

CaBOL Kickoff Meeting

11./12. November 2020



Organization and Moderation: Nils Hein & Stefan Otto

Protocol: Lisa Karalashvili, Tinatin Chkhartishvili, Stefan Otto

Day 1 – 11. November

Starting at 8 am (CET) and 11 am (Tbilisi/Yerevan)

11:00, **S. Otto** CaBOL: Opening of the Kick-off meeting

11:06, **B. Misof** ZFMK: Biodiversity of the hotspots are not known well, this is why it's important to develop scientific research groups. It's important to improve communication between scientists and policy makers. Diversity decline is very important. The CaBOL project was presented to the BMBF, who thought that this project needed to be funded.

11:13, **D. Tarkhnishvili** ISU: ISU was created in 2006. Since day 1 it's been cooperating with the ZFMK. When Georgia became the associate member of the EU in 2016, our study group was identified as important by the EU. During the last decades there have been huge advancements of biodiversity studies in the world. The post-soviet countries were falling behind of these advancements. We experienced a loss of Taxonomy experts. CaBOL is exploring the biodiversity of the Caucasus in light of the loss of biological diversity. It is an investment into a new generation of scientists. It is an important investment into bringing the regional science to the level of the rest of the world.

11:18, **K. Gvenetadze (Embassy of Georgia)**: The implementation of such projects are essential for conservation of the environment. These projects have a very important impact on the regional scientific development. It's important that the ZFMK works closely with Georgian, Armenian and German partners. This creates sustainability in the scientific relationships.

11:23, **R. Harutyunyan**: Armenia is a hotspot of Biodiversity. It's notable for high level endemic species. There are several institutions studying the biodiversity and two of them are members of CaBOL. Since 2004 100 million Dollars have been spent to describe biodiversity and include it in the iBOL. This year Armenia became part of ??? project.

11:29, **S. Otto**: Next session – presenting partner institutions.

11:30, **D. Tarkhnishvili**: *Slide presentation*. ISU created in 2006, is a research university. Academic freedom is very important to the university and so is the involvement of the students into the research projects. One of the first faculties at ISU was the faculty of Life Sciences. A year later former institutions of Zoology and Botany were integrated into the ISU. Several labs were created and included into the institute of Ecology. In 2007/8 the genetic lab was created. It is the only DNA lab in the country focusing of biodiversity and education. We have a broad involvement of young scientists and students.

Developing international connections is very important. We have 3 graduate programs (Ecology, Forest science and management, applied genetics). We have a large output of publications.

11:36, **L. Mumladze**: *slide presentation*. Institute of Zoology is almost 100 years old. In 2006-2010 it became part of the ISU. The barcoding project is our primary research direction. The institute includes a museum, with a collection (not in the best condition). We want to add DNA collection and a library. Another important branch is Research. We have many young researchers working in various fields. We are planning to create Databases. Another important part of the institute is teaching. We have courses for BSc and MSc and we plan to expand this branch. We also plan to renovate the collections.

11:42, **G. Japoshvili** AgrarUni: *slide presentation*. The university was founded in 1929 but new life and reforms started in 2011. Entomology and Biocontrol research center joined in 2011. Today it's called the institute of entomology. We have 3 different labs – Arthropod lab, Beekeeping institute and Silkworm lab. Arthropod lab has 5 PhD students, one professor and one associated professor. A few years ago, we had a project similar to CaBOL, in Lagodekhi. 40 species were described and over 400 new records discovered. Our institute published over 100 papers in the last few years. We believe our participation in the project will be very useful. We have research on BMSB, trying to eliminate the damage done to agriculture. We also have several other projects with international partners.

11:49, **B. Gabrielyan** SCZHE: *slide presentation*. SCZHE was founded in 2006 by joining of Institute of Zoology and Institute Hydroecology and Ichthyology. Main activities are Biodiversity, Taxonomy, Morphology, Ecology, Ethology, Evolution, genetics. Training of young researchers is very important. Institute of zoology was created in 1947. It has 5 labs and a zoological museum. The museum of invertebrates has 500 000 samples and 11 000 species from the 19th century. In the last years 100 monographies were published. About 60% funding from government, 35.5 from Non-basic and 5.8 other. We hope for determination of the new and doubtful species, investment in collections and museums, attraction of students and young scientists, acquisition of new equipment and new scientific collaborations.

12:06, **M. Arakelyan** YSU: *slide presentation*. Yerevan State University is the oldest and biggest education centers of Armenia. We have 3 Bachelor's and 10 Master's programs. Monitoring of large mammals, Genetic diversity and cryptic speciation of rodents and bats, diseases of bats, diversity and conservation of amphibians and reptiles. Endangered species of lizards translocation program, reticulate evolution and parthenogenesis in rock lizards, hybridogenetic speciation, zoonosis of domestic animals, zoonosis of wild mammals. In CaBOL it will be interesting what we already studied and what we're going to introduce now. We also studied molluscs and parasites. We're very interested in studying some insects (butterflies, mites, spiders). Amphibians and reptiles are already well studied.

12:16, **E. Fischer/M. Ackerman** Uni Koblenz: *slide presentation*. Koblenz University has a long-standing cooperation with the institute of Botany and ISU, also with the Batumi Botanical Garden and Gardenia. Our actual partner with the CaBOL project is Konstantine Kereselidze. The aim of the project is inventory of the flora of Georgia and Armenia of Vascular plants, bryophytes and lichens. Establishment of a barcode catalogue. We have Checklists of plants of Georgia, Flora of Georgia and Armenia and checklist of bryophytes. We hope barcoding will help with analyzing doubtful species and cryptic species. Research focus: Herbarium and species mapping, barcoding as much as possible, field campaigns with Georgian colleagues and students (supervising BSc, MSc and PhD). Revision of endemic general and critical groups and establishment of identification keys.

12:27, **L. Fehrmann** Uni Göttingen: *Slide presentation*. The University of Göttingen wants to develop methods and techniques to generate such focused and reliable data and information based on statistically sound techniques. Developing/applying methods in statistical sampling and modelling, remote sensing, image analysis. We have developed the design for the first national forest inventory of Georgia coordinating between ISU and Göttingen. Next year a student from the University of Göttingen will come to Georgia to make their Masters thesis within the CaBOL project.

12:33, **N. Hein** ZFMK: *Slide presentation*. Center of Molecular biodiversity since 2010. Center for Taxonomy and evolution, molecular biodiversity and research, biodiversity monitoring and public relations and exhibitions. GBOL is also BMBF funded and since 2012 it was cataloguing biodiversity and making a database. Currently GBOL is in phase 3. Phase 3 is focusing on the dark taxa. GGBC was founded on the experience of GBOL. GGBC then involved into the CaBOL project. Already almost 5000 entries from Georgia and Armenia. 4 publications are already out from the GGBC/CaBOL.

Coffee Break

13:03, **D. Tarkhnishvili**: Next session – stakeholders.

13:05, **G. Zedania** ISU: It's important that other than the immediate results of this project, we will also get sustainable development of the scientific community and infrastructure in Georgia and also the sustainable use of the biological resources.

13:10, **K. Amirgulashvili** MOE Georgia: The global goal is improving the diversity situation and conservation. The Georgian government is also involved in the assessment and conservation of the biological diversity. As arthropods and such groups are less known, we hope the barcoding approach will help with assessing and conserving the environment. We also hope this project will help us build a new generation of young scientists. I think in light of the reforms in Biodiversity laws in Georgia the CaBOL project is very helpful and important. We are ready to collaborate with the project and offer our help where possible.

13:15, **N. Sultanishvili** APA: This is the first time a project is planning to give us a complete library of the genetic diversity of the species in the country. The role of science in forming and managing protected areas is huge. We hope the CaBOL project will be very useful to the agency of protected areas of Georgia. Barcoding and describing new species will also be very important.

13:20, **K. Tsiklauri** APA: We have employee(s) that can help you in the future in collecting and describing parts of the biodiversity, as research and assessment is very important to us as the agency of protected areas of Georgia. We would be happy to collaborate.

13:24, **N. Zazanashvili** WWF: WWF started working in Georgia in 1990 (?). WWF made ecoregional conservation plan for the Caucasus. We work with Key biodiversity areas. This is based on globally threatened species. However, we have a lack of information about species in the Caucasus generally and especially about the globally threatened species in the Caucasus. The ultimate goal is supporting the establishment of ecological network of protected areas and other conservation efforts.

13:31 **S. Otto**: You said that it is based on biodiversity, to my knowledge the distribution of biodiversity in the Caucasus is not known well. How did you deal with this problem?

13:32, **N. Zazanashvili:** We did this with the help of the knowledge of various experts in the field. It was based on the distribution of the larger animals. We will try to map these sites more correctly, but for now they're mostly based on mammals, birds, amphibians and reptiles and fish. These sites are based not on the whole number of species, but on globally threatened species. The site has to have 1.5% of the species global population.

13:33, **S. Otto:** Should we as CaBOL collect more in these areas or outside them?

13:34, **N. Zazanashvili:** It's important to cover as much area as possible. Even the presence of one globally threatened species in an area qualifies it as a key biodiversity area.

13:37, **B. Misof:** We know this from Europe that top predators usually show a strong delay in the population size and decline. This is why we're trying to focus a lot on the Arthropod groups that are reacting to change in environment much quicker. What can we do to transfer our new methodologies and information into the WWF Caucasus?

13:40, **N. Zazanashvili:** If insects are not globally threatened, they can't be used to identify key biodiversity areas.

13:43, **G. Lebanidze:** GIZ: IBIS project (?) supported the establishment of biodiversity monitoring systems. One focus is drafting the new Biodiversity Law and establishing policies of the protected areas. Another direction was education and awareness rising. There was a sub-project dealing with the emerald project. XX project is focused more on forestry and forest inventory. However, there are support directions of monitoring and legislation. Another subproject is the updating the Georgian Red List. There will be a checklist of species showing the conservation status. We are cooperating with the ISU on that project.

13:50, **B. Misof:** Are there any activities of the GIZ in Armenia as well?

13:50, **G. Lebanidze:** other than the red list projects, they are regional, dealing with Georgia, Armenia and Azerbaijan. They do have different focuses in different countries though.

13:51, **N. Shatberashvili:** ??? The NGO is ready to actively collaborate with the CaBOL project.

13:57, **C. Anderson:** We have heard about your organizations. I would like to hear from you, what would be useful to your agencies or organizations from our side? We have resources and we want it to be a two-way street. Other than the actual goal of CaBOL, we want this to go on past that immediate goal. And for that we need to collaborate with different organizations. So, think about this and let us know, how we can help you.

14:00, **N. Hein:** I would suggest to establish a working group or a basic information platform, in which we would directly communicate with all the stakeholders, constantly sharing our efforts and results. Maybe we could make some meetings for this.

14:03, **N. Zazanashvili:** It would be nice to have working groups, but we need to precisely identify the goals of these working groups in written form.

14:05, **D. Tarkhnishvili:** Which organizations would you consider for such working groups?

14:05, **B. Gabrielyan:** Some NGO's and maybe the ministry and WWF.

14:07, **J. Astrin**: We do have some flexibility in where we go and what we study. So do make suggestions, from NGO's, what we can do to help and we will try to be flexible and adapt to those needs.

14:08, **N. Shatberashvili**: We have an ambition to collect the information about the biodiversity of the Caucasus region, from both the Georgian international researchers.

14:10, **N. Zazanashvili**: our publication is based also on conservation landscapes. This could also be a Geographical indication of priorities.

14:13, **G. Lebanidze**: We had some plans to cooperate with you, but some plans changed due to corona. I can't promise anything specific but we can definitely discuss further cooperation.

14:14, **B. Ibele**: It might be of interest to look into some of the areas where we have a downscale plots of forest assessment. It's difficult to say precise cooperation right now. As our project right now is ending, maybe it would make more sense to discuss this next year.

14:16, **S. Otto**: Could we contribute with pest species research and identifications?

14:16, **B. Ibele**: I think it's definitely interesting to sustainable forest management in Georgia. That isn't our focus, but it can be discussed with the national forest agency and/or agency of protected areas. Right now, our pilot region is in Kakheti, in Akhmeta. We're doing a downscaled inventory there.

14:18, **L. Drösler**: I think we have to think about functional diversity in light of CaBOL.

14:18, **B. Misof**: We do have a scientific goal in the CaBOL project and we have to come together to discuss how this goal can be used to form better networks between different organizations. We have to separate this political side from the scientific goals of CaBOL.

14:22, **D. Tarkhnishvili**: We can make some blocks of information that might be useful for different organizations.

14:24, **M. Bitsadze**: I think the results of this project should improve the conservation in the region. I think this is a great example how scientists and policy makers can work together. It's interesting to see how pure scientific results are directly translated to policy making. We have to make sure the implications are visible. We have to take into consideration that these key BA's are identified only with the globally threatened species. But it is very important to also do this to the regionally threatened species. Just these BA's aren't enough. We need more scientific research. We have to improve conservation planning and demonstrate how science and policy making can work together.

14:28, **C. Anderson**: One thing we haven't mentioned is the educational side. Would you be willing to teach a course on how to communicate to policy making?

14:29, **M. Bitsadze**: I am trying to do this already.

14:30, **D. Schigel**: We are trying to educate on science-policy interface. I think it's important that in CaBOL science, policy is coming together!

14:33, **B. Misof**: Cooperating with GBIF is very important to CaBOL.

14:35, **G. Lebanidze**: GIZ is also working on creating a database in compliance with the GBIF and IUCN requirements.

14:37, **J. Astrin**: It would make a lot of sense to discuss if we want to special focus on barcoding the relict species. Once we have them in the reference database, we can make other applications. We can for example metabarcoding for monitoring. As we have people here who can also help us get permits, this might be interesting to discuss.

14:40, **N. Hein**: It's very important for us to establish a formal or informal meeting so we can discuss further actions with various organizations. Tomorrow we will prepare a statement to share with other organizations about what we as CaBOL can contribute to their activities.

14:42, **D. Schigel**: I think we shouldn't forget the value of in-person meeting, when it's possible again. I think everyone could benefit from some sort of biodiversity days, where we could have a more general part and a more science-oriented part. We could call this PR. These things are very important as they're translating into attention and then into funding. I think that a lot of people interested in the region would join. I think it's important to project onto broader public.

14:44, **B. Misof**: We definitely need a larger conference to invite a lot of different groups working in the Caucasus region, to identify groups for possible future collaborations.

14:47, **G. Lebanidze**: If we're talking about the cooperation opportunities, we are open to discuss what can be done about the barcoding of the red list species.

14:48, **S. Otto**: I volunteer to be the focal point for any wishes of future collaboration or suggestions.

Results session

15:01, **B. Rulik**: *slide presentation*. Collection – dry, wet and Biobank. ZFMK has a large digital catalogue. Earlier specimens from Caucasus are mostly vertebrates. The explosion of invertebrate samples is caused by the two BioBlitz events in the last two years. The museum also has a huge Zygenidae collection from Caucasus. There are also a lot of reptile samples from the Caucasus from before the GGBC times. There are much less samples from the mammal group. There are even bear specimens of bears from Georgia dating back almost 100 years.

15:17, **S. Otto**: How much of this stuff is already barcoded?

15:17, **B. Rulik**: about 9000 specimens, I think.

15:18, **T. Chkhartishvili**: *slide presentation*. Kintrishi project. Transect research of insect diversity in refugial zone. 18 malaise traps on 6 elevations + climate logger at every elevation. Samples were taken every 2 weeks. 2 Bachelor theses made (Tinatin Chkhartishvili and Eka Arsenashvili). During the work on the bachelor's thesis, 142000 insects were sorted to the insect level. It took 250 hours to sort and 102 hours to count these insects. These were 17 samples. Overall, 72 samples out of 202 were sorted. This took 1289 hours, and were a total of 20 liters of insects. We used 2540 tubes and 160 liters of ethanol. We plan to finish sorting the Kintrishi material to the order level as soon as possible and then move on to more precise identifications to prepare them for barcoding.

15:29, **K. Tsiklauri**: How many species did you collect in total?

15:30, **T. Chkhartishvili**: We do not know for sure how many species we collected, as they are not yet identified.

15:32, **S. Otto**: This material is huge, so only the first publications are being published, but it will take some time before we have the final results and numbers. We are sorting right now and after this we will send them to experts for species identification.

15:36, **B. Misof**: It is important to get information about the transect diversity in the region. Even though we are at the moment unable to deliver a species list, that is not so important, as we are still getting a lot of important information and is promoting the barcode database.

15:38, **X. Mengual**: *Slide presentation*. I did two field trips in 2018 and 2019. I also used material from earlier collections and the BioBlitz 2019 which I didn't take part in. I think CaBOL will help on researching Syrphidae, because they have a huge importance for pollination and environment. The previous research in the Caucasus was mostly done by the Soviet authors in the northern Caucasus. Based on previous literature we published a checklist for the Syrphidae in Georgia. These are 357 species of 78 genera from Georgia. 238 specimens from 74 species were barcoded. We know that the real species number is higher. We know this, because we already have new records from 2019 and we have not yet sampled in spring or autumn. Currently we are identifying and barcoding the material from 2019. We have over 500 samples. We are doing a revision of the genus Cheilosia (largest genus). We are also working on identifying the material from Kintrishi. I would like to visit Armenia and create a Checklist of Syrphidae from Armenia.

15:50, **M. Arakelyan**: You are very welcome in Armenia and we would love to collaborate with your research. Maybe we could even collect some material and send it to you to speed up the process.

15:52, **N. Zazanashvili**: The places you've sampled are very interestingly chosen.

15:54, **X. Mengual**: This group is very diverse. Adult and larvae are feeding on completely different things. There are many different species groups, adapting to various environments, so we tried to pick diverse habitats for sampling. I am planning to move my collection sites further to the east now.

16:33, **Hans-Joachim Krammer**: *slide presentation*. Larger species diversity around Tbilisi shows that the rest of Georgia has been vastly under sampled. We collected over 1400 spiders in 2018-2019 (plus the spiders from Stefan Otto). In total this was 274 species, which is about 35% of the known species of spiders for Georgia. We barcoded 770 specimens. Over 30 new records for Georgia, 10 possibly new species and over 30 new BINs. The relative number of species per family of our collected sample is almost identical to that known for Georgia, which means a great coverage collecting. Several species identified through barcode only. Several problematic species (lumps, splits). Paper is asking more questions than answering. Next steps would be to continue collecting to hopefully resolve the problematic species and also to collect in Armenia, for which only a tiny amount is known about spiders.

16:42, **D. Tarkhnishvili**: Is it possible to identify with the barcode resolve some artificially introduced species?

16:42, **H. Krammer**: I don't think CO1 would be very useful for that. From what we saw, the species composition is definitely changing, but it's hard to tell why this is happening.

16:43, **X. Mengual**: A lot of arthropods have large dispersal rate. Often, they can disperse naturally and breed.

16:45, **B. Gabrielyan**: Are you planning to come to Armenia? We have a student here who starts study spiders, so you could make some exchange with her.

16:45, **H. Krammer**: I hope so. She is already in touch with Stefan Otto, so we will definitely have some exchange.

16:46, **L. Mumladze**: *slide presentation*. 3 years ago, we made an international team working on updating the checklist of freshwater fish in Georgia, Armenia and Azerbaijan. We collected some of our material during the two BioBlitz events in 2018 and 2019. The data we have is very useful for genetic and taxonomic studies. The older samples, for example the older collections, are usually damaged and not useful for genetic studies. One of the goals of our study was to establish a barcode database for fish. We obtained barcodes of collected fish from the ZFMK and combined them with the other existing data. In total we obtained about 350 barcodes. While there are existing barcodes for the more widespread species throughout the world, the more endemic species are not represented with barcodes well enough. Within the CaBOL project, the fish barcode library is expected to be completed. We also want to create a barcode library for not only fish, but also other freshwater inhabitants. Due to the industrial development of Georgia, metabarcoding is becoming increasingly useful for monitoring of endangered species. Interest to communicate from both the scientific community and the policy makers are very important for implementing the results.

17:01, **B. Gabrielyan**: What source did you use for Armenian fish?

17:02, **L. Mumladze**: I can share my publication with you so you can take a look at the sources.

17:03, **A. Wellenbeck**: *Slide presentation*. Open Foris app. It is important to standardize the collected data. We aim to combine this with the remote sensing data. No sample can enter the database without accurate collection data. The app would be a good means for easy integration into existing databases. The app will ensure the data complies with the data quality requirements. This will facilitate the harmonization and transfer of data to existing databases. It would make it easier to standardize data collected within CaBOL. The app can also integrate the CaBOL collection guidelines. GPS coordinates will be stored automatically. For the development of this app, we need to define the structure of the database, the underlying taxonomical backbone and the standardization of the code lists. We are planning to release the first beta version and start testing in 2020. In February 2021 we will release the app and test under field conditions. We hope the final version will be ready by March/April 2021.

17:20, **L. Mumladze**: Sometimes we collect in the field without identification. How would we use this application when we're collecting soil samples or bottles?

17:21, **A. Wellenbeck**: The app also runs on the desktop. So you could run the app in the lab and enter the data once you finish identifying your sample.

17:22, **L. Fehrmann**: You can also take the data about habitat types and GPS data in the field and then complete the entry in the lab.

17:23, **B. Misof**: It's very important that the collected data needs to be standardized.

17:24, **A. Kandaurov**: It is very important to have not only the checklist, but also the full metadata, which will also help define the particular habitats.

17:27, **E. Karalashvili:** *slide presentation.* Before starting the Kintrishi project we got a lecture on introduction to basic arthropod taxonomy and worked a few days under supervision. In September 2020 we had an expedition to Javakheti, covering most of the region. We collected many species of molluscs, reptiles, amphibians, beetles and butterflies. Some samples still need identification. We have the genetic material as well as the samples for the collection. In February 2020 6 ISU students did an intensive taxonomy course at the ZFMK. We had theoretical lectures, supervised sorting and had to work with individual taxa. In autumn a group of ISU students and lab assistants also went to the Agricultural University to the lab, got acquainted with the group working there and made some future plans of collaboration.

17:37, **G. Japoshvili:** We had a large malaise trap transect project in Lagodekhi, similar to the Kintrishi project. We are also getting a lot of Hymenoptera material from Kintrishi. All superfamilies of Hymenoptera are represented in our material. We are working on the Kintrishi samples also, but we have material from only few traps and are still expecting more material.

17:46, **B. Gabrielyan:** We started our field work in summer 2020, but had to stop in October due to the political situations. We covered 6 regions of Armenia and at least 12 riverine systems. Several thousand specimens were collected from 65 localities. More than 3000 specimens are already analyzed morphologically and 150 were chosen for barcoding. We sampled macroinvertebrates. We identified 650 insects and 29 fish (about 500 and 13 species respectively).

17:55, **M. Arakelyan:** We collected 57 spiders, 15 lizards and 2 mammals. We also included students in our field work, teaching them identification and collecting methods. ?????

Day 2 – 12. November

1. Summary of first day, Nils, 8 am

- Yesterdays meeting with 70+ people a huge success, we should think about including NGOs and state institutions more and establish cooperations, especially cooperation with WWF office is very important. Marine suggests special meetings based on specific questions concerning stakeholder institutions. Agreement to make an initial document about these cooperations and to make a list of possible stakeholders which could profit from CaBOL services and which could help CaBOL (Stefan Otto will coordinate these efforts).
- Options: ... Larss Drösler suggests offering CaBOL expertise on red listed species, focus on protected areas and examples of such cooperations from GBOL in the past ... David Tarkhnishvili added Georgian Biodiversity Database ... access to CaBOL database to state institutions

2. Database and taxonomic backbone for CaBOL, 8:12 am

- Peter Grobe, presenting a schema of dataflow via PPT from expert/Open Foris to Diversity Collection, from there to Geneius software, enriching collection data with sequence data back to Diversity Collection and from there to GBOL Web Portal or to BOLDSystems ... need for a taxonomic backbone is stated
- Björn Rulik on this topic in GBOL ... stresses importance of solid taxonomic backbone

- Bernhard Misof stresses integratability of the forestry/RS data from Göttingen group ... Peter states this is already in progress and communication is ongoing, a separate server will be set up ... data needs to be linked between species, collection, sequence and habitat and remote sensing
- Lutz Fehrmann ... coordinates link species collection data and habitat data ... asking for type of field needed in the database
- Jonas Astrin in chat: "FIMS (=Field Information Management System), basically just the taxonomic and collecting info when mixed with the lab data"
- Peter Grobe and Lutz Fehrmann agree that habitat type information could be queried from another source/database
- Peter Grobe raises the question of how and when the database might be moved to Georgia/Armenia
- Marine asks that some data on protected species should not be visible to the public ... Peter Grobe reports how this is done in GBOL and that it will be possible in CaBOL database too
- Lutz Fehrmann ... asks whether it is realistic to expect state institutions to share information on e.g. forest inventory with us because this is often sensitive information ... Lars Drösler thinks this is not a problem, institutions will share.
- Lars Drösler cautions us to sample management as well as not managed sites.
- Levan Mumladze states the aim to run the CaBOL database long term ... David Tarkhnishvili and Cort Anderson speak briefly about current development at ISU in data analysis facilities/servers. Nils stresses the need for a plan of implementation and it is agreed to investigate this further at ISU in the next weeks (Levan, David, Cort, Stefan). Peter Grobe suggests a new project proposal including a programmer/IT administrator ... all agree to that. ISU needs to establish a data center and employ someone running the software infrastructure.

! make Zoom meeting with Erekle with Levan, David, Stefan

- Marine states that they have an IT person who could be employed.
- Topic **Taxonomic Backbone** ... Georgian Biodiversity DB as backbone updated successively
- Björn Rulik stresses the importance of curation of the database, checking entries, this is lots of work
- Eberhard Fisher offers to provide a revised checklist of plants ... Stefan and Levan volunteer to **start the taxonomic backbone as MySQL file** and add then species and checklists based on samples and information coming in.
- Peter Grobe sends link ...
http://www.diversitymobile.net/wiki/DTN_Taxon_Lists_Services
- Marine Arakelyan and Bardukh Gabrielyan state the lack of recent checklists for Armenia to be contributed
- Taxonomic Backbone Group will do Zoom Meeting next week on this topic

3. Upcoming field work, harmonisation of efforts, 9:55

- Björn Rulik ... proposes to use Ecoregional Conservation Plan of WWF to find prime sampling sites to maximize sampling of most species in Georgia and Armenia and sample there with a certain set of sampling techniques.

- Lutz Fehrmann ... stresses importance of systematic sampling versus sampling as much as possible
- Jonas: Sampling needs to be logged, this is important for "absence records"
- Lisa Karalashvili stresses collecting in urban areas does make not so much sense in the light of absence of background information on the species' distribution
- Discussion about whether to do standardized collecting for CaBOL or expert groups collecting their taxa only. Jonas proposes to add student helpers to each field trip and they collect by a standard protocol using standard methods.
- idea with some consent **to attach student helpers to field trips** who collect using some standard methods to facilitate modelling.
- do "Mini-Bioblitzes" to get randomized samples and give students credits for their studies. Lisa proposes to give students on these excursions study credits.

4. Knowledge exchange in CaBOL, 24 participants

- Cort ... Make **CaBOL info sheet** for stakeholders (Cort will draft)
- people going to the field should announce one week in advance, so students can attend and collect for CaBOL ... Tina proposes Argus to announce dates in ISU ... **implement calendar (Stefan)**
- Agreement to a **6-week-trial of the website** as information hub ... Stefan, Chris and Nils organize that (Stefan)
- How to formalize training: field methods ... David Tarkhnishvili proposes to enrich existing curricula with training elements from CaBOL
- Dmitry Schigel/GBIF on teaching barcoding, field work for barcoding, web lab course, data courses, principles of barcode determination ... funding is there for courses in Yerevan and Tbilisi (maybe online due to pandemic), for 16-20 students

Dmitry: "Thanks for highlighting the need to open BSc students. I suspect these needs to be already after passing the basic zoology and botany courses, e.g. last year BSc students? The current (draft) prerequisites for the BOLD+GBIF course says: "The course is suitable for MSc and PhD students in biology and other professionals in relevant fields. Participants should have an affinity or professional interest in biodiversity. Participants need to have a motivation and interest to handle barcodes, collection and observation data. A good understanding of English is necessary to follow the course, carry out the exercises and to get good support during the teaching.""

- Cort is looking for participants for a working group on training and teaching aspects, developing curricula, schedule (Milestone 16)

5. Milestones 11:45

- Nils: Overview on progress
- Discussion on information gathering ... Nils gets DLR questions from Vera or DLR and sends it to Stefan who compiles these information from the institutions into a "preliminary report" (December) as the basis for the DLR status report in April (Milestone 8)
- Discussion on next student exchange ISU -> ZFMK is postponed to a later point due to the pandemic

6. Outlook CaBOL Phase 2, 12:20

- Cort: 50,000 barcodes will not exhaust biodiversity coverage in the Caucasus ... How to proceed in CaBOL Phase 2, what strategy is appropriate.
- **big pile of unidentified material** as basis for further research in Phase 2
- Jonas stresses the importance of **taxon lists as background information** of what is still missing after Phase 1, what barcode/species coverage has been reached
- results that increase chances of Phase 2: pilot studies in meta-barcoding, **showcases of applications** of barcoding and the database ... conservation, forensics, illegal trade, joint programs in master programs showing long-term development in the education systems (Armenia-Georgia-Germany)
- **outlooks on going deeper in analysis**
- **broaden project in Armenia** and maybe include new members, Institute of Botany, Mycology department
- **develop curricula in student training** ... development of Erasmus program should be pushed, especially bottleneck at Bonn University (group with Mathias Geiger, Nils, Bernhard Misof)
- Lars proposes to set focus the education part of CaBOL on either biodiversity, ecology or natural resources, should be discussed among the PIs
- Bernhard adds BMBF master programs, financing lectors, hardware development, which could be addressed
- David asks to postpone curricula development until summer of 2021 because at the moment several curricula implementations
- Jonas points to "**well managed collections**" because BMBF sees these as developed resources, therefore this should be focus in CaBOL. Bernhard DISCO programs worldwide to develop collections and databases ... CaBOL should be integrated in these efforts, since it increases the chances for further funding. Funding is being negotiated right now with EU and countries. Big chances if this program could be extended to the Caucasus region.
- David mentions **public relations** and privacy protection regulations.
- Marine: Especially made videos on results could contribute to the public relations part. David mentions ISU PR department could maybe make such a video for CaBOL.
- Lutz Fehrmann suggests to reuse already existing material, e.g. online-lectures made during the pandemic for distance learning.
- Talk about Phase 2 again in December or January 2021