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Annual Meeting - Vancouver - June 27-July 1, 1982

Room reservation cards have been mailed to all ASP members. As noted in the November Newsletter, the University of British Columbia is the host institution, and provides many facilities for our use. Plays, art exhibits, special lectures, and concerts are often available on campus during the summer. An indoor pool, sauna, outdoor pool and exercise area are open to all. A secluded beach tucked in at the base of the peninsula evokes fond memories for those who hiked down to it at our meeting in 1974. Vancouver provides many other activities--food, gardens, etc.--and is located in a splendid setting near snow-capped mountains and Victoria Island. Join us for a pleasant and informative meeting.

Congressional Corner - Harlee Strauss

In addition to bills which provide money for granting agencies like the NSF and the NIH, there are several bills in Congress which will have an impact on scientists. Three of the most important are 1) the small business innovation research act (SBIR), 2) the scientific and engineering manpower act, and 3) the research modernization act. The manpower (personnel, let's try to be nonsexist in our language) act has just been introduced in the House by Rep. Fuqua, chair of the Science & Technology Committee. Its purpose is to increase the number of people to enter science and engineering fields. The research modernization act is to promote the development of nonanimal methods of research, experimentation, and testing, and to assure humane care of lab animals. I will write more about these two bills in future columns.

The SBIR is the furthest along in both Houses of Congress. At present, it has several different forms, all variations on the same theme. One version has already passed the full Senate by a vote of 90-0, which some commentators say either means it was non-controversial or no one was paying attention. In this case, the latter is more probable.

Basically, all of the SBIR bills mandate that all federal agencies which spend more than $100 million per year to support R&D outside of their agencies, to set aside 1% to 3% of their funds (the amount depends on the version of the bill) for research to be conducted by small businesses. The businesses are to compete for the funding by a competitive grant process.

The rationale for these set asides is that small businesses translate research into innovative technology faster than universities or big businesses. It is hoped that the innovative technology will improve the industrial base of the U.S. and allow it to compete more effectively in both domestic and international markets.

The NSF has had a successful pilot SBIR program in place for several years. In this case, successful means that the NSF has received many grant proposals which deserved funding. However, there are several major problems with this bill. First, it will take money away from basic research grants which generally go to university researchers. Although in the aggregate R&D has fared well under Reagonomics, funding for civilian basic research has decreased when measured in constant dollars. So this diversion of money will be keenly felt in the universities. Second, the scaleup of the NSF pilot project is too large over too short a time. It will lead to wasted money because the agencies will be faced with a "use it or lose it" situation. Finally, it has been argued that federal grants are the wrong way to encourage small business research. Tax incentives for both the research and venture capital to fund it would be a more appropriate method to stimulate small business research.

There is a growing concern in the House about the wisdom of SBIR legislation. However, I would say its prospects for passage are good. After all, small businesses are far more organized and vocal in telling lawmakers what they want and care about than are scientists.

History - J. W. Longworth

Pass the Ceylon Magnet!

Who would make such a request? Perhaps an energy detective in a helicopter flying overhead on behalf of the local electricity supply company. A ceylon magnet is a pyroelectric crystal. This is a solid with a permanent electric polarization which alters in magnitude when temperature is varied. Thus, measurement of the electric polarization relates to temperature. By absorbing radiation which also creates heat, radiation can be measured from the infrared emitted by a house or human body to radiation from a picosecond laser pulse.

Dutch traders returning from Sri Lanka in the early years of the 18th century brought with them tourmaline crystals. These crystals were used in ceremonies at Kandy. When placed into hot ashes from a fire, they attract the ash, but on cooling, repell it. They act as an electric equivalent of a magnet. Hence the name ceylon magnet.

Franz Hoch, also known as Aepinus, studied the pyroelectric effect in detail in 1756. Hoch was born in Rostok, Germany, and performed these studies in Berlin. The majority of his research was at St. Petersburg, Russia, and he retired to Tartu, Estonia. Hoch was one of the pioneers of electrical studies, including devising the condenser. In the investigation on pyroelectric effect, he demonstrated that there are opposite polarities for the two ends of a heated tourmaline crystal. This is the essential physical description. Later, David Brewster at Edinburgh in 1824 found that several synthetic solids, especially Rochelle salt, were pyroelectric.

Pyroelectric crystals have oriented electric dipoles grouped into ferro-electric domains, creating a spontaneous polarization which can accumulate stray charge. The domain structure alters when the crystal dimensions change as a consequence of variation in temperature. This modifies the spontaneous polarization and creates a change in electric charge. This is measurable initially by attraction of small charged particles and later by electro-meteric devices. To develop a useful measuring tool from a pyroelectric crystal, its surface is coated with a metal black. This is a layer of droplets of gold some micrometer is size created by condensation from vapor, or else microcrystallites electrolytically deposited. The metal layer appears black, with a diffusive matte reflecting surface. It will absorb radiation equally at all radiation wavelengths, permitting a heterochromatic response. The absorbed radiation heats the metal black, and the pyroelectric effect measures this heat. The measurement of the changes in spontaneous polarization remained difficult until the early 1970's. Then the ready availability of electrometer integrated-circuitry devices made pyroelectric radiation detection relatively simple. It is now the favored means of measurement of radiation when different wavelengths need to be compared. There is an additional benefit from the metal black absorbing layer, since they are also electrically conductive. Known amounts of current may be applied and the absolute thermal response can then be determined. So, if you need to measure radiation, pass the ceylon magnet.

New Book: Pathophysiology of the Visual System

Traditionally, the physiologist has not been very prompt in handing over his achievements to the clinician and the latter has always been very suspicious about messages coming from the physiological laboratory. Nowadays, however, in many advanced institutions, the reciprocal diffidence between clinicians and physiologists is slowly being replaced by collaboration. This Workshop is an example of such progress.

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