Hi, Rob Guralnick and Michael Denslow here. We are excited to talk with you all about Notes From Nature a citizen science tool for mobilizing primary biodiversity information. Ask us anything.

Notes$_{F}rom_{N}ature$[1]$andr/ScienceAMAs$[1]

[1]Affiliation not available

April 17, 2023

Abstract

EDIT: Thanks for all the questions everyone. We appreciate you all stopping by! We are now going to stop answering in real-time, but we will stop back over the next few days to see if additional questions come in. Hi Everyone! Did you know that the vast majority of biodiversity museum specimens rarely see the light of day? They are stored in the back rooms of museums where few people get to see them or use them for scientific research. These billions specimens are housed in natural history collections around the world, where they are carefully curated according to centuries old methods. While this care has successfully preserved important collections for decades to centuries, it is now time to bring 21st century approaches to the sharing of this treasure trove. The primary topic of our conversation today will be a citizen science based transcription platform called Notes From Nature. Notes From Nature is a project that brings together people from around the world to help mobilize biodiversity information. These are experts and non-experts alike. We deal specifically with specimens from natural history museums (think of animal skins and dried, pressed plant specimens). These specimens are generally of interest to researchers and are not often seen by the public. However, the line between "the public" and domain scientists has always been grey when it comes to natural history, since informally trained people have made huge contributions to the study of biodiversity for a very long time. We will also touch on related areas such as the technology side of our field (called informatics), software tools that are being developed to accelerate digitization of museum specimens, data standards and the semantic web. We are also very interested in the research that is being done with the data and specimens that are being mobilized and how this research can be used to answer many of the major biodiversity questions of our time. We should probably mention that we are not experts in citizen science but we work with many people who are. In fact our collaborators at the Zooniverse did an AMA about a year ago (https://www.reddit.com/r/IAmA/comments/1pvge6/we_are_the_zooniverse_the_worlds_most_awesome_and/). We are very passionate about our work and love to talk to people about our field. Ultimately we hope that you all will get excited and will become more involved as well. We will be back at 1 pm ET (10 am PT, 5 pm UTC) to answer your questions, Ask Us Anything!

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CORRESPONDENCE:

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Hi Rob and Michael, Notes From Nature seems really cool from a museum/researcher perspective (I'm pursuing a PhD in ecology, so I definitely support better/digital cataloging of specimens).

However, what's the benefit to the citizen scientists who do this transcribing work? Are you planning on some sort of extended learning opportunities, free museum passes, or other sort of rewards? You mention that the public gets to see cool specimens, but for most people, that desire is filled by going to the public display areas of a museum. It seems like the most successful citizen science projects, like eBird, thrive because they capitalize on something

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people already want to do (go birding, and then organize their birds).

I'm not trying to be antagonistic- I love citizen science, and I hope your project is as successful as you want it to be!

DMcDBee

This is a really important point and we do want this to be a positive experience for our volunteers! There are a few approaches that we are taking to this and it is something that we definitely want to improve upon. First, is that we assume folks want to learn more about biodiversity, so one of the things we are going to expand in the near future is the use of what we call external content. You can see a preview of this idea in the Macrofungi interface that we currently have. It shows you live field images of the fungi. We are a planning to bring in range maps, field images and other information about the species in question. They way we plan to do this is to draw from existing projects like Map of Life (https://mol.org/) and Encyclopedia of Life (http://eol.org/). The goal being that people can learn more about these organism and where they occur.

We also want to develop more “informal education” content related to Notes from Nature. We are actively seeking collaborators and ideas to do this as well. What we have to keep in mind is that people are doing this all over the world so we need determine the best way to reach our volunteers. We are involved in an upcoming initiative called WeDigBio (https://www.wedigbio.org/) where people come to onsite transcription blitzes where they can take part in tours, parties and other fun actiivites that related to natural history collections.

By the way, we love the idea of giving away free museum passes! Thanks for that suggestion.

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DMcDBee

We love the idea of rewards, and in part we have some built in rewards such as badges. Do you think that rewards such as museum passes would be something you'd be interested in? Let us know! We have had some neat ideas about this in the past, but there has been some discussion on whether external motivations are needed/desired.

We do also hope that you get to see a completely different side of the museum work re: digitization and collections, as opposed to more exhibit oriented work!

Hello there! After cataloguing all this stored away information, will the public have free and easy access to it? If so, how? Will there be summarizations of important findings in layman's terms so the average person slightly interested in the field can keep up?

So often the sheer amount of information and specimens out there boggles my mind, this seems quite the huge undertaking but sounds very exciting.

Doug_Mirabelli

Yes it is indeed a huge undertaking! The short answer is that virtually all of the data is Open Access and available to the public. There are a few different places that this data will eventually be available for download such as data aggregators like GBIF (http://www.gbif.org/) and iDigBio (https://www.idigbio.org/). All the herbarium data will be on the SERNEC portal (http://sernecportal.org/) as well. There are a few challenges to this that we want to overcome however. The first is that is it not currently easy for a volunteer to connect their effort with what comes out on these portals. In other words, knowing which specimens are the ones that you were involved in transcribing. The second is that the data flow can take time to make it's way from Notes from Nature back to a museum and then out to these data aggregators. For the first problem, one idea we have is to simply allow volunteers to have a way to go back and view their past effort and be able to download it and visualize it in different ways (e.g, mapping). This is part of the improved User Dashboard that is in development.

We plan to talk about research outcomes on our blog (http://blog.notesfromnature.org/), but we haven't done that as of yet.

Thanks for taking time to answer questions.

There are also significant collections outside museums, of course. I visited Grice Marine Lab, and was shown their impressive collection of hundreds of thousands of specimens. As you mention is the case with museums, these specimens can be available, but I understand they are largely unknown.

My question is, what do you think can be done to improve discoverability? The level of effort to collect and curate these valuable samples far outweighs any expense to modernize interoperable databases. Even if relatively low level metadata were searchable I imagine usage would greatly increase. A natural follow-on question is where might one seek funding to support such an effort?

Wrathchilde

We are agree that digitization is a good way to increase discoverability of the specimens. It is also important to note that there is no replacement for the actual specimen itself and many use cases involve utilizing the physical specimen to do research (e.g., DNA extraction). The National Science Foundation in the United States is the primary agency that funds things related to museum curation and digitization.

This may seem like an extremely dumb and naive question, sorry about that, but what kind of university courses are available in archaeology and biodiversity informatics (basically how does one become a curator and how does one get access to do research on these specimens)? And can these courses be taken later in life? Like after I'm done with my PhD and Post-grads? Thank you.

floweraldehyde

This is not a dumb question at all! The answer is not exactly simple as there may be a few different routes to take to come into the field. There are some great museum studies programs around the Unites States that teach traditional curation techniques. One great way to get involved is to work with someone at a university that has a strong and diverse museum program. One example is where Rob works at the Florida Museum of Natural History (http://www.flmnh.ufl.edu/). I should mention that many museum curators actually get into the field by studying specific organisms and get experience through their research. Many curators in university museums also have teaching responsibilities and might have joint positions in other departments.

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floweraldehyde
Biodiversity informatics is a discipline I would call "nascent" --- there is a lot going on at the professional level but there is not yet a core curriculum developed. I am hoping that changes (and to be an active agent in that change).

Being a Curator or manager of a collection is a different issue, although most of the folks in these jobs are recognizing how important biodiversity informatics is esp. in this day and age. Curators and managers are people who have worked in collections, most often as both researchers and stewards.

Getting involved is as easy as emails a curator or collection manager and asking if there are volunteer opportunities. Often there are! Its especially fortunate if you are in a city or town with a good natural history museum. If not, we are glad Notes from Nature can be a useful way to interact with scientists working with specimens!

How big of a challenge are you facing? Do you have an estimate of what percentage of specimens are digitized?

Doomhammer458
This is a huge challenge and one that is being worked on all over the world. It is estimated that only 5-10% of the specimens in the World are digitized. In the US it is estimated that there are at least 1 billion specimens with only a small fraction digitized. Interesting that with this level of work to be done these projects could not be complete without citizen scientists!

How big of a challenge are you facing? Do you have an estimate of what percentage of specimens are digitized?

Doomhammer458
Another interesting aspect to this is that some specimens are much easier to digitize than others. For example, dried plant (herbarium) specimens tend to be much easier than pinned insects. Wet collections such as fish have there own set of challenges since often the label has to be removed from the specimen jar as well.

I have come across a lot of specimens...my question is that how is that these specimens look so real so alive.....also ...can you explain a bit of about some interesting specimens you came across since some have very distinct characteristics in there life.

etimejumper
Yes I agree that the specimens can look very alive! It really depends on the preservation method. Insects are usually pinned with their wings out in a very natural looking pose so they can look alive, whereas plants usually get flattened into herbarium sheets and so they do not look so alive. I find that I am interested in a lot of different specimens, ones that have cool features like stag-horn beetles or ones that were collected ages ago by Darwin.

This seems like an interesting idea, but in many areas citizen science has yet to catch on. What do you plan to do to engage the active public, and more importantly, engage those that may

have some experience and assist in this cataloging effort?

The barrier to entry has seemed to be public engagement, and people just arent that interested in these sorts of activities. A counter would be something like Folding@Home, which used a video game to crowdsource protein folding and participation. Would such a strategy work for this as well?

glr123
Agreed! These efforts are just the beginning of what we can do with crowdsourcing. We do have plans to turn these efforts into more fun interactive game-like atmospheres. We think these will reach more people and encourage further participation. We can also use these other platforms to increase knowledge of our biodiversity.

I've used citizen science projects from Zooniverse in my classes over the years and I'm passing this along to some of my colleagues. One quick question, why is this organized under "Humanities" on Zooniverse?

jjsav
Good question! This was organized under nature before. Not sure why the change!

I use the Zooniverse portal in my high school science class every year, and I've highlighted your project for the last two years. It's a fantastic concept, and a very important goal. So thanks for doing that, and thanks for being involved with the Zooniverse portal!

BrerChicken
Oh wow thank you for using this in your science classes. One thing we would like to do is to come up with more educational modules that will allow a teacher to have a wide range of specimens available for a classroom setting!

Citizen science is a very useful tool in my world (watershed and estuary management), but ensuring the quality of samples can sometimes be a challenge. How do you manage QA/QC for your citizen groups? Could you also touch on recruiting and keeping volunteers engaged? Longevity can also sometimes be a struggle I see...

Thanks!

BGDrw
Notes from Nature gets multiple transcripts per "subject" - 4 to be exact. We actually think that is less efficient than it could be and we'd like to move to a "transcribe once and validate" model to test that out.

Re: recruiting and engaging volunteers, that is a huge issue for ANY project. I think the big thing is responsiveness --- not that we have nailed this on Notres from Nature. But being responsive and understanding volunteer/public participant needs. That is really important.

Do some of the specimens stink?

BlueZek
Yes, they do. Interesting for plants specimens certain families seem to always have a strange smell. For example the Scrophulariaceae always smells strange even decades after the plants are preserved.

Many wet collections such as fish and reptiles also smell from the preservative that is used.

Do you choose which specimens to preserve or just the holotypes (what about the Isotypes, Paratypes and Topotypes)? How reliable are the specimens preserved in museums with years in alcohol or dried for classification goals? Do you consider your technology could become a better tool for systematics?

Juancarlosmh
Which specimens to preserve is often the decision of the curator or the collector. In general, it is very valuable to have many specimens of the same species from different place and time periods. This way they can be used for a greater number of research purposes and answer a broader range of scientific questions.

If alcohol is replenished regularly (it evaporates even in closed jars) then they will be good for identification. Dried specimens such as plants and insects are also good for identification as long as the are kept free of pests, fire, flood. etc.

One way that Notes From Nature can help systematics is by mobilizing more biodiversity information. It is often difficult for scientists to find all the data or specimens that they may want for their research. Making the data available digitally increases the likelihood that a specimen will get used which generally adds value to the specimen.