

LEUCINE ZIPPER & THE ZINC FINGERS

LZTF

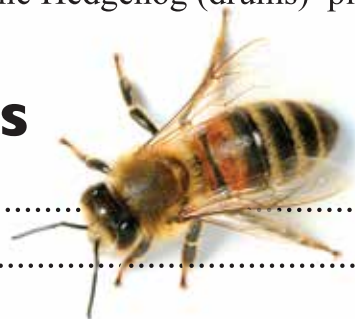
ATOMIC ANARCHY



For years, Professor Morte, host of the Silver Scream Spookshow, has been secretly collecting, sequencing, and analyzing the DNA from some of the most celebrated rock musicians of our time. While he won't divulge his subjects for fear of prosecution, burglaries have been reported at the homes of Joan Jett, Iggy Pop, and Alice Cooper. The only items reported missing have been hair brushes...

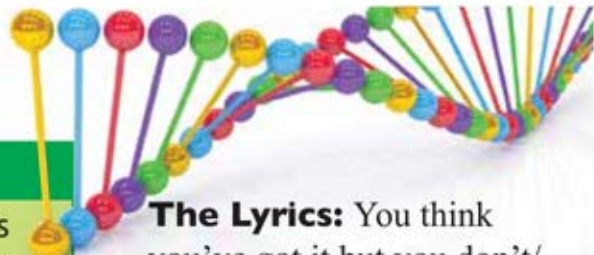
Prof. Morte now claims to have taken a common sequence of rock-star DNA and has inserted it into stem cells derived from tissue samples taken from immunologist Jennifer Leavey, organic chemist Michael Evans, amphibian ecologist Joe Mendelson, and biologist Ben Prosser; all are Georgia Tech faculty or alumni. Using a mysterious accelerated aging protocol, adult specimens were grown from the stem cells and now form the world's first genetically engineered rock band: Leucine Zipper and the Zinc Fingers. When allowed to leave their top-secret sterile test facility, band members Leucine Zipper (guitar), Gringo Perdido (guitar), X.O. Therm (bass), and Sonic Hedgehog (drums) play live, loud, science punk-rock.

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GMO-ROCK *(music and lyrics Jennifer Leavey)*



The Science:

Genetically modified organisms (or GMOs) are living things that have been engineered to contain (or lack) certain genes. Some bacteria have been genetically modified to produce insulin, a hormone that is important for treating people who suffer from diabetes. Rice has been genetically modified to produce beta-carotene, which is converted to vitamin A. Almost 200 million children in the world suffer from vitamin A deficiency, and eating this rice could help prevent them from going blind. Even animals have been genetically modified, including many strains of lab mice that are used for cancer and autoimmune disease research. What if people could be genetically modified? How would you like to have the gene that could make you run fast, calculate math problems in your head, or have perfect pitch? This song is a hypothetical song about creating GMO humans that have “the rock gene”. Wouldn’t it be cool if everyone rocked?!?!?

The Lyrics: You think you’ve got it but you don’t/
You keep on trying but you won’t/
It takes genetics, it’s not luck!/
You keep on playing but your band still sucks/
but... What if we all had the rock gene?/
What if we all sang in tune?/
What if the world had the rock gene?/
Rock and roll for me and you!/
You get your genes from mom and dad/
And they’re both rockers, aren’t you glad?/
But the chances are as high as 1 in 4/
That you WON’T rock and that’s a chance you can’t ignore!

We’re a Science Band

(music and lyrics Joe Mendelson)

The Lyrics: We’re a science band/
we use data to understand/
we’ll impress you with the things we can do/
cuz we’re a science-based punk-rock band/
We’ll collect data from you/
we’ll analyze it through and through/
we’ll find out all the things that you do/
cuz we’re scientists just like you/
We’re a science band (x4)

The Science:

Punk rock and scientific research have a lot in common—namely, a fearless and boundless drive to explore, understand, and embrace all aspects of the cultural, biological, and physical worlds around us. This song proclaims our creative vision for scientific and artistic inquiry.



Fickle Finger of Fate

(music and lyrics Jennifer Leavey)

The Science:

Honey bees are social insects. This means that they divide up the tasks of life between different "castes". Each honey bee colony has two castes of female bees, the workers and the queen. When a fertilized egg is laid and hatches into a larva, it can develop into a worker OR a queen depending on what the other worker bees feed it. If the larva is fed royal jelly, a delicious mixture of hormones, vitamins and growth factors, it will develop into a queen. The queen is the only bee (out of ~50,000 bees!) that reproduces and lays eggs. Worker larvae are fed royal jelly for a couple days but then are fed "bee bread", a mixture of honey and pollen. This diet causes certain genes to be turned on and others to be turned off and the workers don't grow to be as large as the queen. They also don't mate, so they can never lay fertilized eggs! Workers, as their name suggests, work their entire life to make a nest and secure food for their kin.

Honey bee

(*Apis mellifera*)



worker



queen

The Lyrics: I am a worker bee/ I love my family/
I fly and forage/ the whole day through/ but there is
one thing/ I'll never do./ I see my sister fly/ into the
open sky./ She goes and looks for love/ and finds a
mate./ But when it comes to love,/ I'll have to wait
and wait, and wait (like, forever!)/ But I will
sacrifice myself (x3) /I'll sacrifice for you./ I will
sacrifice for you./ When sis and I were laid./ They
said we were the same./ They fed me bread/ to fill
my belly/ but to my sister/ they fed royal jelly./
My sis grew long and tall/ but me I hit the wall/
And now there is no need for me to ovulate./ Our
paths were sealed by the fickle finger of fate!/ I am a
worker bee/ I love my family/ And though I'll never
have/ brood of my own, /it makes me happy just to
watch my kin-folk grow.



Let's Test It *(music and lyrics Joe Mendelson)*

The Lyrics: I got a problem, facing me now/I've got correlation, but no causation how/I will consider it under the whole ray of light/But I need a method to help me get it right/So let's test it, and then we'll know/Scientific method, a way to show/Line 'em up, lay 'em out, and put 'em on their back/I will observe which characters they lack/Spin 'em over, flip 'em now, put 'em on their side/I will use a ruler to determine which is wide/So let's test it, and then we'll know/Scientific method, a way to show/Correlation, causation, what, when, how/I need an answer, what's causing this now/I will submit my results to consider/But I won't give up, I am no scientific quitter/So let's test it, and then we'll know/Scientific method, a way to show.

The Science:

Science is based in reason and much of modern science has its foundations in the scientific method: observe, predict, test, analyze, conclude. You may have a great idea about why things work the way they do in the world, but you'll never know whether your hypothesis is supported unless you test it!

Clones

written by David Carron (originally performed by Alice Cooper)

Joss Paper *(music and lyrics Jennifer Leavey)*

The Science (and culture!):

Joss paper, or ghost money, is used by some Asian cultures as a way to pay tribute to deceased ancestors. The paper is printed to look like money or sculpted into the shape of valuable items like clothing, homes, or even electronics! It is believed that burning this paper will ensure wealth for relatives in the afterlife. When paper burns, a chemical reaction (pyrolysis) occurs and the cellulose fibers are broken down into carbon dioxide and water and also release energy in the form of heat. This song mixes the science of combustion with the sociology of ancestor worship into one STEAMY mess!

The Lyrics: In China, people take cardboard clothes and houses, phones and refrigerators to the graveyard/ where they put them in metal cans around the tombstones of the people they love/ and they watch them burn/ They're sending them riches in the afterlife/ But what makes a house a house, and what makes a phone a phone/ Is getting lost as heat/ But maybe heat is what ghosts need/ Slips of paper, printed up like \$100 bills with Confucius Benjamins are going up in smoke/ And the atoms split apart from each other as they rise in the heated air/ And we watch them burn. We're sending them riches/ In the world beyond/ But what holds the atoms of a \$100 bill together/ Is getting lost as heat/ But maybe heat is what ghosts need.

Hymenoptera *(music and lyrics Jennifer Leavey)*

The Lyrics: Little insect next to me/ You've got six legs that I can see/ I think that you might be a bee/ but I can't really tell so easily./ You've got four wings and yellow stripes./ You sting me once, you sting me TWICE?!?!/ Now I know you're not a bee!/ A yellow jacket's not a bee!!!/ BUT: They're both Hymenoptera (x4)

The Science:

People often get bees and wasps confused and for good reason! They are closely related on the evolutionary tree of life. Ants, bees and wasps all belong to the Order Hymenoptera of insects, that originated in the Triassic period. They evolved social behavior during the Cretaceous. This song describes one of the ways you can tell the difference between a honey bee and a yellow jacket (a kind of wasp). Wasps can sting people multiple times, but honey bees die after leaving their stinger in a victim, so they can only sting once!





Entropy: Atomic Anarchy *(music and lyrics Joe Mendelson)*

The Lyrics: Why are you always trying to organize things?/Can't you understand simple entropy?/Why put order, where it's not meant to be?/You can't control atoms, and you can't control me/Entropy: atomic anarchy (x 4)/Entropy versus thermal energy/My second favorite topic after pleiotropy/I don't want order, I don't want a symphony/I just want entropy to be/Entropy: atomic anarchy (x 4)/Make like a cow and ruminate with me/Help those microbes set the sugars free/Gases expand, and smells they flow/Open up the jar and let the atoms go/Entropy: atomic anarchy (x 4)/Little plastic balls.....watch them scatter as they fall (ad nauseum)/Twist and shout/Move all about/Lose control/This is atomic rock and roll/Sing along with me: Entropy/Shout it on out: Atomic Anarchy!

The Science:

Entropy is a measure of disorder in a system and it increases over time. It is kind of like if you walk a bunch of kindergarteners out to the playground in a straight line and then let them loose. They get disordered quickly (and it takes a lot of energy to get them back in line!). Understanding entropy is essential for understanding chemistry, but in this song we make it easy....Entropy is **ATOMIC ANARCHY! ROCK AND ROLL!!!**



Stuck on You

(music and lyrics Jennifer Leavey)

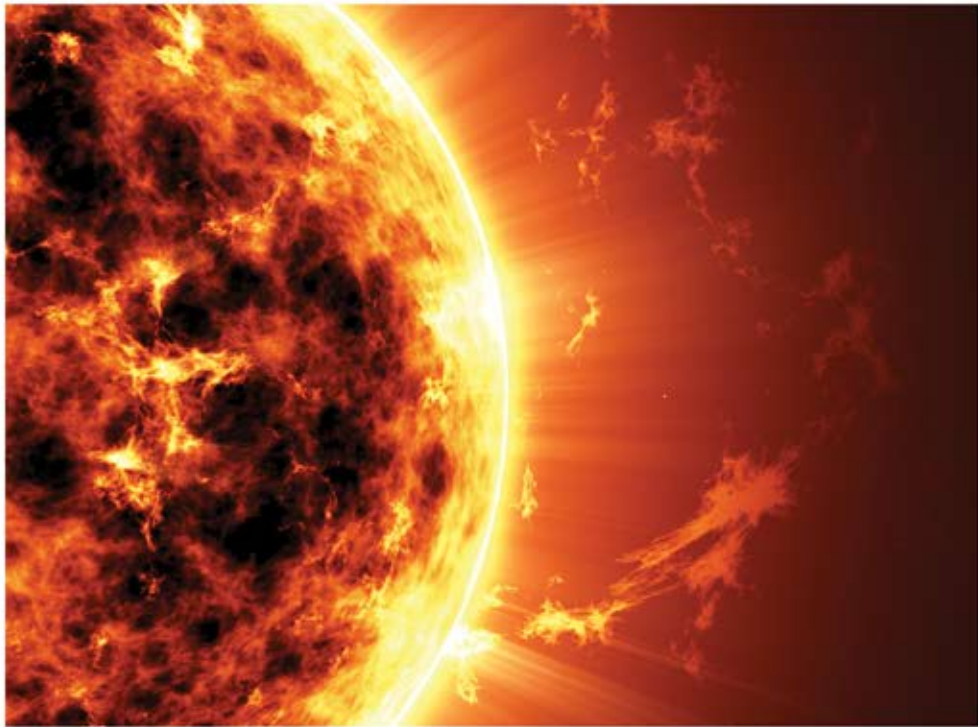
The Lyrics: When I'm alone/ there is nothing I want to do./ I just sit by myself./ I just drift by myself./But when I'm with you/ everything changes/ you turn me on./Now I'm stuck stuck stuck stuck on you/And I can't can't can't can't get loose/I'm stuck stuck stuck stuck on you/You turn me on./When you're nearby/ I can sense that you're around/ I can sense you deep inside/ Feel you're near me deep inside/And when you're close/ I want to keep you close/ I'm stuck on you./Now I'm stuck stuck stuck stuck on you/ And I can't can't can't can't get loose/I'm stuck stuck stuck stuck on you/You turn me on./I'll never make it on my own (Let's stick together)/ I get so scared when I'm alone (Let's stick together)/ There's just so much that we can do (When we're together)/Let's stick together, me and you!/Now I'm stuck stuck stuck stuck on you/And I can't can't can't can't get loose/I'm stuck stuck stuck stuck on you/You turn me on.

The Science:

People usually think of bacteria as single-celled organisms, but many kinds of bacteria like to live together! Bacteria live together in structures that are mixtures of cells and adhesive molecules called biofilms. Living in a biofilm makes it easier for bacteria to capture nutrients, exchange genetic information and can protect the bacteria from antibiotics or from drying out. It takes a lot of energy to make a biofilm and so bacteria float around and don't bother to make one unless there are a lot of other bacteria around. The way they can tell how many other bacteria are around is through a process called "quorum sensing". Basically, the bacteria call out to each other with chemical signals that they detect with receptors in their cells. Once it gets "loud enough," they turn on genes that help them start making sticky stuff that holds them together. Probably the most famous biofilm in our bodies is the plaque on our teeth. This song is a love song about quorum sensing!

Sunburn *(music and lyrics Jennifer Leavey)*

The Lyrics: It was a sunny day in early June/ I'd been spending too much time alone in my room/ I went outside so I could catch some rays/ Laid down in my hammock and fell into a daze/ Ooh, I've never felt quite so at peace/ I feel the sun coming through the leaves/ I closed my eyes and heard a bird sing a tune/ Before I knew it it was late afternoon/ My eyes popped open, things were not the same./ I was screaming out in pain/ And it's a SUNBURN! When will I learn?/ That UV light is wrecking my eyesight/ I fried my DNA, I hope I'll be OK/ I swear I'll never do it again/ Sunburn baby, I've been out all day/ Sunburn baby, It's the price I pay/ If I go out again you know I'll set a timer/ But for now my DNA is full of thymine dimers/ I hope I didn't activate an oncogene/ Why didn't I wear sunscreen???



The Science:

Many wavelengths of solar radiation filter through our atmosphere and reach the surface of the earth. Visible light is lovely, but ultraviolet light is of higher energy and can damage molecules like DNA. DNA damage often comes in the form of thymine dimer formation, wherein two neighboring "Ts" bind together. When cells replicate, mutations can occur in DNA at the dimer sites. If these mutations are in genes that regulate how often a cell divides (oncogenes), the mutation can cause cancer. Don't forget the sunblock, y'all!

I Know the World is Round (Music by the Ramones, lyrics Joe Mendelson)

The Science:

Many, many ancient cultures believed that the world was flat, but as early as the 6th century B.C., philosophers like Pythagoras made observations that were only consistent with a round Earth. Some early Christian sects revived the flat earth idea due to references to the flat earth in the Bible, but most scholars were confident that the earth was round, a fact indisputably confirmed when Magellan's expedition successfully circumnavigated the globe. (In fact, Magellan did not make it home, but it was because he was killed in a battle in the Philippines, not because he fell off the edge of the earth!) There is a lot you can learn from careful observation and mathematical modeling!

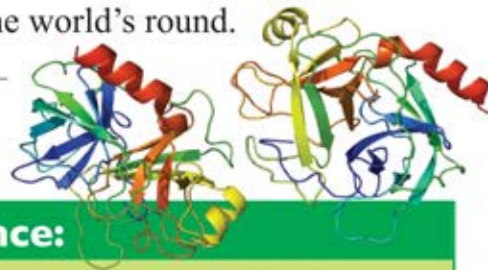
The Lyrics: I know the world is round, I know the world is round/
Ancient cultures made a big fuss/ If they were here they'd argue with us/ They said the world was flat (us)/ I know the world is round, I know the world is round/ I know what you're thinking about/ How does water stay on something that's round/ I know what you're thinking, when you find out that your world is round/ They said the world was flat/ Pythagoras wasn't down with that/ Watch the stars and do some math/ And you'll know the world is round/ I know the world is round, I know the world is round/ Magellan took a big chance/ He sailed for Spain and not for France/ He got home and did a victory dance/ He knows the world's round/ I know the world's round.

React (music and lyrics Jennifer Leavey)

The Lyrics: Come here/ my dear/ there's nothing to fear./ Why do you make it/ so hard?/ It could be easy./ You're tough./ You're strong./ Your bonds hold all night long./ but come into my embrace/ and I'll make it easy./ You're gonna twist, gonna turn, gonna bend and shake/ I'm gonna work you over till your bonds all break/ It'll feel so good you'll never notice the change/ And when I'm done with you, you'll never be the same!/ I'm gonna make you react! (x4) /Put your hand/ in my pocket./ It won't be long/ until we rock it./ Like a lock that finds its key/ together it is easy./ One touch/ and you'll shiver./ Your whole body/ will start to quiver/ and your reaction won't take long/ ooooh I'll make it easy.

The Science:

Enzymes are protein catalysts that reduce the activation energy needed to make a chemical reaction happen. The reactions occur in the enzyme's active site, sometimes compared to a pocket or a lock. Fitting into the site can put strain on the substrate that the enzyme is acting on, making the reaction occur more easily. One class of enzymes are proteases which break down large proteins into smaller bits. (We have them in our stomachs to help digest food!) This is a sexy song written by a protease to her protein substrate/boyfriend.



Bed of Fossils *(music by Curt Kirkwood, lyrics by Michael Evans)*

The Lyrics: I know a place where
dinosaurs toiled/ Then they sunk down into
the soil/ Became a bed of fossils, made oil/
In the tar pits you can watch them boil/
Apatosaurus, neck so tall/ Chewing on branches
until they fall/ This gentle giant didn't
consume meat/ Never met a plant he didn't
want to eat/ Velociraptor, sleek and spry/ Pack
runs by in the blink of an eye/ Better watch
out when you hear that screech/ Got a big ol'
claw foot to help him reach/ Tyrannosaurus,
king of the crew/ Feared by all and a
carnivore too/ Made it a point to really harm/
Every little creature who mocked his little arms.

The Science:

Much of what we know about life long ago comes from our study of mineralized remains, or fossils. Fossils form when a living thing gets covered by soil or silt and some or its tissues are slowly replaced with minerals. Fossils are rare because, most of the time, tissues and especially soft tissues decompose before they can become mineralized. We usually think of dinosaurs when we think of fossils, but fossils of other animals, plants, and even microbes can be found all over the world.



Amoeba *(written by R. Agnew and Casey Royer - originally performed by the Adolescents)*

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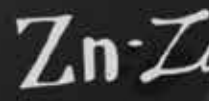
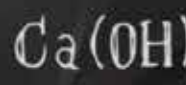
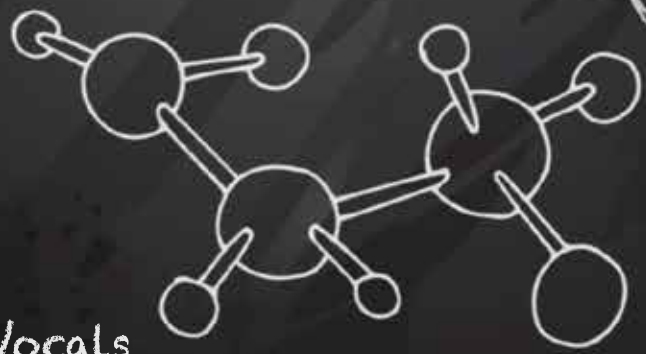
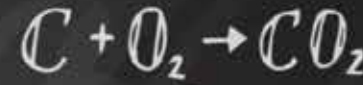
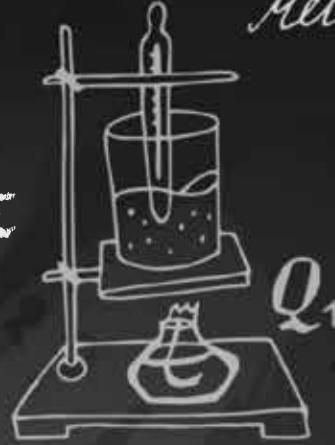
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Metals gases



The ZiNC FiNGERs are:
 LEucine ZiPPER - GiTAR
 GrINGO Perdido - giTAR
 X.O. TheRM - BaSS
 Sonic HEdgehog - DRums
 K-T EXtinction - Backing Vocals
 MOE Mentum - Saxophone

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