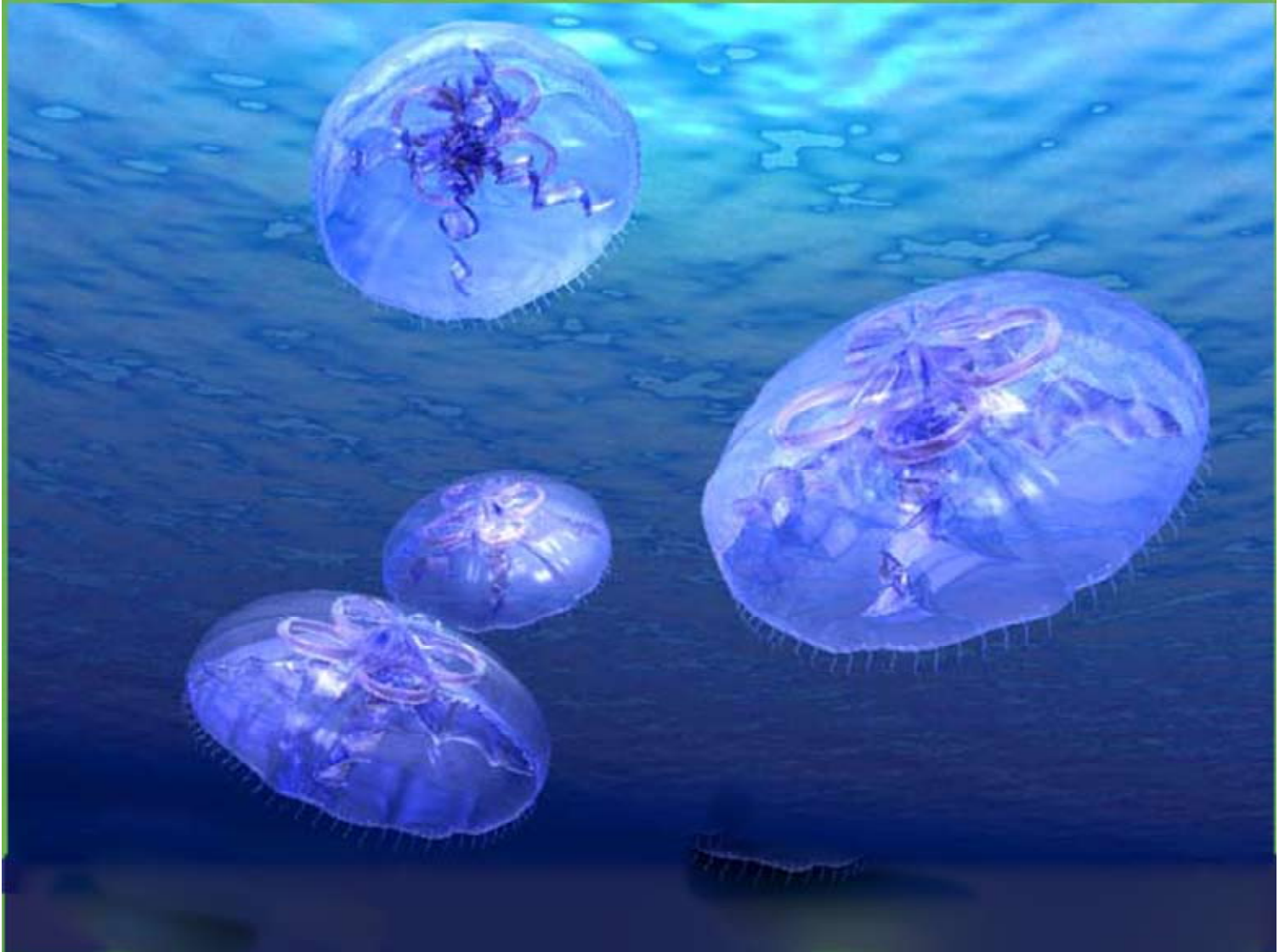


CONNECTICUT JOURNAL OF SCIENCE EDUCATION



Volume 45 No. 1
Fall • Winter 2007-2008

Connecticut Journal of Science Education

A Publication of the
Connecticut Science Teachers' Association

The Connecticut Journal of Science Education

Volume 45 · No. 1 · Fall Winter 2007-2008

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Moon Jelly artwork by Dave Barczak. ©2003, University of Delaware College of Marine Studies

Moon Jellyfish *Aurelia aurita*

Description & Behavior

The moon jellyfish, *Aurelia aurita* (Linnaeus, 1758), aka saucer jelly, moon jelly and common sea jelly, range between 5-40 cm wide. They can be recognized by their delicate and exquisite coloration, often in patterns of spots and streaks. Their behavior depends on a number of external conditions, in particular, food supply. *Aurelia* swim by pulsations of the bell-shaped upper part of the animal. Swimming mostly functions to keep the animal at the surface of the water rather than to make progress through the water. They swim horizontally, keeping the bell near the surface at all times. This allows the tentacles to be spread over the largest possible area, in order to better catch food. The coronal muscle allows the animal to pulsate in order to move. Impulses to contract are sent by way of the subumbrellar nerve net and are nervous in origin. The moon jelly has rhopalial centers, which allow it to control the pulsations. As the oxygen rate in the water goes down, so too does the respiratory rate of the jellyfish.

World Range & Habitat

Atlantic Ocean, Pacific Ocean, Indian Ocean: *Aurelia aurita* are found near the coast, in mostly warm and tropical waters (but they can withstand temperatures as low as -6°C and as high as 31°C). They are prevalent in both inshore seas and oceans. Their habitat includes the coastal waters of all zones and they occur in huge numbers. They are known to live in brackish waters with as low a salt content as 0.6%. Decreased salinity in the water diminishes the bell curvature and vice versa. An optimum temperature for the animals is $9-19^{\circ}\text{C}$. Biomes: reef, tropical coastal, freshwater lake.

MarineBio.org

<http://marinebio.org/print.asp?ref=http://marinebio.org/species.asp?id=231>

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The *Journal* is published two times a year — Fall Winter and Spring Summer. Articles from the membership or other science education sources —short or longer—about science education are welcome.



THE CONNECTICUT SCIENCE FAIR: IMPRESSIONS OF 60 YEARS OF SCIENCE INNOVATION

By Frank LaBanca

This year, the Connecticut Science Fair celebrates its sixtieth year of service to the students of Connecticut. The Fair offers students in grades seven through twelve the opportunity to present the results of their original, authentic, applied science research projects. The fair has a long, rich history of providing exciting experiences for Connecticut's motivated science students. It truly exemplifies a hands-on, minds-on, learning-by-doing experience for its participants. A student who conducts research with the guidance of teachers or mentors can present his or her results each March with over 500 students from around the state. As part of their project evaluation, they often share their research with practicing scientists in industry and academia. The top thirty-two middle school (Grades 7-8) students are invited to participate in the Discovery Channel Young Scientist Challenge and the top four high school students (Grades 9-12) attend the Intel International Science and Engineering Fair. One project is invited to compete in The National Stockholm Junior Water Prize.

George "Bob" Wisner has been involved with the fair for over 50 of its 60 years, first as a student presenter, to his current role as the Fair Director and Chairman of the Board. His unique insight into the science fair process and its benefits for students, coupled with his many years of volunteer service to Connecticut Science education have been admired and valued by teachers, professionals, and, of course, students alike. An exemplary engineer and multi-Patent recipient, Bob was recently inducted into the **Connecticut Academy of Science and Engineering** and he has been a long time fellow of the **Connecticut Academy for Education**. I had the opportunity to speak with Bob as he discussed the history of the fair, his perception of good student projects, and ideas about getting more students and teachers to participate.

CJSE: Bob, you've been involved with the Connecticut Science Fair for many years. Can you tell me a bit about the origins of the fair?

Bob: The Fair began in 1949 as a result of a concerned group of business leaders in Hartford. The businesses included the old, now defunct newspaper, *The Hartford Times*, and a couple of the insurance companies, including the Factory



Insurance Company. Albert I. Prince – that's a legendary name in the Hartford area – was the founder. You might recall that the technical high school in Hartford, Prince Tech, is named after him. Mr. Prince was the educational director for *The Hartford Times*. In my student days in the late 1950s, General Richard Henderson from *The Hartford Times* led the operation. David Congdon from Factory Insurance succeeded him, when the Fair incorporated in 1964.

These were the founding fathers. The Fair came about, because business leaders of the day were concerned that bright young students were not being attracted to the sciences and technology by the normal process of science education in the school systems. A concern that 60 years later is pretty much equivalent, I would say. That's how it got started.

CJSE: This was a regional fair in Connecticut. Didn't the National Science Fair begin a year later in 1950? Were we involved?

The Connecticut Science Fair did participate in the very first National Science Fair, which was a year after the Connecticut Fair's origin. As the story was told to me, the two winners, one boy and one girl, traveled by train with Albert Prince to the National Science Fair in Philadelphia. It was quite an event held at the Franklin Institute, featuring about 30 students.

CJSE: What an exciting beginning. Where did things go from there?

The Fair was run, generally in downtown Hartford in an exhibition hall near the train station. I remember going there as fifth or sixth grader with my mother to see the projects. I thought it was pretty neat.

Back then, the Connecticut Science Fair was called the Northern Connecticut Science Fair. There was also the Southern Connecticut Science Fair – which was basically Fairfield County. It faded out, somewhere, I guess, about the time our fair officially became the Connecticut Science Fair in 1964. When it disappeared, we assumed the role of being the statewide science fair, instead of just the northern

region. At about the same time, *The Hartford Times* faced its demise, and this triggered the Connecticut Science Fair into becoming a nonprofit Connecticut corporation.

CJSE: You participated in the fair as a student. Who turned you on to the science fair?

Bob: My student days involvement came as a result of the Hartford School System's hiring a science teacher named J Randolph Gibson. He was appointed to Kennelly School in Hartford. Gibson was brought in to activate that science program and bring the science fair process to Hartford. He joined this legion of activists. He was a seventh and eighth grade science teacher. I first met him in 1954 as my seventh grade science teacher. I participated in the fair every year seventh grade through twelfth grade.

CJSE: What was your experience like when you participated?

Bob: My first experience in the fair was in seventh grade. I earned second honors. My teacher, Mr. Gibson said, "Gee whiz you almost made it into the finals," which encouraged me greatly. It might not have been true, but those words inspired me. My project involved studying the transistor and building a transistor radio. It was a few years after the transistor was invented and it became commercially available for a price I could barely afford - \$5.00. The second year I came back with a rudimentary start of an electronic computer. Of course, back then you had to have 10,000 vacuum tubes to build something equivalent even to a modern pocket calculator. I designed something that would count to ten, and it didn't quite make it to the finals that year either, and I was getting a little flummoxed.

CJSE: What happened when you got to high school?

Bob: My freshman year, when I was at Hartford's Bulkeley High School, I made it to the finals and won. That inspired me, and I went and did another project during 1957-1958 school year. That was a big year - fifty years ago. Fifty years ago, right around this time, Sputnik was launched. That was the start of Wisner's fame. All of a sudden the administration of the school needed a science education benchmark - something to brag about. And I'll never forget this. Every Friday afternoon in the fall there would be the big pep rally at the school for the football team. I was sitting there attending an October Friday rally - it was required attendance, of course. We were all there chanting, and all of a sudden they stopped the program. They made me stand up and take a bow, along with the grunts from the football team, because I was the "light in the way for saving the

United States from the Russian threat". It was hysterical. I came home and didn't know whether to be embarrassed or what. But that was the beginning of "science was a big deal." The next thing you know, they had me and anyone else they could find that was doing science projects down at the Hartford Board of Education, showing our work to them. And of course Sputnik was causing a major uproar in activation of the sciences nationwide. In 1958, my project went on to win the Fair, and hence my first trip to the National Science Fair. I was really interested in audio that year, and I came up with a way to record stereophonic sound on a single track of a tape recorder. I thought I invented multiplexing. I actually didn't invent it, but I gave it a go and it worked. I thought it was a neat idea.

CJSE: So you won opportunity to go to the National Science Fair?

Bob: As a kid, it was very big deal for me. I won the right to go to the National Science Fair twice, both in 1958 and 1959. When I was a sophomore, in 1958, it was in Flint, Michigan. In 1959, *The Hartford Times* got really enthusiastic about the whole thing and brought the National Fair



to Hartford. It was in the state armory. Legend is - bringing

the National Science Fair to Hartford helped the demise of The Hartford Times by preying on its resources. That was legend from my old science teacher, Mr. Gibson. I have no idea whether it's true. It probably was, in part. It was a big deal – a very big deal. And if we went into the microfiches of Hartford we'd see all sorts of publications – all sorts of press. It was exciting. Except for me, it was somewhat of a disappointment because I desperately wanted to take another plane trip. After a short car ride, my father dropped me off at the Hartford Hilton and said, "You're here!" The year before I got to go to Flint, Michigan. It was my first plane ride.

I did not manage to win the Connecticut Fair in my senior year in 1960. I came in second, and the Fair didn't send second place in those days, so my turn had passed, which was OK with me. I was busy writing college scholarship applications by then.

CJSE: How did you go from being a student at the Connecticut Science Fair to being Chairman of the Board?

Bob: I attended the Fair through college, helping to judge or whatever was needed, if I had time in the semester and breaks were appropriate. I think I judged one year, early in my working career – I might have still been in college. And about that time, Gibson called and asked if I wanted to be on the Advisory Council. Then, some years later I got a call to come and be a member of the Board of Directors. I think that was around 1973. I was still fairly young back then wondering what I was getting into. But it seemed innocent enough. Then in 1974, I got a call at midnight. I was told there was a Board meeting, and I naively said, "Well I wasn't invited." "Well, it was a special meeting," and I was elected Chairman of the Board. I very quickly started involving people from my employer, United Technologies Corporation, as well other industry and academia people. We had some really great teachers involved, too.

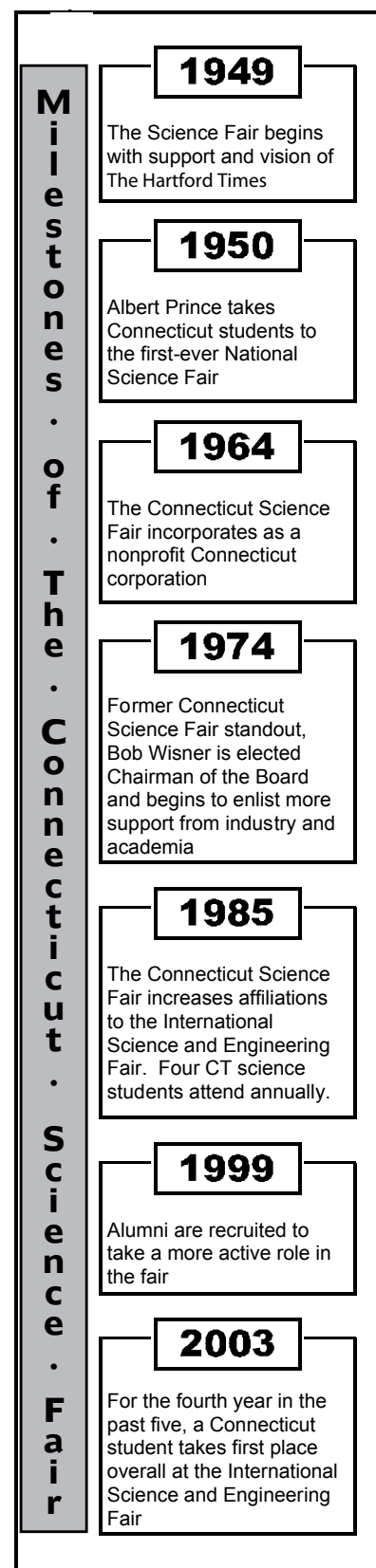
CJSE: What are some of the milestones of the Connecticut Science Fair?

Bob: The first big milestone was becoming a statewide event and a nonprofit corporation in the 1960s. That's clearly its first milestone. The next key milestone was in the mid 1970s reenergizing the fair's leadership with representatives from universities and Connecticut corporations to ensure its continuation. Then the next really big milestone was increasing the representation at the International Science Fair from two students to four. That occurred in 1985, made possible by a major commitment from United Technologies Corporation. Growing our alumni involvement is rela-

tively recent – identifying them as principle shareholders in the worth of the event and trying to keep track of them. That's been happening since 1999.

CJSE: I understand that you had a long career with United Technologies. Did your science fair experience have anything to do with that?

Bob: To make a long story longer, as a result of my success in the science fair, my high school Principal introduced me to the Director of Research at the United Technologies Research Center. There was a very limited summer student program run by the Director. There were only three of us, I think. One of our mentors was an electronics engineer and decided that I had something to offer, so they had me come back each summer. My second summer as an intern, I was going to RPI and I couldn't really afford it. I asked my boss if I got a degree from UConn would they hire me? And at that point they had a little caucus and said, "Absolutely, we'll hire you." Despite the fact that it was largely an MIT/Princeton-type operation, that assured the start of my career with UTC which was known as United Aircraft Re-



search Laboratories in those days. Hence I started my career as an intern working instrumentation and power sources for plasma physics experiments, high energy lasers, and very high power radio frequency generators. Which was exactly my dream. And that was all from the science fair.

CJSE: Wow, what a story! You had a long career at United Technologies. What stands out for you?

Bob: My research and product development efforts produced 14 patents over my career. My proudest technical accomplishment was the development of an automated clinical gait analysis system that was capable of analyzing real-time data of individuals with walking disorders. United Technologies donated it to Newington Children's Hospital,

CJSE: Let's talk a little bit about students and the types of projects they conduct. How is a science fair project different from science labs that take place in many classrooms?

Bob: The difference is clear. When you are doing science experiments in a school laboratory, you're often reliving a well-known question with a well-known outcome. For example, consider a chemical reaction with certain precipitants that come out of it. The difference of a highly successful project is the creative spark introduced by the student. Answering a new question, that in real winning projects, is a question that the student comes up with. It should be a very novel question that gets researched. A mentor might inspire it. It might be the result of discussions with a mentor. It might be the student's own research into some topic that causes him or her to pose a new question that hasn't been asked before or a new way to look at an issue. That, I think, is the key to this whole thing.

CJSE: What are some of the most memorable student projects? What makes them special?

Bob: In 1985 Mary Elizabeth Meyerand was deeply concerned with renewable energy and as a result developed a method for producing electrical power from ocean waves. She holds a patent based on her project. She is now an associate professor of Medical Physics and Biomedical Engineering at the University of Wisconsin, Madison doing fundamental research in magnetic resonance imaging. Meyerand's passion for science was clear from my first meeting with her as a seventh grade student. Many of our students who continue along a technology path have the common denominator of conveying their enthusiasm and insightful thinking in even a short interview. You just know that they are destined to stick to their passion.

There was John Kolenberg's mini-sea lab from Stamford Catholic High. Kolenberg was a two-year winner who developed a method to keep creatures living in an undersea laboratory that he built.

In 1982, Tim Tylaski investigated converting engine heat and exhaust gases into methanol fuel, a concept well ahead of its day. Tim went on to receive a Ph.D. in mechanical engineering and now runs Tylaska Marine Hardware, a racing sailboat marine fittings company that sells highly unique fittings that he invented. His hardware is found on all world-class racing sailboats.

Certainly Alice Havens from New Milford High, who developed a low cholesterol egg.

Another one that I think was fascinating was the ultrasonic larvicide – Michael Nyberg and his exploding mosquitoes. Michael used ultrasound to explode the air bladders of mosquito larvae. He and his father started a business selling the technology. Their website is at <http://www.larvasonic.com>. Interestingly Nyberg was inspired to investigate ultrasound-based larvicides as a result of winning our Fair in 2000 and while at the International Science and Engineering Fair touring the acoustic laboratories of Daimler Chrysler.

One fresh alumnus whose career is yet to be defined is Stephen Ingraham, a New Fairfield High School graduate who is now a sophomore at UConn. Stephen's senior project involved propagating a radio wave group velocity very near the antenna at speeds exceeding the speed of light. Seems contrary to Einstein, but Stephen cites accurately the 100-year-old research of Heinrich Hertz that shows the same results. The research is cutting edge and is not well understood by classical electrical engineers. But, wait and see. Signal transfer on microchips or photonic devices might someday use the phenomenon to continue along Moore's Law curve.

CJSE: I would like you to think about some of the great projects that have come through the Connecticut science fair. Can you please comment on these students' creativity?

Bob: There are two responses to it. There are students with true creativity of their own, and others that have taken, executed, and marketed a good idea that was given to them. Some students have been truly brilliant mathematicians and physicists. They are off answering their own questions and doing extraordinarily well. The idea comes from within. Whereas, we have other students that reach the same level and have seized upon an idea that has been given to them, and they know how to sell it. I would consider my ideal science fair competitor as one that wasn't given his or her

missions. He came up with them and ran with them. She might know what she wanted it to do from an engineering point of view and found a way to do it. And a lot of them are like that. We also see students that are given some of these tools and ideas by their mentors. These projects are also very successful and these students also go on to get great careers, nonetheless, because they are inspired by science, and continue to pursue their passions.

CJSE: What would you say about these students' intellectual ability?

Bob: That's a very good question. There are some incredibly bright students that have come through our process. Ones that can deal in theoretical physics, mathematics, and engineering. And they're clearly brilliant. That's one class of successful students. The other class are intellectually not at that level of brilliance, but understand the implication of their work and understand how to emphasize it and go persevere to make it work and market it. They are our next generation of "Edisons." They, too, have been extremely successful.

CJSE: How about task commitment?

Bob: In all cases, these students are all highly committed to making it happen. They'll put in whatever hours it takes to reach their goal. There's no doubt about it. The commitment is with true zeal. You don't need someone flogging them. They're flogging themselves – they're driving themselves as hard as they possibly can to reach their goals. They're goal driven people, clearly. That's a common theme in all of our successful students.

F: The Connecticut Science Fair reaches and gives opportunities to so many students across the state, yet I am personally surprised how many science educators don't know about it. What kind of message should they know about the fair?

Bob: The important thing for them to know is that it doesn't require a lot of effort on their part to become involved. They do not have to run a school science fair to send students to our fair. All a teacher has to do is identify one or two students that are obviously primed for an opportunity in the sciences or engineering where they could shine and show their talents. The teacher just has to send them our way. That's all you have to do. You don't have to have a massive structure. You don't have to put in many hours after school doing all of this, if you can identify a few and inspire them and connect them to us. Generally there seems to be the impression that you really have to run your own science fair to participate. Some middle schools do run fairs

and send the best from their fairs, but they don't have to. A school could just pick two or three students. That's how it used to be, even in my day. My science teacher didn't run a fair. He recruited those of us who he thought were really interested. He would do it through the science club we were in. You don't even need that anymore. We would love to see many excited students get involved.

The 2008 Connecticut Science Fair will be held March 11-15 at Quinnipiac University, Hamden, CT. For more information about the Connecticut Science Fair, visit their website at www.ctsciencefair.org

About the Author

Frank LaBanca is the Science Department Chair of Oxford High School, Oxford, Connecticut. He is currently completing his Doctorate of Education with his dissertation focusing on the impact of problem finding and idea generation on students' science fair projects. Frank serves on the advisory board for the Connecticut Science Fair. He can be reached at labancaf@oxfordpublicschools.org

