



## MALARIA

## Did They Really Say ... Eradication?

The malaria world is all abuzz about a call by Bill and Melinda Gates to wipe the scourge from the planet. Even if it proves unfeasible, their idea could have a big impact

**SEATTLE, WASHINGTON**—When Bill and Melinda Gates had finished their back-to-back speeches, many researchers could barely believe what they had just heard. At a meeting hosted by their charitable foundation in their hometown, the couple had uttered the long-forgotten e-word, calling for a sweeping new plan to eradicate malaria.

At first, some thought the philanthropists had misspoken. Very few people have talked about eradicating malaria since an earlier program crashed and burned in the 1960s, leaving a permanent smudge on the field and resulting in a resurgent epidemic across much of the globe. Malaria now kills more than a million people a year, and some malaria experts say eradication, although a noble goal, is simply unachievable. Yet the speeches delivered at the Gates Foundation Malaria Forum on 16 to 18 October leave no room for doubt: The couple wants the malaria parasite to go the way of the smallpox virus.

The second surprise came after the speeches, when Margaret Chan, director-general of the World Health Organization (WHO) in Geneva, Switzerland, jumped up, grabbed a microphone, and enthusiastically seconded the idea. "I pledge WHO's commitment to move forward, and I dare you all to come along with us," she said, reportedly without consulting some of her senior lieutenants.

Chan and the Gateses were careful not to set a target deadline, presenting eradication as a long-term vision, not a near-term goal. "Multiple decades" is what Bill Gates told reporters afterward, noting that it is "dangerous" to offer anything more concrete. "They both hope it will happen in their lifetimes," says Regina Rabinovich, head of infectious diseases at the Gates Foundation, who is intimately involved with the plan. Even with those caveats, the call has ignited a debate on whether it is wise—given a long history of broken health promises—to dangle potentially unattainable goals before the public. "There is a danger of overpromising and underachieving," says Joel Breman, senior scientific advisor at the Fogarty International Center at the U.S. National Institutes of Health in Bethesda, Maryland.

But at the same time, the daring call is having a major impact. Bolstered by already-plummeting malaria rates in several countries, a group of informal advisers has formed a kitchen cabinet of sorts, loosely composed of heavyweight scientists and senior officials from the big funding agencies in malaria, to try to turn the lofty vision into reality—or at least see how far they can get. "It has galvanized the community and created quite extraordinary momentum," says Rajat Gupta, chair of the board of the Global Fund to Fight AIDS,

**Impossible dream?** At an October meeting, Bill and Melinda Gates challenged the world to eradicate malaria in their lifetimes.

Tuberculosis, and Malaria, who is a member of that group.

The Roll Back Malaria (RBM) Partnership, composed of all the major players in malaria, including the endemic countries, has already lent its support. Meeting in the Ethiopian capital, Addis Abeba, last week, the RBM Board agreed to set up a high-level steering committee to coordinate efforts and devise a "business plan" within 6 months. No new funding has been announced, but everyone expects the Gateses to put large sums of money where their mouths are.

### Reality check

In the wake of the Seattle meeting, proponents have been trying to reassure skeptical scientists and manage expectations, in part by de-emphasizing the importance of words. Scientists use "eradication" to mean that a pathogen no longer exists anywhere on Earth—save for perhaps a few lab freezers—and control measures can stop. "Elimination" means a pathogen is no longer transmitted in a defined geographical area, although "imported" cases may still occur. By those definitions, malaria has been eliminated in Europe, measles in the Americas, and polio in most countries of the world—but smallpox remains the only disease that has been eradicated.

"I like the term 'elimination' better" than eradication, Chan told *Science* in Seattle, shortly after the Gateses issued their call. "Eradication is of course the ultimate goal, and I don't mind people using [the words] interchangeably. ... It is elimination-slash-eradication, depending on the availability of tools."

Theoretically, there's little doubt that malaria could be eradicated, because there's no animal reservoir from which the disease could bounce back into the human population after it's gone. Nicholas White of Mahidol University in Bangkok believes eradication is already within reach using the latest weapons, such as long-lasting insecticide-treated bed nets, powerful new drugs called artemisinin-based combination therapies (ACTs), and indoor insecticide spraying (*Science*, 26 October, pp. 556 and 560). Where these weapons have been mass-introduced, malaria is retreating fast, says White.

But most others, including Bill and Melinda Gates, say that although current methods can eliminate malaria in some areas, they won't suffice for global eradication; more

powerful ways to break the transmission chain are needed in the hardest-hit areas. “We do not have the tools that are needed to complete malaria eradication today,” says Rabinovich.

That’s one key distinction that sets this initiative apart from the previous failed eradication effort, says Carlos “Kent” Campbell, former head of the malaria branch at the U.S. Centers for Disease Control and Prevention in Atlanta, Georgia, and now at PATH, a Seattle, Washington-based nongovernmental organization, where he directs the Malaria Control and Evaluation Partnership in Africa program. That earlier effort, which was abandoned in the late 1960s, relied on DDT to wipe out the mosquito vector and on chloroquine to treat the disease, only to see the vector and parasite develop resistance to both.

The Gateses outlined a two-part strategy: Go as far as you can with existing tools while simultaneously investing heavily in new ones. The latter would likely include transmission-blocking vaccines and drugs; new, preferably single-dose, drugs to replace ACTs when they inevitably are rendered ineffective by resistance; and alternative insecticides and even nonchemical means to defeat mosquitoes, such as traps or genetic modification, along with rapid diagnostics and monitoring for resistance—none of which exists today. The “beauty of this approach,” as opposed to the earlier one, says Campbell, “is that it links a very specific research agenda with a control agenda.”

Existing tools would be massively scaled up over the next 3 to 5 years, says Gupta of the Global Fund. The goal, he says, is to “reduce dramatically, or even eliminate, mortality from the disease and reduce the number of new infections to much smaller numbers.” The first step, he says, will be to bolster country programs, then to scale up regionally and finally globally. “The regional approach is very, very important. You can’t have a great program in the Zambia and no program in the DR Congo [Democratic Republic of the Congo]. It doesn’t work.” To pull it off, he predicts that donors such as the Global Fund, the World Bank, and the President’s Malaria Initiative will need to roughly triple the money now available for malaria control, up to \$3 billion or \$4 billion a year. Gupta calls it a “no-regrets policy. ... It doesn’t matter when the

science comes along; let’s just control as aggressively as possible.”

Although the hardest-hit countries in Africa and elsewhere are the most obvious targets, public health officials should simultaneously start picking “low-hanging fruit,” says Richard Feachem, former executive director of the Global Fund and now head of the Global Health Group at the University of California, San Francisco. By that, he means trying to eliminate malaria from the “natural margins” or edges of the endemic zones, where the disease isn’t as entrenched. The result would be a gradual “shrinking of the malaria map.” Such an effort is getting under way in southern Africa, where the 14 members of the Southern African Development Community have



**Building an arsenal.** The earlier failed eradication plan relied primarily on DDT to kill mosquitoes; the new initiative would use every tool in the shed, like bed nets—and many that don’t yet exist.



declared their intention to eliminate malaria, starting with the southernmost countries of Botswana, Namibia, South Africa, and Swaziland and moving north, says Feachem. Elimination plans are also afoot for archipelagoes such as Vanuatu and the Solomon Islands.

#### False hope?

Nobody would argue against any plan that can have a dramatic impact on malaria. Still, whether all these new activities are a prelude to eradication—and whether it’s wise to use that term—is under intense debate. Medical entomologist Willem Takken of Wageningen Agricultural University in the Netherlands thinks it’s much too early. Recent victories may be more tenuous than some people realize, he says: Already, researchers are seeing an

increase in resistance to pyrethroids, an important class of insecticides, in West African mosquitoes. The ACT miracle, too, is bound to fade, and a vaccine has yet to materialize. Talking about eradication now is giving affected countries false hope, he says. Some also worry about what is called the “Gates Effect”—the fact that the Gateses’ vast coffers make people reluctant to criticize them or their projects.

At least as important as the push for new tools is a similar investment to improve the weak health infrastructure across Africa, cautions Donald Hopkins, who leads the global Guinea worm eradication effort from the Carter Center in Atlanta. Even with perfect tools, he says, “we would need capability in each village 24/7. That’s not there.” Perhaps

the biggest challenge, even proponents agree, will be to sustain interest and funding over the long haul. “We are having a difficult time keeping polio eradication going, and it’s only been 20 years,” says WHO Assistant Director-General David Heymann, who oversees that effort. Originally targeted for completion in 2000, the campaign has stalled in a few especially tough countries and is

having a hard time raising enough money to finish the job. Feachem, too, agrees that keeping up the commitment will be difficult—and paradoxically, more so as the end nears. “It will require exceptional leadership,” he says. “Luckily, Bill and Melinda are young.”

Some say that malaria fighters would do better to take a page from the measles book. Without making eradication an official goal, a sweeping campaign against that viral disease has made impressive strides; just last week, WHO announced a 91% drop in African measles deaths since 2000. Public health officials can hope for eradication—and some certainly do—but they don’t have to worry about a backlash if the remaining centers of infection turn out to be impossible to mop up.

But others say what’s important is to focus on the big picture. “I think there will be good to come out of this even if malaria eradication proves unachievable in our lifetimes,” says Hopkins. Adds Chan: “We need champions like Bill and Melinda.”

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