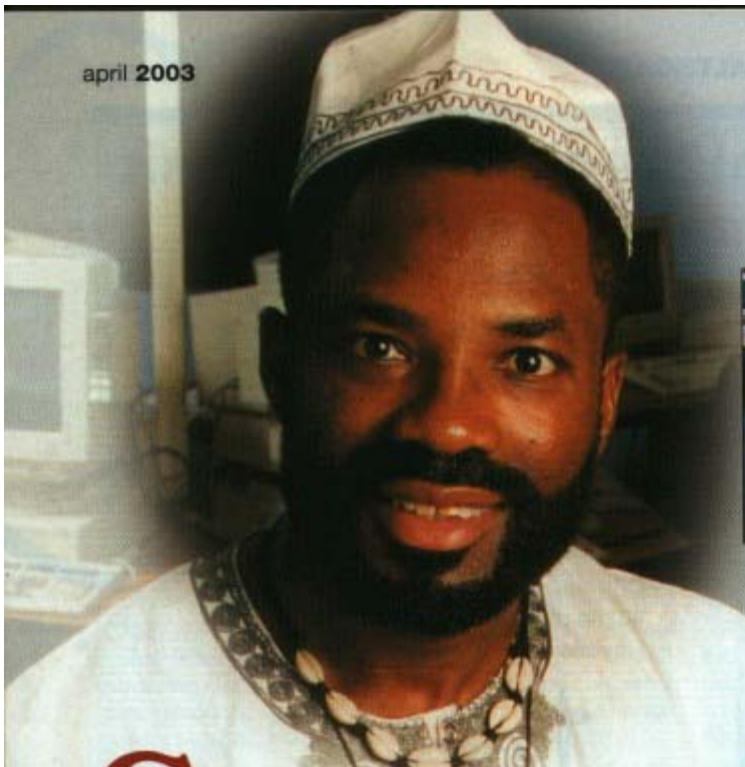

Emeagwali: From Soldier to Scientist

"The experience of being a child soldier in Africa's bloodiest war made me tougher than a Vietnam vet."

These are the words Philip Emeagwali uses to explain how he persevered through years of seeing his ideas ignored, laughed at and rejected, only to emerge as one of the most influential computer scientists in America. Now recognized as a supercomputer pioneer and a father of the Internet, Emeagwali spent his childhood in Nigeria, where he witnessed firsthand the atrocities of the Nigeria-Biafara conflict that left nearly three million dead. "One in fifteen people in my hometown died in that 30-month war," he remembers. "Both sides did not take prisoners of war; they did not want the expense of caring for prisoners…when the soldiers captured my hometown all the men were shot and all the women became comfort ladies."

For Emeagwali, one of the most traumatic aspects of the crisis was being forced to leave school. He had developed a love of learning, inspired by his father, who insisted he solve a hundred math problems every night. This commitment extended to the classroom where in his own words, "I was the hardest working student in my class. I was even considered the best." He began to show an aptitude for mathematics and many of his teachers saw him as a prodigy, regularly reminding Emeagwali of the great things they expected from him. "If you tell a child she is a genius, she will likely become a genius," he says. "It's a self fulfilling-prophecy."

Like many young members of the Igbo tribe in secessionist Biafra, Emeagwali spent the war serving as a child soldier in a futile attempt to halt the advance of the Nigerian army. The violence he witnessed during that time paired with the despair that came from seeing the destruction of his country only strengthened his resolve to continue studying. "I came out stronger from the civil war crisis," he says. "I had self-confidence and knew I had not fulfilled my potential." He enrolled as a correspondence student at the University of London, which he chose because it didn't require a tuition fee.

Emeagwali was the first in his family to even attempt a post-secondary education.

Photos courtesy of © emeagwali.com

"My mother had a third grade education and my father had never seen a college campus. The closest institution for higher education was 100 miles away and I only knew a handful of people who had attended college," he explains. "Also, people with limited education often believe there is a limit to the 'knowability' of the world. My mother thought there was a limit to knowledge and that I could know all there is to know by the time I had completed high school."

Emeagwali completed his diploma in 1973, winning a full scholarship to study at Oregon State University. Despite the sadness of leaving his family he realized emigrating was the only way to fulfill his dream of being the next Albert Einstein. It was also a step into the unknown for the aspiring scientist, whose only knowledge of American culture came from watching John Wayne movies. "A few days before I came to the United States, I decided to educate myself by seeing the movie Shaft," he remembers. "That movie left me speechless. I saw black people, big cars and modern cities."

In 1974, he arrived in the United States as a graduate student with the intention of pursuing a career in mathematics. "As a child in Nigeria, I wanted to be a great mathematician or physicist," he says. "I knew little about computers…I didn't even know that computer science was a field of study. When I came to the United States I decided to be a mathematician who uses supercomputers to solve computation-intensive problems in physics and engineering."

Living in Oregon meant adapting to a culture completely different from his own, one where he was a minority in an overwhelmingly white student body. At his first breakfast in the school cafeteria Emeagwali gazed across the dining hall at a sea of indistinguishable white faces, all wearing the same jeans and T-shirts, all having the same incomprehensible conversations. He was shocked by the amount of food they were eating. "I stood in (the cafeteria) line. Then I asked a fellow next to me, 'How much food am I allowed

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to eat?' 'As much as you want,' he answered. In Nigeria, we rationed food and I assumed that was how it was done everywhere else. 'Wonders will never end,' I told myself."

Emeagwali excelled at the university, switching to civil engineering at the insistence of a professor he was rooming with. It was during this period, inspired by a science fiction story, that Emeagwali came up with the idea of what he termed a Hyperball: A network connecting 64,000 computers together in a spherical form to simulate the earth's surface, which would provide researchers with an accurate understanding of weather patterns. His proposal was completely rejected by the scientific community. Still, Emeagwali continued to work on the project convinced of its eventual success. When asked why, he says, "It was a big idea and it is easy to be inspired and to continue working on an invention that has a huge potential payoff. I learned that people are frightened of innovative ideas. They need time to understand and absorb radical thoughts."

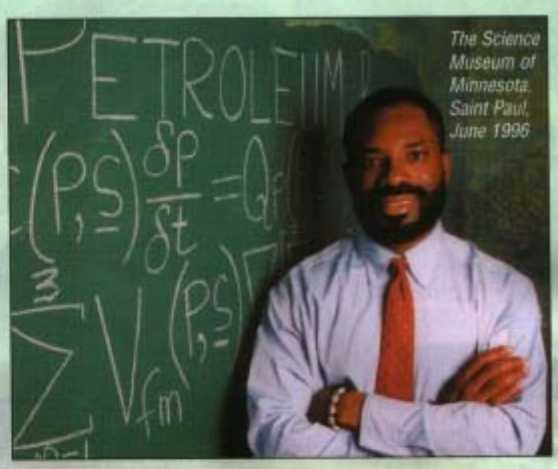
In the meantime, he accumulated five graduate degrees and pursued work in science and engineering, a task that was made difficult by the lack of opportunities available to minorities. He remembers that period as "a life of endless struggles – a struggle for education, a struggle for equal pay, a struggle for promotion and a struggle for respect." It included a five-year stint as a scientist with a research agency where he watched his white co-workers receive full salaries without ever getting a single paycheque. "It was heartbreaking," he says of the experience.

Emeagwali in Enugu, Nigeria, 1972

Even in the face of these hardships, Emeagwali refused to abandon his dream of entering the highest echelons of America's scientific community. He saw his struggles as a learning experience, one he now compares to a long corridor. "As I walked down that corridor, I found most doors were shut to me…however, I discovered that the doors to the emerging fields of supercomputing and the Internet were only half closed."

It was these doors that he pushed his way through after 15 years of trying. In the mid-1980's, computer scientists working for the federal government were attempting, with little success, to program a supercomputer capable of performing billions of calculations simultaneously. After hearing about his work on the Hyperball network the department allowed Emeagwali to program the computer. It was a task that many thought to be impossible.

The challenge was enormous: it involved connecting 65,536 computers together in a structure that would simulate a giant network of oil reservoirs. Using a parallel system, where each individual processor calculated separate parts of an overall equation, Emeagwali was able to create a supercomputer with the ability to perform 3.1 billion operations per second. This was the fastest processing speed ever recorded. The accomplishment drew accolades from scientists and the media – he was hailed by CNN as "a father of the internet." He went on to win the Gordon Bell award, which is the highest recognition of achievement in computer science and ushered in a supercomputing revolution by demonstrating how his massively parallel systems could vastly increase processing speeds. His computerized modeling of petroleum reservoirs, the first one in history, now allows companies to recover oil far more efficiently and accounts for the fact that one in 10 supercomputers is now used by the oil and gas industry.



The Science Museum of Minnesota, Saint Paul, June 1996

Emeagwali looks back at his years of struggle with a mixture of pride, anger and humor. "My work was rejected for fifteen years," he says. "The first five I was laughed at. The second five years I was forced to work without pay. The third five years I was paid $750 a month. As they say in Hollywood, 'It takes 15 years to become an overnight success.'"

Although Emeagwali has continued his work in mathematics and computers, his profile as a leading scientific figure has provided him with the opportunity to serve as a role model for students of all backgrounds. He speaks to young people throughout the country, encouraging them to pursue their goals by following his example.

While noting that "the (university) demographic has changed, with more female, immigrant and low income students," Emeagwali believes that more can be done in order to increase the number of minority scientists in America. "The young minority possess the same qualities as the young majority. What needs to be changed is the prejudice of people in the workplace." In his view, that requires "re-educating the educators" and raising awareness of the invisible forms of discrimination he says have become institutionalized in American society.

Despite the enormity of his scientific achievements, it is his perseverance in the face of seemingly insurmountable obstacles that Philip Emeagwali considers his greatest success and legacy to be passed on to others. "My biggest accomplishment is the courage to dare and attempt what was considered an impossible mission," he says. "It is my courage that inspires many young people." jp

By Daryl Smith

For more information on Philip Emeagwali and his achievements, visit www.emeagwali.com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