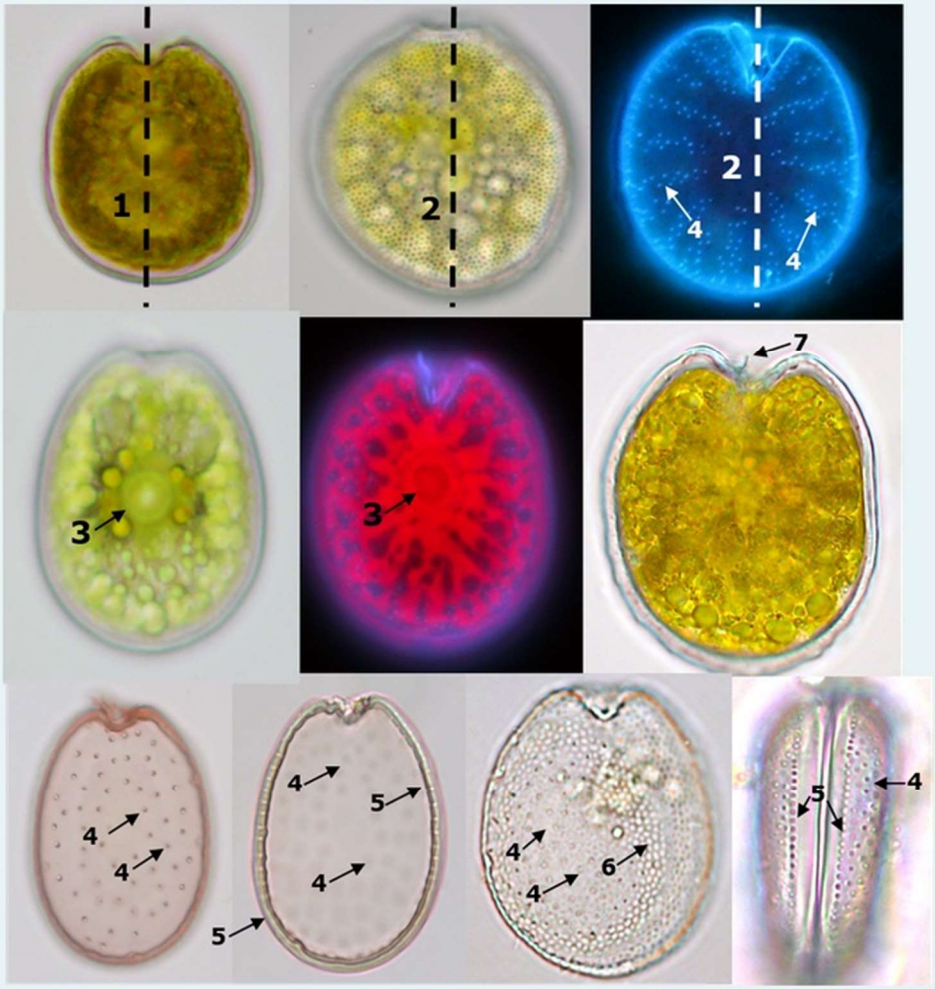
Not yet answered

Marked out of 1.00

Flag question

Edit question

Most benthic species of *Prorocentrum* cannot be identified from only one photo. All diagnostic features are usually not visible and in focus at the same time, and a species is best illustrated by a series of photos. The most important diagnostic features are shown on the plate indicated by numbers - and the terminology used given in the text. Combine the numbers with the correct terminology.



Number 7 indicates	An apical spine
Number 5 indicates	Marginal pores
Number 4 indicates	Valve pores
Number 2 indicates	An asymmetric species
Number 6 indicates	Areolae
Number 3 indicates	A pyrenoid
Number 1 indicates	A symmentric species

ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q17 answers

Q17	Model response	Actual response	Partial credit	Count	Frequency
2963	Number 1 indicates: A symmentric species	A symmentric species	14.29%	84	100.00%
2964	Number 2 indicates: An asymmetric species	An asymmetric species	14.29%	84	100.00%
2965	Number 3 indicates: A pyrenoid	A pyrenoid	14.29%	77	91.67%
2965	Number 3 indicates: Nucleus	Nucleus	0.00%	7	8.33%
2966	Number 4 indicates: Valve pores	Valve pores	14.29%	79	94.05%
2966	Number 4 indicates: Marginal pores	Marginal pores	0.00%	1	1.19%
2966	Number 4 indicates: Areolae	Areolae	0.00%	3	3.57%
2966	Number 4 indicates: Nucleus	Nucleus	0.00%	1	1.19%
2967	Number 5 indicates: Valve pores	Valve pores	0.00%	1	1.19%
2967	Number 5 indicates: Marginal pores	Marginal pores	14.29%	81	96.43%
2967	Number 5 indicates: Thecal plate	Thecal plate	0.00%	2	2.38%
2968	Number 6 indicates: Valve pores	Valve pores	0.00%	2	2.38%
2968	Number 6 indicates: Areolae	Areolae	14.29%	62	73.81%
2968	Number 6 indicates: Chloroplast	Chloroplast	0.00%	2	2.38%
2968	Number 6 indicates: Thecal plate	Thecal plate	0.00%	18	21.43%
2969	Number 7 indicates: An apical spine	An apical spine	14.29%	84	100.00%

ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q18

Question 18

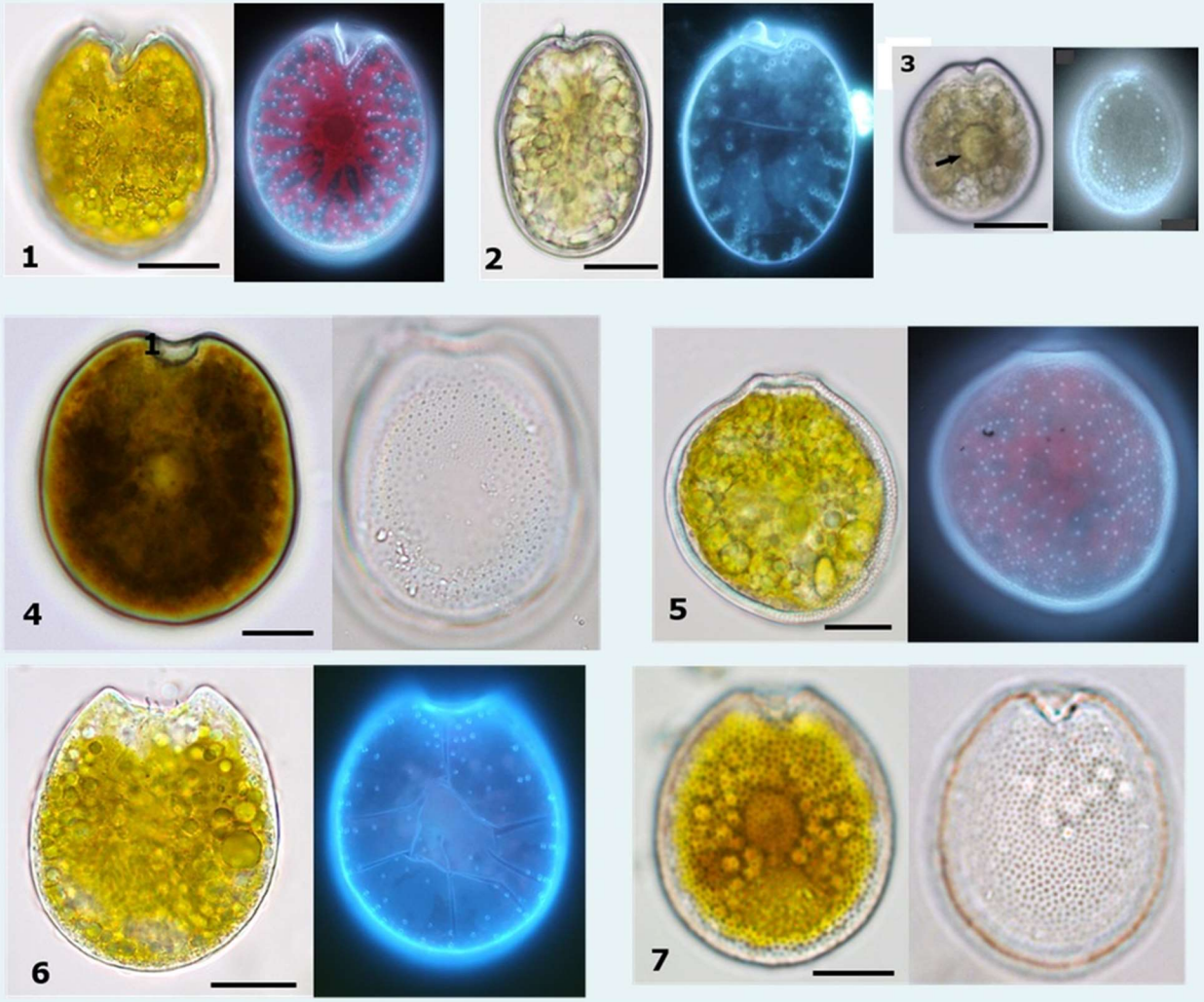
Not yet answered

Marked out of 1.00

Flag question

Edit question

Identify the illustrated species - all seven species are illustrated by two photographs showing the diagnostic features of the species. All scale bars are 10 µm.



Species 1 — Prorocentrum emerginatum

Species 2 — Prorocentrum rhathymum

Species 7 — Prorocentrum hoffmannianum

Species 4 — Prorocentrum concavum

Species 3 — Prorocentrum sipadanensis

Species 5 — Prorocentrum panamense

Species 6 — Prorocentrum tsawwassenense

ANNEX XVI: Ocean Teacher HAB Quiz IPI2022 Q18 Answers

Q18	Model response	Actual response	Partial credit	Count	Frequency
2970	Species 1: Prorocentrum emerginatum	Prorocentrum emerginatum	14.29%	75	89.29%
2970	Species 1: Prorocentrum rhathymum	Prorocentrum rhathymum	0.00%	1	1.19%
2970	Species 1: Prorocentrum panamense	Prorocentrum panamense	0.00%	1	1.19%
2970	Species 1: Prorocentrum tsawwassenense	Prorocentrum tsawwassenense	0.00%	1	1.19%
2970	Species 1: Prorocentrum mexicanum	Prorocentrum mexicanum	0.00%	4	4.76%
2970	Species 1: Prorocentrum consutum	Prorocentrum consutum	0.00%	2	2.38%
2971	Species 2: Prorocentrum rhathymum	Prorocentrum rhathymum	14.29%	71	84.52%
2971	Species 2: Prorocentrum mexicanum	Prorocentrum mexicanum	14.29%	13	15.48%
2972	Species 3: Prorocentrum sipadanensis	Prorocentrum sipadanensis	14.29%	67	79.76%
2972	Species 3: Prorocentrum panamense	Prorocentrum panamense	0.00%	1	1.19%
2972	Species 3: Prorocentrum hoffmannianum	Prorocentrum hoffmannianum	0.00%	2	2.38%
2972	Species 3: Prorocentrum lima	Prorocentrum lima	0.00%	12	14.29%
2972	Species 3: Prorocentrum leve	Prorocentrum leve	0.00%	1	1.19%
2972	Species 3: Prorocentrum consutum	Prorocentrum consutum	0.00%	1	1.19%
2973	Species 4: Prorocentrum sipadanensis	Prorocentrum sipadanensis	0.00%	1	1.19%
2973	Species 4: Prorocentrum concavum	Prorocentrum concavum	14.29%	63	75.00%
2973	Species 4: Prorocentrum hoffmannianum	Prorocentrum hoffmannianum	0.00%	1	1.19%
2973	Species 4: Prorocentrum lima	Prorocentrum lima	0.00%	1	1.19%
2973	Species 4: Prorocentrum leve	Prorocentrum leve	0.00%	14	16.67%
2973	Species 4: Prorocentrum consutum	Prorocentrum consutum	0.00%	1	1.19%
2973	Species 4: Prorocentrum bimaculatum	Prorocentrum bimaculatum	0.00%	3	3.57%
2974	Species 5: Prorocentrum emerginatum	Prorocentrum emerginatum	0.00%	1	1.19%
2974	Species 5: Prorocentrum panamense	Prorocentrum panamense	14.29%	81	96.43%
2974	Species 5: Prorocentrum consutum	Prorocentrum consutum	0.00%	2	2.38%
2975	Species 6: Prorocentrum emerginatum	Prorocentrum emerginatum	0.00%	2	2.38%
2975	Species 6: Prorocentrum concavum	Prorocentrum concavum	0.00%	2	2.38%
2975	Species 6: Prorocentrum tsawwassenense	Prorocentrum tsawwassenense	14.29%	79	94.05%
2975	Species 6: Prorocentrum leve	Prorocentrum leve	0.00%	1	1.19%
2976	Species 7: Prorocentrum emerginatum	Prorocentrum emerginatum	0.00%	2	2.38%
2976	Species 7: Prorocentrum concavum	Prorocentrum concavum	0.00%	5	5.95%
2976	Species 7: Prorocentrum hoffmannianum	Prorocentrum hoffmannianum	14.29%	61	72.62%
2976	Species 7: Prorocentrum lima	Prorocentrum lima	0.00%	7	8.33%
2976	Species 7: Prorocentrum leve	Prorocentrum leve	0.00%	6	7.14%
2976	Species 7: Prorocentrum consutum	Prorocentrum consutum	0.00%	2	2.38%
2976	Species 7: Prorocentrum bimaculatum	Prorocentrum bimaculatum	0.00%	1	1.19%

ANNEX XVII: Oceanteacher 2022 quiz results pg1

A. Code	Total	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18
1	**97.0**	100.0	91.1	100.0	100.0	100.0	100.0	100.0	78.6	100.0	100.0	100.0	100.0	89.3	100.0	100.0	100.0	100.0	85.7
2	**97.2**	87.5	91.1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	85.7	85.7
3	**95.9**	100.0	91.1	100.0	100.0	100.0	100.0	50.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	85.7	100.0
4	**98.7**	100.0	91.1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	85.7	100.0
5	**79.7**	87.5	91.1	39.3	0.0	100.0	100.0	100.0	100.0	78.6	50.0	0.0	100.0	100.0	100.0	100.0	100.0	85.7	100.0
6	**94.8**	100.0	91.1	100.0	100.0	100.0	100.0	50.0	78.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	85.7	100.0
7	**83.2**	37.5	91.1	100.0	100.0	100.0	100.0	100.0	78.6	100.0	100.0	0.0	100.0	100.0	58.9	100.0	100.0	71.4	57.1
8	**97.9**	100.0	71.4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	89.3	100.0	100.0	100.0	100.0	100.0
9	**89.5**	100.0	100.0	78.6	100.0	100.0	100.0	55.4	100.0	100.0	75.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
10	**99.5**	100.0	91.1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
11	**96.5**	100.0	100.0	78.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	57.1
13	**96.0**	100.0	100.0	100.0	100.0	100.0	100.0	55.4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	85.7	85.7
14	**90.5**	87.5	91.1	78.6	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	85.7	85.7
15	**99.2**	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	85.7
16	**99.5**	100.0	91.1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
17	**98.4**	100.0	91.1	78.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
18	**91.2**	100.0	91.1	78.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	71.4
19	**90.2**	87.5	100.0	78.6	100.0	100.0	100.0	55.4	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
20	**99.5**	100.0	91.1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
21	**91.6**	100.0	80.4	78.6	100.0	100.0	100.0	100.0	78.6	100.0	55.4	100.0	100.0	100.0	78.6	100.0	100.0	100.0	71.4
22	**83.5**	100.0	80.4	100.0	0.0	100.0	100.0	50.0	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	71.4
23	**87.3**	100.0	91.1	100.0	0.0	100.0	100.0	100.0	78.6	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
24	**92.0**	100.0	100.0	100.0	100.0	100.0	100.0	55.4	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
25	**100.0**	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
26	**89.8**	100.0	100.0	58.9	100.0	100.0	100.0	55.4	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
27	**99.2**	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	85.7
28	**98.1**	100.0	100.0	78.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	85.7
29	**96.6**	87.5	100.0	78.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	71.4
30	**99.2**	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	85.7
31	**98.1**	100.0	100.0	78.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	85.7
32	**97.3**	100.0	91.1	78.6	100.0	100.0	100.0	100.0	100.0	78.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
33	**96.8**	100.0	80.4	78.6	100.0	100.0	100.0	100.0	100.0	78.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
34	**95.5**	100.0	91.1	78.6	100.0	100.0	100.0	100.0	100.0	66.1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	82.1
35	**99.5**	100.0	91.1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
36	**98.4**	100.0	91.1	78.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
37	**98.9**	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	78.6	100.0	100.0	100.0	100.0
38	**93.6**	62.5	91.1	58.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	85.7	85.7
39	**97.6**	100.0	91.1	78.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	85.7
40	**96.8**	100.0	91.1	78.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	85.7	85.7
41	**96.0**	100.0	91.1	78.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	85.7	71.4
42	**96.0**	100.0	91.1	78.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	85.7	71.4
43	**88.5**	100.0	100.0	100.0	100.0	100.0	83.9	55.4	100.0	55.4	100.0	100.0	100.0	89.3	78.6	100.0	100.0	85.7	42.9

ANNEX XVII: Oceanteacher 2022 quiz results pg2

A. Code	Total	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18
44	**81.2**	87.5	80.4	78.6	0.0	100.0	100.0	55.4	100.0	78.6	100.0	0.0	100.0	89.3	100.0	100.0	100.0	100.0	85.7
45	**95.1**	75.0	91.1	78.6	100.0	100.0	100.0	100.0	100.0	66.1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
46	**89.8**	75.0	91.1	100.0	100.0	0.0	100.0	50.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
47	**92.7**	87.5	91.1	100.0	100.0	100.0	100.0	100.0	58.9	100.0	50.0	100.0	100.0	100.0	78.6	100.0	100.0	100.0	100.0
50	**94.4**	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
51	**94.4**	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
52	**94.4**	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
53	**99.2**	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	85.7
54	**92.9**	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	71.4
55	**93.2**	100.0	91.1	78.6	100.0	100.0	100.0	55.4	100.0	50.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
56	**75.8**	87.5	91.1	78.6	100.0	100.0	100.0	50.0	100.0	26.8	30.4	0.0	100.0	89.3	78.6	100.0	100.0	71.4	57.1
57	**84.6**	75.0	100.0	100.0	100.0	100.0	100.0	55.4	100.0	58.9	78.6	0.0	100.0	78.6	100.0	100.0	100.0	85.7	85.7
58	**98.2**	100.0	80.4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	85.7
59	**90.4**	100.0	91.1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0	78.6	100.0	100.0	71.4	85.7
60	**85.8**	87.5	91.1	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0	78.6	100.0	100.0	100.0	85.7
61	**91.7**	100.0	100.0	100.0	100.0	100.0	94.6	55.4	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
62	**75.9**	75.0	80.4	19.6	100.0	100.0	87.5	55.4	58.9	55.4	100.0	0.0	100.0	100.0	100.0	100.0	100.0	57.1	71.4
63	**94.7**	100.0	80.4	100.0	100.0	100.0	100.0	55.4	100.0	66.1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
64	**95.9**	75.0	100.0	78.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	71.4
65	**95.8**	87.5	100.0	100.0	100.0	100.0	100.0	100.0	100.0	78.6	100.0	100.0	100.0	100.0	100.0	100.0	100.0	71.4	85.7
66	**85.1**	75.0	100.0	100.0	100.0	100.0	87.5	100.0	100.0	58.9	78.6	0.0	100.0	100.0	100.0	100.0	100.0	85.7	42.9
67	**100.0**	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
68	**92.0**	100.0	100.0	100.0	100.0	100.0	100.0	55.4	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
70	**100.0**	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
71	**93.1**	100.0	91.1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	85.7	100.0
72	**93.2**	100.0	80.4	100.0	100.0	100.0	100.0	50.0	100.0	58.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	85.7	100.0
73	**89.9**	100.0	91.1	100.0	100.0	100.0	87.5	55.4	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	82.1
74	**93.7**	100.0	91.1	100.0	100.0	100.0	100.0	50.0	100.0	58.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	85.7	100.0
75	**99.4**	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	89.3	100.0	100.0	100.0	100.0
76	**84.8**	100.0	91.1	58.9	100.0	100.0	87.5	55.4	100.0	55.4	75.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
77	**96.9**	100.0	100.0	100.0	100.0	100.0	87.5	55.4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
78	**84.4**	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	100.0	89.3	100.0	100.0	100.0	85.7	42.9
79	**77.7**	100.0	71.4	58.9	100.0	0.0	87.5	50.0	100.0	100.0	78.6	0.0	100.0	89.3	100.0	100.0	100.0	71.4	85.7
80	**81.3**	100.0	80.4	100.0	100.0	100.0	87.5	100.0	100.0	0.0	0.0	100.0	100.0	100.0	50.0	100.0	100.0	85.7	57.1
81	**68.7**	100.0	80.4	100.0	100.0	100.0	87.5	100.0	100.0	0.0	0.0	0.0	0.0	100.0	78.6	100.0	100.0	71.4	14.3
82	**75.7**	50.0	91.1	39.3	0.0	100.0	100.0	55.4	100.0	100.0	55.4	0.0	100.0	100.0	100.0	100.0	100.0	85.7	85.7
83	**92.5**	100.0	91.1	100.0	100.0	100.0	46.4	55.4	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	71.4
84	**100.0**	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
85	**97.9**	100.0	91.1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	71.4
86	**99.4**	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	89.3	100.0	100.0	100.0	100.0	100.0
90	**77.4**	50.0	71.4	100.0	100.0	100.0	100.0	55.4	78.6	75.0	75.0	100.0	100.0	89.3	78.6	100.0	0.0	71.4	42.9
Total	**92.6**	**92.9**	**92.9**	**89.3**	**89.3**	**96.4**	**96.4**	**83.9**	**96.4**	**89.3**	**92.9**	**66.1**	**98.2**	**98.2**	**96.4**	**100.0**	**98.2**	**92.9**	**85.7**