VJAS Voice

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In this new and exciting installment of the VJAS *voice*, we have many new and exciting articles from some stellar scientists. If there is ever anything you wish you could see in *The Voice*, do not hesitate to reach out to the editors!

-Noah Portner
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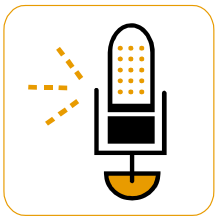

Letter from the president

First up, we have a letter from the VJAS president Shan Lateef addressing the VJAS community. Go to page two to read about Shan's aspirations, advice and excitement.

Advice on project topic

Having trouble choosing or refining a topic? Vice President Claire Morton has done a fabulous job giving some veteran advice for everyone with experimenter's block. Claire shows us that asking yourself a few easy questions can take you a long way.

Interview with past success

Does the name Ana Humphery ring a bell to you? No one would be surprised if it did! This young scientist has done remarkably during her tenure as a student. Now headed off towards a bright future, she leaves us with her inspiration and energy. Read the excepts of our interview with her on pages 4,5 and 6!

Letter from the President

Welcome to the 2019-2020 School Year!

Dear VJAS community,

I hope everyone is having a wonderful start to the school year.

It is truly an honor and privilege to be a junior officer serve as your president of VJAS this year. I started attending the VJAS symposia as an 8th grader and I have continued ever since. Being a part of VJAS and attending our annual symposium has become the grand finale of my last three school years. There is a palpable energy and excitement as hundreds of young scientists gather to enthusiastically present their findings to peers and more established scientists. This year I look forward to helping with the planning and execution of this monumental event.

For those of you who are seasoned VJAS attendees, welcome to a year of new possibilities or continued research in your chosen field of interest. To the newcomers, I have one piece of advice. Instead of trying to find an idea for a "science fair project" think about a problem facing the global community today and how you might use science or engineering to solve it. You may think that the world's problem are too complex or profound and cannot be singlehandedly solved by you, but many problems can be reduced to a tangible form or model and systematically studied. For example, while we may not be able to conduct human research and find cures for deadly diseases such as cancer we can use a variety of small model organisms to study cell proliferation and growth which simulate cancer. Let your imagination guide you and your passion propel you – then apply the science that you have learned within and outside your classroom.

Let's make this year's symposium at James Madison University the best one ever! I wish everyone academic success and fruitful scientific missions, until we meet in May 2010.

Yours in Science,

Shan Lateef

President, Virginia Junior Academy of Science

Advice on topic choices

Bio about Claire. . . Claire has graciously volunteered to answer some much-asked questions about new science projects. This advice should prove invaluable!

What part of STEM interests you the most?
Students at VJAS pursue projects in many different STEM fields. I have always been interested in making scientific discoveries, so I knew that I wanted to work in the sciences and, more specifically, do biology research. Some of my peers designed new technologies, putting their passion for engineering to use. Others worked computationally, analyzing data with their statistical skills. Which general area do you think you want to work in?

Who could you work with to do research?
Search around your area. Are there any laboratories that you could contact? Do you or your family know any researchers or engineers? Finding a mentor is not an essential part of completing your VJAS research. However, if you will need laboratory equipment to perform your project (for example, I needed to knock a gene out of yeast), you should look for a mentor. If you have a few different people in mind, read what they have published and look at what they are currently doing. Does it fit into your area of interest? Could you see yourself working with them? If so, contact them!

What exactly do you want to study?
Once you have determined your general area of study, you have to narrow it down. For me, this was the most difficult part of the research process. Did I want to research bacteria or elephants? Oxygen or carbon monoxide? A more efficient way to brush your teeth, or a device to make surgery easier for doctors? Reading recently published research in your area is an effective way to find out what interests you the most. Having a mentor can also be a great help in this process -- my mentor and I worked together to determine the specifics of my project. If you don’t have a mentor, try contacting your teachers at school and discussing your project with them. Choosing a research question can be difficult, but, once you narrow down your project, it will be easier to plan your methods and create a hypothesis, which are the next steps in the research process.

Ana Humphrey is now a well-known face in Alexandria, Virginia. If you've driven around town any time in the last few months you will have seen her face on the cover of the local paper in newsstands. This is because in March, Ana won the prestigious Regeneron Science Talent Search Competition, one of the most prestigious science competitions in the country. Ana is a VJAS alumna herself; she even won the opportunity to present at the Virginia Academy of Science. She was one of just three STS finalists from Virginia, the only Virginia finalist not from a magnet or private School, and the first Hispanic winner in decades. This fall, she is beginning her studies in astrophysics at Harvard.

Interview with Ana

Briefly introduce ColiFind and your research on exoplanets.
Over the past four years, I have developed ColiFind, a digital image analysis application to identify E. coli colonies in Coliscan Easygel water quality tests. To keep people safe, knowing how many bacteria are present in waterways is essential. However, accurate quantitative assays are expensive and difficult to perform, and more accessible, user-friendly methods struggle with accuracy. I created ColiFind to address the inaccuracies in the common citizen science test Coliscan Easygel that arise from the need to hand count and classify the cultured bacteria colonies detected by the test. Over the past two years, I also have conducted research to predict exoplanets, planets that orbit stars beyond our solar system. Over 2500 planets have been found using the Kepler Space Telescope, which discovers planets using the transit method. The transit method works by measuring the drop in brightness of a star when a planet passes in front and blocks some of the light, similar to how an observer standing outside a house at night would see a lit window flicker if a ball were thrown in front of it. Although the transit method has found the most planets of any planet-discovery method, a planet can be missed if it is not in our plane of view or if it is so small that it blocks an insignificant amount of its star's light. The goal of my research has been to determine whether such missing planets exist in systems where multiple planets already have been discovered.

How did you get interested in each subject, was it something in biology or physics class that inspired you to work on these projects, or personal experience outside the classroom?
I first became interested in science in my 7th-grade life science class. That year, instead of lecturing, my teacher armed us with the scientific method and challenged us to find and solve an environmental issue in our community. I investigated whether wetlands could reduce waterborne fecal coliform contamination. My classmates voted to continue my project, and, together, we planned and executed the restoration of a local wetland. I experienced first-hand how science could be a tool to discover the world around me and create positive change in my community. My environmental projects, especially ColiFind, have all stemmed from this desire to make the world a better place. My love for astrophysics was mostly born out of my curiosity and my desire to ask and answer deep and complex questions. Astrophysics is really the study of how the universe works and what our place is within it. I was inspired to research exoplanets after learning about how researchers at Caltech had used mathematical simulations to predict a 9th planet. I did more research and found that Neptune had also been discovered using math. I wanted to see if similar techniques could be applied to find exoplanets, and was thus led into the research I have been doing for the past three years.

Interview with Ana

With Intel pulling their sponsorship of ISEF, and Siemens shutting down their competition, what role do you think science fairs should play in getting kids interested in STEM fields? In other words, why is middle and high school science research important?
Middle and high school research is so important because it is one of the few structures that give students the opportunity to explore something they are passionate about in a meaningful and "real life" way. Science fair teaches real-world skills like project management, communication, scientific reasoning and thinking, and problem-solving.

You keep a detailed research notebook for your project. Could you talk a little about what you put in it, why keeping one has been important for your project, and why other students might consider using a research notebook themselves.
I keep everything in my research notebook! I try to log everything I do during my research, from summaries of conversations with researchers and mentors to logs of hours spent to, most importantly, records of all of the thoughts I have during the project. If you have to ask whether or not you should put something in your research notebook, you probably should.

Presenting one's research is a very important aspect of the scientific research process. For students who might stress out over their VJAS paper or oral presentation, what advice do you have?
.When creating the presentation, start by telling your story like you were explaining it to a relative and then flush it out with the specific technical details (hypothesis, procedures, data analysis and results, conclusions, limitations, and next steps). Make sure you talk about some of the challenges you've faced and how you solved them. On the day of your presentation, just have fun!

Was finding a mentor an important step in your research? If so, how did guidance from an expert in his/her field help your project, and for students looking for a mentor, what advice do you have?
The key to finding a mentor is doing sufficient background research and reaching out to as many people as possible until you get a response. See who is publishing papers in your field and email them or see if they are giving any talks in your area. It never hurts to reach out to someone as the worst they can do is not respond or say no (and even those who say no can often refer you to someone else who can help). Be persistent!

What was one thing you learned from doing and presenting research that you wish you had known before you started?
I wish I had known that it's okay to be uncomfortable. Scientific research is all about discovering something that hasn't been discovered before, which means that a researcher has to be comfortable going into a world of unknowns.

Lastly, do you have a favorite scientist? If so, how does his/her work inspire your own?
I would say that right now, one of the groups I look up to most are the female computers that worked at the Harvard Observatory in the late 1800s and early 1900s. Women like Annie Jump Cannon and Henrietta Swan Leavitt spent hours upon hours analyzing photographic glass plates covered in stars. These women made many of the breakthroughs that astronomy is based on today, including creating the stellar classification system and determining a method to calculate how far away stars are.