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World Health Organization

Report for the Review of Collaborating Partner Product Pricing

Summary Document

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INTRODUCTION

The World Health Organization ("WHO"), has entered into a Memorandum of Understanding "MOU" on May 23, 2001 with Novartis Pharma AG ("Novartis") whereby Novartis has agreed to furnish the anti-malarial drug Coartem® "the Product" to WHO for redistribution to public sector agencies in the developing world. In this endeavour, WHO is anxious to ensure that the costs charged for the Product to the public sector agencies are kept to the minimum. In accordance with Art 6.3 of the MOU WHO, through the Office of Internal Audit and Oversight, sought to confirm compliance with certain contractual obligations relating to Product pricing, notably that the price charged does not exceed Novartis' costs as outlined in Annex 4 of the MOU and therefore commissioned a review of which this report contains a summary of the work performed and the principal findings.

THE SCOPE OF THE REVIEW

This engagement was undertaken in accordance with the International Standard on Auditing applicable to agreed-upon procedures engagements. Both WHO and Novartis representatives agreed the procedures to be performed as part of the review and this report presents the factual findings as a result the procedures performed.

The fieldwork was performed during October and November including visits to Novartis' offices in Bâle, with some supporting information being provided by their Toll Manufacturing site in Beijing, China.

WORK PERFORMED

The assumptions, terms and conditions governing the production and availability of the Product are summarized in the MOU and are the responsibility of two parties to the MOU. The procedures were agreed with the WHO and Novartis and were performed solely to assist in evaluating the validity of the specified elements of the data reported and made available by the parties under the terms of the MOU and are summarized and itemised as follows:

1. We met with Novartis Finance and Standard Cost Management representatives to obtain an understanding of the overall approach adopted by Novartis in the determination of the costs for the products.
2. We obtained and checked the mathematical accuracy of the underlying schedules, information models (i.e. bills of materials) and analysis, provided by Novartis, supporting the calculation of the costs involved in the production of the WHO (as per Annex 4 of the MOU) for:
    a. Costs of all active substances
    b. Costs of formulation
    c. Costs of packaging
    d. Royalties payable to third parties.
3. On a test basis, we have agreed the "net total costs" to the underlying manufacturing standard cost records (i.e. for the July 3rd, 2002 and November 8th 2002 standard cost calculations as per the bills of materials etc.) supporting the direct and indirect cost "charges" for the

Product (based on the Nopas 148421 Coartem Tab 20/120 30 (6x4) I05) as accounted for within Novartis' underlying information systems

4. On a test basis, we have agreed the "elements used" in the calculations to the underlying detailed information and cost allocations reported by the applicable production units. We also identified where the application of "inter-company charges" or a form of "tax" was included in the costs.
5. We obtained and checked the mathematical accuracy and the breakdown of the financial results supporting the "actual" costs for the components for each of the above mentioned categories of cost (i.e. active substances, formulation, packaging and royalties) relating to the production of the Product.
6. We obtained and checked the mathematical accuracy and the breakdown of the financial information supporting the "actual" costs for the components for each of the above mentioned categories of cost relating to the production of the Product under the Toll Manufacturing agreement in China.
7. Specifically in relation to the "royalties", we reviewed extracts of the License & Development Agreement, i.e. the "royalty agreement" between CIBA-GEIGY Ltd (now Novartis Pharma AG) and the representatives of the CITIC Technology Inc of the People's Republic of China signed on September 20th 1994, covering the Product
8. We compared key trends (historic and projected) in the costs of the elements of the Product, through comparing the last two standard cost calculations to determine if there were any significant changes in the cost structure in addition to comparing the standard cost calculation with that of Riamet© (i.e. the commercial version of the Product) based on information supplied by Novartis.

PRINCIPAL FINDINGS

Neither WHO nor Novartis was able to provide reliable information concerning the determination of the "baseline" product pricing structure that was used to fix the original Product supply price, per the MOU, of US$ 2.40.

Therefore, the determination of the cost for the standard reference pack for Coartem®, i.e. the NOPAS 148421 Coartem Tab 20/120 30 (6x4), was based on the standard cost information provided by Novartis. The accumulation of the related costs has been calculated as US$ 3.25 as of July 2002 and US$ 3.20 based on the standard cost for November 2002 i.e. the cost to be applied for 2003, resulting in a difference per pack in favour of WHO

We report our findings below:

a) With respect to item 1, we found that the practices adopted by Novartis reflected normal business practices and that the individual components of the cost records were supported by plausible explanations without exception.

b) With respect to item 2, we found the cost records were supported by detailed standard cost calculations without exception. On a test basis, we have agreed the "production elements" information in the pricing calculations to the underlying detail reported by Novartis without exception.

c) With respect to item 3, we found the information concerning production costs and packaging used to be consistent with the data used in items 1 and 2.

d) With respect to item 4, we found the amounts arriving at the “Total Production Costs” to be as per the summary calculation mentioned above.

e) With respect to item 5, we found the mathematical accuracy of the underlying supporting Product standard cost schedules to be correct. We compared the costs, for all material items included in the calculations to supporting corroborative information (e.g. copies of supplier invoices etc.). On a test basis we found that the independently available information to be consistent with the costs recorded.

f) With respect to item 6, we reviewed the listing and the mathematical accuracy of the underlying supporting Product standard cost schedules provided by Beijing Novartis Pharma Ltd. We compared the costs, for all material items included in the calculations to supporting corroborative information (e.g. copies of supplier invoices etc.) We have confirmed that the reported total production costs as per the latest standard cost calculation. (Note: As we did not visit the Beijing Novartis Pharma Ltd facility we were unable to confirm that the extract of the standard costs provided by Beijing Novartis Pharma Ltd were in agreement with the underlying accounting records).

g) With respect to item 7, we found the amounts in the agreement agreed to the calculation of the royalties for the year was based on the “Net sales of the Product sold”. We also reviewed a copy of the invoice for the royalties paid for 2001, which was in accordance with an extract of the underlying accounting records.

h) With respect to item 8, we found the comparison of the standard cost records (extract of the underlying accounting records) supporting the detailed cost calculation of Riamet©, (i.e. the commercial version of the Product) as of July 2002 were only marginally higher than the equivalent standard pack size for the Product.

LIMITATIONS

There were no factors that came to our attention that led us to believe that full disclosure, under the terms of the MOU, was not complied with by Novartis in supporting this review.

Had we performed additional procedures, other matters might have come to our attention that would have been reported to you.

As the services provided under this engagement did not constitute an audit *per se* this report does not constitute the issuance of any formal expression of a conclusion or any form of assurance with respect to the financial data or statements or the internal controls of Novartis.

This report is issued solely for the purpose set forth in the first paragraph of this document, titled "Introduction".

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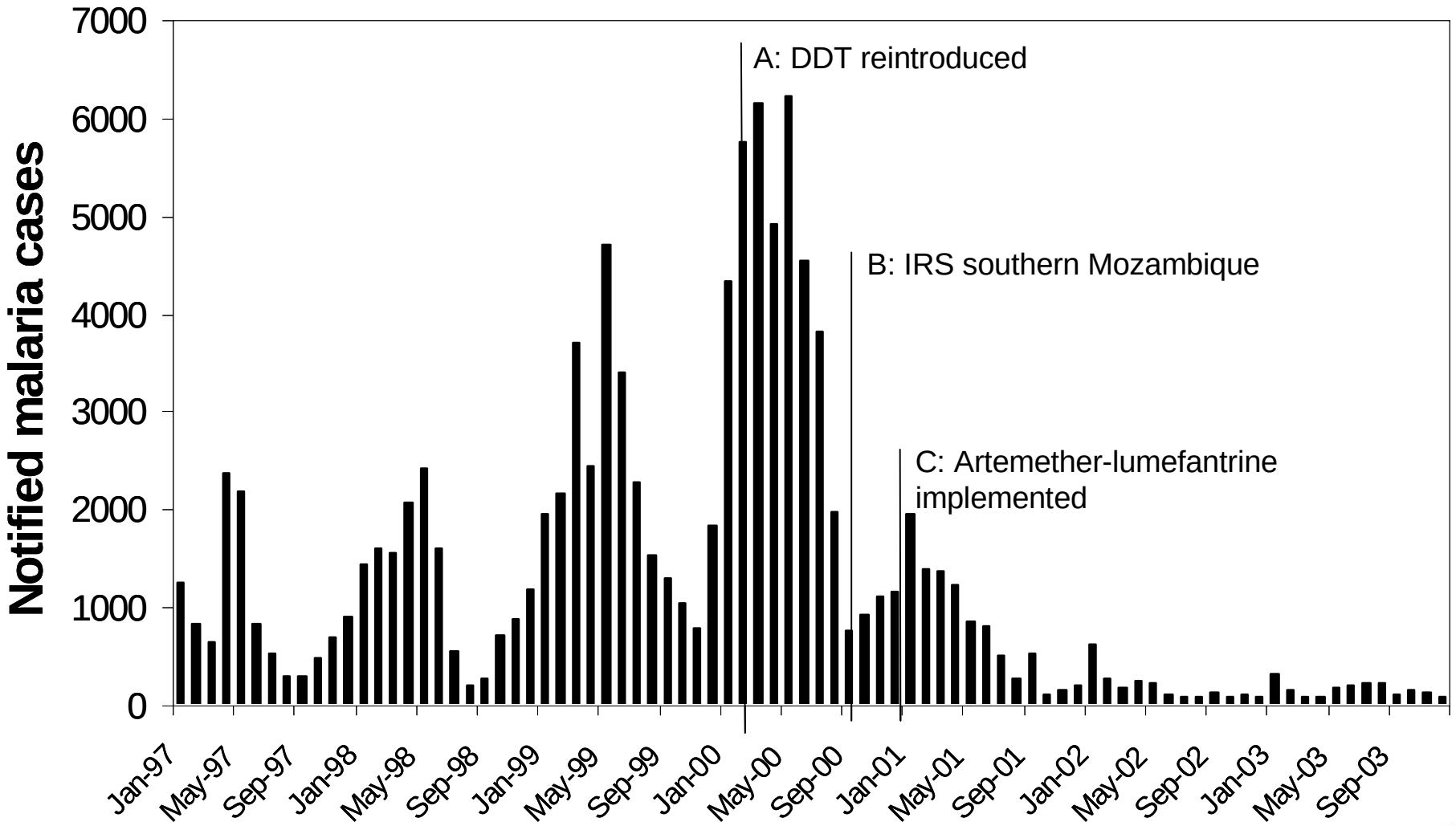
APPENDIX 1 : Information Received

The following is a list of the information obtained in the connection with this review.

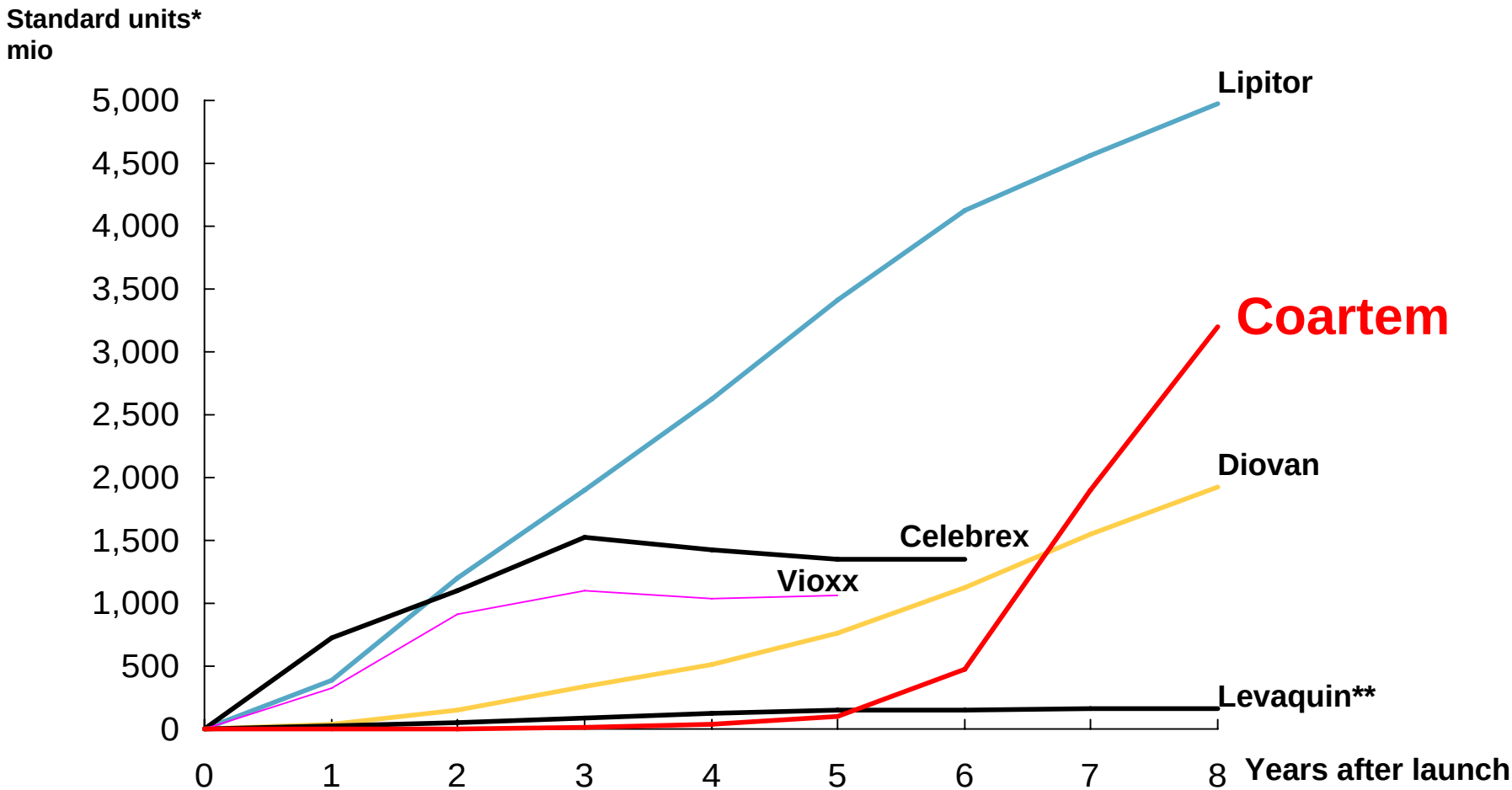
Document Name	Source
Memorandum of Understanding, i.e. the "agreement" between Novartis Pharma AG) and the representatives of WHO signed on May 23rd 2001, covering the Product	WHO
Extracts of the License & Development Agreement, i.e. the "royalty agreement" between CIBA-GEIGY Ltd (now Novartis Pharma AG) and the representatives of the CITIC Technology Inc of the People's Republic of China signed on September 20th 1994, covering the Product	Novartis Pharma AG
Royalty Payment Summary – CITIC Technology	Novartis Pharma AG (Systems printscreen extract)
Royalty Payment Invoice – CITIC Technology	Novartis Pharma AG
Novartis Coartem/Riamet Net Sales for 2001	Novartis Pharma AG (Excel spreadsheet)
Novartis Coartem/Riamet Sales to WHO for 2001	Novartis Pharma AG (Excel spreadsheet)
Novartis Coartem Sales to WHO for period up to Sept 2002	Novartis Pharma AG (Excel spreadsheet)
Analysis Cost Calculation – NOPAS 148421 Coartem Tab 20/120 30 (6x4) (value 1000 packs/720'000 tablets)	Novartis Pharma AG
Analysis Cost Calculation – NOPAS 132195 Coartem Tab 20/120 U17 (2x8) (value 1000 packs/16 tablets per pack)	Novartis Pharma AG
Novartis Pharma AG Basel Income Statement LE3 2002	Novartis Pharma AG
Bill of materials/Standard Cost Calculation July 2002– NOPAS 148421 Coartem Tab 20/120 30 (6x4) (value 1000 packs/720'000 tablets)	Novartis Pharma AG
Bill of materials/Standard Cost Calculation November 2002– NOPAS 148421 Coartem Tab 20/120 30 (6x4) (value 1000 packs/720'000 tablets)	Novartis Pharma AG
Bill of materials/Standard Cost Calculation July 2002– NOPAS 146687 Riamet Tab 20/120 30 (3x8)	Novartis Pharma AG
Summary of Material Costs - Beijing	Novartis Beijing – Excel sheet
Bill of Material - Beijing (Coartem Tab 20/120 30 (6x4) WHO)	Novartis Beijing
Bill of Material/price list update - Beijing	Novartis Beijing – Excel sheet 8/11/02
Sample Copy of sample Invoice for purchase of Artemether	Supplier Beijing
Sample Copy of sample Invoice for purchase of Lumefantrine (dated 24/5/02)	Orgamol SA
Copies of Invoices for IC sales of Coartem (Novartis Beijing Pharma Ltd to Novartis Pharma AG	Novartis Beijing
Copies of Invoices for sales of Coartem (Novartis Pharma AG to WHO Agents)	Novartis Beijing
Copies of freight documents supporting invoices for sales of Coartem (Novartis Pharma AG to WHO Agents)	WHO

How DDT and Coartem stopped malaria in KwaZulu Natal, South Africa



Source: South African National Department of Health, Notification Data

Novartis' expected pace of non-profit Coartem scale-up exceeds even the most major pharmaceutical blockbusters



* US, Japan, top 5 EU ** US only

Source: IMS data

NOVARTIS

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What the World Needs Now Is DDT

By TINA ROSENBERG

Above left: With equipment provided by Unicef, a 1960 DDT team prepared to go house to house in Masuleh, Iran. Center: DDT was an insecticide of choice in the United States. Then, in 1962, came Rachel Carson's "Silent Spring." Right: A female mosquito, needing blood to nourish her eggs, sucks away with her probiscus.

The year 2000 was a time of plague for the South African town of Ndumo, on the border of Mozambique. That March, while the world was focused on AIDS, more than 7,000 people came to the local health clinic with malaria. The South African Defense Force was called in, and soldiers set up tents outside the clinic to treat the sick. At the district hospital 30 miles away in Mosvold, the wards filled with patients suffering with the headache, weakness and fever of malaria -- 2,303 patients that month. "I thought we were going to get buried in malaria," said Hervey Vaughan Williams, the hospital's medical manager.

Today, malaria has all but vanished in Ndumo. In March 2003, the clinic treated nine malaria cases; Mosvold Hospital, only three.

As malaria surges once again in Africa, victories are few. But South Africa is beating the disease with a simple remedy: spraying the inside walls of houses in affected regions once a year. Several insecticides can be used, but South Africa has chosen the most effective one. It lasts twice as long as the alternatives. It repels mosquitoes in addition to killing them, which delays the onset of pesticide-resistance. It costs a quarter as much as the next cheapest insecticide. It is DDT.

KwaZulu-Natal, the province of South Africa where Ndumo and Mosvold are located, sprayed with

DDT until 1996, then stopped, in part under pressure from other nations, and switched to another insecticide. But mosquitoes proved to be resistant to the new insecticide, and malaria cases soared. Since DDT was brought back in 2000, malaria is once again under control. To South Africans, DDT is their best defense against a killer disease.

To Americans, DDT is simply a killer. Ask Americans over 40 to name the most dangerous chemical they know, and chances are that they will say DDT. Dichloro-diphenyl-trichloroethane was banned in the United States in 1972. The chemical was once sprayed in huge quantities over cities and fields of cotton and other crops. Its persistence in the ecosystem, where it builds up to kill birds and fish, has become a symbol of the dangers of playing God with nature, an icon of human arrogance. Countries throughout the world have signed a treaty promising to phase out its use.

Yet what really merits outrage about DDT today is not that South Africa still uses it, as do about five other countries for routine malaria control and about 10 more for emergencies. It is that dozens more do not. Malaria is a disease Westerners no longer have to think about. Independent malariologists believe it kills two million people a year, mainly children under 5 and 90 percent of them in Africa. Until it was overtaken by AIDS in 1999, it was Africa's leading killer. One in 20 African children dies of malaria, and many of those who survive are brain-damaged. Each year, 300 to 500 million people worldwide get malaria. During the rainy season in some parts of Africa, entire villages of people lie in bed, shivering with fever, too weak to stand or eat. Many spend a good part of the year incapacitated, which cripples African economies. A commission of the World Health Organization found that malaria alone shrinks the economy in countries where it is most endemic by 20 percent over 15 years. There is currently no vaccine. While travelers to malarial regions can take prophylactic medicines, these drugs are too toxic for long-term use for residents.

Yet DDT, the very insecticide that eradicated malaria in developed nations, has been essentially deactivated as a malaria-control tool today. The paradox is that sprayed in tiny quantities inside houses -- the only way anyone proposes to use it today -- DDT is most likely not harmful to people or the environment. Certainly, the possible harm from DDT is vastly outweighed by its ability to save children's lives.

o one concerned about the environmental damage of DDT set out to kill African children. But various factors, chiefly the persistence of DDT's toxic image in the West and the disproportionate weight that American decisions carry worldwide, have conspired to make it essentially unavailable to most malarial nations. With the exception of South Africa and a few others, African countries

depend heavily on donors to pay for malaria control. But at the moment, there is only one country in the world getting donor money to finance the use of DDT: Eritrea, which gets money for its program from the World Bank with the understanding that it will look for alternatives. Major donors, including the United States Agency for International Development, or Usaid, have not financed any use of DDT, and global health institutions like W.H.O. and its malaria program, Roll Back Malaria, actively discourage countries from using it.

Part of the reason for DDT's marginalization is that its delivery method, house spraying, doesn't work everywhere. Insecticide sprayed inside houses repels mosquitoes -- and kills those that do make it indoors and perch on walls -- for several months. Since most mosquitoes bite at night, when people are likely to be indoors, the spray reduces the number of times people are bitten. If around 80 percent of houses are covered, spraying protects everyone, as the bites that take place will be from mosquitoes less likely to have bitten an infected person. But house spraying is only effective against mosquitoes that bite indoors -- not all do. It also requires a government capable of organizing, training and equipping sprayers, which is beyond the reach of some countries.

Even when spraying is possible, though, developed nations don't want to pay for it. Instead, the malaria establishment in developed nations promotes the use of insecticide-treated nets that people can buy to hang over their beds. Treated bed nets are indeed a useful tool for controlling malaria. But they have significant limitations, and one reason malaria has surged is that they have essentially become the only tool promoted by Western donors. "I cannot envision the possibility of rolling back malaria without the power of DDT," said Renato Gusm-o, who headed antimalaria programs at the Pan American Health Organization, or P.A.H.O., the branch of W.H.O. that covers the Americas. "Impregnated bed nets are an auxiliary. In tropical Africa, if you don't use DDT, forget it."

The other reason DDT has fallen into disuse is wealthy countries' fear of a double standard. "For us to be buying and using in another country something we don't allow in our own country raises the specter of preferential treatment," said E. Anne Peterson, the assistant administrator for global health at Usaid. "We certainly have to think about 'What would the American people think and want?' and 'What would Africans think if we're going to do to them what we wouldn't do to our own people?'"

Given the malignant history of American companies employing dangerous drugs and pesticides overseas that they would not or could not use at home, it is understandable why Washington officials say it would be hypocritical to finance DDT in poor nations. But children sick with malaria might perceive a more deadly hypocrisy in our failure to do so: America and Europe used DDT irresponsibly to wipe out malaria. Once we discovered it was harming the ecosystem, we made even its safe use impossible for far poorer and sicker nations.

Today, westerners with no memory of malaria often assume it has always been only a tropical disease. But malaria was once found as far north as Boston and Montreal. Oliver Cromwell died of malaria, and Shakespeare alludes to it (as "ague") in eight plays. Malaria no longer afflicts the United States, Canada and Northern Europe in part because of changes in living habits -- the shift to cities, better sanitation, window screens. But another major reason was DDT, sprayed from airplanes over American cities and towns while children played outside.

In Southern Europe, Latin America and Asia, DDT played an even more prominent role in controlling malaria. A malaria-eradication campaign with DDT began nearly worldwide in the 1950's. When it started, India was losing 800,000 people every year to malaria. By the late 1960's, deaths in India were approaching zero. In Sri Lanka, then called Ceylon, 2.8 million cases of malaria

per year fell to 17. In 1970, the National Academy of Sciences wrote in a report that "to only a few chemicals does man owe as great a debt as to DDT" and credited the insecticide, perhaps with some exaggeration, with saving half a billion lives.

From the 1940's to the late 1960's, indoor house spraying with DDT was tested all over Africa. It was least effective in the lowland savannas of West Africa, but even partly successful programs provided considerable health improvements. And in other parts of Africa, DDT reduced the infant mortality rate by half and in some places wiped out malaria completely.

Still, DDT was falling out of favor even before the 1962 publication of "Silent Spring," Rachel Carson's book that described the dumping of DDT and other pesticides on American towns and farms and detailed the destruction they caused. DDT had not been sold as a way to control malaria but to eradicate it, so the world would never have to think about malaria again. But eradication failed -- it is now considered biologically impossible -- and because DDT had not lived up to its billing, disillusion set in. At the same time, DDT's indiscriminate use was provoking the development of resistance among mosquitoes, and many countries were shifting to decentralized health systems, which meant they were no longer able to organize nationwide house spraying.

The move away from DDT in the 60's and 70's led to a resurgence of malaria in various countries -- Sri Lanka, Madagascar, Swaziland, South Africa and Belize, to cite a few; those countries that then returned to DDT saw their epidemics controlled. In Mexico in the 1980's, malaria cases rose and fell with the quantity of DDT sprayed. Donald Roberts, a professor at the Uniformed Services University of the Health Sciences in Bethesda, Md., has argued that when Latin America stopped using DDT in the 1980's, malaria immediately rose, leading to more than a million extra cases a year. The one country that continued to beat malaria was Ecuador, the one country that kept using DDT.

In the few countries where it is used today, DDT is no longer sprayed from airplanes, and no country admits to using it as an insecticide for crops -- although there are probably cases where it is diverted for agricultural use. Its only legitimate use is inside houses. Roberts said that the quantities used for house spraying are so small that Guyana, to take one example, could protect every single citizen of its malarious zones with the same amount of DDT once used to spray 1,000 acres of cotton. "The negative environmental effects of DDT use that led to its banning were due to massive, widespread agricultural use," says a fact sheet published by Usaid (no fan of the chemical). "Spraying limited amounts of DDT inside houses is considered unlikely to have major negative environmental impact."

What about DDT's impact on the people inside the houses? The most serious evidence of DDT's harm to humans are a few studies showing that higher levels of DDE (the form DDT takes when it metabolizes) in a mother's blood is associated with premature birth and shorter duration of breast-feeding. But other studies have found no such associations. There was suspicion that DDT causes breast cancer, but study after study has found no connection. In general, DDT is feared for its effect on the environment, not on humans. It has been used on such a huge scale over the last 50 years that it is reasonable to think that if it had any serious effect on human health, we would know it by now.

Rereading "Silent Spring," I was again impressed by the book's many virtues. It was serialized in The New Yorker in June 1962 and published in book form that September -- a time when Americans were living in the golden glow of postwar progress and science was revered. "Silent Spring" for the first time caused Americans to question the scientists and officials who had been

assuring them that no harm would result from the rain of pesticides falling on their farms, parks and backyards. Carson detailed how DDT travels up the food chain in greater and greater concentrations, how robins died when they ate earthworms exposed to DDT, how DDT doomed eagle young to an early death, how salmon died because DDT had killed the stream insects they ate, how fiddler crabs collapsed in convulsions in tidal marshes sprayed with DDT.

"Silent Spring" changed the relationship many Americans had with their government and introduced the concept of ecology and the interconnectedness of systems into the national debate. Rachel Carson started the environmental movement. Few books have done more to change the world.

But this time around, I was also struck by something that did not occur to me when I first read the book in the early 1980's. In her 297 pages, Rachel Carson never mentioned the fact that by the time she was writing, DDT was responsible for saving tens of millions of lives, perhaps hundreds of millions.

DDT killed bald eagles because of its persistence in the environment. "Silent Spring" is now killing African children because of its persistence in the public mind. Public opinion is so firm on DDT that even officials who know it can be employed safely dare not recommend its use. "The significant issue is whether or not it can be used even in ways that are probably not causing environmental, animal or human damage when there is a general feeling by the public and environmental community that this is a nasty product," said David Brandling-Bennett, the former deputy director of P.A.H.O. Anne Peterson, the Usaid official, explained that part of the reason her agency doesn't finance DDT is that doing so would require a battle for public opinion. "You'd have to explain to everybody why this is really O.K. and safe every time you do it," she said -- so you go with the alternative that everyone is comfortable with.

"Why it can't be dealt with rationally, as you'd deal with any other insecticide, I don't know," said Janet Hemingway, director of the Liverpool School of Tropical Medicine. "People get upset about DDT and merrily go and recommend an insecticide that is much more toxic."

Because the ban on DDT became the midwife to the environmental movement, the debate about it, even today, is bizarrely polarized. Most environmental groups don't object to DDT where it is used appropriately and is necessary to fight malaria. But liberals still tend to consider it a symbol of the Frankenstein effects of unbridled faith in technology. For conservatives, whose Web sites foam at the mouth about the hypocrisy of environmentalists, DDT continues to represent the victory of overzealous regulators and Luddites who misread and distort science.

So far, conservatives have not been able to budge Usaid, even though they have managed to remake the agency's overseas AIDS programs to promote abstinence and discredit condom use. But malaria is not part of the public debate as AIDS is, and DDT does not have the same cultural urgency for the religious right that abstinence does.

William Ruckelshaus, the head of the newly created Environmental Protection Agency, banned DDT in 1972. It remains one of the most controversial decisions the E.P.A. has ever taken. Ruckelshaus was under a storm of pressure to ban DDT. But Judge Edmund Sweeney, who ran the E.P.A.'s hearings on DDT, concluded that DDT was not hazardous to humans and could be used in ways that did not harm wildlife. Ruckelshaus banned it anyway, for all but emergencies.

Ruckelshaus made the right decision -- for the United States. At the time, DDT was mainly sprayed on crops, mostly cotton, a use far riskier than indoor house spraying. There was no malaria in the

United States -- in part thanks to DDT -- so there were no public health benefits from its use. "But if I were a decision maker in Sri Lanka, where the benefits from use outweigh the risks, I would decide differently," Ruckleshaus told me recently. "It's not up to us to balance risks and benefits for other people. There's arrogance in the idea that everybody's going to do what we do. We're not making these decisions for the rest of the world, are we?"

n fact, we are -- the central reason that African nations who need DDT do not use it today. Washington is the major donor to W.H.O. and Roll Back Malaria, and most of the rest of the financing for those groups comes from Europe, where DDT is also banned. There is no law that says if America cannot use DDT then neither can Mozambique, but that's how it works. The ban in America and other wealthy countries has, first of all, turned poor nations' agricultural sectors against DDT for economic reasons. A shipment of Zimbabwean tobacco, for example, was blocked from entering the United States market because it contained traces of DDT, turning Zimbabwe's powerful tobacco farmers into an effective anti-DDT lobby. From a health point of view, of course, American outrage would have been more appropriate if traces of tobacco had been found in their DDT than the other way around.

Then there are chemical companies. "I get asked all the time -- are you being paid by chemical companies?" said Thomas DeGregori, a professor of economics at the University of Houston and an advocate for DDT. The question is amusing, because the corporate interests in this issue are actually on the other side. DDT is no longer on patent, and it is known to be made only in India and China -- and the price has soared since the rich-country ban put manufacturers out of business, making it harder for poor countries to buy. Janet Hemingway of the Liverpool School, who advises African governments, said that she and the officials she works with are often lobbied by chemical companies selling more expensive insecticides, telling her about DDT's evils. "Clearly, they'd like to see DDT banned -- it cuts into their markets," she said.

But more important to DDT's demise has been pressure from the international malaria establishment. Sometimes it is direct. Mexico gave up DDT, for example, because the North American Free Trade Agreement obligated it to. Donald Roberts, who was working in Belize in the early 1990's, said that Usaid told the country to stop using DDT or it would lose foreign assistance. (Belize did, and malaria rates soared.)

In May 2001, 91 countries and the European Community signed a treaty in Stockholm on 12 persistent organic pollutants, the "dirty dozen." It banned nine outright. For DDT, the treaty allowed its use in indoor spraying for public health purposes, but called for its gradual phase-out. DDT's exemption, which had been opposed by environmental groups but supported by malariologists, did allow countries dependent on DDT to continue to use it for the present. But Stockholm's guiding principle -- phase it out -- is one more factor that discourages donors from financing DDT.

Brian Sharp, who is leading South Africa's house-spraying program, said that some international research agencies will not finance studies in any way associated with DDT. Roll Back Malaria sees its mosquito-control strategy as promoting bed nets, period. Its 2003 Africa report hardly mentions house spraying. The Global Fund to Fight AIDS, Tuberculosis and Malaria -- which uses guidelines set by W.H.O. -- currently finances no DDT. Vinand Nantulya, senior adviser to the fund's executive director, said that the fund might theoretically supply DDT to a country that requests it -- but none have. This is no surprise: these countries work closely with W.H.O. and advisers from Usaid to formulate their proposals to the Global Fund, and they are unlikely to ask for things that stand a low chance of approval. Many African scientists and health officials report being told by donors, "You'll have trouble getting money for this" or "Donors believe this has unacceptable

environmental effects." The balance of power is so tilted toward the donors in these relationships that poor countries will go quite far out of their way to not offend. DDT is controversial; better not to ask.

In 1999, the Pan American Health Organization recommended that Ecuador use DDT to control malaria in the wake of El Nino. The World Bank said no. In a document explaining its decision, the bank said, "Because of the controversial issues surrounding DDT, the World Bank's malaria team discourages the habitual use of DDT for malaria control." Renato Gusm-o of P.A.H.O. said that the bank's environmental group told him it was fighting for the elimination of DDT and could not allow the bank to finance DDT while advocating a ban.

In many countries, decisions about DDT are made by environmental ministries, with little input from health officials. When Colombia banned DDT in the early 1990's, for example, "people in public health found out when they read about it in the newspaper," Gusm-o said. Malaria cases more than doubled. The 1980's and 1990's also saw the rise of environmental units within the health institutions and donors like the World Bank. These watchdog units were much needed and in general have been a crucial tool to protect the environment. But they look at only the risks, not the benefits. Walter Vergara, the World Bank official who headed the unit that dismissed DDT in Ecuador, defended the decision to me: "DDT has an awful impact on the biosystem and is being eliminated by the world community. There are alternatives. We're not the only species on the planet."

Said David Brandling-Bennett, the former deputy director: "My experience at P.A.H.O. was that the malaria community eventually gave in to heavy pressure from environmental groups, including within the organization. There was a fairly heavy debate in P.A.H.O. a few years back about whether we should use DDT where it is effective. But the overwhelming perception of DDT as the nastiest kid on the block just made it very difficult to argue for continuing. Really, the malaria community retreated."

When Lee Jong-Wook became head of W.H.O. last year, he wrote an article for The Lancet, the British medical journal, setting out his vision. Lee wrote about AIDS, about SARS, about strengthening public health systems. He did not mention malaria.

Probably the worst thing that ever happened to malaria in poor nations was its eradication in rich ones. That has made one of Africa's leading killers shockingly invisible. "'Silent Spring' had a clear message about things at home Americans could see and touch and feel," said Brooks B. Yeager, vice president of the Global Threats Program for the World Wildlife Fund. "Americans who live on the Carolina coast know the brown pelicans have come back" since DDT spraying was halted. "Malaria is a long way away. You have to read about it or see in person its devastation, and not many Americans have the opportunity to do it."

Lawrence Barat, the World Bank's adviser on malaria control, said, "When I tell people I work on malaria, sometimes I get, 'Gee, I didn't know it still existed.'"

One of the most depressing aspects of talking about malaria is that you get to hear the phrase "the powerful AIDS lobby," a term no one but a malariologist would use. AIDS in the third world is still criminally underfinanced, but at least it gets some money and a lot of attention. Malaria gets AIDS's dregs. AIDS was a sudden plague, very visible in its choice of victims, and it has a vocal constituency in rich countries. Even in Africa, malaria gets nowhere near the attention of AIDS. It

has always been around, and it kills not middle-class adults but rural 4-year-olds, who don't have much of a lobby.

Malaria's status can be read in the aid figures. By the 1990's, it was almost completely ignored, and Africa's malaria-control programs disintegrated. In some countries, the entire federal antimalaria program employed only two or three people. When developed nations got together to begin Roll Back Malaria in 1998, they pledged money to meet its goal of cutting the death toll from malaria in half by 2010, but have then proceeded to donate peanuts. In 2000, according to Amir Attaran, a Massachusetts-based fellow of the Royal Institute for International Affairs, the 23 richest countries in the world plus the World Bank together provided $100 million to fight malaria -- less than a tenth of the annual sum necessary to meet Roll Back Malaria's goals.

The AIDS epidemic has begun to excite a broader interest in third-world diseases, and malaria has benefited, especially from the establishment of the Global Fund, which has approved $499 million for malaria -- although it has only actually disbursed a tenth of that amount. Usaid, which in 1998 gave just $12 million to fight malaria, now gives $80 million a year, a notable advance.

But money is still very short. One illustration of donor stinginess is the fact that the world today employs malaria cures that don't work. As resistant strains of malaria have evolved, chloroquine, the most popular remedy, fails up to 80 percent of the time, and a newer treatment, Fansidar, is not much better and is getting worse. They are still in use because they are cheap; chloroquine costs only pennies per dose, a cost most African families can handle themselves. New, effective drugs are available, but they cost a minimum of 40 cents for a child's treatment and $1.50 for an adult's, which means that African governments -- and therefore donors -- will have to pay. Only a handful of Africa's 42 malaria-endemic countries have switched; one is South Africa, where the new drugs have been partly responsible for the country's recent success. Those prices may not seem like much to cure malaria, especially when contrasted with the hundreds of dollars a year for life needed to treat AIDS. But 40 cents a child is apparently too much for donors to provide.

The lack of political interest in malaria has been a very important factor in the decline of house spraying and rise of bed nets. Bed nets follow the fashion in development assistance today: bypass the government and work through private sector, nongovernmental groups and with the affected people themselves. People can buy nets in a store for $2 to $10, or their subsidized or even free distribution can be integrated into other health programs, like vaccination days.

Bed nets are an exciting and important form of mosquito control. But they have major drawbacks. Even a few dollars is still too much money. People surveyed in rural Africa about what they would like to buy listed a bed net as only the sixth product on their wish list. The first three were a bicycle, a radio and, most heartbreakingly, a plastic bucket. The price is also kept artificially high because most countries, shamefully, still tax bed nets. And until nets with long-lasting insecticide can be widely distributed, bed nets need regular retreatment. It is insecticide that protects, not the net, and the insecticide wears off without people knowing it.

Both bed nets and house spraying can be effective, and studies comparing costs differ on which is cheaper. For the world malaria establishment, however, one huge difference is that with house spraying, the central government -- and therefore donors -- bear the cost. Financing repeated rounds of spraying, donors argue, is not sustainable. "But 'sustainable' is what you choose to sustain," Amir Attaran fumed. "Nobody demands my garbage collection in Cambridge, Mass., be sustainable. The garbageman comes once a week, and it is accepted that society pays for that."

Mozambique is now doing house spraying successfully and cheaply without a national army of sprayers and a fleet of S.U.V.'s. Mozambique hires a few people in each community and gives them two weeks of training and the materials they need. Those sprayers then walk from house to house, spraying each one twice a year. "It helps save on transport costs, and the fact that sprayers come from the community makes it a lot more credible in terms of people accepting what is done in their households," said Jotham Mthembu, KwaZulu-Natal's malaria control program manager, who also advises the program in neighboring Mozambique. Mozambique, because it depends on Western donors, uses a more expensive insecticide. But if it used DDT, it could protect people for $1.70 per person per year.

There are other ways to control mosquitoes. Parts of India, for example, are having success stocking mosquito-breeding ponds with guppies, who eat mosquito larvae. But India's ingenious strategy would not work in Africa, where mosquitoes breed in cattle hoofprints during the rainy season.

Malaria must be more than simply a line item in the health budget. Malaria kills tourism and foreign investment. It greatly reduces human intelligence and productivity and lessens agricultural yields. Against these costs, a nation's business sectors and economic ministries should willingly join the fight -- and donors must begin to think of malaria control as an unusually cost-effective antipoverty program.

South Africa's success is inspiring another look at DDT around the continent. Uganda, Kenya and other places are now examining whether it could work in their nations. If it could, donors should encourage it. DDT is a victim of its success, having so thoroughly eliminated malaria in wealthy nations that we forget why we once needed it. But malaria kills Africans today. Those worried about the arrogance of playing God should realize that we have forged an instrument of salvation, and we choose to hide it under our robes.

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