

measured and thus the more precise the timing.) Cornell predicted that the ability to control atoms on that scale would make it possible to detect extremely small effects such as the change in gravitational force at ground level over an oil deposit.

The chemistry award recognized more than 40 years of research into what was once one of the deepest mysteries in biology: How cells create and deploy ATP (adenosine triphosphate), the basic material that provides energy for all living things.

This ubiquitous fuel is produced in enormous quantities in cellular sub-components called mitochondria, each of which is surrounded by its own tiny membrane. Just as one can store energy in a mousetrap by cocking the spring, organisms store energy in the chemical bonds of ATP. It is done by grafting a third bit of phosphate onto an ever-present cellular substance called ADP (adenosine diphosphate), a strand of adenosine that already has two phosphate groups attached. When energy is needed for muscle motion, nerve transmission or sundry metabolic chores, ATP sheds its added third phosphate, liberating the energy of that chemical bond and becoming ADP again.

ATP had been discovered in 1929, but until the work of this year's laureates, nobody knew exactly how it was made except that it was produced by an enzyme called ATP synthase and apparently involved differences in concentrations of charged hydrogen atoms on either side of the mitochondrial membrane.

In the 1950s, Boyer began to study the function of ATP synthase, which has a very complicated structure. The lower part, imbedded in the membrane, gathers energy from the flow of hydrogen atoms like a water wheel picks up energy from a moving stream. The top part, which protrudes above the membrane, resembles a grapefruit with six segments, through the middle of which runs an asymmetric rotation axle connected to the lower section.

As the hydrogen-powered axle turns, it distorts the segments into different shapes that cause them to do various things, such as bind ADP to phosphates, or to cast off freshly minted ATP molecules into the surrounding cellular goo. Boyer also determined that ATP synthase doesn't use energy the way most enzymes do. This "molecular mechanism" model was subsequently confirmed and clarified by Walker and colleagues, who also explained the peculiar axle configuration.

"It's a discovery of fundamental significance to understanding the way living organisms work," said Peter Preusch, a program director at the National Institute of General Medical Science here, which supported Boyer's work for 30 years.

Meanwhile, since 1957 Skou had been trying to understand the processes that cause the normal chemical imbalance between the insides of cells and their surroundings. Within the cell, sodium content is normally very low and potassium very high; outside, it's the opposite. Numerous essential biological processes—such as the electrical build-up and firing of nerve cells—depend critically on changes in the transport of these elements across cell membranes. Skou found that those actions are controlled by an enzyme called Na-K-ATPase that also degrades ATP in cells, and described how it works.

"The insight he had was really crucial, and not just for this one enzyme but for understanding a great deal about the physiology of the cell," said biochemistry expert Kathleen J. Sweadner of Massachusetts General Hospital and Harvard Medical School. "It opened [Researchers'] minds to studying a whole bunch of other processes."

[From the Washington Post, Oct. 16, 1997]  
ONE OF SCIENCE'S NICE GUYS FINISHES FIRST  
(By Michael E. Ruane)

Bill Phillips is 48, lives in Darnestown, wears a beard and works for the government. He has a wife and two kids. His office is down a brown tile corridor in a government building off I-270. He teaches Sunday school at Fairhaven United Methodist Church and founded the church's gospel choir.

Yesterday, Bill Phillips won the Nobel Prize.

"Couldn't happen to a nicer guy," said Paul Lett, a member of Phillips's team of physicists at the federal agency that used to be known as the Bureau of Standards and now has an even duller name.

A blaze of glory and a bunch of money fell into the life of the anonymous government scientist, who happens to know how to make atoms almost stand still.

"It really is a thrill, an emotional thrill, a physical thrill, like riding a roller coaster," Phillips said in a telephone interview from California, where he was attending a conference when he received the news. "I am surprised, astounded."

Phillips will share the \$1 million Nobel award for physics with two other scientists, in California and France, who worked separately in the same field. The award recognized their success in chilling and "trapping" atoms for deeper scientific study.

Phillips has worked in Gaithersburg at the 585-acre campus of the National Institute of Standards and Technology, or NIST, since 1978. He is the agency's first Nobel winner since the institute was founded as the Bureau of Standards in 1901.

Phillips and his colleagues labor in a casual atmosphere, wearing jeans and T-shirts, but they use state-of-the-art equipment and enjoy an esprit de corps that comes from knowing they are at the cutting edge of research into some of nature's basic laws. Although they struggle for the most exact measurement attainable of the location and other attributes of atomic particles, NIST scientists say only God can get it precisely.

Phillips was born in Wilkes Barre, Pa., the son of social workers who fueled his interest in science with books, microscopes and chemistry sets.

His wife, Jane, 50, whom he met in high school in Camp Hill, Pa., said: "He was always the one who got all the A's in physics class, in all the classes, and threw off the curve for everyone."

Phillips said: "It seems like I've been interested in physics for as long as I can remember."

He explained: "It's the simplicity of it. Physics is the simplest science. You're dealing with things that are fundamentally more simple, so you have more of a chance to understand something fully."

"I work with single atoms. More and more, we're finding that single atoms are incredibly rich in the things they have to teach us. . . . Whenever I go into the lab to make a measurement, there are things that we don't understand, things that aren't clear at all."

The "trapping" of normally frenetic atoms has allowed scientists to scrutinize their properties more deeply. It could lead to such things as a new, more precise definition of the duration of a second—that is, an improved way to measure time.

"The trick is getting atoms to stay still," said Michael E. Newman, an institute spokesman. "Trying to get atoms to stay still . . . is a very, very difficult thing to do."

The institute operates one of the nation's two atomic clocks, which keep time according to the known rate of the natural oscillation of cesium atoms. The institute's atomic

clock, in Boulder, Colo., is so accurate that it would neither gain nor lose a second in a million years.

If that were not precise enough, Phillips's study of slowed sodium atoms could produce an atomic clock that is even more accurate. Such insanely precise time-keeping can improve such things as global navigation systems, which depend on the time-keeping abilities of orbiting satellites, Phillips's colleagues said yesterday.

There was jubilation yesterday on the institute's campus and in the laser lab, where Phillips's experiments were arrayed along tables like a fantastically complicated electric train set. Printouts of complex graphs and schematic drawings hung on the walls.

In a conference room adjacent to the lab, colleagues toasted Phillips with sparkling cider and carrot cake brought by his wife. Aides scrambled to arrange interviews, fielded an avalanche of phone calls and struggled to explain Phillips's complex work.

Phillips cut short his trip and caught an afternoon plane back to Washington.

"We're tremendously excited by this news and as proud as can be to have Bill Phillips on the . . . staff," Robert Hebler, the institute's acting director, said in a statement. "The elegant work that Bill and his colleagues have done at the frontiers of atomic measurement opens up new possibilities both in science and measurement technology."

Some of Phillips's colleagues heard about the prize while they were still in bed yesterday. Steven Rolston, 38, one of the four members of Phillips's atom-trapping team, said he heard the news when his clock radio clicked on about dawn. "I couldn't believe it. Great way to wake up. I shouted to my wife, who had just gotten up a few minutes before me, 'Bill won the Nobel Prize!'"

Rolston said Phillips is "really just a great guy. He's enthusiastic, happy, always willing to help people, very involved in his church."

Katharine Gebbie, director of the institute's physics laboratory, said she, too, had been in bed when the word came. She had just returned from a long trip, and she said the deputy who called said: "You know I wouldn't be calling you now if there weren't some good news."

Gebbie said, "I held my breath."

"It's a wonderful honor for Bill and his colleagues in the physics laboratory," she said. "We have cherished them very much."

Phillips "is one of the greatest guys in the world, that's all I can say," Gebbie said. "Anybody who listens to him gets a sense of the great thrill of physics that he's doing . . . He just loves it and wants everybody else to love it."

Another member of Phillips's group, Lett, 39, said he was "thrilled."

"It's well deserved," he said.

Phillips, who has been married for 27 years, has two daughters, one in high school and one in college. Group members said he is "very much a family man." Physics, though, has kept him in thrall.

"It's the same thing that gets a grip on all of us," Lett said. "Wanting to know the nitty-gritty of why things work."

Rolston said, "I always tell my daughter: Everything's physics."

## DETERMINING GUAM'S POLITICAL FUTURE

The SPEAKER pro tempore. Under the Speaker's announced policy of January 7, 1997, the gentleman from Guam [Mr. UNDERWOOD] is recognized for 60 minutes as the designee of the minority leader.

Mr. UNDERWOOD. Mr. Speaker, I take to the floor to talk a little bit

about H.R. 100, which is the Commonwealth bill for Guam. This bill was first introduced in 1989 and it has endured some 8 years of negotiation with both the Bush and the Clinton Administration, and to date we have not reached any consensus on this bill.

As a consequence of that, I had asked the gentleman from Alaska [DON YOUNG], Chairman of the Committee on Resources, to schedule a hearing in order to perhaps facilitate more discussion on the bill and to get a kind of check on the health of the bill, both from the perspective of the administration and the Congress. The chairman of the Committee on Resources has gratefully allowed us to have this hearing on October 29, next Wednesday.

H.R. 100 has been a bill that we deliberately labeled it H.R. 100, because next year, 1998, stands for the 100th anniversary in which the island of Guam has been associated with the United States. Guam was ceded to the United States by Spain as a result of the Spanish-American War, and next year we commemorate or celebrate, or otherwise acknowledge in one way or another the 100th anniversary of what most historians call the splendid little war.

In that time period, Guam has really, its political status has only been changed once. It was and still is an unincorporated territory, but the process of changing perhaps the way in which Guam has been dealt with occurred only once, and that was in 1950 with the passage of the Guam Organic Act, making the indigenous people, the Chamorro people of Guam, U.S. citizens.

Since that time, it certainly has been clear to the people of Guam that we need to revisit our political status, and that we need to revisit our relationship with the Federal Government.

Throughout the decades ever the 1980's, there were a series of elections that took place on Guam with all eligible voters participating on what political status Guam should pursue for the immediate future. In 1982, this election was held and the two winners were what was labeled Commonwealth and the aspiration for statehood, and a runoff election was held between those two sometime later, two years later, and the eventual winner of that, by a 3 to 1 margin, was Commonwealth.

There ensued on Guam a series of discussions and public hearings in which a Commonwealth proposal was fashioned, and this led to a 12-titled piece of legislation, which was in itself voted on, article-by-article, and which eventually surfaced as legislation ratified by the voters of Guam, and legislation which was introduced in Congress in 1989.

At that time, the Subcommittee on Insular Affairs of the Committee on Resources held a hearing on this Commonwealth proposal, and suggested that there be a period of time in which negotiations and discussions could be held between, at that time, the Bush administration, and the Commission on

Self-Determination, which is a body created by Guam public law.

There ensued a period of discussions for 3 years, and at the conclusion of the Bush administration, the Bush Administration concluded that they could not agree to major parts of this Commonwealth proposal and left it at that, with a negative report that was actually issued 1 hour before the administrators at the Department of the Interior physically left office, signalling the end of the Bush administration.

As a consequence, we had very serious high hopes when the Clinton administration came in, and for the past few years we have been in discussion with the Clinton administration with a team led by John Garamendi, the Honorable John Garamendi, the Deputy Secretary of the Department of the Interior.

Throughout those discussions we have discovered, somewhat to our dismay, that many of the people we were confronting in earlier times under the Bush administration were essentially the same bureaucrats and had the same bureaucratic perspectives of those under the succeeding administration, and to date very little progress has been made.

What is Guam seeking in this legislation? Well, Guam is seeking in this legislation a new relationship with the Federal Government. It seeks a new relationship with the Federal Government through a joint commission to review the application of laws and the application of rules and regulations for the people of Guam. It seeks to resolve some issues of historical injustice regarding Federal landholdings on Guam and the right of the Chamorro people, the indigenous people of Guam, to ultimately determine their political faith in the future.

Lastly, it offers some economic items that would lead to a greater economic growth for Guam. That is the basis for this package that we call the Guam Commonwealth proposal. At this point in time, I wish that I could report that we had made great progress with the administration, but we have not made that great progress. Yet, I remain the optimist and hope that in the context of the hearing next week, we will have people who will say there may be serious disagreements, but that there will always be opportunities to further discuss this and that the administration would not close the door to further discussion.

It is my hope as well that as the Committee on Resources, which is the only committee in this body that is charged with the general management and review of insular affairs, takes its responsibilities seriously with regard to the territories. It is of note that the Committee on Resources hearing room, the primary hearing room used by the Committee on Resources, is the only committee room in Congress that flies the flags of the insular areas behind the chairman's seat. So this responsibility is entrusted to the Committee

on Resources, and I think the people of Guam are coming to the Committee on Resources with a sense that these are people who understand their responsibility with regard to the territories.

At one time or another, even though it may not be of abiding concern to many Americans, because we are talking about fellow Americans who are few in number and quite distant, the island I represent is some 9,000 miles from Washington, DC; is on the other side of the international dateline; takes some 19 hours to get to by air; and has only 150,000 people. It is very difficult to understand why this would be an abiding concern to most Americans. Yet, these people are U.S. citizens. We fight and we die in American wars.

Guam has the distinction of having the highest per capita casualty rate and death rate from Vietnam. And nobody asked us whether we were full citizens or second-class citizens as we sought to participate fully in those challenges that are most presented by American citizenship.

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At some point in time we are going to have to cross that bridge and try to understand what is the meaning for U.S. citizenship and what kinds of ways can we offer people who live in distant and small areas in order to more effectively participate as American citizens in their government.

We all take it as a core creed of America that the only legitimate form of government is through the consent of the governed. That is not true for all Americans, because it is certainly not true for the insular areas. The insular areas do not have meaningful participation in the development of the laws under which they must live, laws which are passed in this body in which we have nonvoting representation by delegates, laws which are passed in the other body in which there is no representation, and laws which then become administrative rules created by an administration which the people of the territories cannot vote for. So in that sense there is no meaningful participation, and that violates the very creed of America and the sense of American democracy.

So we need to be creative as we try to figure out what is the meaning of American citizenship for the people of the insular areas, and certainly I am making that pitch for the people of Guam.

The real test of our democratic creed is not to try to act when only it is in our best interests, but to try to act and to understand the necessity to act when there is no personal interest at stake, other than the pure understanding of democratic principles.

So the people of Guam come to this hearing hoping for a fair hearing and a fair opportunity for their proposal, and I am sure that most of the members of the Committee on Resources will give them that opportunity. I am sure that

most of the people of this great country will understand that if they had the opportunity to draw a little attention to it.

When we talk about extending the basic principles of democracy to other parts of the world or shoring them up, and we are talking about millions and millions of people, and we are talking about trade interests and strategic interests and security interests, there is an imperative in that beyond the desire for democracy, to make democracy work in other parts of the world.

But when we are challenged simply by the existence of 150,000 citizens by people who live on what is a relatively small island some 9,000 miles away, really, when there is no abiding interest to address those issues, we are really testing whether we do really care about democracy, where we are willing to think outside the box, and try to come up with and fashion an instrument which gives these people meaningful participation in the Government which controls their lives.

The people of Guam will be represented by a large delegation: The three living Governors, the current Governor, Carl Gutierrez, the Honorable Paul Calvo, and the Honorable Joseph Ada, both of whom are Republicans, Carl Gutierrez is a Democrat, this proposal is very bipartisan on Guam and supported across the board by the elected leadership; Senators Tony Blaz, who is the vice speaker of the Guam Legislature, Senator Mark Forbes, the chairperson of the Federal Relations Committee of the Guam Legislature, Senator Ben Pangelinan, the minority leader, Senator Elizabeth Barrett-Anderson, chairperson of the Committee on the Judiciary of the Guam Legislature; Chief Justice Pete Siguenza; presiding judge, Alberto LaMorena; members of six groups that are important in the context of Guam; and a very important symbolic figure for most people on Guam, the Archbishop, Anthony Apuron; leader of the Chamorro Nation, Ed Benavente; leader of the Organization of People for Indigenous Rights, Hope Cristobal; chairman of the Chamber of Commerce, Sonny Ada; president of the Guam Bar Association, J. Arriola; and president of the Filipino Community of Guam, Roger Ruelos have all received invitations, and we look forward to their testimony.

We certainly look forward to welcoming them to Washington and hope that they have a safe trip to this very distant city, when you look at it from Guam's point of view; and hopefully we will give them a warm welcome, and entertain warmly the proposal of a people who are striving to create a mechanism to better participate in the fabric of American democracy through a Commonwealth proposal.

It is a proposal whose time has come, it is a proposal that must be addressed, and it is a proposal that deserves the serious attention of the members of the Committee on Resources as well as all

Members of the House of Representatives and the American people at large.

#### THE HAZARDS OF NUCLEAR WASTE TRANSPORT

The SPEAKER pro tempore [Mr. PEASE]. Under the Speaker's announced policy of January 7, 1997, the gentleman from Nevada [Mr. GIBBONS] is recognized for 60 minutes as the designee of the majority leader.

Mr. GIBBONS. Mr. Speaker, I believe it was H.G. Wells who was once quoted as saying, "Human history becomes more and more a race between education and catastrophe." Right now, Mr. Speaker, this Congress is in a race and we must not let catastrophe win.

In examining both the education and catastrophe spectrum here, I would first like to do my part in educating the ladies and gentlemen of America, Mr. Speaker, on the facts concerning H.R. 1270, the Nuclear Waste Policy Act of 1997. This legislation will mandate transportation of high-level radioactive nuclear waste by way of our national highways and railways.

This deadly waste will traverse 43 States to a nuclear waste dump at Yucca Mountain, NV, that is right, through 43 States out of 50, traveling right alongside of you during your commute to work or on your weekend outing, or with your family over bridges that traverse your community's source of water, near schools where your sons and daughters are attending their education. On these routes will be nuclear, radioactive waste from 109 of our country's nuclear reactors.

American citizens from Los Angeles to New York, from Atlanta to Denver, from Pittsburgh to Dallas, St. Louis to Tucson, Kansas City to Baton Rouge, Jacksonville to Chicago, and from here in Washington, DC, to Cleveland, are all in harm's way. That is exactly why it is important for us to educate Members on H.R. 1270.

Mr. ENSIGN. Mr. Speaker, would the gentleman yield?

Mr. GIBBONS. I am happy to yield to my colleague from district 1.

Mr. ENSIGN. Mr. Speaker, I would ask, is the gentleman aware that in the transport of this nuclear waste across the country, that the most highly dangerous substance ever produced by mankind is an environmental problem, is a health and safety problem? This high-level nuclear waste on these routes of transportation will be going near even elementary schools, day care centers, and the like across the country?

Is the gentleman aware that we tried to offer and tried to get approved in order an amendment just to make nuclear waste not go within 1 mile of schools, and that the leadership, the Republican leadership, did not allow this amendment to be in order? Is the gentleman aware of that?

Mr. GIBBONS. I thank the gentleman from Nevada for reminding me of that

fateful day when we proposed those amendments, and certainly were told that we could not offer those amendments; an amendment which would, in essence, protect children from transportation and the exposure to the transportation of nuclear waste by their schools. I am aware of that.

Mr. Speaker, we would like to point out to everyone just exactly where the proposed railway and highway routes are going to be. Imagine, if you will, that 75 percent of all the nuclear waste in America is generated east of the Mississippi, and it is all coming right here to southern Nevada. Seventy-five percent of those 109 reactors are going to have to funnel their waste through what could be regular hub and spoke communities. For example, if we took St. Louis, MO, where I-70 passes through St. Louis, MO, crosses over the Mississippi River, an accident in St. Louis, MO, could have catastrophic results.

As we recall, earlier, I would remind the gentleman today that we heard earlier about a train accident in West Virginia, a terrible catastrophe. In fact, there were two train accidents in the last several days in West Virginia: a head-on, two trains colliding head on, and a train intersecting or a train intersection where it impacted a truck.

Mr. ENSIGN. If the gentleman will continue to yield, Mr. Speaker, from what I understand from hearing the gentleman from West Virginia this morning, or this afternoon, he talked about this train collision happening, and he even said, luckily, only by God's grace, was the explosive material on one of the trains taken off just before these trains collided.

Mr. GIBBONS. If the gentleman will yield for point of correction, I think he said that that was a truck that was at an intersection that was loaded with explosives, or previously loaded with explosives, just hours before.

Mr. ENSIGN. Yes. If the gentleman will yield further, let us take, for instance, if we had nuclear waste in these tri-cask cannisters, which are supposed to, based on the testing, if I am correct on this, they are supposed to be able to withstand temperatures of up to 1,500 degrees.

Mr. GIBBONS. One thousand five hundred, that is correct.

Mr. ENSIGN. Explosive materials could lead to a fire. Diesel fuel, what does diesel fuel, if the gentleman would answer, being a geologist and a scientist, what does diesel fuel burn at?

Mr. GIBBONS. Diesel fuel burns at 1,830 degrees, but in addition to that, if cooked long enough, the metal surrounding structures will burn in excess of 3,000 degrees, sometimes.

So the problem we have here is twofold. We have natural hazards, diesel fuel from trains and trucks and the metal surrounding it, the incendiary position of the metal; as well as the explosives, if the accident had occurred with a trainload of nuclear fuel and this truck, loaded with explosives; or a terrorist act.