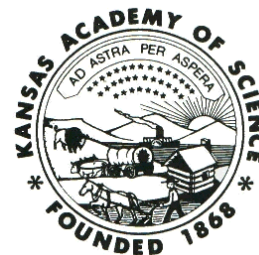


# KAS BULLETIN



## NEWSLETTER OF THE KANSAS ACADEMY OF SCIENCE

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January, 2019



## 151<sup>st</sup> ANNUAL MEETING OF THE KANSAS ACADEMY OF SCIENCE

March 29<sup>th</sup> -30<sup>th</sup>, 2019

Johnson County Community College  
Overland Park, Kansas



Regnier Center

Online registration and abstract submission information will be available at the meeting website starting February 1 for early bird discounts. Annual Meeting Website:  
<http://www.jccc.edu/conferences/kansas-science-entomology/index.html>

Questions regarding the meeting should be addressed to:

Mark LaBarge ([mlabarge@jccc.edu](mailto:mlabarge@jccc.edu)) or Lori Slavin ([lslavin1@jccc.edu](mailto:lslavin1@jccc.edu)).

### Friday's Events:

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**1:00-4:00 PM**

**Field Trip: Linda Hall Library** at UMKC

Meet in Regnier Center Atrium

(see [field trip information](#) tab)

**3:30-5:00 PM**

**Field Trip: Campus as a Learning Lab** at the

JCCC Open Petal Farm & Sustainability

Meet in Regnier Center Atrium

(see [field trip information](#) tab)

**5:00-5:45 PM**

• **Registration**

Regnier Center(1<sup>st</sup> floor)

• **Social Hour**

Capitol Federal Room 101

**5:45-7:00 PM**

**KAS Banquet**

Capitol Federal Room 101

**7:30-8:30 PM**

**Keynote Presentation: Dr. Kasey Fowler-Finn:**

**"Good vibrations: the (not so) secret world of  
insect vibrational communication"**

Hudson Auditorium

**8:30-9:30 PM**

**KAS Board of Directors Meeting**

Regnier Center 270

## Saturday's Events:

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### 7:30-10:00 AM

- **Check-in at the registration table**  
1st Floor Regnier Center
- **Poster setup**  
(Posters must be put up by 10 a.m.)  
Regnier Center Atrium

### 8:00-8:30 AM

- **Continental Breakfast**  
Regnier Center Atrium
- **Judges Meeting**  
Regnier Center 171
- **Moderators Meeting**  
Regnier Center 170

### 8:30-10:00 AM

#### ORAL SESSION #1

Regnier Center Breakout Rooms

- Paleontology Symposium
- Ecology/Organismal Biology
- Chemistry/Biochemistry, Anthropology
- Computer Science

### 10:00-10:30 AM

- **Poster Session**  
(Authors available at posters)  
Regnier Center Atrium
- Mid-morning break with refreshments

### 10:30 AM-Noon

#### ORAL SESSION #2

Regnier Center Breakout Rooms

- Paleontology Symposium
- Ecology/Organismal Biology
- Cell Biology/Genetics, Health and  
Medicine

### Noon-1:30 PM

- **Lunch**  
Capitol Federal Room, Regnier Center 101
- **KAS Business Meeting**
- **Keynote Presentation:** Dr. Kasey  
Fowler-Finn, Saint Louis University

### 1:30-2:30 PM

**Poster Session**  
(Authors available at posters)  
Regnier Center Atrium

### 2:30-2:45 PM

**Refreshment Break**  
Regnier Center Atrium

### 2:45-3:45 PM

- **Featured Speakers** in Hudson  
Auditorium:  
"Expanding the search for novel  
antibiotics: An Authentic Course  
Based Research Program"

Dr. Heather Seitz, Dr. Jamie Cunningham  
and Dr. Melanie Harvey, Johnson County  
Community College

- **Featured Speaker** in Capitol Federal  
Room, Regnier Center:  
"Monarch Butterflies: Past, Present  
and Future"

Dr. Orley "Chip" Taylor, University of  
Kansas

### 4:00-4:30 PM

**Awards Presentation**  
Hudson Auditorium

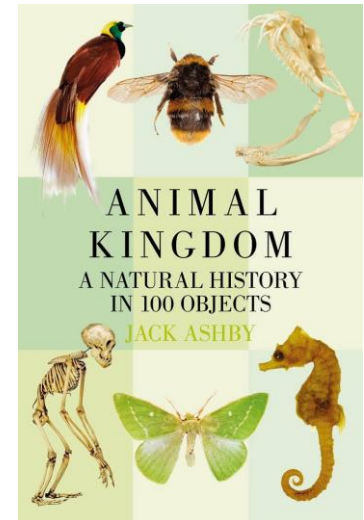
## BOOK REVIEW: “Animal Kingdom a Natural History in 100 Objects“

by Jack Ashby. 2017. The History Press, 328 p.

When I first examined this book at the local library I was skeptical concerning its usefulness and depth. However, my fears were quickly quelled as I began reading the interesting species accounts contained within. Rather than being a horizontal treatment of various species, the author takes the time to explore biological principles illustrated by the biology of these species, as well as presenting current, little-known facts unique to each one. The range of animals included is vast.

Beginning with the platypus, the most primitive mammal on the planet and the author’s favorite, he explains that evolution can only work with what it has. Mammals have evolved from a group of reptile-like animals, called the synapsids, present at the end of the Triassic Period over 200 million years ago. Therefore, they lay eggs and walk with bent elbows and knees with their legs held out at right angles to their bodies, just like their immediate ancestors did. Although many people think that all mammals give birth to live young, this is not one of the defining characteristics of being a mammal. The related species of echidna also lay eggs and have a cloaca, a single urogenital opening, just like present-day reptiles and birds. The author then proceeds to explain that the platypus is the only venomous mammal. Males possess a horny spur on their heels attached to a venom gland, which is used during male-male competition. As a biologist, I was aware of this fact. However, I did not know that the platypus uses its rubbery bill to detect electrical impulses to hunt worms and tiny crustaceans. These seemingly bizarre, physical features of the platypus confounded natural historians for over a century. The first skins sent to museums were thought be an obvious hoax, consisting of parts of three different animals.

The author deals with the large diversity of invertebrates, worms, sponges and others too numerous to mention here. One group called the “mantis shrimp” is particularly interesting. There are two types: stabbers and smashers. The former ambush prey, waiting for prey to come along, then pop out and stab it with their mantis-like limbs. The smashers use their hammer-like “elbows” to smash clam shells, crabs, and other crustaceans to access the meat inside. They have the fastest punch in the animal kingdom: 23 meters per second. This is enough to smash the glass of an aquarium in which they may be housed. The author goes on to briefly explain the mechanisms used to achieve such great speeds. “The water trapped between their limbs and their prey suddenly vaporizes. This forms ...cavitation bubbles, which themselves are highly destructive. They instantly collapse, causing a mini-explosion, the force of this deals a second blow to the victim...” Although this feat alone would make mantis shrimp amazing, they also possess the largest known number of photoreceptor types of any animal, twelve!



The jawless fishes were very diverse from the Cambrian to the Devonian. Two species still survive today. The lamprey is a freshwater external fish parasite, while the hagfish is a very slimy marine scavenger that uses rows of horny teeth to grab onto a dead animal. If pulling does not work to dislodge a piece of meat, the hagfish “...tie their tail in a knot and then pass the knot down their body until it is at the head end, pushed against the animal they are eating. This gives them enough leverage to pull their head backwards through the knot and tear off a mouthful of food.”

The author then briefly mentions the evolution of the placoderms which had bones in their skin, followed by a section on the “jawed fishes.” Again, the detail provided is very useful and interesting. I could go on about this book, but I hope you are convinced that it is book worth having on your shelf.

## BOOK REVIEW: “Rust the Longest War”

by Jonathan Waldman. 2015. Simon & Schuster, New York. 288 pp.

Although the subject may at first appear somewhat mundane and of interest to only a handful of engineers, this is a very engaging, well written book - worthy reading on a cold, winter's night. Technically, rust is the corrosion of iron by oxygen, but oxygen corrodes most metals except for a handful of rare ones, including tantalum, niobium, iridium, and osmium. “Some, like aluminum, chrome, nickel, and titanium form a thin outer layer of protective metal oxide, and then call it quits.” “Rust,” as used by the layperson includes corrosion of any metal, and is responsible for the structural decay of bridges, buildings, ships, and even the Statue of Liberty. It also makes Mars the “red planet.”

From the earliest history of rust, the author relates interesting stories concerning how people have attempted to prevent or control its spread. In 1823, British chemist Sir Humphry Davy, experimented with ways to prevent the copper sheathing on ships from rusting. He discovered that placing a small piece of zinc or iron on copper in a ratio between 1:40 to 1:150 prevented the copper from rusting. These “sacrificial anodes,” based on the principles of galvanizing, are still widely used today.

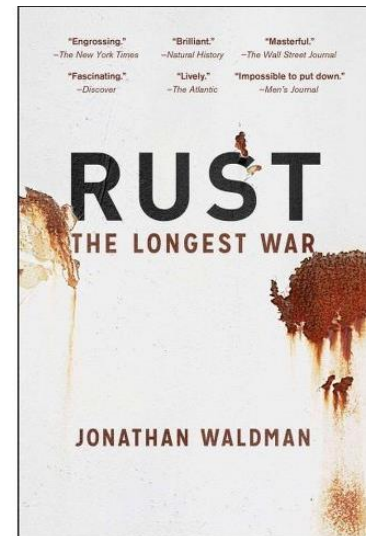
A thorough, historical account is presented of steel-making, including cementation, the crucible process, the Bessemer process, and the eventual discovery of stainless steel. The author recounts the interesting journeys of the people who created these processes.

In 1980, two protestors climbed the Statue of Liberty, forcing the National Park Service to take a closer look at the structure, composed of an iron frame holding copper plating. Of course, there was a gap between the two metal layers to prevent galvanic corrosion. However, French experts determined that water had become trapped between the layers because paint on the inside of the statue prevented it from escaping. The water bridged the gap and had caused extensive corrosion. The ensuing saga of the six-year restoration process is interesting reading.

There is an in-depth look at the can making process, and the controversial estrogen-mimicking chemical, BPA (bisphenol-A), used in the plastic spray-on resin liners, which can be epoxy, vinyl, acrylic, polyester, oleoresin; or even styrene, polyethylene, or polypropylene. The author went to “can school” where he learned that there are over 1,000 different can liners used in cans housing different foods. “There’s one coating for tomatoes, one for beans, one for potatoes, and another for corn, peas, fish, and shrimp.”

In the chapter appropriately titled “Indiana Jane,” Waldman recounts his adventures with noted photographer, Alyssa Eve Csük, as they sneak into the now defunct Bethlehem Steel Works, in Bethlehem, Pennsylvania. “In 1995, with the American steel industry in shambles, the paychecks stopped, and the last blast furnace shut down. Since then, the place has done nothing but rust.” They climb around this behemoth to capture the perfect image of metal rusting. The colors can be quite alluring and other-worldly.

Inside the Department of Defense there is the Office of Corrosion Policy and Oversight headed by the “corrosion czar,” Dan Dunmire. He is described as an ebullient, exuberant, character who has teamed up with the Star Trek actor, LeVar Burton, to make a series of interesting, informative videos about rust.



Rust has been responsible for bridge collapses, such as the Silver Bridge across the Ohio River that caused the death of 46 people in 1967. Several major accidents of military aircraft, including F-16s, F-18s, and a Huey helicopter, have been caused by rusty components.

Pipelines carrying oil, such as the Alaska pipeline, must be carefully monitored for corrosion, both inside and outside. The author describes the sequence of technological improvements that enable engineers to adequately assess damage to the inside of a pipeline. He also recounts the passage of a “pig” (large, metal detector) through the 800-mile long Alaska pipeline, and all the hopes and fears of the monitoring crew as it travels on its journey.

This is a very worthwhile book that is both engaging and easy to read, while presenting a wealth of information. I heartily recommend it.

### **BOOK REVIEW: “Ground Truth A Guide to Tracking Climate Change at Home”**

by Mark L. Hinline, Univ. of Chicago Press, 229 p

I picked up this book from the new book shelf at the public library because of its promising title. Keeping track of climate change at home is a good concept, for example, noting when plants first flower, like Henry D. Thoreau did at Walden Pond in Massachusetts. Now, we can use this information to determine if the flowering dates have changed, thereby documenting aspects of climate change. Unfortunately, the book did not live up to my expectations. The tone was remarkably condescending and the presentation was very scattered and rambling. The author goes through a list of plant and animal life, attempting to present a guide for the readership to use when documenting phenological changes, ie. the seasonality of certain natural history events in the lives of various organisms. His treatment leaves much to be desired. For instance, he summarizes: “...the common wisdom is that the ranges of spiders are likely to move northward, and upslope, in such a way that, for any place in the United States, you are likely to find more spiders and larger spiders, and they are likely to be faster on their eight legs than any spiders they displace.” From my experience, this statement is full of unjustifiable, flippant assumptions that cannot be reasonable embraced.

So, although the author focuses our attention on important topics, such as ground truthing, phenology, and the potential contributions that can be made by ordinary citizens, this book does a very mediocre job in conveying this message. I cannot recommend it to our readership.

#### **Attention Graduate Students:**

The student research grant application deadline for graduate students is **February 2, 2019**.

See the KAS website for more information:

<http://www.kansasacademyscience.org/files/student-research-program-graduate-2019.docx>



## BOOK REVIEW: “Lamarck’s Revenge “

by Peter Ward 2018. Bloomsbury Pub., NY, NY, 273 p.

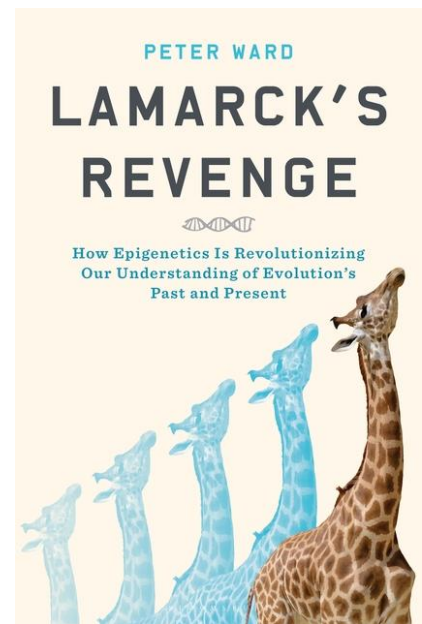
This newly published hardback book summarizes the latest information regarding epigenetics, and how our understanding of evolution is being radically altered. Darwinism posits slow, evolutionary changes in heritable characteristics via the mechanism of natural selection. Random shuffling of DNA during reproduction produces small differences among individuals in a population, some of which may prove slightly more advantageous than others. Therefore, individuals possessing these characteristics would be more successful, and consequently leave more offspring. The unique genetic makeup of these successful individuals would lead to its spread throughout the population.

An alternative mechanism underlying evolutionary change was proposed by Jean-Baptiste Lamarck several decades before the publication of Darwin’s work, *On the Origin of Species*. He believed that phenotypic changes occurring within the lifetime of an individual would somehow be passed on to their offspring, and that these cumulative changes could explain the incredible diversity of life. For example, a giraffe’s long neck could be explained by individuals of each generation stretching their necks a little farther to reach leaves high in the trees, and that the slight increase in neck length over a giraffe’s lifetime would be inherited by the next generation. Since Darwin’s publication, Lamarck’s hypothesis has been soundly rejected. However, recent research in epigenetics has uncovered additional fundamental processes altering genetic expression that can explain rapid phenotypic changes, and how these changes can be passed along to future generations.

Since the discovery of DNA and the elucidation of the functional units of inheritance (genes), a host of other factors have been found that can either radically alter DNA chains themselves or the expression of genes. Random mutations (structural modifications of DNA) can be caused by “mistakes” during cellular replication, ie. chromosomes (which contain DNA strands) may not divide or recombine properly. DNA strands themselves may have been broken or altered by external factors such as UV light, which is known to cause anomalies in the

chain whereby adjacent thiamine molecules join together yielding “thiamine dimers.” Viruses can invade cells and insert their DNA into the host’s DNA strands. All of these processes result in changes to the DNA structure itself. Epigenetics refers to those changes that do not change the actual structure of the DNA chain, but which modify DNA by turning various sections “on” or “off,” thereby altering gene expression. One major mechanism for such changes involves methylation, ie. attaching methyl groups (CH<sub>3</sub>) to specific sites along the DNA strand, specifically where cytosine is adjacent to guanine.

Recent DNA analysis of Neanderthals and modern humans has indicated that there are less than 100 proteins that differ between the two species, but “there are more than 2,000 differentially methylated sites along the two sets of DNA.” Of prime importance are the epigenetic changes to hox genes. Hox genes control the timing, shape and form of various body parts during foetal development in all animals, including humans. Slight changes in the expression of hox genes can cause dramatic differences in the shape of a human skull, such as the protruding brow ridge of Neanderthals. In addition to these radical anatomical differences produced by gene modification, modern humans and cave men most likely had different susceptibilities to and mortality rates of many shared diseases, because the rate of methylation



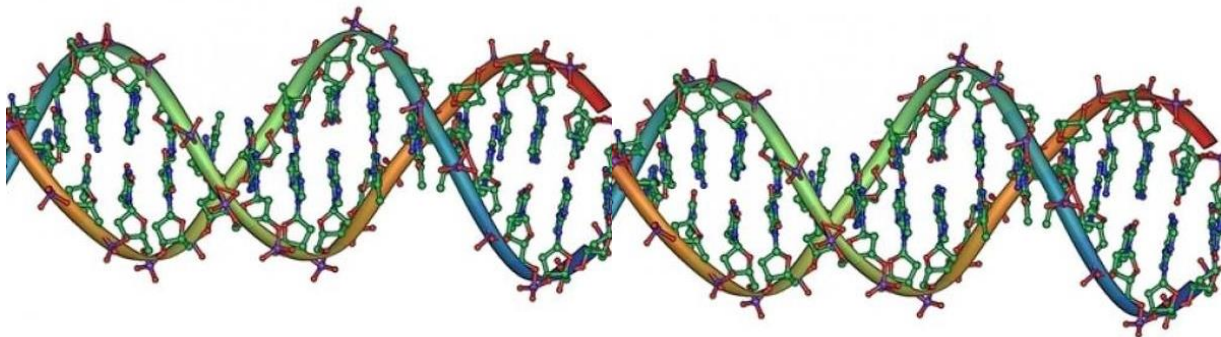
of DNA at gene sites associated with these diseases were twice as high in Neanderthals as in *Homo sapiens*.

Although the information presented on epigenetics so far is startling enough, it gets even stranger. Traumatic events early in life, such as child abuse, lead to epigenetic changes that reduce the effectiveness of a primary stress-response gene, yielding a host of behavioral conditions, including depression, violence, and suicide later in life. This fact is somewhat obvious. Less obviously, these epigenetic changes can be transmitted to offspring through the next two generations.

The author presents a theory explaining the great diversity of life found in fossil layers just after major extinctions. He believes the stress in the survivors led to high levels of epigenetic changes which almost instantly produced a myriad of new, inheritable anatomical and behavioral changes. This is truly Lamarckian!

The book concludes with a look to the future: the influence of toxic chemicals in the environment and the still unknown consequences of new gene-altering technologies, especially CRISPR-Cas9.

This book is very informative and summarizes the latest research in epigenetics during the past 5 to 10 years. However, the writing style is often distracting, and points to the limited proficiency of the author in this arena. Basic errors, such as phrases passed off as complete sentences, should have been corrected by a good editor. In spite of these deficiencies, I highly recommend reading this book.





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MAIL TO:

**2019 Annual Meeting Keynote Speaker: Dr. Kasey Fowler-Finn**



Dr. Fowler-Finn is an evolutionary biologist from Saint Louis University. Her research focuses on the evolution of insect and arachnid communication.

In addition to the keynote speaker, featured speakers **Dr. Heather Seitz**, **Dr. Jamie Cunningham**, and **Dr. Melanie Harvey**, JCCC, will give presentations on expanding the search for novel antibiotics, and **Dr. Chip Taylor**, University of Kansas, will give a presentation on the Monarch Watch Program.