

DON MELNICK

PART II

GENETIC THREATS TO SMALL POPULATIONS

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DM: Let me just go into a brief introduction. As George said, I wear two different hats. I'm director of a consortium that includes Columbia University, The American Museum of Natural History, Wildlife Conservation Society, The New York Botanical Garden and Wildlife Trust. And I also direct a laboratory of genetic investigation and conservation along with my colleague, Dr. Juan Carlos Morales. And it's very much involved in the kind of work that you've heard about this morning, and you're going to hear throughout this two-day conference.

I was asked to sort of set the stage for the presentations that are going to be in this part of the conference. And, so, to set that stage, I'd really like to talk about where the study of genetic diversity of populations and, perhaps, clusters of populations within species fits within this larger context of conservation.

In general, what we've seen is that when we go about trying to do this research

(break ... announcements and waiting for computer....)

DM: Okay. The unholy trio, which you've heard talked about to some extent today: habitat fragmentation, invasive species and loss of genetic diversity. And, obviously, if you've been awake this morning while this was going on, you know that we are actually talking about genetic diversity. And what do we do with genetic diversity? We describe it. That's what geneticists do they describe it, they map it, and then they use it. And they use it to address a number of important conservation questions. And some of them have already been described this morning actually very eloquently.

I'd like to categorize those questions very simply. They are the questions of: What are we going to conserve? Where are those things? How are we going to do it, once we find them, where they are? And who is going to do that work?

Okay. Today, the session that I am moderating, about genetic diversity, really usually deals with this issue of how. Once we've defined the units, and defined where they are, how are we going to actually do this? So the questions of how usually involve investigations at the species level or below; measures of genetic diversity and space possibly, over time, if we're lucky, and have that kind of sample; and recommendations for action to preserve that existing diversity. We've all heard about the correlation of diversity with the health populations in species, and so, therefore, we usually are trying to use this information to make some kind of a conservation recommendation.

But I wear this other hat as directing this consortium of conservation groups and researchers. And I would say that this approach assumes we have an infinite amount of time to conserve biological diversity; we can save nearly everything; and, therefore, we can study whatever we want to.

Now, an alternative approach might see: We're nearly out of time. We can only save a fraction of what remains. And, therefore, we should conduct research

on species whose analyses will have the maximum conservation impact. It would be great if the first model were true. Unfortunately, I believe this one is probably true.

So, therefore, we have to focus on certain kinds of species. At least, this is what I believe I'm not saying this is generally true. And I would say they fall into these categories of labels that we've actually heard but we usually hear them in terms of conservation of species and ecosystems, and not so much in terms of conservation genetic. These are flagship, indicator and umbrella species. Sometimes correlated with those other charismatic, keystone and landscape but they are actually a little different.

So the flagship, or charismatic. Here's an example the black lion tamarin, just to give you a concrete example. The black lion tamarin is a kind of flagship, or emblematic, of the Atlantic forest particularly the Atlantic forest of the interior. In fact, the term Atlantic forest of the interior was probably invented for the black lion tamarin. It is a forest that you can see here. It once had a broad extent, in 1500 and now you can see little bits of red all around there. Highly fragmented here's why it's highly fragmented. A lot of agriculture burning, and little patches of forest that now exist.

The genetic analysis of this species done by a student of mine, [B. Perez,] in collaboration with our collaborators in Brazil Claudio Padua and Laury Cullen has revealed to us that there are important genetic differences between the last fragmented populations; that they do not follow a simple geographic pattern. And what does this mean? It means that we now have a genetic justification an objective scientific justification for, in fact, conserving most of these fragments, in a highly fragmented, highly endangered forest habitat.

Indicator species. An example the Javan gibbon. The Javan gibbon is a perfect sort of miner's canary of closed-canopy forest. And you open the closed-canopy forest, the Javan gibbon disappears. It turns out the Javan gibbon even though they only exist now in these little patches that are darkened here, in this kind of forest the animals here, as you can see in this little tree of relationships here the Javan gibbons here are quite different from the Javan gibbons there.

And, in fact, again, we now have justification or we have objective scientific data to argue and it, in fact, is indeed being argued right now for the separate conservation of two blocks of fragments. When, in fact, most of the effort had initially been focused in this region here, we have an argument for doing it here. Why? Because we have this species, which is indicative of closed-canopy forest that, if it disappears, you will lose a considerable amount of the variation in this species. All this will be gone, but you will also lose all of this closed-canopy forest. So it's a good indicator of closed-canopy forest on the island of Java. Umbrella species Asian elephant work. The previous work, on the Javan gibbon, was done with Noviar Andayani and Jatna Supriatna from our colleagues, who have worked in our lab, from Indonesia. This work by Prithiviraj Fernando, and Raman Sukumar, and other colleagues we have in India and Sri Lanka is basically looking at the Asian elephant. Which is a real umbrella species, because it's spread over a very large area 13 different countries. And, in fact we found that there are two very different genetic types in the research that we're doing.

The elephant exists in a variety of different habitats, so it's not indicative of a particular habitat. But because it extends over such a large range, the conservation efforts to preserve the genetic diversity both within these clusters and between them really is an effort to preserve habitats across a very large part of South and Southeast Asia.

So the next point I want to make and then I'll turn it over to our real speakers is the who question. And, again, I would argue very strongly that the who has to be people that are working in a lot of these countries who come from these countries and are doing this research ... like in this lab in Indonesia right here. We've tried to practice what we preach, and these are all of the people since 1994, and the countries of origin of all the people who have worked in our lab. And all I would say is that, if there are other labs like that, that's great and, if not, we should get more of them, and eventually fill in this entire map.

Take-home message: Interesting evolutionary genetic research is not equal to important conservation genetic research. Those two things are not coequal. And we have to think about that when we're designing our research projects and the species that we're going to be working on.

The second one is that conservation genetics or conservation, in general is done best when it involves those from countries rich in biota, as well as those from countries rich in technology. Technology will not save species, in my opinion people will save species.

And I would just end by saying we need to focus our research on species that have a specific role in the conservation world; we need to broaden our training, to involve people from many countries in which the biodiversity we wish to conserve actually live; and then we have to fight like there's no tomorrow. Because I think, in a very real sense, there is no tomorrow.

So, with that, I will introduce our first speaker. And, actually, it's a pleasure and, I think, coming on the heels of the last talk is very nice. Because in sessions, often, like this, they're very heavily loaded towards animals, but now we're going to probably have back-to-back two talks about plants. Which is a very refreshing thing, actually.

So I would like to introduce Kent Holsinger, who is a professor at the University of Connecticut, and has been engaged in a considerable amount of research on plants and their diversity, and his relationship to the conservation of those. Thank you.

(Applause)