



City of Cambridge

Calendar Item # 61
40.

IN CITY COUNCIL

~~October 18, 1993~~
October 25, 1993

VICE MAYOR CYR
COUNCILLOR DUEHAY
MAYOR REEVES

WHEREAS: Dr. Phillip A. Sharp, cancer researcher, professor and head of the Department of Biology at the Massachusetts Institute of Technology, has been awarded the 1993 Nobel Prize in Medicine and Physiology for his work on gene splicing; and

WHEREAS: Dr. Sharp discovered that genes in cells with a nucleus are linked along their strand of DNA by surplus DNA segments that have no apparent protein message (and hence are often referred to as "nonsense DNA"); Dr. Sharp subsequently discovered that DNA is copied into RNA, and the cell's RNA splicing machinery then clips out the unneeded "nonsense" sections and splices the genetic material together as the model for assembling proteins; Dr. Sharp shares the prize with Dr. Richard Roberts, who independently made the same discovery at about the same time; and

WHEREAS: Dr. Sharp's discovery of surplus DNA has been called by other experts in the field perhaps the most unanticipated observation in molecular biology, with implications for the evolutionary origin of genes; and

WHEREAS: Dr. Sharp, born June 6, 1944 in Falmouth, Ky, holds a BA in chemistry and mathematics from Union College, Barboursville, KY, and holds a PhD in chemistry from the University of Illinois, Champaign-Urbana; was a postdoctoral fellow at the California Institute of Technology in Professor Norman Davidson's laboratory, and at the Cold Spring Harbor Laboratory, before joining MIT in 1974 as an associate professor of biology and a member of the Center for Cancer Research, of which he served as director from 1985 until July, 1991, when he was appointed to head MIT's Department of Biology; and

WHEREAS: Dr. Sharp has written more than 240 articles in scientific journals and books; is a member of more than a dozen notable scientific academies and associations; has a distinguished record of public service including having served as a member of the President's Advisory Council on Science and Technology; and is currently on the editorial board of the scientific journal Cell; and

WHEREAS: Dr. Sharp is also a co-founder and member of the board of directors of Biogen, Inc., of Cambridge and a faculty member of the Harvard-M.I.T. Division of Health Sciences and Technology; now therefore be it

RESOLVED: That this City Council go on record extending its heartiest congratulations to Dr. Phillip A. Sharp for his achievement of the high honor of the Nobel Prize and for the outstanding work that has led to this award; and be it further

RESOLVED: That the City Clerk be and hereby is requested to forward a suitably engrossed copy of this resolution on behalf of the entire City Council.

ORDERED: That the City Clerk be and hereby is requested to prepare a suitably engrossed resolution congratulating Nobel Prize in Medicine, co- winner, Phillip A. Sharp, of Massachusetts Institute of Technology, Chair of the Center for Cancer Research, and also a co-founder of Biogen, Inc.

In City Council October 25, 1993.

Adopted by a ye and nay vote:-

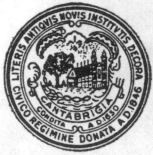
Yeas 9; Nays 0; Absent 0.

Attest:- D. Margaret Drury, City Clerk.

A true copy; *D. Margaret Drury*

ATTEST:-

D. Margaret Drury
City Clerk



City of Cambridge

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CHARTER RIGHT WAS EXERCISED BY COUNCILLOR WALSH

The MIT logo, consisting of the letters "MIT" in a white, sans-serif font inside a black circle.

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FOR IMMEDIATE RELEASE, Oct. 11, 1993

MIT Contact: Ken Campbell, Elizabeth Thomson or Bob DiIorio, 617-253-2700

HEAD OF MIT BIOLOGY DEPT.

Phillip A. Sharp, Winner of Nobel Prize in Medicine, Is A Pioneer of Gene Splicing and 'Surplus' DNA

CAMBRIDGE, Mass., Oct. 11, 1993 – MIT Professor Phillip A. Sharp, cancer researcher, teacher and head of the Department of Biology at the Massachusetts Institute of Technology, today was awarded the 1993 Nobel Prize in Medicine and Physiology for his work on gene splicing. He shares the prize with Dr. Richard Roberts, formerly of the Cold Spring Harbor (N.Y.) Laboratory and now New England Biolabs in Beverly, Mass., who independently made the same discovery at about the same time.

Dr. Sharp discovered that genes in cells with a nucleus are linked along their strand of DNA by surplus DNA segments that have no apparent protein message (hence, they are often referred to as "nonsense DNA"). Dr. Sharp subsequently discovered that DNA is copied into RNA, and the cell's RNA splicing machinery then clips out the unneeded nonsense sections and splices the genetic material together as the model for assembling proteins.

Professor Sharp told a news conference at the MIT Center for Cancer Research today that 99% of the 100,000 genes in the human body share this structure.

Recent research suggests that some diseases – including cancer – may be directly due to breakdowns in the protein assembly process involving the removal of nonsense genetic segments. Dr. Sharp's studies showed that protein production is far more complex than previously imagined.

The discovery of surplus DNA has been called "perhaps the most unanticipated observation in molecular biology, with implications for the evolutionary origin of genes."

Dr. Pierre Chambon, professor of biochemistry at the Institute de Chimie Biologique in Strasbourg, France, and a pioneer in the field, has said that the discovery of nonsense segments in DNA was "perhaps the most unanticipated observation in molecular biology, with implications for the evolutionary origin of genes."

Dr. Sharp, of Newton, Mass., teaches courses on animal virology and cell biology at the Massachusetts Institute of Technology, which he joined in 1974 as a faculty member in the Department of Biology and a research scientist in the MIT Center for Cancer Research. His research has centered on the molecular biology of tumor viruses and the mechanisms of RNA splicing.

Dr. Sharp's research in the late 1970s caused a great upheaval in the world of biology. Previously, bacterial cells had been the principal subject of DNA research. Genes in bacterial cells form a continuous sequence along their strand of DNA. Dr. Sharp and his colleagues discovered that genes in cells that have a nucleus (eukaryotic cells) are in a significant way unlike bacterial cells (prokaryotes).

(MORE)

2-2-2 PHILLIP A. SHARP WINS NOBEL PRIZEMIT PROFILE10/11/93

In the nucleated cells of higher organisms – and in the viruses that infect them – genes are distributed among widely spaced segments separated by apparently "surplus" DNA (called introns) that bear no apparent protein message. Dr. Sharp and others later found that nucleated cells selectively remove great quantities of these surplus or "nonsense" segments and splice together the remaining intelligible sequences, which are then translated into proteins – the building blocks of life.

SPLICING RNA

Following his initial discovery, Dr. Sharp succeeded in duplicating the snipping and gene recombination process in the laboratory without relying on living cells. He showed that what is actually spliced is messenger RNA, the genetic material that translates hereditary instructions coded in DNA into proteins.

But DNA does not make the final determination about which proteins a nucleated cell will make. The ultimate decisions are left to messenger RNA. DNA is copied into RNA, nonsense segments included. Then the cell's machinery clips out the nonsense segments and splices the remainder together in the correct order. The trimmed messenger RNA leaves the cell nucleus and goes to special molecular factories – the ribosomes – in the main body of the cell, where the RNA serves as a blueprint for protein assembly.

The latter is an astonishingly precise process – with many opportunities for mistakes – and yet it goes on continuously in the many cells that make up an organism. Mistakes in RNA processing have been shown to be related to a number of disorders, including for example, the blood disorder, thalassemia.

EVOLUTIONARY IMPLICATIONS

Dr. Sharp's studies and those of others who are researching nonsense genes, suggest that – in contrast to the once dominant view in evolutionary theory – higher organisms may not have evolved from present-day bacteria. "Probably both evolved from some now extinct organism," says Dr. Sharp. Studies of how genes change during evolution indicate that some nonsense segments have persisted for a billion years, even though they do not carry hereditary information.

Some scientists believe that by separating and recombining the hereditary message, DNA with nonsense segments may safeguard genetic coding better than unbroken genes, which could be damaged more easily. In fact, in the cells of mammals there is sometimes more nonsense material than working gene units. Dr. Sharp and others have argued that the efficiency of bacterial genes – those without "excess baggage" – may have come at the expense of making adaptation more difficult. In this view, "inefficient" mammalian genes, with all their nonsense subunits, are probably more flexible in an evolutionary sense.

Dr. Sharp, born June 6, 1944 in Falmouth, Ky., holds a BA (1966) in chemistry and mathematics from Union College, Barbourville, Ky., and a PhD (1969) in chemistry from the University of Illinois, Champaign-Urbana, where he worked with Professor Victor Bloomfield. In 1969-1971, he was a postdoctoral fellow at the California Institute of Technology in Professor Norman Davidson's laboratory, and in 1971-72 at the Cold Spring Harbor Laboratory with 1962 Nobel laureate James D. Watson. In 1972-74 he was a senior research investigator at Cold Spring.

Dr. Sharp joined MIT in 1974 as an associate professor of biology and a member of the Center for Cancer Research. He was promoted to professor in 1979. Dr. Sharp became associate director of the Center for Cancer Research in 1982 and served as director from 1985 until July, 1991, when he was appointed to head MIT's Department of Biology.

Dr. Sharp has said of the MIT Center for Cancer Research, "We have probably had more impact on understanding cancer than any other center in the country."

The Center, numbering about 175 people, does research on the molecular biology of cancer, virology, immunology, and cellular and developmental biology.

(MORE)

3-3-3 PHILLIP A. SHARP WINS NOBEL PRIZEMIT PROFILE10/11/93

MIT Biology Professor Susumu Tonegawa of the Cancer Center won the 1987 Nobel Prize in Physiology or Medicine for discovering how gene fragments combine to produce countless variations in the immune response of humans; the work was done at the Basel Institute in Switzerland and continued at the Center. Dr. David Baltimore, who won the Nobel Prize in 1975 as a professor at MIT, started his research on reverse transcriptase in the biology department at MIT and developed it at the Center. MIT Biology Professor Robert Weinberg (with whom Dr. Sharp teaches the course on animal virology) discovered the oncogene at the Center. The late Salvador Luria, an MIT biology professor who won the Nobel Prize in 1969, started the Center in 1972 and became its first director.

In 1992, Professor Sharp became the first Salvador E. Luria Professor, a chair established by MIT in honor of Professor Luria. From 1988 to 1992, Dr. Sharp held the John D. MacArthur Professorship at MIT, a chair established in 1981 by a grant from the John D. and Catherine T. MacArthur Foundation in recognition of the "outstanding reputation and contributions of MIT as an institution of distinction in both instruction and research."

Among Dr. Sharp's awards are the 1990 Dickson Prize of the University of Pittsburgh; the 1988 Albert Lasker Basic Medical Research Award; the 1988 Louisa Gross Horwitz Prize of Columbia University; the 1986 Alfred P. Sloan Prize of the General Motors Cancer Research Foundation; the 1986 New York Academy of Sciences Award in Biological and Medical Sciences; the 1986 Gairdner Foundation International Award; the 1985 Howard Ricketts Award of the University of Chicago; the 1980 Eli Lilly Award in Biological Chemistry; and the 1980 National Academy of Sciences-U.S. Steel Foundation Award in Molecular Biology.

Dr. Sharp has written more than 240 articles in scientific journals and books. He is a member of the National Academy of Sciences; the Institute of Medicine of the National Academy of Sciences; the American Academy of Arts and Sciences; the American Philosophical Society; and the American Association for the Advancement of Science. He is also a member of the American Association for Cancer Research; the American Chemical Society; the American Society of Biological Chemists; the American Society for Biochemistry and Molecular Biology; the American Society for Microbiology; and the American Society for Virology.

His current public service includes serving as co-chairman of the National Institutes of Health Strategic Plan, 1992; member, 1992, of the Advisory Panel of the Joint High Level Committee on US-Japan Science and Technology Agreement; member, 1992-95, of the Committee on Science, Engineering and Public Policy (COSEPUP); consultant, 1992, to NIH on Genome Patenting; member, 1992, of the NIH Search Committee for a Director of the National Center for Human Genome Research; and member of the Howard Hughes Medical Institute Medical Board. In 1991, he served as a member of the President's Advisory Council on Science and Technology.

Companies or foundations that have supported Dr. Sharp's research include: Bristol-Myers; Merck Sharpe & Dohme; the John D. and Catherine T. MacArthur Foundation; and Ajinomoto, a Japanese pharmaceutical company.

Dr. Sharp is on the editorial board of the scientific journal *Cell*, and formerly served on the editorial boards of the *Journal of Virology*, *Virology*, and *Molecular & Cellular Biology*. He is also a co-founder and member of the board of directors of Biogen, Inc. of Cambridge, Mass.

Dr. Sharp and his wife, Ann, have three daughters. The family lives in Newton, Mass.

- END -

KDC 10/93



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25 MIT-RELATED NOBELISTS

(AS OF 10/11/93--INCLUDES ALUMNI & FORMER FACULTY)

CURRENT FACULTY: (9)

(**Bold** indicates work done at MIT)

[Underline indicates awarded while person was employed at MIT]

(*Italic* means post-doc, not MIT prof, staff or alum)

1. Har Gobind Khorana, 1968, Medicine/Physiology; Prof. of Biology & Chemistry
2. **Paul A. Samuelson**, 1970, Economics; Prof. Emeritus, Economics
3. **Samuel C.C. Ting**, 1976, Physics; Prof. Physics
4. **Franco Modigliani**, 1985, Economics; Inst. Prof. Emeritus, Economics
5. **Susumu Tonegawa**, 1987, Medicine/Physiology; Prof., Biology
6. **Robert M. Solow**, 1987, Econ; Institute Prof., Economics
7. **Henry W. Kendall**, 1990, Physics, Prof. Physics
8. **Jerome I. Friedman**, 1990, Physics, Prof. Physics
9. **Philip A. Sharp**, 1993, Medicine/Physiology, Prof. of Biology, Head of Dept.

STAFF (1)

10. Dr. Eric S. Chivian, psychiatrist, MIT Medical Dept., 1985, Peace, Int'l Physicians for the Prevention of Nuclear War.

RETURNING TO MIT (1)

1. David Baltimore, 1975, Medicine/Physiology, Prof., Biology, 1972-90 (On faculty, 1968-90) Returning to MIT in 1994; now on research faculty of Rockefeller University.

DECEASED FACULTY (1)

1. Salvador E. Luria, 1969, Medicine/Physiology; Prof. of Biology at MIT

FORMER FACULTY (2)

1. Charles H. Townes, 1964, Physics; MIT Provost 1961-66 (work done at Cal Tech)
2. Steven Weinberg, 1979, Physics, Prof. at MIT 1967-73; (Awarded while at Harvard for work begun at MIT:

ALUMNI OTHER THAN DAVID BALTIMORE (11):

1. William Shockley (MIT Ph.D. 1936) shared 1956 Physics
2. The late Richard P. Feynman (MIT S.B. 1939) shared 1965 Physics
3. The late Robert Burns Woodward (MIT S.B. 1917) won 1965 Chemistry
4. The late Robert S. Mulliken (MIT S.B. 1917), won 1966, Chemistry
5. Murray Gell-Mann (MIT Ph.D. 1951) won 1969 Physics
6. John Robert Schrieffer (MIT S.B. 1953) shared 1972 Physics
7. Burton Richter (MIT S.B. 1952, Ph.D 1956) shared 1976 Physics (with SCC Ting)
8. Lawrence R. Klein (MIT Ph.D. 1944) won 1980 Economics
9. The late Charles J. Pedersen (MIT S.M. 1927) shared 1987 Chemistry.
10. Sidney Altman (MIT S.B. 1960) shared 1989 Chemistry with
Thomas R. Cech (who did postdoctoral work at MIT from 1975-1978) .
11. Elias J. Corey Jr. (MIT S.B. 1948, PhD 1951) won 1990 Chemistry.

MIT-related Nobelists By Discipline:

Physics (10): Shockley, Townes, Feynman, Friedman, Gell-Mann, Kendall, Schrieffer, Ting, Richter, Weinberg

Chemistry (5 or 6): Corey, Woodward, Mulliken, Pedersen, Altman, *Cech*.

Medicine-Physiology (4): Khorana, Luria, Baltimore, Tonegawa.

Economics (4): Samuelson, Klein, Modigliani, Solow.

Peace (1): Chivian.



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skt

~~has current position as head of department~~

~~WHEREAS: Dr. Sharp is also a faculty member of the Harvard-MIT~~

and a family member of
the Harvard - MIT Division of
Health Sciences and Technology

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sharp.res



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Bluebay, Reeves

Consent Order #40

Cal #61 R-476

Vice Mayor Cyr re: resolution
congratulating Nobel Prize in
Medicine co-winner, Phillip A. Sharp.

In City Council,

October 18, 1993

*Chapter right exercised
by Councilor Stalsh
10/25/93 order adopted*

8-0-0