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SCIENCE

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

R&D in FY 1986: The Reagan Administration, Chapter Two

Tenth Annual AAAS Colloquium on R&D Policy

3 & 4 April 1985

Capital Hilton • Washington, D.C.

- Discussion will be based on *AAAS Report X: Research and Development, FY 1986*, a timely and comprehensive analysis of the proposals for R&D in the FY 1986 budget, prepared by AAAS and a group of its affiliated scientific, engineering, and higher education associations. Registrants will also receive *Proceedings* following the Colloquium and *Congressional Action on R&D in the FY 1986 Budget* in the fall.
- Trends and prospects for R&D in defense, energy, health, space, and other areas will be explored by leaders from industry, universities, agencies of the federal government, Congress, the White House, and the scientific and engineering communities.
- Perspectives will be provided on topics such as deficits and the overall budget climate, R&D and industrial innovation, government organization for science and technology, public and private roles in research, and strategies for government-industry-university cooperation.

For further details, write: R&D Colloquium, AAAS Office of Public Sector Programs, 1776 Massachusetts Avenue, N.W., Washington, D.C. 20036

Sponsored by the AAAS Committee on Science, Engineering, and Public Policy

American Association for the Advancement of Science

10th AAAS R&D Colloquium
Washington, D.C.
3 & 4 April 1985

Advance Registration Form (S1)

Wednesday & Thursday, 3 & 4 April, The Capital Hilton, 16th & K Streets, N.W., Washington, D.C.

Registrant's Name _____
(last name) (first name and initial)

Affiliation _____

Mailing Address _____
(street and number)

_____
(city) (state and zip) (telephone number)

☐ Please check here if you need special services due to handicap. We will contact you prior to the meeting.

Enclosed is a check, purchase order, or credit card information (see below) for:

☐ $150 Full Registration (sessions, three meals, three publications)
☐ $110 Partial Registration (sessions, three publications)
☐ $ 50 Student Registration (sessions, three publications; full-time graduate and undergraduate students only)

Separate Meal Tickets: ☐ Lunch, Wed. ($20) ☐ Contl. Breakfast, Thu. ($7) ☐ Lunch, Thu. ($20)

Packets will be mailed to preregistrants on 18 March; registrations received after 18 March will be held at the AAAS Registration Desk in The Capital Hilton. **Refund policy:** Advance registration fees and meal tickets will be refunded for cancellations received by 1 April; no refunds will be made on cancellations received after this date.

All registrants will receive *AAAS Report X: Research and Development, FY 1986* before or at the Colloquium, published *Proceedings* following the meeting, and a supplementary report, *Congressional Action on R&D in the FY 1986 Budget,* in the fall.

Charge to my ☐ **VISA** or ☐ **MASTERCARD** Number _____ Expires _____

Cardholder's signature _____

Return both top & bottom forms (full page) to the following address:
AAAS Meetings R&D, 1515 Massachusetts Ave., N.W., Washington, D.C. 20005

Capital Hilton Hotel Reservation—AAAS Colloquium (3 & 4 April 1985)

(Reservations received after 10 March cannot be guaranteed)

Names and Address of All Occupants of Room:

Name: _____ Name: _____

Address _____ Address _____

City _____ State _____ Zip _____ City _____ State _____ Zip _____

Room: ___ Single ($105*) ___ Double ($115*) ___ Twin ($115*)

Arrival: Date _____ Time _____

Departure: Date _____ Time _____

(*Plus 10% D.C. sales tax and $1 occupancy tax.)
Be sure to list definite arrival and departure date and time. Hotel reservations will be held only until 6 p.m. unless otherwise specified. Check-in time is 3:00 p.m.; check-out time is 12 noon.

Special housing needs due to handicap _____

Enclose separate check, made out to The Capital Hilton, for first night's room deposit **or** indicate major credit card number:

Credit Card Name _____ Number _____ Expires _____

Cardholder's signature _____

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COVER

Variegated Glacier (Alaska) in full surge, 4 July 1983. View is upstream from a point 5 kilometers from the terminus. It shows the extreme fracturing (crevassing) and bulging, or arching up, of the ice caused by the surge. Ice in the middle ground is moving toward the camera at a speed of about 30 meters per day. In the foreground is a lake (with icebergs) formed by welling up of highly turbid (brown) water in the large crevass (left foreground), from which the water flows out to the glacier margin. This water comes from the glacier bed and its upwelling is an indication of high pressure in the basal system. See page 469. [Elise Mezger, California Institute of Technology, Pasadena 91125]

1 February 1985, Volume 227, Number 4686 **SCIENCE**

The Bell Laboratories Revisited

On each of my many visits to the Bell Laboratories, I have learned of new activities. Among those described to me on a recent visit, two types of efforts were particularly notable: experiments on new forms and structures of matter and further developments in photonic transmission of information.

Molecular beam epitaxy continues to be a very useful technique in creating new structures. When beams of more than one element are used, the composition of the deposited surface can be varied at will. Measuring equipment permits detection of a thousandth of a monolayer. A major objective is to find a big improvement over present-day technology. One set of molecular beam experiments involves building a part-Si, part-Ge layer on silicon. It has already been possible to create a transistor whose performance is equivalent to state-of-the-art. Another application of molecular beam epitaxy is the deposition of CaF_2 on silicon (100) surfaces. The two lattices match. The CaF_2 is an insulator and would be employed instead of SiO_2 in some structures when the high temperature of formation of SiO_2 is incompatible with other features of the device. In creating new epitaxial structures, the experimenters ask the question, "What will nature allow us to get away with?"

Another study is devoted to creating clusters of atoms and examining their properties. The clusters range in size from 2 to 100 atoms, and clusters of a given number of atoms can be selected. In effect, one is dealing with a state of matter intermediate between gas and solid.

Another effort is devoted to investigating the behavior of tiny solid-state structures. With electron beam lithography, it has been possible to make items with a width of 300 angstroms (150 atoms across). One of the items is a narrow-channel MOSFET (metal oxide semiconductor field effect transistor). At low temperatures, the effect of single electrons can be noted. The group of physicists involved make tiny new structures that enable them to explore new physical phenomena. At the same time, they learn how to create the technology necessary to produce the structures and thus make possible further engineering development.

A major objective of AT&T must be to improve on its already high proficiency in photonic transfer of information. It is possible now to transmit at the rate of 2 gigabits per second through a fiber 130 kilometers long with an error rate of less than 1×10^{-9}. The older digital coaxial cable required a repeater station at 1-mile intervals and could transmit only 270 megabits per second. One approach to further progress is to sharpen the laser pulse. This has been achieved in the laboratory with the use of 0.2-micrometer diffraction grating within the laser. With this device, laser side bands are suppressed, and an extremely sharp peak is obtained. It is now possible to transmit simultaneously pulses from ten lasers with differing wavelengths. In the laboratory, data have already been transmitted through a fiber at the rate of 20 gigabits per second.

Progress is also being made on high-speed photo detectors. An InGaAs detector with a mesa 1 to 2 micrometers thick produces an avalanche of electrons with a half-width of detector pulse of 40 picoseconds. Another important development is that of high-speed optical switching. For this, an electrooptic crystal, lithium niobate, is employed. The device is 1 centimeter long with a wave guide 6 micrometers across. Switching voltage is 5 to 10 volts. Still another area of research is on solitons. The propagation and the optical amplification of solitons in fibers has been demonstrated and, thus, the possibility of forming an all-optical system.

The Bell Laboratories have recovered from the trauma occasioned by the break-up of the Bell system. The staff has been assured by words and deeds that top management of AT&T believes that successful research and development are crucial to the company's future. Morale among scientists is excellent.—PHILIP H. ABELSON

THE U.S. ARMY MEDICAL RESEARCH AND DEVELOPMENT COMMAND IS ACCEPTING PROPOSALS FOR RESEARCH IN STAPHYLOCOCCAL TOXINS OF MILITARY IMPORTANCE

(DAMD17-85-R-0031)

Novel methods to mitigate the pathophysiological effects in military personnel caused by exposure to staphylococcal enterotoxins by natural routes or following biological warfare attack are sought. Studies addressing both the mechanisms by which the toxins exert their effects and methods of protection or treatment are of special interest.

The primary emphasis is on the enterotoxins, with staphylococcal enterotoxin B (SEB) serving as the model for other serotypes. Program interests may be expanded to include other staphylococcal toxins that may be produced simultaneously or occur concurrently with the enterotoxins in a natural or artificially contrived scenario.

Research areas of interest include the following:

1. *Mode of action:* Studies involving specific mechanisms that provoke symptoms following oral, intravenous, and pulmonary routes of exposure to toxins.

2. *Immune response:* Evaluation of conventional toxoids, development of new candidate immunizing agents such as peptide fragments, subunits or products derived from genetic manipulation.

3. *Structure/function studies:* Biochemical investigation to elucidate the specific toxic site of the enterotoxin molecule. Studies on receptor binding of the toxins.

4. *Genetic studies:* Cloning and sequencing studies for enterotoxin genes. Recombinant DNA studies that may lead to new immunogens or antigens for use in diagnostic or immunization procedures.

5. *Pathogenesis:* Effects of enterotoxin encountered via the pulmonary route. Effects of the toxin in combination with other known agents that alter pulmonary function. Development of model systems to evaluate aerosol exposure.

6. *Treatment:* Identification, development, and evaluation of any drugs or other biologicals (including antiserum) that can be used to reverse the effects of toxin or to ameliorate the symptoms of intoxification.

Proposals may be submitted for one or more of the above topics or a specific portion of one topic. A proposer may submit separate proposals on different topics or different proposals on the same topic.

In accordance with the Federal Acquisition Regulation (FAR) any contracts awarded under this solicitation may be of any type or combination of types which will promote the best interests of the Government. It is anticipated that multiple-year, incrementally-funded, level-of-effort type, cost reimbursement contracts will be awarded. Each increment will be approximately 12 months. Duration of the contract should be commensurate with the proposed scope of work but in no case shall exceed five years.

PROPOSAL PREPARATION INSTRUCTIONS AND REQUIREMENTS

Research proposals shall include a table of contents and should cover the points cited below, insofar as they are applicable. TECHNICAL AND COST PROPOSALS SHALL BE SEPARATE DOCUMENTS. THE TECHNICAL PROPOSAL SHALL NOT CONTAIN COST DATA.

a. *Name and Address of Organization.* At least one copy must carry the original signatures of an official authorized to legally bind the organization.

b. *Title and Description of Proposed Research.* Submit a detailed description of the research objectives, approach, methods, military relevance and applications, summary of previous or on-going work that may be relevant, bibliography and literature references. No cost information shall be included in the technical portion of the proposal.

c. *Research Involving Human Subjects.* No research involving human subjects is to be considered.

d. *Research Involving Animals.* Acknowledgement that conduct and reporting of the studies shall adhere to the "Guide for the Care and Use of Laboratory Animals," (NIH 78-23, 1978) must be included. Submit a detailed listing of the types and numbers of animals required.

e. *Personnel.* Qualifications of the principal investigator and other senior professional personnel and the time each will devote to the research. This information, to the extent that it is information about an individual, is subject to the requirements of the Privacy Act of 1974 (5 USC 552(a)). The principal purpose and routine use of the information are for the evaluation of the qualifications of those persons who will perform the research. Disclosure of the information is voluntary, but failure to provide such will prevent evaluation of the proposal. Related organizational experience in the research area may also be described.

f. *Facilities and Equipment Available.* Also, specify types of equipment to be purchased.

BUSINESS PROPOSAL CONTENT

g. An estimate of the total research project cost with a breakdown of funds by category (direct labor cost, indirect cost, property or equipment cost, travel cost, publication cost, consultant cost, other direct costs, fee or profit) by year must accompany each proposal and must be submitted on SF 1411 with complete supporting information. (The SF 1411 must be separate from the technical proposal. Absolutely no cost information shall be included in the technical proposal.)

Every effort will be made to protect the confidentiality of the proposal and any evaluations. The submitter may mark the proposal with a legend such as that provided in FAR 52.215-12. Proposals containing a more restrictive legend shall not be considered.

Unnecessarily elaborate brochures or presentations beyond that sufficient to present a complete and effective proposal are not desired.

CONSIDERATIONS

Reports. Quarterly, annual and final progress reports shall be required in accordance with the schedule of any resultant contract. Reprints of any publications resulting from sponsored research shall also be provided to the USAMRDC.

Contract Provisions. Contracts awarded shall contain, where appropriate, detailed special provisions concerning patent rights, rights in technical data and computer software, reporting requirements, equal employment opportunity, care of laboratory animals, use of human subjects, Good Laboratory Practices requirements, procedures for safeguarding proprietary information, acquisition and disposition of equipment, and other provisions required by the FAR.

METHODS OF SELECTION AND EVALUATION CRITERIA

Proposals will be evaluated first on their relevance to military and program requirements. Those found to be relevant will then be evaluated by a collective discussion conducted by a Source Selection Board composed of scientists knowledgeable in the topic area. Scientific acceptability will be determined by using the criteria listed below:

a. *Research Objective.* Is this proposal clearly written, are the goals well defined, and is there a logical approach to the problem? Is the proposal designed to answer a specific question relating to the biochemical characteristics of the toxins, the host response to the toxin, genetic controls of toxin production, or effectiveness of therapeutic and/or prophylactic measures used to counter the effects of the toxin?

b. *Technical Approach.* Are the methods described in the proposal state-of-the-art? Are there sufficient references given to indicate that a particular line of experimentation may prove to be productive? Is adequate background information furnished to indicate a source of materials (e.g. purified toxin, specific antisera, etc.), or a method described for generation of new products (e.g. peptide fragments)?

c. *Quality of Facilities & Equipment.* Are they sufficient to accomplish the research? If new equipment is needed, is there adequate justification? If facilities and/or equipment are shared, is there sufficient information to establish priority for this proposal?

d. *Investigator Competence.* Has the primary investigator demonstrated the necessary scientific and administrative capabilities necessary to complete this research? Are additional personnel qualified to conduct the specific types of studies required (e.g. biochemical, immunological, veterinary, etc.)? Is there an adequate number of total man hours proposed to accomplish this proposal?

e. *Safety Considerations.* Is the investigator cognizant of the requirements for and capable of working with any hazardous materials involved? Has the organization agreed to allow storage and use of such materials in its facility?

f. *Animal Use Consideration.* Are the studies in which animal models are to be used to be conducted in accordance with all applicable laws and regulations? Are all necessary assurances of compliance and certificates provided?

g. *Genetic Studies.* Are all studies to be conducted in accordance with all appropriate regulations? Are all necessary assurances of compliance and certificates provided?

After determination of scientific acceptability, the Source Evaluation Board will determine the competitive range based on priority of program requirements, scientific acceptability, and cost to complete the contract. Although cost will be a factor in selection, program relevance and scientific acceptability will be more significant factors in selection for contract award. Also, the proposed cost must be realistic and reasonable to be selected for contract award. Negotiations will be conducted with those contractors in the competitive range, as determined by the factors in paragraphs a–g above. Final decisions for funding will be made by the USAMRDC based on these criteria and consideration of duplication of other research and program balance. The Government may elect to fund several or none of the proposed approaches to the same topic. There is no commitment by the Government to make any awards on any topic, to make a specific number of awards or to be responsible for any monies expended by the proposer before award of a contract. It should be noted that only a duly appointed Contracting Officer has the authority to enter into a contract on behalf of the U.S. Government.

SUBMISSION OF PROPOSALS

Twenty copies of the complete proposal are required for review and evaluation. Proposals must be received at the address below by 4:00 p.m. on 18 March 1985 to:

Commander
U.S. Army Medical Research Acquisition Activity
ATTN: SGRD-RMA-RC/DAMD17-85-R-0031 (K. Hargett)
Fort Detrick
Frederick, MD 21701-5014