

issue 4

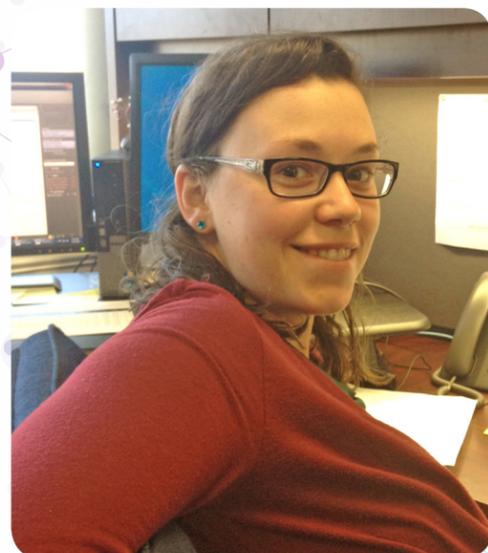
the neurite

west virginia's STEM magazine for students



Jordan Ratcliffe
Marshall University

Editor's Corner



Want a free subscription to future issues of the Neurite? Send us an email directly to neurite@wvresearch.org, to receive future issues.

If you want to stay connected between issues, please like us on Facebook: TheNeurite Follow us on Twitter: @TheNeurite

Did you know that health care - the application of health sciences - is the largest but still the fastest growing industry in the United States? Now, you do!

Do you know what this could mean for your future? Let me answer that one for you: There will be a variety of careers in the health sciences just waiting for you to grab once you finish your education. You will have a pool of jobs to choose from and probably even get to decide where you want to work. This is the best possible scenario you can hope for in your future.

But why are we even talking about health sciences? Although this field has the word "science" in its name, it's not always self-intuitive that the health sciences are part of the STEM fields. But by definition, health science careers apply STEM knowledge to improve and prolong the health of humans (and animals). There you have it!

In this issue, you will discover the vast opportunities the health science field has to offer as it incorporates many careers that spread across a great range of categories. There are careers that only require a high school diploma and a few months of training. On the opposite side of the spectrum are careers that require doctoral degrees, like a pharmacist (Pharm.D.) or the obvious one, a doctor of medicine (M.D.).

I hope that this issue of the Neurite opens your eyes to some not-so-obvious STEM careers and thus increases your array of potential careers to think about for yourself.

Happy reading!

Elisabeth Kager, Ph.D.
Former Education, Outreach, and Diversity Manager
West Virginia Higher Education Policy Commission
Division of Science and Research

From Health and Science Club to Medical School... or not

In this issue, the main story features three individuals: Jordan Ratcliffe, a third-year pre-med student from Marshall University (MU); Nathan Nichols, a Bluefield High School Senior; and Trent Pendleton, a PikeView High School Senior. What do those three students have in common, you might wonder? Well, they all participated in their high school's health and science club but despite this commonality, their paths are unfolding quite differently:

Jordan was part of Spring Valley High School's Science Occupations Academic Resources (S.O.A.R.) Club and is currently enrolled in MU's Accelerated BS/MD program (refer to page 11 for details about this program). Currently, she is studying Biology with the goal of becoming a physician in or around Huntington.



Ratcliffe

Neurite: When did you decide what your future career should be?

Jordan: During my sophomore year of high school, I took my first actual Biology class and was absolutely fascinated with the material because it provided such a deep understanding of the world we live in and gave me just enough information to begin grasping how complex life itself is.

N: So, S.O.A.R. Club didn't help in this decision?

J: No, I knew my career path before I joined but my two-year membership was packed full of fantastic experiences and networking opportunities. I learned a lot about MU's Accelerated BS/MD program, received resources that helped with the application process, and I got to see many fun demonstrations by different physicians during club meetings.

N: Why did you decide to go to MU?

J: Marshall's medical school was my first choice because it's close to home. I've lived at home and commuted to class every year so far, which saves me a lot of money, lets me spend more time with family, and allows me to participate in community outreach efforts that primarily benefit people in or around the community I grew up in. I knew it would be tough to get in, but ultimately I had nothing to lose and everything to gain.

N: Is that also why you want to eventually practice medicine in Huntington?

One of Jordan's most favorite experiences in her program was shadowing a doctor, her clinical mentor, employed by MU's Department of Family Medicine. Jordan gained clinical experience in various medical environments, got a glimpse of a physician's work life, and was able to narrow her specialized career choices to family or emergency medicine.

J: Yes. It's important to me that I stay home to practice because Huntington obviously has a very bad reputation that has only worsened lately, but I love this place and want to do what I can to make a positive impact on the community.

N: Jordan, why these two specializations?

J: I genuinely could not be more intrigued with the work my clinical mentor does daily because of the amazing variety of patients and illnesses she could encounter on any given occasion. I was so impressed by the range of knowledge she possesses that allows her to handle virtually any patient with any problem.

N: But don't family doctors usually see mostly established patients for wellness visits or preventative care?

J: Yes, oftentimes that's true. I actually shadowed a different family doctor during high school who did just that and I was not overly excited by what I saw. I'd just rather see patients who have an acute problem because thinking critically to make a diagnosis and develop a treatment plan on the spot is exciting for me, whereas follow-up type visits seem a little more monotonous. I think emergency medicine would give me the best of both worlds, so to speak. I'd have to possess the same range of knowledge of a family doctor, and every patient I'd see would be acutely ill or injured. I can't imagine ever getting bored with that line of work.

N: You are probably right about that! Now, let's touch on your college experience a little bit more. Could you tell us about one of the challenges that you faced?

J: Before starting freshman year, I believed that college would be harder than high school, but not drastically so because I had actually studied quite a bit throughout high school. However, even though I came in with a good work ethic, the studying I did for my most difficult classes in high school did not prepare me for the volume of material we were expected to fully understand in college. I feel like that first semester was harder for me than it should have been because I didn't come in mentally prepared.

N: What advice would you give students so they can cope with this drastic change?

J: In college, you are often given pretty insubstantial, vague PowerPoint notes, and told to read a relatively large range of chapters in a textbook, for which not even the most efficient student may have the time. In that case, you have to be ready to take your education into your own hands and use other resources to learn the material. Knowing which studying techniques work best for you will make it easier to get into a steady rhythm from the start, and keep you from falling behind while you try to learn how to study.

Trent will be starting on his long road to becoming an anesthesiologist by attending WVU in the Fall majoring in pre-med Biology.

Neurite: Trent, why did you join your school's health and science club?

Trent: I knew I was going into the medical field so I thought this club would help me experience different pathways within this field. I really liked all the professionals that came to the meetings because I learned so much about different career opportunities. These role models helped me narrow down my options and feel more confident in my ultimate decision.

N: So, what is your ultimate decision?

T: Anesthesiology.

N: How did you get interested in that?

T: In eighth grade, we participated in a survey and the medical field was my projected field. I looked into careers in that area and anesthesiology caught my eye because it was posted as one of the most challenging and I love a good challenge. Before this, I had no idea what I was going to do for a career.

N: Is it daunting to think of the long path to becoming an anesthesiologist?

T: It does a little, but I just have to keep reminding myself that it will all be worth it when I'm done. To deal with this, I do have to have my support group, which are my family and friends. As long as I stay persistent and work towards my goal, it doesn't faze me as much.

N: Do you have any advice for your younger peers?

T: Challenge yourself! Even if you think you won't do well in a course, colleges like to see students take on obstacles. Also, take part in clubs as your involvement establishes your ethic towards certain groups, develops leadership and team skills and colleges love to see a well-rounded student.

Although Nathan was not swayed to study STEM by participating in the health and science club, he gained confidence in his decision to study business administration at Concord University by giving STEM a proper chance. Also, touring a college for the first time helped him realize what to look for and what will be expected.

Neurite: Nathan, what did you like about your school's health and science club?

Nathan: I have thoroughly enjoyed getting to hear from various STEM professionals such as paramedics, a DNA researcher, and a physiologist just to name a few. Another great aspect was a trip to MU to tour their forensic house and science departments. This trip was very helpful in expanding my knowledge of not only forensic science but also college itself because I had never toured a college before.

Ne: Has your club participation helped you decide on a career?

Na: While I have enjoyed learning about various STEM fields, it has not really helped me decide on a career. I am interested in going into business and politics rather than the sciences, but science club has opened my mind to how I might fit into a STEM career.

Wheeling Hospital
 Wheeling, W.Va.
Medical Technologist

Diagnostic Services: Perform medical tests and procedures as well as occasional experiments whose data lead to diagnosis, treatment, or prevention of diseases.

*Bachelor's Degree in Medical Technology**

LHC Group
 Parkersburg, W.Va.
Certified Nursing Assistant

Support Services: Provide non-medical, in-home assistance to elderly, like cooking, cleaning, or preparing daily medication intake.

Nursing Assistant Certification + CPR Certification

State of West Virginia - Lincoln County Health Department
 Hamlin, W.Va.
Nurse Practitioner

Clinical Services: Diagnose and treat advanced healthcare needs, especially addiction issues, in a public health setting, as well as supervise other nurses.

*Masters Degree**

WVU Research Corporation
 Morgantown, W.Va.
Health Care Associate II - Clinical & Pharmacologic Research Center

Biotechnology Research & Development: Provide clinical support in the research studies– administer drugs, collect data (drawing blood, getting specimen, performing glucose tests), and process data.

Licensed Practical, Registered Medical Assistant, or EMT + CPR Certification

Pocahontas Memorial Hospital
 Buckeye, W.Va.
Speech Therapist

Therapeutic Service: assess, diagnose, prevent or treat communication and swallowing disorders

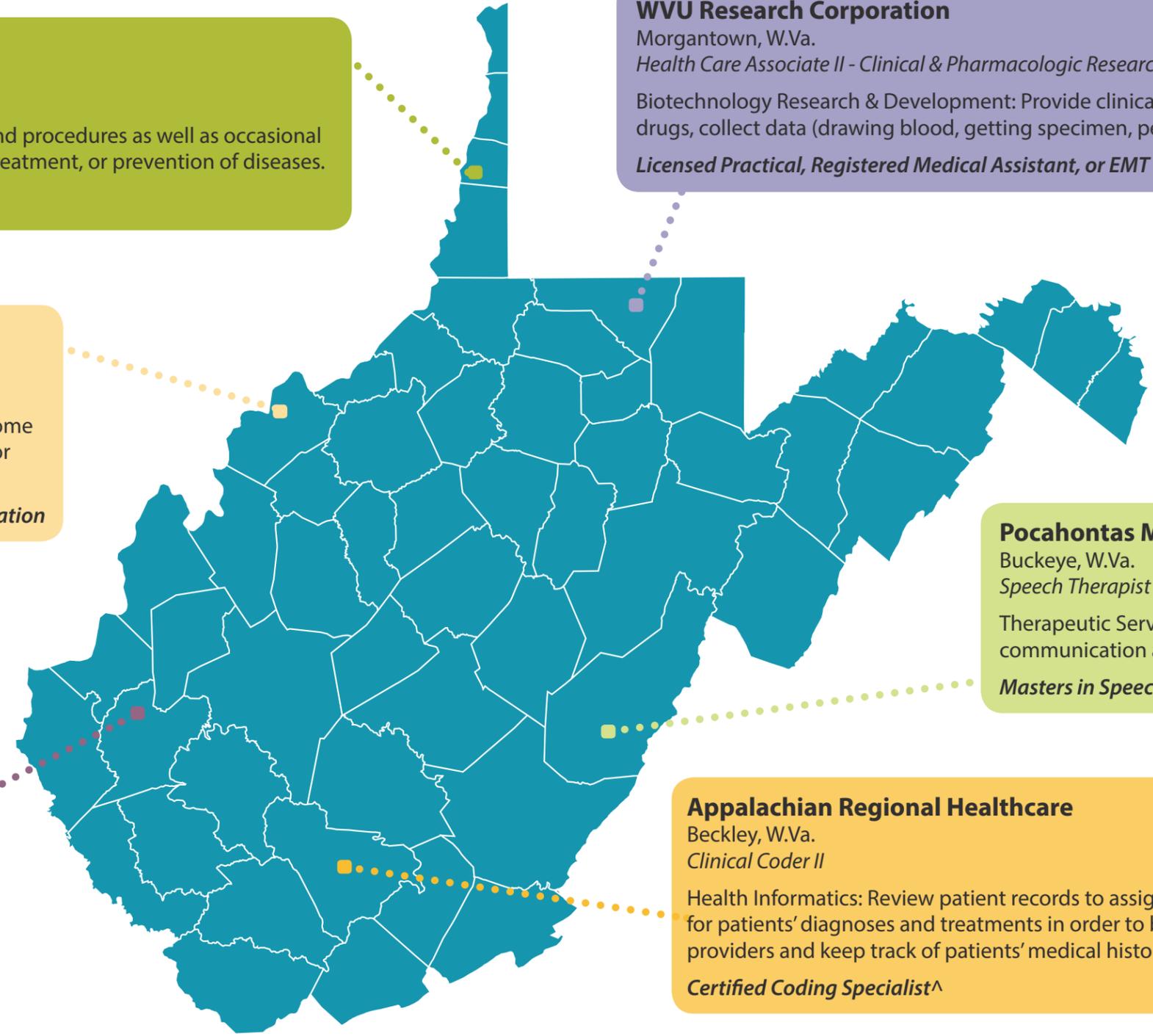
*Masters in Speech Language Pathology**

Appalachian Regional Healthcare
 Beckley, W.Va.
Clinical Coder II

Health Informatics: Review patient records to assign proper codes for patients' diagnoses and treatments in order to bill insurance providers and keep track of patients' medical history.

Certified Coding Specialist^

- Clinical
- Diagnostic
- Therapeutic
- Biotechnology Research
- Support
- Health Informatics



where do health science
 some job options available

professionals work?
 right now in the field

What's so special about nursing?



As you have seen, nursing is just one of the many health science careers out there but there are two good reasons why it is valuable to take a closer look at this particular career.

For one, nursing isn't a typical STEM degree and is not always listed as such because not everyone considers it to be part of STEM at all. You may be surprised, though, that there are plenty of STEM aspects to a nursing degree. For instance, a student going for a Bachelor of Science degree in Nursing has to take classes such as General Chemistry, Microbiology, General Biology, Human Anatomy, Human Physiology, and Introduction to Statistics, all of which sound pretty STEM-like, don't you think? And these do not even include all the nursing and health specific classes! So, to some, nursing might not be included in STEM itself but nurses very well apply STEM knowledge to help people stay healthy so, let's just leave it that.

The second reason nursing is interesting is there are so many kinds of nurses and specialty nurses that require different types or levels of education. There are varying ways of making an impact in the field as well as plenty of opportunities to grow and rise up the ranks. You may want to start your nursing career as a certified nursing assistant to get a taste of the nursing profession. Once you decide this profession is for you, you can enroll in one of the many different programs to become a licensed practical nurse, a registered nurse, an advanced practice registered nurse, or, if you are more interested in the patient outcomes and nursing practice, a nurse educator or researcher.

Check out the infographic on the next page for more information on each one of those levels of nursing.



A career ladder to climb

DOCTOR OF NURSING PRACTICE (DNP)/ DOCTOR OF NURSING SCIENCE (DNS)/ DOCTOR OF PHILOSOPHY IN NURSING (PH.D.)

Doctoral Degree

Job Duties: Become a Nurse Educator, improve patient outcomes as a Nurse Researcher, or practice in clinical settings

Average Annual Salary: *Dependent on type of Doctoral Degree*

ADVANCED PRACTICE REGISTERED NURSE (APRN)

Masters Degree

Job Duties: Provide specialized care as, for instance, a Clinical Nurse Leader, Nurse Administrator, Nurse Midwife, Nurse Informaticist, or Nurse Educator

Average Annual Salary: *Dependent on specialty*

BACHELOR'S OF NURSING DEGREE (BSN)

Job duties are similar to ADNs with the following differences: Opportunities for leadership positions and managing roles; specialization opportunities, like being a labor and delivery nurse or pediatric nurse

Average Annual Salary: *\$64,730* (Morgantown)*

REGISTERED NURSE (RN)

Associates Degree (ADN)

Job Duties: Assess patient needs, monitor patient symptoms, recommend care plans, educate patients on disease prevention and maintenance

Average Annual Salary: *\$59,620^ (Morgantown)*

LICENSED PRACTICAL NURSE (LPN):

Nursing Diploma + National Licensure

Job Duties: Register patient vital signs (heart rate and blood pressure), collect blood samples, administer medications

Average Annual Salary: *\$34,170* (Beckley)*

CERTIFIED NURSING ASSISTANT (CNA)

H.S. Diploma + Nursing Assistant Training + CNA Certification

Job duties: Assist nurses with patient admittance & vital recording; provide basic care, such as feeding, dressing, bathing, and transporting patients

Average Annual Salary: *\$24,000* (Weirton)*

For more details about nursing, please visit West Virginia's own nursing resource at <http://www.futureofnursingwv.org/nursing-education-toolkit>.

*2017 salary data provided by the Bureau of Labor Statistics for the city listed in parentheses
^2018 salary data provided by nursesalaryguide.net

Rural health initiatives and why we need them

Did you know about half of West Virginia's population lives in a rural area? Maybe. But did you know this presents significant challenges to meeting the health care needs of those same 50 percent?

One challenge is definitely to recruit and keep primary care physicians (oftentimes also called family doctors because they are a family's first stop when seeking medical care) in rural areas. But why?

Rural areas have small populations. Therefore, they often lack the presence of a nearby hospital and have a shortage of family doctors, as well as specialized professionals, such as a heart specialist (cardiologist) or an allergist (immunologist). Without the support of other professionals, rural doctors struggle to serve their population properly, which often causes them to leave. So, the rural areas that already have a low supply of physicians are more likely to lose them, which feeds back into the problem. Often doctors who did not grow up in rural areas themselves, and who are unfamiliar with small-town culture, move to more metropolitan areas. So what are we to do as a rural state to improve the availability and quality of healthcare?

Well, get our very own students – you – interested in health science careers because you know and most likely love your state and are more likely to stick around after your education has ended. Those who grew up in our state are more likely to give back by medically caring for family, neighbors, and fellow West Virginians.



West Virginia's three medical schools have started rural health initiatives to support young people like you to ultimately improve rural health care in the state.

All three schools provide high school pipeline programs to spark students' interest in health careers. They also provide programs for undergraduates who are studying pre-med or pre-health fields. These are meant to fuel students' health career interest even further and some are intended to introduce them to the special field of rural health care in the hopes of awakening a passion for it. The medical schools also provide graduate and post-graduate rural health initiatives.



Marshall University Joan C. Edwards School of Medicine

High school pipeline program reaches 29 schools in 16 counties with activities including lectures from various healthcare professionals, trips to MU's anatomy lab, and hands-on suturing workshops. To find out if this program exists at your school, ask your biology instructor.

Health Care Pipeline Initiative is a four-week residential summer camp immersing high school students in seminars and activities on careers in pharmacy, medicine, other health care fields, sciences, and engineering.*

Accelerated BS/MD program is a very selective degree program. The 10 students that ultimately get accepted graduate with a Bachelor of Science degree in three instead of the traditional four years and if they pass all their undergraduate requirements, they automatically move up to MU's medical school without having to pass the Medical College Admissions Test (MCAT) and on top of that, get all four years of medical school tuition paid, which is a really big deal!

Summer Academy is a one-week, hands-on, residential immersion experience for undergraduate pre-med students to help them prepare for medical school.*

•Project P.R.E.M.E.D is a week-long program that exposes undergraduate students of color to the life of a medical student in medical school.*

* For more information on these programs, please visit: <https://jcesom.marshall.edu/news/musom-news/summer-pre-med-programs/>

West Virginia School of Osteopathic Medicine

High school pipeline program introduces students to underserved and rural medicine opportunities by offering activities such as CPR training in schools, anatomy lab tours on campus, and the "Just say KNOW to Drugs" pharmacology summer camp.

Green Coat Program exposes undergraduate students interested in a healthcare profession or medical school to the daily responsibilities of health care professionals working in a hospital environment through shadowing them. (<https://wvsom.edu/Programs/rhi/pipeline-premed>)

West Virginia University Health Sciences Center (WVUHSC)+

Middle and high school pipeline program provides students with health career presentations by health professionals, a health career day, and a very selective shadowing program.

Rural Health Day offers selected pre-health students interactions with practicing rural physicians as well as hands-on workshops in the hopes to increase interest in practicing rural medicine in West Virginia.

Rural Undergraduate Shadowing in Healthcare (R.U.S.H) Program provides undergraduates interested in a health career insight into what being a health professional in rural West Virginia is like through first-hand experience by shadowing a rural health professional. (<http://www.hsc.wvu.edu/icrh/students/rush-program/>)

+WVUHSC includes School of Dentistry, Medicine, Nursing, Pharmacy, and Public Health



West Virginia Science & Research
West Virginia Higher Education Policy Commission
1018 Kanawha Boulevard East, Suite 1101
Charleston, W.Va. 25301
304.558.4128
wvresearch.org



A cryptogram is a puzzle in which text has been encrypted by substituting each letter with a number or a letter other than itself. This method is called substitution cipher. It is usually solved by trial and error by recognizing letter combinations that are common, like "th," "sh," short words like "is" or "a," or double letters, like "ll" or "ee."

Two quotes about health science by two of WV's own high school teachers are encrypted below. One quote was encrypted using letters, the other one using numbers. To get you started, one or two clues are provided for you. Good luck!

**FVMILF H KGVTKV GH M DGVIU LFML OGII KCTLGTRV LC PACO MH L FV
XCXRIMLGCT MPVH. L F VAV GH M TVVU DCA L F VHV L JXVH CD KMAVVAH MTU
CTV HFCRIU WV MWIV LC DGTU M ZCW GT ZRHL MWCRL MTJ XIMKV. HRKF
KMAVVAH MAV MIHC BVAJ AVOMAUGTP MTU XMJ OVII.**

-Susan Eastham, Spring Valley High School Science Department Chair

Clue: O ⇔ W

**A ⇔ _____, B ⇔ _____, C ⇔ _____, D ⇔ _____, F ⇔ _____, G ⇔ _____, H ⇔ _____, I ⇔ _____,
J ⇔ _____, K ⇔ _____, L ⇔ _____, M ⇔ _____, O ⇔ _____, P ⇔ _____, R ⇔ _____, T ⇔ _____,
U ⇔ _____, V ⇔ _____, W ⇔ _____, X ⇔ _____, Z ⇔ _____**