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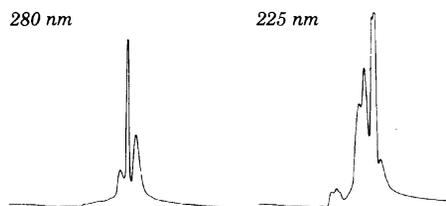
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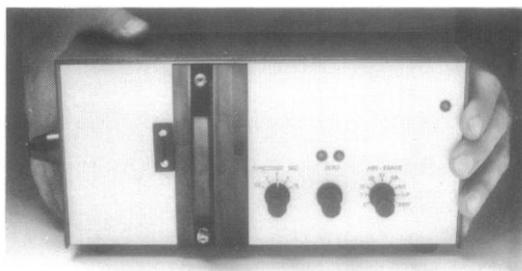
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Large ground finch (*Geospiza magnirostris*) on Isla Pinta, Galápagos. A study of banded individuals of another population of Darwin's finches, *Geospiza fortis* on Isla Daphne Major, has demonstrated natural selection; large birds with large bills survived better than small birds with small bills during a drought when food was scarce. See page 82. [D. Schluter, Division of Biological Sciences, University of Michigan, Ann Arbor 48109]

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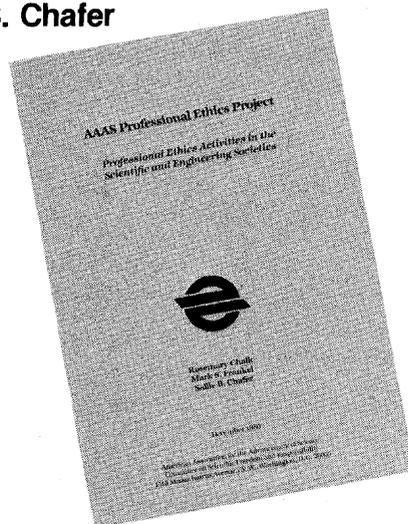
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## Tectonic Hazards

Officials at the Department of Interior have been considering a sharp cut in the department's budget for studying volcanism and the elimination of funds for earthquake prediction. Funding for the earthquake program is \$16 million a year. In contrast, the probable costs of a major earthquake are tens of billions of dollars and tens of thousands of lives.

Top officials at the Office of Management and Budget should refresh their memories of the eruptions at Mount St. Helens. The destruction near the mountain is awesome—large areas of forest blown down and ash flows more than 100 meters thick. Had there not been seismic monitoring and restrictions on travel into the area, as many as 1000 lives might have been lost. And Mount St. Helens was a small event in comparison with other eruptions. At one time, Mount Mazama in southern Oregon was comparable in size to the largest mountains of the Cascade Range. Where that mountain once stood there is now Crater Lake, which is about 600 meters deep.

Before the eruptions at Mount St. Helens, such destruction seemed to be something that happened in other places. But having experienced a small sample of nature's violence should make us prudent and vigilant. We should have a monitoring program including the use of seismometers, tiltmeters, and distance-measuring facilities on the more active peaks, as well as geologic studies to determine the frequency of earlier events.

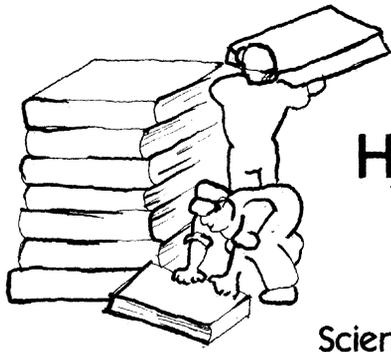
The destruction at Mount St. Helens led President Carter to order a study of the likelihood of a major earthquake in California and the potential damage from such an event.\* The study identified seven fault systems capable of generating major earthquakes that could severely damage population centers. The aggregate probability of a catastrophic quake in California during the next 30 years is greater than 0.5. The prime candidate is the Southern San Andreas fault near Los Angeles. Geologic evidence indicates that at least eight major earthquakes have occurred there during the last 1200 years with an average interval of 140 years. The last episode was in 1857.

California is only one of many states where earthquakes may occur. Perhaps the most violent quakes of record in the United States occurred at New Madrid, Missouri, in 1811 and 1812. Another event of large magnitude took place near Charleston, South Carolina, in 1886. Geologists believe that earthquakes are likely in more than 30 states, although the probability in any one spot is much less than that in the Pacific states.

Present knowledge and experience do not permit dependable and accurate forecasting of the time of an earthquake. Some of them are attended by obvious premonitory phenomena, others are not. Through observing and heeding such phenomena, the Chinese were successful in avoiding great loss of life in one instance. On another occasion, precursors were not evident and several hundred thousand lives were lost. Ultimately, there will be a better understanding of the events culminating in a major quake.

For now, the most practical approach is to identify the likely locations and magnitudes of earthquakes and to design structures to withstand the disturbances. Around the world most of the lives lost in earthquakes have resulted from collapse of buildings. In view of the potential damage and loss of life, it hardly seems wise policy to contemplate abandoning a program designed to improve predictive capabilities. Substantial efforts and funds have gone into emplacing instrumentation along major fault systems. The program should be continued. In addition, the United States should seek to expand its cooperation with other countries where earthquakes occur frequently. Some of them, especially Japan and China, have extensive programs. The Japanese have widespread monitoring networks and are making notable progress in engineering research on building design. We have much to learn from them.—PHILIP H. ABELSON

\*Federal Emergency Management Agency, *An Assessment of the Consequences and Preparations for a Catastrophic California Earthquake: Findings and Actions Taken*, Washington, D.C., November 1980.



# Half Price AAAS Book Sale

## Science Compendia Series

### Solar Energy in America

by William D. Metz and Allen L. Hammond  
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Annual Meeting  
Washington  
3-8 January 1982

## Tours

Registrants at the forthcoming AAAS Annual Meeting will have a unique opportunity to explore a select few of the many outstanding research facilities in the Washington area. The tours listed below have been arranged by the Washington Advisory Committee's Subcommittee for Tours, chaired by David Challinor of The Smithsonian Institution. AAAS gratefully acknowledges the Subcommittee's efforts and the hospitality extended by the host institutions.

**1. National Bureau of Standards.** Monday, 4 January, 8:00 a.m.–1:00 p.m. (Limit: 40 persons)

This tour offers visits to five laboratories: the Environmental Specimen Bank, which permits the comparison of new pollutants with historic ones; the Theta Pinch Facility for analysis of highly ionized plasmas; the Environmental Chamber, which permits the simulation of a wide range of climatic conditions; the Illumination Color Laboratory for research in color perception; and the Refuse-derived Fuels Laboratory for experiments using solid wastes as fuels.

**2. Naval Research Laboratory.** Monday, 4 January, 12:30–5:00 p.m. (Limit: 20 persons)

Visitors will become acquainted with NRL's research efforts in the physical sciences, technology and engineering aimed at the development of improved techniques, systems, and equipment to enhance the Navy's operating capabilities. Research includes physical, organic, inorganic, and analytical chemistry; fracture mechanics, metallurgy, fiber and x-ray optics, magnetism, radiation technology, radio and rocket astronomy, solar physics, marine biology, ocean engineering, and more. Walking shoes and winter clothing are recommended; **persons wearing heart pacers should inform the tour leader, so that areas with electromagnetic radiation can be avoided.**

**3. The Smithsonian Institution—National Museum of Natural History/National Museum of American History.** Tuesday, 5 January, 8:00 a.m.–1:30 p.m. (Limit: 20 persons)

This tour provides a behind-the-scenes look at a coral reef microcosm, the first successfully installed, self-maintaining reef ecosystem in the world; it continues through the Museum's Gem Hall to the Department of Mineral Sciences to view a collection of gems not on public display. Visitors will also see artifacts reflecting the history of science. Public cafeterias in both buildings are open for lunch at visitors' expense.

**4. The Smithsonian Institution—Paul E. Garber Preservation, Restoration, and Storage Facility.** Tuesday, 5 January, Noon–4:00 p.m. (Limit: 35 persons)

The National Air and Space Museum's reserve collection of historically significant air- and spacecraft is housed at this facility. Visitors will see a SPAD XIII, Curtiss Jenny, Able-

Baker Missile Nose Cone, North American F-86A, Minuteman III ICBM Guidance and Control System, Hawker Hurricane, and more. Also offered will be a close-up look at restoration work in progress. Walking shoes and warm clothing are recommended.

**5. Chesapeake Bay Hydraulic Model.** Wednesday, 6 January, 7:30 a.m.–1:30 p.m. (Limit: 45 persons per tour\*)

The hydraulic model is a scientific tool used by engineers, scientists, and water resource planners to analyze hydraulic problems that cannot be solved from textbooks, experience, or mathematical treatment alone. It can reproduce—on a manageable scale—phenomena occurring throughout this complex estuarine system. The 14-acre shelter emulates the climatic conditions of the area; wear walking shoes and warm clothing. Restaurant stop, at visitors' expense, planned at conclusion of tour.

\*A second tour may be scheduled if demand is sufficient.

**6. Carnegie Institution—Geophysical Laboratory.** Wednesday, 6 January, 12:30–4:30 p.m. (Limit: 40 persons)

The Laboratory conducts studies of geological problems, especially the formation and evolution processes of the Earth's crust and mantle. Projects include lunar petrology, deep-sea cores, deep drilling, geothermal resources, planetary atmospheres, and archeological materials. Guests will visit six research laboratories and be briefed by the principal investigator of each facility.

**7. National Institutes of Health—Animal Center.** Thursday, 7 January, 7:30 a.m.–1:30 p.m. (Limit: 40 persons)

Visitors will be taken to a 500-acre farm where monkeys, dogs, cats, and farm animals are raised, conditioned, and quarantined for biomedical research. Foxhound and beagle breeding colonies, a foxhound blood donor colony, and herds of burros, goats, sheep, and pigs will be observed. Restaurant stop for lunch at visitors' expense. **Caution:** Pregnant women and persons with cardiovascular problems are advised against taking this tour as a Q-fever precaution.

**8. U.S. Naval Observatory.** Thursday, 7 January:

**8-a:** 7:00–9:30 p.m.; **8-b:** 7:30–10:00 p.m.;

**8-c:** 8:00–10:30 p.m.; **8-d:** 8:30–11:00 p.m.

(Limit: 35 persons per tour)

The Observatory is the oldest scientific institution in the Navy. Its mission is to provide accurate time and other astronomical data essential for safe navigation at sea, in the air, and in space. Escorted tours will take visitors to the Gilliss Building at half-hour intervals to view celestial objects such as the Moon or double stars through the 26-inch and 12-inch

To reserve your tour tickets, use the form on the next page. Please note that tours are limited to Annual Meeting registrants only. For a listing of symposia scheduled for the meeting, see the Preliminary Program in the 18 September issue of *Science*, pages 1355 to 1362.

refracting telescopes. Astronomers will be on duty to answer questions. These tours are planned for mature groups and are not generally suitable for children. Warm clothing is recommended, because some of the buildings are open to the sky and unheated.

**9. Goddard Space Flight Center.** Friday, 8 January, 8:00 a.m.–1:00 p.m. (Limit: 45 persons per tour\*)

The Goddard Space Flight Center is one of NASA's largest research and development facilities; it is the focal point for the U.S. near-Earth-type satellites, tracking, and communications. The tour includes a visit to the Operations Control Room and a stop at the Satellite Integration and Test Facility. The latter will highlight the tests to which spacecraft are subjected prior to shipment for launch.

\*A second tour may be scheduled if demand is sufficient.

**General Tour Information**

AAAS meeting registrants who wish to reserve tickets for any of the tours should complete the coupon below and return it to AAAS as soon as possible; space is limited and early commitments must be made to the host facilities. Reservations received after 15 December will be returned.

Because all of this year's tours are taking place in

nonpublic areas of U.S. government facilities, the host institutions request that persons of foreign nationality (visitors as well as U.S. residents) give their birth place and birth date in addition to name and address. Appropriate space is provided on the tour reservation form. Foreign nationals will not be restricted from participating in any tour, but AAAS must submit the appropriate data to the host institutions in advance of the respective tours.

Reserved tickets will be held at the AAAS Ticket Desk in the meeting registration area at the Washington Hilton Hotel (Concourse Level). *Tickets must be picked up by noon of the day preceding the tour*, except on 3 January, when the Ticket Desk opens at 2:00 p.m. Reserved tickets not picked up by the deadline will be released to others. A nominal charge will be made for all tour tickets to help defray transportation cost. *Do not send any remittance with this coupon*; it is a reservation form only. Please note that tours are limited to meeting registrants only.

All tours depart from and return to the T Street Entrance of the Washington Hilton at the respective times listed for each tour.

Handicapped persons who need assistance with tours should consult the staff at the Resource Center for Disabled Registrants in the Washington Hilton (State Room, Terrace Level).



Annual Meeting  
Washington  
3-8 January 1982

**Tours  
Reservation Form**

Mail to: Tours  
AAAS Meetings Office  
1776 Massachusetts Avenue, NW  
Washington, D.C. 20036

Name \_\_\_\_\_

Institution or Company \_\_\_\_\_

Street Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_

Foreign Nationals, please list: Place of Birth \_\_\_\_\_ Date of Birth \_\_\_\_\_

Indicate any special requirements due to a handicap: \_\_\_\_\_

Tour	No. of Tickets	Tour	No. of Tickets
1. National Bureau of Standards .....	_____	6. Carnegie Institution—Geophysical Lab .....	_____
Mon., 4 January, 8:00 a.m.–1:00 p.m.		Wed., 6 January, 12:30–4:30 p.m.	
2. Naval Research Laboratory .....	_____	7. NIH Animal Center .....	_____
Mon., 4 January, 12:30–5:00 p.m.		Thurs., 7 January, 7:30 a.m.–1:30 p.m.	
3. National Museums of Natural History & American History .....	_____	8. U.S. Naval Observatory, Thurs., 7 January:	
Tues., 5 January, 8:00 a.m.–1:30 p.m.		8-a: 7:00–9:30 p.m. ....	_____
4. Paul E. Garber Facility .....	_____	8-b: 7:30–10:00 p.m. ....	_____
Tues., 5 January, Noon–4:00 p.m.		8-c: 8:00–10:30 p.m. ....	_____
5. Chesapeake Bay Hydraulic Model .....	_____	8-d: 8:30–11:00 p.m. ....	_____
Wed., 6 January, 7:30 a.m.–1:30 p.m.		9. Goddard Space Flight Center .....	_____
		Fri., 8 January, 8:00 a.m.–1:00 p.m.	
		<b>Total Number of Tickets Reserved</b> .....	_____



Scenes from Shakespeare (1932), by John Gregory located at the Folger Shakespeare Library. [Columbia Historical Soc. and J. M. Goode]

## AAAS Science Film Festival

The Science Film Festival continues to be a popular feature of the AAAS Annual Meeting. The Festival presents a unique collection of recent educational and entertaining films dealing with the natural and social sciences, the technologies derived from them, and the social issues they raise. The 1982 Festival includes a wide variety of productions in each of these subject areas.

The Science Film Festival will run from 10:00 a.m. to 4:00 p.m. daily, Monday, 4 January, through Thursday, 7 January, in the International Ballroom West at the Washington Hilton Hotel. Admission is free.

Detailed information about the films presented at the Festival will be printed in the Annual Meeting Program.

### Monday, 4 January

- 10:00 a.m. Beyond the Stars: A Space Story
- 10:13 a.m. Animals of Australia
- 10:32 a.m. World Within Worlds
- 10:56 a.m. Song of the Canary
- 11:55 a.m. The Wonder of Dolphins
- 12:07 p.m. A Forest in the Clouds
- 12:28 p.m. The Asteroid and the Dinosaur
- 1:26 p.m. Civilization in Ancient Chiapas
- 1:54 p.m. Sand song
- 2:15 p.m. Babymakers
- 2:59 p.m. Astronomy—The Cosmic Quest
- 3:26 p.m. Possum Living

### Tuesday, 5 January

- 10:00 a.m. Loons of Amisk
- 10:16 a.m. Slima the Dhowmaker
- 10:42 a.m. Etosha: Place of Dry Water

- 11:42 a.m. The Exploration of Mars
- 11:58 a.m. Marvels of the Mind
- 12:22 p.m. The Pinks and the Blues
- 1:22 p.m. Dawn of Electronic Identification
- 1:34 p.m. Journey for Survival
- 1:51 p.m. The Atom: A Closer Look
- 2:50 p.m. Teen-Age Whiz Kids
- 3:02 p.m. Lucy in Disguise

### Wednesday, 6 January

- 10:00 a.m. The Immune Response
- 10:19 a.m. Harness the Wind
- 10:32 a.m. The Keys of Paradise
- 11:30 a.m. How to Dig a Hole to the Other Side of the World
- 11:42 a.m. Combat in the Classroom
- 12:10 p.m. Koko—A Talking Gorilla
- 1:36 p.m. Heat From the Earth
- 1:44 p.m. The World of Insects
- 2:05 p.m. Boreal Forest, Spring and Summer

- 2:21 p.m. Deep Threat
- 2:30 p.m. The Sea Behind the Dunes
- 3:29 p.m. Growing Pains

### Thursday, 7 January

- 10:00 a.m. The Last Chance
- 10:29 a.m. Byron B. Blackbear and the Scientific Method
- 10:45 a.m. The Paleolithic Society
- 11:05 a.m. Antarctica: Desert of Ice, Sea of Life
- 11:35 a.m. Fire in the Water
- 12:25 p.m. The Whales That Wouldn't Die
- 12:54 p.m. All the Way Up There
- 1:22 p.m. Sun Power
- 1:40 p.m. About Sharks
- 1:53 p.m. More Than Hugs and Kisses
- 2:17 p.m. Elk Biotelemetry
- 2:34 p.m. Future
- 2:57 p.m. Dive to the Edge of Creation
- 3:57 p.m. Biogas in Fiji



Annual Meeting  
Washington  
3-8 January 1982

ADVANCE  
REGISTRATION  
(B)

MAIL TO:  
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1515 Massachusetts Ave., NW  
Washington, D.C. 20005

Name of Registrant: \_\_\_\_\_  
(Last Name) (First and Initial)

Registrant's Institution or Company: \_\_\_\_\_

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[For receipt of program(s), badges, and *Science* (for new applicants)]  
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(City/State or Province) \_\_\_\_\_ (Zip Code) \_\_\_\_\_

Name of Spouse Registrant: \_\_\_\_\_  
(Last Name) (First and Initial)

Other Additional Registrants: \_\_\_\_\_  
(With same mailing address. Use new form if address differs.)

Convention Address: \_\_\_\_\_  
(Where you can be reached) (Hotel and/or Phone No.)  
Check days attending: Sun Mon Tue Wed Thu Fri

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

- Please check appropriate boxes, complete remainder of form (type or print), and enclose payment or charge to credit card below.
- Preconvention Program, badge, and voucher for full Program and Abstracts will be mailed to registrants in early December.
- Full Program and Abstract Volume can be picked up at *Advance Registrants' Desks* at the Washington Hilton or the Capital Hilton.
- Registrations received after 14 December will be held at the AAAS Information Booth at the Washington Hilton.
- Refund requests for registration fees must be made by letter or telegram prior to 28 December 1981 and will be honored after the Annual Meeting. No refunds are made on cancellation notices received after this date.
- Special one-day attendance registration will be available at on-site Registration Desks only.

Registration Category	Regular		Student or Retired	
	Single	Double	Single	Double
<input type="checkbox"/> AAAS Member	<input type="checkbox"/> \$34	<input type="checkbox"/> \$50	<input type="checkbox"/> \$17	<input type="checkbox"/> \$25
<input type="checkbox"/> Non-Member:				
<input type="checkbox"/> Meeting registration only	<input type="checkbox"/> \$43	<input type="checkbox"/> \$60	<input type="checkbox"/> \$21	<input type="checkbox"/> \$30
<input type="checkbox"/> Register and join: Single membership	<input type="checkbox"/> \$77	<input type="checkbox"/> \$93	<input type="checkbox"/> \$44	<input type="checkbox"/> \$52
<input type="checkbox"/> Register and join: Double membership		<input type="checkbox"/> \$105		<input type="checkbox"/> \$64

Students: Fulltime undergraduate or graduate students only.

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SURVEY OF ATTENDANTS

Annual Meeting, Washington, D.C. 3-8 January 1982

Your answers to the following questions will help us to plan future Annual Meetings. Please complete the form and either return it with your registration form or send in separately (to the same address) if you wish to respond anonymously (the two forms will be processed separately).

<b>Principal Professional Interest</b>		<b>Principal Professional Activity</b>		<b>Institutional Affiliation Type</b>	
11 <input type="checkbox"/> Physical, mathematical	21 <input type="checkbox"/> Teaching, education	31 <input type="checkbox"/> University, 4-year college			
12 <input type="checkbox"/> Biological, medical	22 <input type="checkbox"/> Health practice	32 <input type="checkbox"/> Other educational			
13 <input type="checkbox"/> Engineering	23 <input type="checkbox"/> Other practice, consulting	33 <input type="checkbox"/> Industrial, commercial			
14 <input type="checkbox"/> Social, behavioral	24 <input type="checkbox"/> Research, development	34 <input type="checkbox"/> Other Private			
15 <input type="checkbox"/> Science policy	25 <input type="checkbox"/> Administration	35 <input type="checkbox"/> Government			
16 <input type="checkbox"/> ..... (other)	26 <input type="checkbox"/> ..... (other)	36 <input type="checkbox"/> ..... (other)			
<b>Highest Educational Level</b>		<b>Age</b>		<b>Number of Past AAAS Meetings Attended</b>	
41 <input type="checkbox"/> Doctoral Degree	51 <input type="checkbox"/> Under 26 years	61 <input type="checkbox"/> None			71 <input type="checkbox"/> Under 51 miles
42 <input type="checkbox"/> Master's Degree	52 <input type="checkbox"/> 26 to 35 years	62 <input type="checkbox"/> One			72 <input type="checkbox"/> 51 to 150 miles
43 <input type="checkbox"/> Other professional	53 <input type="checkbox"/> 36 to 45 years	63 <input type="checkbox"/> Two			73 <input type="checkbox"/> 151 to 400 miles
44 <input type="checkbox"/> Bachelor's Degree	54 <input type="checkbox"/> 46 to 55 years	64 <input type="checkbox"/> Three			74 <input type="checkbox"/> 401 to 1000 miles
45 <input type="checkbox"/> ..... (other)	55 <input type="checkbox"/> 56 to 65 years	65 <input type="checkbox"/> Four			75 <input type="checkbox"/> 1001 to 3000 miles
	56 <input type="checkbox"/> Over 65 years	66 <input type="checkbox"/> Five or more			76 <input type="checkbox"/> Over 3000 miles

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**1575 Eye Street, N.W.**  
**Suite 250**  
**Washington, D.C. 20005**

**HOTEL  
 RESERVATIONS**

**Annual Meeting  
 Washington  
 3-8 January 1982**



**Send confirmation to:**

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 City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_ Phone No. \_\_\_\_\_

**Other occupants of room:**

Name \_\_\_\_\_ Name \_\_\_\_\_

**Choice of hotel:** 1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_

**Room:**  Single  Double  Twin **Suite:**  1 Bedroom  2 Bedrooms **Preferred Rate:** \$ \_\_\_\_\_

**Please indicate special housing needs due to a handicap:**  Wheelchair accessible room.

Other: \_\_\_\_\_

**Arrival Date:** \_\_\_\_\_ **Time:** \_\_\_\_\_  a.m.  p.m. Be sure to list definite arrival and departure date and time. Reservations will be held only until 6 p.m. unless accompanied by 1 night's deposit.

**Departure Date:** \_\_\_\_\_ **Time:** \_\_\_\_\_  a.m.  p.m.

- All hotel reservations must be submitted to the AAAS Housing Bureau in writing (use form above; type or print).
- Reservations must be received by the Housing Bureau **not later than 14 December 1981**; reservations received after that date are conditional upon space availability at the hotels.
- Rooms are assigned on a first come, first served basis. If room rate requested is no longer available, the next available higher rate will be assigned.
- Confirmation will come directly from the hotel. All changes and cancellations must be made in writing (not by phone) through the AAAS Housing Bureau.

**HOTEL RATES\***

Hotel	Single	Double & Twin	Parlor + 1 Bedrm.	Parlor + 2 Bedrms.	Parking (rates subject to change)
<b>Washington Hilton</b> <i>Headquarters Hotel</i> 1919 Connecticut Ave., N.W. (No. of rooms: 1,000)	\$51 68 81	\$66 83 96	\$175 and up	\$271 and up	\$5.00 per 24 hrs. with in & out privileges for registered guests only. Inquire for hourly rates.
<b>Capital Hilton</b> 16th and K Streets, N.W. (No. of rooms: 500)	\$45 63 81	\$65 83 96	\$225 and up	\$300 and up	\$4.75 per 24 hrs. (no in & out privileges) at PMI Garage on L St. adjacent to hotel. Inquire for other rates.
<b>Highland Hotel</b> 1914 Connecticut Ave., N.W. (No. of rooms: 75)	\$45	\$55	\$75	_____	No parking on premises. Commercial parking in Universal Bldg. across street @ \$4.50 per 24 hrs. (no in & out privileges).
<b>Holiday Inn</b> 1900 Connecticut Ave., N.W. (No. of rooms: 100)	\$45	\$55	_____	_____	Limited indoor parking (cars only) free of charge for registered guests only.

\*Add 10% D.C. sales tax and 80¢ per night room occupancy tax.  
 Charges for roll-away beds: Washington Hilton and Capital Hilton, \$15/night; Highland Hotel, \$10/night; Holiday Inn, \$8/night.  
 Children are accommodated free of charge in same room with parents if no extra beds are required. Age limits are as follows: Washington Hilton and Capital Hilton, no age limit; Highland Hotel, 14 and under; Holiday Inn, 19 and under.

**Buy Your Airline Tickets Now!**

Air fares, unlike aircraft, seem to be going in only one direction—up. The AAAS Annual Meeting starts on the last day of the New Year's weekend, when post-holiday travel is at its peak. Protect yourself by purchasing your airline tickets now. Thus, you will not only secure a seat on the flight of your choice, you will also save money by paying the currently applicable price. Be sure to inquire about discount fares such as "super saver" and others; these fares often require reservations or purchase of tickets well in advance and a minimum length of stay.