Basics of Taxonomy: Describing, Illustrating and Communicating Biodiversity

A course in the DEST Modern Taxonomy course program 2015-2016, consisting of five modules: ¹Learning the computer program DELTA (DEscription Language for TAxonomy), ²Vectorbased digital illustration technique, ³Scientific writing and communication, ⁴Different methods to make a scientific illustration and ⁵Overview and introduction to Scratchpads (Equivalent to 5 ECTS).

Report to DEST
2016-11-01
Reporter Dr Matz Berggren
Instructors and participants at the DEST course “Basics of Taxonomy”. Standing from left: Petar Nikolic, Matz Berggren (standing behind), Oliver Coleman, Zandra Sigvardt, Jasmijn Ruijgrok, Kamil Hupalo, Chiara Manfrinato, Carlos Martinez, Chim Chee Kong, Helen Wong. Kneeling in front (from left): Raquel Pereira, Marco Canella, Isabelle Ochoa, Sophie Gonzalez, Melissa Martin.

Introduction

Exploration of biodiversity is one of the big challenges of this century. In many areas there is ongoing loss of species and biodiversity is decreasing. There is an increasing demand for taxonomic expertise and an increased need for more efficient data handling by the taxonomists. Therefore, there is a dire need for courses dealing with different aspects of taxonomy.

To meet this need and to increase the interest, knowledge and skills in taxonomy, it was decided to offer PhD-students and early postdocs the opportunity of learning DELTA (DEscription Language for TAxonomy), which is the state of the art tool in taxonomy. Although being built on an almost outdated program/operating system it is still the only fully versatile program today. It contains all aspects on coding characters in text and illustrations, generating and exporting both interactive species keys as well as written dichotomous keys, and it can also generate a natural language description from the species database system. This will automatically make the description setup standardized and thereby the format will be consistent throughout all the taxa described! Learning how to use computerized taxonomy and how to build a complex database is a knowledge needed for the future. Together with illustration, writing and presenting lectures and the increasingly expanding tool, Scratchpads for a web-based
way of describing taxonomy, we thought this would be a good help for future taxonomists!

**Funding**
Funding for the course was provided by the DEST Modern Taxonomy course program 2015-2016, KVA-fund to Lovén Centre for marine Sciences and by participants fee.

**Venue**
The venue of the course was at the Sven Lovén Centre for Marine Sciences, Kristineberg, Sweden. 10 – 21 October 2016.

**Participants**
The course was attended by 13 participants (Ph.D.-, M.Sc.-students and postdoctoral researchers) representing 11 countries; Bosnia and Herzegovina, Canada, Cuba, Denmark, French Guiana, Italy, Malaysia, Netherlands, Poland, Portugal, Singapore. A list of participants and teachers is enclosed in Appendix 1.

**Organizers**
The course was set up by Dr. Isabella Van de Velde (Royal Belgian Institute of Natural Sciences, Brussel, Belgium) together with Dr. Matz Berggren (Dept. Marine Sciences, Gothenburg University), at the Sven Lovén Centre for Marine Sciences, Kristineberg, in Fiskebäckskil, Sweden. Dr. Matz Berggren was also the organizer on-site.

**Teachers**
The teachers were (listed for the five different modules):

1. **DELTA**: Dr Matz Berggren, Institution of Marine Ecology, Göteborg University, Sweden and Dr Charles Oliver Coleman, Museum für Naturkunde, Berlin, Germany.
2. **Digital drawing**: Dr Charles Oliver Coleman, Museum für Naturkunde, Berlin, Germany.
3. **Scientific illustration**: Prof. Tomas Cedhagen, Department of Bioscience, University of Aarhus, Denmark.
4. **Scientific writing and communication**: Dr Gabor Lövei, Department of Agroecology, Aarhus University, Denmark.
5. **Scratchpads**: Dr Dimitrios N Koureas, Department of Life Sciences, Natural History Museum, London, UK.
Content

Overview
The course focused on describing taxonomy in different ways. All starts with Matz giving a seminar on various types of databases and about the construction of databases in general from the Biodiversity Information Standards (TDWG) web-site. Also, some taxonomy sources on the internet were shown and discussed. After this, the proper course took place with its different themes. One theme was focused on how to write and present scientific studies, explaining extensively the details of writing scientific publications. Also an important part is how to prepare figures and tables for publications and presentations. Another theme is targeting how to illustrate the material one wants to describe. This part, aimed at understanding the human perception of illustrations as well as to be informed about a variety of illustration methods and techniques. A third theme is concentrating on the technical issues how to use the software program Adobe Illustrator to make vector based illustrations, from a photo or a sketch from a camera lucida. The program makes it possible to edit the illustration continuously until a publishable result has been reached! A fourth theme is dealing with the software package DELTA (DEscription Language for TAxonomy) used for description of both species and higher taxa. One important part here is how to make written keys and natural language text descriptions automatically from the database. Another part deals with how to construct and publish interactive keys that could be displayed on the internet for common use. Another possibility of the program is to link together different databases and also to export data matrices into NEXUS format to import into different phylogenetic programs! The fifth and last theme of the course concerns an introduction and hands-on use of the interactive web-based Scratchpads in making a workflow of biodiversity data from databases to a published paper. For a day to day schedule see Appendix 2.

Course program
On the first day (Monday) participants arrived in the morning. At 14:00 Matz Berggren welcomed them at the Lovén Center. An introduction to the area of Gullmarsfjord and a brief history of the Kristineberg marine station was given.
DELTA (Tuesday 11 Oct. –Wed. 12 Oct.)

First a short lecture was given of various types of databases and about the construction of databases in general from the Biodiversity Information Standards (TDWG) web-site. Some taxonomy sources on the internet were shown and discussed. The DELTA-lectures started with an overview of the system with the highlights and drawbacks and ending with how it can be published on the internet. After the general structure of the program had been demonstrated, the software was installed on all laptops and the students could start building their own interactive keys. All students were given “Beginners guide of DELTA” in pdf-format.

From Tuesday to Wednesday, the participants had mixed lectures and demonstrations. After each newly introduced part of the computer program, the participants used their own data to build a simple database in the DELTA-program. These activities allowed the students to add on more and more details into their dataset after each new part of the program was explained and exemplified. A small section was dedicated to images and illustration handling inside the DELTA program because more information on these topics has already been discussed and provided in the Digital drawing module. This was explained in the form of a demonstration using the photo/illustration editing program Adobe Photoshop. An image was edited by using different layers in order to emphasize the character of interest using layer techniques, finally resizing the image to a usable size in DELTA. The further step of making the illustrations interactive using clickable areas in the DELTA program, e.g. Intkey, was demonstrated, and later tried out by the students through hands-on.
Morphological illustration using digitizer
The next module started on Thursday 13 Oct. and consisted of two days of digital drawing.

A new method to make publishable illustrations using the Adobe Illustrator with a digitizer was introduced. It was first described during a lecture and also shown in detail by a series of small movies focusing on the different steps. Thereafter, the students started hands-on testing/training of the method with their own material. It is challenging to look at the computer screen while moving the pen below you!

The students were encouraged to use both photographies as pen sketches as background to use to illustrate it in another layer in Adobe Illustrator with the use of the digitizer. Also how to make drawing libraries of different often-used drawing items like setae was shown.
Scientific illustration

The module “Scientific illustration” started on Saturday 15 October and on Monday 17 Oct. It dealt with the theories behind the use of illustrations for various scientific purposes, human perception of illustrations and composition, colour theory and choice of the illustration method. The lectures also included a short history of scientific illustrations. Both demonstrations and hands-on of different techniques were covered, including aids like camera lucida, black and white methods like copper graphics, charcoal, pencil and black ink and also colour methods like water-colour (aquarelle), crayons, coloured pencils, pastel, computer graphics and airbrush. Beside illustrations of biological specimens, aspects on projections in cartography, diagrams, tables, typography and posters were discussed.
An overview on macrophotography/photo-stacking

An evening lecture and hands-on with stacking techniques for macrophotography was given by Matz on Saturday 15 Oct. Various ways of making a macrophoto with the highest depth of field (DOF) was shown. To obtain a good DOF one common method is using a high aperture and good light sources. A more advanced way is to take many photos with a shallow DOF in a “photo-stack” and combine them with the aid of different methods. One method was to have a few photos and combine them manually in Adobe photoshop.

A more exact and controlled method is to use a macrorail and advance the camera in small increments or even better have a computerized stepmotor that can be programmed to perform the stepping automatically. The last method was demonstrated using the StackShot equipment.

To have more control over the stacking procedure a build-in script in Adobe photoshop can be used for stacking, but a more effective way is to use a dedicated program like Zerene Stacker or Helicon focus. The stacking here was shown using Zerene Stacker and then also how to edit the final result inside the program! The fine adjustment of the end result from Zerene Stacker was done in Adobe Photoshop and an even colored background was added!
Scientific writing

On Monday evening 17 Oct., the module of “Scientific writing and communication” started and ran until lunch Wednesday 19 Oct. It covered how to make a scientific text understandable and how to communicate with the potential reader, to make the message as clear and interesting as possible. The use of tables and figures was extensively discussed and how they should be designed to enhance the understanding of the text. Examples from the library were used to exemplify how the writer should think when deciding to which journal a certain manuscript should first be sent to. Furthermore, the important aspects of participating in international conferences (posters, talks, personal interactions) were covered. Furthermore, the whole procedure from submitting a manuscript until it is accepted, was discussed. Major and minor revisions, rejections and how a manuscript is processed through the reviewing process were important parts that were looked into in detail, in order to understand what is happening once the manuscript is sent in.
Scratchpads

Introduction to the Scratchpads and some intensive training in the use of the program was given in the last module. From after lunch on Wednesday 19 Oct to lunch Friday 21 Oct.

The program is a versatile set of modules and are used as a social networking tool to build, share and publish information on the diversity of life on the Web (http://scratchpads.eu/). The focus in this course was on creating and setting up a Scratchpad site, adding various kinds of data such as a biological classification, images, literature, taxon descriptions with distribution maps. This is done both by adding in data by hand or retrieving from online databases! The participants were shown how to communicate with other users (in the course) by adding users to their site, creating a forum or blog. The goal of this course was to give an overview of what a Scratchpad can do for the research of the participants and allow them to independently explore their Scratchpad after the course.
Students presentation
During the first week, three evenings were designated to student presentations, in which students discussed their current (or intended) research and indicated the need for this course (Presentation titles see Appendix 3).
Course material
The course material consisted of the DELTA program package, including a new user guide “DELTA for beginners”. A number of printed text pages, explaining specific parts of the program more in detail, were distributed. In Digital drawing, Scientific writing as well as in Scientific illustration, different instruction texts were given to the participants both in printed and pdf-format. Some material of pen and paper was given to the participants in the module “Scientific illustration”. Many examples of recommended textbooks to buy from the internet were given.

Leisure
Although the course had a tight schedule with both day and evening activities, there was time for some leisure.
On Friday 14 October, we had the course dinner – a shrimp party (Northern shrimp - *Pandalus borealis*) that was very nice.
In the morning of Sunday 16 October, an excursion was organized to a small nature reserve with one of the northern-most natural Beech (*Fagus sylvatica*) forests in Sweden. This time of the year, the ground is full of golden brown Beech leaves. The area (Vägeröd) does also have a high peak which we climbed. There is a beautiful view over the island and down to the waterways between us and the mainland. Then we went to the nearby village of Grundsund and walked the seaside boardwalk.
The certificate given to the participants:

Basics of Taxonomy: Describing, Illustrating and Writing biodiversity

Sven Lovén Centre for Marine Infrastructures, Kristineberg, Sweden
10 – 21 October 2016

CERTIFICATE OF ATTENDANCE

This is to certify that

Participants name

has successfully completed the DEST Modern Taxonomy course programme 2015-2016, in this five module course:

1. Learning the computer program DELTA (DEscription Language for TAxonomy),
2. Vector-based digital illustration technique,
3. Different methods to make a scientific illustration,
4. Scientific writing and communication,
5. Scratchpads (the course is equivalent to 5 ECTS).

Fiskebäckskil 21 October 2016

Instructors:

DELTA and Macro photography:
Dr Matz Berggren, Institution of Marine Sciences, Göteborg University, Sweden
DELTA and Digital drawing:
Dr Charles Oliver Coleman, Museum für Naturkunde, Berlin, Germany
Scientific illustration:
Prof. Tomas Cedhagen, Department of Bioscience, University of Aarhus, Denmark
Scientific writing and communication:
Dr Gabor Lövei, Department of Agroecology, University of Aarhus, Denmark
Scratchpads:
Dr Dimitrios N Koureas, Department of Life Sciences, Natural History Museum, London, UK
Diploma time

All happy participants with their diploma!
Course evaluation
The course was evaluated by a questionnaire (Appendix 4). (Information was compiled by one of the participants, Raquel Pereira, to make it anonymous).
Appendix 1 – List of participants.

Participants:
Name, current workplace, country - nationality
Marco Canella, Università degli Studi di Padova, Italy - Italian
Chee Kong Chim, Tropical Marine Science Institute, National University of Singapore, Singapore - Singaporian
Sophie Gonzalez, Institut de Recherche pour le Développement (IRD), Cayenne Cedex, French Guiana - French
Kamil Hupalo, Department of Invertebrate Zoology and Hydrobiology, University of Lodz, Poland - Polish
Raquel Macedo Pereira, Department of Organismal Biology, Uppsala University, Sweden - Portuguese
Chiara Manfrinato, Università degli Studi di Padova, Italy - Italian
Melissa Martín, School of Marine and Environmental Sciences, Universiti Malaysia Terengganu, Malaysia - Malaysian
Carlos Alberto Martínez Muñoz, Institute of Botany and Landscape Ecology Ernst Moritz Arndt University, Greifswald, Germany - Cuban
Petar Nikolić, Faculty of Agriculture, Bosnia and Herzegovina - Bosnian Herzegovinan
Isabelle Ochoa, Natural Resources Canada, Ontario, Canada - Canadian
Jasmijn Ruijgrok, Leiden University, Leiden, The Netherlands - Dutch
Zandra Maria Skandrup Sigvardt, Zoological Museum, Natural History Museum of Denmark, University of Copenhagen, Denmark - Danish
Pei San Helen Wong, Tropical Marine Science Institute, National University of Singapore, Singapore - Singaporian

Instructors:
DELTA and Photostacking:
Dr Matz Berggren, Department of Marine Sciences, Göteborg University, Sweden

DELTA and Digital drawing
Dr Charles Oliver Coleman, Museum für Naturkunde, Berlin, Germany

Scratchpads
Dr Dimitrios Koureas, Department of Life Sciences, The Natural History Museum, London, UK

Scientific illustration:
Prof. Tomas Cedhagen, Department of Bioscience, University of Aarhus, Denmark

Scientific writing and communication:
Dr Gabor Lövei, Department of Agroecology, University of Aarhus, Denmark
### Appendix 2 – Schedule

**Basics of Taxonomy - Sven Lovén Centre for Marine Infrastructure, Kristineberg. COURSE SCHEDULE 10-21 October 2016**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td><strong>Monday 10 October 2016</strong></td>
<td></td>
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<tr>
<td>08:00 – 13:30</td>
<td>Arrival</td>
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<tr>
<td>14:00 – 15:00</td>
<td>Welcome to the station by Matz Berggren</td>
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<tr>
<td>15:30 – 17:00</td>
<td>Matz Berggren - Introduction to available databases / overview of DELTA</td>
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<td><strong>Tuesday 11 October 2016</strong></td>
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<tr>
<td>09:00 – 17:00</td>
<td>Matz Berggren &amp; Oliver Coleman</td>
<td>DELTA</td>
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<tr>
<td>19:00 – 20:30</td>
<td>5 participants present their research (10+5min each)</td>
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<tr>
<td><strong>Wednesday 12 October 2016</strong></td>
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<tr>
<td>09:00 – 17:00</td>
<td>Matz Berggren &amp; Oliver Coleman</td>
<td>DELTA</td>
</tr>
<tr>
<td>19:00 – 20:30</td>
<td>5 participants present their research (10+5min each)</td>
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<tr>
<td><strong>Thursday 13 October 2016</strong></td>
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<tr>
<td>09:00 – 17:00</td>
<td>Oliver Coleman</td>
<td>Morphological illustration using digitizer</td>
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<tr>
<td>19:00 – 20:30</td>
<td>5 participants present their research (10+5min each)</td>
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<tr>
<td><strong>Friday 14 October 2016</strong></td>
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<tr>
<td>09:00 – 17:00</td>
<td>Oliver Coleman - Morphological illustration using digitizer</td>
<td>Course dinner</td>
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<tr>
<td>18:00 – 20:30</td>
<td>5 participants present their research (10+5min each)</td>
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<tr>
<td><strong>Saturday 15 October 2016</strong></td>
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<tr>
<td>09:00 – 17:00</td>
<td>Tomas Cedhagen</td>
<td>Scientific illustration – methods and use</td>
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<tr>
<td>18:00 – 20:00</td>
<td>Short overview on macrophotography/photo-stacking – Matz Berggren</td>
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<tr>
<td><strong>Sunday 16 October 2016</strong></td>
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<td>Day off and excursion</td>
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<tr>
<td><strong>Monday 17 October 2016</strong></td>
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<tr>
<td>09:00 – 17:00</td>
<td>Tomas Cedhagen</td>
<td>Scientific illustration – methods and use</td>
</tr>
<tr>
<td>18:00 – 20:00</td>
<td>Gabor Lövei - Scientific writing and communication</td>
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<tr>
<td><strong>Tuesday 18 October 2016</strong></td>
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<tr>
<td>09:00 – 17:00</td>
<td>Gabor Lövei</td>
<td>Scientific writing and communication</td>
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<tr>
<td><strong>Wednesday 19 October 2016</strong></td>
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<tr>
<td>09:00 – 12:00</td>
<td>Gabor Lövei - Scientific writing and communication</td>
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<tr>
<td>13:00 – 17:00</td>
<td>Dimitrios Koureas - Scratchpads</td>
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<tr>
<td><strong>Thursday 20 October 2016</strong></td>
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<tr>
<td>09:00 – 17:00</td>
<td>Dimitrios Koureas</td>
<td>Scratchpads</td>
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<tr>
<td>18:00 – 20:00</td>
<td>Scratchpads (extra time if needed)</td>
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<tr>
<td><strong>Friday 21 October 2016</strong></td>
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<tr>
<td>09:00 – 12:30</td>
<td>Dimitrios Koureas</td>
<td>Open Science - Open Access</td>
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<tr>
<td>13:30</td>
<td>Departure</td>
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</tbody>
</table>

**Teachers:**
- Matz Berggren – Course organizer and DELTA
- Oliver Coleman – DELTA and Digital drawing
- Thomas Cedhagen – Scientific illustration
- Gabor Lövei – Scientific writing and communication
- Dimitrios Koureas – Scratchpads
Appendix 3 – Participants presentations.

Student’s name and title of presentation:

**Marco Canella** – “Effects of different light regimes and nutrient availability on *Nannochloropsis gaditana*”

**Chee Kong Chim** – “Ecological studies on marine animals in Singapore”

**Sophie Gonzalez** – “Taxonomy of the Podostemaceae family for the flora of the Guianas”.

**Kamil Hupalo** – “Diversity and origin of freshwater gammarids from Crete and Peloponnese”

**Raquel Macedo Pereira** - “The problematic *Suberites* genus”

**Chiara Manfrinato** - "Not only for research"

**Melissa Martin** – “Taxonomy and phylogeny of the buccal-attaching cymothoids from Australia”

**Carlos Alberto Martínez Muñoz** – “Preliminary conservation assessment of Cuban giant centipedes (Chilopoda: Scolopendromorpha)”

**Petar Nikolić** - "Morphological characterisation of root-knot nematodes (*Meloidogyne* spp.) in Republic of Srpska"

**Isabelle Ochoa** – “Entomology research within Natural Resources Canada”

**Jasmijn Ruijgrok** – “Commelinaceae in the Guianas”

**Zandra Maria Skandrup Sigvardt** – “Evolution of Branchiopoda (Crustacea) with focus on systematics of Laevicaudata (‘smooth’ clam shrimps) and comparative functional morphology across branchiopod taxa”

**Pei San Helen Wong** – “Exploring the sea from Singapore to the pacific ocean”
Appendix 4 – Participants evaluations of the course.

COURSE EVALUATION

Name of course: Basics of Taxonomy: Describing, Illustrating and Communicating Biodiversity.
Consisting of: ¹Learning the computer program DELTA (DEscription Language for TAXonomy), ²Vectorbased digital illustration technique, ³Scientific writing and communication, ⁴Different methods to make a scientific illustration, ⁵Scratch Pads (Equivalent to 5 ECTS).

Semester: October Year 2016

NB! If the answer of the questions can’t be applied to all of the course modules, please make it more clearly in the comments!

The course had 13 participants, 12 answered the questionnaire.

1. The correspondence between the objective and content of the course has been:
   From 5=Very good to 1=Very bad

   Comments:
   - No comment x11
   - I think that the objectives set out for the course was largely covered and provided an excellent overview of the various issues. All the lecturers were very interesting and very engaging. For me it was really a great course and I will be able to use each tool we have learned to use in my own work.

2. How was the work load compared to the number of credits?
   From 5=Much too high to 1=Much too low

   Comments: Not applicable x3
   - No comment x8
   - Workload was not that high, and manageable, except for DELTA. One day more for DELTA should have been better.
   - Keeping the work load while increasing the number of credits. Courses with the same workload in Germany give 8 ECTS
   - Of course I don’t mean that the work load should be reduced (everything is do interesting!) but maybe you can add some credits
   - Was good

3. Were there areas where you didn’t have the necessary previous knowledge?

   No Yes, in

   Comments: Not applicable x1
   - No comment x9
   - Yes, I did not have the knowledge on DELTA and on Hand Drawing. But with the course, the resources given during the course and a real time investment I will be able to use DELTA and it will be very useful for my work.
There were some areas where I did not have previous knowledge, however, the course material was well provided and I did not feel overwhelmed or lost during the lectures and practical components.
Some arguments were totally new for me, but the professors gave me all the basis information to understand

4. How will you assess the lectures?
   From 5=Very useful to 1=Not at all useful
   
   \[ 7x5, 2x4, 2x3 \]

   Comments (on the pedagogics, the standard, etc.): Not applicable x2
   - No comment x10
   - Instructors were very engaging and very motivating. They were very attentive to the genuine needs of the participants. Lectures were very useful for me, but I would have liked the DELTA lectures much focusing on beginners who doesn’t have any knowledge of the software. The course about “How to write scientific papers” should have been more specifically being devoted to the taxonomic aspects (how to write a species description, a revision, how to cite the material studied).
   - The lectures were very informative. It is appreciated that the lecture notes were provided electronically.

5. How will you assess the field course/practicals (delete if does not apply)?
   From 5=Very useful to 1=Not at all useful
   
   \[ 5x5, 4x4, 1x3 \]

   Comments (on the pedagogics, the standard, did you get the necessary help, etc.): Not applicable x2
   - I really appreciate the way in which Instructors adjusted to the respective stage of study of each participant. Only the DELTA part was a bit difficult for me. However I must say the professors (Matz and Oli) were really helpful during the practice time. More generally, all the instructors were very helpful and attentive. I think that it could be a good thing to let the participants know in advance what are the advantages and disadvantages of having a Mac or a Windows Laptop during the course.
   - I think that people need a more practical approach on traditional scientific drawing. Probably this part should have more time.
   - I think it needs more practice time

6. How will you assess the seminars/student presentation (delete if does not apply)?
   From 5=Very useful to 1=Not at all useful
   
   \[ 5x5, 4x4 \]

   Comments: Not applicable x3
   - No comment x10
   - Student presentation were really useful to provide a good indication of what other participants do and the context in which they work. It helped a lot to know each other. The comments was also very useful
   - The seminars were very interesting. They provided information regarding what each participant was working on and their needs related to the DEST course. I don’t believe that it was useful regarding the context of the course.

7. How will you assess the syllabus (extent and contents)?
   From 5=Too big to 1=Too small
   
   \[ 1x5, 3x4, 7x3 \]

   From 5=Very good to 1=Very bad
   
   \[ 2x5, 6x4, 3x3 \]

   Comments: Comments: Not applicable x1
- No comment x8
- I think that, given the time constraints, the course provided a good overview of all the topics covered. However sometime it went a little too fast for me, and it was difficult to practice almost at the same time the information on how to practice was coming. Some courses were very intensive but I think we got all the information to practice the tools on our own thereafter. Yet, I would have appreciated if the lecture on how to write a scientific paper had been more specific for taxonomic papers. We have had a lot of comments about the figures and tables, but nothing about how to write revisions, descriptions, rules for naming species, rules for citing the material examined, etc...
- The syllabus was well laid out. I was hoping to have more hands on for the scientific illustration component of the course.
- I believe we need more time for trying out illustration and writing. Having more practical and the same amount of theory will help to understand all the problems.
- All were good. There were overlaps between Tomas’s and Gabor’s presentation on “how to present figures/tables/graphs”.

8. How do you assess the organizing and practical arrangements of the course?
From 5=Very good to 1= Very bad

| 6 x 5, 5 x 4 |

Comments: Comments: Not applicable x1

- No comment x9
- Everything concerning the accommodations was excellent. The information given before we came was pretty good to find the Center. However, it should be better to ask the participants to download DELTA on their computer (if not already done) before the course, especially if they have a Mac! Some of the participants spent too much time during the DELTA lessons in preparing their material because of bugs with the DELTA installation.
- I felt that the organizers covered and maintained the schedule for the course, but were flexible in adjusting time slots to accommodate the participants’ needs.
- I believe that we need a little bit more of practical activity on the scientific writing and traditional drawing

9. Your general impression of the course:
From 5=Very good to 1= Very bad

| 6 x 5, 5 x 4 |

Comments: Not applicable x1
- No comment x11
- Very good ambiance. Very good organization. Every think went perfect and the implication of each Professor was really great.

10. Did this course readily combine with other courses that you took this term (e.g. in terms of work load and schedule)?
From 5=Yes, very much so to 1=No, not at all

| 6 x 4 |

Comments: Not applicable x6
- No comment x10.
- Actually I did not take other courses this term. It was really good for me to get this training time. I am going to use it right away for my own work.
- This course was very involved but allowed the participants time to wind down each day. The most recent course I attended started at 0800 daily and did not end before midnight.
11. How did you receive information about the course?
- No comment x2
- Via e-mail from TAXACOM
- I found this course on the internet while searching for Taxonomy courses and information at DEST website
- My supervisor knew about this course and she told me I should join because I am doing taxonomic
- My supervisor told me about this course
- ForBio
- My supervisor told me about this course.
- Colleagues
- A professor of mine tell me about DEST programs
- A professor of mine is a DEST teacher so he advertizes DEST courses

Any suggestions on how to advertise future courses?
- No comment x7
- Perhaps inform the Universities but also the Associations (Entomology, Herpetology....)
- Maybe trying to use more social media to spread the word about the course.
- Use a more practical approach on traditional drawing and scientific writing
- Social network are very powerful, but mainly I think that should be more advertize in universities

General comments / suggestions for improvement / criticism:
- No comment x5
- I wish to pass my congratulations, sincere appreciation and thanks to Matz for the extraordinary well organized programme, and to all the lecturers who made this course an amazing experience.
- a course for taxonomist. Also, students had the opportunity to bring their own input and contribute with content to enrich future editions (e.g., new digitization routine in Adobe Illustrator). Suggestion for improvement: To include "tips and tricks" for pencil drawing.
- No
- approach government agencies of different countries to help support full/partial funding and create networking. They are always happy to collaborate, and it is best to start with your participants.
  • please be clear about the eating hours to both participants and kitchen staff. The kitchen staffs seem to always have a frustrated look and they start clearing food away (10-15 minutes) before the participants are done. This can be quite rude.
  • It may come in handy to inform participants paper money that is now not valid. Also important to let participants know there is no nearby bank, and they it would be advisable to have cash in hand, since it is far away from town.
  • On the same note for food and beverages, please inform us beforehand meals that we have to pay and not pay. It will also be useful to notify participants the nearest grocery store so that they have meals to eat. More often than not the kitchen provides limited meals (most males eat twice the portions as females), hence sometimes there isn’t enough or we end up eating leftovers.
  • It would be useful to inform participants to not bring as many clothes since there are laundry services, hence they can bring less clothes.
  • At 9.45 am, prior to making payment for accommodation, all receptionist took a coffee break despite another participant ringing the bell several times. One decided to ‘happily’ entertain us, only to let us know the “system isn’t set up” and that we should come at 1.00 pm to make payment! HIGHLY INEFFICIENT! POOR IMPRESSION OF THE INSTITUTE! Your staffs play an important role in welcoming people in the future, not deterring them to never come again!
  • The different option for transportation was useful, but has to be presented in a way that is not confusing (seemed like we had to take a bus AND ferry when the bus transit was enough).
    Example:
    o Option 1: using bus...... and transit....
    o Option 2: using ferry from ......
    o Option 3: using bus type......

- The “DELTA” and “Adobe Illustrator” were the most useful components of the course for taxonomy and deserve more time (at least an additional of one day each) in the syllabus. “Scientific illustration” was interesting but the emphasis should be more on practicing on the drawing and less on the introduction of different mediums, history of illustrations, etc. There was too little focus on taxonomic drawing. The use of the photostacking software and the camera-lucida deserve more time as these are very useful techniques for taxonomy. “Scientific writing and communication” was very applicable to us researchers but I think that the lectures were too much and could be
condensed into one day. The lectures of “Open Access” were dwelling too much on the problems and too little on the solutions. The practical sessions on “Scratchpads” could be taught in a more structured manner (i.e. step-by-step). Overall, the instructors have been really patient, passionate and helpful. I am really thankful of them because I have learnt a great deal despite the limitations mentioned above. I just hope that my comments can help this great course become an even better one for future taxonomists.

- This course had been a fantastic experience! Thank you for all this quality time