WELCOME & INTRODUCTION

CENTER FOR BIODIVERSITY AND CONSERVATION

SPRING SYMPOSIUM

CONSERVATION GENETICS IN THE AGE OF GENOMICS

AMERICAN MUSEUM OF NATURAL HISTORY
APRIL 5-6, 2001

DAY ONE

WELCOME

MICHAEL NOVACEK, *Senior Vice President and Provost of Science, American Museum of Natural History*

MN: ... curator of paleontology. I'm going to tell the same joke I always tell when I open these symposia. My brother always likes to say: Mike likes his animals dead—real dead. I work on extinction. But I don't want my science—that is, paleontology—to represent the only science of the future. I hope there's a living planet that we can all live in, and enjoy and study, for millennia to come.

But it is quite interesting to think of institutions like this and our important partners, The Wildlife Conservation Society. When institutions like this were established, the world was quite a different place than it is today. Nature and the world were something mysterious and vast — maybe endless — and humans were only a small, had only a small impact on this vast, mysterious world. Institutions like this were to go out into that void, much like we're exploring the solar system and beyond. To go out in that void and sample parts of that living world.

And humans, themselves, were intimidated by the whole natural state of the planet. Now, obviously, a millennium—well, some of these institutions are a couple of centuries old. A little more than a century, the world has completely changed. And I think, as a theme in some of the presentations last night and many other gatherings like this, there is not one corner of the planet — not one little sector of nature — that doesn't have the mark of human and human activities.

We live in a world of human-dominated ecosystems; it's an undeniable reality of our lives. And in our effort to try to live compatibly — at least some of us, our effort — to live compatibly and exercise some stewardship over these ecosystems — over the living world — and, at the same time, look for our own welfare in our balance with these ecosystems, we've also looked to biotechnology and some of the possibilities that that can provide us.

You're here because I know you understand some of the controversies, the dilemmas and the questions about the use of biotechnology in balancing our needs for food with our needs for preserving ecosystems, and looking at things like cloning endangered

species and other important issues. And that's the purpose of this symposium today.

As I said, we're very proud to present this symposium — it's our Spring Symposium — in our partnership this year with The Wildlife Conservation Society. This is — as some of you know, who have been alumni to this series — this is one of several spring symposia on biodiversity topics that we established some years ago.

And we've ranged around — first with an opening symposium on the importance of biodiversity, and the massive extinction going on — to such topics as urban fragmentation. We've looked at geography and climate change, and its relationship to biodiversity, and a number of other important topics. Next year we're going to have a symposium on marine ecosystems — the seascapes, and the efforts that we're trying to effect, in terms of stewardships of these very endangered — and, in some cases, devastated — ecosystems. So I think this has been an important series for the Museum, and it's also been important because it's brought in some wonderful collaborations — like the one we now have with WCS.

There is another reason for this symposium that I think is important, and this particular theme that I think it's important emphasizing. Although the Museum — institutions like this one, and WCS — are steeped in the traditions of natural sciences, —there's nothing, I believe, more noble than the interest in the natural world, and collecting, and surveying and studying animals, plants and other organism in their habitats.

But in combination with that tradition we've now moved, very emphatically, into the field of genomics. With a mission of using the experiment — the 3.5 billion years of the history of life as an experiment that tells us something about genomics. And the information from the gene

not only in humans, and a few model organisms, but in the millions of species that exist on this planet, and the history of those species.

This is very important for us, and it represents a major new program, with about 40 scientists working in this institution — including curators, postdoctoral fellows and graduate students from many programs. In two state-of-the-art labs we recently established a frozen-tissue collection, which will launch officially fairly soon.

And our goal there is very audacious. We want to really become probably a primary world repository for nonhuman comparative genomics. Something that captures the biodiversity of the planet in terms of genetic information. With a goal of, within a few years, of providing over a million specimens, representing very strategic sampling of species. And this is now a new facility, with big vats — cryogenic vats — that are fed by liquid nitrogen. It looks very "Star Trek" — it looks very space-age — and it's an important new facility for the kinds of work we're interested in.

So we have a multipronged assault on issues of comparative genomics, but we also have an important role in public education. And I would also want to draw your attention to the fact that in May, late May, we'll be opening an exhibit, a temporary exhibit, called "The Genomic Revolution." And this is to share with the public the major issues about the human genome and how it really relates to our life. Not just in terms of scientific information, but the questions that people have about cloning; about designer babies; about issues of genetic fate — even eugenics and genetic testing. And the whole idea of privacy and property. We try, very intensively, to connect this exhibit with human interests.

So it's a delight, as I say, to begin our symposium. And, oh — I should also say that the genomics — the presentations you're going to

hear today in this symposium also reflect our very serious collaboration with WCS in the area of conservation genetics. We worked very well together over the last few years with an effective program.

And one of the reasons that program is so effective is our next speaker, George Amato, who comes to us from WCS. George is a leader in the genomic and comparative scientific effort at WCS. He's worked very closely with colleagues here — like Rob DeSalle. He's a great scientist and a fine fellow. George, would you please come up here and begin the symposium? Thank you very much.

(Applause)

INTRODUCTION

GEORGE AMATO (MODERATOR), *Director for Conservation Genetics, Wildlife Conservation Society*

GA: Thank you, Michael. And on behalf of my own organization, The Wildlife Conservation Society — and my home away from home, The American Museum of Natural History — I welcome all of you to our symposium: "Conservation Genetics in the Age of Genomics." On behalf of my co-organizers — Eleanor Sterling, Rob DeSalle and Howard Rosenbaum; the staff at the Museum's Center for Biodiversity and Conservation; and the other members of our programs, who have all made substantive contributions to organizing this symposium — we hope that this will be a thoughtful and challenging experience in examining the past, and looking forward to the future of conservation genetics.

I'm especially excited to have all of you here today, and to have this event here. We began a conservation genetics program at The Wildlife Conservation Society just about 13 years ago. Shortly thereafter, we developed a joint program with the molecular systematics laboratory here at the Museum— in a collaboration with Rob DeSalle, and later on with other curators and scientists here at the Museum. It's something that we're very proud of — that we feel very strongly about. And the opportunity to have such a distinguished group of scientists talking about the future of this discipline, here in our own home, is one that we're enormously excited about.

For, really, almost 20 years, conservation geneticists have employed techniques and theories from population genetics and systematics, really to sort of better understand and ameliorate the current human-induced extinction crisis. At the same time, scientists have been making really remarkable discoveries about molecular genetics and genome organization. And so, as we enter the Age of Genomics, armed with powerful new tools to elucidate, and even manipulate, genetic information, it seems appropriate to pause and examine the past utility of genetics-based conservation research, and consider potential new avenues of research and implementation.

During this symposium we brought together a really divese group of scientists and managers, people from the academic community — really a variety of areas — to really think about and examine: What have been the successes — and what have been the failures — in conservation genetics? And what, really, are the potential things that we can do in this sort of Age of Genomics?

Conservation biology as a field really arose out of this notion that traditional disciplines within biology had something substantive to contribute to conservation of endangered species. And genetics was immediately identified as a very important subdiscipline, since populations that were decreasing in number, while becoming increasingly fragmented, were likely to suffer a loss of genetic variation and a concomitant decrease in fitness.

Really two areas of research in conservation genetics have been predominant from the beginning. The first really involves this impact of fragmentation in the wild, and also the small populations that we see to. And we really use theoretical and empirical methods, using population genetics as a model, to try to guide managers, and design protected areas, and address these issues substantively.

Also, understanding and articulating the set of organisms that should constitute our unit of conservation has been another major area of research. And using evolutionary biology and systematics, scientists have really worked hard to identify natural units. These determinations provide guidance for managing translocation and reintroduction efforts, prioritizing taxa for conservation, and designing captive-breeding programs for targeted species.

In recent years, conservation geneticists have begun to more broadly use molecular markers to better understand life-history traits of rare and endangered species — especially ones that are difficult to observe directly. The emerging field of molecular ecology brings together the interests and research of conservation biologists in genetics, ecology, behavioral biology, in a powerful new interdisciplinary way.

Looking forward in the field of conservation genetics, it appears that we are facing a number of crossroads. One challenge involves synthesizing our past successes and failures, in order to better translate research efforts to applied conservation. A second challenge is to creatively and conscientiously explore if new technologies from the field of genomics offer important *opportunities* for conservation, or merely provide high-tech distractions from the hard decisions that still need to be addressed.

Now, in our first session this morning we set the stage by examining the role and promise of conservation genetics. It's, of course, an extraordinary pleasure to introduce the first speaker, William Conway, who's the senior conservationist with The Wildlife Conservation Society, as well as our former president and general director. Bill Conway's contributions to conservation are remarkable in their number and breadth. His work in transforming the zoo and aquarium community into conservation organizations; his international conservation activities, including his own research in the Southern Cone area; and his tireless efforts to assist and promote conservation at every level, have been recognized by numerous awards and accolades from nearly every major conservation organization.

However, first, personally, I would just like to say: I feel privileged to be one of a vast number of conservation biologists who learned from, and were inspired by, Bill Conway. Please....

(Applause)