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Executive Director of the United Nations Children's Fund (UNICEF)
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Putting Biomedical Knowledge to Use in the Third World

JAMES P. GRANT

*United Nations Children's Fund
Three United Nations Plaza
New York, New York 10017*

BIOMEDICAL SCIENCE AND THE THIRD WORLD

UNDER THE VOLCANO

Edited by Barry R. Bloom and Anthony Cerami

I am delighted to address the L. W. Frohlich Award Conference, and especially pleased to do so during this ceremony in which the award will be presented to my highly respected friend, Kenneth Warren.

The power of the theme of this conference, "Under the Volcano: Biomedical Science and the Third World," derives from the potential to make a major difference in human well-being on a grand scale through accelerating the application of biomedical sciences to Third World health problems. This is, of course, the arena in which the considerable contributions of Dr. Warren's career have been made. By nature, the theme evokes one main and simple question: How do we get the fruits of the biomedical sciences into use for the poor majority in the Third World who need it the most?

NEGLECTED DISEASES

Two main paths toward this end, both well known, are ripe with possibility, yet both have been seriously neglected. First, there are the "diseases of the poor," about which relatively little research is being done even now, despite increased attention in recent years. Ken Warren has been a leader in focusing more attention by the scientific community on this issue through his persistent work, which is exemplified in his book *The Great Neglected Diseases of Mankind*; through his work with the Rockefeller Foundation on the neglected diseases; in his work on schistosomiasis; and in his work with the Rockefeller Foundation on INCLIN, the international network dedicated to strengthening clinical epidemiology in the Third World through local training in these skills. These name but a few of his relevant contributions.

In this domain we see the great inequity between the quantity and quality of research done on diseases to which the rich are prone, such as cancer, and, "poor-prone" diseases such as, for example, the diarrheal diseases that still take the lives each year of 3.5 million primarily young children, the great majority of them among the world's poorer families, and schistosomiasis, which affects those such as paddy farmers and laborers working in infected waters. There are also, of course, the neutral-prone diseases such as AIDS, which strike without regard to economic boundary, but to which, so far, the medical "breakthroughs" have been decidedly rich-prone. As a pure science, biomedical research has a unique potential to unravel the secrets of

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diseases and reveal means to overcome their ravaging effects. Is this powerful tool meant to be used to explore only (or in gross disproportion) those diseases which affect rich people? The challenge in this sphere is to attract more and better research to the poor- and neutral-prone diseases, as well as to orient research to seek treatments that are applicable to the masses and not just largely to the rich.

MASS APPLICATION OF AVAILABLE KNOWLEDGE AND TECHNOLOGY

The second area of tremendous yet inadequately tapped potential—a second category of great neglect regarding diseases—involves massive health problems in which the biomedical sciences have already made breakthroughs, but that are greatly neglected in terms of application. It has long been acknowledged that one of the greatest health challenges of our times is to bridge the vital gap between existing knowledge and technologies and their actual use by those for whom they can make the life-or-death difference. I can remember my father, Dr. John B. Grant, a pioneer in Third World public health, writing more than forty years ago that the *use made of medical knowledge depends on social organization*. And it is a main principle of Primary Health Care, codified in the Declaration of Alma-Ata a decade ago. Yet in the early 1980s we were still slow in applying this principle in practice even though its rhetorical acceptance had soared since the meeting at Alma-Ata.

It was, in fact, following this second path of vastly expanding the availability to those most in need of existing health knowledge and technology that led in 1982 to the call for a "Child Survival and Development Revolution" (CSDR)—a call made possible by the combination of grossly underutilized low-cost/high-impact medical knowledge and technologies of mass applicability with the new capacity to communicate with and organize among the poor of the world. It was the synergistic convergence of these forces that led the global community concerned with children's health to dare to strive in earnest to achieve the unprecedented goal of *halving the 1980 infant and child mortality rates by the turn of the century*. Existing low-cost medical technologies with maximum capacity to affect children's health in poor countries were identified, and approaches for making these available and used on a massive scale were designed.

As Dr. Hiroshi Nakajima, the new Director-General of the World Health Organization, stated eloquently on August 28th to 1,500 health educators from around the world:

We must recognize that most of the world's major health problems and premature deaths are preventable through changes in human behaviour and at low cost. We have the know-how and technology but they have to be transformed into effective action at the community level. Parents and families, properly supported, could save two-thirds of the 14 million children who die every year—if only they were properly informed and motivated. Immunization alone could save 3 million lives—and another 3 million deaths a year could be prevented by oral rehydration, a simple and cheap technology. . . .

Society must make it possible for people to live healthy lives. A grand alliance of people, policy-makers and health professionals is necessary . . . to . . . empower people with knowledge and the relevant health skills to improve their own health.²

The actual medical and health techniques singled out in the CSDR are, of course, familiar to you all. They include *growth monitoring* to warn of impending malnutrition,

GRANT: PUTTING KNOWLEDGE TO USE

oral rehydration therapy (ORT) to combat the lethal effects of diarrheal dehydration, *breastfeeding* combined with proper weaning practices, and universal *immunization* against the six main child-killing diseases—all of which are low-cost and adaptable to mass application. They also include *female education*, *family planning*, and *food supplementation* when necessary—measures which are either somewhat more costly or more difficult to implement, or both. As you are well aware, these are simple techniques which have been available for some time. Yet 10 years ago, only 5 percent of the world's children were immunized against the targeted diseases. And 10 years ago, despite the potential of ORT to save the lives of more than 10,000 children dying each day from diarrheal diseases, fewer than 1 percent of the developing world's children were being treated in this simple manner when they had diarrhea. As a result of CSDR activities (i.e., mass application efforts) by 1987 more than 20 percent of children with diarrhea were being treated with oral rehydration therapy, and as of August 1987, 50 percent of the world's children were immunized. Consequently, in the past 12 months *the lives of some 2.5 million children have been saved by these two interventions alone*, with a comparable number saved from lives of crippling disabilities due to the side-effects of childhood diseases. Unfortunately I must add that, lest we become complacent, nearly six million young children *still* die annually from causes preventable by these simple means.

These accomplishments are but the more visible aspect of a much larger picture of a shifting approach toward health. The picture offers, however, a glimpse of what is possible when low-cost/high-impact medical technologies are made available on a mass scale, and especially to those normally removed from channels of easy access.

You might well ask at this point: How has the CSDR fostered use of the benefits of medical sciences in the Third World? What is the prototype from which lessons can be applied on a broader scale?

A PIONEER IN HEALTH FOR ALL CHILDREN

Colombia was the pioneer, and it began with leadership from the top to persuade all sectors of society to participate in the child-survival revolution, beginning with universal immunization. Then-President Belisario Betancur mobilized the cooperation of the media, including the leading opposition press, and he recruited the Church and the Red Cross, the Rotarians and Lions, Scouts, schoolteachers, businesspeople, and all of his government ministries into what we might call a "Grand Alliance" for Colombia's children.

Together, they set out to do what had never been done before in history. In one 3-month period, through three national immunization days, a nation mobilized to immunize the great majority of its children against five major diseases then killing and crippling tens of thousands of Colombian children each year. There were more than 10,000 TV and radio spots; virtually every parish priest devoted several sermons to the importance of families' immunizing their children, and every school teacher was involved. President Betancur and other leaders personally immunized children.

The Campaign began in June 1984. By the end of that August, more than three-quarters of the under-fives had been fully immunized. For the children of the world, of whom more than 10,000 were dying each day from these six diseases, this unprecedented accomplishment in Colombia was far more significant than even man's landing on the moon 15 years before. Colombia illustrated the use of communications

and social organization to close the gap between available knowledge and its widespread use in the community.

The results demonstrate how we can defend children against these brutal mass killers and cripples, if only we fully mobilize to ensure that low-cost available health knowledge and technology is used by all of a population rather than by the relative few who traditionally enjoy easy access to such benefits. The great majority of Colombian children now have been immunized and a significant start has been made in teaching millions of mothers how to use oral rehydration therapy, thereby saving the lives of more than 10,000 children a year who would otherwise have died.

The effort in Colombia was sometimes referred to as Universal Child Immunization "to the third power" (UCI³), because the goals were threefold: first, to immunize the children; second, to build "sustainability" into the program so that it would continue through the years; and third, to use it as an entry point for expanding support for other programs and the entire PHC effort at a time of economic constraints, when political forces are pressed for diversion of financial resources away from, rather than towards, PHC.

The "Trojan horse" of the "campaign" approach in Colombia in 1984 and 1985 provided the entry point and political will for strengthening the ongoing Primary Health Care infrastructures which have been vastly bolstered by intensive and complementary follow-up efforts. The primary school curriculum has been drastically revised to emphasize health education, and all high school students have to contribute 100 hours of "health scout" service as a pre-condition to receiving their graduation certificates. Television and radio spots and promotions now have a continuing supporting role. The Catholic Church has introduced a training program for priests: premarital counseling now includes health care of children (on the importance of immunization, ORT, and breastfeeding, among other items) as a major component. And, of course, all these measures have resulted *not* in higher costs for government services, but in the *saving* of many millions of dollars, as well as saving the lives of more than 10,000 children yearly and preventing the crippling and disabling of many thousands more.

Colombia's pioneering success at "going to scale"—UCI³—has been joined by literally scores of countries. Medical scientists cannot do the task alone, but also it cannot be done without you.

In this second path of getting the benefits of biomedical sciences into use in the Third World—that of *expanding the application* of existing knowledge and technologies—Ken Warren's work has also made significant contributions. The "Good Health at Low Cost" conference that he organized through the Rockefeller Foundation in 1985 is considered by many a landmark in defining such approaches. He was the Rockefeller Foundation's active member of the Task Force for Child Survival beginning with its first meeting (which was hosted by the Foundation) in Bellagio, Italy in March 1984, and for the second meeting at Cartagena, Colombia, in October 1985. This spring the third "Bellagio" meeting, held in Talloires, France, gathered a dozen health ministers and health secretaries from most major developing countries of the world (Brazil, China, Colombia, India, Mexico, Nigeria, Pakistan); heads of major international organizations such as Barber Conable of the World Bank, Halfdan Mahler of WHO, and myself; plus major bilateral aid agency administrators such as Margaret Catley-Carlson of CIDA (Canada), Carl Tham of SIDA (Sweden), and Alan Woods of USAID; and private leadership from the Rockefeller Foundation and Rotary International. Out of this review of the world immunization/child survival effort came the exciting conclusion that, with a modest additional amount of political will, it is *do-able* by the end of this century—in twelve years—to reduce the 1980 child death rate by more than *half*, saving from death or disability in this process well over one-

hundred million children over the period, while slowing population growth as well, as families gain the confidence—through these means in which they participate—that the children they have will live.

The "Declaration of Talloires" proposes Year 2000 health goals that received consensus approval of participants. Achieving these ends will, of course, only be possible if biomedical scientists, and indeed much of the medical scientific community, takes an active leadership role in solving some of the problems which still remain. Of these goals, a useful "short-list" of do-able Year 2000 goals could be capsulized to include:

- (1) halving the 1980 under-5 mortality rates, or reducing them to 70 per 1,000 live births, whichever is less;
- (2) eliminating polio (endorsed by the World Health Assembly in May);
- (3) achieving universal primary education (to which I would add 80 percent literacy among women of child-bearing age);
- (4) achieving less than 1 percent severe malnutrition; and
- (5) promoting expanded coverage of water supply and sanitation.

The accelerated health programs to which Ken Warren has contributed so much have brought a new political visibility, and consequently increased financial support, to PHC and other programs for children. It is the success of these politically attractive programs that has contributed so much to getting children placed, for the first time, on the political agenda of various summit meetings.

Within the last two years, the South Asian Association for Regional Cooperation (SAARC) Summit issued a Declaration on Child Survival; the heads of the seven Central American countries went on television together in behalf of the region-wide immunization campaign on World Health Day in 1987; and the Organization of African Unity (OAU) Summit in 1987 declared 1988 the Year of the African Child and issued a Declaration on Child Survival and Development. And this May in Moscow, at the USSR:USA Summit meeting of US President Reagan and USSR General-Secretary Gorbachev, their call for accelerated worldwide action to reduce childhood deaths from readily preventable causes was the only reference to development issues in the joint statement that the two leaders issued. The communiqué stated:

Both leaders reaffirmed their support for the WHO/UNICEF goal of reducing the scale of preventable childhood deaths through the most effective methods of saving children. They urged other countries and the international community to intensify efforts to achieve this goal.

These health approaches for children have also contributed importantly to the growing support for the early adoption of the Convention on the Rights of the Child, which was first proposed in 1979, and which encompasses the protection and development as well as the survival of children.

UNDER THE VOLCANO: THE ROLE OF BIOMEDICAL SCIENCES

The historically unprecedented progress in Third World health which has just appeared on the horizon through the new perspective of the CSDR can be attained.

It is not a fanciful theory. But along with this revolutionary capacity comes a tremendous responsibility and challenge. For it will come about if—and only if—we are willing to travel two paths in ensuring that the biomedical sciences are put to use in poor countries and communities: using the resources at our disposal (including our scientific know-how) to tackle the health problems of the poor and ensuring that low-cost available knowledge is used *everywhere in the world*.

In Ken Warren's paper for the second Bellagio Conference he quoted an esteemed colleague who had written in 1963: "Never in the history of human progress has a better and cheaper method of preventing illness been developed than immunization at its best." Ken went on to add that "In spite of the great potential power of vaccines, however, there has been little, if any, increase in support for vaccine research by most funding organizations," and he noted that research had to be conducted under contrived and "bootlegged" conditions. He continued:

And herein lies the metaphor of the volcano. Given all of this subterranean activity, there are still relatively few new and better vaccines on the market. But the pressure is building up, and it is now inevitable that there will be a virtual eruption of vaccines within the next 15 years.

Those who are committed to the improved health and well-being of the world's children, and especially its poor children, await eagerly the eruption of that volcano. We are ready to put to use the secrets hidden so closely beneath the surface. And we call for the shifting of priorities which will allow research to focus in this direction rather than so disproportionately toward the diseases and treatments of the rich. As you are well aware, we are close to having a rotavirus vaccine; a heat-stable measles vaccine would tremendously facilitate the prevention of that disease; and combining antigens against the six main child-killing diseases into one singly applied vaccine would be another major breakthrough. Can you, gathered at this conference—prominent leaders of the scientific community of the latter part of the twentieth century—take responsibility for producing before the year 2000, such a single-dose vaccine which could be taken orally? I add my voice to those who have issued such a challenge.

Another tremendous force lies close to the surface, a force that has just begun to be unleashed, and one that holds unprecedented possibility for the future. It is the volcanic potential of social organization, of mobilizing and empowering people to take greater charge of their own health.

Can we, as a gift from the twentieth to the twenty-first century, offer not only the eradication of smallpox, but the elimination of polio as well? Can we achieve in this time-frame the halving of child mortality rates worldwide? These are achievements that will require sophisticated research into both poor-prone diseases and into expanding our capacity in the new field of social mobilization. Scientists must demand that attention is focused on both of these arenas.

As it becomes increasingly undeniable that the capacity to save the lives of so many children, and to improve the health and well-being of so many more, is well within our reach, it becomes increasingly unconscionable *not* to act on these new possibilities. Never before has the scientific community been faced with the opportunity—and the challenge—to do so much, for so many, for so little.

As I said to the Convocation of Nobel Laureates in Paris in January, surely the time has come to put the mass deaths of children from immunizable diseases, from diarrhea and from other preventable causes, on the shelf—alongside slavery, colonialism, racism and apartheid—reserved for things that are no longer acceptable to

humankind. Surely the time has come to say that it is obscene to let these preventable deaths continue day after day, year after year, as our civilization moves into the twenty-first century.

It is you, the world's leaders in the health sciences, who must take a leadership role in making these possibilities become realities throughout the world. And it is you, the readers of this volume, who must, each in your own field of expertise, support these efforts in your own country, whether of the first, second or third worlds. I urge all of you to take an even stronger, accelerated leadership in this peaceful revolution for the health of children, and of all the world's people.

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