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Bill Gates' Donation

-- Bill Gates donated $168 million to fight malaria, and urged the world to intensify its battle against a disease which kills more than one million people a year. --

BACKGROUND:

Malaria is a debilitating infectious disease characterized by chills, shaking, and periodic bouts of intense fever. Caused by single-celled parasites of the genus *Plasmodium*, malaria is transmitted from person to person by the bite of female mosquitoes.

Although malaria was once widespread in North America and other temperate regions, the last major outbreak of malaria in North America occurred in the 1880s. The disease today occurs mostly in tropical and subtropical countries, particularly sub-Saharan Africa and Southeast Asia. According to the World Health Organization, malaria is prevalent in over 100 countries. Each year, between 300 million and 500 million cases of malaria are diagnosed, and 1.5 million to 2.7 million people die of the disease. In recent years, malaria has become more difficult to control and treat because malaria parasites have become resistant to drugs, and mosquitoes that transmit the disease have become resistant to insecticides.

LIFE CYCLE *Plasmodium* parasites undergo many stages of development, and their complete life cycle occurs in both humans and mosquitoes. The parasites are transmitted to humans by female mosquitoes. About 60 of the 390 species of *Anopheles* mosquito transmit the malaria parasite. Of these, only a dozen species are important in the transmission of malaria worldwide. Usually just one or two species play a role in malaria transmission in a particular region where the disease is prevalent.

Malaria transmission begins when a female mosquito bites a human already infected with the malaria parasite. The mosquito ingests blood containing immature male and female gametes (sex cells) of the malaria parasite. Inside the mosquito's stomach, the gametes quickly mature. A male gamete fuses with a female gamete to produce a cell known as a zygote. The zygote enters the wall of the mosquito's gut and develops into an oocyst. The oocyst multiplies to produce thousands of cells known as sporozoites. The sporozoites leave the wall of the gut and migrate to the mosquito's salivary glands. The mosquito phase of the malaria parasite's life cycle is normally completed in 10 to 14 days. This development process occurs more slowly in areas with cooler temperatures. Sporozoite development of *Plasmodium falciparum* is slowed particularly by low temperatures, preventing transmission of this parasite in temperate climates except during summer.

When the infected mosquito bites another human, sporozoites in the mosquito's saliva transfer to the blood of the human. Sporozoites travel in the blood to the liver. In liver cells over the course of one to two weeks, the sporozoites divide repeatedly to form 30,000 to 40,000 merozoites. The merozoites leave the liver to enter the bloodstream, where they invade red blood cells. Inside these blood cells, the merozoites multiply rapidly until they force the red cells to burst, releasing into the bloodstream a new generation of merozoites that go on to infect other red blood cells. Some merozoites divide to form gametocytes, immature male and female gametes. If another mosquito bites the human and ingests these gametocytes, the life cycle of the malaria parasite begins again.

SYMPTOMS The fever that characterizes malaria develops when merozoites invade and destroy red blood cells. The destruction of red blood cells spills wastes, toxins, and other debris

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into the blood. The body responds by producing fever, an immune response that speeds up other immune defenses to fight the foreign invaders in the blood. The fever usually occurs in intermittent episodes. An episode begins with sudden, violent chills, soon followed by an intense fever and then profuse sweating that brings the patient's temperature down again. Upon initial infection with the malaria parasite, the episodes of fever frequently last 12 hours and usually leave an individual exhausted and bedridden. Repeated infections with the malaria parasite can lead to severe anemia, a decrease in the concentration of red blood cells in the bloodstream. The malaria parasite consumes or renders unusable the proteins and other components of the patient's red cells.

Infections caused by *Plasmodium falciparum* are marked by their severity and high fatality rate. This type of malaria can also cause severe headaches, convulsions, and delirium. The infection sometimes develops into cerebral malaria, in which red blood cells infected with parasites attach to tiny blood vessels in the brain, causing inflammation and blocking the flow of blood and oxygen.

DIAGNOSIS AND TREATMENT

Malaria is difficult to diagnose based on symptoms alone. This is because the intermittent fever and other symptoms can be quite variable and could be caused by other illnesses. A diagnosis of malaria is usually made by examining a sample of the patient's blood under the microscope to detect malaria parasites in red blood cells. The different species of *Plasmodium* can be distinguished by their appearance under the microscope. Parasites can be difficult to detect in the early stages of malaria, in cases of chronic infections, or in *Plasmodium falciparum* infections because often in these cases, not many parasites are present.

Malaria is treated with drugs that block the growth of the *Plasmodium* parasite but do not harm the patient. Some drugs interfere with the parasite's metabolism of food, while others prevent the parasite from reproducing. Drugs that interfere with the parasite's metabolism are related to quinine, the first known antimalarial drug. Quinine is a chemical derived from the bark of the South American cinchona tree and was used as a fever remedy by the ancient Inca in the 15th century. This drug has a bitter taste and produces severe side effects, such as nausea, headache, ringing in the ears, temporary hearing loss, and blurred vision, and large doses can be fatal. However, quinine is still sometimes used in treating malaria today, particularly in developing nations, because it is inexpensive and effective.

Chloroquine is a synthetic chemical similar to quinine. It became the drug of choice for malaria when it was developed in the 1940s because it was effective, easy to manufacture, and lacked most of the side effects of quinine. However, in the last few decades, malaria parasites in many areas have become resistant to chloroquine. Presently, it is effective against malaria only in some parts of Central America and the Middle East.

IMMUNITY After repeated infections, people who live in regions where malaria is prevalent develop a limited immunity to the disease. This partial protection does not prevent people from developing malaria again, but does protect them against the most serious effects of the infection. These individuals develop a mild form of the disease that does not last very long and is unlikely to be fatal.

Most of the deaths and severe illnesses caused by malaria occur in infants, children, and pregnant women. Infants and children are vulnerable because they have had fewer infections and have not yet built up immunity to the parasite. Pregnant women are more susceptible to malaria because the immune system is somewhat suppressed during pregnancy. In addition, the malaria parasite uses a specific molecule to attach to the tiny blood vessels of the placenta, the tissue that nourishes the fetus and links it to the mother. After exposure to this molecule during her first pregnancy, a woman's immune system learns to recognize and fight against the molecule. This

phenomenon makes a woman particularly vulnerable to malaria during her first pregnancy, and somewhat less susceptible during subsequent pregnancies.

Some people have genetic traits that help them resist malaria by preventing the parasites from growing and developing normally, even in people who are infected with malaria for the first time. Sickle-cell anemia and thalassemia are two inherited blood diseases linked to malaria resistance. People with two sickle-cell or thalassemia genes become seriously ill and often die in childhood if their disease is untreated. But people who have only one sickle-cell or thalassemia gene do not develop the genetic disorder and are, in fact, resistant to malaria. Various sickle-cell or thalassemia genes are widespread among people in Africa, the Mediterranean region, the Middle East, India, and Southeast Asia.

PREVENTION AND CONTROL

Malaria can be prevented by two strategies: eliminating existing infections that serve as a source of transmission, or eliminating people's exposure to mosquitoes. Eliminating the source of infection requires aggressive treatment of people who have malaria to cure these infections, as well as continuous surveillance to diagnose and treat new cases promptly. This approach has been successful in areas such as North America and Europe where malaria is not common. However, it is not practical in the developing nations of Africa and Southeast Asia, where malaria is prevalent and governments cannot afford expensive surveillance and treatment programs.

Eliminating exposure to mosquitoes, the second strategy, can be accomplished by several means. These means include permanently destroying bodies of stagnant water where mosquitoes lay their eggs; treating such habitats with insecticides to kill mosquito larvae; fogging or spraying insecticides to kill adult mosquitoes; or using mosquito netting or protective clothing to prevent contact with mosquitoes. In 1947 the United States initiated a program to eliminate exposure to malaria-carrying mosquitoes. The program involved applying the insecticide DDT to the interior walls of homes, where female mosquitoes typically rest after feeding. Within five years, this program virtually eliminated illness and death due to malaria in the US.

During the mid-1960s, insecticide-resistant mosquitoes began to emerge in some regions. Around the same time, malaria parasites developed resistance to chloroquine and other antimalarial drugs. By the late 1970s, malaria had reemerged in many countries, such as Sri Lanka and Mozambique, where eradication programs had virtually eliminated the disease a few years before.

HISTORY Malaria is an ancient disease that has plagued humans throughout history. The Greek physician Hippocrates described malaria in his writings during the 400s BC. Documents from early civilizations in China, the Middle East, and Egypt also show evidence that malaria was known to these cultures. Throughout history—and even today—outbreaks of malaria have often been associated with warfare, migrations, and other societal disruptions. More soldiers have been lost to malaria than to bullets in the 20th century.

Historians believe that malaria was brought to the Western Hemisphere by European explorers. The first recorded malaria outbreak in the Western Hemisphere occurred in 1493, and the disease was common during the era of European exploration and settlement in the Americas. The first malaria treatment emerged in 1638, when Spanish Jesuit missionaries brought cinchona bark—the source of quinine—back to Europe from South America. Tonic water, which contains quinine, was developed in an attempt to make the drug more palatable.

Malaria's association with bodies of stagnant water has long been recognized, and civilizations as early as the Etruscans (1st millennium BC) drained marshes and swamps in an effort to combat the disease. However, the exact cause of malaria was not understood until the closing years of the 19th century. In 1880 the French surgeon Charles Alphonse Laveran

identified the malaria parasite in the blood of a patient. In 1899 Sir Ronald Ross, a British physician, demonstrated that the parasite is transmitted from human to human by the female *Anopheles* mosquito, for which he was awarded the 1902 Nobel Prize in physiology or medicine.

STORY:

(Reuters) - The world's richest man donated $168 million to fight malaria Sunday, and urged the world to intensify its battle against a disease which kills more than one million people a year, mainly in Africa. "It's time to treat Africa's malaria epidemic like the crisis it is," said Microsoft chairman Bill Gates during a visit to the southern African country of Mozambique.

"Malaria is robbing Africa of its people and its potential -- beyond the extraordinary human toll, malaria is one of the greatest barriers to Africa's economic growth, draining national budgets and deepening poverty," he told reporters.

Malaria is the biggest killer in Africa alongside HIV/AIDS, killing about 3,000 children a day and costing the world's poorest continent around $12 billion a year in lost income.

The grants from Gates and his foundation exceed the $100 million allocated globally for research into the killer disease and will be used to fund research on new malaria prevention strategies for children, new vaccines and new drugs.

Mozambique -- one of the world's poorest countries -- is also one of the nations worst hit by malaria, a parasitic disease transmitted by the female anopheles mosquito which destroys red blood cells and impairs blood flow to vital organs.

Medical experts say malaria -- which also accounts for about 40 percent of public health spending in Africa -- is making a comeback on the continent for the first time in 20 years, because of an increase in strains resistant to drugs.

But Mozambique's Manhica research center, funded by Gates, may be close to finding a new method for treating infants known as the "intermittent preventive treatment." This involves administering the anti-malaria drug sulfadoxine pirimetanine three times during a child's first year of life. Early studies showed this treatment could reduce malaria among infants by nearly 60 percent, and halve the incidence of severe anemia resulting from the disease.

Former college dropout Gates -- worth an estimated $41b -- is in Africa together to visit projects funded by his philanthropic foundation.

SIGNIFICANCE:

Today continuing difficulties with insecticide-resistant mosquitoes and drug-resistant parasites have led to the abandonment of community-wide mosquito control programs in many countries. In these areas, the primary means of preventing malaria is the use of insecticide-treated bed nets. Recent research has shown that these nets are one of the most effective malaria prevention strategies available, but even their modest cost is beyond the means of many families in developing nations. Lack of access to medical care and to effective antimalarial drugs is also a problem in these countries.

The resurgence of malaria and the widespread problems of drug and insecticide resistance have focused increasing attention on the need for a malaria vaccine. Developing such a vaccine has been difficult because the malaria parasite has hundreds of different strategies for evading the human immune system. Many of these strategies are not well understood, and it is difficult to develop a vaccine that will block all of the parasite’s ways of getting past the immune system. To be successful, a vaccine will also need to target several different stages of the parasite’s life cycle. Some pharmaceutical companies have been reluctant to work on a malaria vaccine because malaria is most prevalent in developing nations and the companies fear that sales of the vaccine may not be able to recoup the costs of its development. Progress has also been slow because the malaria parasite is difficult to raise in the laboratory and study, since it must live inside the cells of another organism. Despite these hurdles, scientists have developed several possible vaccines that are now being tested in humans.

SPORTS:

U.S. Women Win Cup Opener

(AP) - Mia Hamm showed why she is the biggest star in women's soccer, setting up three goals Sunday as the United States opened defense of its world championship with a 3-1 victory over Sweden. Twice, Hamm's corner kicks floated onto the heads of teammates, with Cindy Parlow, then Shannon Boxx scoring. Hamm also was in the middle of the game's first goal. "I give credit to CP and Boxxie," Hamm said. "They were not uncontested on those goals."

The third U.S. goal was critical because the Swedes, ranked fifth in the world, had taken control of the game's pace. Sweden got back into it when its star, Hanna Ljungberg, sent a long cross in front of the U.S. net and Victoria Svensson headed it over goalkeeper Briana Scurry in the 58th minute.

But Hamm, playing in her WUSA home, sent a corner kick in the 78th minute that Boxx, in just her third international appearance, converted into her third national team goal. That's a record for a U.S. woman. "I am around great players and they make me better," said Boxx, who was chosen for the World Cup team without ever having played an international game for the United States.

The boisterous crowd, estimated at 35,000 — with hundreds of young girls wearing red-white-and-blue face paint and Team USA jerseys — got its first thrill when Abby Wambach bulldozed the Swedish defense on the right wing after a brilliant pass upfield by Julie Foudy.

Wambach played the ball behind Hamm in the penalty area, but Hamm wisely sent it to Kristine Lilly for a 15-yard left-footed blast. It was Lilly's 92nd national-team goal.

Just eight minutes later, Hamm's perfect corner kick found Parlow. Using her 5-foot-11 height to advantage, Parlow headed the ball off the bottom of the crossbar and in for a 2-0 lead. Earlier, Parlow missed a wide-open header off Wambach's cross as the Americans' physical style kept the Swedes off-balance.

North Korea, which beat Nigeria 3-0 on Saturday, leads Group A on goal differential. But the Americans' performance against a much tougher opponent was more impressive.

THIS WEEK IN HISTORY:

September 22, 1828

Shaka Zulu Assassinated

Shaka, founder of the Zulu Kingdom of southern Africa, is murdered by his two half-brothers, Dingane and Mhlangana, after Shaka's mental illness threatened to destroy the Zulu tribe.

When Shaka became chief of the Zulus in 1816, the tribe numbered fewer than 1,500 and was among the smaller of the hundreds of other tribes in southern Africa. However, Shaka proved a brilliant military organizer, forming well-commanded regiments and arming his warriors with *assegais,* a new type of long-bladed, short spear that was easy to wield and deadly. The Zulus rapidly conquered neighboring tribes, incorporating the survivors into their ranks. By 1823, Shaka was in control of all of present-day Natal. The Zulu conquests greatly destabilized the region and resulted in a great wave of migrations by uprooted tribes.

In 1827, Shaka's mother, Nandi, died, and the Zulu leader lost his mind. In his grief, Shaka had hundreds of Zulus killed, and he outlawed the planting of crops and the use of milk for a year. All women found pregnant were murdered along with their husbands. He sent his army on an extensive military operation, and when they returned exhausted he immediately ordered them out again. It was the last straw for the lesser Zulu chiefs: On September 22, 1828, his half-brothers murdered Shaka. Dingane, one of the brothers, then became king of the Zulus.

www.thehistorychannel.com

ENTERTAINMENT:

And The Emmy Goes To…

Comedy Series – "Everybody Loves Raymond," CBS
Drama Series – "The West Wing", NBC
Lead Actor, Drama – James Gandolfini, "The Sopranos," HBO
Lead Actress, Drama – Edie Flaco, "The Sopranos", HBO
Miniseries – "Steven Speilberg Presents Taken," Sci Fi
Lead Actor – Comedy – Tony Shaloub, "Monk," USA
Bob Hope Humanitarian Award – Bill Cosby
Lead Actress, Comedy – Debra Messing, "Will and Grace," NBC
Made for TV Movie – "Door to Door," TNT
Reality Show – "The Amazing Race," CBS
Variety Special – "Cher: The Farewell Tour," NBC
Variety Series – "The Daily Show with Jon Stewart," Comedy Central
Supporting Actress, Movie – Gena Rowlands, "Hysterical Blindness," HBO
Supporting Actor, Movie – Ben Gazzara, "Hysterical Blindness," HBO
Writing Variety Series – "The Daily Show with Jon Stewart," Comedy Central
Supporting Actor, Drama – Joe Pantoliano, "The Sopranos," HBO
Outstanding Performance – Wayne Brady, "Who's Line?" ABC
Writing, Drama Series – David Chase, "The Sopranos," HBO
Supporting Actor, Comedy – Brad Garrett, "Everybody Loves Raymond," CBS
Supporting Actress, Drama – Tyne Daly, "Judging Amy," CBS
Supporting Actress, Comedy – Doris Roberts, "Everybody Loves Raymond," CBS

BIOGRAPHY:

William H. Gates

William (Bill) H. Gates is chairman and chief software architect of Microsoft Corporation. Born on Oct. 28, 1955, Gates grew up in Seattle with his two sisters. Their father, William H. Gates II, is a Seattle attorney. Their late mother, Mary Gates, was a schoolteacher. Gates attended public elementary school and the private Lakeside School where he discovered his interest in software and began programming computers at age 13.

In 1973, Gates entered Harvard University as a freshman, where he lived down the hall from Steve Ballmer, now Microsoft's chief executive officer. While at Harvard, Gates developed a version of the programming language BASIC for the first microcomputer - the MITS Altair.

In his junior year, Gates left Harvard to devote his energies to Microsoft, a company he had begun in 1975 with his childhood friend Paul Allen. Guided by a belief that the computer would be a valuable tool on every office desktop and in every home, they began developing software for personal computers. Gates' foresight and his vision for personal computing have been central to the success of Microsoft and the software industry.

Under Gates' leadership, Microsoft's mission has been to continually advance and improve software technology, and to make it easier, more cost-effective and more enjoyable for people to use computers. The company is committed to a long-term view, reflected in its investment of more than $4 billion on research and development in the current fiscal year.

Philanthropy is also important to Gates. He and his wife, Melinda, have endowed a foundation with more than $24 billion to support philanthropic initiatives in the areas of global health and learning, with the hope that as we move into the 21st century, advances in these critical areas will be available for all people. To date, the Bill and Melinda Gates Foundation has committed more than $2.5 billion to organizations working in global health; more than $1.4 billion to improve learning opportunities; more than $260 million to community projects in the Pacific Northwest; and more than $381 million to special projects and annual giving campaigns.

Gates was married on Jan. 1, 1994, to Melinda French Gates. They have three children. Gates is an avid reader, and enjoys playing golf and bridge.

FEATURE:

What is DIABETES?

If left untreated, diabetes mellitus may cause life-threatening complications. Type 1 diabetes can result in diabetic coma (a state of unconsciousness caused by extremely high levels of glucose in the blood) or death. In both Type 1 and Type 2 diabetes, complications may include blindness, kidney failure, and heart disease. Diabetes can cause tiny blood vessels to become blocked; when this occurs in blood vessels of the eye, it can result in *retinopathy* (the breakdown of the lining at the back of the eye), causing blindness. Diabetes mellitus is the leading cause of new cases of blindness in people aged 20 to 74.

When diabetes affects the kidney it is called *nephropathy* (the inability of the kidney to properly filter body toxins). About 40 % of new cases of kidney failure are caused by diabetes mellitus. Blockages of large blood vessels in diabetics can lead to many cardiovascular problems, including high blood pressure, heart attack, and stroke. People with diabetes are two to four times more likely to develop cardiovascular disorders than nondiabetics.

Diabetes mellitus may also cause loss of feeling, particularly in the lower legs. This numbness may prevent a person from feeling the pain or irritation of a break in the skin or of foot infection until after complications have developed, possibly necessitating amputation of the foot or leg. Burning pain, sensitivity to touch, and coldness of the foot, conditions collectively known as neuropathy, can also occur. Other complications include higher-risk pregnancies in and a greater occurrence of dental disease.

DIAGNOSIS Diabetes is detected by measuring the amount of glucose in the blood after an individual has fasted (abstained from food) for about eight hours. In some cases, physicians diagnose diabetes by administering an oral glucose tolerance test, which measures glucose levels before and after a specific amount of sugar has been ingested. Another test being developed for Type 1 diabetes looks for specific *antibodies* (proteins of the immune system that attack foreign substances) present only in persons with diabetes.

Once diabetes is diagnosed, treatment consists of controlling the amount of glucose in the blood and preventing complications. This can be accomplished through regular exercise, a carefully controlled diet, and medication.

Individuals with Type 1 diabetes require insulin injections, often two to four times a day, to provide the body with the insulin it does not produce. The amount of insulin needed varies from person to person and may be influenced by factors such as a person's level of physical activity, diet, and the presence of other health disorders. Typically, individuals with Type 1 diabetes use a meter several times a day to measure the level of glucose in a drop of their blood obtained by pricking a fingertip. They can then adjust the amount of insulin injected, physical exercise, or food intake to maintain the blood sugar at a normal level. People with Type 1 diabetes must carefully control their diets by distributing meals and snacks throughout the day so as not to overwhelm the ability of the insulin supply to help cells absorb glucose. They also need to eat foods that contain complex sugars, which break down slowly.

For persons with Type 2 diabetes, treatment begins with diet control, exercise, and weight reduction, although over time this treatment may not be adequate. People with Type 2 diabetes typically work with nutritionists to formulate a diet plan that regulates blood sugar levels so that they do not rise too swiftly after a meal. Regular exercise helps body cells absorb glucose—even ten minutes of exercise a day can be effective. Diet control and exercise may also play a role in weight reduction, which appears to partially reverse the body's inability to use insulin. Oral medication may be prescribed. If oral medications are ineffective, a person with Type 2 diabetes may need insulin injections or a combination of oral medication and insulin injections.

Quote of the Week:
It's time to treat Africa's malaria epidemic like the crisis it is. -Bill Gates

Fact of the Week:
The world's first "motor-hotel", the Milestone Mo-Tel, opened in San Luis Osbispo, CA, in 1925.

Word of the Week:
postbellum (post*bel;um), a. After the war, especially the American Civil War.

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