

NEWS in Science and Technology

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The following is an Executive Summary of the Academy's quarterly Bulletin (Vol. 20,1) that includes topics and issues in science and technology deemed by the Academy to be both timely and relevant to Connecticut's interests. Each item is briefly summarized from press releases and reports of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. Hyperlinks are included to the original online source, where more detailed information is available.

NOTE: Online versions of this newsletter and the Bulletin are available on the Academy website at www.ctcase.org.

FEATURE: BIOMEDICAL ENGINEERING

➤ Biomedical Engineering in Connecticut

One of the youngest and fastest-growing engineering fields, (particularly among women), biomedical engineering (BME) combines engineering design expertise with medical or biological science.

- Specialties within BME include: biotechnology; physiologic modeling, simulation and control; biologic effects of electromagnetic fields; biomechanics; biosystems; biomedical instrumentation; medical imaging; prosthetic devices and artificial organs; rehabilitation engineering; ergonomics; medical informatics; clinical engineering; and bioengineering.
- BME has great potential to improve quality of life, contribute to economic growth:
 - Robotics, imaging technology and genomics "greatest examples of promise BME holds for the future."
 - US leads world in BME with more than \$6 billion in annual exports of medical device and biotechnology products.
 - Ten-fold increase in number of CT bioscience companies in last 10 years, from 10 to 40; projected to double to 80 in next 10 years:
 - BEACON (Biomedical Engineering Alliance and Consortium) dedicated to developing and commercializing new medical technology, including BME.
 - Biggest issue for CT startup companies is capital.
 - Recent report shows state's infrastructure poised to support growth in medical device sector of economy.
 - "Potential job market is enormous for people with the right combination of knowledge and creativity."
- In 2001, UConn became first public university in New England to offer an undergraduate program in BME.
 - Undergraduate program offers six different tracks and numerous elective BME courses.
 - Select freshmen offered opportunity to apply for acceptance into the UConn School of Medicine.

[See <http://www.ctcase.org/bulletin/bme.html>]

HEALTH

➤ Hold Complementary and Alternative Therapies (CAM) to Same Standards as Conventional Ones

A new report from the Institute of Medicine advises that complementary and alternative medical treatments be held to the same standards as conventional treatments for demonstrating clinical effectiveness. It says:

- Same general research principles should be followed in evaluating both types of treatments, although innovative methods to test some therapies may have to be devised.
- Congress should amend regulation of dietary supplements (important component of some CAM therapies) to improve quality control and consumer protections and create incentives for research on the efficacy of these products
- Use of CAM therapies is widespread among Americans.
- Common set of methods and standards for generating and interpreting evidence is necessary.

[See <http://www.nap.edu/catalog/11182.html>]

➤ Data Show No Health Risk From Cape Radar Site

Available scientific data provide no evidence of adverse health effects to Cape Cod residents from long-term exposure to radio-frequency energy from the nearby US Air Force PAVE PAWS radar installation (a phased-array warning system designed to detect and track sea-launched and intercontinental ballistic missiles), according to a new report from the National Research Council. The report, which follows up on the findings and recommendations of two 1979 National Research Council studies that examined the safety and possible health effects of the radar, found:

- No increase in the total number of cancers or in specific cancers of the prostate, breast, lung, or colon due to radiation exposure from the Air Force installation.
- A few biological responses in the scientific literature to radio-frequency exposures that were statistically significant; while such responses do not necessarily result in adverse health effects, the report recommends additional studies.
- No evidence of a mechanism or pathway by which levels of radio-frequency energy similar to those emitted by PAVE PAWS could change biological processes.
 - Recommends additional biological studies to investigate possible health effects of PAVE PAWS exposure in cell and animal systems, and requests studies of plant growth in the vicinity of PAVE PAWS, such as tree-ring growth before and after the radar went into operation.

[See http://www.nap.edu/catalog/11205.html?onpi_newsdoc01132005]

➤ Health Implications of Perchlorate Exposure

A new report by the National Research Council on the health effects of perchlorate, a chemical that in high doses can decrease thyroid function in humans and that is present in many public drinking-water supplies, says daily ingestion of up to 0.0007 milligrams per kilogram of body weight can occur without adversely affecting the health of even the most sensitive populations. The report, prepared at the request of the

HEALTH (continued)

federal government to address controversies over scientific conclusions as US Environmental Protection Agency (EPA) considers a national standard for acceptable perchlorate levels in drinking water, concludes that:

- Environmental releases of perchlorate, a component of rocket fuel and fireworks, have been discovered in 35 states.
- More than 11 million people have perchlorate in their drinking water at concentrations of 4 parts per billion or higher, more than 20 times the "reference dose" proposed by EPA.
- Evidence of tumors in rats does not support EPA's conclusion that perchlorate exposure is likely to lead to thyroid tumors in humans, because humans are much less susceptible to disruption of thyroid function or formation of thyroid tumors than rats.

[See <http://www.nap.edu/catalog/11202.html>]

ENERGY

➤ Methane Hydrate: A New Source for Natural Gas?

A new Research Council report finds that, while the US Department of Energy's (DOE) methane hydrate research program boosts the ability of US commercial interests and scientists to develop energy from gas hydrate and to understand potential geological constraints on drilling through hydrate, improvements are needed. It notes that:

- Methane hydrate, abundant in Arctic regions and beneath the ocean floor, is a highly concentrated source of natural gas.
- Accurately identifying hydrate deposits remains a challenge, and it is unclear how much of the world's vast reserves can actually be recovered.
- Methane is a greenhouse gas that has been widely cited as a factor in previous episodes of global warming; releasing methane from hydrate could affect global climate change.
- About 60% of the program's annual budget has gone to three large, industry-managed research projects:
 - Because of their size and price tags, special checks and balances should be implemented to aid such research efforts.
 - Reviews of project progress ought to be based on solid science, and results should be available in public databases.
- Program should closely examine links between methane hydrate and climate change.
- Greater scientific oversight of DOE's program is needed to ensure that key goals are met.

[See http://books.nap.edu/catalog/11094.html?infocus_4.3]

In Memoriam: D. Allan Bromley

One of the world's leading nuclear physicists, D. Allan Bromley, died February 10 at age 78.

The first person to hold the Cabinet-level rank of Assistant to the President for Science and Technology, Bromley served from 1989 to 1993 under George H.W. Bush.

He was founder and director of the A.W. Wright Nuclear Structure Laboratory at Yale from 1963 to 1989, where he carried out pioneering studies on both the structure and dynamics of atomic nuclei. He was considered the father of modern heavy ion science, a major field of nuclear science. He received numerous honors and awards, including, in 1988, the National Medal of Science, the highest scientific honor awarded by the United States.

Bromley helped found the Connecticut Academy of Science and Engineering, and always gave of his time when asked to guide and assist the Academy's work, contributing to several important in-depth studies; helping the Academy and the state create the Connecticut Medals of Science and Technology, chairing both the first and the most recent Awards Selection Committee for those awards; and helping guide the Academy's Initiative for Science and Technology. His work will have a lasting impact on the state's science and technology programs. He will be deeply missed by the Academy.

Our Thanks to Academy Sponsors

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