

# FIRST WORD/

## LIGHT AND VERITY

By Douglas McCormick

**T**here was a hint of the biblical—light and the beginnings of things—about the Keystone Center's Scientist to Scientist meeting, an August gathering of some seventy august American scientists.

Ron Cape (ex-Cetus, ex-Chiron, and now starting a new company called Darwin Molecular Technologies) and the non-profit Keystone Center started the conference a year ago to do something that other august groups—from the National Academy to the faculties of big research universities—do not: bring together first-rate scientists from many disciplines to learn what is happening on the frontiers of fields far removed from their own.

Written words—and only a few hundred of them, at that—can scarcely convey the resulting excitement. Remember when the doors of science first opened for you, when you first peered inside and saw the...well, grandeur? Remember when the new concepts and new insights seeped into your very dreams and transformed the way you looked at the waking world?

At its best, that's what Keystone was like—six different versions of the very best introductory science course you ever had (David Baltimore, Irving Weissman, and Leroy Hood taught introductory immunology), delivered to a roomful of students mostly unfamiliar with the material, but eager, intelligent, critical (in the most constructive sense), and questioning.

### LET THERE BE LIGHT

And so it went for six days, often from eight in the morning to after ten at night.

Cosmologists peered back in time toward the great wall, tracking photons almost to the instant they first condensed out of the blazing primordial cloud to produce the very lumpy universe we now see around us.

Biophysicists traced the picosecond pulses of chlorophyll's astounding network of molecular antennae, as they trap light and funnel its fire into the maw of the chloroplast's reaction center for conversion into living energy.

Quantum physicists brought time almost to a standstill, making "optical molasses"—and the world's most precise clocks—from finely tuned laser light, a honey trap that slows atoms to crawl, cooling them to within a few thousandths of a degree of absolute zero.

Evolutionary biologists squinted back some three billion years to the beginnings of life on earth—perhaps as fortuitous tangles of self-replicating RNA captured, two by two, in natural liposome, combining and redividing in some gently lapping Precambrian surf.

Computer scientists, too, acknowledged the power of the "evolutionary method," as they described arthropoid robots that walk and stalk, and computer programs that manage their own evolution to produce rock videos and super-efficient sorting algorithms.

### QUESTIONS

It was a time for asking the stupid questions and musing on the big ones. A geophysicist could ask, relatively unself-consciously, "What is a cell?" A Nobel laureate physician could ask, "What is time?"

A prominent biologist could aver, "Evolution stopped when humanity invented medicine, but before too long, we will be altering ourselves intentionally. It will happen."

"Or perhaps," an artificial-intelligence guru could retort, "this will be the age in which the evolution of electronic life succeeds the evolution of chemical life."

Perhaps.

Amidst this meeting's melding of Darwinian method and the majesty of creation, though, ran the subtext of a verse from Genesis:

Now the whole earth had one language and few words. And as men migrated... they said to one another... "Come, let us build ourselves a city, and a tower with its top in the heavens, and let us make a name for ourselves, lest we be scattered abroad upon the face of the whole earth."

And the Lord came down to see the city and the tower, which the sons of men had built. And the Lord said, "Behold, they are one people, and they have all one language; and this is only the beginning of what they will do; and nothing that they propose to do will now be impossible for them. Come, let us go down, and there confuse their language, that they may not understand one another's speech." So the Lord scattered them abroad from there over the face of all the earth, and they left off building the city.

For a long time, it seemed that the edifice of Western science—humanity's most profound and beautiful artistic achievement, whatever else it may be—was doomed to become a self-limiting Babel of isolated disciplines scattered abroad over the face of the earth, each cut off from the others by its own parochial obsessions and impenetrable jargon. Impious as it may be, we still yearn to build those towers with their tops in heaven, spires not of stone and mortar but of understanding. And the purpose of meetings like Keystone's is to teach us each the other's tongue, so that all can share in the execution and the plan.

The point of all this is synthesis and synergy—the very recipe that created and sustains biotechnology, among other things. We have said before that biotechnology is about the crossing of boundaries—disciplinary, national, species, it doesn't matter. Well, it seems that this may have been too narrow a view. After a week of talking with computer scientists taking lessons from biology, and biologists learning from the physicists how to look even more closely at fundamental life processes, and on and on in a web of new insights and ideas... For a moment, it seemed that all boundaries were in jeopardy—that truly nothing they proposed to do would be impossible to them.