



## Future imperfect

### What remains to be discovered

John Maddox

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My interest is in the future because I am going to spend the rest of my life there.

Charles F. Kettering

I have had both an interest in and a great suspicion of futurism ever since, when I was young, I was told that I could look forward to unrelenting leisure time and a three-day work week. In such ways futurists have consistently failed in their self-appointed task. The existence of x-rays, for example, was not anticipated — they kept trying to announce themselves to unbelievers until Röntgen dared to trust his eyesight — and the Internet, microchips and biotechnology have crept in unheralded by prophets. But despite futurism's unimpressive record, the imminence of the new millennium is bound to produce prophecy on a biblical scale.

John Maddox is in a strong position to speculate on the future of science, having been editor of *Nature* for over 30 years. However, the very title of his book, *What Remains to Be Discovered*, is an oxymoron. How can we “discover” what is *known* to be awaiting discovery? Moreover, philosophers of science increasingly doubt that there is an objective reality waiting to be found. They suspect that scientific knowledge may be as much an expression of the human mind and spirit as the music of Bach or of the Balinese, the art of the Haida and the Inuit peoples, the novels of Conrad or Proust, or the writings and art of Rabindranath Tagore. Maddox does concede, however, that what remains to be discovered and what will be discovered may not be the same thing.

Maddox reflects on the rate of change in this dying century, a century that began, as he notes, when modern

physics had just begun and most disease mechanisms were little understood. Now, words such as neurosis, antimatter, immunity and black holes are commonplace among the metaphors we use in everyday life. And the present seems to be a time when superscientists are eager to propose “a theory of everything.” Perhaps it is time for another scientific upheaval — or do these syntheses themselves create the instability from which renewal begins? Maddox explicitly expects a new physics to emerge but he admits that it is unimaginable at present.

Perhaps our failure to imagine the future reflects the gulf between the world we think we know and that described by science. Quantum mechanics, cell receptors, the structure of DNA and the expanding universe are not intuitively understood while one walks in the mountains or leans with the heel of a sailboat. The world described by science is greatly different from that perceived by the senses. Genesis chapter 1 and “the big bang” are two profoundly different if not inconsistent views of creation. Inevitably, we extrapolate to the future from our perceptions. However, the things that have radically changed the world around us, whether lasers, microchips, the Human Genome Project or magnetic resonance imaging, have a different provenance. They belong to the universe described by modern science, a universe whose relation to our sensory experience is not always obvious. Yet it is from such a counterintuitive world that the future will invent itself.

Although Maddox treats physics, cosmology and genetics as of a kind, the future of the physical sciences is

crucially different from that of the life sciences. In the one, we are observers; in the other we will not only witness but will also create the future. Knowledge of the human genome will give us new and formidable powers. In his discussion of genomics Maddox makes an interesting distinction between the botanical impulse — “the naming of parts” — and the need to understand the underlying mechanisms at work. But there is also a need to understand the moral implications of our science: we humans are a wayward tribe, and the future of the life sciences will require moral dialogue as well as technical virtuosity. Maddox deals only briefly with the moral and ethical dimensions of his subject. In another recent example of the genre — *Visions* — Michi Kaku merely extrapolates from what we already know (e.g., expert systems, artificial intelligence, biotechnology and robotics) and then invokes the notion of an electromechanical immortality for each of us, with no consideration of its relevance to a soiled and crowded earth.<sup>1</sup>

Gene technology apart, Maddox pays scant attention to medicine beyond the potential for disease and environmental capacity to extinguish life. Indeed, in medicine we seem to spend little time questioning the future. As I considered this issue, I conducted a simple survey of the deans of Canada's 16 medical schools. Of the ten who responded, only two gave administrative recognition to information science, even though this field will, I believe, be as important to us as surgery (or even radiology) by early in the next century. A third faculty reported that it planned to make information science a major thrust. Seven faculties are engaged in a quasi-formal dialogue with the future by means of retreats, long-range planning and other strategies. When asked about four potential initiatives for curriculum enrichment (genetics and molecular biology, low-trauma surgery with or without imaging guidance, artificial intelligence in medicine, and remote patient moni-



toring and telemedicine) eight faculties were able to muster 14 such programs, and one reported a move to a programmatic rather than discipline-based curriculum structure. Five deans stated that their faculties have a structure in place for instruction in the humanities. Given the uncertainty facing us, perhaps we need an enduring context from which to examine the future and by which to recognize the base and the false. In this sense we need to be in touch with those who have thought most penetratingly about the human condition — and the more so as universities are increasingly driven by utilitarian concerns.

On this, admittedly limited, evidence our medical faculties seem to be slowly mutating into the future. But our profession as a whole is in some disarray. We act as if the only remedy it requires consists in fixed fee schedules and injec-

tions of health care funding. Perhaps medicine would benefit from more futurism, that is, from an attempt to plot a future course on the basis of where we are headed rather than where we have been. The challenge of providing quality care in the future (and in doing so more cheaply) will demand new solutions. Our structures of specialization, our health care institutions and even our medical faculties are unlikely to survive unchanged for long into the next millennium. The choice may be between radical renewal and oblivion. Yet we seem to have a limited appetite for renewal.

Rich in wisdom and scholarship, Maddox's book is, although technically dense, well worth the reader's effort. His perspective is strongly historical and his prose expansive and, apart from the occasional lapse, lucid. His imagi-

nation lives as easily in the past as in the future; as easily in the theatre of ideas as at the bench. Read his book as an antidote to that which passes for a hold on the next century in too many of our corridors.

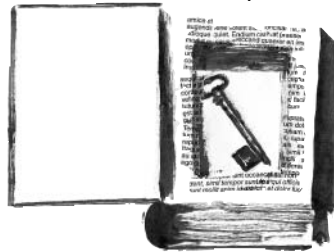
Peter Drucker observed that "Strategic planning does not deal with future decisions. It deals with the futurity of present decisions." Perhaps we should likewise consider that futurism is less about the future than about the futurity of the present. The other more shattering changes that are also probable as the years turn will almost inevitably surprise us — and futurists.

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**Reference**

1. Kaku M. *Visions: how science will revolutionize the 21st century*. New York: Doubleday; 1997.



Freud Sebastian

*Illness and metaphor*  
**Tuberculosis**

The child had a delicate little face, very wasted, with the serious expression I had seen on the faces of most of the children here, as if the cares of the adults had crushed them all too early. She might have been ten or eleven years old. If she had lived a little longer, I reminded myself, she would have been one of my pupils. She would have learned something from me. I would have given her something to keep. A bond would have been formed between me and this little stranger — who knows, perhaps even for life.

As I contemplated the dead child, those words "for life" — as if they implied a long existence — seemed to me the most rash and foolish of all the expressions we use so lightly.

In death the child looked as if she were regretting some poor little joy she had never known. I continued at least to prevent the flies from settling upon her.

The children were watching me. I realized that they now expected everything from me, though I didn't know much more than they and was just as confused. Still I had a sort of inspiration.

"Don't you think Yolande would like to have someone with her always till the time comes to commit her to the ground?"

The faces of the children told me I had struck the right note.

"We'll take turns then, four or five around her every two hours, until the funeral."

They agreed with a glow in their dark eyes.

"We must be careful not to let the flies touch Yolande's face."

They nodded to show they were in agreement. Standing around me, they now felt a trust in me so complete it terrified me.

In a clearing among the spruce trees a short distance away, I noticed a bright pink stain on the ground whose source I didn't yet know. The sun slanted upon it, making it flame, the one moment in this day that had been touched by a certain grace.

"What sort of girl was she?" I asked.

At first the children didn't understand. Then a boy of about the same age said with tender seriousness, "She was smart, Yolande."

The other children looked as if they agreed.

"And did she do well in school?"

"She didn't come very often this year. She was always being absent."

"Our teacher before last this year said Yolande could have done well."

"How many teachers have you had this year?"

"You're the third, mamzelle. I guess the teachers find it too lonesome here."

"What did Yolande die of?"

"T.B., mamzelle," they replied with a single voice, as if this was the customary way for children to die around here.

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