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FOIA MARKER

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Record Group/Collection: George H.W. Bush Presidential Records
Collection/Office of Origin: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Personal Files

OA/ID Number: 62030
Folder ID Number: 62030-001

Folder Title:
D. Allan Bromley: Awards [1 of 2] [1992]

Stack:	Row:	Section:	Shelf:	Position:
	0	0	0	0

"Document Control"

TYPE: INFORMATION DOCUMENT NUMBER: 9203688
ORIGINATOR: 02 STATUS C DIRECTORATE STATUS

FROM: FRIEMAN, Edward: PRESIDENT'S COMMITTEE ON THE NATIONAL MEDAL OF SCIENCE

TO: DR. D.A. BROMLEY

DATE OF CORRESPONDENCE: 12/21/92

SUBJECT: HE IS FORWARDING THE NAMES OF THE PROPOSED AWARDEES FOR THE 1993 NATIONAL MEDAL OF SCIENCE.

DIRECTORATE STAFF
ASSIGNED: ASSIGNED:

ACTION STAFF
REQUIRED: ACTION:

SENDER'S DUE DATE:
OSTP DUE DATE: STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT:

COPIES TO: D. Allan Bromley

WHITE HOUSE TRACKING #: CONTACT PERSON:
REMARKS: PHONE: EXT:

OSTP RECEIVED: 01/11/93 DEPT RECEIVED:
FILE: P-DAB-AWARDS

CENTRAL FILES:

3684

PRESIDENT'S COMMITTEE ON THE NATIONAL MEDAL OF SCIENCE
NATIONAL SCIENCE FOUNDATION

1800 G STREET, N.W.
WASHINGTON, D.C. 20550

DEC 21 1992

Close-out

Dr. D. Allan Bromley
Assistant to the President for
Science & Technology and
Director, Office of Science
and Technology Policy
Washington, D.C. 20500

Dear Dr. Bromley: *Alla*

Enclosed is a list of the eight proposed awardees and four alternates for the 1993 National Medal of Science copy as selected by the President's Committee at their October 27, 1992 meeting. The list of proposed awardees has been formally submitted to the President. A proposed citation and summary of achievements for each candidate is enclosed.

On behalf of the Committee, let me say that we very much appreciate your meeting with us on October 27. We appreciated particularly your comments concerning the proposed legislation for reduction in the numbers of awards, the newly signed agreement between the National Science Foundation and the Foundation for the National Medals of Science and Technology, and the appointment process for new Committee members.

The Committee feels that the names on the enclosed list of candidates represent the best cross-section among those nominated and at the same time sends a clear message of excellence to the scientific community.

The Committee recommends that the White House press office and/or that of the National Science Foundation again contact the press offices of all of the recipients' institutions on an appropriately embargoed basis in order to obtain the maximum press coverage allowable. The Committee members believe that more advanced publication of the names of the Medalists would enhance the importance of the Award.

The systematic solicitation of nominations from all segments of the scientific community afforded an outstanding group of candidates for the next class of awardees. A systematic cycle of activities will help prevent an increase of unrecognized contributions by the very top scientists among us. Therefore, the Committee is hopeful that the President will take early

action to announce the new recipients and to schedule a White House ceremony. In this regard, I would strongly urge you to recommend that the ceremony actually take place in the White House itself, specifically the East Room, as befits the importance of the occasion.

If I can be of any additional service to you and the President, please do not hesitate to call me.

Sincerely,



Edward A. Frieman
Chairman

Enclosures

Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
01a. List	Personal contact information for National Medal of Science Recipients [personal information redacted] (2 pp.)	12/21/92	(b)(6)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Personal Files
WHORM Cat.:
File Location: D. Allan Bromley: Awards [1 of 2] [1992]

Date Closed: 1/11/2010	OA/ID Number: 62030-001
FOIA/SYS Case #: 2005-0336-F	Appeal Case #:
Re-review Case #:	Appeal Disposition:
P-2/P-5 Review Case #:	Disposition Date:
AR Case #:	MR Case #:
AR Disposition:	MR Disposition:
AR Disposition Date:	MR Disposition Date:

RESTRICTION CODES

Presidential Records Act - [44 U.S.C. 2204(a)]

P-1 National Security Classified Information [(a)(1) of the PRA]
P-2 Relating to the appointment to Federal office [(a)(2) of the PRA]
P-3 Release would violate a Federal statute [(a)(3) of the PRA]
P-4 Release would disclose trade secrets or confidential commercial or financial information [(a)(4) of the PRA]
P-5 Release would disclose confidential advice between the President and his advisors, or between such advisors [(a)(5) of the PRA]
P-6 Release would constitute a clearly unwarranted invasion of personal privacy [(a)(6) of the PRA]

C. Closed in accordance with restrictions contained in donor's deed of gift.

PRM. Removed as a personal record misfile.

Freedom of Information Act - [5 U.S.C. 552(b)]

(b)(1) National security classified information [(b)(1) of the FOIA]
(b)(2) Release would disclose internal personnel rules and practices of an agency [(b)(2) of the FOIA]
(b)(3) Release would violate a Federal statute [(b)(3) of the FOIA]
(b)(4) Release would disclose trade secrets or confidential or financial information [(b)(4) of the FOIA]
(b)(6) Release would constitute a clearly unwarranted invasion of personal privacy [(b)(6) of the FOIA]
(b)(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA]
(b)(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
(b)(9) Release would disclose geological or geophysical information

Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
01b. Biography	Biographies of proposed awardees of the National Medal of Science [personal information redacted] (14 pp.)	12/21/92	(b)(6)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Personal Files
WHORM Cat.:
File Location: D. Allan Bromley: Awards [1 of 2] [1992]

Date Closed: 1/11/2010	OA/ID Number: 62030-001
FOIA/SYS Case #: 2005-0336-F	Appeal Case #:
Re-review Case #:	Appeal Disposition:
P-2/P-5 Review Case #:	Disposition Date:
AR Case #:	MR Case #:
AR Disposition:	MR Disposition:
AR Disposition Date:	MR Disposition Date:

RESTRICTION CODES

<p>Presidential Records Act - [44 U.S.C. 2204(a)]</p> <p>P-1 National Security Classified Information [(a)(1) of the PRA] P-2 Relating to the appointment to Federal office [(a)(2) of the PRA] P-3 Release would violate a Federal statute [(a)(3) of the PRA] P-4 Release would disclose trade secrets or confidential commercial or financial information [(a)(4) of the PRA] P-5 Release would disclose confidential advice between the President and his advisors, or between such advisors [(a)(5) of the PRA] P-6 Release would constitute a clearly unwarranted invasion of personal privacy [(a)(6) of the PRA]</p> <p>C. Closed in accordance with restrictions contained in donor's deed of gift.</p> <p>PRM. Removed as a personal record misfile.</p>	<p>Freedom of Information Act - [5 U.S.C. 552(b)]</p> <p>(b)(1) National security classified information [(b)(1) of the FOIA] (b)(2) Release would disclose internal personnel rules and practices of an agency [(b)(2) of the FOIA] (b)(3) Release would violate a Federal statute [(b)(3) of the FOIA] (b)(4) Release would disclose trade secrets or confidential or financial information [(b)(4) of the FOIA] (b)(6) Release would constitute a clearly unwarranted invasion of personal privacy [(b)(6) of the FOIA] (b)(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA] (b)(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA] (b)(9) Release would disclose geological or geophysical information</p>
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TYPE: ACTION

DOCUMENT NUMBER: 9203571

ORIGINATOR: 02

STATUS I

DIRECTORATE STATUS

FROM: FRIEMAN, Edward A.; PRESIDENT'S COMMITTEE ON THE NATIONAL MEDAL OF SCIENCE

TO: DR. D.A. BROMLEY

DATE OF CORRESPONDENCE: 12/11/92

SUBJECT: HE IS WRITING REGARDING THE INDIVIDUALS SUGGESTED FOR POSSIBLE APPOINTMENT TO FILL THE VACANCIES ON THE COMMITTEE.

DIRECTORATE

STAFF

ASSIGNED: DIRECTOR'S OFFICE

ASSIGNED:

ACTION

STAFF

REQUIRED: AS NECESSARY

ACTION:

SENDER'S DUE DATE:

OSTP DUE DATE: 12/28/92

STAFF DUE DATE

DATE COMPLETED:

DATE COMPLETED/DEPT:

COPIES TO: D. Allan Bromley

WHITE HOUSE TRACKING #:

CONTACT PERSON:

REMARKS:

PHONE:

EXT:

OSTP RECEIVED: 12/14/92

DEPT RECEIVED:

FILE: P-DAB-AWARDS

CENTRAL FILES:

3571

PRESIDENT'S COMMITTEE ON THE NATIONAL MEDAL OF SCIENCE
NATIONAL SCIENCE FOUNDATION
1800 G STREET, N.W.
WASHINGTON, D.C. 20550

DEC 11 1992

Dr. D. Allan Bromley
Assistant to the President
for Science & Technology and
Director, Office of Science and
Technology Policy
Washington, DC 20506

Dear Dr. Bromley:

Individuals suggested for possible appointment to fill the six vacancies on the committee, as of January 1, 1993, are shown on the attached list (biographical sketches attached). I hope that consideration will be given to the individuals recommended by current committee members, and that selection for new committee members will be completed in time for our annual meeting in October 1993.

Attached for your information is a copy of the membership list as of January 1. As indicated, there will be one in the behavioral/social sciences, two in engineering and three in physical sciences (five including the ex officio members). Strong consideration should be given to nominating individuals in the biological sciences, chemistry, and mathematics/computer science.

If I can be of any further assistance in this, please do not hesitate to call on me.

Sincerely,



Edward A. Frieman
Chairman

Attachments

Document Originally
Attached to
Following Page

THE WHITE HOUSE
WASHINGTON

DAB-Awards

12/7/92

TO: Demar W. Hawkins *JG*
OSTP
Rm 360

FROM: Joan Gibson
Special Letter Response

RE: National Science Scholarship

Per our conversation, here is
the letter we discussed. Thank
you for helping to address
Congressman Hollings concern.

896983

DEC 7 1992

THE WHITE HOUSE
WASHINGTON

November 29, 1992

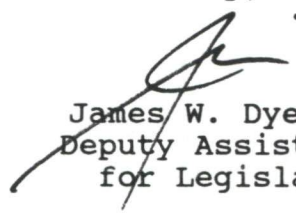
Dear Senator Hollings:

This is to acknowledge and thank you for your letter of October 28, regarding the 1992 recipients of the National Science Scholarship.

In order to ensure expeditious review of your request, I have forwarded the letter to the appropriate member of the President's staff. You may be sure that it will be given prompt and careful attention.

With kindest regards,

Sincerely,



James W. Dyer
Deputy Assistant to the President
for Legislative Affairs (Senate)

Honorable Ernest F. Hollings^X
United States Senate
Washington, DC 20510

@ Shipping
action: Presidential
Inquiries
OE0894

ERNEST F. HOLLINGS
SOUTH CAROLINA

OFFICES:

1835 ASSEMBLY STREET
COLUMBIA, SC 29201
803-765-5731

103 FEDERAL BUILDING
SPARTANBURG, SC 29301
803-585-3702

126 FEDERAL BUILDING
GREENVILLE, SC 29603
803-233-5366

112 CUSTOM HOUSE
200 EAST BAY STREET
CHARLESTON, SC 29401
803-724-4525

United States Senate

125 RUSSELL OFFICE BUILDING
WASHINGTON, DC 20510-4002
202-224-6121

October 28, 1992

COMMITTEES:

COMMERCE, SCIENCE, AND
TRANSPORTATION: CHAIRMAN

APPROPRIATIONS

COMMERCE, JUSTICE, STATE AND
THE JUDICIARY: CHAIRMAN

DEFENSE

LABOR, HEALTH AND HUMAN SERVICES,
EDUCATION

ENERGY AND WATER DEVELOPMENT
INTERIOR

BUDGET

INTELLIGENCE

DEMOCRATIC POLICY COMMITTEE

OFFICE OF TECHNOLOGY ASSESSMENT

NATIONAL OCEAN POLICY STUDY

Mr. James Dyer
Deputy Assistant to the President
for Legislative Affairs
The White House
1600 Pennsylvania Avenue, N.W.
Washington, DC

Dear Mr. Dyer:

I have received a number of calls from students in South Carolina who are the 1992 recipients of the National Science Scholarship.

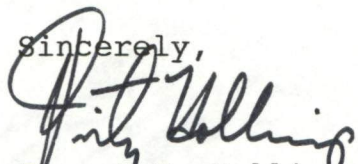
The students received their notifications from the Department of Education in late August, but the colleges have not received the money. This is unfortunate because many of these students have already started the semester. The Department of Education indicates that the White House has not given official notification so that the funding can be released.

I urge you to look into this matter and see that these students receive their scholarship as soon as possible.

If any further information is needed, please do not hesitate to contact Ms. Kem Carter in my office on (202) 224-6121.

With kindest regards, I am

Sincerely,



Ernest F. Hollings

EFH:kc

TYPE: ACTION
ORIGINATOR: 02

DOCUMENT NUMBER: 9203560
DIRECTORATE STATUS

STATUS I

FROM: IACHELLO, Franco: YALE UNIVERSITY

TO: DR. D.A. BROMLEY

DATE OF
CORRESPONDENCE: 12/04/92

SUBJECT: HE IS FORWARDING INFORMATION THAT WAS DISCUSSED IN A
CONVERSATION WITH DR. BROMLEY.

DIRECTORATE STAFF
ASSIGNED: D. Allan Bromley ASSIGNED:

ACTION STAFF
REQUIRED: AS NECESSARY ACTION:

SENDER'S DUE DATE:
OSTP DUE DATE: 12/23/92 STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT:

COPIES TO:

WHITE HOUSE TRACKING #: CONTACT PERSON:
REMARKS: PHONE: EXT:

OSTP RECEIVED: 12/09/92 DEPT RECEIVED:
FILE: P-DAB-AWARDS

CENTRAL FILES:

3560



Yale University
Center for Theoretical Physics

Sloane Physics Laboratory
217 Prospect Street
P.O. Box 6666
New Haven, Connecticut 06511

Francesco Iachello

Josiah W. Gibbs Professor
203 432-6944 FAX 203 432-5741

December 4, 1992

Professor D.A. Bromley
Science Advisor to the President
Executive Office of the President
Office of Science and Technology Policy
Old Executive Office Building, Rm. 360
17th and Pennsylvania Avenue, NW
Washington, D.C. 20506

Dear Allan:

Following our conversation of a week ago, I enclose herewith a brief description of the main scientific contributions together with a possible citation. The contributions in chemistry are not yet so mature as those in physics, in the sense that the impact on the field is only now beginning to be felt.

Last year members of the Committee for the Physics prize were:

- Ingvar Lindgren, Chairman
- Cecilia Jarlskog
- Erik Karlsson
- Bengt Nagel
- Carl Nordling
- Anders Barany, Secretary.

I do not recognize any of them as a nuclear physicist.

Peter-Olov Löwdin could help in Chemistry. I do not know whether or not he is a member of the Committee for Chemistry.

I received on Wednesday a telephone call from Alfredo Molinari who is at the present time scientific attache' at the Italian Consulate in Boston offering help through diplomatic channels. He may call you next week to ask your advise.

I am looking forward to your return to Yale.
With very best regards.

Sincerely

Franco Iachello

Brief description of main contributions:

Physics

For the discovery of the rich variety of symmetries of atomic nuclei and the development of a theory based on these symmetries.

1974 Development of the Interacting Boson Model.
Discovery of dynamic symmetries in nuclei.

The introduction of the interacting boson model (done in collaboration with Akito Arima) has profoundly modified nuclear physics. On one side, the model provides a simple and yet detailed description of nuclear properties. On the other side, it unifies the two seemingly different nuclear models previously used to describe atomic nuclei: the independent particle model (for which Maria Geoppert-Mayer and Hans Jensen received the Nobel prize in 1963) and the collective model (for which Aage Bohr, Ben Mottelson and James Rainwater received the Nobel prize in 1976). The algebraic structure of the model, $U(6)$, suggested the possible occurrence of three types of dynamic symmetries which were subsequently discovered. The use of algebraic methods gave rise to a rich amount of predictions later verified experimentally. The unification of the independent particle model and the collective model came from the recognition that the bosons could be interpreted as correlated pairs of nucleons, similar to Cooper pairs in the electron gas. This recognition, done in collaboration with Igal Talmi, opened the way for further detailed microscopic studies of nuclear properties.

References: A. Arima and F. Iachello, Ann. Phys. (N.Y.) 99, 253 (1976); Ann. Phys. (N.Y.) 111, 201 (1978); Ann. Phys. (N.Y.) 123, 468 (1979). These three articles are among the most quoted articles in physics. They have been quoted more than 2,000 times.

1980 Development of the Interacting Boson-Fermion Model.
Discovery of dynamic supersymmetries in nuclei.

The development of the interacting boson fermion model provided a way to describe the coupling of fermionic degrees of freedom to collective (bosonic) variables. The algebraic structure of this model suggested the possible occurrence of super or graded symmetries. Supersymmetries were subsequently discovered in several nuclear species. Nuclear supersymmetries are, up to now, the only experimentally verified example of this type of symmetries occurring in Nature.

References: F. Iachello, Phys. Rev. Lett. 44, 772 (1980); A.B. Balantekin, I. Bars and F. Iachello, Nucl. Phys. A370, 284 (1981).

Brief description of main scientific contributions:

Chemistry

For the discovery of a theory of molecular structure based on continuous groups of transformations and applications to the study of properties of complex molecules.

1981 Development of the Vibron Model.
Discovery of dynamic symmetries in molecules.

The introduction of algebraic methods (vibron model) is having a major impact in molecular physics. This model, subsequently developed with Raphael D. Levine, and based on the algebra of $U(4)$, provides a relatively simple and yet very detailed description of complex molecules. An important aspect of this model is the recognition that most molecules have a dynamic $SO(4)$ symmetry. The model has become an important tool for the analysis of molecular properties. In recent years, it has been used to study both static and dynamic properties of molecules, such as the mechanism of intramolecular vibrational energy redistribution and electron-molecule and molecule-molecule collisions.

References: F. Iachello, Chem. Phys. Lett. 78, 581 (1981); F. Iachello and R.D. Levine, J. Chem. Phys. 77, 3046 (1982); O. Van Roosmalen, A.E.L. Dieperink and F. Iachello, Chem. Phys. Lett. 85, 32 (1982); O.S. Van Roosmalen, F. Iachello, R.D. Levine and A.E.L. Dieperink, J. Chem. Phys. 79, 2515 (1983).

1986 Development of the Electron-Vibron Model.

The development of this model provided a way to describe the coupling of electronic degrees of freedom to the collective rotations and vibrations of molecules.

References: A. Frank, F. Iachello and R. Lemus, Chem. Phys. Lett. 131, 380 (1986); A. Frank, R. Lemus and F. Iachello, J. Chem. Phys. 91, 29 (1989).

"Document Control"

TYPE: ACTION DOCUMENT NUMBER: 9203370
ORIGINATOR: 02 STATUS I DIRECTORATE STATUS

FROM: DUSZA, Nancy: GREEN VALLEY ELEMENTARY SCHOOL

TO: DR. D.A. BROMLEY

DATE OF CORRESPONDENCE: 10/19/92

SUBJECT: SHE IS WRITING TO ASK FOR DR. BROMLEY'S ASSISTANCE IN GETTING HER STUDENTS INTO THE WHITE HOUSE FOR THE AWARDING OF TEACHING EXCELLENCE AWARD TO MRS. JOYCE BRUCHEY. LETTERS FROM THE STUDENTS ARE ENCLOSED.

DIRECTORATE STAFF
ASSIGNED: DIRECTOR'S OFFICE ASSIGNED:

ACTION STAFF
REQUIRED: AS APPROPRIATE ACTION:

See note attached. I called Green Valley elementary School

SENDER'S DUE DATE: OSTP DUE DATE: 11/16/92 STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT: 11-12-92

COPIES TO: D. Allan Bromley

WHITE HOUSE TRACKING #: CONTACT PERSON: EXT:
REMARKS: PHONE:



OSTP RECEIVED: 10/30/92 DEPT RECEIVED:
FILE: P-DAB-AWARDS
CENTRAL FILES:

Green Valley Elementary School

3370

11501 Fingerboard Road
Monrovia, Maryland 21770
301-865-5511

Principal
JEROME R. STRUM

RECEIVED
OCT 20 1992
OCT 19, 1992
MAIL ROOM

Dear Mr. Bromley,

It is with great pride and pleasure that I send to you the attached letters written to you by the fifth grade classes at Green Valley Elementary School. We are located near Frederick and are situated in the rolling hills of Holly Hills Country Club. The children often see the President at the Frederick Keys games or in the local newspapers. We also are privileged to have a Presidential Award winner for Teaching Excellence in Mathematics in our school. The children are aware that she, Mrs. Joyce Bruchey, will receive her award in the spring, but they will not be able to see her receive this recognition. They wish very much to see her shake the President's hand when we come to the White House on December 17, 1992. They have written letters to him requesting that he consider their request. I hope that you will be able in some way to facilitate this matter.

Thank you for the time and effort you took to read this. We know how busy you are, but are hoping that we will be one of the lucky ones!

Gratefully,

Nancy Dusza

5th Grade Team Leader

Green Valley Elem. School

*They are cute
and some write better
letters than I do
college grads!!*

DAB:

This is a cute letter to you enclosing many letters from 5th grade students. One of their teachers has been selected to receive the Excellence in Teaching Award (elementary). They realize that the ceremony and attendant activities will be held in the spring.

I learned by calling that there is planned a field trip to Washington on Dec. 17 where 70 students and teachers will wait on line to see the White House on a regular daily tour. Since this special teacher will be with the kids and the kids realize they cannot be part of the festivities in the spring, they would like the President to say hello on December 17.

If you have no objections, I will send this correspondence to Jane Leonard in Public Liaison and see if they wish to pursue a drop by or any acknowledgement by the President or Mrs. B.

Please advise.

*Please do
DAB*

**Damar
11/10/92**

"Document Control"

TYPE: INFORMATION DOCUMENT NUMBER: 9203415
ORIGINATOR: 02 STATUS C DIRECTORATE STATUS

FROM: JENKINS, GARRY: BELLCORE

TO: DR. D.A. BROMLEY

DATE OF
CORRESPONDENCE: 11/02/92

SUBJECT: A COPY OF GEORGE HEILMEIER'S REAMRKS ON RECEIVING
THE FOUNDERS AWARD OF THE NATIONAL ACADEMY OF
ENGINEERING, WITH GEORGE'S COMPLIMENTS.

DIRECTORATE STAFF
ASSIGNED: ASSIGNED:

ACTION STAFF
REQUIRED: ACTION:

SENDER'S DUE DATE:
OSTP DUE DATE: STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT:

COPIES TO: D. Allan Bromley

WHITE HOUSE TRACKING #: CONTACT PERSON:
REMARKS: PHONE: EXT:

OSTP RECEIVED: 11/19/92 DEPT RECEIVED:
FILE: P-AWARDS
CENTRAL FILES:

Document Originally
Attached to
Following Page

Bellcore

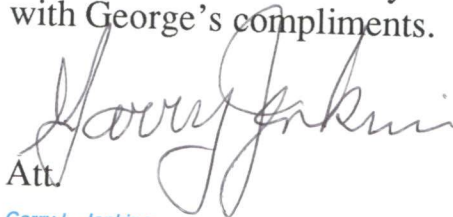
© Bell Communications Research

November 2, 1992

Allan Bromley
Asst. to the President - S&T
The White House
Old Exec. Office Bldg., Rm. 358
17th and Pennsylvania Ave., NW
Washington, DC 20500

Allan,

Attached is a copy of George Heilmeier's
remarks on receiving the Founders Award
of the National Academy of Engineering,
with George's compliments.


Att.

Garry L. Jenkins

LCC 2B-308
290 West Mt. Pleasant Avenue
Livingston, New Jersey 07039
201-740-6238



Some Reflections on Innovation and Invention

George H. Heilmeier
President and CEO, Bellcore

Remarks on Receiving the Founders Award
National Academy of Engineering
Washington, D.C., September 29, 1992

I am grateful to the National Academy of Engineering for honoring me with the Founders Award. I confess to being awed by this award. The past recipients are among my heroes, and one has strong feelings of inadequacy in such company.

I'd like to share with you some personal experiences in the saga of liquid crystal display technology, along with some lessons they taught me about invention and innovation.

Looking at innovation on the personal level, it seems to me that most successful innovators have something in common with a successful hockey player. Wayne Gretsky once said that he doesn't skate to where the puck is. He skates to where it's going to be. Innovation depends in part on anticipating where technology and its applications are going in the future and daring to trust that intuition. It's rooted in knowledge, skill, practice, experience, and the courage to act. It is often nurtured by the support and guidance of mentors whose intuition and motivation resonate with yours.

For my own experience in exploring liquid crystal display technology, this passage from the Biblical Book of Ecclesiastes is a fitting epigraph:

I returned and saw under the sun
that the race is not to the swift,
nor the battle to the strong,
neither yet bread to the wise,
nor yet riches to men of understanding,
nor yet favor to men of skill,
but time and chance happeneth to them all.

In that work, which I began some thirty years ago, I was certainly favorably blessed by time and chance. Time and chance have also played a role in the subsequent development efforts. I have seen many of my dreams become reality in the hands of the world-class Japanese engineers who are driving liquid crystal display technology today.

In many respects, the story of liquid crystal display technology has all the ingredients of a good novel: excitement, frustration, success, failure, and personal tragedy. I will not bore you with the whole story but rather will concentrate on how the experience has shaped my thoughts on innovation, invention, technology transfer, and industrial policy. You see, time and chance are not the only players in this drama.

Every story has a beginning, and this one began at Princeton University in 1961, with my search for a doctoral dissertation topic. I had worked for two years in the then emerging field of solid-state microwave devices, and it seemed logical that I would do my dissertation in that area. But the field was getting more crowded and competition there for new ideas was getting tougher, and I was looking for something more exciting. I had been keeping track of some interesting work on organic semiconductors through a friend, and I discussed this with Dr. Leon Nergaard, Director of the Microwave Laboratory at RCA Laboratories.

His advice changed my career. He said, "Look, George, you may never have another opportunity to try something completely new like this again. . . . Do something different." Professor George Warfield agreed that organic semiconductivity would offer the greatest learning experience for me. And so it was that I left behind the relatively safe world — safe, that is, for an electrical engineer — of inorganic materials.

A few eventful years later, I found myself in the office of Dr. Vladimir Zworykin — whom many consider the father of television and who, incidentally, would receive the NAE Founders Award in 1968 — explaining how I had stumbled upon the first of several new phenomena: what is known as the guest-host color switching effect in liquid crystals.

Note that around the time we first demonstrated this effect, I had discussed it in a general, hypothetical way with a visiting Nobel Laureate, Peter Debye. I was very guarded because of the potential commercial implications. He told me, in essence, that it couldn't be done. It would never work. I didn't tell him that I had already done it.

Now Dr. Zworykin had summoned me to his office to find out why everyone at RCA Laboratories was so excited about my results. To my comment that I had *stumbled* upon this breakthrough, he replied: "Stumbled, perhaps . . . but to stumble one must be moving." I will never forget those words. And that was the beginning of an exciting period, from 1964 to mid-1968, during which our liquid crystal research *kept* moving, and moving fast.

The step that generated the initial excitement had been to dope a nematic liquid crystal with a "guest," pleochroic dye, sandwich the mixture between two glass slides coated with transparent tin-oxide electrodes, place this cell on a hot stage — since at that time there was no material known to have a nematic liquid phase at room temperature — and apply a dc voltage. We watched the cell change from red to colorless as the applied field aligned the dye molecules.

After this discovery of the guest-host effect, we tackled a number of problems on all fronts at once, and we eventually solved most of them. Along the way, we discovered how to electronically control the reflection of light in certain classes of nematic liquid crystals — an effect we called dynamic scattering. We also discovered an electro-optic storage effect when we mixed two different classes of liquid crystals. The transparent material turned milky white in the presence of a dc field, remained in this state after the removal of the field, and became transparent again in the presence of an ac field. Once the first room-temperature nematic materials were prepared, we were able to fabricate a number of crude prototype devices based on dynamic scattering: alphanumeric displays, windows with electronically controlled transparency, static pictorial displays, an all-digital clock with liquid crystal readout, and an e-beam-addressed liquid crystal TV (IC capability did not permit matrix addressing at that time).

A press conference in June 1968 presented our prototype devices to the world and attracted worldwide attention to the potential of liquid crystal displays. This was the end of the beginning.

But liquid crystal displays were not to be a commercial success for RCA, for a number of reasons. They were not “silicon.” They were “dirty” by semiconductor standards. They were liquids. They were too easily duplicated. They were said to be “too difficult to make.” These were among the reasons the product divisions gave for the failure of their commercialization efforts. Liquid crystals were viewed as a threat rather than an opportunity by the product divisions.

Looking back on what is to be learned from the liquid crystal saga, I can think of several lessons:

- Never be afraid to explore something entirely new. Treat intuition as real.
- Don't be deterred by judgments based on incomplete information that "it can't be done."
- Do the difficult experiments first. Don't substitute research for insight.
- Review older concepts periodically in light of progress made in other areas that might change earlier views.
- Approach problems from an interdisciplinary point of view. Remove the barriers to exploiting the viewpoints of other disciplines, and do not be afraid to be called naive when venturing outside your own professional discipline.
- Have a clear view of what you are trying to do, but be prepared to modify this view in light of new information.
- Clearly understand the limits of current approaches.
- Understand what is new in your approach and why you think it might succeed.
- Understand the implications of success. Build prototypes so that others can begin to share your vision.

In retrospect, I can't help wondering what would have happened if our team, suitably augmented, had been given the responsibility for developing the business opportunity as well as the technology. We were the innovators, the ones who saw opportunities, not problems — the ones who had no vested interest in the status quo.

History seems to indicate that breakthroughs are usually the result of a small group of capable people fending off a larger group of equally capable people with a stake in the status quo. If one subscribes to this theory, it is not surprising that the Polaroid process was not pioneered by

the largest photographic company in the world, that most U.S. vacuum tube companies did not succeed in the transistor business, that office copiers were not pioneered by the giants in the office equipment business, and that jet engines were not pioneered by the piston engine makers.

Would a "national industrial policy" have changed this situation? Industrial policy is a popular topic these days. Politicians talk about it and are lobbied about it. I find it difficult to get a precise definition of what constitutes an industrial policy. For some it seems to include whatever we don't have now. Does industrial policy mean that the government should be the venture capitalist of last resort and pick the emerging businesses of the future?

Where in the world has this aspect of industrial policy really worked? In France? In Japan? Wasn't it MITI that advocated mainframe computers instead of PCs and workstations, and steel instead of automobiles? Japanese corporate executives moved into microelectronics and automobiles on their own, with MITI support coming after the fact. Contrary to popular belief, I don't believe that the part of Japan's industrial policy that tries to pick the industries of the future is responsible for Japan's success. Strictly followed, this aspect of Japan's industrial policy would have led Japanese industry down the wrong path, because bureaucratic consensus — anywhere in the world — usually occurs only when looking through a rear-view mirror.

In my view, while there may be merit in the concept of a national industrial policy, it would not have changed what happened in liquid crystal displays. Would government bureaucrats have responded any differently than RCA bureaucrats? I doubt it, but it may have taken them longer to decide. This raises questions in my mind about the general applicability to the innovation process of an industrial policy that plays the role of a market surrogate.

I have to wonder what would have happened to liquid crystal display technology under different circumstances. Suppose it had been fostered by a “domestic DARPA” — another popular “solution” to the competitiveness problem. Again, I believe it would have led to a similar result. The DARPA I know and love has performed best when it applied advanced technology to the real problems of a receptive, deep-pocketed customer willing to fully fund the process from conception to deployment. I don’t see a “domestic DARPA” in this light at all, because the key ingredients are missing. A “domestic DARPA” would find itself with too many “and” gates in the decision process.

As technologists and engineers, perhaps our energy could be better directed to something each of us could do something about — promulgating an effective technology transfer policy throughout U.S. industry. In my view, one of the reasons technology transfer is problematic in the U.S. is that “innovation” is misunderstood among members of our technical community. Innovation is an idea or invention that becomes a business success. Liquid crystal displays were an invention and a technological achievement in the '60s. They became an innovation in the '70s, and that continues today. Innovation, by definition, must include business success. Unfortunately, it has come to mean “invent something” or “change something.” In the process, all too often the context of a business success has been lost.

The lessons I learned from the liquid crystal display saga are the basis of a policy that I would like to advocate. I call it the “No Excuse” Technology Transfer Policy. Implicit in the “No Excuse” Technology Transfer Policy is an understanding that successful productization of new technology is very difficult — a contact sport among consenting adults. At the corporate or organizational level, such a policy could short-circuit the self-fulfilling prophecies of those protecting the status quo. It could also break the classic stalemate between responsibility and authority by empowering those most likely to achieve a business success.

The "No Excuse" Policy represents a no-nonsense commitment to technology transfer. There are seven basic tenets:

- Formulate a "catechism" which addresses:
 - What are you trying to do?
 - How is it done today? What are the limitations of the current practice?
 - What is new in your approach and why do you think it can succeed?
 - Assuming you are successful, what difference does it make?
 - How long will it take? How much will it cost? What are the mid-term and final exams?
- Recognize "productization" as a necessary, crucial activity. Allocate capital and personnel to productization early. Technology, however good, is not enough.
- Identify receivers of the technology and ownership of the transfer early. Provide incentives on both sides.
- To the maximum extent possible, use common equipment in the development laboratory and in early manufacturing.
- Begin the transfer process immediately after demonstrating feasibility in the laboratory. Stay close to marketing.
- Manufacturing must prove the methods developed in the laboratory before initiating efforts to improve them.
- Keep the laboratory involved in the productization and manufacturing phases through completion of product qualification and achievement of cost/performance goals.

I've outlined seven tenets of the "No Excuse" Technology Transfer Policy, but there is more: Don't think that you can make it work by doing four of the seven or five of the seven. You must do all seven. This is why failures in technology transfer occur. The road to failure is jammed with people who think they can get away with not doing the tough stuff.

I would like to see a *de facto* "No Excuse" Technology Transfer Policy propagate throughout U.S. industry. In many respects, I believe, it might

have a greater effect than that which proponents of a national industrial policy hope to achieve.

I wonder what the next step will be. Can U.S. industry learn to “skate to where the puck is going to be”? I think we’d better try. One thing is certain: We’ll never find out unless we, as leaders in the profession, try something different — perhaps something completely new, like a “No Excuse” Technology Transfer Policy. As Wayne Gretsky says, “Statistically, 100 percent of the shots you don’t take . . . don’t go in.”

"Document Control"

TYPE: ACTION DOCUMENT NUMBER: 9203355
ORIGINATOR: 02 STATUS I DIRECTORATE STATUS

FROM: BINGAMAN, Jeff: UNITED STATES SENATE

TO: DR. D.A. BROMLEY

DATE OF
CORRESPONDENCE: 10/30/92

SUBJECT: HE IS FORWARDING HIS LETTER OF RECOMMENDATION FOR
THOMAS MURRIN TO RECEIVE THE NATIONAL MEDAL OF
TECHNOLOGY.

DIRECTORATE STAFF
ASSIGNED: DIRECTOR'S OFFICE ASSIGNED:

ACTION STAFF
REQUIRED: AS NECESSARY ACTION:

*forwarded to
Dept of Commerce
11/9/92*

SENDER'S DUE DATE:
OSTP DUE DATE: 11/10/92 STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT: *dlh*

COPIES TO: D. Allan Bromley

WHITE HOUSE TRACKING #: CONTACT PERSON:
PHONE: EXT:
REMARKS: ORIGINALS SENT TO FRONT OFFICE FOR FORWARDING.

OSTP RECEIVED: 11/07/92 DEPT RECEIVED:
FILE: P-DAB-AWARDS
CENTRAL FILES:

Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
02. Letter	To: Chairman of nomination committee From: Jeff Bingaman Re: Letter of Recommendation for Thomas Murrin to receive the National Medal of Technology [personal information redacted] (2 pp.)	10/30/92	(b)(6)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Personal Files
WHORM Cat.:
File Location: D. Allan Bromley: Awards [1 of 2] [1992]

Date Closed:	1/11/2010	OA/ID Number:	62030-001
FOIA/SYS Case #:	2005-0336-F	Appeal Case #:	
Re-review Case #:		Appeal Disposition:	
P-2/P-5 Review Case #:		Disposition Date:	
AR Case #:		MR Case #:	
AR Disposition:		MR Disposition:	
AR Disposition Date:		MR Disposition Date:	

RESTRICTION CODES

Presidential Records Act - [44 U.S.C. 2204(a)]

- P-1 National Security Classified Information [(a)(1) of the PRA]
- P-2 Relating to the appointment to Federal office [(a)(2) of the PRA]
- P-3 Release would violate a Federal statute [(a)(3) of the PRA]
- P-4 Release would disclose trade secrets or confidential commercial or financial information [(a)(4) of the PRA]
- P-5 Release would disclose confidential advice between the President and his advisors, or between such advisors [(a)(5) of the PRA]
- P-6 Release would constitute a clearly unwarranted invasion of personal privacy [(a)(6) of the PRA]

C. Closed in accordance with restrictions contained in donor's deed of gift.

PRM. Removed as a personal record misfile.

Freedom of Information Act - [5 U.S.C. 552(b)]

- (b)(1) National security classified information [(b)(1) of the FOIA]
- (b)(2) Release would disclose internal personnel rules and practices of an agency [(b)(2) of the FOIA]
- (b)(3) Release would violate a Federal statute [(b)(3) of the FOIA]
- (b)(4) Release would disclose trade secrets or confidential or financial information [(b)(4) of the FOIA]
- (b)(6) Release would constitute a clearly unwarranted invasion of personal privacy [(b)(6) of the FOIA]
- (b)(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA]
- (b)(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
- (b)(9) Release would disclose geological or geophysical information

"Document Control"

TYPE: ACTION DOCUMENT NUMBER: 9203284
ORIGINATOR: 02 STATUS I DIRECTORATE STATUS

FROM: MILLER, Edward: NATIONAL CENTER FOR MANUFACTURING SCIENCES

TO: DR. D.A. BROMLEY

DATE OF CORRESPONDENCE: 10/29/92

SUBJECT: HE IS FORWARDING A COPY OF HIS LETTER OF SUPPORT FOR THOMAS MURRIN'S NOMINATION FOR THE NATIONAL MEDAL OF TECHNOLOGY.

DIRECTORATE ASSIGNED: DIRECTOR'S OFFICE STAFF ASSIGNED:

forwarded to Dept of Commerce 11/9/92

ACTION REQUIRED: AS NECESSARY STAFF ACTION:

SENDER'S DUE DATE: OSTP DUE DATE: 11/10/92 STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT:

du

COPIES TO: Damar Hawkins



WHITE HOUSE TRACKING #: CONTACT PERSON: PHONE: EXT:
REMARKS: ORIGINALS SENT TO DIRECTOR'S OFFICE FOR FORWARDING.

OSTP RECEIVED: 10/30/92 DEPT RECEIVED:
FILE: P-DAB-AWARDS
CENTRAL FILES:

Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
03. Letter	To: Chairman of nomination committee From: Edward Miller Re: Letter of Recommendation for Thomas Murrin to receive the National Medal of Technology [personal information redacted] (2 pp.)	10/29/92	(b)(6)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Personal Files
WHORM Cat.:
File Location: D. Allan Bromley: Awards [1 of 2] [1992]

Date Closed: 1/11/2010	OA/ID Number: 62030-001
FOIA/SYS Case #: 2005-0336-F	Appeal Case #:
Re-review Case #:	Appeal Disposition:
P-2/P-5 Review Case #:	Disposition Date:
AR Case #:	MR Case #:
AR Disposition:	MR Disposition:
AR Disposition Date:	MR Disposition Date:

RESTRICTION CODES

Presidential Records Act - [44 U.S.C. 2204(a)]

- P-1 National Security Classified Information [(a)(1) of the PRA]
- P-2 Relating to the appointment to Federal office [(a)(2) of the PRA]
- P-3 Release would violate a Federal statute [(a)(3) of the PRA]
- P-4 Release would disclose trade secrets or confidential commercial or financial information [(a)(4) of the PRA]
- P-5 Release would disclose confidential advice between the President and his advisors, or between such advisors [(a)(5) of the PRA]
- P-6 Release would constitute a clearly unwarranted invasion of personal privacy [(a)(6) of the PRA]

C. Closed in accordance with restrictions contained in donor's deed of gift.

PRM. Removed as a personal record misfile.

Freedom of Information Act - [5 U.S.C. 552(b)]

- (b)(1) National security classified information [(b)(1) of the FOIA]
- (b)(2) Release would disclose internal personnel rules and practices of an agency [(b)(2) of the FOIA]
- (b)(3) Release would violate a Federal statute [(b)(3) of the FOIA]
- (b)(4) Release would disclose trade secrets or confidential or financial information [(b)(4) of the FOIA]
- (b)(6) Release would constitute a clearly unwarranted invasion of personal privacy [(b)(6) of the FOIA]
- (b)(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA]
- (b)(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
- (b)(9) Release would disclose geological or geophysical information

"Document Control"

TYPE: INFORMATION DOCUMENT NUMBER: 9203430
ORIGINATOR: 02 STATUS C DIRECTORATE STATUS

FROM: GONIAK, OLIVIER J.:LVMH

TO: DR. D.A. BROMLEY

DATE OF
CORRESPONDENCE: 10/26/92

SUBJECT: RE: THE SCIENCE FOR ART PRIZE.

DIRECTORATE STAFF
ASSIGNED: ASSIGNED:

ACTION STAFF
REQUIRED: ACTION:

SENDER'S DUE DATE:
OSTP DUE DATE: STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT:

COPIES TO: D. Allan Bromley
Tom Ratchford

WHITE HOUSE TRACKING #: CONTACT PERSON:
REMARKS: PHONE: EXT:

OSTP RECEIVED: 11/02/92 DEPT RECEIVED:
FILE: P-DAB-AWARD
CENTRAL FILES:

LVMH

MOËT HENNESSY, LOUIS VUITTON

October 26, 1992

The Honorable D. Allan Bromley
Assistant to the President
for Science and Technology
Office of Science and Technology Policy
Old Executive Office Building
17th Street & Pennsylvania Avenue, N.W.
Washington, DC 20500

Dear Dr. Bromley,

The United States of America have consistently provided the Science for Art Prize with numerous candidates of international standing. We would like to commemorate this achievement by presenting a special trophy to the U.S. scientific community through one of its official representative. Ambassador Evan G. Galbraith and Mr. Jean-Pierre Mègnin are honored to present you with this trophy.

Dr. J. Thomas Ratchford, as you know, attended the Science for Art Award Presentation on October 14 in New York City where he accepted on your behalf the trophy from the hands of the winners of the 1992 Science for Art Prize, two American neurobiologists, Dr. Richard Axel (Columbia University) and Dr. Linda Buck (Harvard Medical School). The trophy is a steel dodecahedron, a figure made of pentagons and triangles originally drawn by Leonardo Da Vinci and commissioned to a Parisian artist. We are shipping this work of art separately.

Several other American finalists of the Science for Art Prize received a plaque rewarding the high scientific quality of their contribution, during the Presentation:
Dr. Susan Schiffman (Duke University), Dr. Dorothea Jameson (University of Pennsylvania), Dr. Jiri Janata (Battelle Laboratories) and Dr. Frank Margolis (Roche Institute of Molecular Biology).

.../...

Please find for your information documents summarizing the concept and the results of the Science for Art Prize. We were sorry that you could not attend the event, but we certainly hope to remain in contact with you and that you will be able to join us next year.

Looking forward to hearing from you, I remain,

Yours respectfully,

A handwritten signature in black ink, appearing to read 'O. Goniak', written in a cursive style.

Olivier J. Goniak
Scientific Attaché

Enclosure

THE WHITE HOUSE
WASHINGTON

November 24, 1992

Dear Mr. Goniak:

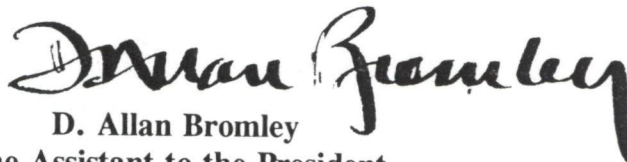
I am deeply indebted to you and your colleagues for the trophy that you were good enough to present to my Associate Director, Dr. J. Thomas Ratchford, on October 14. I very much regret that I was not able to accept this in person but as we indicated at the time the President had other plans for me on that evening.

The trophy is a striking piece of modern art and one that will have a place of honor here in OSTP.

I am delighted with your selection of the American winners of the Science for Art Prize for 1992 and, indeed, would congratulate you on the excellence of your choice throughout the prior years as well.

Let me then once again thank you for the trophy and wish you every success in the years ahead.

Sincerely yours,



D. Allan Bromley
The Assistant to the President
for
Science and Technology

Mr. Olivier J. Goniak
Scientific Attache
LVMH Moet Hennessy Louis Vuitton, Inc.
2 Park Avenue - Suite 1830
New York, NY 10016

1992 SCIENCE FOR ART PRIZE

**AWARD PRESENTATION OF
THE VINCI OF EXCELLENCE**

**October 14, 1992
The Stanhope, New York**

For more information, please contact:

**Mr. Olivier J. GONIAK
LVMH MOET HENNESSY LOUIS VUITTON INC.
Two Park Avenue, Suite 1830
New York, NY 10016
Tel. (212) 340-7489
Fax. (212) 340-7620**

THE SCIENCE FOR ART PRIZE

Created in 1988, the Science for Art Prize rewards annually scientific researchers from all over the world for the impact of their discoveries on artistic or aesthetic creation.

It is dedicated to promoting remarkable scientific insights likely to accelerate creativity in the fields where an alliance between art, science and industry proves possible; as it were, to widen the field of action for aesthetic creation in the field of science.

Each year, the Science for Art Prize centers around a different theme; all themes are broad enough to allow scientists from different fields to participate: physics, chemistry, neuroscience, engineering, mathematics, computer science, ... Artists using technical concepts, tools or materials are also encouraged to participate.

Two main Prizes are awarded, each one worth FF100,000: a Scientific Prize, rewarding a work which opens up promising potential for basic or applied research; and an Innovation Prize which takes greater account of industrial and commercial applications. The Prize recipients also receive a commissioned work of art presented by its creator.

Decisions are reached by a majority vote of the Jury, comprising international scientists and personalities from the art community, and composed of three groups meeting in New York, Tokyo and Paris.

The Science for Art Prize is part of the research philosophy of a Group focusing on aesthetics and open to collaboration with the international scientific community.

LVMH Moët Hennessy Louis Vuitton is the world leader in luxury products. Its prestige brands include Dom Pérignon, Moët & Chandon, Veuve Clicquot and Pommery champagnes; Hennessy and Hine cognacs; Louis Vuitton luggage and leather goods; Givenchy Couture; and Christian Dior, Givenchy, Christian Lacroix and Roc perfumes and cosmetics.

SCIENCE FOR ART PRIZE

LIST OF THE PRIZE LAUREATES

SCIENTIFIC PRIZE

INNOVATION PRIZE

1992

Richard AXEL & Linda BUCK
(Columbia University, USA
& Harvard Medical School, USA)

Nicolas FRANCESCHINI
(CNRS, France)

1991

Semir ZEKI
(University College, UK)

Jozsef SZEJTLI
(Cyclolab Co., Hungary)

1990

Hans KUHN
(Max-Planck Institute, Germany)

Werner OSTERTAG
(BASF Co., Germany)

1989

Pierre-Gilles DE GENNES
(Collège de France, France)

Jerzy DOBROWOLSKI
(National Research Council, Canada)
& **Sueo KAWABATA**
(Kyoto University, Japan)

1988

Benoit MANDELBROT
(Yale University & IBM, USA)

Karl KNOP
(P. Scherrer Institute, Switzerland)

SCIENCE FOR ART PRIZE

LIST OF THE LAUREATES AND THE FINALISTS
FROM THE UNITED STATES OF AMERICA

1992

<u>Linda BUCK</u>	Harvard Medical School
<u>& Richard AXEL</u>	Columbia University
Edward BOYSE	University of Arizona
Dorothea JAMESON	University of Pennsylvania
Jiri JANATA	Battelle Pacific Northwest Laboratories
Frank MARGOLIS	Roche Institute of Molecular Biology
Braja MOOKHERJEE	International Flavors & Fragrances, Inc.
Lubert STRYER	Stanford University

1991

John DESIMONE)
& Gerard HECK) Virginia Commonwealth University
Walter FREEMAN	University of California Berkeley
Bert Menco	Northwestern University
Susan SCHIFFMAN	Duke University
Norman SINGER	The Nutrasweet Co.

1990

Joseph DEMUTH	IBM T.J.Watson Research Center
Frederick M. FOWKES	Lehigh University (†)
Patrick GUIRE	Bio-Metric Systems, Inc.
Arthur HUBBARD	University of Cincinnati
Frank MARCO)
& William PASCOE) Milliken Research Corp.

1989

Jack FEINBERG	University of Southern California
Jacob ISRAELACHVILI	University of California Santa Barbara
Egon MATIJEVIC	Clarkson University
Julio OTTINO	Northwestern University

1988

<u>Benoit MANDELBROT</u>	Yale University & IBM Watson Research Center
Joe MASKAKY	Eastman Kodak Co.

Announcing the
1993 SCIENCE FOR ART PRIZE

"THE MOVEMENTS OF MATTER"

"Related to its particular nature"

This Prize, dedicated to rewarding scientists internationally for the direct or indirect impact of their research on artistic or aesthetic creation, will cover all dynamic aspects of matter leading to sensory effects.

The research can be applicable to industries or crafts such as flavors and fragrances, optics, photography, printing, cosmetics, imaging, audiovisual, music, painting, fashion, conservation and restoration of works of art,...

The scientific fields concerned are biology, physics, chemistry and physicochemistry to explain the structure and properties of matter producing the effect, neuroscience and psychology to explain the sensory perceptions (taste, olfaction, vision, touch or hearing), simulation technique and other theoretical system designed to help creativity, and technical processes - whether analytical or manufacturing - related to the phenomena within the scope of the Prize.

Two prizes will be awarded, each worth FF 100,000 (or about US\$ 20,000, at the actual exchange rate):

- The **SCIENTIFIC PRIZE** will be awarded to the most promising scientific study for further work in basic or applied research.
- The **INNOVATION PRIZE** will be awarded to the most promising innovative work with a technological or commercial value.

The Prize recipients will be invited by LVMH Moët Hennessy Louis Vuitton to the Award Ceremony in Paris, France, to receive their prize and a commissioned work of art.

Other submissions considered of high international quality by the Scientific Jury will be rewarded by the VINCI OF EXCELLENCE, a hand-assembled metal dodecahedron based on an original drawing by Leonardo da Vinci.

For the complete rules of the Prize, please contact:

Olivier J. Goniak
LVMH Moët Hennessy Louis Vuitton Inc.
Two Park Avenue, Suite 1830
New York, NY 10016
Tel. (212) 340-7489
Fax. (212) 340-7620

1992 SCIENCE FOR ART PRIZE

"FLAVORS, FRAGRANCES AND COLORS"

"Effects and perceptions"

This Prize was dedicated to several of our senses: taste, olfaction and vision. The improvement of the physical or chemical properties of matter to create a sensory effect and the understanding of the mechanisms of the sensory perceptions were covered by the theme of the Prize.

Scientific Prize:

The Scientific Prize was awarded to **Linda BUCK** (Harvard Medical School, Boston, MA, USA) and to **Richard AXEL** (Columbia University, New York, NY, USA). These neuroscientists, when at Columbia University, discovered a large family of genes coding for proteins expressed in the olfactory epithelium and showed the complexity and specificity of olfaction system. This breakthrough at last reveals the secret of the sense of smell.

Innovation Prize:

The Innovation Prize was awarded to **Nicolas FRANCESCHINI** (CNRS Marseille, France), a specialist of the visual perception system, for developing a robot whose sophisticated visual system mimicks the one of the fly. This neurocybernetic work was based on detailed physiological analyses of vision such as color perception and the detection of motion.

Several artists contributed to this exchange between the world of art and the world of science:

Shunsho MACHI, a Japanese master of Haiku, the ancient art of short hand-written poems associated to drawings, along with the French creator of the drawings **Philippe CARPENTIER**,
Bernard QUENTIN, the French painter and sculptor influenced by scientific concepts such as the Big Bang,
Edmond ROUDNITSKA, probably the greatest fragrance creator of the century, and
Jean CORTOT, a famous French illustrator inspired by botany.

Attached is the biography of the Prize laureates, along with abstracts of their work and the list of the Jury members of the 1992 Science for Art Prize.

1992 SCIENCE FOR ART PRIZE

SCIENTIFIC PRIZE

Linda BUCK

Linda BUCK was born in Seattle, Washington, in 1947. After studying psychology and microbiology, she obtained a Ph.D. in immunology at the University of Texas Health Center in Dallas in 1980. She then joined Columbia University College of Physicians and Surgeons in New York in the laboratory of Dr. Richard AXEL. She is Assistant Professor in the Department of Neurobiology, Harvard Medical School, in Boston, since 1991.

She received the McKnight Scholar Award, the Alfred P. Sloan Research Fellowship Award, the Kenji Nakanishi Award for Research in Olfaction and the LVMH Science for Art Prize in 1992.

Richard AXEL

Born in New York in 1946, Richard AXEL studied at Columbia University before receiving his M.D. at the Johns Hopkins School of Medicine in Baltimore in 1970. After holding several positions at Columbia University and the National Institutes of Health, he is now Investigator at the Howard Hughes Medical Institute, Columbia University and Higgins Professor of Biochemistry and Pathology at Columbia University. He is also Associate Editor of CELL and NEURON and on the board of several institutions.

He received numerous honors, including the John Jay Award from Columbia University, the Richard Lounsbery Award from the National Academy of Sciences, the New York Academy of Sciences Award in Biological and Medical Sciences and the LVMH Science for Art Prize. He was elected in 1983 to the National Academy of Sciences and to the American Academy of Arts and Sciences.

INNOVATION PRIZE

Nicolas FRANCESCHINI

Nicolas FRANCESCHINI was born in 1942 in Mâcon, France. He studied physics and electronics at the Institut Polytechnique de Grenoble. Since 1964, he has specialized in automatics then in biology. After 14 years spent mainly in Germany, he returned to France in 1979 to establish within the C.N.R.S. in Marseilles a laboratory of neurocybernetics.

THE MOLECULAR BASIS OF OLFACTORY PERCEPTION

Linda BUCK & Richard AXEL

In vertebrate sensory systems, peripheral neurons respond to environmental stimuli and transmit these signals to higher sensory centers in the brain where they are processed to allow the discrimination of complex sensory information. Mammals possess an olfactory sensory system of enormous discriminatory power. Humans, for example, are capable of distinguishing among thousands of distinct odors. The specificity of odor recognition is emphasized by the observation that even subtle alterations in molecular structure of an odorous substance can lead to profound changes in perceived odor quality. How is the diversity and specificity of olfactory perception accomplished? The detection of chemically-distinct odors presumably results from the association of odorants with specific receptors on olfactory neurons which reside in specialized epithelium in the nose. The brain must distinguish which receptors or which neurons have been activated to allow the discrimination between different odorant stimuli. These observations pose two interesting questions: what mechanisms have vertebrates evolved to allow the recognition of this huge array of odorant molecules, and how does the brain know with the nose is smelling? Insight into these problems is likely to depend upon the isolation and characterization of the odorant receptors expressed in the nose. To address the problem of olfactory perception at the molecular level, Linda Buck and Richard Axel have cloned and characterized several members of an extremely large and novel gene family likely to encode a diverse array of odorant receptors.

Cloning the Genes Encoding Odorant Receptors.

The experimental design that Buck and Axel employed to isolate the genes encoding odorant receptors was based upon three assumptions: first, the odorant receptors are likely to belong to the superfamily of structurally-related receptor proteins that transduce intracellular signals by coupling to GTP-binding proteins (G-proteins). Second, the large number of structurally-distinct odorous molecules suggest that odorant receptors themselves should exhibit significant diversity and are therefore likely to be encoded by a multigene family. Third, expression of the odorant receptor should be restricted to the olfactory epithelium. To identify molecules in the olfactory epithelium that resemble members of the G-protein-coupled seven transmembrane domain superfamily, homologs of this gene superfamily were amplified from olfactory epithelium RNA using the polymerase chain reaction (PCR). Buck and Axel then used restriction enzyme digestion to ask whether any of the PCR products obtained consisted of a mixture of DNA sequences consistent with the amplification of members of a multigene family. In this manner, they identified a multigene family that encodes a large family of proteins belonging to the seven transmembrane domain receptor superfamily and whose expression is restricted to the olfactory epithelium.

.../...

Receptor Structure and the Specificity of Odor Recognition

The nucleotide and deduced protein sequence of several different cDNAs defines a novel multigene family whose expression is restricted to the olfactory epithelium. The olfactory proteins they have identified are clearly members of the superfamily of receptors that traverse the membrane seventimes. This family of olfactory proteins can be further divided into several different subfamilies that exhibit significant sequence divergence within the transmembrane domains. Experiments with other members of the seven transmembrane domain receptor superfamily suggest that ligand binds to its receptor within the plane of the membrane such that the ligand contacts many, if not all, transmembrane helices. These observations suggest a model in which each of the individual olfactory receptor subfamilies encodes receptors that bind to odorants of widely different molecular structures. Within a given subfamily, however, the sequence differences are far less dramatic and are often restricted to a small number of residues. The members of the subfamily may therefore recognize more subtle variations among odor molecules of a given structural class. Thus, this gene family exhibits features which are well suited for the detection of a diverse array of structurally distinct odors.

How Large is the Multigene Family?

How many structurally distinct odors can an organism detect, and how large is the receptor gene family? The size of the receptor repertoire is likely to reflect the range of detectable odors and the degree of structural specificity exhibited by the individual receptors. It has been estimated that humans can identify over ten thousand structurally distinct odorous ligands. This does not necessarily imply, however, that humans possess an equally large repertoire of odorant receptors since it is possible that individual receptors are capable of associating with several structurally related ligands. Buck and Axel have provided a minimum estimate of the size of repertoire of the putative odorant receptors of the rat. Screens of genomic libraries with mixed probes consisting of divergent family members detect approximately two hundred positive clones per genome. The present estimate reflects a lower limit since it is likely that the probes used do not detect all possible subfamilies. Moreover, they have recently demonstrated that many of these genes are linked such that a given genomic clone may contain multiple genes. It therefore is likely that the actual size of the gene family is considerably higher and this family of putative odorant receptors could constitute one of the largest gene families in the genome. These observations provide a possible solution to the problem of how vertebrates can recognize a vast array of odorants. The characterization of a large multigene family encoding putative odorant receptors suggests that the olfactory system utilizes a far greater number of receptors than the visual system. Color vision, for example, allows the discrimination of several hundred hues, but is accomplished by only three different photoreceptors. Rather, olfactory perception probably employs an extremely large number of receptors each capable of recognizing a small number of odorous ligands.

Receptor Diversity and the Central Processing of Olfactory Information.

How then does the brain distinguish which receptors or which neurons have been activated to allow the discrimination between different odorant stimuli? In other sensory systems, such as vision and touch, neurons in the brain are organized in a topographic map which identifies the position of a sensory stimulus. Thus, the position of a given neuron in the brain is used to define the location of a sensory stimulus within the external environment. Olfactory processing does not extract spatial features of the odorant stimulus. Relieved of the necessity to encode information about the spatial localization of a sensory stimulus, the olfactory system may use spatial segregation of sensory input solely to encode the identity of the stimulus itself. Recent data utilizing the receptor genes as molecular probes, taken together with prior electrophysiologic data, suggests a model of olfactory processing in which sensory neurons expressing distinct odorant receptors all project to a restricted region within the olfactory bulb, the first relay station in the brain. In this instance, the discrimination of odors would be a consequence of the position of second order neurons in the olfactory bulb, such that spatially-localized groups of neurons would preferentially respond to different odorants. Thus, the molecular identification of the genes encoding a large family of olfactory receptors has provided initial insight into the logic of olfactory processing in the mammalian brain.

The logic of olfactory perception emerging from these studies is consistent with the central role of olfactory sensory processing in behavior. These studies suggest that olfaction may differ from other sensory systems, and that multiple genes are required in the periphery to detect multiple, sensory modalities associated with olfaction. As such, the peripheral sensory cells are "information-rich;" a great deal of the information processing may be performed in the periphery such that olfactory sensory perception may require less integration in higher order centers in the brain. Finally, the isolation of this novel multigene family may ultimately help permit an understanding of the way in which olfactory cues govern behaviors in lower animals, and the possible role of olfactory sensory perception in human behavior.

SMART SENSORS : NATURAL AND SYNTHETIC

(From animal vision to robot vision and back again)

Nicolas FRANCESCHINI

The panoramic visual system of the fly comprises an array of 6000 lenslets that collect visual information for the underlying nervous system. This system itself constitutes a sophisticated image processor which is built out of one million neurons driven by the electrical signals from 48000 ultrasensitive photoreceptor cells. Twenty years ago we developed special microscopical techniques and succeeded in making these cells individually accessible in the live and intact animal. This was for us the start of a long series of interdisciplinary studies which now make the compound eye of the fly a unique model for analyzing information processing in a sensory system at the single cell level.

The housefly is an agile aircraft carrying the million neurons of its visual system swiftly through most unpredictable environments. This self-contained creature whose sensors and actuators are linked by non-trivial interfaces epitomizes general problems in sensory-motor control, with a potential of uniting some studies common to natural and artificial intelligence.

Initially our research was purely fundamental in scope, the main goal being to study interactions in the neural network of the insect compound eye in order to understand how visual input is processed step-by-step to generate animal behavior. However, the detailed knowledge we recently acquired about signal processing in the highly miniaturized compound eye of the fly (using microelectrode recording from single neurons associated with microscopical stimulation of the photoreceptor mosaic) led us to the design and construction of an artificial visual system which can steer an autonomous vehicle in complex and cluttered environments. This technological spin-off was itself followed by a rich feedback towards the physiology of the visual system, not the least by the discovery that flies are equipped with a refined mechanism for moving their gaze binocularly -- like humans -- in spite of the rigid optics of their compound eyes.

Our results not only illustrate one application of research in Sensory Perception -- one of the very few applications where the logic of a real neural network has been directly copied from nature -- but also underline the benefit which can be gained from Robotics and Artificial Intelligence towards studies of animal sensory perception. Living and non-living sensory systems have to strive against common nuisances of the real world and they have to solve common problems. Some of the problems we started to tackle in the fly, such as colorvision and motion perception are extremely challenging and reputedly difficult to implement in artificial visual systems. Our results on the visual system of a humble creature, followed by the design of an artificial visual system which controls behavior underscores the advantage of studying both natural and artificial sensory systems within one and the same laboratory. This multidisciplinary approach readily permitted us to achieve a fruitful cross-fertilization of three basic disciplines of Sensory Perception : Physics, Neurobiology and Artificial Intelligence

MEMBERS OF THE JURY

The Jury for the "Science for Art Prize" is composed of international figures in the science and arts world, within three groups meeting in Paris, New York and Tokyo.

Depending on the theme selected, each year brings together specialists from various disciplines who are in a position to judge highly scientific works. For the 1992 Prize, the Jury was made up of, for example, eminent specialists in neurosciences, chemistry, physico-chemistry, material science, cosmetology, ink, paint or food industry, etc.

PARIS

Jacques Adda

Research Director, National Institute of Agricultural Research, Paris

Hervé Arribart

R&B Department, Saint-Gobain Recherche

André Berkaloff

Research Director, National Institute of Agricultural Research, Paris

Guy Bouchier

Faculty of Dental Surgery, Paris

Françoise Brochard

Laboratory of Condensed Matter Physics, Collège de France

Jacques Damagnez

Research Director, Ministry of Research and Technology, Paris

Gilbert Delcroix

Scientific Adviser for the Conservation and Restoration of the Cultural Heritage

Lothar Dulog

Professor at the University of Stuttgart, Director of the Institute for Paints and Pigments

Thierry GAUDIN

Director, CPE, Ministry of Research, Paris

Etienne Guyon

Professor at the Paris Sud University, Director of the Ecole Normale Supérieure

André Holley

Professor, University of Lyons, Lyons

Roël Keuning
Professor, University of Wageningen, Wageningen

Hans Kuhn
Professor, University of Munich & university of Marburg

Alain Meybeck
Deputy Director, LVMH Research

Pierre Perrier
Director of the Parfums Christian Dior Laboratories

Pierre Piganiol
Former Research and Technology General Deputy to the Prime Minister

Hans Pulker
Professor, Dietetic Basic Research, Balzers, Liechtenstein

Francis Rondelez
Director of Research, CNRS, University Paris VI

Jacques Schultz
Professor at the University of Upper Alsace, Director of the Centre for Research on the Physico-Chemistry of Solid Surfaces, CNRS Mulhouse

Jürg Solms
Professor, Polytechnical School, Zurich

Semir Zeki
Professor, University College, London & Fellow, Royal Academy

NEW YORK

Robert E. Baier
Professor, State University of New York, Buffalo

William S. Cain
Professor, John B. Pierce Foundation Laboratory, New Haven

Daryl B. Lund
Professor & Dean, Cook College, Rutgers University, Piscataway

Benoît Mandelbrot
Professor at Yale University, Member of the American Academy of Arts and Sciences, and of the National Academy of Sciences of the United States, IBM Fellow, Winner of the 1988 "Science for Art" Scientific Prize

Vernon B. Mountcastle
Professor, School of Medicine, Johns Hopkins University, Baltimore

Richard E. Riman
Assistant Professor, Center for Ceramic Research, Rutgers University, Piscataway

P. Somasundaran

Professor, Chairman, Department of Mineral Engineering, Henry Krumb School of Mines, Columbia University, New York

Claude Wolff

Counselor for Science & Technology, French Embassy, Washington

TOKYO

Takeshi Amari

Professor, Department of Image Science and Technology, Faculty of Engineering, Chiba University, Chiba

Keishi Amano

Professor, Tokyo Fishery University

Yioshiaki Iwamura

Professor, Department of Physiology, Toho University, Tokyo

Sueo Kawabata

Professor, Department of Polymer Chemistry, Faculty of Engineering, Kyoto University, Kyoto

Winner of the 1989 "Science for Art" Innovation Prize

Katsuhiko Nakamae

Professor, Department of Industrial Chemistry, Faculty of Engineering, Kobe University, Kobe

Hudeo Sakata

Professor, Nihon University, Tokyo

Toyohiko Yoshida

Professor, Chemical Group, Institute of Vocational Training, Kanagawa

Masayasu Sato

Professor, Director the Brain Science Foundation, Tokyo

Tei Yamanishi

Professor, Tokyo Women's University, Tokyo

Tsuguo Yamaoka

Professor, Department of Image Science & Technology, Chiba University, Chiba

1991 SCIENCE FOR ART PRIZE

"MATTER AND THE SENSES"

**"The relationship between the composition
or morphology of matter and sensory effects"**

Opening new and wide areas of research, this Prize was dealing with the scientific discovery of our sensory perceptions, in relation with either the human senses such as vision, taste or olfaction, or the matter where the sensory effect originates.

Scientific Prize:

The Scientific Prize was awarded to **Semir ZEKI** (University College, United Kingdom) for his groundbreaking work in the visual perception. He has demonstrated that different areas of the brain undertake different visual tasks such as color, shape and motion and analyzed them in their complexity. His work shed a new light on the mechanisms of visual perception and on the processing of signals from our sensors to the brain.

Innovation Prize:

The Innovation Prize was awarded to **Jozsef SZEJTLI** (Cyclodextrin Laboratory, Hungary) who researched the use of cyclodextrins in encapsulating unstable or insoluble molecules. Potential application of his work span the industries of pharmaceuticals, food and cosmetics production.

Special mentions went to **Jean-Louis MAUBOIS** (France) and **Jean-Claude GUILLOTEAU** (France) for the development and production of cheese using the ultra-filtration process; to **Bernard CHEVASSUS** (France) for the application of biological methods in the development of big and tasty sterile brown trouts; to **Jacques MONESTIER** (France) for creating a technically and artistically remarkable mechanical hand.

Three world-famous artists brought their talent to pay homage to the laureates at the Awards Ceremony in Paris:

Balthazar KLOSSOWSKI DE ROLA, the great French painter better known as **BALTHUS**,
Sakaida KAKIEMON XIV, the heir of the most famous dynasty of traditional Japanese ceramists, and
GOUDJI, the Paris-based Georgian silversmith.

1990 SCIENCE FOR ART PRIZE

"APPLICATION OF MATTER ON A SURFACE"

**"Physicochemical phenomena,
Processes of deposit
and aesthetic effects"**

This Prize concerned studies or innovations related to the application of fluids or powders on surfaces in order to achieve aesthetic effects, mainly visual or tactile. The innovation could relate to phenomena such as flowability, projection, spreading, film formation, adhesion or surface deposition.

Scientific Prize:

The Scientific Prize was awarded to **Hans KUHN** (Switzerland) for his wide-ranging theoretical studies from the properties of monomolecular layers to the energy interactions in complex molecules, interactions which may constitute the transition from inert to living matter. His work has led to important advances in the technology of organic film deposits and to a profound understanding of the complex physicochemical interactions linking color to molecular structure.

Innovation Prize:

The Innovation Prize was awarded to **Werner OSTERTAG** (BASF, Germany) for the development and manufacture of a new type of interference pigment consisting of aluminium particles covered by a thin layer of iron oxide. These stable and non-toxic pigments have remarkable aesthetic and optical properties, making them of the greatest interest to industries related to the decorative arts.

Three well-known artists were particularly associated to the 1990 Prize Ceremony:

Setsuko KLOSSOWSKA DE ROLA, the Japanese painter and wife of the world-famous painter **BALTHUS**,
Alev SIESBYE, the Turkish ceramist, and
Itchiku KUBOTA, the great Japanese master of Tsujigahana (the art of kimono printing).

1989 SCIENCE FOR ART PRIZE

"TEXTURES AND INTERFACES"

"Tactile, visual and technical effects"

The Prize was dedicated to the best scientific survey and the most innovative technical process dealing with the creation or the improvement of a sensory - tactile or visual - effect using the surface or the interface of solids or fluids, leading to an aesthetic or technical appeal.

Scientific Prize:

The Scientific Prize was awarded to **Pierre-Gilles DE GENNES** (Collège de France, France) for his determining work in the physics of surfaces and interfaces. His work led to significant advances in the comprehension of phenomena such as wetting and spreading which play an important role in art, especially in painting, glazing and printing. DE GENNES received the Nobel Prize in Physics in 1991.

Innovation Prizes:

The Innovation Prize was awarded to **Jerzy A. DOBROWOLSKI** (National Research Council, Canada) for developing interference multilayer optical coatings which produce the same iridescence as some bird feathers or even soap bubbles. This sophisticated system precludes any photographing or photocopying, therefore making it an excellent tool to combat counterfeiting.

The Innovation Prize was awarded (ex aequo) to **Sueo KAWABATA** (Kyoto University, Japan) for his research on the mechanical properties of solid polymers and fibrous materials. After determining their characteristics, he developed instruments that are now used throughout the world and that translate the "feel" of a fabric into objective data.

Two candidates received a special artistic distinction for having intimately combined in their work artistic virtuosity and technological innovation:

Showzi TSUKAMOTO (Japan), for his scintillating lacquer and titanium creations, and

Oscar REUTERSVÅRD (Sweden), famous for the geometric magic of his "impossible figures".

1988 SCIENCE FOR ART PRIZE

"APPEARANCE OF MATERIALS"

"Creation of visual effects through chemical innovation"

This Prize was aimed at scientific or technical works dealing with the creation of visual effects, through chemical or simulation techniques exploiting new scientific insights and approaches. The creation of visual effects, through the interaction of light and matter, has potential applications in a large number of industries and arts.

Scientific Prize:

The Scientific Prize was awarded to **Benoît B. MANDELBROT** (IBM Watson Research Center and Yale University, USA), father of the fractal mathematics. He was the initiator of this new geometry tool whose mathematical language has a key role in various new scientific theories, and whose images have a mysterious beauty, intimately linking art and science.

Innovation Prize:

The Innovation Prize was awarded to **Karl KNOP** (P. Scherrer Institute, Switzerland) for his work on the generation and reproduction of pigmentless color images by the differential diffraction of light from relief surfaces.

In order to bridge the gap between scientific endeavour and artistic creation, a special honorable mention was awarded to two "technical artists": **Daniel DE MONTMOLLIN** (France) for his technique utilizing ash enamels to create special artistic effects, and to **Pietro PEDEFERRI** (Italy) who has mastered the artistic use of titanium oxides based on a profound knowledge of electrochemical processes.

Three artists were associated to this Prize for their interest in the application of scientific techniques to the creation of artistic products:

Fance FRANCK, the American ceramist,
GOUDJI, the Georgian sculptor and silversmith, and
OHNISHI, the famous Japanese lacquer artist.

"Document Control"

TYPE: ACTION DOCUMENT NUMBER: 9203256
ORIGINATOR: 02 STATUS I DIRECTORATE STATUS

FROM: MILLIKEN, Roger: MILLIKEN

TO: DR. D.A. BROMLEY

DATE OF
CORRESPONDENCE: 10/20/92

SUBJECT: HE IS FORWARDING A LETTER OF RECOMMENDATION FOR
THOMAS MURRIN TO RECEIVE THE NATIONAL MEDAL OF
TECHNOLOGY.

DIRECTORATE STAFF
ASSIGNED: DIRECTOR'S OFFICE ASSIGNED:

*forwarded to
Dept of Commerce
10/29
dlh*

ACTION STAFF
REQUIRED: AS NECESSARY ACTION:

SENDER'S DUE DATE:
OSTP DUE DATE: 11/10/92 STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT:

COPIES TO: D. Allan Bromley
PCAST

WHITE HOUSE TRACKING #: CONTACT PERSON:
REMARKS: PHONE: EXT:



OSTP RECEIVED: 10/26/92 DEPT RECEIVED:
FILE: P-DAB-AWARDS

CENTRAL FILES:

Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
04a. Letter	To: Allan Bromley From: Roger Millikin Re: Letter of Recommendation for Thomas Murrin to receive the National Medal of Technology [personal information redacted] (1 pp.)	10/20/92	(b)(6)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Personal Files
WHORM Cat.:
File Location: D. Allan Bromley: Awards [1 of 2] [1992]

Date Closed: 1/11/2010	OA/ID Number: 62030-001
FOIA/SYS Case #: 2005-0336-F	Appeal Case #:
Re-review Case #:	Appeal Disposition:
P-2/P-5 Review Case #:	Disposition Date:
AR Case #:	MR Case #:
AR Disposition:	MR Disposition:
AR Disposition Date:	MR Disposition Date:

RESTRICTION CODES

Presidential Records Act - [44 U.S.C. 2204(a)]

P-1 National Security Classified Information [(a)(1) of the PRA]
P-2 Relating to the appointment to Federal office [(a)(2) of the PRA]
P-3 Release would violate a Federal statute [(a)(3) of the PRA]
P-4 Release would disclose trade secrets or confidential commercial or financial information [(a)(4) of the PRA]
P-5 Release would disclose confidential advice between the President and his advisors, or between such advisors [(a)(5) of the PRA]
P-6 Release would constitute a clearly unwarranted invasion of personal privacy [(a)(6) of the PRA]

C. Closed in accordance with restrictions contained in donor's deed of gift.

PRM. Removed as a personal record misfile.

Freedom of Information Act - [5 U.S.C. 552(b)]

(b)(1) National security classified information [(b)(1) of the FOIA]
(b)(2) Release would disclose internal personnel rules and practices of an agency [(b)(2) of the FOIA]
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(b)(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA]
(b)(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
(b)(9) Release would disclose geological or geophysical information

Withdrawal/Redaction Sheet (George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
04b. Letter	To: Chairman of nomination committee From: Roger Millikin Re: Letter of Recommendation for Thomas Murrin to receive the National Medal of Technology [personal information redacted] (2 pp.)	10/20/92	(b)(6)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Personal Files
WHORM Cat.:
File Location: D. Allan Bromley: Awards [1 of 2] [1992]

Date Closed: 1/11/2010	OA/ID Number: 62030-001
FOIA/SYS Case #: 2005-0336-F	Appeal Case #:
Re-review Case #:	Appeal Disposition:
P-2/P-5 Review Case #:	Disposition Date:
AR Case #:	MR Case #:
AR Disposition:	MR Disposition:
AR Disposition Date:	MR Disposition Date:

RESTRICTION CODES

Presidential Records Act - [44 U.S.C. 2204(a)]

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"Document Control"

TYPE: ACTION DOCUMENT NUMBER: 9203356
ORIGINATOR: 02 STATUS I DIRECTORATE STATUS

FROM: CYERT, Richard M.: CARNEGIE MELLON

TO: DR. D.A. BROMLEY

DATE OF CORRESPONDENCE: 10/19/92

SUBJECT: HE IS FORWARDING HIS LETTER OF NOMINATION FOR THOMAS MURRIN TO RECEIVE THE NATIONAL MEDAL OF TECHNOLOGY.

DIRECTORATE STAFF
ASSIGNED: DIRECTOR'S OFFICE ASSIGNED:

ACTION STAFF
REQUIRED: AS NECESSARY ACTION:

SENDER'S DUE DATE:
OSTP DUE DATE: 11/10/92 STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT:

COPIES TO: D. Allan Bromley

*forwarded to
Dept of Commerce
11/9/92
da*



WHITE HOUSE TRACKING #: CONTACT PERSON:
REMARKS: PHONE: EXT:

OSTP RECEIVED: 10/30/92 DEPT RECEIVED:
FILE: P-DAB-AWARDS

CENTRAL FILES:

Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
05a. Letter	To: Allan Bromley From: Richard Cyert Re: Letter of Recommendation for Thomas Murrin to receive the National Medal of Technology [personal information redacted] (1 pp.)	10/19/92	(b)(6)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Personal Files
WHORM Cat.:
File Location: D. Allan Bromley: Awards [1 of 2] [1992]

Date Closed:	1/11/2010	OA/ID Number:	62030-001
FOIA/SYS Case #:	2005-0336-F	Appeal Case #:	
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Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
05b. Letter	To: Chairman of nomination committee From: Richard Cyert Re: Letter of Recommendation for Thomas Murrin to receive the National Medal of Technology [personal information redacted] (3 pp.)	10/19/92	(b)(6)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Personal Files
WHORM Cat.:
File Location: D. Allan Bromley: Awards [1 of 2] [1992]

Date Closed:	1/11/2010	OA/ID Number:	62030-001
FOIA/SYS Case #:	2005-0336-F	Appeal Case #:	
Re-review Case #:		Appeal Disposition:	
P-2/P-5 Review Case #:		Disposition Date:	
AR Case #:		MR Case #:	
AR Disposition:		MR Disposition:	
AR Disposition Date:		MR Disposition Date:	

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(b)(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA]
(b)(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
(b)(9) Release would disclose geological or geophysical information

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TYPE: INFORMATION DOCUMENT NUMBER: 9203269
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FROM: STANSBERRY, James: STANSBERRY ASSOCIATES INTERNATIONAL INC.

TO: DR. D.A. BROMLEY

DATE OF
CORRESPONDENCE: 10/16/92

SUBJECT: HE IS FORWARDING A COPY OF HIS LETTER NOMINATING
THOMAS MURRIN FOR THE NATIONAL MEDAL OF TECHNOLOGY.

DIRECTORATE STAFF
ASSIGNED: ASSIGNED:

ACTION STAFF
REQUIRED: ACTION:

SENDER'S DUE DATE:
OSTP DUE DATE: STAFF DUE DATE
DATE COMPLETED: DATE COMPLETED/DEPT:

COPIES TO:

WHITE HOUSE TRACKING #: CONTACT PERSON:
REMARKS: PHONE: EXT:

OSTP RECEIVED: 10/27/92 DEPT RECEIVED:
FILE: P-DAB-AWARDS

CENTRAL FILES:

Withdrawal/Redaction Sheet

(George Bush Library)

Document No. and Type	Subject/Title of Document	Date	Restriction	Class.
06. Letter	To: Chairman of nomination committee From: James Stansberry Re: Letter of Recommendation for Thomas Murrin to receive the National Medal of Technology [personal information redacted] (2 pp.)	10/16/92	(b)(6)	

Collection:

Record Group: Bush Presidential Records
Office: Science and Technology Policy, Office of (OSTP)
Series: Bromley, D. Allan, Files
Subseries: Personal Files
WHORM Cat.:
File Location: D. Allan Bromley: Awards [1 of 2] [1992]

Date Closed: 1/11/2010	OA/ID Number: 62030-001
FOIA/SYS Case #: 2005-0336-F	Appeal Case #:
Re-review Case #:	Appeal Disposition:
P-2/P-5 Review Case #:	Disposition Date:
AR Case #:	MR Case #:
AR Disposition:	MR Disposition:
AR Disposition Date:	MR Disposition Date:

RESTRICTION CODES

Presidential Records Act - [44 U.S.C. 2204(a)]

P-1 National Security Classified Information [(a)(1) of the PRA]
P-2 Relating to the appointment to Federal office [(a)(2) of the PRA]
P-3 Release would violate a Federal statute [(a)(3) of the PRA]
P-4 Release would disclose trade secrets or confidential commercial or financial information [(a)(4) of the PRA]
P-5 Release would disclose confidential advice between the President and his advisors, or between such advisors [(a)(5) of the PRA]
P-6 Release would constitute a clearly unwarranted invasion of personal privacy [(a)(6) of the PRA]

C. Closed in accordance with restrictions contained in donor's deed of gift.

PRM. Removed as a personal record misfile.

Freedom of Information Act - [5 U.S.C. 552(b)]

(b)(1) National security classified information [(b)(1) of the FOIA]
(b)(2) Release would disclose internal personnel rules and practices of an agency [(b)(2) of the FOIA]
(b)(3) Release would violate a Federal statute [(b)(3) of the FOIA]
(b)(4) Release would disclose trade secrets or confidential or financial information [(b)(4) of the FOIA]
(b)(6) Release would constitute a clearly unwarranted invasion of personal privacy [(b)(6) of the FOIA]
(b)(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA]
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