Adirondack ABTI Plenary Session
13th Annual Conference for the Adirondacks
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The following text formed the basis of the Opening Presentation
by
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Grandeur (Ambitiousness) of the Goal
Extent and diversity of the Park
Classification and naming
Living versus fossil/extinct forms

It is hoped that you are openly curious, even skeptical, about the goals of ABTI – the All-Taxa Biodiversity Inventory for the Adirondacks. How can anyone, any group, possibly hope to survey and classify ALL kinds of life forms for the Adirondack Park, a domain of six million acres of lowlands, uplands, alplands, wetlands, dry lands, urban lands, cultivated lands (including flower gardens), and open waters? Something like this has not been done anywhere, really! Further, Classification (with a big C) presumes agreement on the system, species definition, and naming to be used and this is yet to be decided globally yet alone for our region. How many kingdoms, each containing how many phyla, do you suggest? How many kingdoms do you want to encompass the Protista?* The legions of living vascular plants for New York alone now include some 4,000 species and a host of frustrating hybrids, and what about those species no longer living? Are we to exclude the archaeologists and paleontologists and the wondrous biotas of the past, the stuff at the bottom of sediment core taken from a 15,000 year old pond? Shall we call the alien and sometimes deadly *Trifolium repens*, White Clover, Lawn-clover, Iandino Clover, Shamrock, Black Clover, Bronze Dutch Clover, Beyoz Yonca, Nafel, Dutch Clover or another of this plant's hundreds of common names? Some DEC officer favoring common names could use one in his UMP while another working on her UMP might use another. And, painfully. common names such as these remain important as keys to historical and cultural stores of information. We can learn something from an Asian sheep herder grazing his animals on meadows too heavy with clover.

But when the armature, the framework, the scaffolding is in place, it will serve to store far more than the binomials and common names, The structure will serve to house the "ecosalients", the details on species interactions, e.g. the diet preferences

of the gypsy moth and the White-tailed Deer, the root toxicity of Garlic Mustard and Black Walnut, the shade tolerance of Witch Hazel and Wild Sarsaprilla, the seed longevity of *Chenopodium*, *Juniperus* as a calciphile, *Giardia*, giardiasis and the parasite load of the beaver, and hundreds of thousands more!

Size of "organism"
Confusion of boundaries
Need for well-equipped specialists

Consider that the tiniest of life forms (those lacking ribosomal RNA, rRNA), the viruses, are the biognomic domain of the highly trained and experienced specialist using large and expensive machinery such as the electron microscope and nucleic acid sequencer for "observation". Further, there are hundreds of thousands (or millions) of different viruses, most still unknown, and most biologists, though aware of their power, e.g. AIDS, Spanish Flu, common cold, etc., are quite unaware of their diversity, habitat and significance. How many people know that more than 50% of the human genome is viral - as is the case for many other eukaryotes? How many specialists know the commerce of our viral guests, both in and out of our bodies and their sources and destinations? How important is it to know anyway? See Charles Siebert's fine article in the March. 2006, issue of *Discover* for a fine updating on virology.

Power, influence and prevalence of small organisms
Cryptic challenges

Consider bacteria. There are also millions of kinds of this microbiont assigned to two phyla (Eubacteria and Archaebacteria) that are yet unknown but of exceptional influence. Prof. E. O. Wilson of Harvard reminds us that when you stand on a cubic yard of soil your weight might be impacting as many as four million kinds of bacteria. Another Harvard great, the microbiologist Kenneth Thimann accents the idea that a warm, i.e. at human body temperature, bacterium will have a metabolic rate one-thousand or more times that of the hosting human being - and thus be an extravagant force. Again, most are surprised to learn that the human body is the relatively happy habitat for large amounts of microbial DNA. Jeffrey Gordon of the Center for Genomic Studies at the University of Washington at St. Louis estimates that we host some one-hundred times as many microbial genes as our own. Yet most biologists are quite incompetent to work efficiently (and safely) with bacteria let alone see them. Indeed some of the greatest ecosystemic influences are bacterial. Think of the role of Rhizobium in nitrogen fixation.

Consider the fungi: Most of us speak of the fauna and flora of a region and think that we have encompassed all, but the fact is that most habitats have at least twice as many kinds of fungi, i.e. mycota, as vascular plants and that these are often ponderous but well hidden in the soil or vascular tissue of plants. Indeed, some of the largest organisms on earth are fungi and they are potent and crucial members of any ecosystem. Many have intimate and crucial linkages with vascular plants, the mycorrhizae, but are never seen. See the magnificent text, *Diseases of Trees and Shrubs*, by the Cornel team of Wayne Sinclair, Howard Lyon and Warren Johnson (now in its 2nd edition) for an affirmation.

Seed bank and other perennating structures

Do not forget the so-called seed bank. Many species survive as seed or spore or other perennating structure for years in the soil and only emerge on receiving the right stimulus. Think of the bulbs, corms and rhizomes of our spring wild flowers that shed their leaves after a brief flowering period.

Taxonomic challenges
Polyploidy
Hybrids

Consider the nematodes: How many of us have the skill or means to ID a nematode? Yet, again, nematodes are influential in every ecosystem working their ways both inside and outside of many organisms.

Consider the grasses. Think about the members of the genus *Carex* (Sedge family Cyperaceae, c. 200 species in NYS as listed by R. S. Mitchell and Gordon Tucker, 1997), the copepods, the collembola, beetles, minnows; indeed, each taxon is the domain of specialists – and each specialty has its attending technical dynamics and delights. And so on and on.

And then there is the matter of polyploidy as in the Red Maples. N for this group is 13 and thus one will find trees with 26, 52, and 78 chromosomes
that look quite the same but do not sexually communicate. There are many other examples.

How about the damnable hybrids? I think of the hybrids of the highly aggressive honeysuckles of the genus *Lonicera.*

An exciting and meritorious adventure

Scientific and aesthetic merit
New Tools: analytical and communicational
Time of change: invasions and climate
Role models elsewhere

Are you now convinced that this whole undertaking needs further consideration? Still tentative? Then let's proceed.

First, all forms of life are exquisite, fabulous, multilayered, and influential. It is exciting to look at them and we are all equipped at very basic psychological levels to learn and respond to them; it's part of a million year- long CNS heritage beginning well before our appearance as a species. Further, the science of the matter is reason enough. There are a multitude of rewards just for looking! And let's reach out and place some confidence in our youth AND elders. The time is quickly coming when they will rediscover that there is a grand and extravagant world outside of their video and DVD rooms that cannot be matched by gadgetry. The return is imminent and, hopefully, this new cadre will be replete with competent amateurs such as the emerging multitudes of the birders, flower photographers, mushroom eaters, herbalists, butterfly collectors and other naturalists. A child and a grand parent is an exiting and productive social unit.

The time is also right because of the amazing capability of the analytical devices, theory and electronic data management systems. I think of GPS, the internet with Yahoo, Google, Google.Earth and other search engines, "bar-coding", and nucleic acid sequencing machinery as examples. We now have the means to network data sets spread out all over the world and to be in communication in graphic detail with the world's finest specialists – be they academic or amateur. There is no need to have a central repository for all of the data or the voucher specimens – these constituting a major burden of curation and up-dating. There is the need to build this Adirondack-centered network however and this is where ATBI comes in. But let's not float past this matter of need too quickly. We must pump ourselves up on this topic on an annual or more frequent basis Besides, other groups have already engaged in the development process and thus we have advisors who will greatly expedite the process and become part of the global team. The New York State Museum, the ABTI folks of the Smoky Mountain, the Northeast Information Node (NBII); at Columbia University the Center for International Earth Science Information Network (CIESIN), Hudsonia, the Vermont Monitoring Cooperative (VMC) – and others. Papers presented at the recent NYSM conference in Albany were thrilling to hear and see and greatly relieving in terms of learning about work already done in other areas.

Selection and monitoring of indicator species
Drawing the line
The Rare and Endangered

Is it necessary to survey everything right now Of course not because we cannot, but little by little the system will mature and diagnostic skill will emerge. Certain indicator species will emerge for each participant in the system and grow in power as we develop long-term files. It will be the selection and monitoring of these indicator species that we must foster for the long-run and in this the ATBI administration, appropriately centered in the heart of the Adirondacks at Paul Smith's College, must invest special time and energy in its links with competent agencies and institutions. And, of course, it must gain financial and the basic networking of cultural support.

How firmly are we to follow the Blue Line? Is it prudent to ignore Chronic Wasting Disease or some other powerful organism when it is just outside the Park? Of course not.

Great sensitivity is needed in the management of location data on rare and endangered species and those having special medicinal-herbal value (Think of ginseng and the commercial sang hunters.) How should such data be stored and shared? I think we will have to rely on the conscience of each expert to handle this matter.

Networking and team building
Therapy at Paul Smith's College
Sponsor lectures, workshops and research on hot topics

How is the ATBI network to be used? How important is it? First, it is best to be used widely with the PUBLIC having general access and input. The stakeholders should be many because the resource thus gains in supervision. Special users will be the academics who teach and research and the resource managers and especially those who develop, update and integrate Unit Management Plans. But, the general pubic will probably surprise us all by its engagement. Next, the network serves as the first line of defense in the matter of disease, human and otherwise, and the influx of alien species. The diseases are many and will be many, especially in a time of global warming and the implications will spread to human health even more so than at present. Forest disease and infestation will become a major issue within five years. The Department of Health, The New York State Museum,

members of the forest and paper products industries and the private recreational industries of the region are all likely stakeholders that will become part of the ATBI team. Sickness, of diverse types, will be a revolutionary force in the Adirondacks.

Most important of all, Paul Smiths College can be a therapy for the failure of the modern academy in the arena of natural history, a subject simultaneously the fountainhead of modern biology while in the minds of some an obsolescence. Hands-on courses in taxonomy and biognomics have been discarded willy-nilly from the curricula of most American colleges and universities and so we are desperately short of people who can identify things, especially small things. Paul Smith's College can staff such courses, and seminars and feature summer workshops taught by nationally recognized specialists. Paul Smith's College can also foster interest through outreach to the Visitor Information Centers, BSA and GSA, summer camps,
naturalist societies and so on. It might even consider sponsoring courses and contests in nature photography, illustration and science and nature writing.

Paul Smith's College could also become a coordinative center for the still bright and active retired who are often affluent, well connected and delighted by natural things. The elders greatly enjoy working with the young and should serve to attract at least a few of the multitudes of ever fatter young people hooked on their video games at their indoor work stations. Sadly, we cannot count on our schools to get the young into forest, to lake-shore and marshland because of bussing and scheduling problems
during the regular academic year. Summer time has got to be the new natural history frontier. The task is essential. See the remarkable book by Richard Louv, *Last Child in the Woods (2005),* suggesting the disease of nature deficit disorder?

There is much more to this, of course, as my fellow panelists will demonstrate. In closing I'm glad to say that I've convinced myself that the task is essential, exciting AND doable. We are entering a new and extravagant era of natural history. Let's get started and enjoy the details as they emerge.

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- Following James L. Gould and William T. Keeton. 1996 (6th ed.) Biological Science. W. W. Norton and C., New York and London. 1205 pages. Eight kingdoms (bold) are suggested.
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- **Archaebacteria**
- **Eubacteria**
- **Archezoa**
- **Protista**
- Protozoans
- Slime Molds
- Euglenoids
- **Chromista**
- Chrysophytes
- Brown Algae
- **Plantae**
- Red Algae
- Green Algae
- Bryophytes
- Tracheophytes
- **Fungi**
- True Fungi
- **Animalia**
- Myxozoa
- Multicellular Animals