

Sesquicentennial prompts recognition of science legacy

by Jeanette Steinert

As in this sesquicentennial year every aspect of Kansas culture is ripe for recognition, it only seems right that science should get its due in Kansas history.

After all, we weren't just clod-busting in the 1860s. Founded in 1868 as the Kansas Natural History Society at what is now Washburn University, the Kansas Academy of Science (KAS) is the oldest

society of its kind west of the Mississippi and thought to be the second oldest in the U.S. (after one in Connecticut).

The work Kansas scientists have done over the past 150 years has impacted not only Kansas, but often the nation and the world.

In 1890, entomologist (and co-founder of the KAS)

Francis Snow discovered a solution to a ruinous chinchbug infestation, saving corn crops in Kansas and surrounding states.

Early Kansans made big differences as part of the United States Department of Agriculture. As a plant explorer for the USDA around the turn of the century, David Fairchild introduced alfalfa, soybeans, pistachios and other crops to the U.S. Walter Swingle helped develop hardier citrus plants and saved Florida's citrus industry.

During the same time period chemist Elmer McCollum discovered vitamins A and B, and found that vitamin D helps prevent rickets; while in medicine Dr. Walter Sutton is famous for the Boveri-Sutton Theory which explains that hereditary information is carried in the chromosomes.

In 1905, physicist Ernest Fox Nichols proved that light exerts pressure, information important to astrophysicists as they study the stars. The same year Hamilton Cady and David McFarland discovered that helium could be extracted from natural gas. Before that it had been thought that helium could

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Left: The SCIENCE in KANSAS--150 Years and Counting trading card project features scientists both past and present.

Governor's Proclamation 2011

Whereas, 2011 is the 150th anniversary of Kansas' entry into the Union; and

Whereas, that event was commemorated by the state's motto, Ad Astra per Aspera; and

Whereas, Kansas has a long history of leadership in aeronautics and aerospace innovation; and

Whereas, Kansas' future economic renaissance encourages development of opportunities in manufacturing, aerospace, scientific and technical services, energy, bioscience and technical innovation; and

Whereas, in April 1990 Kansan Steve Hawley was Mission Specialist 1 on the shuttle mission to launch the Hubble Space Telescope; and

Whereas, Kansas' legacy to science and technology includes Nobel Prize winners and astronauts as well as cutting-edge research in astrophysics, information technology, bioscience and nanotechnology; and

Whereas, all these accomplishments are dependent on excellence in science, technology, engineering and mathematics; and

Whereas, Kansans have chosen "Ad Astra per Aspera," or "To the Stars Through Difficulties" as the state motto:

NOW THEREFORE I, Sam Brownback, Governor of the State of Kansas, do hereby proclaim April 23, 2011, as

Ad Astra Kansas Day

and encourage all citizens, university, business and government leaders to look to the stars and celebrate, encourage and promote the scientific achievements of our state and its citizens.

NOTE: Over the past ten years our organization has been granted six proclamations by three governors of an Ad Astra Kansas Day to celebrate science in Kansas. The plans are next year to submit a request to the state legislature for a permanent designation.

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Ernest Fox NICHOLS 1869-1924

- Born in Leavenworth. Because of poor health he was homeschooled by his mother.
- Orphaned at age 15, he went to live with his aunt and uncle in Manhattan.
- Graduated from Kansas State University.
- Famous for his work on infrared radiation. He proved that light exerts pressure, information important to astrophysicists as they study the stars.
- Also known for the Nichols radiometer, a device for measuring stellar radiation.
- Did radiation research for General Electric.

EXTRA COOL: Nichols was one of the most famous scientists of the time and was friends with Albert Einstein.

Project of the Ad Astra Kansas Initiative
www.adastra-ks.org

Ernest Fox NICHOLS
Physics
General Electric

2011 SCIENCE in KANSAS
150 years and counting



Judy Z. WU current

- Fell in love with physics and math in seventh grade.
- Wu is a University Distinguished Professor at KU and is leading a NanoTechnology for Renewable Energy Team.
- The team is devising improved and less costly solar panels and cells for capturing the sun's energy.
- By working with the atoms and molecules that make up materials, the goal is to make materials that will better hold on to the sun's energy so it can be used to light our homes or provide other power in the future.

EXTRA COOL: Received a KU Kemper Award for Teaching Excellence in 2006.

Project of the Ad Astra Kansas Initiative
www.adastra-ks.org

Judy Z. WU
Physics / Astronomy
University of Kansas

2011 SCIENCE in KANSAS
150 years and counting

Presentation on possible Kansas observatory to be given in Topeka

Wichita State University physicist Nickolas Solomey will give a presentation April 23 at Washburn University on the Auger North Cosmic Ray Observatory project which may be partially located in Kansas.

The presentation, which is free and open to the public, will be at 7 p.m. at the Stoffer Science Hall.

The internationally-funded Pierre Auger (Oh-zhay) Observatory Project studies the universe's highest energy particles which shower down on earth in the form of cosmic rays. After nearly a century of research, though low to moderate energy cosmic rays are fairly well understood, the high energy ones remain a mystery to scientists. The Auger project studies these high-energy ones.

The project consists of an already-operating observatory in Argentina, Auger South, and a correlating one to be placed in the northern hemisphere. The Auger North Observatory is beginning construction in eastern Colorado and may eventually extend into southwest Kansas also.

Solomey, chair of the WSU Department of Physics, will speak on the science of cosmic rays and explain this unique type of observatory which consists of strategically-placed tanks and buildings spread over 8,000 square miles including up to five counties in Kansas.

Solomey also works with Fermi Lab, the U.S. Department of Energy's national high-energy physics research laboratory and is a physics consultant to Cornell University's online scientific library.

The AD ASTRA KANSAS INITIATIVE in cooperation with Washburn University is sponsoring a

SPACE CELEBRATION

9th annual Ad Astra Kansas Day—
celebrating science in Kansas

- ✦ Planetarium shows
- ✦ Flight demonstrations
- ✦ Telescope displays
- ✦ Robotics demos
- ✦ "Space" ice cream
- ✦ JPL "Eyes on the Sky" virtual solar system
- ✦ Voyager model
- ✦ SKY-Q quiz for all ages
- ✦ Auger North presentation
- ✦ Crane Observatory stargazing
- ✦ High-altitude ballooning display
- ✦ Hands-on activities, take-aways and more...



**FREE- Fun
for all ages
Rain or shine**

Participants include:
Washburn University Dept. of Physics/Astronomy
Northeast Kansas Amateur Astronomers League
The Foundation for Aeronautic Education
Fundamental Technologies, LLC
Wichita State University Dept. of Physics/ Astronomy
American Assoc. of Civil Engineers /Kansas DOT
Washburn University Chemistry Club
NearSys
Space Age Publishing Company

5:30—10 p.m. Saturday, April 23

**Stoffer Science Hall —Washburn University
17th and Washburn, Topeka**

Interested in the Ad Astra Kansas Initiative? Find more info at www.adastra-ks.org

STICKING POWER: NEW PATENTED ADHESIVE COULD FIND PLACE IN SPACE

MANHATTAN — A recently patented adhesive made by Kansas State University researchers could become a staple in every astronaut's toolbox.

The patent, "pH dependent adhesive peptides," was issued to the Kansas State University Research Foundation, a nonprofit corporation responsible for managing technology transfer activities of K-State. The patent covers an adhesive made from peptides — a compound containing two or more amino acids that link together — that increases in strength as moisture is removed.

It was created by John Tomich, professor of biochemistry, and Xiuzhi "Susan" Sun, professor of grain science and industry. Assisting in the research was Takeo Iwamoto, an adjunct professor in biochemistry, and Xinchun Shen, a former postdoctoral researcher.

"The adhesive we ended up developing was one

that formed nanoscale fibrils that become entangled, sort of like Velcro. It has all these little hooks that come together," Tomich said. "It's a mechanical type of adhesion, though, not a chemical type like most commercial adhesives."

Because of its unusual properties, applications will most likely be outside the commercial sector, Tomich said.

For example, unlike most adhesives that become brittle as moisture levels decrease, this adhesive's bond only becomes stronger. Because of this, it could be useful in low-moisture environments like outer space, where astronauts could use it to reattach tiles to a space shuttle.

Conversely, its deterioration from water could also serve a purpose.

"It could be used as a timing device or as a

moisture detection device," Tomich said. "There could be a circuit or something that when the moisture got to a certain level, the adhesive would fail and break the circuit, sounding an alarm."

The project began nearly a decade ago as Sun and a postdoctoral researcher were studying the adhesive properties of soybean proteins. Needing an instrument to synthesize protein peptides, Sun contacted Tomich.

Serendipitously, Tomich's lab had developed a peptide some time ago that had cement-like properties. Tomich said he knew it was unusual but had set it aside to pursue other interests.

"When Dr. Sun and I resurrected this protein, we didn't use the whole thing — just a segment of it," Tomich said. "We isolated a certain segment where the cells are highly attracted to each other and form these fibrils."

Science-Q Answers

The following is part of an ongoing reference directory featuring representative research projects in Kansas. An Ad Astra Kansas' goal is to serve as an information hub in Kansas focusing on different areas of high-tech and space research for networking and educational purposes.

AEROSPACE

“Aeroelastic Modeling Effects and Flight Test Demonstrations of Resilient Adaptive Flight Controls on a General Aviation Testbed...”, Kenneth Barnard and Thomas Karcz, K-State Salina Aviation. NASA funding awarded 12-10.

ENERGY

“Development of Water-based, Critical Flow, Non-Vapor Compression Cycle”, \$68,738; C. Sorensen, J. Beck, S. Eckols, KSU Dept. of Mechanical and Nuclear Engineering. U.S. DOE funding 12-10.

ASTRONOMY / PHYSICS

“Heavy Quark and Neutrino Physics”, Glenn Horton-Smith, et al., KSU Dept. of Physics and Astronomy. U.S. DOE funding awarded 12-10.

INFORMATION TECHNOLOGY

“Communication Requirements and Integration Options for Smart Grid Deployment”; V. Aravinthan, V. Nambodiri, W. Jewell, B. Karimi, WSU Dept. of Electrical Engineering / Computer Science. Project sponsors Power Systems Engineering Research Center and U.S. DOE. Funding 2009-2011.

Sources: KSU Research / Sponsored Programs Awards, WSU Dept. of Engineering website

What's your Kansas Science-Q?

1) Who is the co-inventor of the search tool now known as Google Earth?

2) Who invented the microchip in 1958?

3) Which historical botanist who homesteaded in Ness County is in three American Halls of Fame?

4) Where did the internationally-known Olathe-based GPS corporation Garmin get its name?

5) Name the three astronauts from Kansas.

6) Which native Wichitan is a world-famous oceanographer, having found the Titanic?

7) Who invented Styrofoam?

8) This pioneer in the “green” movement founded the The Land institute in Salina in 1976.

9) Electrical engineer Richard K. Moore developed the wind scatterometer, a radar sensor that measures winds over the oceans, allowing weather forecasts farther in advance. With which university is he connected?

10) Which historical Kansan has fossils on display all over the world, including the Smithsonian in Washington D. C.?

11) How many Nobel Prizewinners in science have Kansas ties? Extra points for everyone you can name.

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only be found around the Sun and in rare minerals.

William Coleman invented a superior gasoline lantern in 1914—just in time to provide over 70,000 for American soldiers in World War I.

In 1924, biologist Cora Downs gained national attention for her work with the bacterial disease tularemia which provided a breakthrough in the understanding of how infections develop.

In 1927, Clyde Cessna and Lloyd Stearman were starting their own plane manufacturing companies, ushering in an era that resulted in Wichita being the aviation capitol of the world. Also with his eyes on the skies, Clyde Tombaugh discovered Pluto in 1930.

The examples above don't even take us half-way into our state history and many of these people are not well-known outside their fields.

Hence the reason for our Ad Astra Initiative Sesquicentennial project **SCIENCE IN KANSAS--150 Years and Counting** which is providing downloadable trading cards about 150 people in STEM fields in Kansas, both past and present, for teachers and students or anyone interested in science.

The goal is inform the public about our rich science legacy and to inspire Kansas youth to go into careers in STEM fields. This project will run through December 2011, with about a dozen new scientists being added each month.

One hundred fifty sounds like a lot of people, and it is, but there are literally hundreds and hundreds of worthy scientists, so this project only scratches the surface of our amazing legacy, both past and present.

To follow this project, go to www.adastra-ks.org

1) Brian McClendon. He is from Lawrence. 2) Jack Kilby. He grew up in Great Bend. 3) George Washington Carver homesteaded in Ness County. He is in the Hall of Fame of Great Americans, the National Inventors Hall of Fame and the USDA Hall of Heroes. 4) The Olathe-based company was founded by Gary Burrell and Min Kao. The name is a combination of their first names. 5) Ron Evans, Steve Hawley and Joe Engle. 6) Robert Ballard 7) A Gardner native, Otis Ray McIntire invented Styrofoam. 8) Wes Jackson 9) The University of Kansas. 10) Charles Sternberg.

11) FIVE. Jack Kilby earned the Nobel Prize in physics in 2000 for his invention of the microchip in 1958.

Earl Sutherland, Jr, earned the Nobel Prize in medicine in 1971 for his discoveries about hormones. Sutherland grew up in Burlingame and graduated from Washburn.

Chemist Frank Sherwood Roland, 1995 recipient for his work with ozone depletion was a member of the KU faculty from 1956-1964.

Physicist Norman Ramsey who earned a Nobel Prize in Physics in 1989 for his work dealing with the atomic clock spent a number of his growing up years in Kansas at Ft. Leavenworth and Topeka as his father was in the military. He planned to attend KU, but his father was reassigned again.

Agronomist Charles Rice of Kansas State University, was a member of the United Nations Intergovernmental Panel on climate change that received a Nobel Peace Prize in 2007. This was a peace prize, but his work is STEM work.

State Science Olympiad event held April 2

At the 2011 Kansas Science Olympiad state competition, held April 2 at Wichita State University, 30 schools from all areas of the state competed in each of two levels.

Winning the junior division was California Trail Junior High, Olathe. Second was earned by St. Thomas Aquinas Elementary, Wichita.

The high school division winner was Olathe East High, Olathe, with second place going to St. James Academy, Lenexa.

The Kansas Science Olympiad program, administered by Wichita State University's Fairmount Center for Math and Science Education, is part of a national program to encourage students in science and engineering fields. According to its website, the goal is for students to “learn science and have fun in the process.”

Students in both competition levels compete in 23 events. The five discipline areas are life sciences, technology and engineering, science inquiry, earth and space science and physics and chemistry.

Interstellar R&D

Ad Astra Kansas News

This "Interstellar R&D" feature in this Ad Astra Kansas News nineteenth issue continues an enterprise to research and gather information on the most important developments preparatory to humanity's greatest adventure — voyaging to the stars. Now, at millennium's turn, is an appropriate time for grand vision and forward thinking, and there are strong signs of a renaissance in interstellar travel thought and activity. This new feature and newsletter, thus, now set forth to develop a national / international / global clearing center and storehouse of knowledge and know-how for travel to the stars: Ad Astra. — Steve Durst, Michelle Gonella

OBSERVATION

Galaxy Forums in 2011 Advance 21st Century Education Globally

Expanding in 2011 to Shanghai, New York and Cape Town, the Galaxy Forum program of the Hawaii-based International Lunar Observatory Association (ILOA) continues pioneering 21st Century Education with its focus on observing and understanding our Milky Way Galaxy, our place in it, and beyond. Dynamic and unique Galaxy Forums since July 4, 2008, have developed in Hawaii in Kona, Hilo, Waimea and Honolulu; across the USA in California and Kansas, and around the world in Canada, China, India, Europe and Japan.

Observation of our Galaxy, its hundreds of billions of stars, and beyond, is most excellent in Hawaii, where the next generation Thirty Meter Telescope is advancing the Island's astrophysical leadership and renown as "Galaxy Central." Observation of the cosmos made knowable through communication forms the foundation of Galaxy / 21st Century Education, which enable Galaxy enterprise, Galaxy exploration and Galaxy development. As Virgin Galactic CEO George Whitesides recently noted, "It is our destiny...to access the solar system and eventually the rest of the galaxy."

And what a Galaxy of superlatives is our Milky Way home, as we daily learn. The Kepler Space Telescope now estimates 2 billion worlds similar to Earth and its life-nurturing conditions are possible Galaxy neighbors. New measurements by the VLBA ten 25-meter antenna array are redrawing the map of our Galaxy and its star-forming regions—confirming four spiral arms not two—and offering new possible explanations for the nature of dark energy; and the enormity of our Galaxy can be sensed in knowing that the record attached to the Voyager interstellar spacecraft has a projected lifespan of 1000 million years, which means those recordings of Earth sounds will never travel beyond our finite but immense Milky Way Galaxy.

The increasing discoveries in astronomical observation assure diverse, complex, and exciting 21st century growth of the ILOA Galaxy Forum architecture in America and Asia, Europe and Africa, Antarctica and beyond.

COMMUNICATION & TRANSPORTATION

A Starship in 100 Years?

Early this year, DARPA and NASA Ames Research Center brought in a small, specially chosen group of individuals to assess the possibilities of creating a starship in 100 years. DARPA funded the study, which examines organizational development only.

The study was conducted by a group of about 30 participants, with half chosen from NASA and DARPA. The other participants represented some of the most recognized space organizations—including SETI, Tau Zero Foundation, the Planetary Society and the X Prize Foundation—as well as members of the science fiction and entertainment industry.

The first issue examined was, "Why go to the Stars?" The attendees' votes favored Human Evolution, with the possibility of Contacting New Life coming in second. They believe that the general public would view Contacting New Life as the priority, with Human Survival running second. An assessment of funding sources, however, would place the priority on Discovery, with Human Survival running a very close second. It was agreed, though not unanimously, that an international effort was the most appropriate strategy.

The attendees also defined a number of logistical and technological Milestones or Goals that they believed would put them on track for a 100 Year Starship. In the near term, they recommended a five year milestone consisting of four accomplishments. First would be proof that habitable worlds exist. This would be followed by a credible plan, which would then be marketed to promote an international view of hope and produce a mainstream movie with huge receipts.

A decade out, goals would be much more technologically oriented, including a human landing on Mars, communications at faster than light speeds, the ability to generate life from computer code, and the capability to sink carbon on Earth faster than it is being created.

At twenty years, things seem to get easier, with the goals being an image of another Earth-like planet, a robotic / telepresent probe on Jupiter's moon, Europa, and closed system life support known as ECLSS. At twenty-five years, the ability to reflect energy off of an exoplanet would be required and at thirty years, a satellite to the Oort Cloud which is propelled, not by fuel, but by groundbreaking discoveries in physics. These new forms of propulsion will not only solve the problem of access to fuel while on a long journey, but will also dramatically reduce the weight of spacecraft.

Unfortunately, discussions of funding resources fell back on the typical ideas that some "wealthy supporters" would establish lasting endowments and that the deficit might be filled in by branding the "100 Year Starship" name and making huge, mainstream films which could supply astronomical profits.

Certainly one must question the credibility of using the entertainment industry as a "fundraising mechanism" since many big budget films with high profit aspirations are not moneymakers. It may seem easy to make a "Star Wars" in retrospect, but the huge investment is always a gamble.

Likewise, it might seem reasonable to find "wealthy supporters," but these are invariably shrewd business people who will want to support a well conceived and developed plan. It is not reasonable to look to wealthy individuals in the hope some of them will be willing to impulsively gamble with funding that has the capacity to do a huge amount of good wherever it is applied. When the 100 Year Starship has a well conceived and developed plan, funding will be obtainable from many sources.

Marc Millis, of Tau Zero, points out that there are a number of organizations—Tau Zero included—that are already working to develop a vehicle for interstellar travel. He rightly questions funding a million dollar study to create a new organization.

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