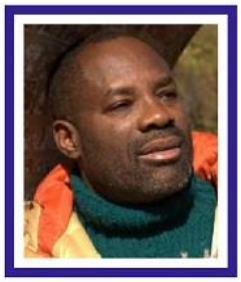
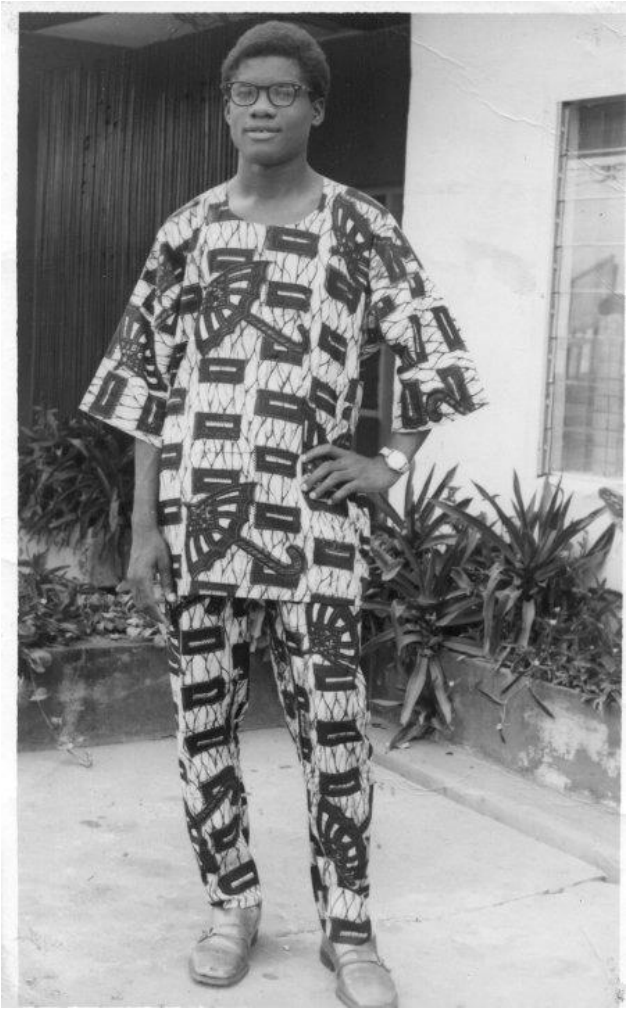


Philip Emeagwali

info@emeagwali.com 202-203-8724

Below is an interview by Reuben Abati of Philip Emeagwali. It took place in the west African Songhai Restaurant in Washington, D.C. shortly before its dated June 22, 1997.



Philip Emeagwali, age 17, in Enugu, Nigeria.

Back in 1972, the name of 17-year-old Philip Emeagwali (of Onitsha, Nigeria) was mentioned by a science columnist of the *Daily Times* of Nigeria.

On July 8, 1974, Philip Emeagwali (a teenage computer programmer in Oregon, United States) gave a published newspaper interview.

In 1989, The Computer Society of IEEE (the world's largest computer society) issued a press release that Philip Emeagwali made a paradigm shifting breakthrough in computing. That story about how an important but impossible problem was cracked by a lone programmer was picked up by international media outlets.

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A Genius Of Our Time

information warfare will be used by developing countries as their bloodless and low-cost "nuclear weapon." With a few dozen talented computer programmers, Libya or Iraq could force the United States to surrender by crippling its stock exchanges, banks, electric power and air-traffic. Developing countries with no nuclear warheads would use the threat of unleashing computer virus to deter developed countries from launching a nuclear strike at them.

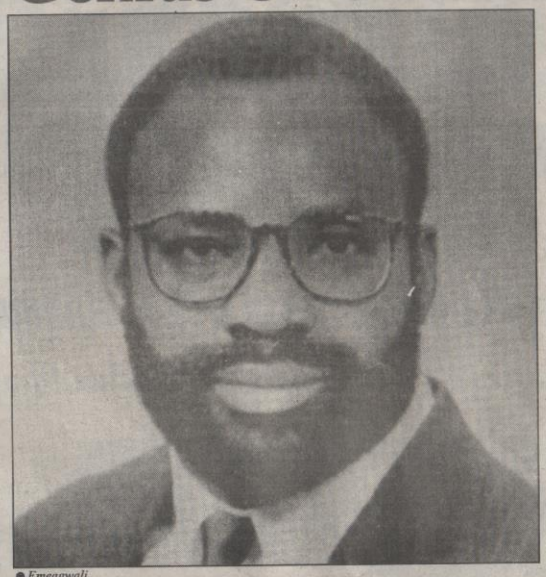
You sound optimistic. With all the poverty, political instability and famine and war in Africa, how would Africa take advantage of this revolution? The priorities appear different.

The Information Superhighway is a technology that will create wealth, make it more difficult to plan coups and indirectly reduce famine and war. African telephones and electricity services are unreliable and three-quarters of the residents have never made a telephone call. In many African countries, it is faster and cheaper to travel than to make a telephone call. My answer is that the Internet and Information Superhighway are cheaper and more of a necessity than the telephone.

I will use our interview as an example. You will deliver our, say 10,000-word interview to *The Guardian* headquarters by e-mail in Nigeria in 30 seconds. The same 10,000-word interview will take ten minutes to fax and 50 minutes to read aloud. Based on these estimates, an e-mail message is 20 times cheaper than a fax message and 100 times cheaper than a telephone conversation. More importantly, the new fiber optic lines will greatly reduce the cost of sending e-mails to Nigeria.

The Internet e-mail should be more popular in Nigeria than telephone conversations since the low cost will put it within the reach of the average Nigerian. Since the cost of sending e-mails from Lagos to Onitsha will be the same as sending from Kaduna to New York, the barriers of space and time will be erased and the average Nigerian would rather send an e-mail than hold a 150 Naira a minute telephone conversation or mail a letter that takes two months to arrive at their destinations, if they are not completely lost. Seventy percent of the oil in Nigerian oil fields are not being recovered and Nigeria will run out of oil much sooner than expected. We should start planning how to survive when we run out of oil.

With the new fiber-optic lines, that will be completed in 1999, I can demonstrate for the Nigerian National Petroleum Corporation (NNPC) how to use those lines to access a $55 million supercomputer in the United States, 7,000 miles away. This supercomputer can then be used to generate three-dimensional images or an X-ray of subsurface formations of non-petroleum producing locations in Nigeria which, in turn, will enable NNPC to discover more oil fields. Geologists will study the X-ray of each subsurface formation to identify impervious layers of soil that can contain



● *Emeagwali*

interest of Africa for the Organisation of African Unity (OAU) and/or the Economic Community of West African States (ECOWAS) to place a restriction on the importation of computers into Africa.

The paradox is that although Africa has 35 of the world's poorest countries, not participating in the information superhighway will leave the continent poorer. To build an information highway without computers will be analogous to building highways without cars. For this reason, the completion of the Internet project in 1999 will require that the continent start manufacturing computers by 1999. However, the African ONE Internet project will change that. In fact, with the completion of the project, follow-me-everywhere number. It doesn't change, but you can't trace it. The best security is that people won't know where you are.

You have been compared to Microsoft's Bill Gates and Steve Jobs of Apple Computer. Is there any direct connection between your work and theirs?

The connection is that Gates, Jobs and myself made contributions to the computing field. However, there are some differences between Bill Gates, Steve Jobs and myself. First, Bill Gates and Steve Jobs made contributions to the development of personal computers (PCs) while I made mine to the field of supercomputing. Petroleum engineers,

showdown. The media ignored the computer programmers that used a massively parallel computer to defeat Gary Kasparov. It was massively parallel computing technology, not artificial intelligence, which enabled it to perform extremely fast calculations that won. Those chess grandmasters that believed that a computer can never defeat Gary Kasparov never understood how computers work.

Since the human brain is a massively parallel neural computer, it is conceivable that we could build a massively parallel computer powerful enough to declare itself the king of the earth, enslave the human race and challenge God as the Supreme Being. What is scary is that computers cannot forget or make mistakes or have compassion for human suffering. Once it takes over, it would be difficult to plan a successful coup against it.

In other words, a world dominated by computers is apocalyptic?

I agree. Cyber wars could be as apocalyptic as nuclear wars. On the other hand, the benefits of computers outweigh their risks. The computer, the telephone and the television will gradually become one equipment in the future. Whatever disadvantage you have with one is same with the rest. But the technology is not the problem, it is people that are the problem. Let's take cars and aeroplanes. Because you can travel with them, that's an obvious advantage. But if you drink and drive, and have an accident, you can't blame the car. There will always be things like scam artists, but they could do the same thing through the Post Office. The only difference is that the computer makes it instantaneous.

Deep Blue's major achievement was its speed and sophisticated parallel processing. This sounds close to your own work. Do you think Deep Blue breaks new grounds?

Yes, it is very close to my earlier work that demonstrated that massively parallel computers can be used to solve real problems. IBM applied the experience gained and lessons learned from my early work on massively parallel computing to design Deep Blue's chess program. In that sense, Deep Blue did not break any new scientific grounds.

In 1989, I used 65,536-processor massively parallel computer to perform the world's fastest computation of 3.1 billion calculations per second. Back then, IBM believed that it will be impossible to us: thousands of processors to solve scientific problems and for that reason refused to use massively parallel technology in computers such as Deep Blue. Today, IBM develops and sells massively parallel computers such as Deep Blue which uses 256 processors. Gary Kasparov defeated 1989 IBM Chess computer which used one processor and lost to 1997 Deep Blue which used 256 processors. Since 256 times 256 is 65,536, Deep Blue will be 256 times faster and more powerful when IBM uses 65,536 processors in the future generation of Deep Blue. If I can find a sponsor, I can use a 65,536-processor computer to defeat Deep Blue

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Without this technology, up to $20 million could be spent to drill each well. At the $20 million per well, Nigeria cannot afford to drill hundreds of exploration wells in which 90 per cent of them could be dry. The above is only one example out of hundreds.

Developing nations need the Information Superhighway more than developed nations. The Information Age is already here and Africa will become poorer by refusing to take advantage of this modern technology. I will also like to point out that most African countries like Benin, Ghana, Ivory Coast and Malawi are far ahead of Nigeria in using the Internet. Should the Giant of Africa not be first in embracing modern technology?

Not many Nigerians can afford to own a computer. It's too expensive.

You don't need to have a computer to access the internet. There's now web TV which is $250. With a telephone line and your web TV, you can hook up to the internet. And that's today's price, as Web TVs are mass marketed, they will become cheaper. The only difference is that you can do a lot of other things with a computer; with web TV you can only surf. And it's not something you can say you don't want. It's like saying you don't want the radio or television or telephone because these technologies are merging and gradually becoming one.

What about the level of computer knowledge in Nigeria and Africa? You can only ask people to use something they know and are comfortable with.

My seven-year-old son has his own computer at home and has one at his school.

As a graduate student, I had access to a dozen supercomputers that cost five to 30 million dollars a-piece. Kayode Ojo, the national president of the Nigerian Association of Computer Science Students, sent me an e-mail complaining about "students who go through universities for four years without touching a personal computer."

An entire generation of 50 million Nigerian school age children are being undereducated. Children are our future, not petroleum. You can predict the future of a country by the quality of education its youth is receiving. In thirty years, Nigeria's oil fields will be dried and it will be more difficult to find money to educate our children. Most importantly, the Nigerian government should recruit the thousands of Nigerian computer scientists working abroad to teach in its high schools and universities. Also, personal computers can be manufactured at a cheaper price in Africa. It will be in the best interest of Africa for the Organisation of African Unity (OAU) and/or the Economic Community of West African States (ECOWAS) to place a restriction on the importation of computers into Africa.

The paradox is that although Africa has 35 of the world's poorest countries, not participating in the information superhighway will leave the continent poorer. To build an information highway without computers will be analogous to building highways without cars. For this reason, the completion of the Internet project in 1999 will require that the continent start manufacturing computers by 1999. However, the African ONE Internet project will change that. In fact, with the completion of the project, Nigerians can use their computers and telephone to download thousands of movies, newspapers, magazines, photographs, books, and music from the Internet. This will be more exciting than satellite television.

What motivates you?

I want to expand the boundaries of scientific knowledge and inspire potential scientists of African descent to do the same. I like to discover and invent because it is a labour of love and an instrument for destroying the myth of whites as the only race of inventors and explorers. I am motivated when I learn that my discoveries have travelled to places that I have never seen and that I may never see.

You are suggesting that there is racism in science. Have you been discriminated against on the basis of the colour of your skin?

I found it difficult to rent a room in the mid-1970's. Landlords would offer me a room over the telephone and a few hours later, when I show up in person, I would be told that the room has been rented. Many employers who told me over the telephone that I was the most qualified candidate will later tell me that I did not do well in the face-to-face interview. White scientists have a deeply-ingrained belief that they are intellectually superior to black scientists and are surprised to read about my accomplishments.

Whites oppress blacks by denying them the opportunity to contribute as much as they can to society. I would have made ten times more scientific discoveries if I was provided the same opportunities that Albert Einstein had in this country. Being Nigerian or foreign-born is not the obstacle. Many top scientists, including Albert Einstein, are foreign-born and educated but are fully accepted by white scientists. I have seen less qualified white scientists who are born in Europe hired over a black scientist.

Some white scientists are threatened by qualifications and try to compensate for their inadequacy by petty and mean-spirited attacks. I recently changed my address because I was getting death threats from whites who read my work and saw it as a threat to their white supremacist beliefs.

How have you dealt with the problem? Did you seek police protection?

There is nothing one can do. My web site (http://emeagwali. com) gets a lot of hits. Now and then, you get an oddball who can't stand the idea of a black man excelling in anything. And he sends hate mail across. What I have done is to make sure nobody can trace me geographically. You can call me and send me an e-mail but you can't tell where I live. My telephone line is also anonymous. I use a 500 number. It's a follow-me-everywhere number. It doesn't change, but you can't trace it. The best security is that people won't know where you are.

You have been compared to Microsoft's Bill Gates and Steve Jobs of Apple Computer. Is there any direct connection between your work and theirs?

The connection is that Gates, Jobs and myself made contributions to the computing field. However, there are some differences between Bill Gates, Steve Jobs and myself. First, Bill Gates and Steve Jobs made contributions to the development of personal computers (PCs) while I made mine to the field of supercomputing. Petroleum engineers, mathematicians and others also see it as a contribution to their fields.

PCs are more widely used than supercomputers which cost up to $55 million. However, since PCs are 10,000 times slower than supercomputers, the technology of supercomputers will be used to increase the speed of PCs and my contributions will eventually help the development of PCs. Second, the contributions of Bill Gates and Steve Jobs are primarily enterpreneural while mine is intellectual. My discoveries require far more theory and abstraction and the use of mathematical and scientific principles and methodologies.

So you don't agree that you are the "Bill Gates of Africa."

It depends on the criteria — intellectual, economic or social — that are used in comparisons. Intellectually, my contribution has more depth than that of Bill Gates or Steve Jobs. Bill Gates and Steve Jobs are both billionaires who made their money by selling computer- related products. Bill Gates is the richest man in the United States and has enough money to buy all the oil that Nigeria sells in a year. I cannot buy Nigeria's oil, but I can help Nigeria discover and recover more oil. Bill Gates gave a lot to society and society gave a lot ($10 billion) to Bill Gates. I gave a lot to society and took practically nothing from society. Socially, my contribution is having an impact among people of African descent who find it inspiring.

Best selling books like *The Bell Curve* have proposed the theory that people of African descent lack the genes to make discoveries in fields like mathematics and computer science which require an ability to think in abstract terms. There are millions of young boys and girls in Africa who can win Nobel Prizes in science when given the opportunity that I had. The scientific contributions of Africans will silence many white supremacists and drive a deep stake into their argument that caucasians are the race of explorers, scientists, and inventors.

Most recently, Deep Blue, an IBM computer, played Chess with Gary Kasparov, the greatest living Chess grandmaster and won. Do you feel breakthroughs in artificial intelligence are getting to a point when they threaten man as man, and all the values we hold dear as God's most favoured creation?

Unfortunately, IBM and the media are describing the Deep Blue versus Gary Kasparov match as a machine versus man contest. I view it as men (computer programmers) versus man parallel computer to perform the world's fastest computation of 3.1 billion calculations per second. Back then, IBM believed that it will be impossible to us. thousands of processors to solve scientific problems and for that reason refused to use massively parallel technology in computers such as Deep Blue. Today, IBM develops and sells massively parallel computers such as Deep Blue which uses 256 processors. Gary Kasparov defeated 1989 IBM Chess computer which used one processor and lost to 1997 Deep Blue which used 256 processors. Since 256 times 256 is 65,536, Deep Blue will be 256 times faster and more powerful when IBM uses 65,536 processors in the future generation of Deep Blue. If I can find a sponsor, I can use a 65,536 - processor computer to defeat Deep Blue in a chess match.

Deep Blue is based on massively parallel technology which enabled it to evaluate 200 million positions per second while Gary Kasparov was evaluating 3 position per second. I am not surprised that Gary Kasparov was defeated since I proved in 1989 that this technology works for many applications. IBM has used the Deep Blue victory to provide another proof that the technology works. Using computers to play chess has something in common with using computers to discover and recover more oil. Both applications are computation-intensive because governing rules must be implemented for several locations or objects. In chess playing, there are thousands of options and evaluating each option requires thousands of calculations.

In petroleum reservoir simulation, there are thousands of oil field locations and determining the amount of oil that can be recovered from each location requires thousands of calculations.

Are you currently employed by any institution?

I am an independent consultant to various organizations. The last place I worked was with the military. I did some computing work for the US army. The things that I did there are classified, so don't ask to know.

That's about all that I can say. Most of the work we do in supercomputing is proprietary. The things you see you cannot discuss. I can only talk in generic terms.

When you're not working, what do you do? How do you relax?

On weekends, I might cook some Nigerian foods while listening to highlife or soukous music. I love to go to concerts. Recently, I saw concert performances by Jimmy Cliff, Chaka Khan, Tabu Ley Rochereau and King Sunny Ade.

I visit the pubic libraries about twice a week. I enjoy reading the works of African writers and writers of African descent. On some summer weekends, I do my flying practice on a four-seater single-engine airplane at the local airport. I run ten to 18 miles and occasionally play in local tennis tournaments. I cross-train by swimming, weight training, scuba diving, and cross-country skiing. My family activities include attending plays or visiting museums.

Do you have any plans to become an American citizen? Or do you intend some day to return to Nigeria?

Where I live is not as important as what I do. I will always be of Nigerian heritage and have an obligation to contribute to the progress of the Nigerian people.

THE GUARDIAN

CONSCIENCE NURTURED BY TRUTH

On Sunday

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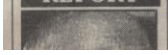
WORLD REPORT



● A man with jerry-can of petrol at Apapa, Lagos, as fuel scarcity lingers... at the weekend PHOTO: PAUL OLOKO

Etete Unfolds Measures To Tackle Fuel Crisis

By Emma Eke
Staff Reporter

NEW measures are being adopted by the Petroleum Resources Minister, Chief Dan Etete, to address the crippling fuel crisis.

The minister held two separate meetings last week with the management of the Nigerian National Petroleum Corporation (NNPC) and representatives of the National Union of Petroleum, Energy and Natural Gas Workers Union (NU-

sis.

According to an official of PENGASSAN, who attended the meetings, Etete has given approval to the NNPC to hold any depot manager, who cannot give proper accounts of fuel distribution in his area of authority, responsible anytime there is a temporary scarcity.

The minister also said that henceforth directors

Eating Habit Implicated In Cancer Cases

By Seth Akintoye

Banks Scramble To

I use the word "internet"
to describe any global network
of computers
as well as their connecting
email wires.
That is, at its core,
an internet ~~is~~ has its base globe
and ~~comp~~ a multitude of computers
and email wires
encircling that globe.
I use my internets
to send and receive emails
between all my computers.
I use my internet
to email numeric data
and to execute arithmetical computations

that I must solve
to get the fastest answers
to the most computation-intensive problems..
I use ~~use~~ the Laws of physics
codified in prose, algebra, calculus,
algorithms, and codes
that are defined within fluids
that enshroud planet Earth
to get answers to questions
such as: How much oil can be
recovered from an oilfield? Is global
warming a myth or reality.
Global warming can only be computed
by using computers to simulate
the motions of fluids
— namely, the atmosphere and oceans —
that enshroud the globe.