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ERGA iBOL EUROPE

Connections

3. What brings us together?

The European Reference Genome Atlas (ERGA) and the European node of the International Barcode of Life (iBOL Europe), two international communities of scientists brought together under the Biodiversity Genomics Europe Project, are joining forces for a series of blog posts that explore the fascinating world of Biodiversity Genomics and the intersection of their communities.

Biodiversity Genomics Europe
BiodiversityGenomics.eu

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What brings us together?

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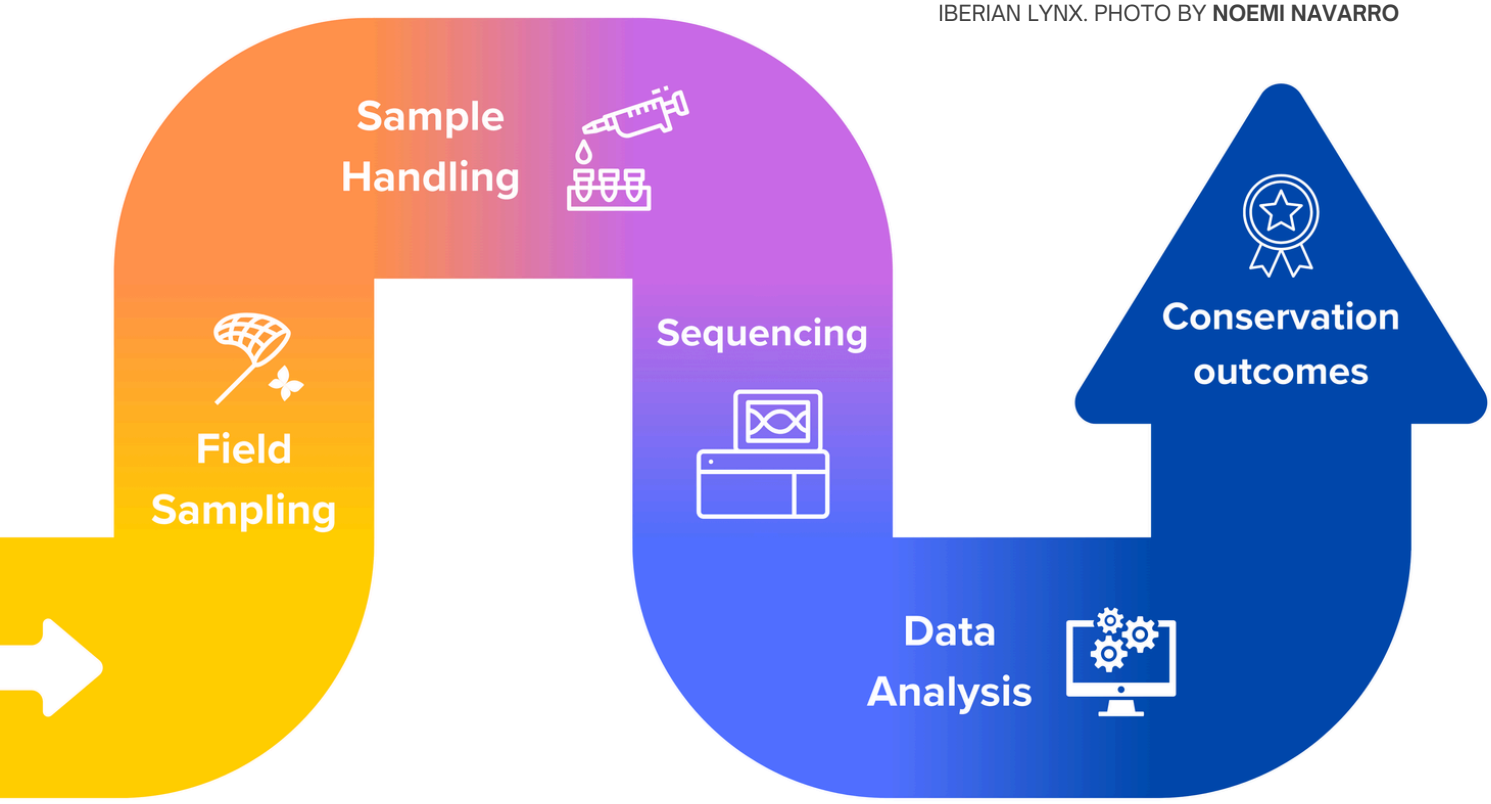
In our last post, we introduced barcoding and reference genome sequencing - the two different but complementary DNA-based techniques IBOL Europe and ERGA use to study European biodiversity. Now, we will explore the work of these two communities step-by-step:

IBERIAN LYNX. PHOTO BY **NOEMI NAVARRO**



Going on an adventure

Both iBOL Europe and ERGA's work begins by stepping into the natural habitats of European species. iBOL Europe might scoop up a cup of pond water or set up special traps to collect insects, looking for tiny bits of DNA (also called eDNA) that tell them which animals or plants are found there. ERGA also collects samples, but they have to be extra careful: they might freeze entire leaves, small pieces of fungi, or other tissues in liquid nitrogen right away to keep the DNA in perfect shape. It's like putting food in the freezer so it doesn't spoil!

From the peaks of the Alps to the wetlands of Biebrza, collecting samples for DNA sequencing can feel like an expedition! But it's not just about the adventure - fieldwork requires extra care to keep specimens in perfect condition. That's why researchers use special storage methods, like the small tank of liquid nitrogen in the left photo, to safely transport their precious samples. Photos by Brad Carlson and Szczepan Skibicki.

The magic begins

Once the samples are back in the lab, both groups extract DNA (the "instruction manual" for living things). But ERGA also goes one step further by looking at RNA, which helps them see which parts of the DNA are actively at work in the organism. Think of DNA as a big book with all the recipes and RNA as the ingredients currently being used to bake something yummy.

Reading the DNA

With their DNA samples ready, both iBOL Europe and ERGA use sequencing machines to read the genetic code. iBOL Europe focuses on short bits of DNA, the “barcodes” on a product, that tell them which species they’re looking at. Meanwhile, ERGA uses long-read technology (such as machines from Oxford Nanopore Technologies) to piece together a complete “book” of DNA for each organism, giving them a more detailed view of how everything fits together.

Sequencing centers, along with the sequencing machines depicted here, are crucial components of the infrastructure needed to support biodiversity genomics initiatives such as BGE. photo: David Levene/ Wellcome Sanger Institute.

Let's start the puzzle

After DNA is read, there's a lot of information to look at. Artificial intelligence (AI) and machine learning help researchers find patterns in these vast datasets. For iBOL Europe, the main question is: Which species do we have here? For ERGA, it's more like: How is each organism's DNA arranged, and what can that tell us about its survival or evolution?

Helping nature

Finally, both groups use their findings to protect biodiversity. If a certain species suddenly disappears from a spot where it used to live, the barcoding data can raise a red flag for conservationists. ERGA's full genomes can show how a species might adapt to threats like climate change or pollution, useful for genetic rescue plans. By sharing information, these two communities help each other and the planet, too!

Even though iBOL Europe and ERGA look at DNA differently, ID checks versus "book-length" analyses, their steps along the way are quite similar. In the end, they both aim to give us a clearer picture of the amazing life we share on Earth so we can keep it safe for years to come. Stay tuned for our next post to learn more about how science, technology, and teamwork are saving the day in the world of biodiversity genomics!

THE SPANISH MOON MOTH. PHOTO BY FAUNUSLSD