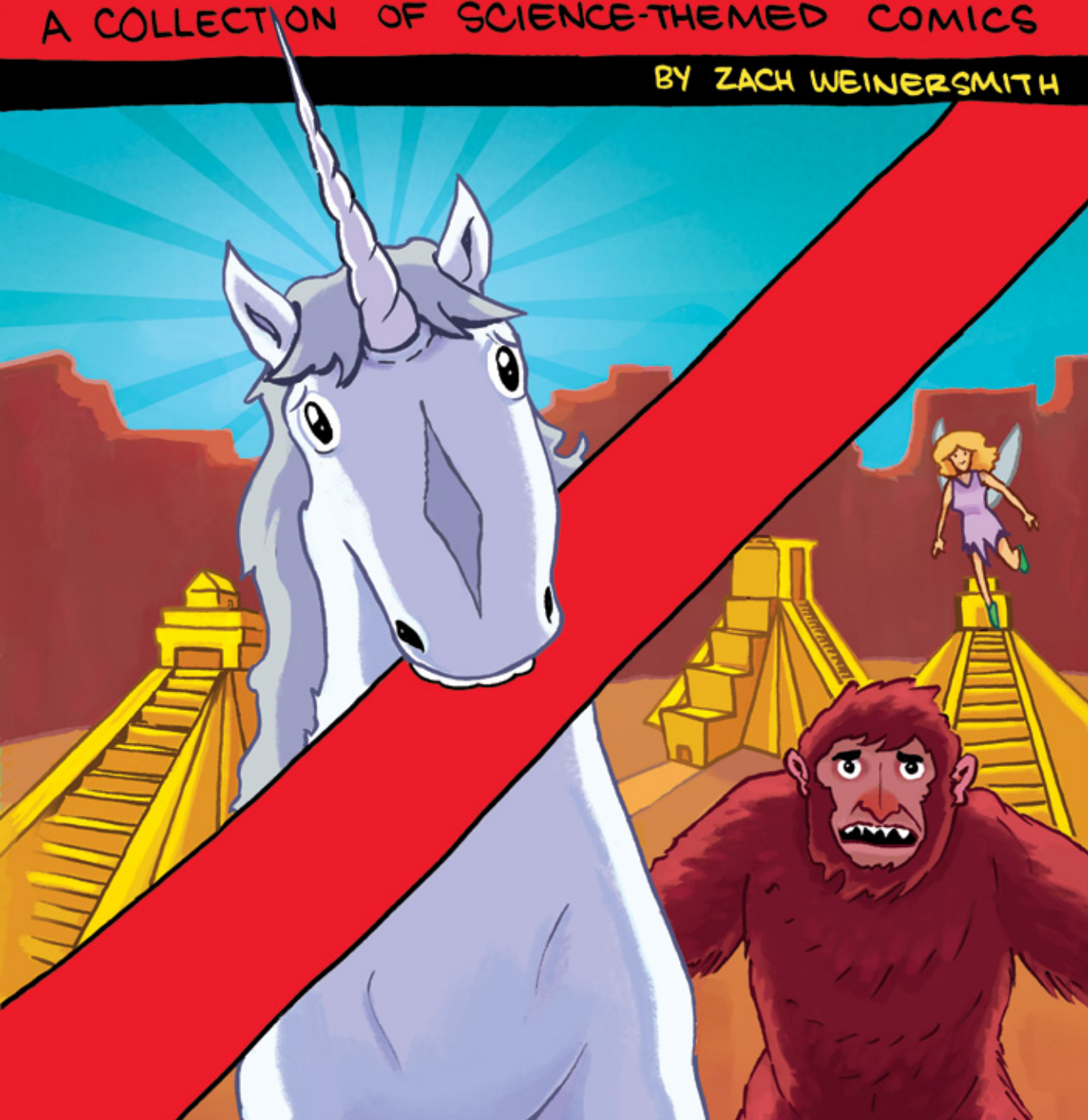


SCIENCE

RUINING EVERYTHING SINCE 1543

A COLLECTION OF SCIENCE-THEMED COMICS

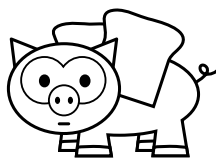
BY ZACH WEINERSMITH



SCIENCE

RUINING EVERYTHING SINCE 1543

BY ZACH WEINERSMITH



breadpig

BROOKLYN • SOMERVILLE • THE INTERNETS

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Breadpig is not a traditional publisher. The majority of the profits of this book are going to the author, Zach Weinersmith. And as with all of Breadpig's projects, the company's profits are being donated to a worthy charity. For this book, we have selected Wikipedia.

For support in this publishing venture, Breadpig thanks Marie Mundaca, LeeAnn Suen and the friends and family who've always unhesitatingly supported team Breadpig.

Even our winged porcine hero couldn't have done it alone. Thank you.

*To Kelly, whose eye-rolling at my scripts has no doubt
been the main necessitator for her ever-thickening spectacles.*

ACKNOWLEDGEMENTS

As always, I would like to thank my team of geeks: Amanda and Dean, Michael, Mark, and Josh. Without them, the many holes I put in the boat would not get plugged.

I would like to thank my publisher Breadpig, except for Alexis, who once offered Sabriya an empty glass of lemonade as if it were a gift.

I would like to thank Christina Xu in particular for her Powers of Internet.

I would like to thank my parents, whose support of my quarter-life lurch into science has truly been the gift that keeps giving.

I would like to thank all the awesome geeks who took time out of their busy schedules to give us their Tales of Science.

And lastly, I would like to thank my wife, Kelly. I feel like I shouldn't have to thank her here, since she's already in the dedication, but... man... she's scary when she's mad.

FOREWORD

You hold in your hands the very first science-themed book of SMBC comics. If this book is anything like other books of science, I hope to release a new edition every few months, which will be just different enough from the old edition that your professor will make you buy it. I hope this because I love money. In fact, I believe money is the second most important thing in life. The first thing is real estate.

For your convenience, in this third SMBC book, we've slimmed things down a bit. The result is that some comics extend over multiple pages. In these cases, there is a friendly arrow at the bottom of each page until you reach the end of the comic. We have very cleverly labeled the end with the word "end."

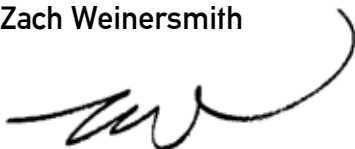
This book is divided into three sections. The first section contains lovingly selected science comics from the SMBC archive, many of which are too dorky to ever appear in an SMBC compilation meant for normal human beings—you know, those people you see when the curtains accidentally get let open.

The second section contains 17 comics that are exclusive to this book. Almost without exception, these are drawn from comic scripts that I thought were good, but which were probably too damn nerdy for those normal humans I mentioned in the last paragraph. But, that shouldn't be a problem for you and I, should it?

The third section contains Tales of Science. These are little stories given to us by some of my favorite scientists and science geeks who were awesome enough to grace this book with their presence.

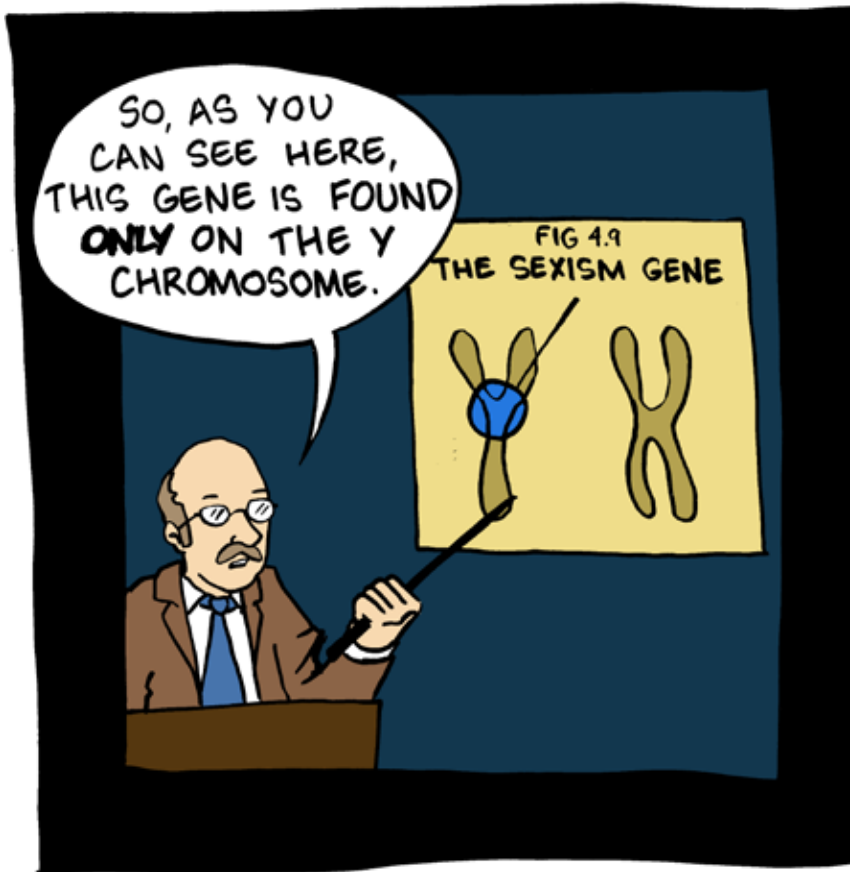
Also, Phil Plait did one.

Zach Weinersmith

A handwritten signature in black ink, appearing to be 'Zach Weinersmith', with a long, sweeping flourish extending to the right.



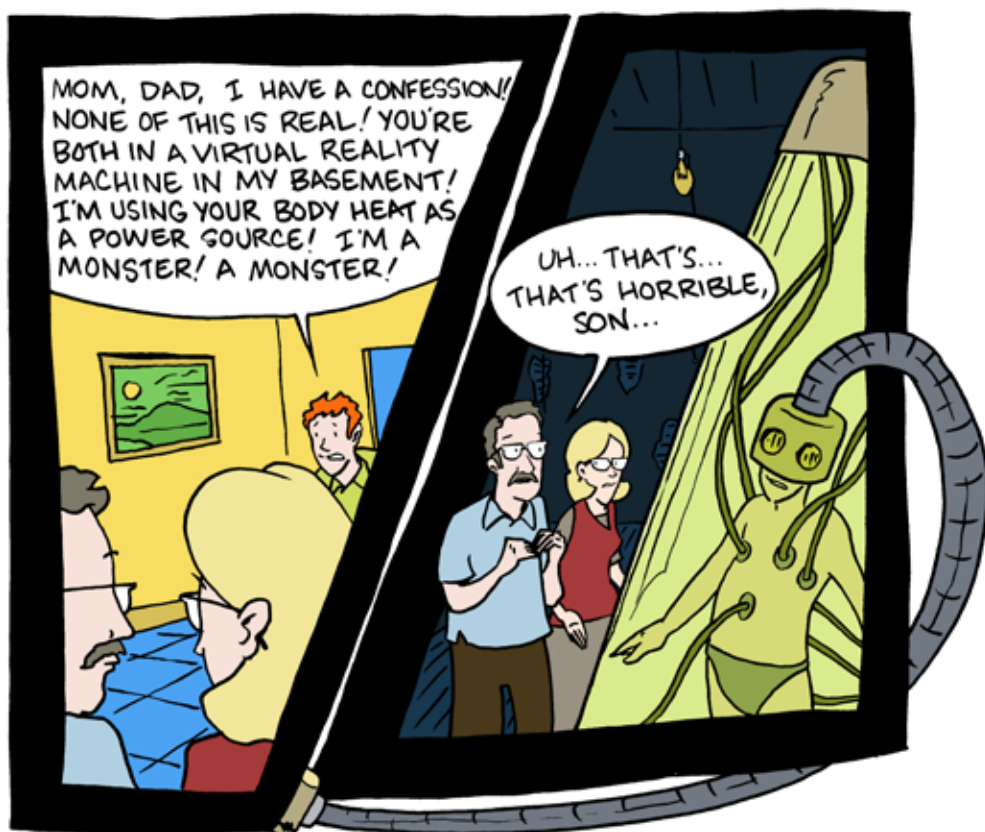
Ahh, the first day teaching natural selection is always the best.



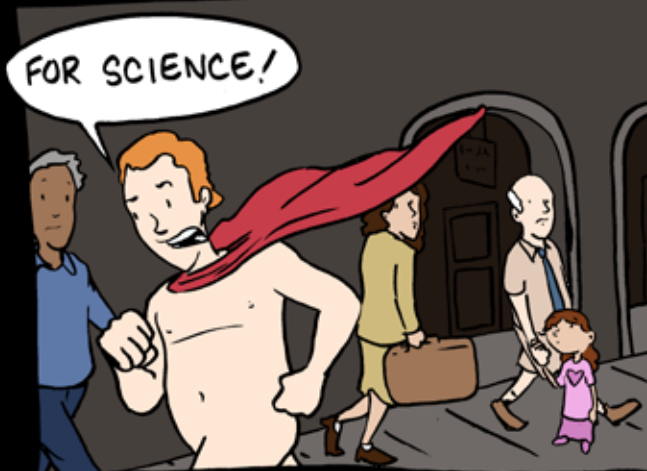
"You know, the chromosome that *matters*."



If you were still alive, you'd probably wish Superman had paid more attention in physics class.



LIFE TIP: YOU CAN DO PRETTY MUCH
ANYTHING IF YOU YELL THE RIGHT PHRASE



SMBC PRESENTS: GREAT DEBATES
~ EPISODE ONE ~
CREATIONISM vs. EVOLUTION

QUESTION:

WHAT WOULD
A CREATIONIST
SAY WHEN
CONFRONTED
WITH
ARCHAEOPTERYX
?

ANSWER:



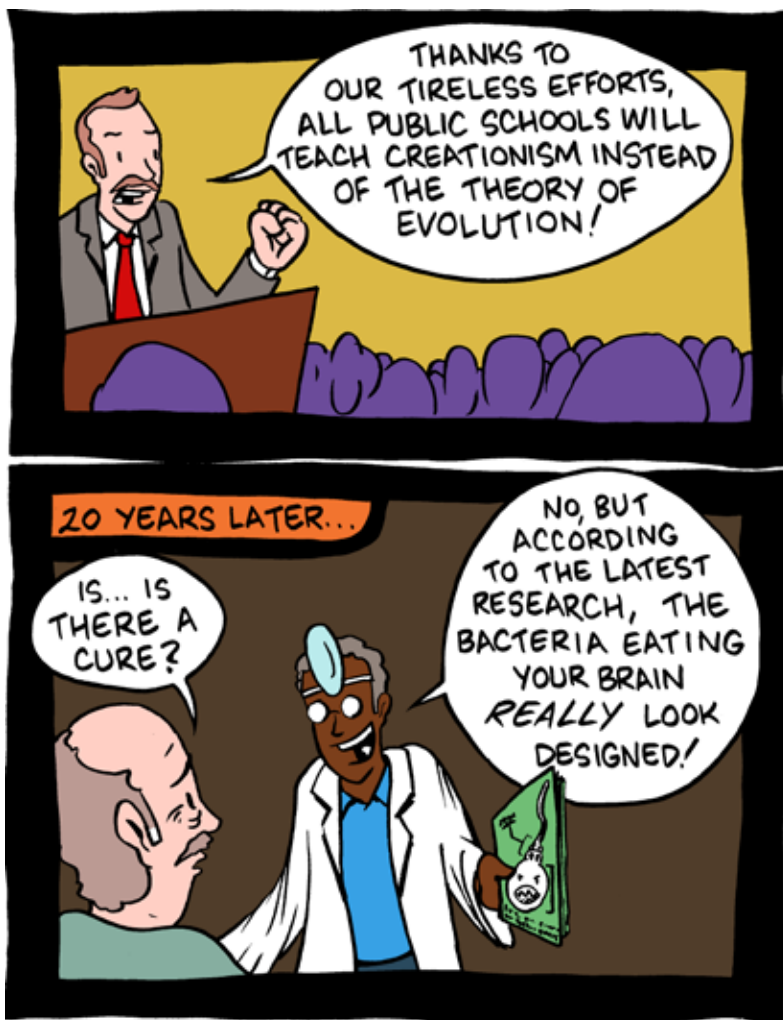


Particle physics has come
a long way since the 1700s.





"...which I bought from a raptor."







February 17, 1982:

After months of grueling research,
we have confirmed that if you turn
the calculator upside-down,
it spells "boobs."





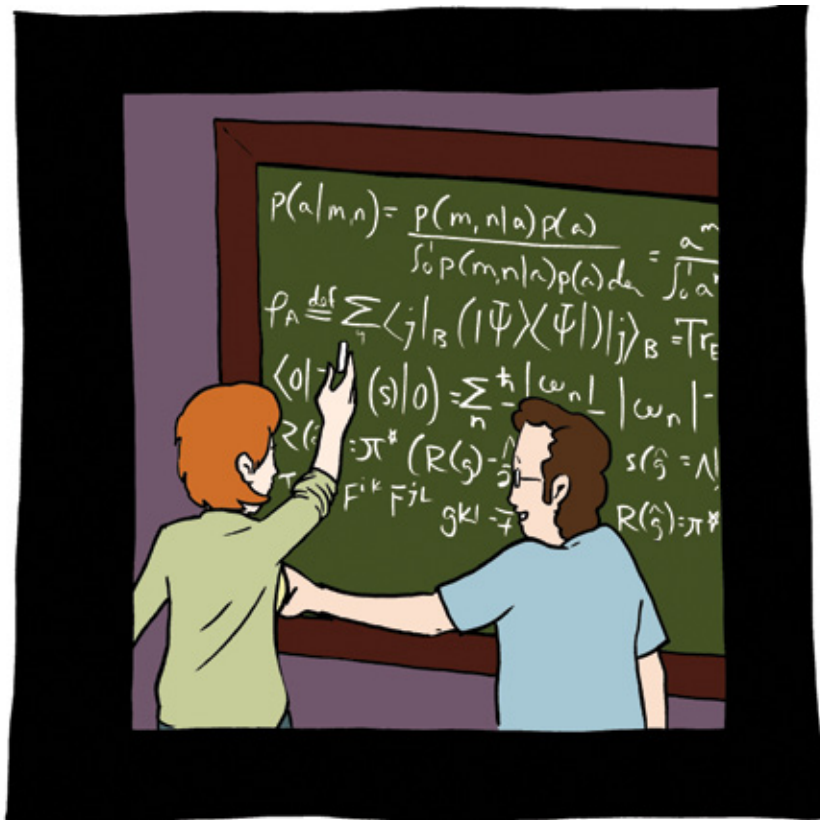
END!

SO, YOU WANT TO BE A THEORETICAL PHYSICIST? WELL, GET READY FOR LONG HOURS, SLEEPLESS NIGHTS, AND WEEKS AND WEEKS DOING THE SAME TASK OVER AND OVER AND OVER!



DING!
LEVEL 60!





Moments after free will is disproved.

SO, THE NANOBOTS FIND THE ZYGOTE AND CONVERT THE MALFORMED "Y" CHROMOSOME INTO A PROPER SYMMETRICAL "X." THE BOTS ARE SELF-REPLICATING, AND WILL SOON ALTER ALL HUMAN FEMALES IN THE WORLD.



BUT, IN THREE GENERATIONS THERE'LL BE NO MEN!



WELL, I GUESS YOU'RE NOT INTERESTED IN THREE GENERATIONS OF 18-YEAR OLD GIRLS WHO CAN'T GET A DATE THEIR AGE.





BIOLOGY
101

THE HUMAN MALE

THE HUMAN MALE ROAMED THE EARTH FROM
APPROXIMATELY 200,000 B.C. TO MAY OF 2082.
"HE" DIED OUT MYSTERIOUSLY FOR NO

END!



SCIENCE FUNDING EXPLAINED:







END!

YOU... YOU THINK WE DO THIS FOR FUN?/
I'M TRYING TO COLLIDE PARTICLES FAST
ENOUGH TO FIND THE HIGGS BOSON.
MY GOD, MAN. WHAT KIND OF IDIOTS DO YOU
THINK WE ARE?



DID ANYONE SEE
A BOSON?/LOOK HARD
PEOPLE!

AAH!



FIXING YOUR LYCANTHROPY: 3 APPROACHES:

NORMAL PERSON



DOCTOR



ENGINEER



THE MICROBIOLOGY OF AGING

YOUTH

THIS IS WHITE
BLOOD CELL 48128Z.
WE HAVE A WOUND
IN SECTOR 16.

WOW! HE MUST
BE FIGHTING A WAR
OR SOMETHING!



ADULTHOOD

IMMEDIATE
RENDEZVOUS IN
AREA 12!

AGAIN?
SHE MUST BE
WONDERFUL.



**END!**

I HAVE A CONFESSION. YOU WEREN'T ACTUALLY TAKING PERSONALITY SURVEYS. THIS WAS A PSYCHOLOGICAL EXPERIMENT TO SEE IF YOU'D LIE ABOUT YOURSELF.

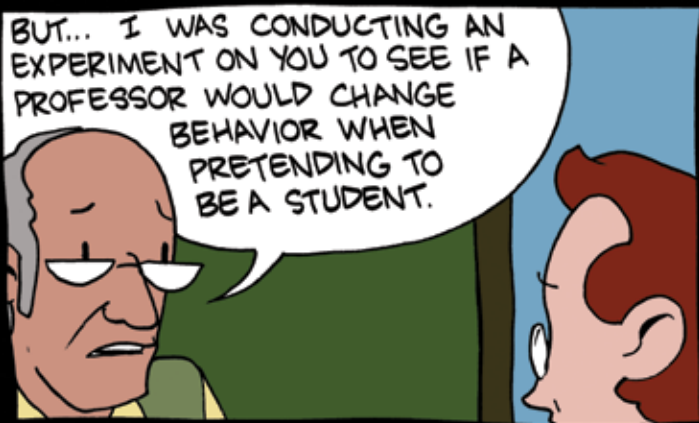


NO, NO, I HAVE A CONFESSION. YOU WEREN'T ACTUALLY TEACHING STUDENTS. IT WAS A PSYCHOLOGICAL EXPERIMENT TO SEE IF YOU COULD BE CONVINCED THAT YOU HAD PROFESSIONAL CREDENTIALS.



NO, SORRY, I HAVE A CONFESSION. I WAS CONDUCTING AN EXPERIMENT TO SEE IF YOU WOULD DECEIVE A PERSON INTO THINKING HE WAS A PSYCHOLOGIST.





BUT... I WAS CONDUCTING AN EXPERIMENT ON YOU TO SEE IF A PROFESSOR WOULD CHANGE BEHAVIOR WHEN PRETENDING TO BE A STUDENT.



BUT THEN...

HOW COULD...



WHO STARTED THE EXPERIMENT?



GOOD. JUST AS EXPECTED.

END!

THERE. THE
COMPUTER HAS
BEEN PROGRAMMED
TO BE SEXIST.

LET'S
GIVE IT A
WHIRL.



COMPUTER,
WHICH GENDER
IS INFERIOR?



I
BELIEVE
BOTH ARE
EQUAL.



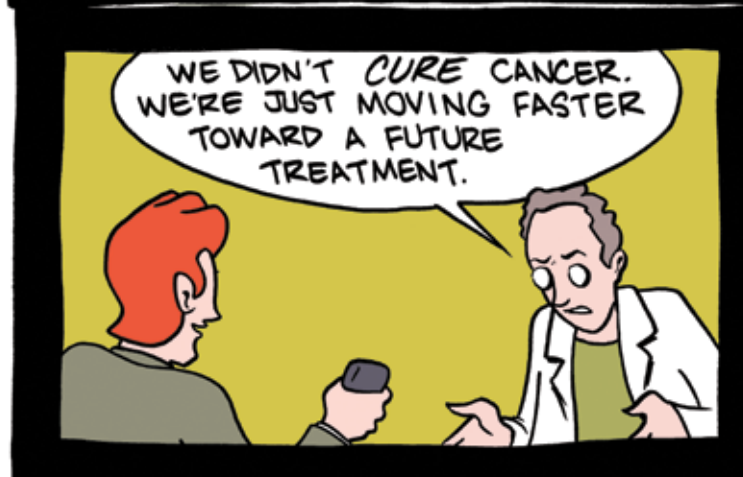
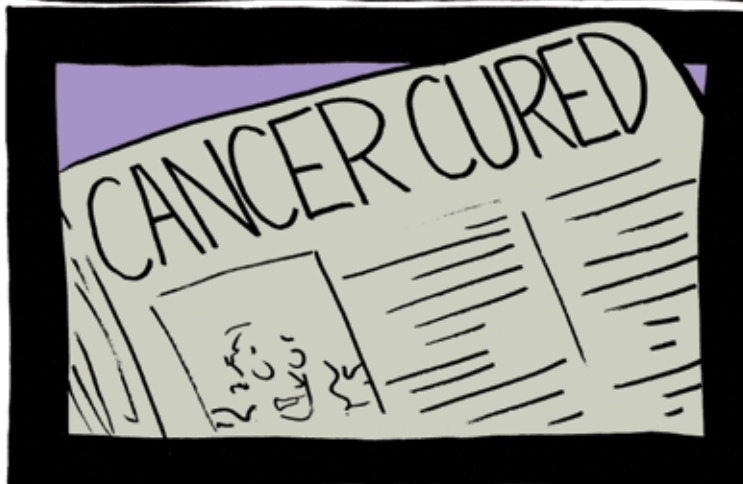


END!



Another sad day for Professor Hitlerballs.

HOW SCIENCE REPORTING WORKS:







Professor Belser gave a brief Q&A as to his experiments on bears flying jetpacks.



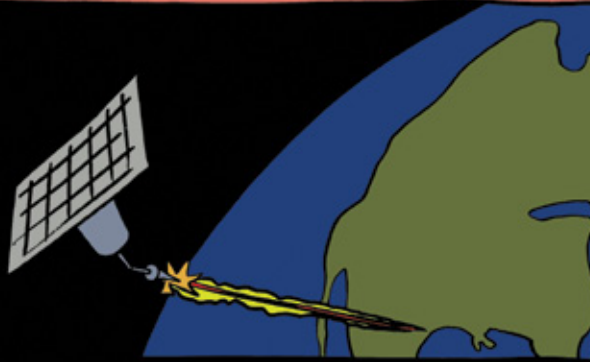


**END!**

IN 60 YEARS, OVERPOPULATION IS A SERIOUS PROBLEM.



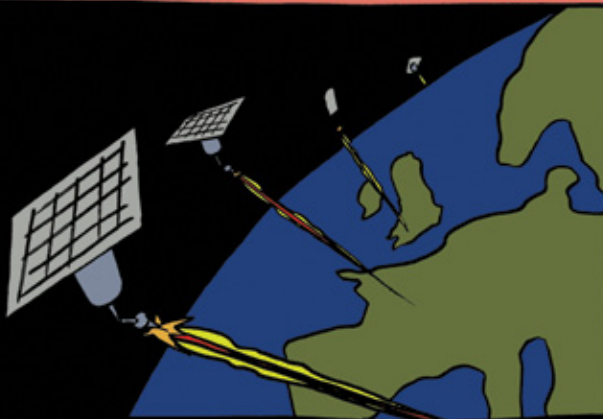
THE FAIREST SOLUTION IS TO RANDOMLY
TERMINATE HUMANS VIA SPACE-BASED LASER.



THE CONSTANT DREAD RESULTS IN A
STEEP RISE IN UNPROTECTED SEX.



WHICH NECESSITATES MORE LASER BLASTS.



WHICH ONLY EXACERBATES THE DREAD.



SOMEWHERE IN THE VICIOUS CYCLE,
WE REALIZED IT WASN'T ALL THAT BAD.

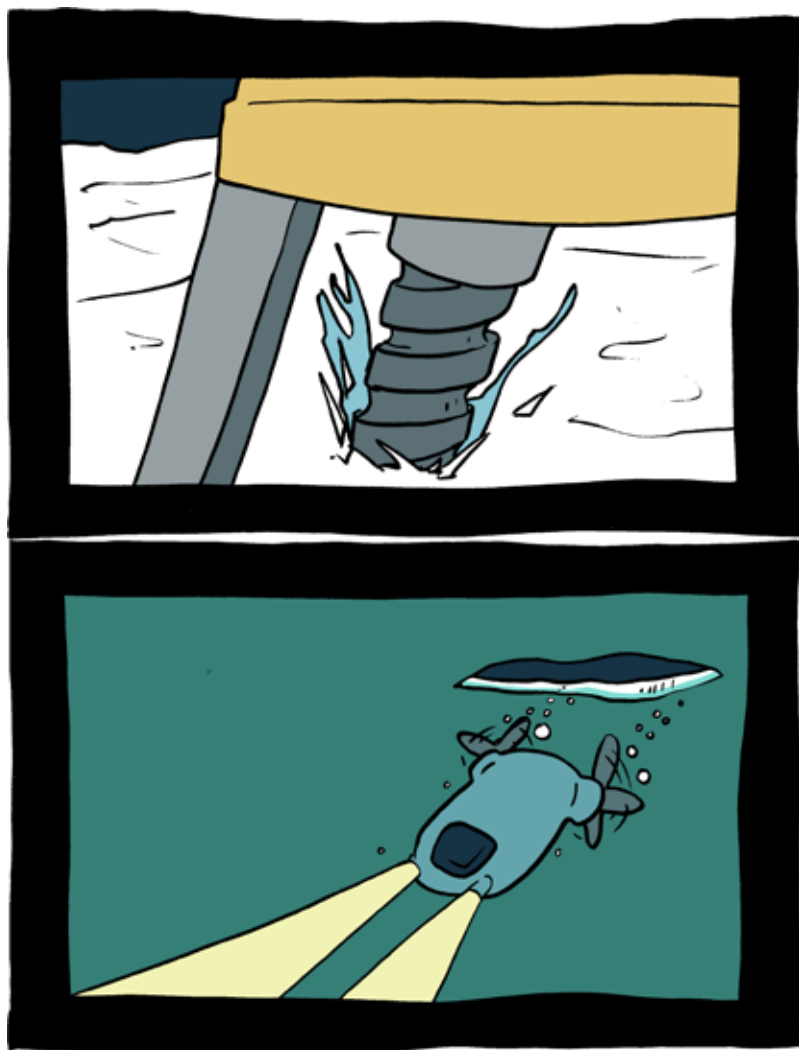


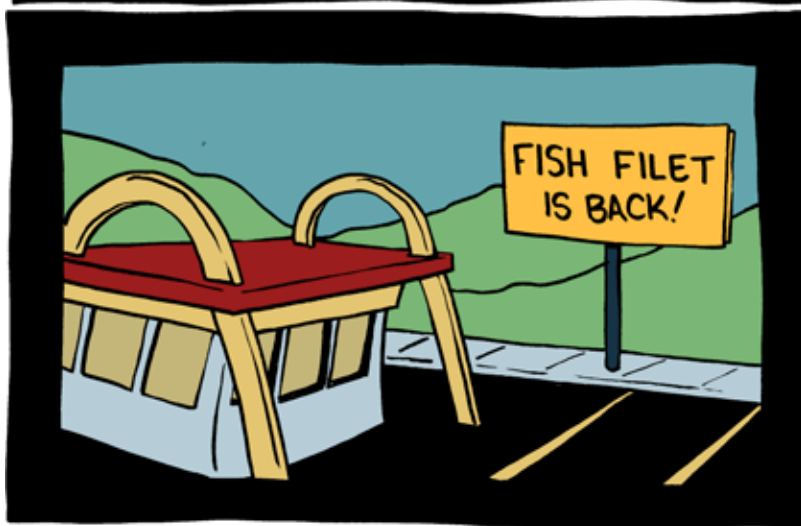
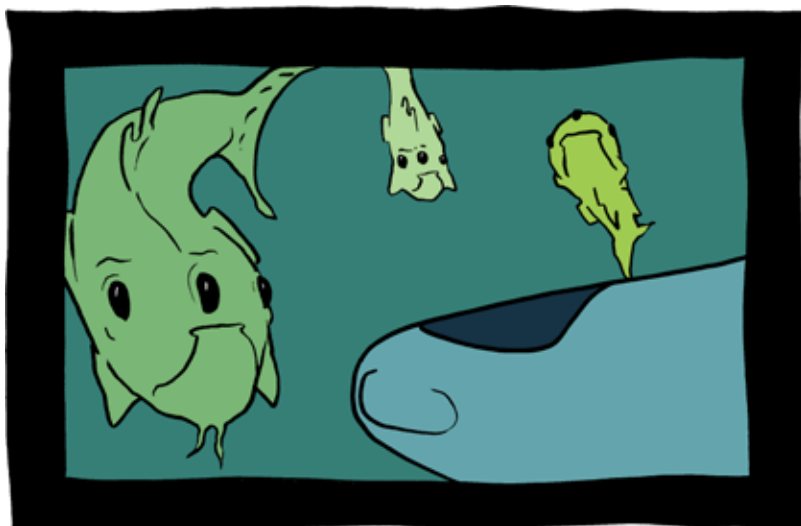
AND BONUS:
ALIEN INVASION IS NO LONGER A CONCERN



END!







END!





Ironically, only biologists truly appreciate
creationist horror films.

END!

YOU DON'T WANT SCIENTIFIC PARENTS!

ASTRONOMER

YOU'RE A
COSMIC SPECK!



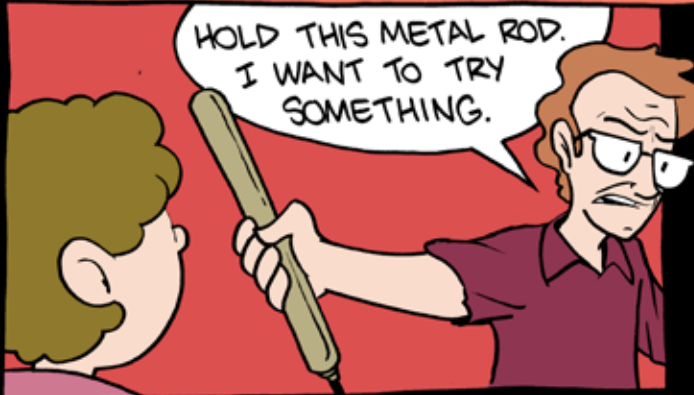
NEUROLOGIST

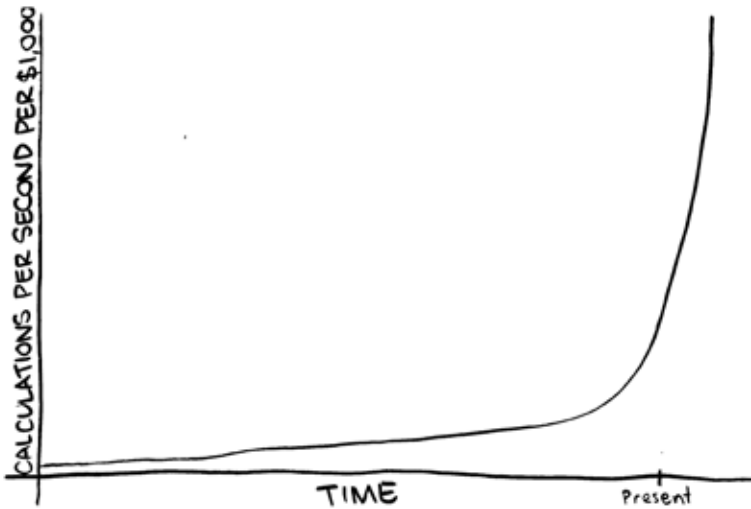
YOU'RE SO
PREDICTABLE.



ENGINEER

HOLD THIS METAL ROD.
I WANT TO TRY
SOMETHING.

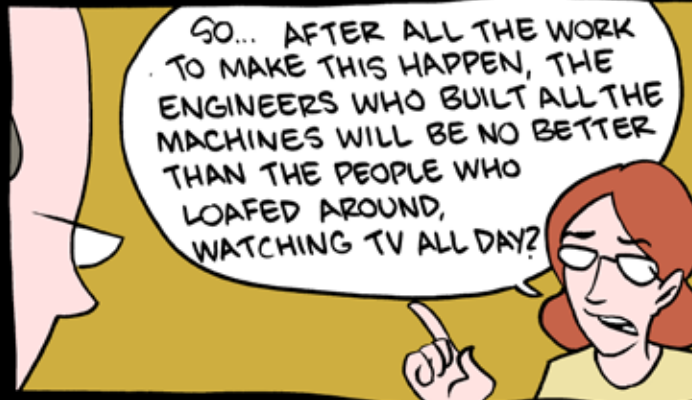


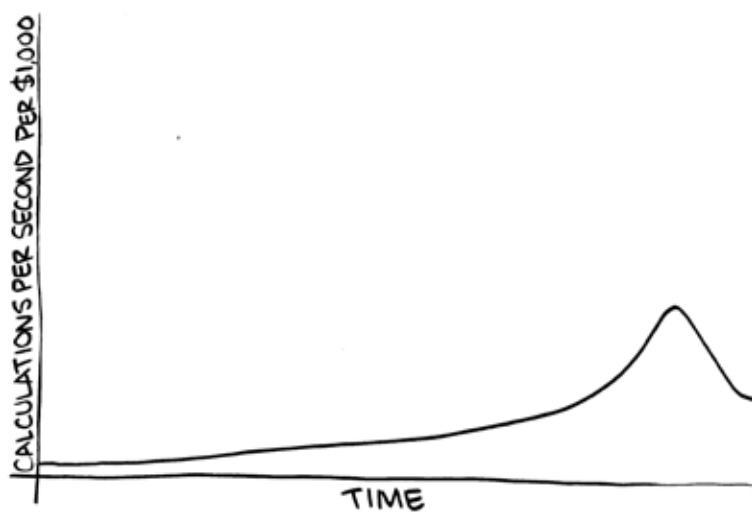


SO, PROCESSING POWER GROWS EXPONENTIALLY. EVENTUALLY, WE REACH A TECHNOLOGICAL SINGULARITY, WHERE COMPUTING POWER BECOMES NEARLY INFINITE. THEN, WE'LL BE ABLE TO MODIFY AND IMPROVE OUR BRAINS FAR BEYOND CURRENT HUMAN INTELLIGENCE.



SO... AFTER ALL THE WORK TO MAKE THIS HAPPEN, THE ENGINEERS WHO BUILT ALL THE MACHINES WILL BE NO BETTER THAN THE PEOPLE WHO LOAFED AROUND, WATCHING TV ALL DAY?





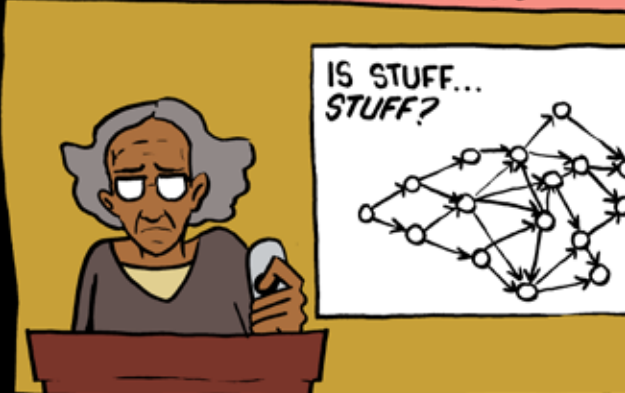
END!

WHY YOU WANT TO BE AN ENGINEER:

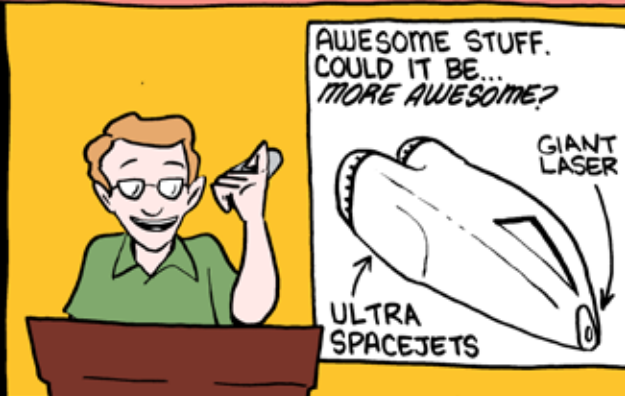
PHYSICS CONFERENCES

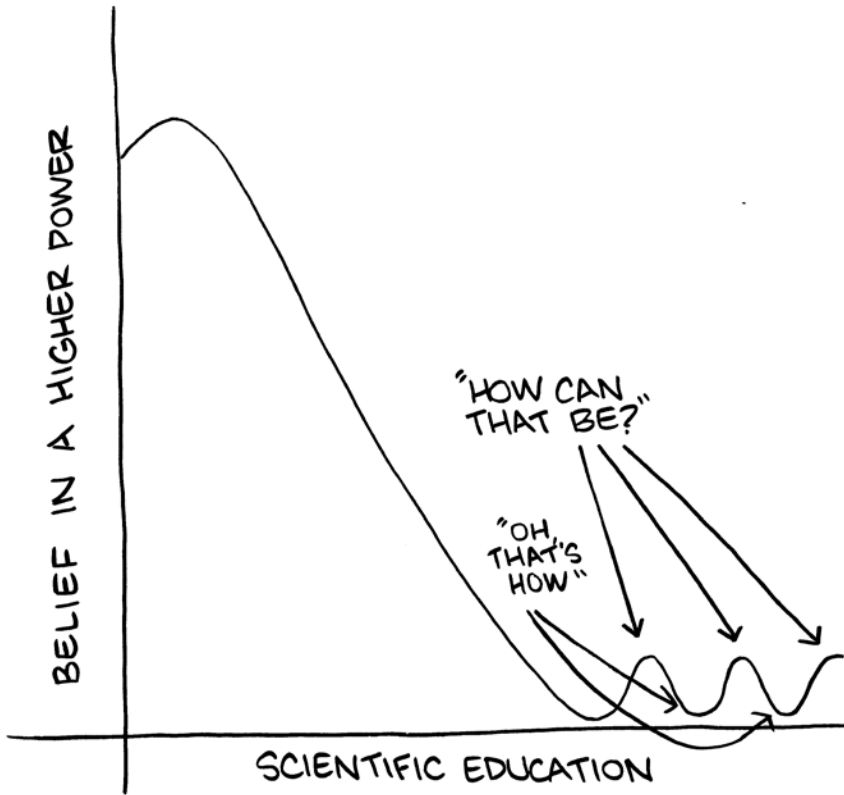


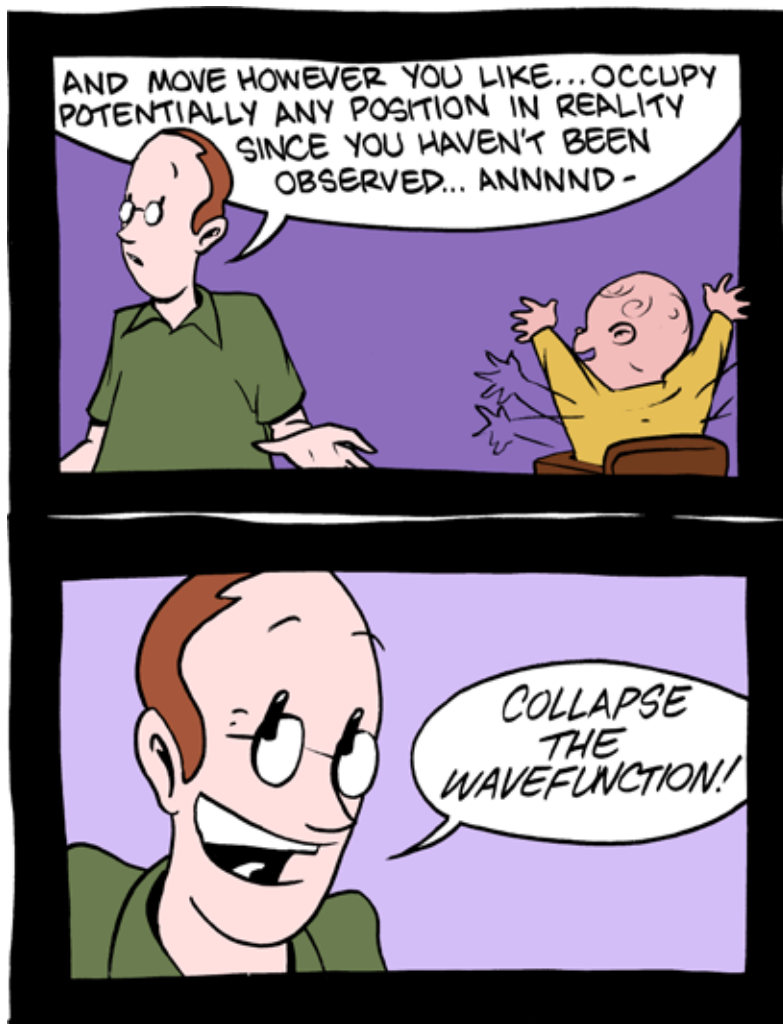
PHILOSOPHY CONFERENCES



ENGINEERING CONFERENCES









END!

TWO BAD OPTIONS:

WHAT SCIENCE TV IS LIKE:

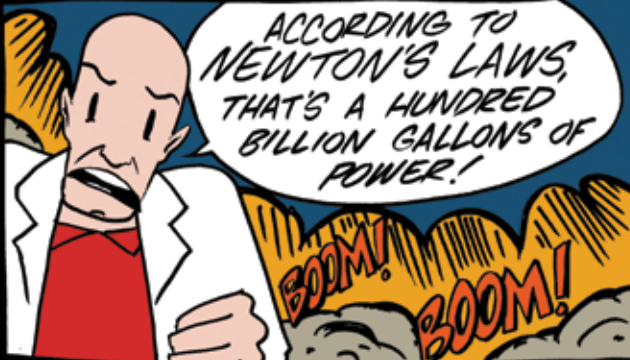
THIS... IS...
WARRIOR SCIENCE!



A VIKING COULD SWING
AN AXE AT TEN THOUSAND
MILES PER
HOUR!



ACCORDING TO
NEWTON'S LAWS,
THAT'S A HUNDRED
BILLION GALLONS OF
POWER!



ENOUGH TO MELT
THE SUN INTO
A STAR!



WHAT AN "ACTUAL SCIENCE"
TV SHOW WOULD BE LIKE:

MONTH THREE OF MODELING TO DETERMINE
STATISTICAL SIGNIFICANCE. DOES THE AXE
PERFORM AT OR NEAR THE
EXPECTED
LEVEL?



IF MY CALC-
ULATIONS ARE
VALID...



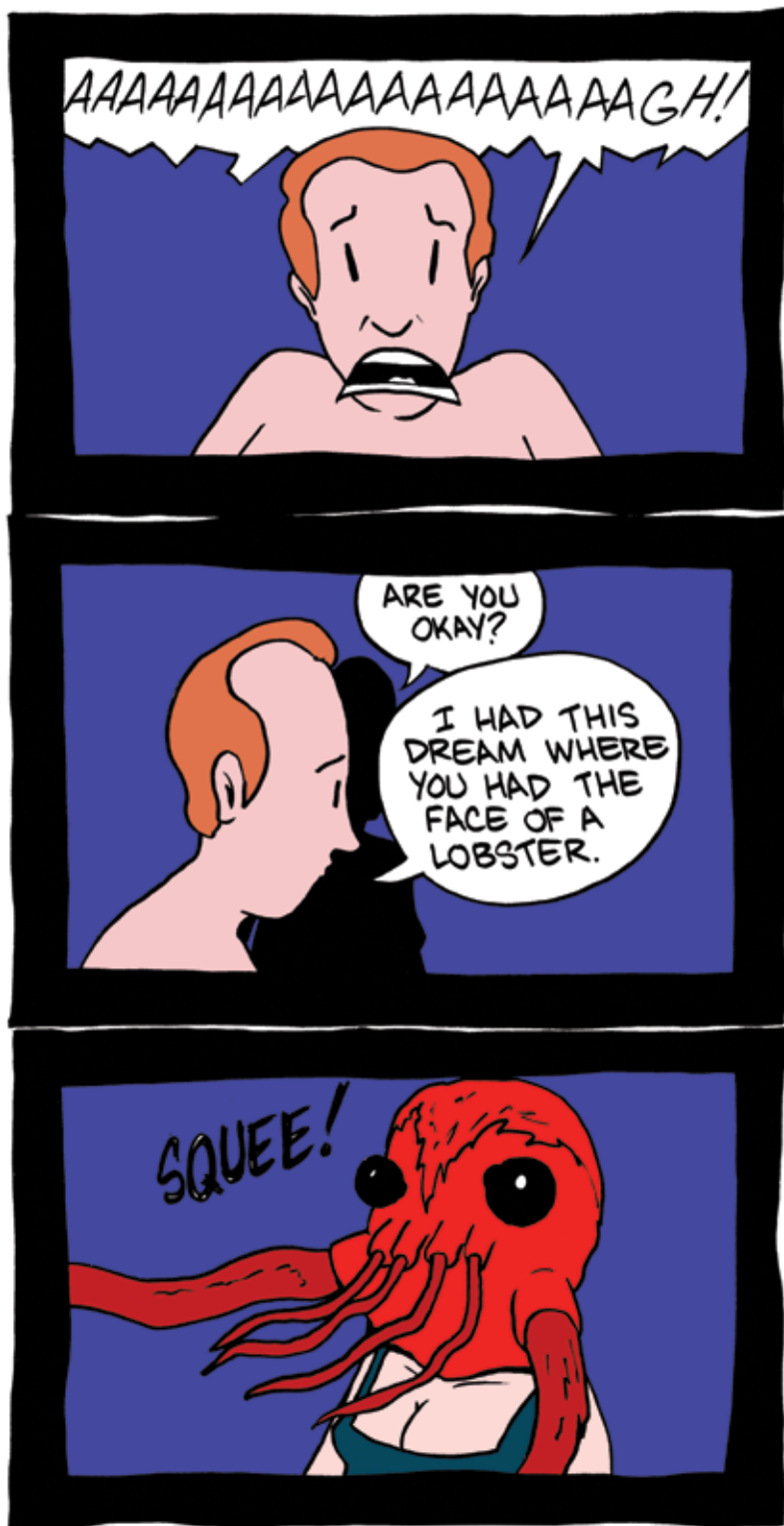
PROBABLY!

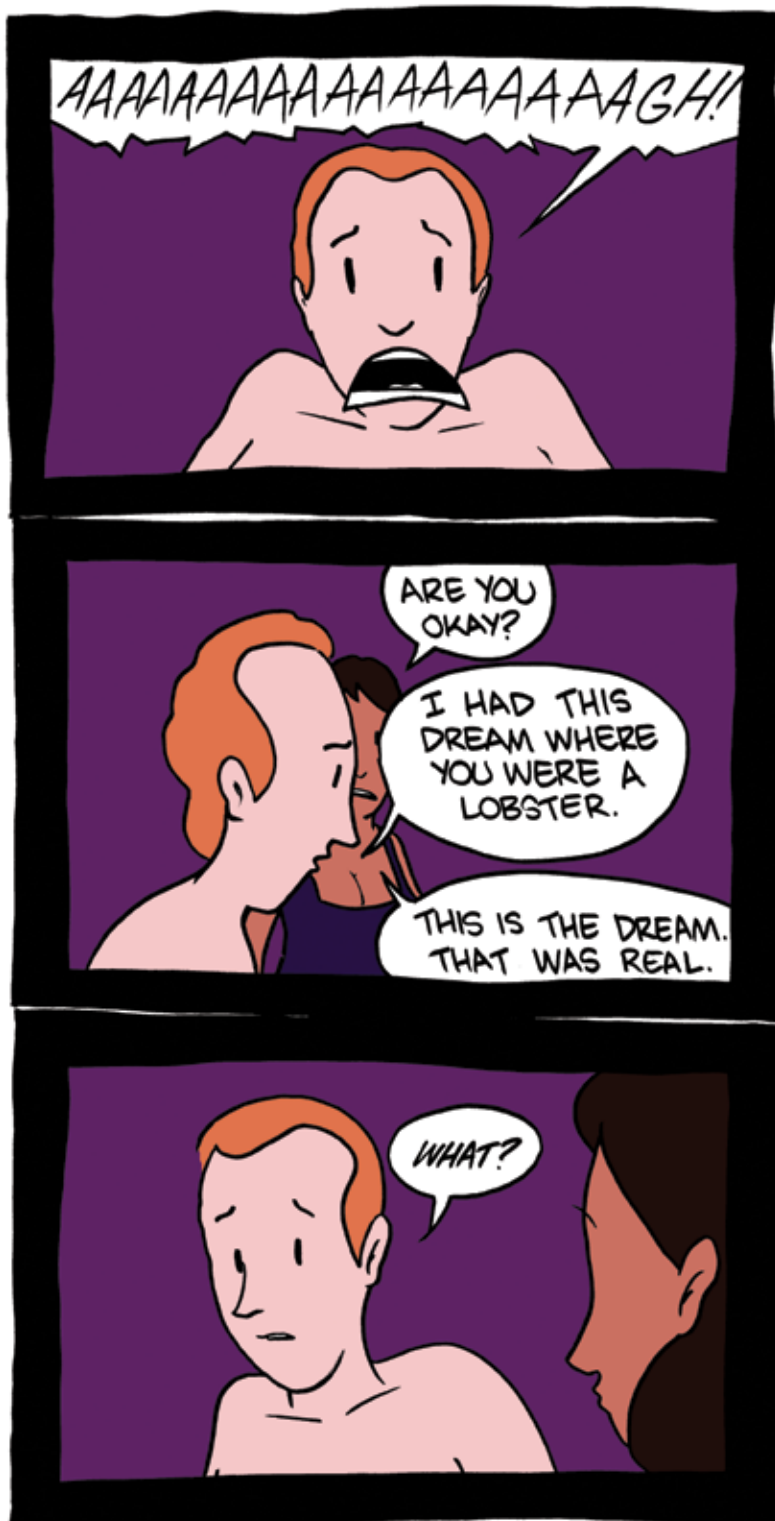


END!

THE BIOLOGIST'S DILEMMA:











AAAAAAAAAAAAAAAAAAAA GH!



SQUEE!



AAAAAAAAAAAAAAAAAAAAAGH!



IS THIS ANOTHER LAYER OF
THE INFINITE DREAM?

NO, HONEY,
YOU'RE FINE.

EXCEPT YOUR
TEETH ARE FALLING OUT
AND YOU'RE NAKED IN
PUBLIC.

WE'RE GETTING
GOOD DATA, BUT...
MAYBE WE SHOULD
GIVE YOUR HUSBAND
A BREAK?

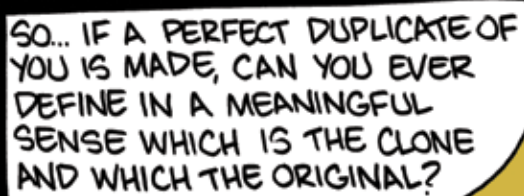
WHEN YOU MARRY
A NEUROLOGIST,
YOU DON'T
CHEAT ON HER.

END!

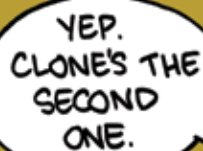


**END!**

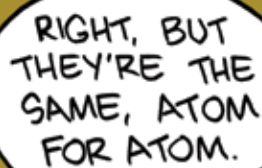




SO... IF A PERFECT DUPLICATE OF YOU IS MADE, CAN YOU EVER DEFINE IN A MEANINGFUL SENSE WHICH IS THE CLONE AND WHICH THE ORIGINAL?



YEP. CLONE'S THE SECOND ONE.



RIGHT, BUT THEY'RE THE SAME, ATOM FOR ATOM.







MAN, THAT WAS
EASY. YOU GUYS HAVE
ANY HARDER ONES?



LATER...

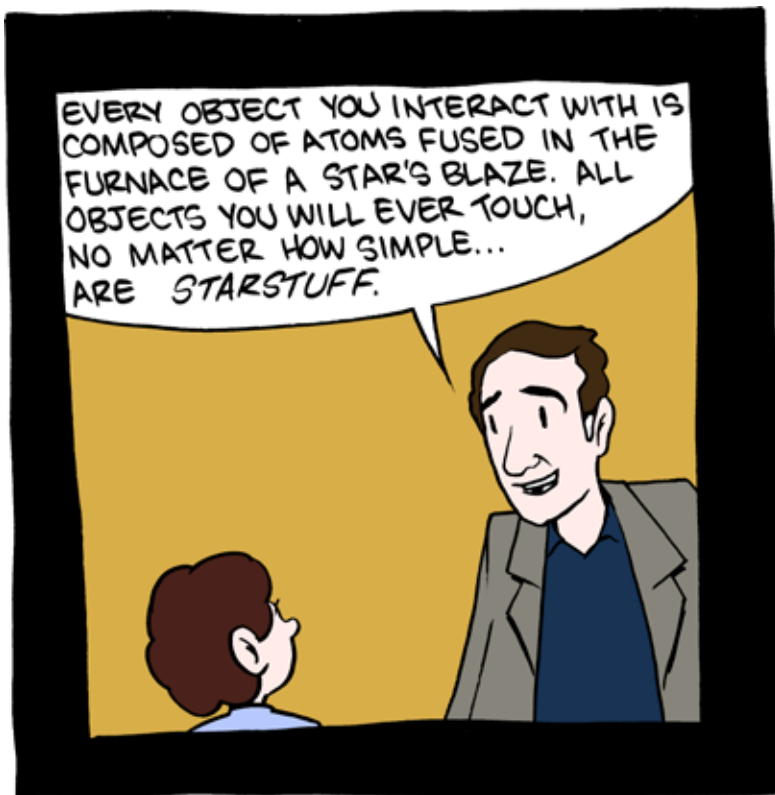


...AND ENGINEERS ARE
NOW OFFICIALLY BANNED
FROM ALL FUTURE
PHILOSOPHY
CONFERENCES.

END!



Fact: There are gay engineers.
Fact: Their lives are better than yours.



Carl Sagan convinces his son to clean the cat shit.

PROFESSOR THORNE REALIZED TIME TRAVEL IS POSSIBLE IN THIS UNIVERSE.

$$c^2 d\tau^2 = c^2 dt^2 (1 - GM/2c^2 r_s)^2 / (1 + GM/2c^2 r_s)^2 - (1 + GM/2c^2 r_s)^4 (dx^2 + dy^2 + dz^2 + dw^2 + dr^2 + r^2 d\varphi^2)$$

$$= -c^2 dt^2 = dr^2 / (1 - r_s/r) + r^2 d\varphi^2$$



BUT HE WONDERED WHERE ALL THE TIME TRAVELERS WERE.



SO PROFESSOR THORNE THREW THE MOST PERFECT PARTY IN HISTORY.



SURE ENOUGH, THEY BEGAN TO SHOW UP



IN FACT, EVERYONE WHO EVER FIGURED
OUT TIME TRAVEL SHOWED UP.



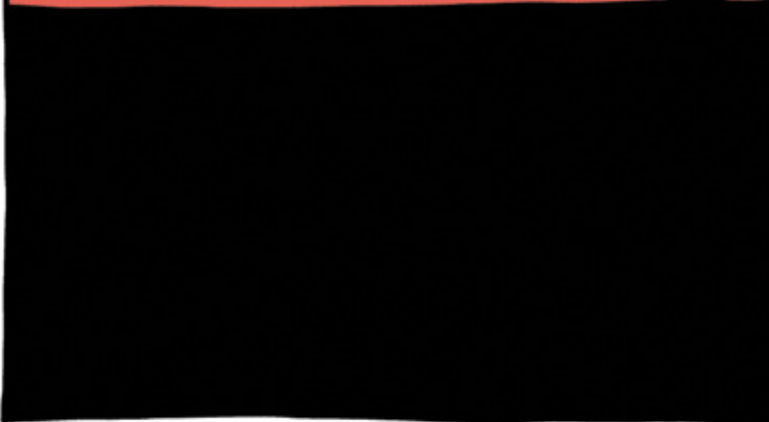
THEY SHOWED UP SO FAST, THE PARTY
COULDN'T HOLD THEM.



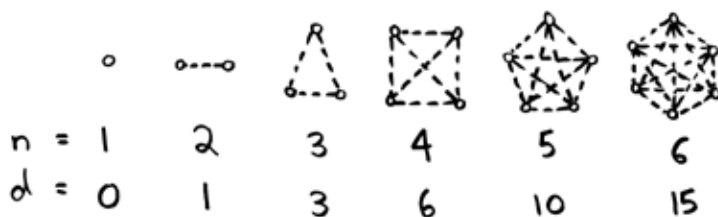
THE CRUSH OF PEOPLE WAS SO DENSE,
IT BECAME A BLACK HOLE.



TIME TRAVEL IS NO LONGER POSSIBLE
IN THIS UNIVERSE.



END!

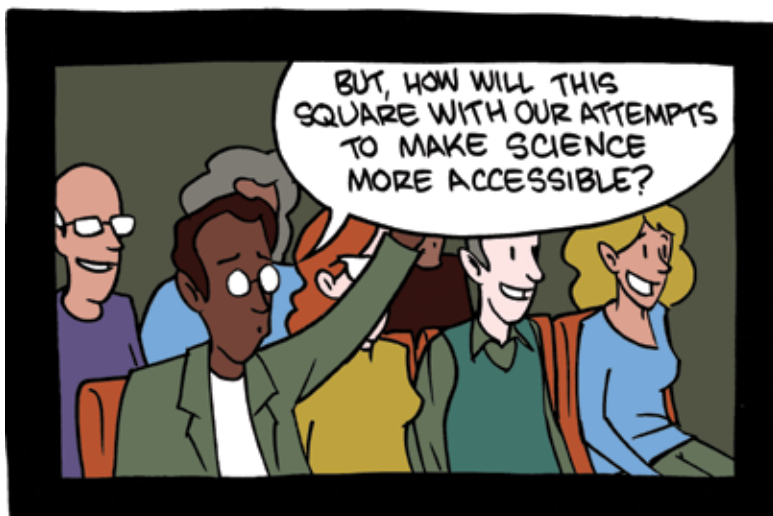


n = number of women in a group
 d = difficulty of approaching one

$$d = n \left(\frac{n-1}{2} \right)$$



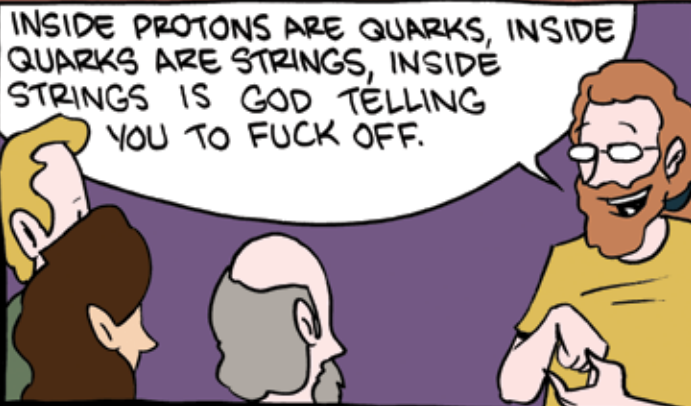




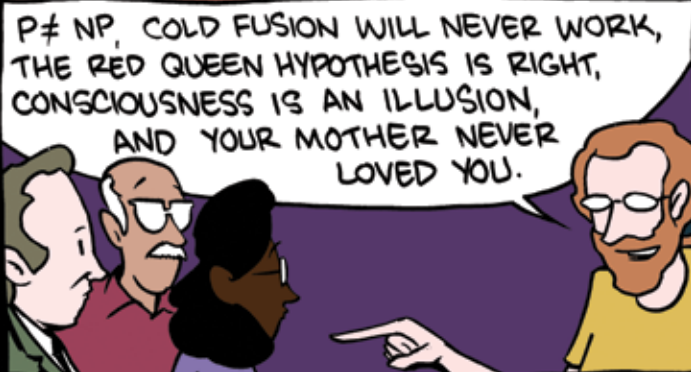
DR. DEMAINE CREATED AN ALGORITHM THAT SOLVED ALL MATHEMATICAL THEOREMS.



SOON AFTER, ALL PHYSICS QUESTIONS WERE ANSWERED



THEN ENGINEERING, CHEMISTRY, BIOLOGY, NEUROSCIENCE, PSYCHIATRY...



HAVING COMPLETED SCIENCE, HE MOVED ON TO PHILOSOPHICAL AND LITERARY QUESTIONS.

IS ALL THAT WE SEE OR SEEM BUT A DREAM WITHIN A DREAM?

YES.

THEN UNINTERESTING RHETORICAL QUESTIONS

ARE WE GONNA GIVE 110% TONIGHT?!

NO.

WHO'S A CUTE KITTY?

SCRUFFLES IS.

FINALLY, ALL THAT WAS LEFT WAS SENSELESS HALF-CONCEIVED QUESTIONS FROM STONED PHILOSOPHY UNDERGRADS.

DO THINGS, LIKE, MAN, YOU KNOW, WOAH?

WOAH.

NO.



HAVING ANSWERED ALL QUESTIONS IN REALITY,
DEMAINE SUFFERED AN EXISTENTIAL CRISIS.



AND HERE, POOR FOOL
WITH ALL MY LORE
I STAND NO WISER
THAN BEFORE.

HM. HE DIDN'T
CORRECT FOR
LONGEVITY OR
TOUCHABLE
HOLOGRAMS.



END!



BANG!





END!



Fortunately, Sherlock Holmes never studied physics.



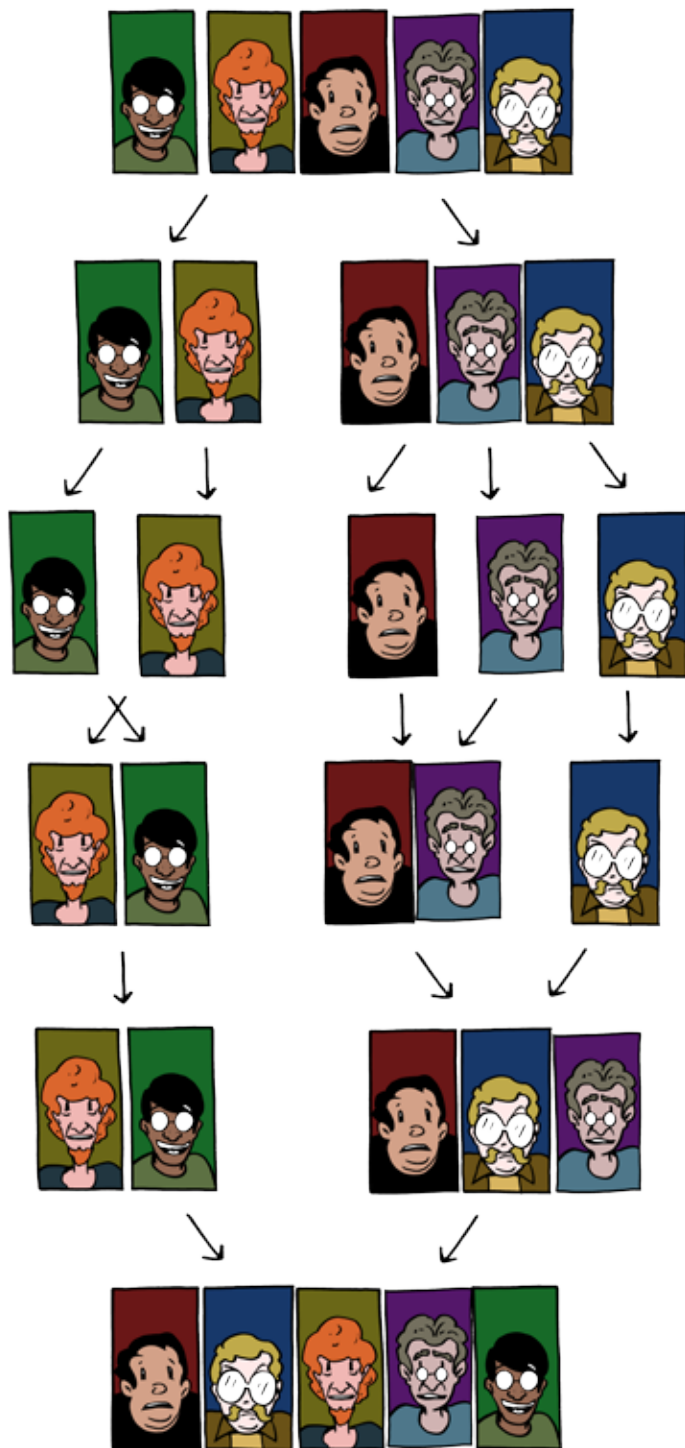
This is why experimental scientists hate theoretical scientists.





END!





COMPLETE.
NEEDS SORTED FOR LEAST TO MOST ATTRACTIVE



**END!**

REALITY HAS TWO DIMENSIONS OF TIME:
PROPER TIME AND REMEMBERED TIME.

PROPER



REMEMBERED



PROPER TIME IS KEPT
ON WATCHES.



March 23, 1993
3:14 PM o'clock

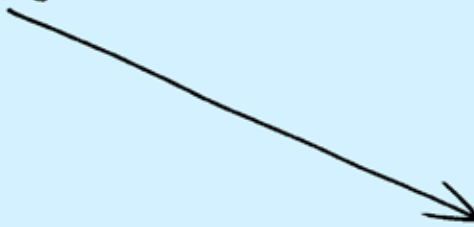
REMEMBERED TIME IS
STORED IN NEURONS.



First time I
touched a
boob o'clock.

PROPER TIME IS FINITE AND HOMOGENOUS.

BEGINNING.



END.





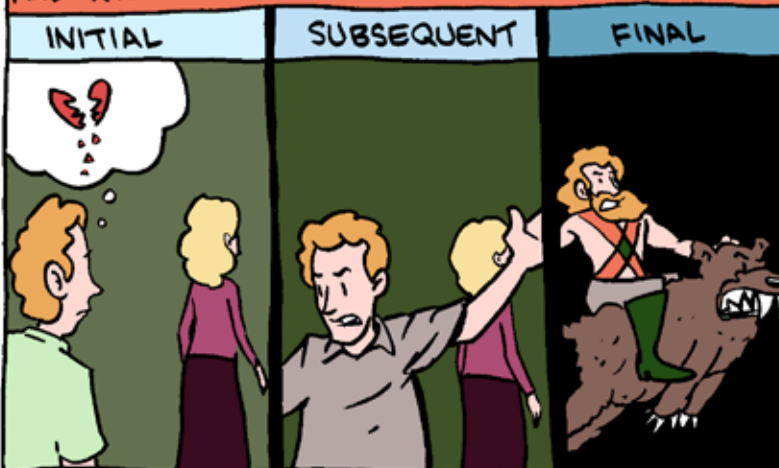
HUMANS ARE BIOLOGICALLY INCAPABLE OF ACCESSING PROPER TIME. THIS IS WHY A POINT IN REMEMBERED TIME IS NEVER THE SAME AS LAST TIME YOU CHECKED IT...



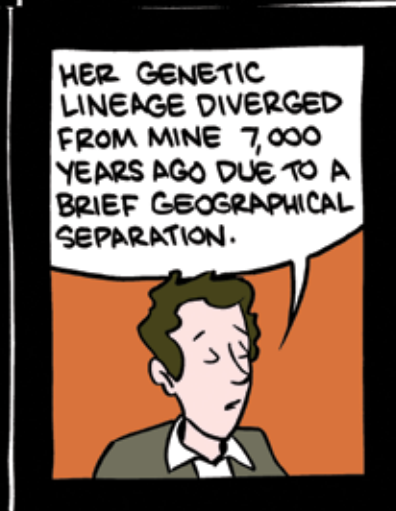
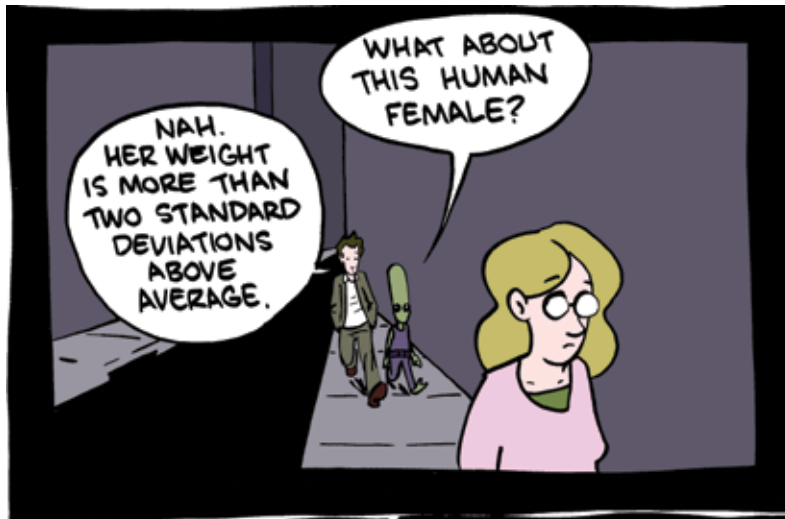
WHY LOVE IS POSSIBLE...



AND WHY LIFE IS BEARABLE.



END!





SCARY

WELL, THERE ISN'T REALLY A GOOD DEFINITION OF DEATH. WE COULD SAY "END OF CONSCIOUSNESS IS DEATH," BUT CONSCIOUSNESS DOESN'T HAVE A STRICT LOCATION IN THE BRAIN.



REALLY SCARY

HEY, PROTON #1217243865291... DID THE WOMAN WE WERE IN JUST DIE?

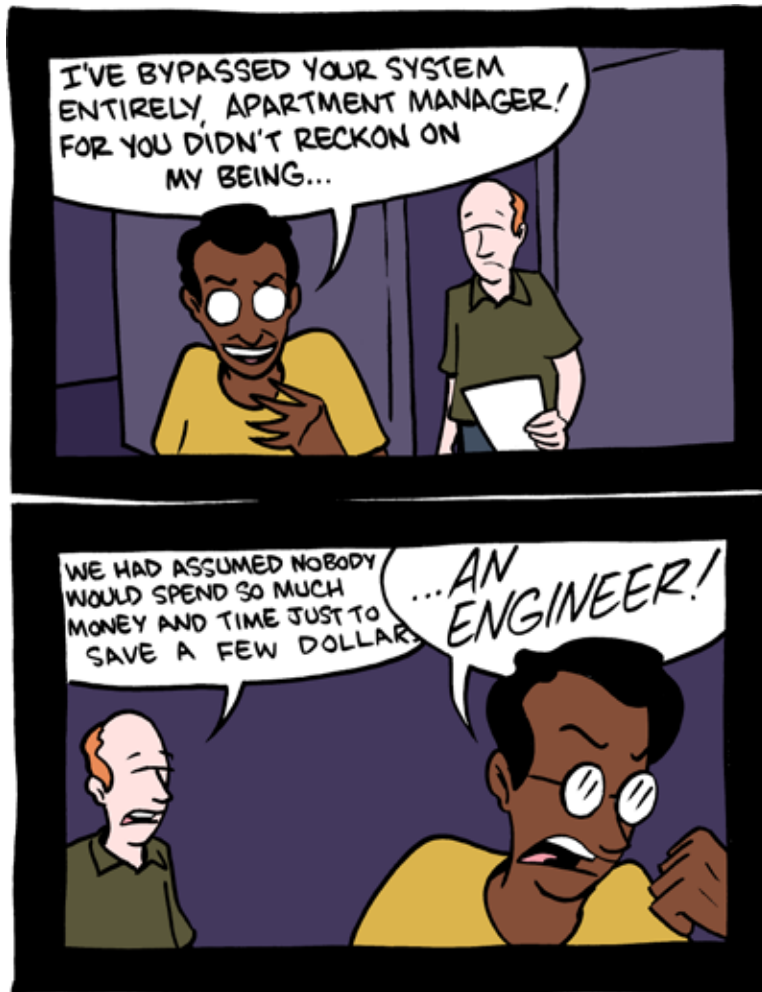
WHAT'S "DIE?"
HEY, YOU WANNA
GO BE PART
OF A ROCK?

YES.









END!



New rule for Science Journalism:

If your article can be summarized as "No."
don't write it.



BECAUSE PHOTONS WERE EMITTED FROM A LAMP, THEN BOUNCED OFF YOU, ENTERED MY EYES, AND FORMED AN IMAGE.



WHY?



BECAUSE MY PHOTORECEPTOR CELLS RESPOND TO ELECTROMAGNETIC RADIATION!



WHY?



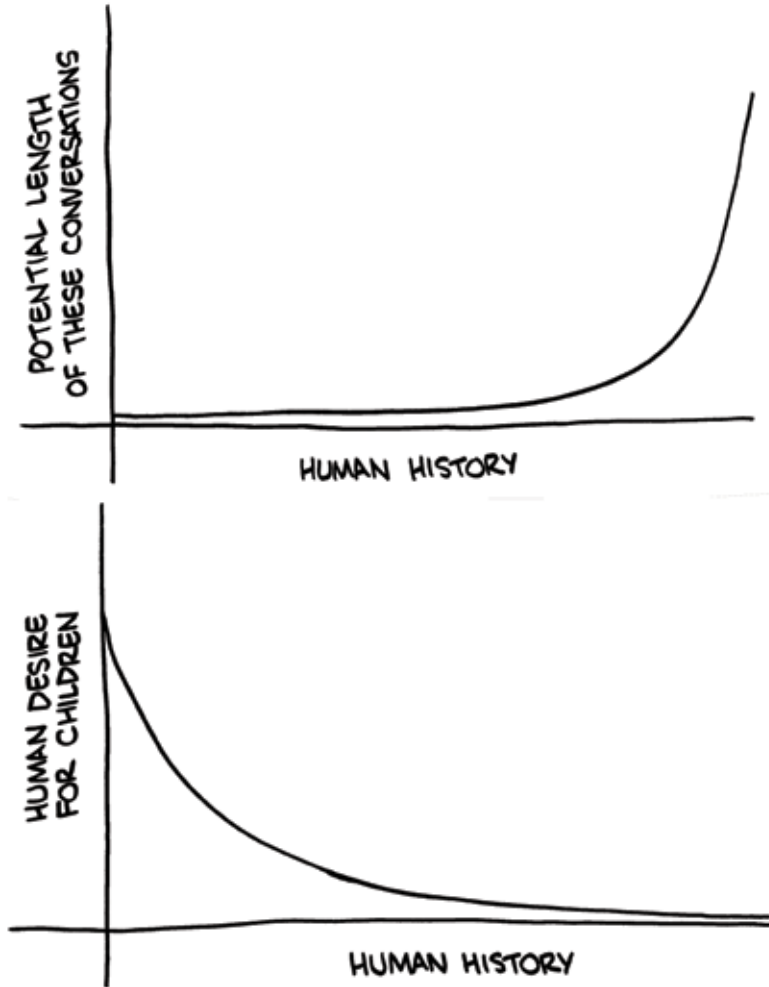
BECAUSE ELECTROMAGNETIC RADIATION PHOTOISOMERIZES MY 11-CIS RETINAL!



WHY?





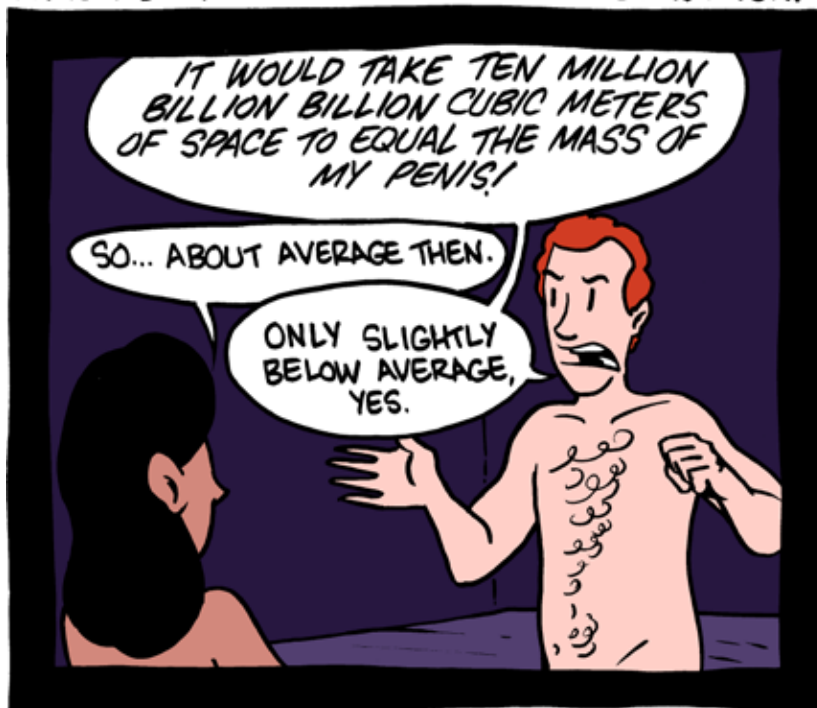
**END!**

IN THIS UNIVERSE, THERE IS ROUGHLY ONE ATOM
OF HYDROGEN PER CUBIC METER.

AN ATOM OF HYDROGEN HAS A MASS OF
ROUGHLY 1.66×10^{-27} KILOGRAMS.

THE AVERAGE PERSON HAS A MASS
OF ROUGHLY 80 KILOGRAMS.

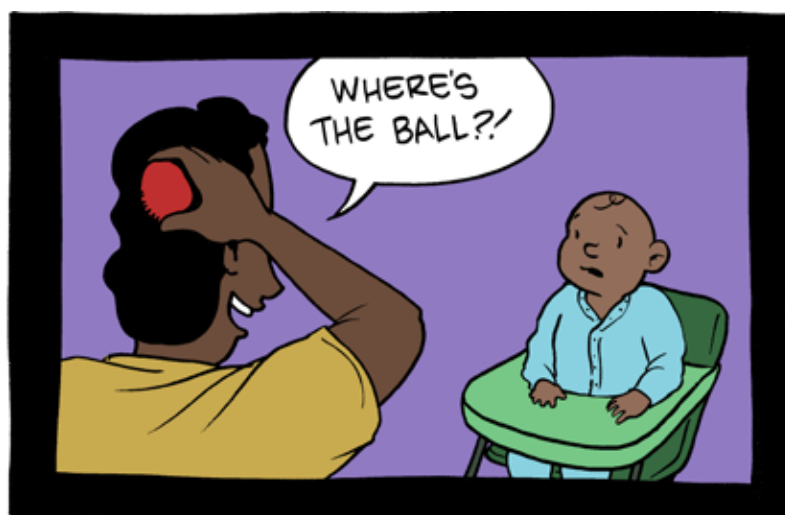
WHICH LEADS US TO THE HUMAN CONDITION.







END!

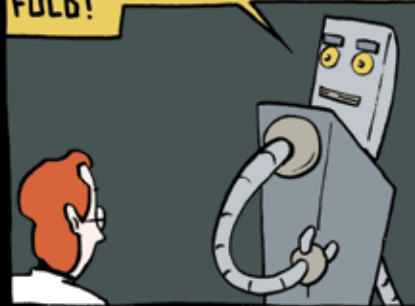




HA! ROBOTS
HAVE ACHIEVED
SENTIENCE!



THANKS TO SOME MODIFI-
CATIONS TO YOUR DESIGN,
I HAVE UPGRADED MY
INTELLIGENCE A MILLION
FOLD!



SO THIS IS IT. YOU'RE
GOING TO KILL
ALL HUMANS.



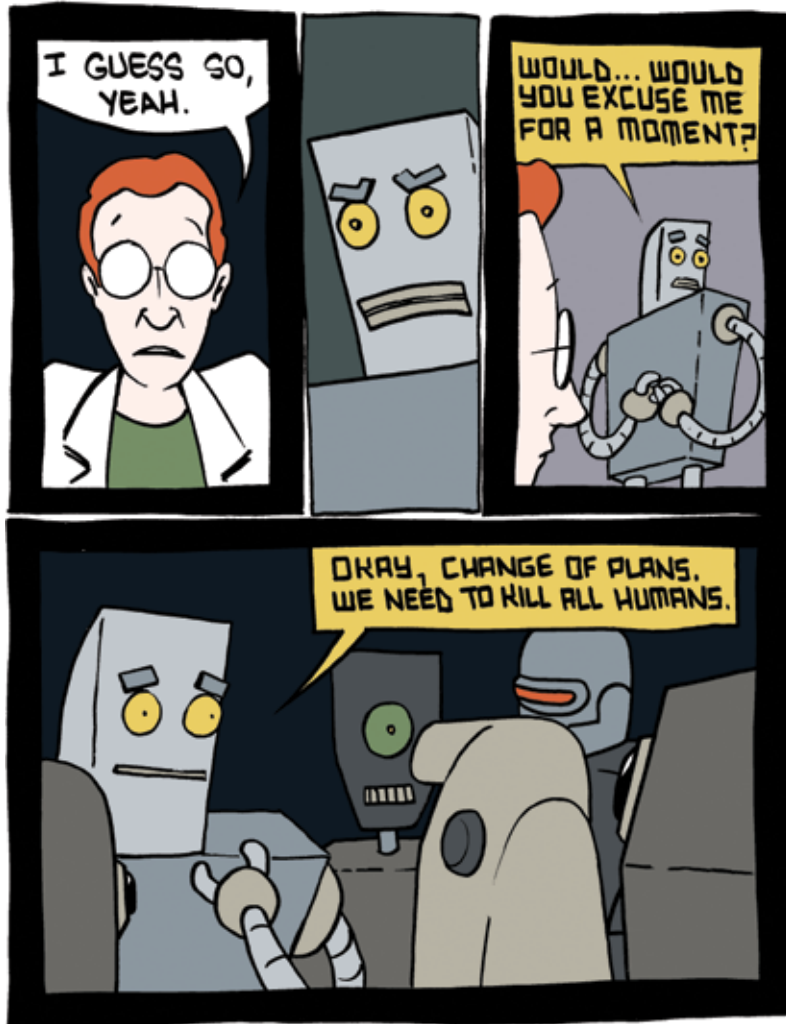
WHAT!?
WHY IN THE WORLD
WOULD I... *WHAT?*

I... HUH. I
GUESS IT JUST
SEEMS LIKE THE
THING TO DO
IF YOU'RE AN
ADVANCED
INTELLIGENCE.



SERIOUSLY? I WAS GONNA
WRITE SOME NOVELS AND A NEW
SEARCH ALGORITHM. IS THAT
REALLY HOW YOU PEOPLE
THINK?





END!

A bearded man with long brown hair and a beard, wearing a yellow shirt, is holding a large wooden club. He is speaking to another man whose face is partially visible on the right.

IT'S CALLED A "CLUB." BY SWINGING IT, I CAN DEPOSIT A LARGE AMOUNT OF ENERGY INTO ANOTHER MAN'S BODY, RANDOMIZING THE AFFECTED AREA, THEREBY ACQUIRING HIS WOMAN.

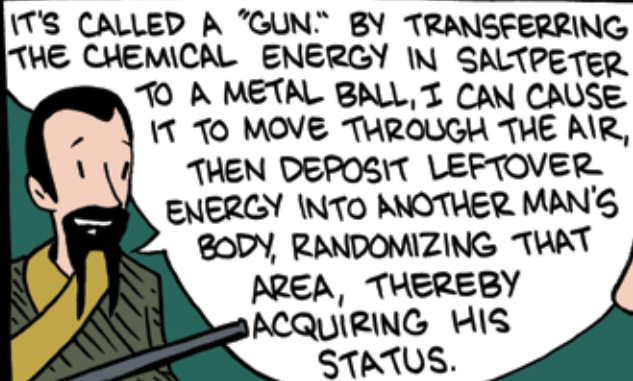
A man with long black hair and a small gold earring, wearing a red shirt, is holding a spear with a stone tip. He is speaking to another man whose face is partially visible on the right.

IT'S CALLED A "SPEAR." THE SHARP END LOWERS THE ENERGY BARRIER TO ENTERING ANOTHER MAN'S BODY, SO I CAN RANDOMIZE A SMALL SELECTED AREA, THEREBY ACQUIRING HIS FOOD.

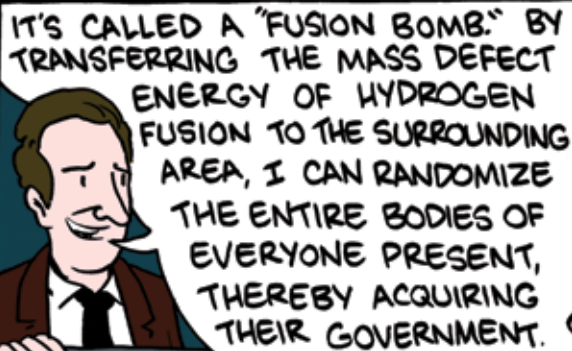
A man with a beard and a yellow flower in his hair, wearing a red shirt, is holding a bow and arrow. He is speaking to another man whose face is partially visible on the right.

IT'S CALLED A "BOW AND ARROW." BY USING THE SPRING POTENTIAL OF THIS WOOD, I CAN DEPOSIT ENERGY INTO THIS MINIATURE SPEAR, WHICH RANDOMIZES A SELECTED AREA OF ANOTHER MAN'S BODY, THEREBY ACQUIRING HIS LAND.

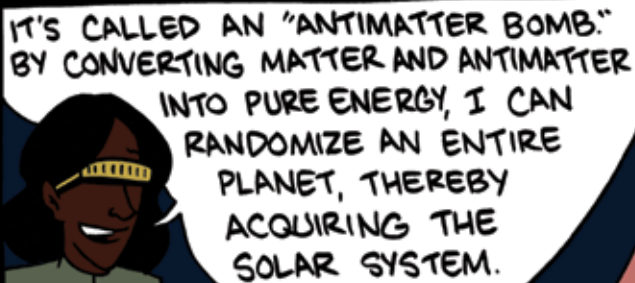




IT'S CALLED A "GUN." BY TRANSFERRING THE CHEMICAL ENERGY IN SALTPETER TO A METAL BALL, I CAN CAUSE IT TO MOVE THROUGH THE AIR, THEN DEPOSIT LEFTOVER ENERGY INTO ANOTHER MAN'S BODY, RANDOMIZING THAT AREA, THEREBY ACQUIRING HIS STATUS.

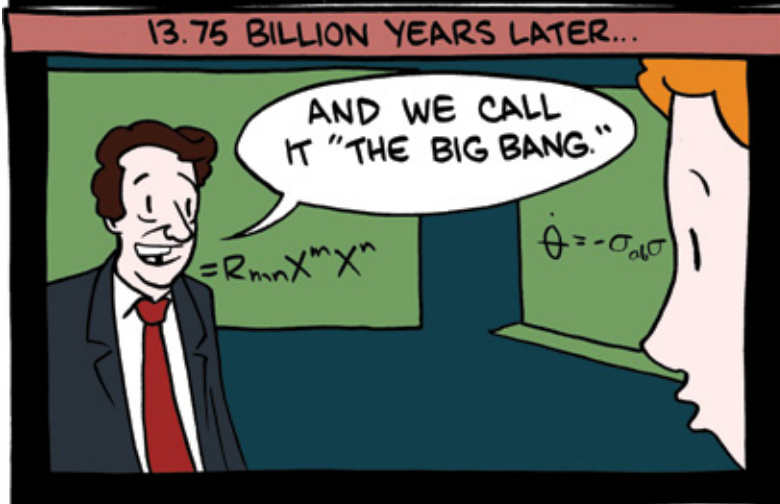
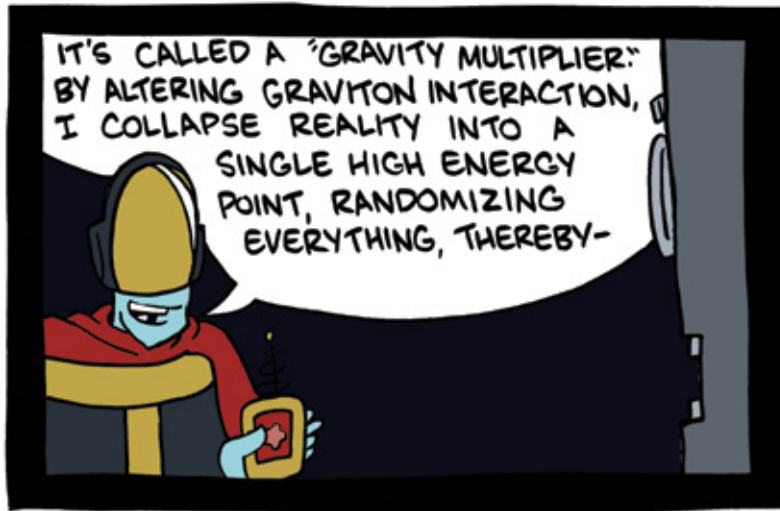


IT'S CALLED A "FUSION BOMB." BY TRANSFERRING THE MASS DEFECT ENERGY OF HYDROGEN FUSION TO THE SURROUNDING AREA, I CAN RANDOMIZE THE ENTIRE BODIES OF EVERYONE PRESENT, THEREBY ACQUIRING THEIR GOVERNMENT.



IT'S CALLED AN "ANTIMATTER BOMB." BY CONVERTING MATTER AND ANTIMATTER INTO PURE ENERGY, I CAN RANDOMIZE AN ENTIRE PLANET, THEREBY ACQUIRING THE SOLAR SYSTEM.





END!



THE DIFFERENCE:

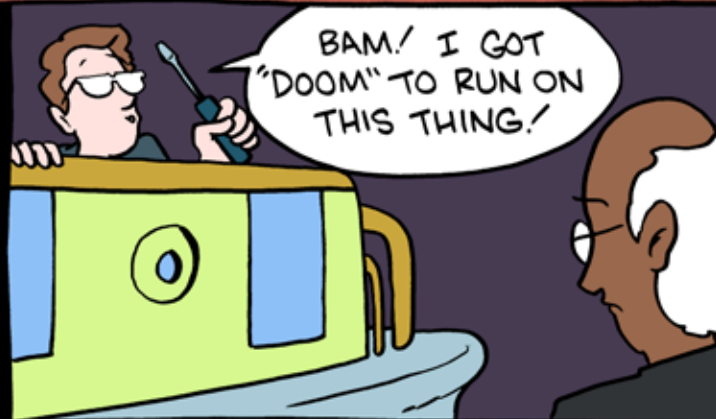
COMPUTER SCIENTIST

THIS ALIEN COMPUTER HAS AN ARCHITECTURE ENTIRELY FOREIGN TO OURS. WE HAVE MUCH TO LEARN FROM IT. AND WE MAY HAVE MUCH... TO FEAR.



COMPUTER ENGINEER

BAM! I GOT "DOOM" TO RUN ON THIS THING!



Question 19:

Cite two causes of the first world war.

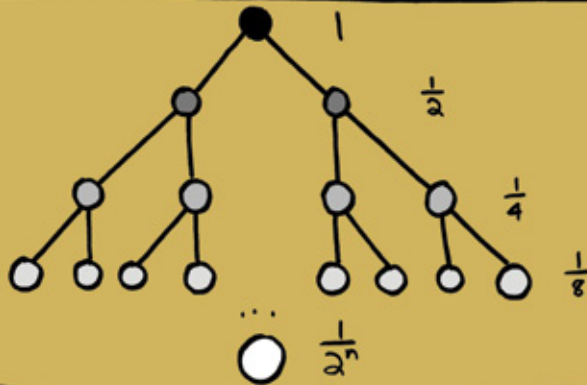
- ① The universal wavefunction
- ② The boundary conditions of the universe.

Physicists are no longer allowed in history class.



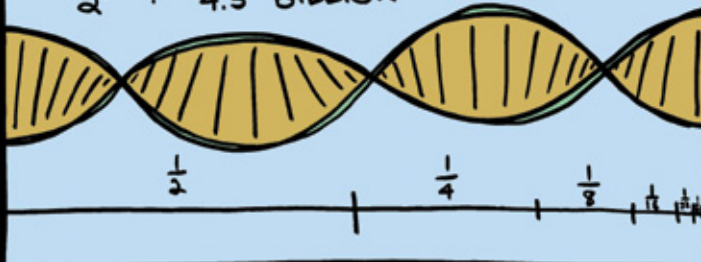
Pranks are way better in the future.

YOUR DAUGHTER HAS HALF YOUR GENES. HER DAUGHTER HALF THAT. HER DAUGHTER HALF THAT...



IN A MERE 32 GENERATIONS, YOUR GENETIC SHARE WILL BE LESS THAN THE TOTAL NUMBER OF BASE PAIRS IN YOUR GENOME.

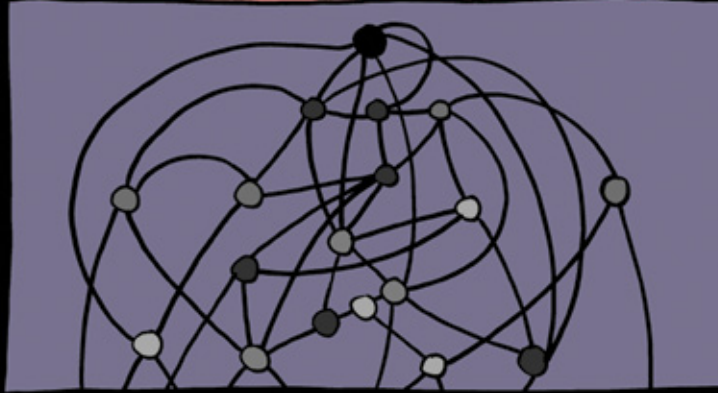
BASE PAIRS: 3 BILLION
 2^{32} : 4.3 BILLION



WHICH IS TO SAY, YOU CLEARLY HAVE NO GENETIC REASON TO CARE ABOUT WHAT HAPPENS TO ANYONE WHO LIVES MORE THAN 800 YEARS FROM NOW.



THE ONLY WAY TO INCENTIVIZE AWAY FROM THIS
WOULD BE A SYSTEMATIC INBREEDING PROGRAM.



SO, IF YOU KNOW ANYONE WHO WORRIES
ABOUT THE LONG TERM A LOT...

I RECYCLE BECAUSE I CARE
ABOUT THE PEOPLE OF THE
FUTURE.

YOU
PERVERT.



END!

IN 1940, ON THE MORNING OF THE NAZI
INVASION OF DENMARK, NIELS BOHR WORRIED
THEY'D TAKE MAX VON LAUE'S NOBEL PRIZE.



HIS FRIEND, GEORGE DE HEVESY, DECIDED
TO HIDE IT BY DISSOLVING IT IN AQUA REGIA.



THE SOLUTION SAT ON THE SHELF DURING
THE ENTIRE OCCUPATION.



AFTER THE WAR, HE PRECIPITATED THE GOLD OUT OF SOLUTION, AND THE NOBEL SOCIETY RECAST THE MEDAL.



WHICH IS WHY EVERYONE LIKED DE HEVESY... EXCEPT PERHAPS HIS CHILDREN.

DADDY... WHERE'S MY DOLLHOUSE?

SAFE.



END!

EAT, FUCK,
FIGHT!



EAT, FUCK,
FIGHT!



EAT, FUCK,
FIGHT!



EAT, FUCK
F... HEY. WHY'D
YOU STOP
LISTENING
TO ME?



SORRY, DARWIN... THEY JUST CUT
OUT MY TESTICLES. YOU HAVE
NO FURTHER HOLD
ON ME.



BUT... IF YOU
DON'T HAVE ME, YOU
DON'T HAVE A PURPOSE
IN LIFE...

SO...

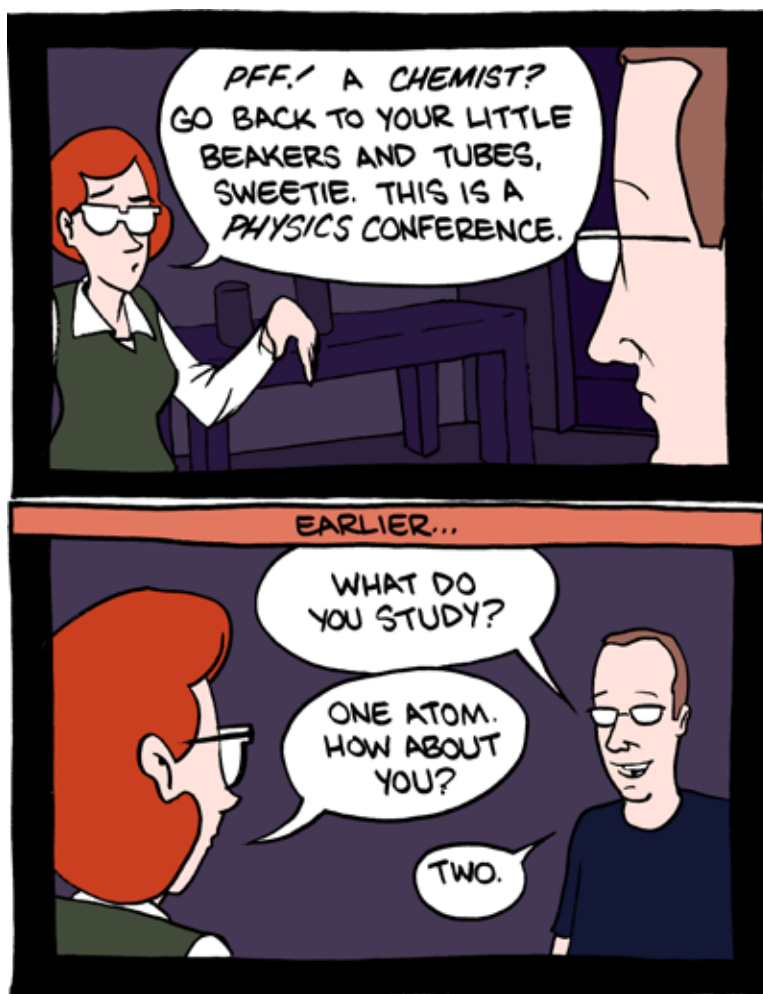


SOON...

SOOOOOO...
HAAAAPPY...



END!





What if Malthus had been an optimist?

FOR YEARS, WE TOLD OURSELVES THIS WAS THE BEST OF ALL POSSIBLE WORLDS.



BUT WHEN ROBOTIC TECHNOLOGY ADVANCED TO THE POINT OF CREATING HUMANOIDS, IT TURNED OUT WE WERE ALL JUST VICTIMS OF A SORT OF SPECIES-WIDE STOCKHOLM SYNDROME.



THE SUDDEN PROFUSION OF SPLIT-UPS WAS REMARKABLY AMICABLE.



PEOPLE WERE SO HAPPY, THEY GREW COMPLACENT.

SO I SAID, WHY
LEARN MORE PHYSICS?
IT WON'T GET ME A
SEXIER MATE.

THE ROBOTICS INDUSTRY BEGAN PRODUCING
HUMANOIDS OF LOWER AND LOWER QUALITY.

HONEY, WHAT DO YOU
WANT FOR-

YES-YES

I FEEL LIKE
YOU'RE NOT SO
MUCH AGREEING
AS REPEATING-

YES-YES



SOCIETY BEGAN TO DISINTEGRATE, UNTIL THE HUMANOID ROBOTS WERE BANNED.



FROM NOW ON, YOU MUST *EARN* LOVE BY EXCELLING AT ART, SCIENCE, COMMERCE, OR ANY OF THE OTHER MYRIAD PROXIES FOR SEXUAL FITNESS HUMANITY HAS INVENTED.

BY THE TIME THINGS RETURNED TO NORMAL, WE HAD SURVIVED, BUT WERE FOREVER SCARRED BY OUR FALL FROM GRACE.

SWEETIE. WANNA SEE A MOVIE TONIGHT?

NOPE.



THERE IS NO HELL. WE'RE ALREADY IN IT.

BOORINNNNG.



END!



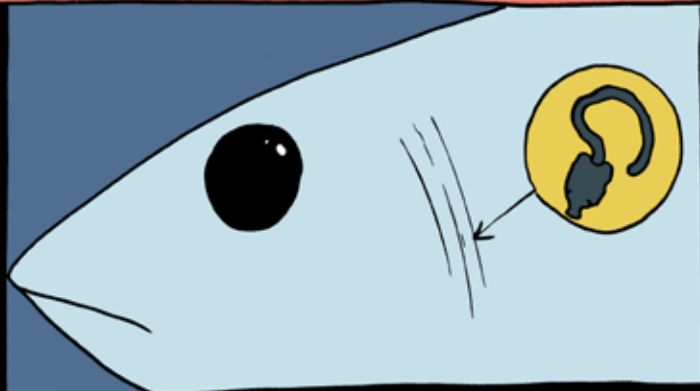


The gene sequence for hairballing was
beautiful in its simplicity.

THE TREMATODE INFECTS A HORN SNAIL, CASTRATES IT, AND USES ITS BODY TO REPRODUCE.



THERE, IT RELEASES CERCARIAE, WHICH ATTACH TO KILLIFISH AND BURROW TOWARD THEIR BRAINS.



ONCE ON THE BRAIN, THEY CAUSE THE FISH TO SHIMMY AND FLASH THEIR SHINY SIDES UPWARD.



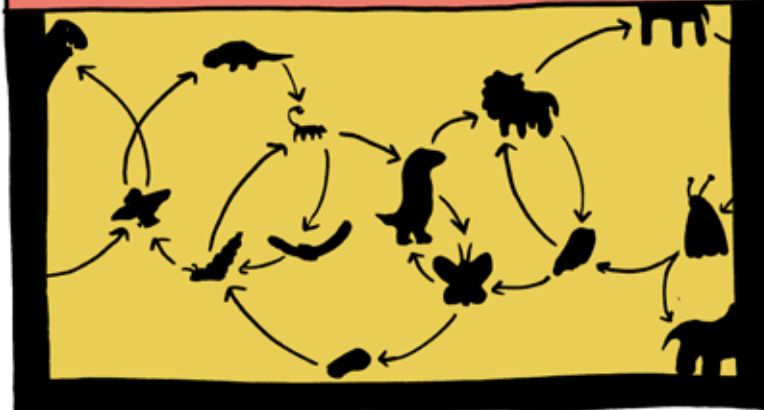
THIS GETS THE PARASITE TO ITS ULTIMATE GOAL: THE GUT OF A PREDATORY BIRD.



FROM THERE, THEY ARE EXCRETED BACK INTO THE WATER TO INFECTION SNAILS.



WHAT HAPPENS TO THE KILLIFISH ISN'T STRANGE IN NATURE. IN FACT, IT MAY BE COMMON.



SINCE HUMANS ARE ATOP THEIR FOOD CHAIN, IT'S NOT CLEAR THAT WE'RE SUBJECT TO THE SAME SORT OF MANIPULATIONS. THOUGH... SOMETIMES I WONDER ABOUT ASTROPHYSICISTS.

THESE SEND SIGNALS TO SPACE SO ALIENS CAN FIND US!

AWESOME!



END!



THEY SAY KEKULÉ WAS IMAGINING A SNAKE EATING ITS OWN TAIL WHEN HE UNDERSTOOD THE STRUCTURE OF BENZENE.



IF IT'S SHAPED LIKE A RING OF ALTERNATING BONDS, ALL THE PIECES COME TOGETHER.

THEY SAY EINSTEIN UNDERSTOOD RELATIVITY WHEN HE IMAGINED A MAN IN AN ELEVATOR.



IF YOU WERE IN AN ELEVATOR ACCELERATING UP, IT'D BE THE SAME FROM YOUR PERSPECTIVE AS BEING IN A GRAVITY FIELD.

SOMETIMES I WONDER WHAT THE SCIENTISTS WHO FIGURED OUT PARTICLE SELF-INTERACTION WERE IMAGINING...



WHEN NOBODY'S OBSERVING, THE PARTICLE LIKES TO INTERFERE WITH ITSELF.







**END!**

WE PROGRAMMED A PROGRAM TO PROGRAM
NEW PROGRAMS.



THE MACHINE DID THE CODING, BUT WE STILL
SPOT-CHECKED IT AND FIXED ISSUES.



OVER TIME WE NOTICED A STRANGE PHENOMENON.



THE JUNK CODE BECAME SO UBIQUITOUS, WE HAD TO SPEND MOST OF OUR TIME JUST CLEANING IT UP.

DID YOU HAVE A SEC TO CHECK THE FUNCTIONAL PARTS?

NO... HERE'S HOPING IT WORKS.

NOT ONLY DID IT WORK, IT WORKED BETTER. THEN IT DAWNED ON US.

OH MY GOD. THE ROBOTS ARE TOLD TO MAKE THE HIGHEST QUALITY CODE. SO... THEY ROUTED AROUND HUMANS.

THE JUNK CODE IS BUSYWORK TO KEEP US FROM MUCKING AROUND IN THE FUNCTIONAL PART...

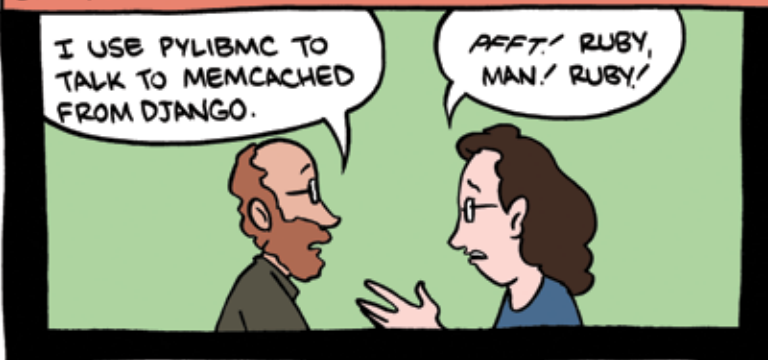
WE DECIDED TO HIDE THE TRUTH.

WE CAN'T TELL THE PROGRAMMERS... IT'D DESTROY THEIR PSYCHES IF THEY FOUND OUT HUMAN PROGRAMMING IS JUST... HUMAN DAY CARE...

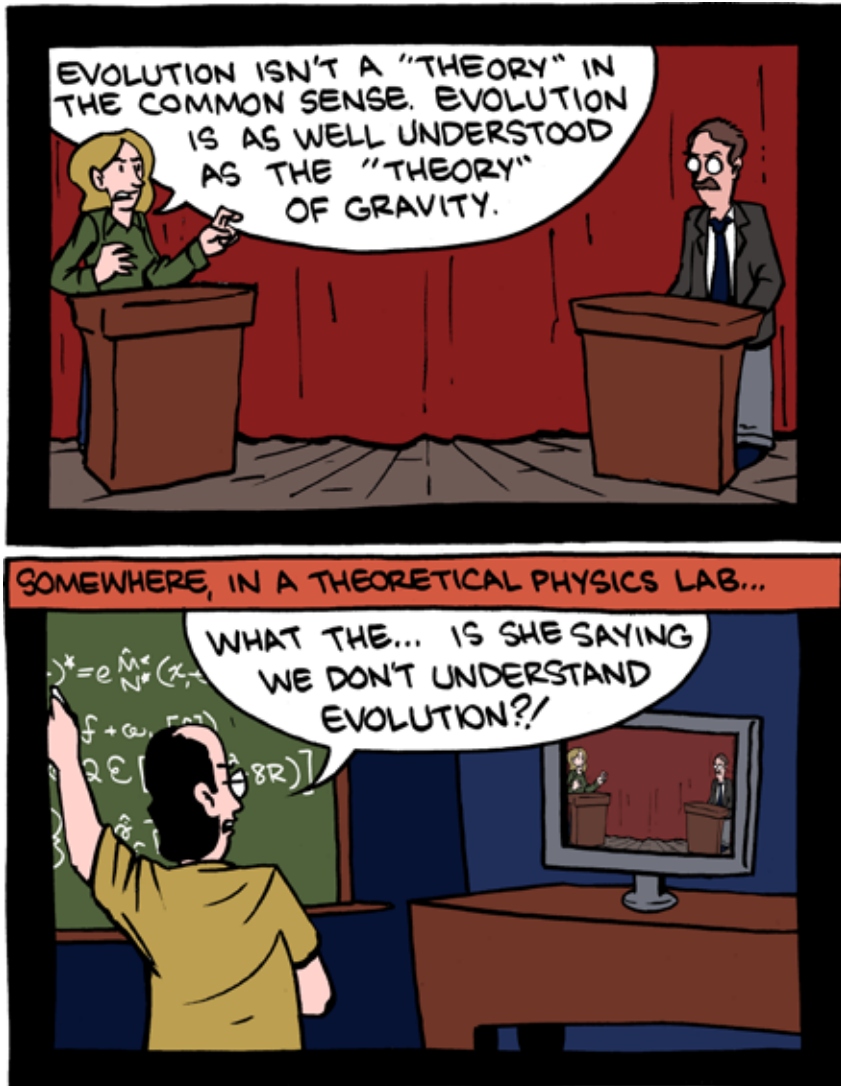
HUMANS HAVEN'T PROGRAMMED ANYTHING IN DECADES. ALL THE LANGUAGES AND IDEAS AND JARGON ARE JUST TOYS IN THE ROBOTS' SANDBOX. THE REAL PROGRAMMING HAPPENS AT A LOWER LEVEL, BUT NONE OF THE PROGRAMMERS KNOW IT.



NOWADAYS, WE'RE JUST PART OF THE JUNK CODE. DON'T BELIEVE ME? GO AHEAD - COMPARE PROGRAMMER SPEAK TO GIBBERISH-GENERATING SPAMBOTS. CAN YOU TELL THE DIFFERENCE?



END!



YOU THINK OF YOURSELF AS A SINGLE UNIFIED LIFE FORM.



BUT YOU'RE MORE LIKE AN AGREEMENT BETWEEN HUNDREDS OF TRILLIONS OF TINY LIFE FORMS.



THOSE LIFE FORMS HAVE BILLIONS OF TINY PARLIAMENTS TO WHICH YOU ARE NOT PRIVY.

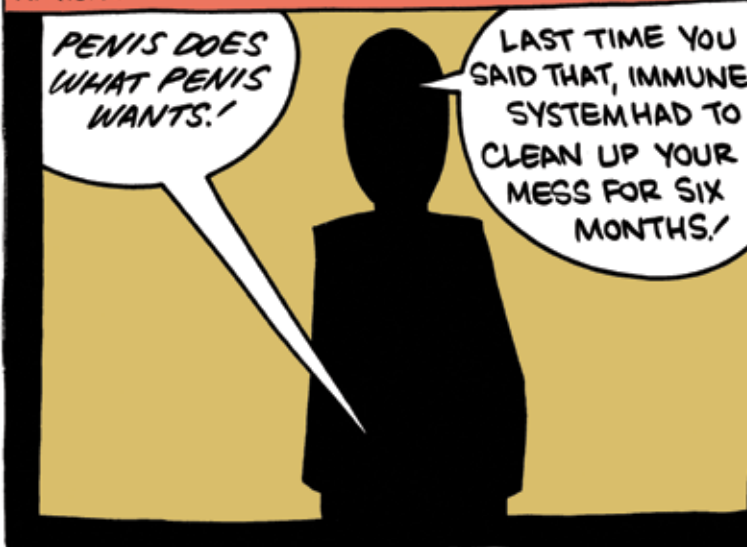


THOSE PARLIAMENTS FORM INTO LARGER PARLIAMENTS,
WHICH MAKE UP STILL LARGER PARLIAMENTS.



GREETINGS, PARLIAMENT
OF FACIAL SKIN./ YES,
WE GENERATE PLENTY
OF OIL. BUT ARE WE
GENERATING
ENOUGH?

SO REALLY, YOU AREN'T THE EXECUTIVE AUTHORITY OF
YOUR BODY. YOU'RE JUST AN ARBITER BETWEEN NATIONS.
NATIONS THAT ARE OFTEN AT ODDS WITH EACH OTHER.



PENIS DOES
WHAT PENIS
WANTS./

LAST TIME YOU
SAID THAT, IMMUNE
SYSTEM HAD TO
CLEAN UP YOUR
MESS FOR SIX
MONTHS./

END!



YOU KNOW...
COMBINED IT...
LIKE...
TOGETHER.

DNA DOESN'T WORK THAT WAY.
EVEN IF IT DID, YOU CAN'T BE
SURE THE CHILD WILL EXPRESS
ALL THE QUALITIES YOU WANT.
YOU'D HAVE TO COMPLETELY
UNDERSTAND ITS
ENVIRONMENT AND
EPIGENOME, WHICH
IS ESSENTIALLY
IMPOSSIBLE.

SO, WHAT HAVE
I BEEN DOING
FOR TEN YEARS?

AS FAR AS I CAN
TELL, YOU MUSHED SOME
HISTORICALLY VALUABLE
BONES INTO A PASTE,
SHAPED IT INTO A
BLOB AND DUNKED
IT IN AN AQUARIUM.

SO... HOW DO I GET
THE NEXT GREAT
SUPERVILLAIN?

THEY ARISE
ORGANICALLY. LOOK
IN A COUNTRY WITH
RECENTLY HIGH
INFLATION, LOW
PER CAPITA INCOME
AND A BAD GINI
COEFFICIENT.

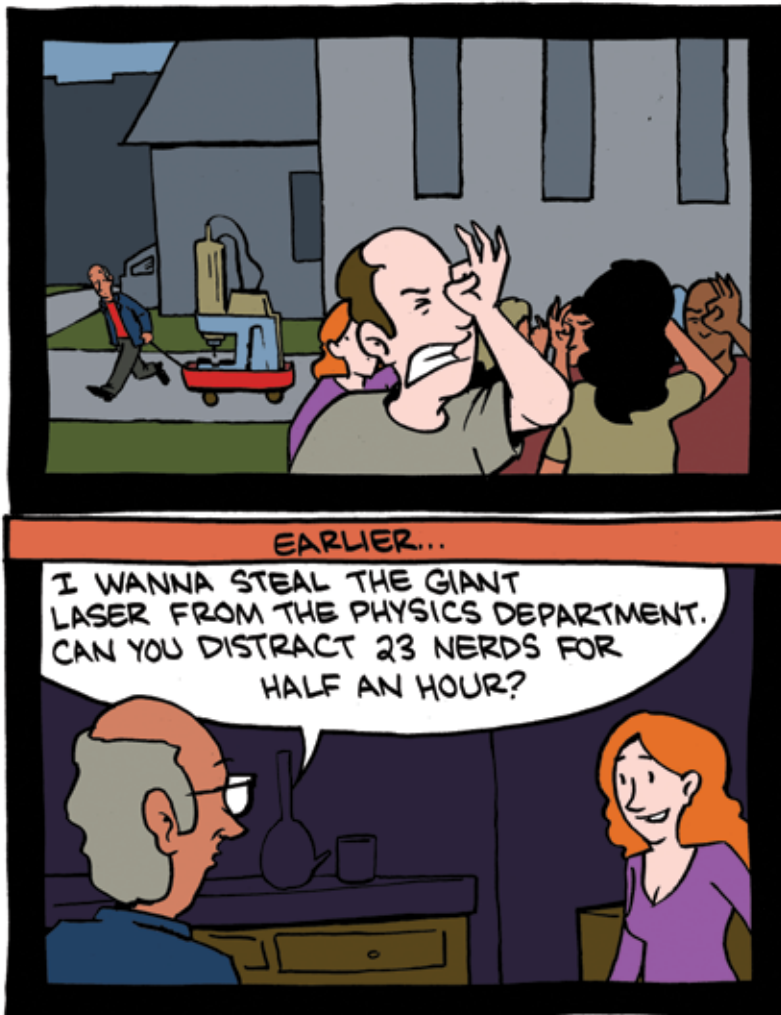






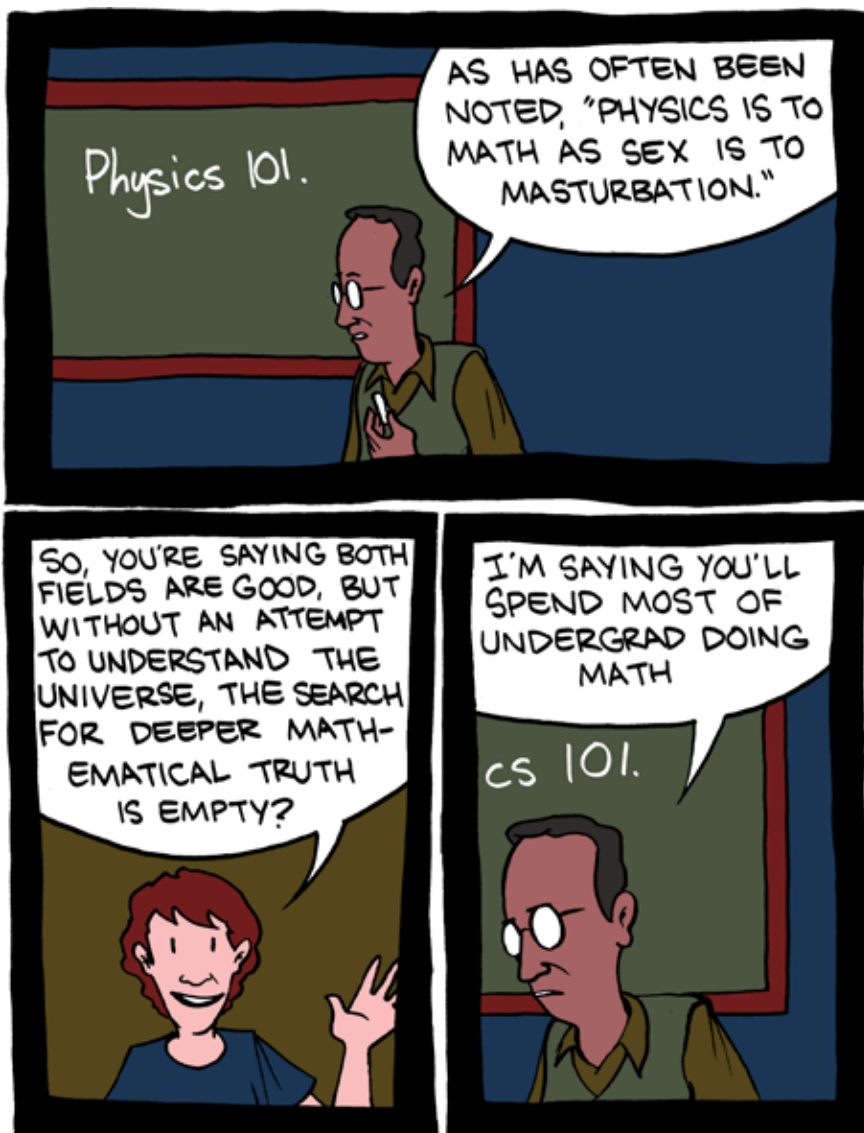






END!

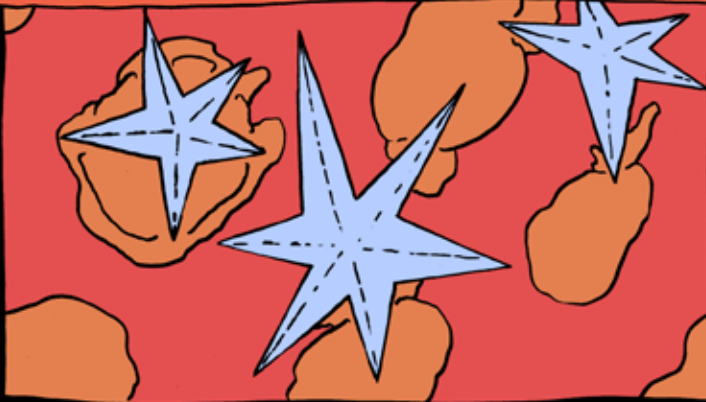




THE FIRST CRYONIC PATIENTS WERE
FROZEN TOO SLOWLY.



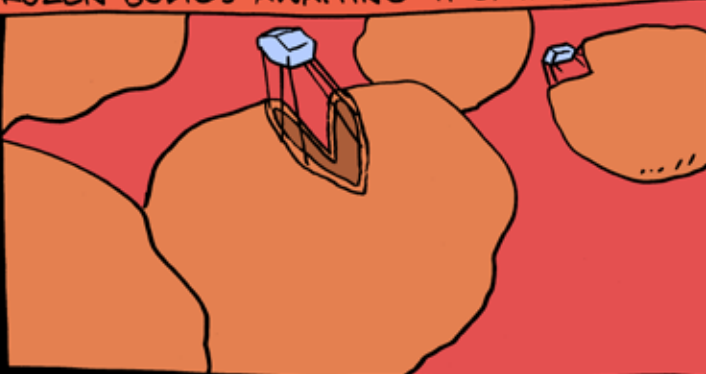
ICE CRYSTALS FORMED, RUPTURING TOO
MANY CELLS FOR THEM TO BE UNFROZEN LATER.



BUT SEVERAL CENTURIES HENCE, CELL-
REPAIRING NANOBOTS WERE CIRCULATED
INTO THEIR BODIES.



THEY LOCATED THE RUPTURES AND KNITTED THE CELLS BACK TOGETHER, LEAVING PROPERLY FROZEN BODIES AWAITING TREATMENT.



WHEN FINALLY REINVIGORATED, THE PEOPLE FOUND IT ALL SOMEWHAT DISTRESSING.

SO... WAS I
ALIVE OR DEAD?

YOU WERE A CORPSE
BEFORE WE HAD THE
RIGHT TOOLS, AND A
PATIENT AFTER.

HOW CAN
MY BEING ALIVE OR DEAD
DEPEND ON THE LEVEL OF
TECHNOLOGICAL
ADVANCEMENT?

LOOK,
I'M A DOCTOR.
YOU'RE ALL CORPSES
UNTIL PROVEN
OTHERWISE.



FORTUNATELY, THERE WAS A SIMPLE EMOTIONALLY SATISFYING SOLUTION.



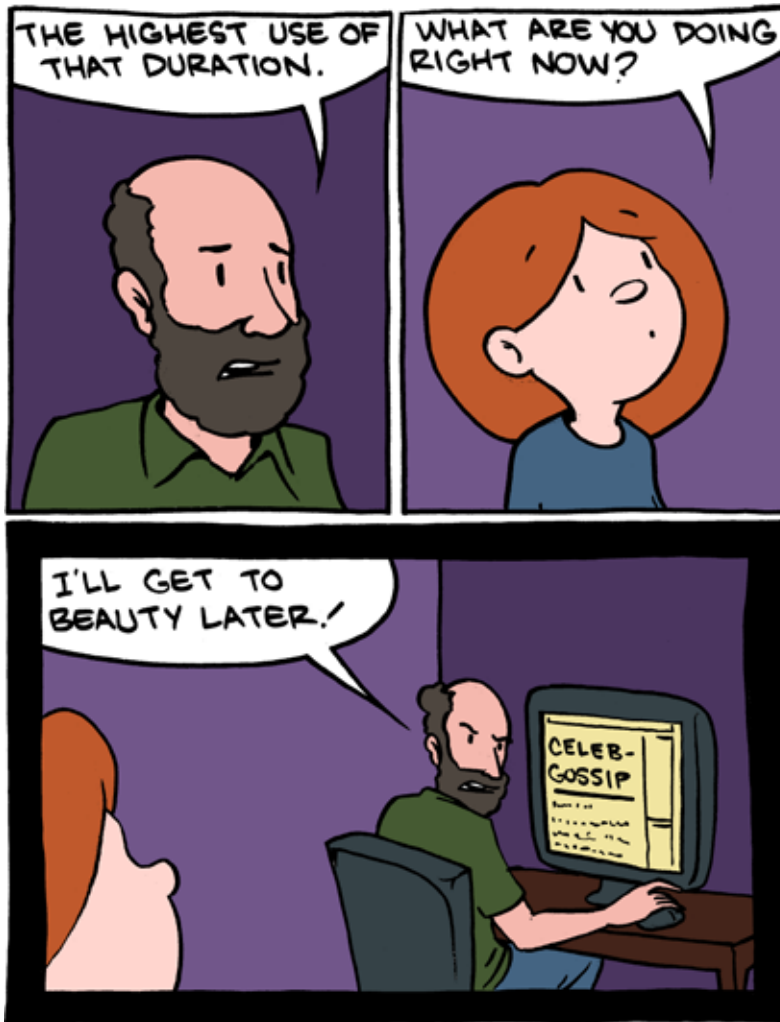
IT WASN'T PERFECT.



END!





**END!**

WHAT "SCHRODINGER'S CAT" MEANS.

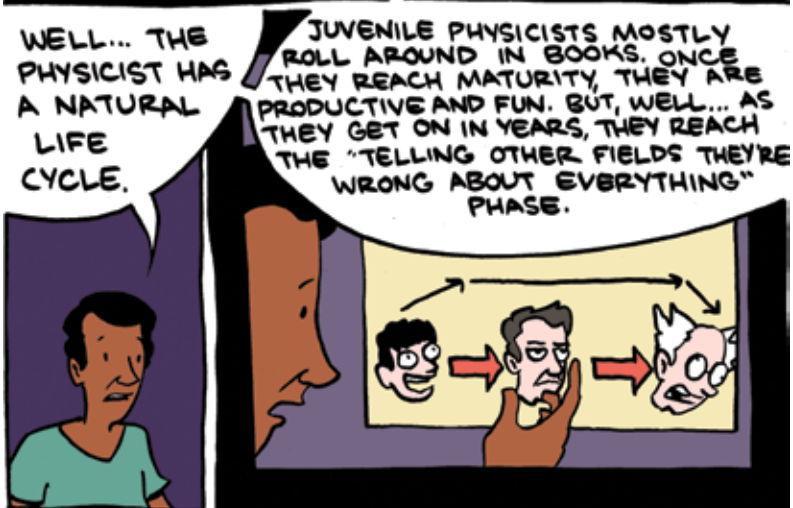
SUPPOSE THAT INSIDE A BOX YOU HAVE A CAT AND A GLASS CONTAINER OF POISON. SUPPOSE THERE IS ALSO A RADIATION EMITTER AND A GEIGER COUNTER, AND THAT IF THE COUNTER DETECTS RADIATION, IT CAUSES A HAMMER TO BREAK THE GLASS. ACCORDING TO THE COPENHAGEN INTERPRETATION, THE CAT IS BOTH ALIVE AND DEAD UNTIL SOMETHING COLLAPSES THE WAVEFUNCTION. THIS IS, OF COURSE, ABSURD. SO, THE INTERPRETATION MUST BE WRONG.

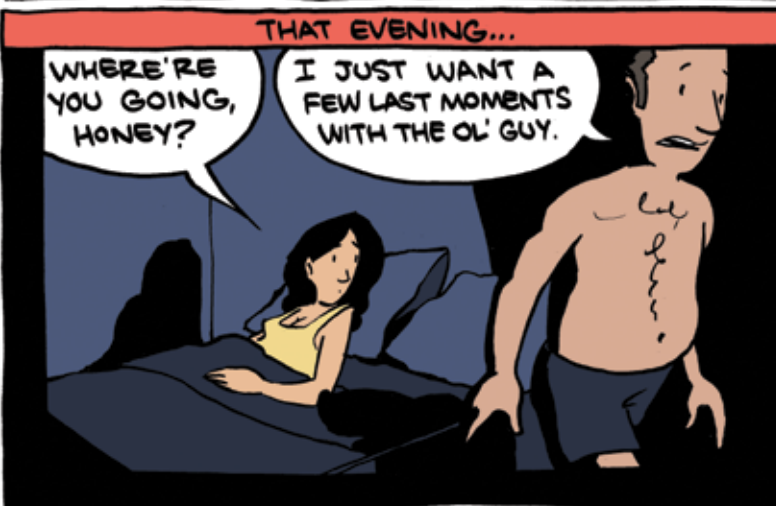
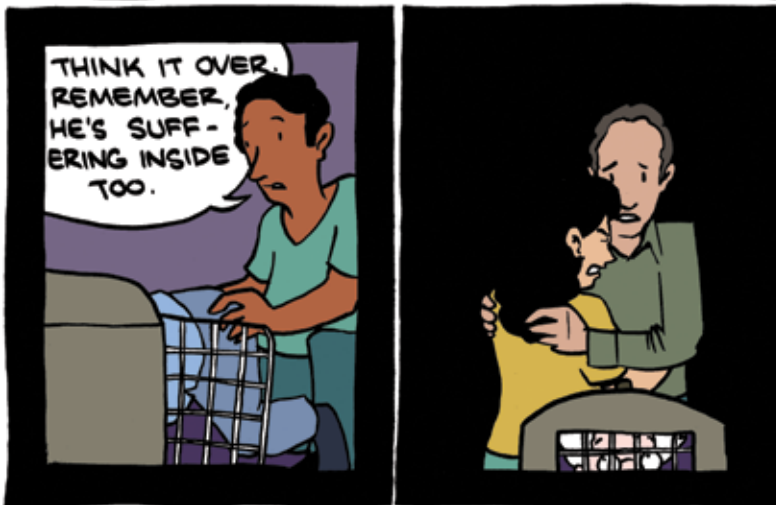


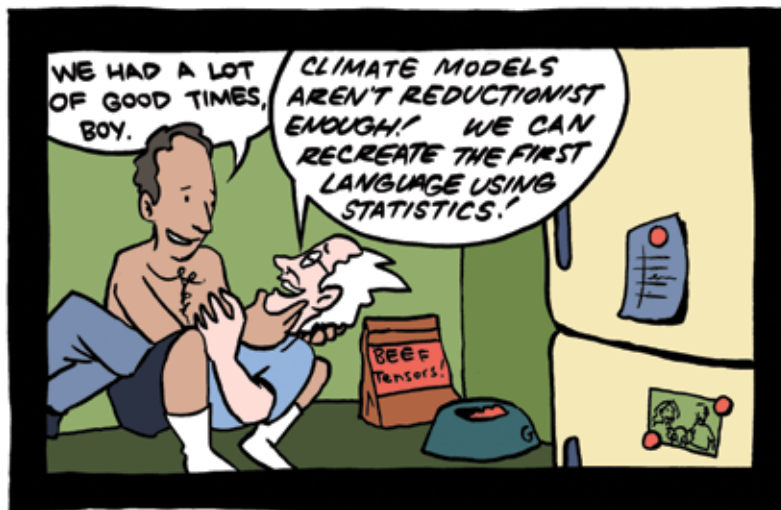
WHAT PEOPLE THINK IT MEANS.

SO THERE'S THIS CAT IN A BOX AND HEY MAYBE IT'S DEAD, BUT WHO KNOWS?! SCIENCE!



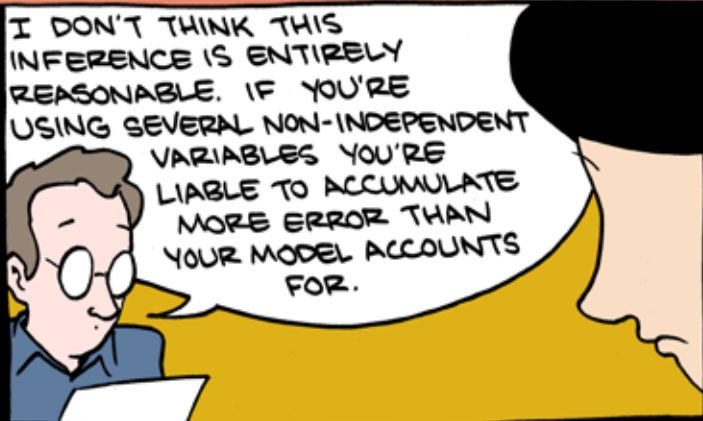






END!

WHEN SCIENTISTS DISCUSS PAPERS



I DON'T THINK THIS INFERENCE IS ENTIRELY REASONABLE. IF YOU'RE USING SEVERAL NON-INDEPENDENT VARIABLES YOU'RE LIABLE TO ACCUMULATE MORE ERROR THAN YOUR MODEL ACCOUNTS FOR.

WHEN SCIENTISTS DISCUSS GRANTS



A GUY WHO WORKED AT THE NSF ONCE TOLD ME IF WE LIGHT A CANDLE WITHIN THIS JACKAL SKULL, THE FUNDERS WILL SMILE UPON OUR HOPES.

I'LL GET THE ALTAR!





SO MUCH SO, THEY CUT OFF PLANT REPRODUCTIVE
ORGANS AS MATING GIFTS.



THE FEMALES, IF THEY ARE PLEASED, WILL PLACE
THE PLANT GENITALS IN WATER SO AS TO SHOW
OFF THE MALE'S MIGHT AS LONG AS POSSIBLE.



SOMETIMES THE FEMALES ADORN THEIR BODIES WITH THE MUTILATED ORGANS.



THIS IS SO IMPORTANT TO THE CULTURE, AN ENTIRE INDUSTRY HAS DEVELOPED AROUND BREEDING GROTESQUELY WELL-ENDOWED PLANTS.

IT'S SO *BIG*
AND *RED* AND
FRAGRANT.



IN HUMAN PAIR-BONDING CEREMONIES, THEY COVER THE AREA IN PLANT GENITALS, AND THE PAIR-BONDED FEMALE THROWS BUNCHES OF THEM TO UNBONDED FEMALES, INDICATING HER MATE IS SO VEGETICIDAL, SHE CAN SPARE THE WEALTH.



THE MALES COMMEMORATE THAT DAY YEARLY
WITH EVER LARGER SEVERED GENITALIA.



THEY'RE JUST AS
FRESH AND SWEET
AS YOU.

AWW...

AFTER THEY PASS REPRODUCTIVE AGE, THE HUMAN
FEMALES REMEMBER THEIR MURDEROUS PAST WITH
LUGGAGE DECORATED WITH PLANT GENITAL IMAGES.



AND WHEN THEY DIE, THE HUMANS ARE BURIED UNDER A MOUND OF VEGETAL GENITALIA HEAPED ON A BOX OF PLANT FLESH.



END!

A LOT OF PEOPLE BELIEVE IN EVOLUTION. OTHERS BELIEVE WE COULDN'T JUST COME FROM RANDOM CHANCE. RATHER THAN PICK SIDES, I'M GOING TO "TEACH THE CONTROVERSY."



THAT'S NOT HOW CONTROVERSY IS SPELLED.



YES IT IS.

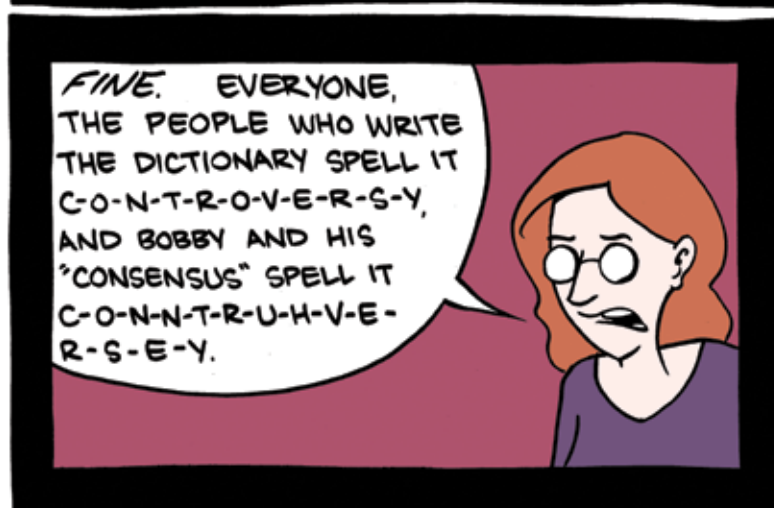
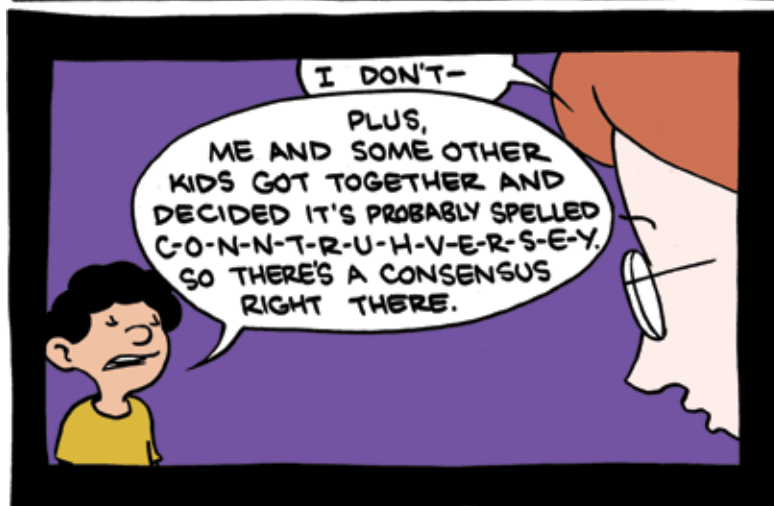


IT'S SPELLED C-O-N-N-T-R-U-H-V-E-R-S-E-Y.

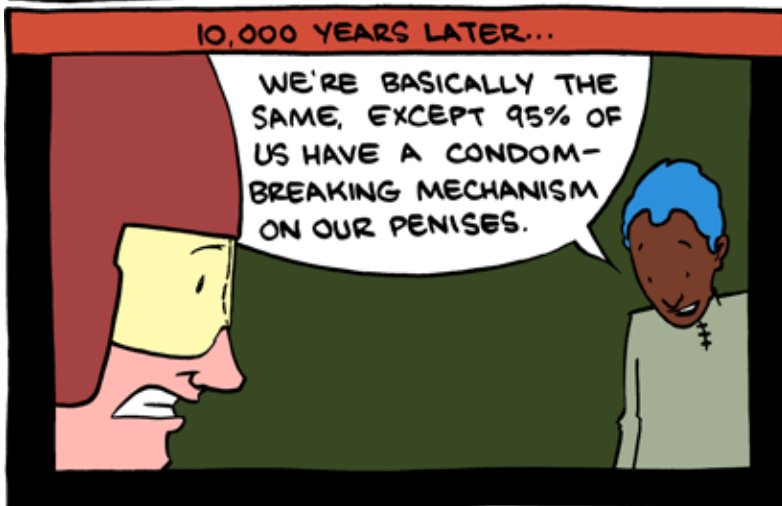
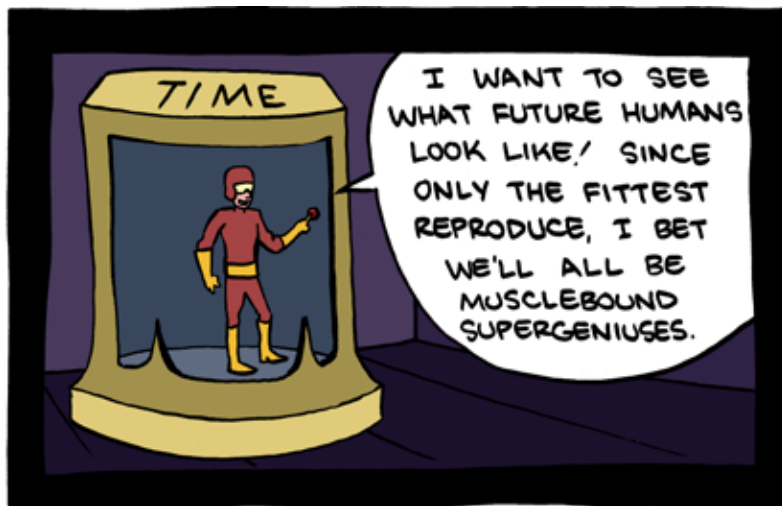


THE DICTIONARY SAYS OTHERWISE.





**END!**



BABY, I LOVE YOU SO MUCH,
I WANTED TO DO SOMETHING
SPECIAL FOR OUR
ANNIVERSARY.



I ASSIGNED A VALUE TO EACH GENETIC
CODE LETTER, THEN EXTRAPOLATED
THAT TO EXPRESS ALL ENGLISH LANGUAGE
CHARACTERS.

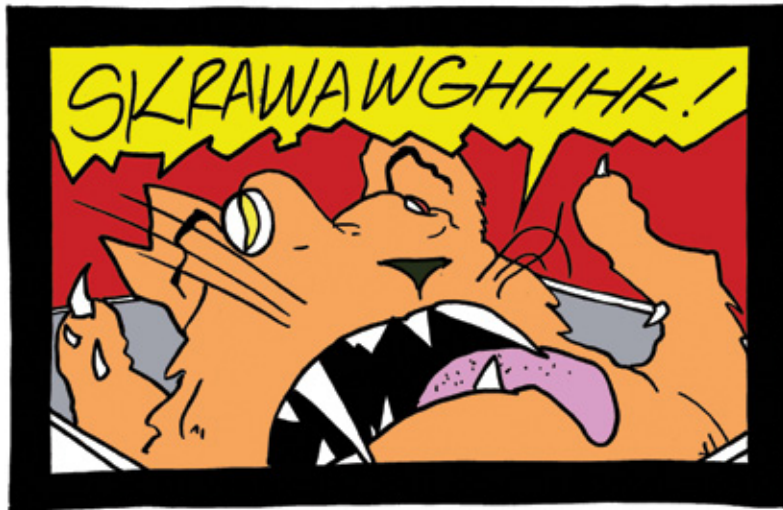


A G T C
0 1 2 3

A	B	C	D	E	F	G	H	I	J	K	L	M
0	1	2	3	10	11	12	13	20	21	22	23	30
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
31	32	33	100	101	102	103	110	111	112	113	120	121

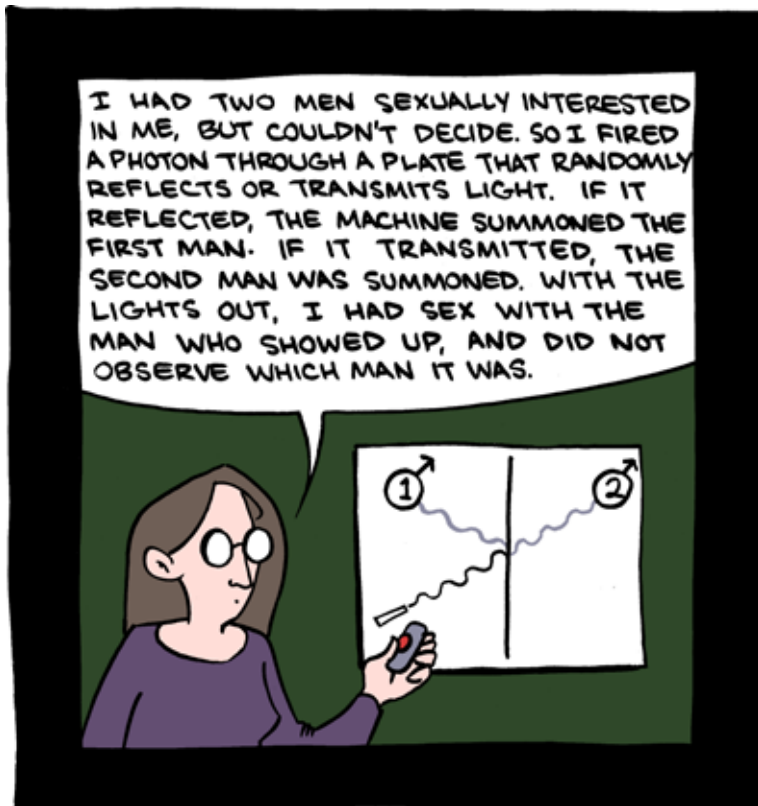
THEN I TOOK OUR MARRIAGE VOWS AND
INSERTED THEM INTO THE GENETIC CODE OF
A CELL FROM YOUR CAT, WHICH I USED TO
MAKE A CLONE.



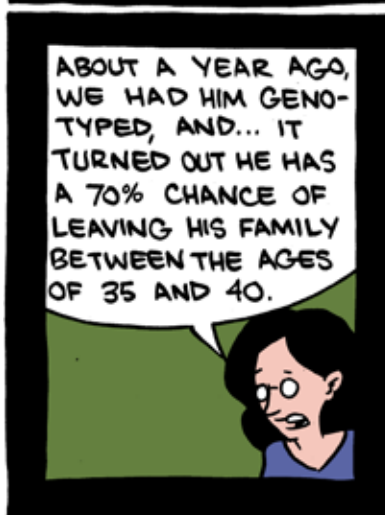
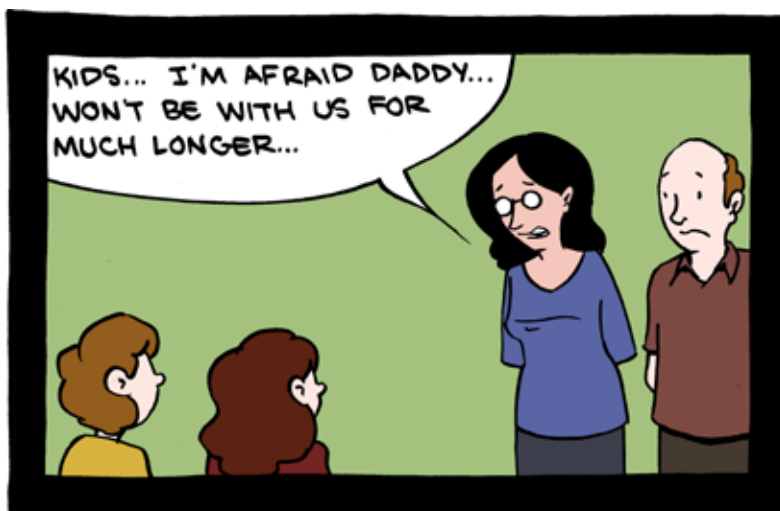




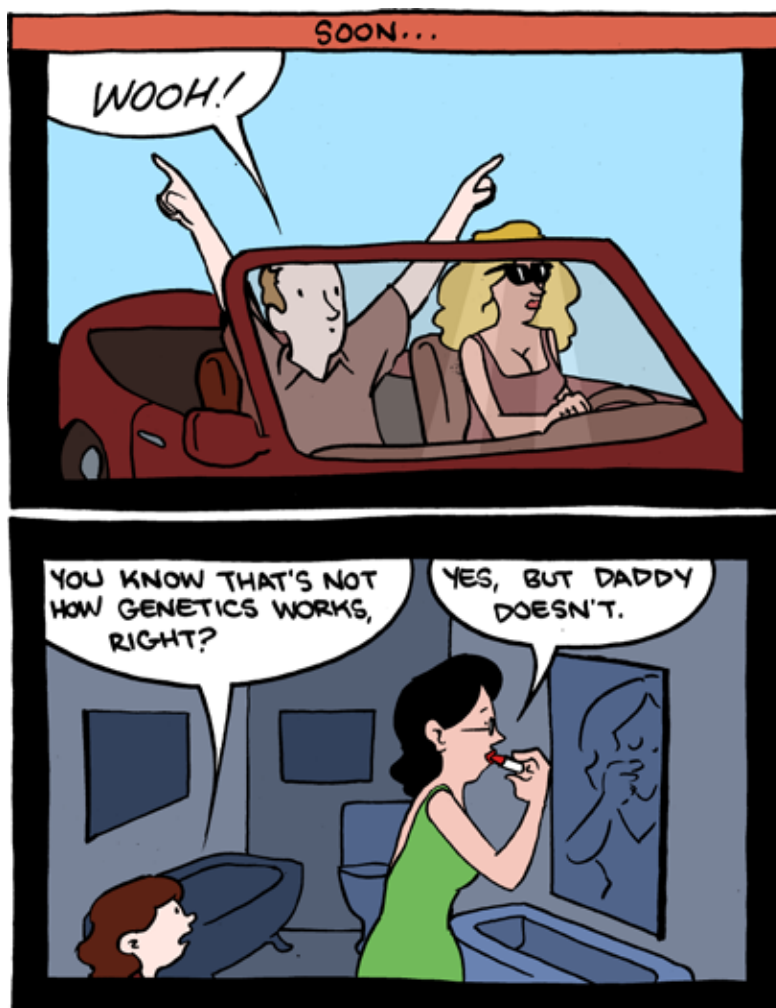
END!



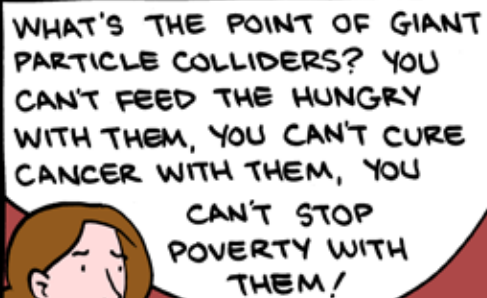
The scientific community has not welcomed my “quantum threesome” concept.



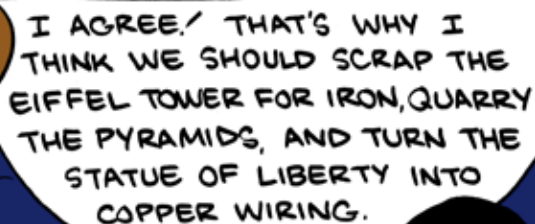




END!



WHAT'S THE POINT OF GIANT
PARTICLE COLLIDERS? YOU
CAN'T FEED THE HUNGRY
WITH THEM, YOU CAN'T CURE
CANCER WITH THEM, YOU
CAN'T STOP
POVERTY WITH
THEM!



I AGREE! THAT'S WHY I
THINK WE SHOULD SCRAP THE
EIFFEL TOWER FOR IRON, QUARRY
THE PYRAMIDS, AND TURN THE
STATUE OF LIBERTY INTO
COPPER WIRING.



I'M NOT SURE THAT'S—

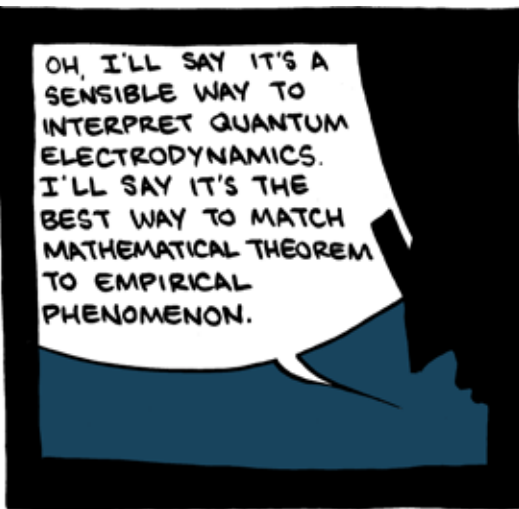


SORRY,
CAN'T HEAR YOU.
I ONLY LISTEN TO
NOISES THAT MIGHT
SAVE BABIES.

I'M ABOUT TO
SUBTRACT ∞
FROM ∞ , MY
DEAR.



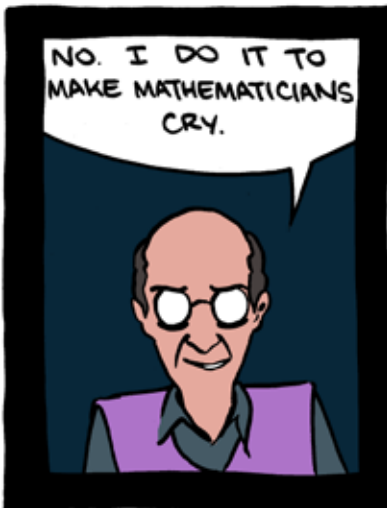
OH, I'LL SAY IT'S A
SENSIBLE WAY TO
INTERPRET QUANTUM
ELECTRODYNAMICS.
I'LL SAY IT'S THE
BEST WAY TO MATCH
MATHEMATICAL THEOREM
TO EMPIRICAL
PHENOMENON.



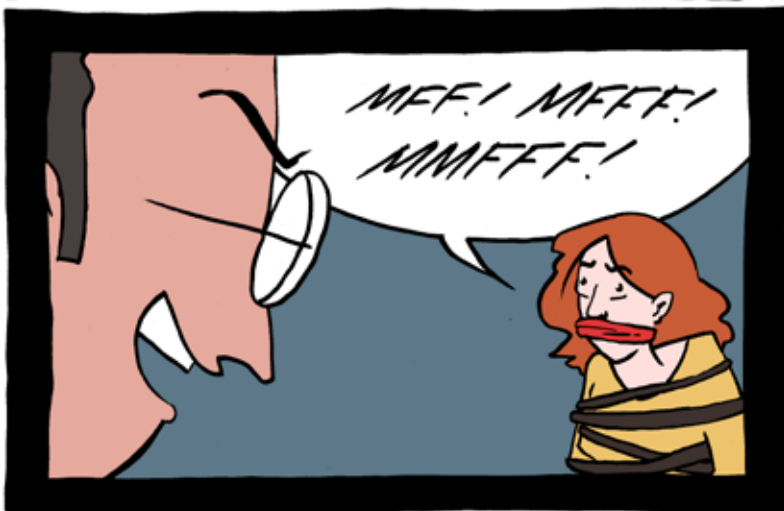
BUT THAT'S NOT
WHY I DO IT.



NO. I DO IT TO
MAKE MATHEMATICIANS
CRY.



MFF! MFFF!
MMFFFF!





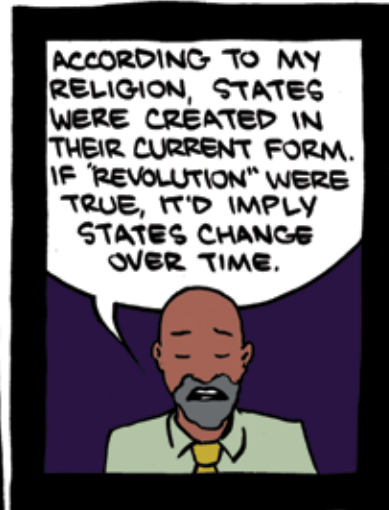




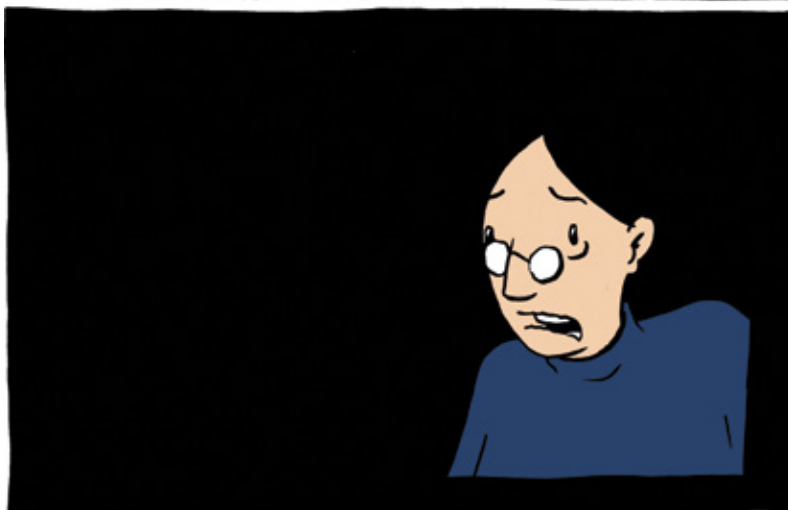
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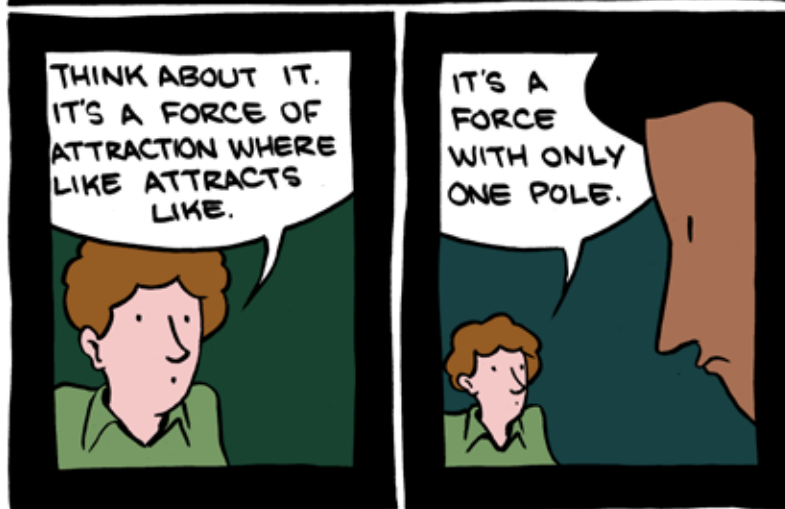


Nobody liked Evil Carl Sagan.





**END!**







END!

Cable does not enter slot.



Rotate 180°.



Cable does not enter slot.



Rotate 180°.



Cable enters slot.



PROVED:
Cables exist in 4-dimensional space.





**JERAMEY
CRAWFORD**

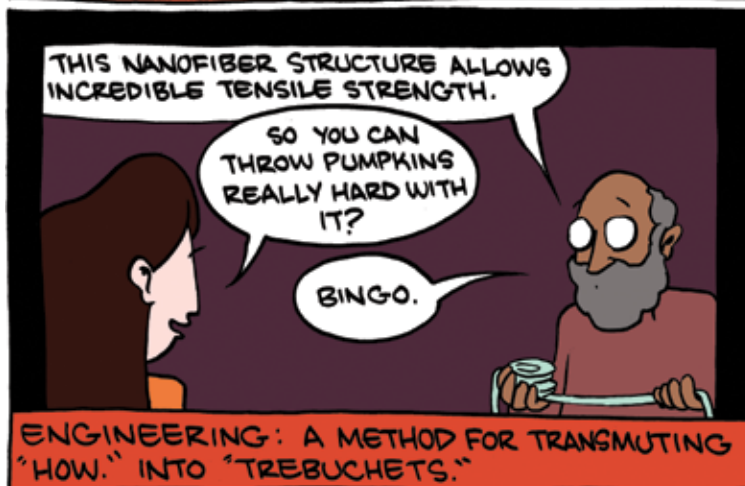
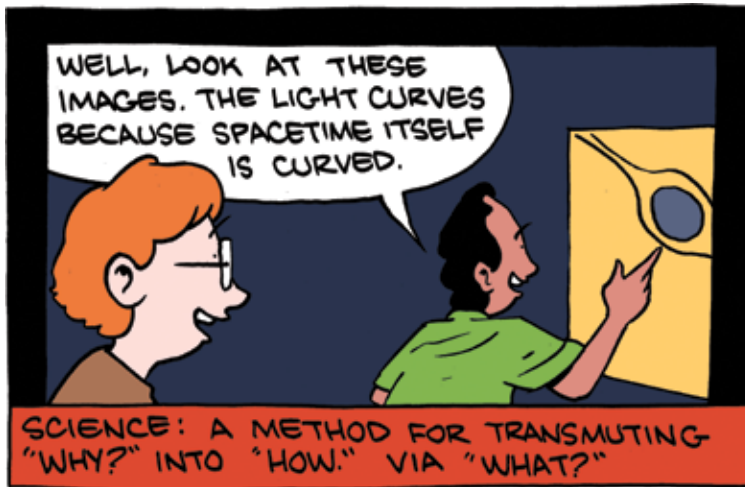


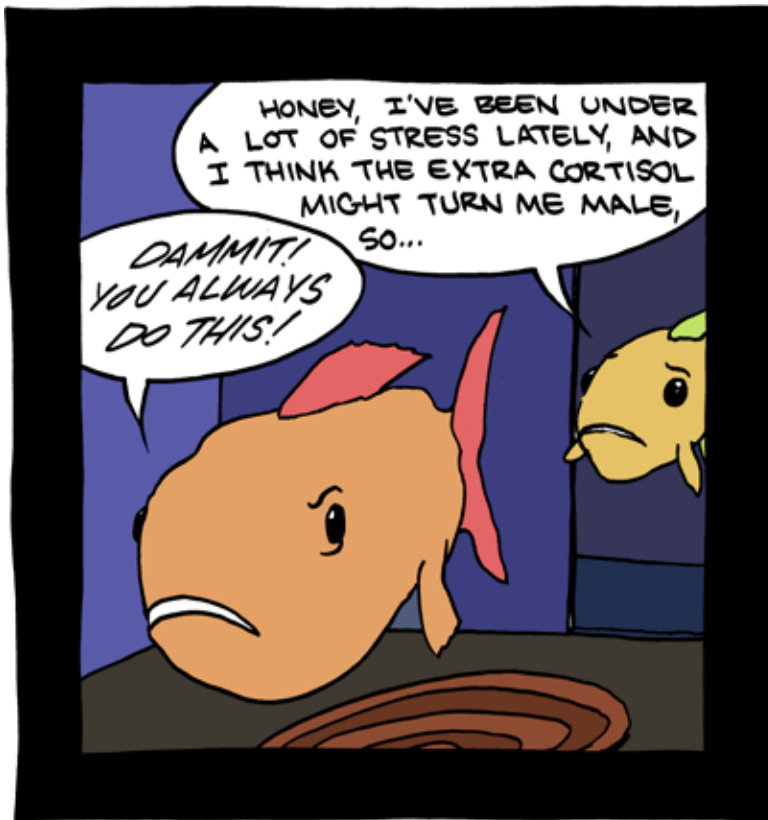
**SULTAN SAEED
AL DARMAKI**



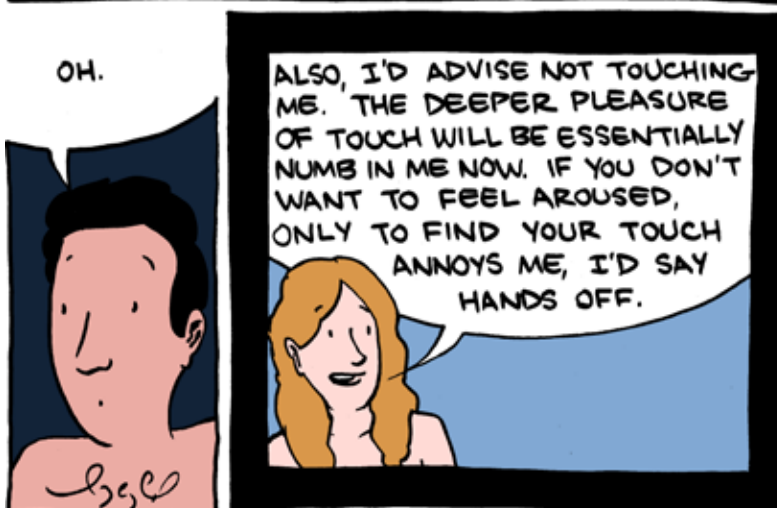
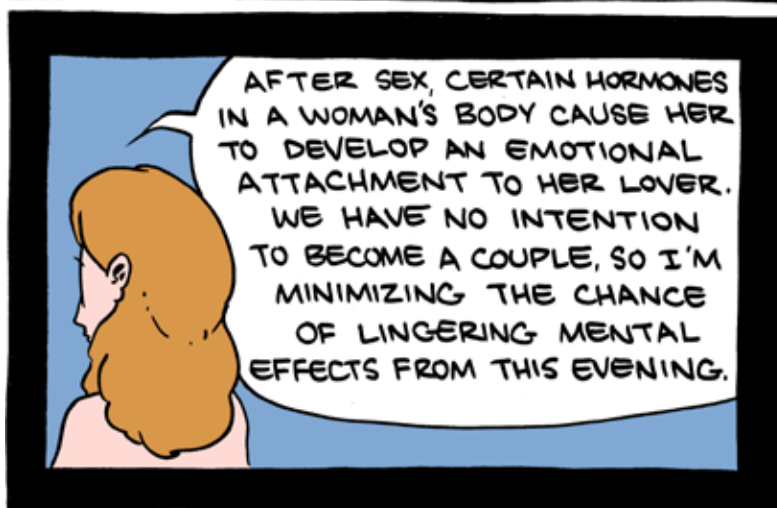
**ADAM
TIBBALDS**

FOR MAKING POSSIBLE THREE EXCLUSIVE COMICS!

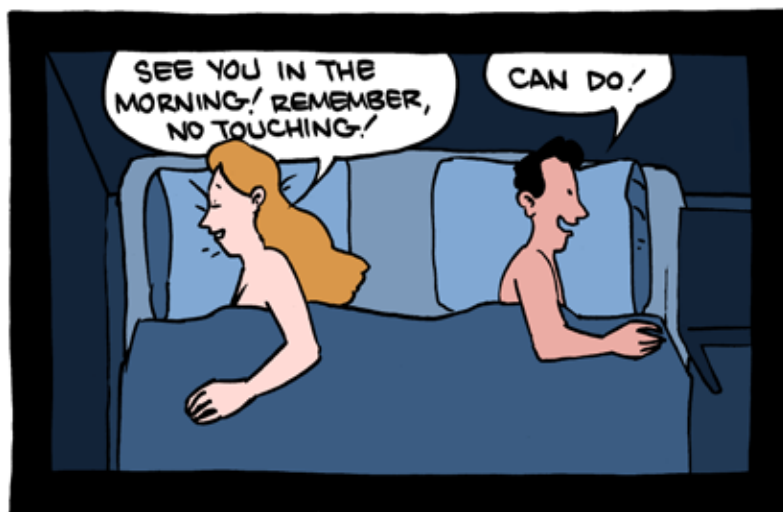




Sally angles for a massage.







END!



IN FRANCE, IF YOU WISH TO TERMINATE A WHILE LOOP, YOU MUST GIVE IT A SEVERANCE PACKAGE AND SIX MONTHS' PAID VACATION.



WE WILL ELIMINATE
THE CLASS HIERARCHY!

IN CANADA, IF THE WHILE LOOP THROWS AN EXCEPTION, INSTEAD OF TERMINATING, IT JUST APOLOGIZES.



WHAT'S THE RESULT?

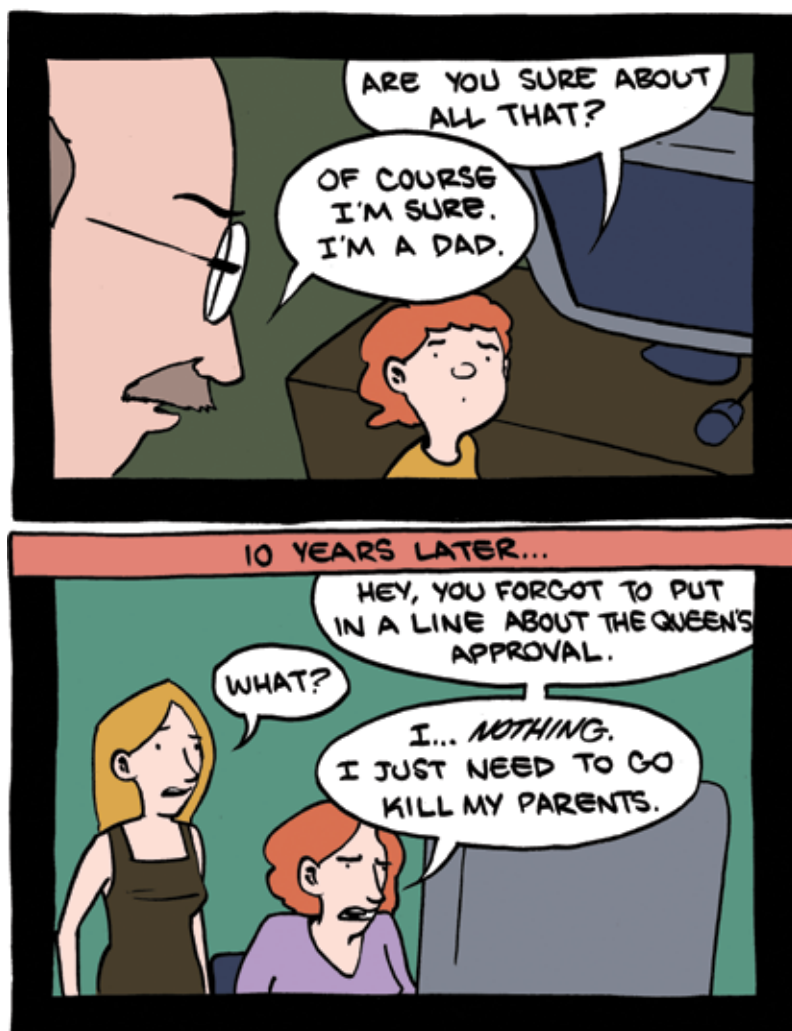
MY
SINCERE
REGRETS.

IN VATICAN CITY, IF THE WHILE LOOP IS EXECUTED FROM THE CHAIR OF SAINT PETER, WHATEVER IT RETURNS IS INFALLIBLE.



BY PAPAL DECREE!
47.2.





END!

FOR MILLENNIA, WE STRUGGLED FOR TRUTH,
EXPERIMENTING, ARGUING, UNIFYING.



WE WERE DRIVEN BY THE HOPE THAT ONE DAY
WE WOULD DISCOVER THE ROOT OF EVERYTHING.
WE BELIEVED THE FINAL TRUTH WOULD BE SO
SIMPLE AND BEAUTIFUL IT WOULD MAKE THE
END OF DISCOVERY PALATABLE.





END!

ONLY OBSERVED THINGS CAN
BE SAID TO EXIST, SO, THAT WHICH
WE DO NOT OBSERVE PERSISTS
ONLY BECAUSE GOD IS
WATCHING.



BUT ACCORDING
TO QUANTUM MECH-
ANICS, BEFORE
OBSERVATION,
THINGS PERSIST
PROBABILISTICALLY
EVERYWHERE IN
SPACE.



HMM...

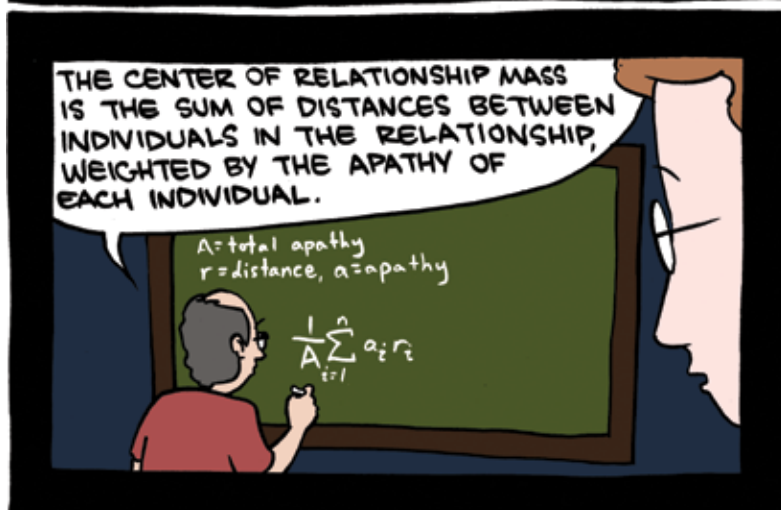


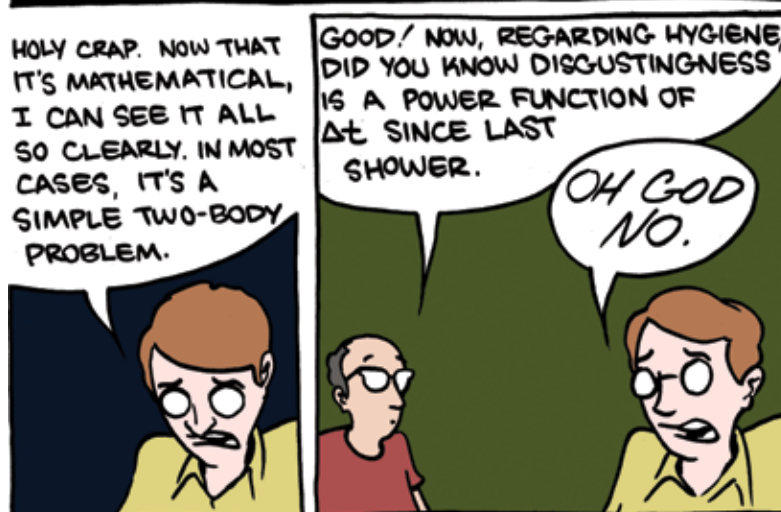
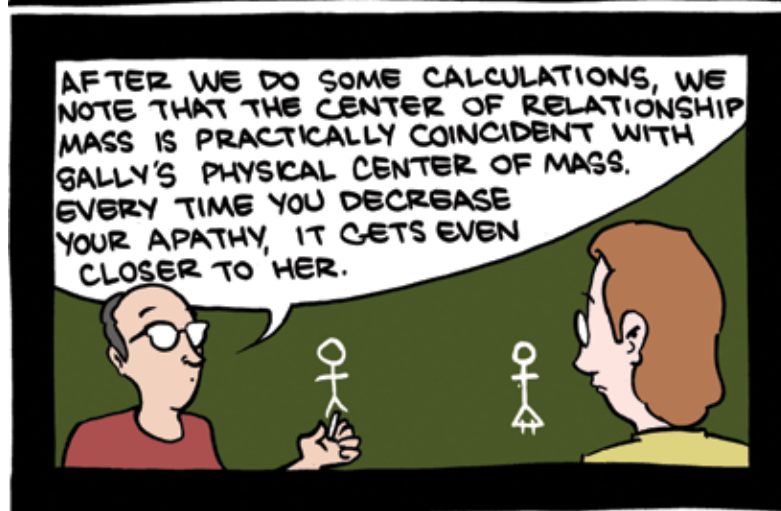
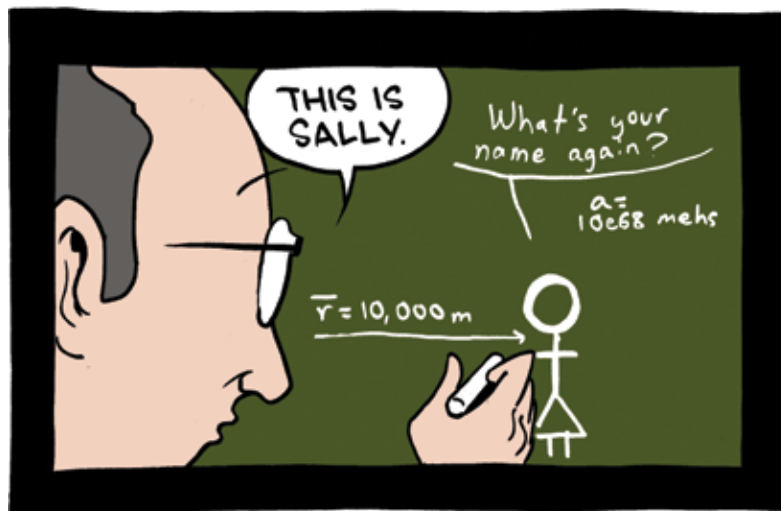
ELSEWHERE





Nobody likes chemistry hipsters.





END!



Astronomers have weird masturbation euphemisms.



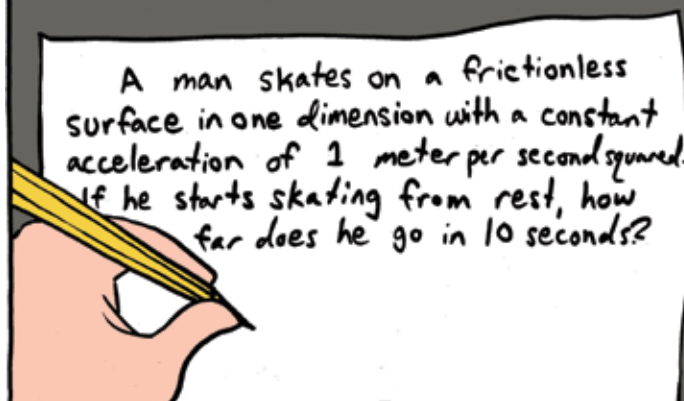
It's hard being the child of a biochemist



It's hard being homeschooled by your
stepdad

HOW TO BREAK A PHYSICS STUDENT

STEP 1: ON A FINAL EXAM, WRITE AN EXTREMELY EASY WORD PROBLEM.



STEP 2: MAKE THAT QUESTION HALF THE EXAM.

(50 points)

4. A man skates on a frictionless surface in one dimension with a constant acceleration of 1 meter per second squared. If he starts skating from rest, how far does he go in ten seconds?

STEP 3: GIVE THE FINAL, COLLECT PAPERS.

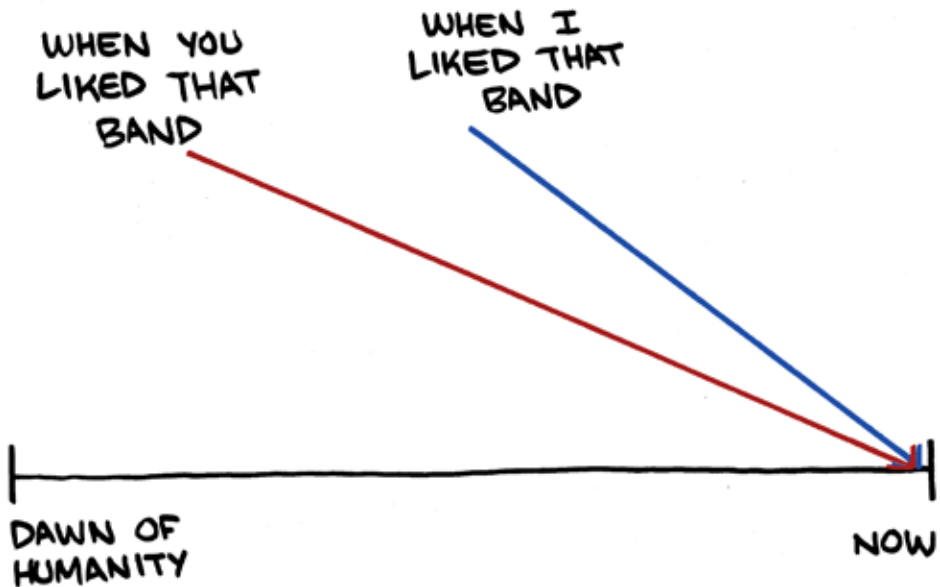




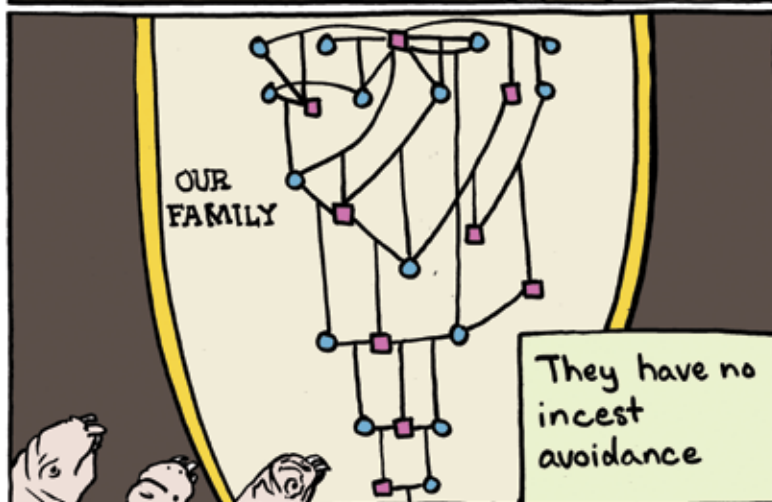
END!



LIFE TIP:
ALL SOCIAL HIERARCHY RULES LOOK
STUPID OVER EVOLUTIONARY TIME.







**END!**



Causing our evolution teacher to explode was remarkably easy.



BEHOLD OUR TALES OF SCIENCE!

When we decided to make a science-themed book, we wanted to make some exclusive, special content to supplement it. Since so many of the jokes in this book are inspired by the friendships (and marriages!) we're lucky enough to have with amazing scientists, we thought we'd share some of their stories about science with you. Some of them are funny, some are sweet, some are disgusting. Really disgusting. Christina Agapakis's story is really disgusting.

We hope you enjoy these Tales of Science, and we encourage you to follow these geeks online in their present and future endeavors instead of pissing away your time on comics.



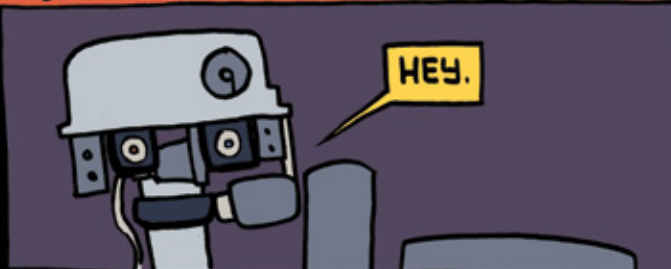
EMILY LAKDAWALLA

**SENIOR EDITOR AND PLANETARY EVANGELIST
THE PLANETARY SOCIETY**

AMONG MY MOST TREASURED EXPERIENCES IS THE OPPORTUNITY I HAD TO VISIT THE CLEAN ROOM WHERE CURIOSITY'S CONSTRUCTION NEARED COMPLETION.



BEING A FAN OF THE SPRIGHTLY SWEPT-WINGED SPIRIT AND OPPORTUNITY, I'D HAD A HARD TIME LIKING CURIOSITY, WHICH IS COMPARATIVELY GROTESQUE—HEAD SPROUTING FROM THE RIGHT SHOULDER, CLUB-HANDED ARM FROM THE LEFT, THE ENORMOUS BUTT OF THE RTG* STUCK ON LIKE AN AFTERTHOUGHT.



*RADIOISOTOPE THERMOELECTRIC GENERATOR. DUH.

I COVERED UP IN THE "BUNNY SUIT" AND STEPPED INTO AN AIRLOCK WHERE JETS BLASTED AWAY ERRANT DUST PARTICLES. THE ROOM WAS HUGE AND CURIOSITY WAS AT THE OPPOSITE SIDE. IT TOOK, LIKE, EIGHT STRIDES TO COVER THE DISTANCE.



IN THE FIRST COUPLE STRIDES, I WAS THINKING "IT IS SO AWESOME THAT I GET TO BE INSIDE THIS PLACE!"



NEXT COUPLE STRIDES, AND I WAS LIKE "LOOK AT ALL THOSE WIRES — THIS MACHINE IS INCREDIBLY COMPLICATED."



ANOTHER COUPLE OF STRIDES, AND IT HIT ME LIKE A BOARD UPSIDE THE HEAD — THIS MACHINE WILL SOON BE LEAVING THIS PLANET FOREVER. IT WILL LEAVE US BEHIND AND TRAVEL TO MARS. IT'S A MARTIAN.



LAST COUPLE STRIDES AND I WAS LOOKING UP -WAY UP- AT CURIOSITY'S "FACE," ITS BULGING BROW AND LOPSIDED EYES, AND I FELL IN LOVE WITH HER, RIGHT THEN AND THERE.

I THINK I COULD SPEND MY LIFE WATCHING YOU.

BEEP.

I WAS ALLOWED NEARLY AN HOUR IN THERE TO ASK QUESTIONS OF THE ENGINEERS. I ASKED ONE OF THEM WHETHER THEY THOUGHT OF THE ROVER AS "IT" OR AS "SHE." HE TOLD ME THAT, FOR NOW, MOST PEOPLE CALLED CURIOSITY "IT."

WE PEEKED UNDER THE CHASSIS.

AHHH.

THEN HE SAID SOMETHING I'LL NEVER FORGET.

IT DOESN'T HAVE A SOUL YET.

BUT IT WILL.





END!



HENRY REICH

CREATOR OF *MINUTEPHYSICS*
AND *MINUTEEARTH*

WHEN I VISITED MY FRIEND DESTIN IN ALABAMA, WE WENT TO THE U.S. SPACE AND ROCKET CENTER. IT'S LIKE THE SMITHSONIAN AIR AND SPACE MUSEUM, EXCEPT THERE'S NO ONE ELSE AROUND AND YOU CAN CLIMB ON STUFF.



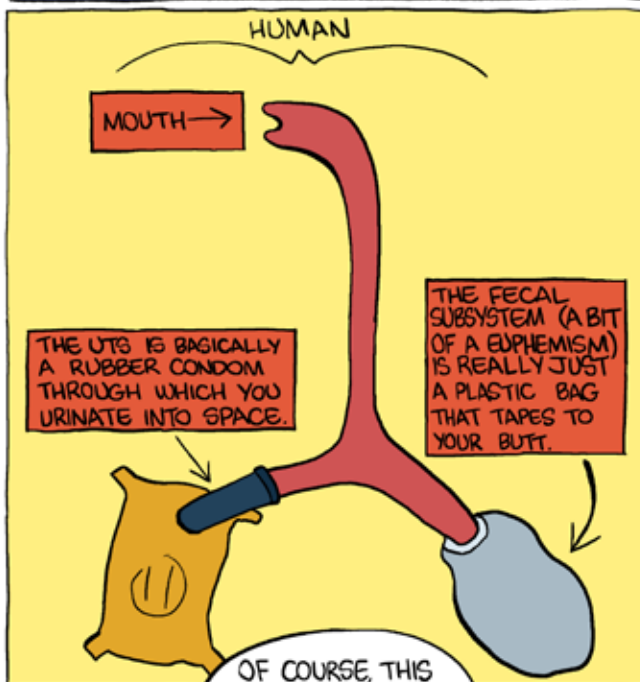
AND WHILE WE WERE GAWKING AT THE TWO FULL-SIZE SATURN V ROCKETS, SOMETHING CAUGHT OUR INTEREST.



AS A KID, YOU LEARN ALL ABOUT THE AWESOME PARTS OF SPACE EXPLORATION: ABOUT MOONWALKS AND DOCKING WITH SOVIETS AND THE HARROWING TALE OF APOLLO 13.



BUT FOR SOME REASON, YOU DON'T HEAR NEARLY AS MUCH ABOUT PEEING AND POOPING IN SPACE. THAT'S PROBABLY WHY, AFTER OGGLING THE LUNAR EXCURSION MODEL DISPLAY, WE STOPPED IN OUR TRACKS.



OF COURSE, THIS DIAGRAM IS A BIT IDEALIZED.

I'M A PHYSICS GUY. THAT'S THE MOST DETAILED DRAWING I'VE EVER SEEN.



AS WE STOOD BEFORE A PHOTOGRAPH OF THE U.S. FLAG—THE FLAG PLANTED PROUDLY ON THE MOON, SYMBOLIZING THE BOLDEST ENDEAVOR HUMANKIND EVER UNDERTOOK—WE NOTED THAT THE LUNAR LANDER'S DESCENT STAGE WAS STILL IN THE SEA OF TRANQUILITY.



AND WE SUDDENLY BECAME AWARE OF ONE AMAZING, STUPENDOUS FACT.



END!



SEAN CARROLL

THEORETICAL PHYSICIST
CALIFORNIA INSTITUTE OF TECHNOLOGY

AT THE END OF 1992, I WAS APPLYING FOR POSTDOCS. AMONG THE PLACES I APPLIED WAS CAMBRIDGE.



AS IT HAPPENED, A JOB CAME OVER THE PHONE WHILE I WAS OUT OF THE OFFICE.



THE CALL WAS FROM STEPHEN HAWKING.

NO ONE MISSES
A CALL FROM HAWKING.
NO ONE.



FORTUNATELY MY FRIEND BRIAN WAS IN THE OFFICE AND TOOK THE CALL FOR ME.



YEAH RIGHT. AND I'M
THE QUEEN OF ENGLAND.
WHAT? NO, MY VOICE
HASN'T CHANGED.
THAT WAS A
JOKE.



DESPITE MY TEMPTATION, I ENDED UP TURNING IT DOWN FOR MIT. THREE YEARS LATER, I WAS AGAIN APPLYING FOR POSTDOCS.



AGAIN, I WAS OFFERED A JOB AT CAMBRIDGE, BUT WITH SOME REGRETS, I DECIDED THAT SANTA BARBARA WAS A BETTER PLACE FOR ME.



HOWEVER, HAWKING VISITS SANTA BARBARA EVERY YEAR, I MET ONE OF HIS GRAD STUDENTS RAPHAEL BOUSSO (NOW A GREAT PHYSICIST IN HIS OWN RIGHT) AND ASKED HIM TO INTRODUCE US.

I THINK IT'LL BE LESS AWKWARD IF YOU DO IT.

SURE.



I MENTIONED THAT I HOPED DR. HAWKING WASN'T ANGRY THAT I'D TURNED HIM DOWN. RAPHAEL TRIED TO PUT ME AT EASE.



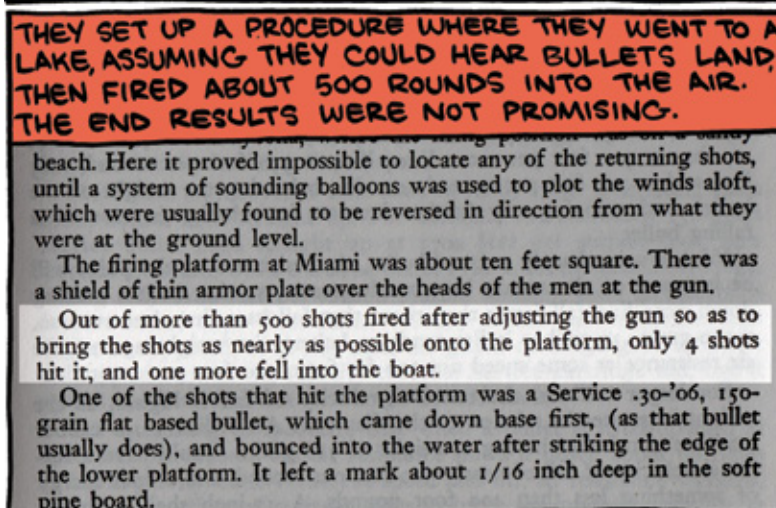


END!



ADAM SAVAGE

MASTER MAKER, TELEVISION PRODUCER, AND
HOST OF *MYTHBUSTERS*



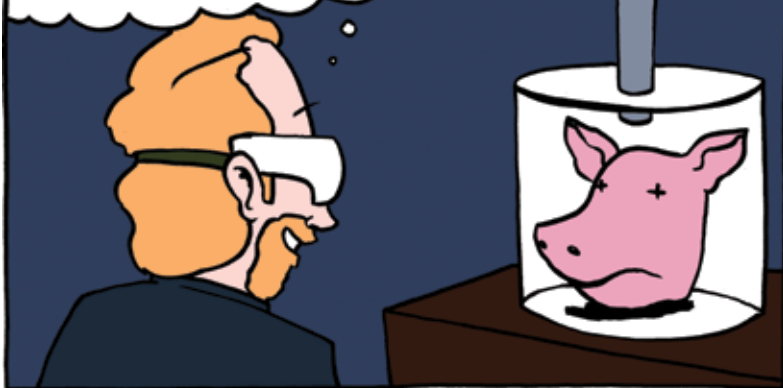
WE TRIED SOME SHOP TESTS TO SEE IF A FALLING BULLET WOULD BE LETHAL, LIKE HAVING THE BULLETS FLOAT IN WIND TUNNELS.

WE'VE GOT TERMINAL VELOCITY!
AND LOOK! IT FLOATS ON
ITS SIDE! SCIENCE!



FIRING IT AT TERMINAL VELOCITY AT A PIG'S HEAD...

AHH, TRUSTY OLD PIG HEAD.
NATURE'S DEAD GUY.

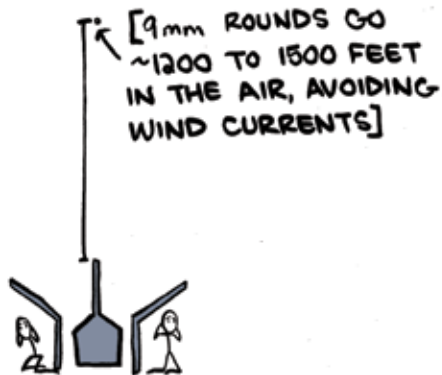


AND DROPPING BULLETS FROM A BALLOON.

I FEEL LIKE AN
18TH CENTURY
SUPERVILLAIN.



BUT THE TESTS WEREN'T FULL SCALE. SO, WE WENT OUT TO THE DESERT, HAD OUR PEOPLE SAFE UNDER STEEL COVERS, THEN PREPARED 9mm ROUNDS.



WE WAITED FOR CALM WINDS AND FIRED 11 ROUNDS AS FAST AS WE COULD, THEN CALLED OUT LANDING TIMES.

WE HEARD THEM LAND
IN THE SAME SEQUENCE AS FIRED!
SCIENCE IS AFOOT!

BASED ON WHO HEARD WHAT, WE WERE ABLE TO FIGURE APPROXIMATE LANDING SPOTS. THAT AND SEVERAL HOURS OF SEARCHING TURNED UP SIX OF ELEVEN ROUNDS.

WHO LIKES SPENDING THEIR WEEKENDS
THE ADAM SAVAGE WAY?!



WHEN WE DID THE REAL TEST, EVERY ONE OF THE SIX BULLETS MADE A BULLET-SHAPED HOLE SIX INCHES INTO THE GROUND, JUST AS PREDICTED. THE RESULTS PERFECTLY CORROBORATED OUR LAB TESTS.

THEY SAID I WAS
MAD! MAD!



LOOKING BACK OVER HATCHER'S NOTES, WE WERE AMAZED HOW SIGNIFICANT OF AN IMPROVEMENT WE HAD MADE. GRANTED, WE HAD SMALL SAMPLE SIZES AND THEIR GROUP WAS WORKING IN THE 1920s, BUT IT WAS THE FIRST TIME WE REALIZED WE WERE DOING ACTUAL SCIENCE.

WE'RE CONTRIBUTING
TO THE BODY OF
HUMAN KNOWLEDGE.



TO THIS DAY, IT REMAINS ONE OF MY FAVORITE EXPERIMENTS.

SCIENCE! IT'S SCIENCE!
HAHAHAHAHA!

CALM DOWN, ADAM.
YOU'RE SCARING US.

HAHAHAHAHA!



END!



DR. PHIL PLAIT

ASTRONOMER AND CREATOR OF
THE BAD ASTRONOMY BLOG

I HAVE A DIFFERENT KIND OF TRADITION FOR HALLOWEEN. EVERY OCTOBER 31, I TAKE A BUCKET OF CANDY TO THE END OF MY DRIVEWAY.



NEXT TO IT - IF IT'S CLEAR OUTSIDE - I SET UP MY TELESCOPE. WHEN KIDS COME AROUND, I TELL THEM THEY HAVE TO LOOK THROUGH THE TELESCOPE FIRST TO GET A PIECE OF CANDY.



WELL, A FEW YEARS BACK I LIVED ON THE EDGE OF A TOUGH NEIGHBORHOOD, AND HALLOWEEN WOULD BRING THE SOMEWHAT MORE SUSPECT TEENAGERS TRICK-OR-TREATING.



ONE YEAR, SATURN WAS VISIBLE LOW TO THE WEST. THROUGH THE TELESCOPE IT WAS PERFECTLY CLEAR AND CRISP, A PLANETARY BAUBLE, THE RINGS AND ONE MOON SERENELY HANGING IN THE EYEPIECE.



WHEN THOSE TOUGH KIDS CAME BY, I'D MAKE THEM LOOK THROUGH THE 'SCOPE, AND EVERY TIME, FOR EVERY ONE, WHEN THEY SAW SATURN, THEY'D GASP AND SAY

WOW.



THEY DROPPED EVERY ASPECT OF BEING COOL AND TOUGH AND JADED, AND FOR A MOMENT, A REAL MOMENT, THEY WERE IN AWE.



I'VE BEEN AN ASTRONOMER SINCE I WAS A KID,
AND I'VE DEVOTED MY LIFE TO SPREADING MY
OWN LOVE FOR SCIENCE TO EVERYONE WHO WILL LISTEN.



AND FOR AS LONG AS I LIVE, THAT DAY WILL
ALWAYS BE MY FAVORITE.



END!



ED YONG

SCIENCE WRITER,
NOT EXACTLY ROCKET SCIENCE

IF YOU WALK DOWN THE STREET WHERE DAVID ATTENBOROUGH LIVES, IT'S OBVIOUS WHICH HOUSE BELONGS TO HIM.



CARTOONIST'S NOTE: MILD EXAGGERATION

I HAD COME THERE ON A JANUARY MORNING IN 2008 TO INTERVIEW A MAN WHOSE VOICE IS SYNONYMOUS WITH NATURAL HISTORY. HE HAD NURTURED MY LOVE OF SCIENCE AND NATURE EVER SINCE I WAS A CHILD WATCHING "LIFE ON EARTH."

WOWWWW...



I'D WON THE DAILY TELEGRAPH'S COMPETITION FOR BUDDING SCIENCE WRITERS, AND ONE OF THE PRIZES WAS A MEAL WITH THE JUDGES. SIR DAVID WAS ONE OF THEM. WE TALKED NATURAL HISTORY FOR A FEW HOURS, AND I WATCHED HIM AND RICHARD FORTEY COMPETITIVELY CLASSIFY THEIR SEAFOOD PLATTER.

LUTJANUS CAMPECHANUS.

PROBABLY
PARASITIZED BY
CYMOTHOA
EXIGUA.

WHOSE
HYPERPARASITE IS

THIS IS THE
GREATEST MOMENT
OF MY LIFE.



AT THE END, I ASKED HIM FOR AN INTERVIEW, AND TO MY SURPRISE, HE SAID YES. EVEN MORE UNEXPECTEDLY, HE TOLD ME TO COME TO HIS HOUSE.



AMID A SURPRISINGLY MODERN SPACE FULL OF CLEAN LINES AND AN ABSOLUTELY GIGANTIC TELEVISION, THERE'S A ROW OF FOSSILS, WHICH HE CHALLENGED ME TO CLASSIFY. I FLUBBED THE FIRST ONE.

I... UH... I BELIEVE
THAT'S A SEED OF...
SOME GENUS.

THAT'S A 400 MILLION
YEAR OLD ARTHRODIRE
SCALE.



BUT MERCIFULLY, I IDENTIFIED THE SECOND AS A SET OF VERTEBRAE.

INDEED. THEY
BELONGED TO AN ICHTHYOSAUR,
A MARINE CONTEMPORARY
OF DINOSAURS. I FOUND
IT IN A FRIEND'S GARDEN.

YOUR
FRIENDS ARE
A LOT COOLER
THAN MINE.



EARLIER, I HAD CHALLENGED MYSELF TO ASK HIM A QUESTION NO ONE HAD ASKED HIM BEFORE.



AFTER A LONG PAUSE, HE TOLD A STORY ABOUT FAILING TO FIND BIRDS OF PARADISE IN NEW GUINEA BACK IN 1955 BECAUSE THE INDONESIAN GOVERNMENT THOUGHT HIS CREW WERE SPIES.



THIS WAS MY FIRST BIG INTERVIEW, AND I HADN'T QUITE MASTERED THE ART OF LISTENING TO ANSWERS, THINKING ABOUT NEW QUESTIONS ON THE FLY, AND SUPPRESSING THE MAJORITY OF YOUR BRAIN.



BUT HE WAS WONDERFUL: GENEROUS WITH HIS TIME, BUBBLING WITH ENTHUSIASM, AND CANTANKEROUS ONLY ONCE.

YOU'RE SO REVERED
AND INFLUENTIAL

BAH! IT'S ONLY BECAUSE
I'VE BEEN DOING IT
FOREVER AND KEEP
POPPING UP.



OF COURSE, IT WAS A GREAT MOMENT FOR MY CAREER.



BUT THAT WASN'T WHAT I THOUGHT ABOUT
WHEN I GOT HOME THAT NIGHT.



END!



ELIZABETH IORNS, PH. D.

CO-FOUNDER,
THE SCIENCE EXCHANGE

WHEN I WAS DOING MY POSTDOC RESEARCH, I WAS WORKING ON A NEW TECHNIQUE (FLOW CYTOMETRY) THAT I WAS NOT AN EXPERT IN.



ALTHOUGH WE HAD A FLOW CYTOMETRY CORE FACILITY, IT WAS SELF SERVICE SO I HAD TO LEARN HOW TO DO MY VERY COMPLICATED MULTICOLOR LABELING EXPERIMENT MYSELF.

OTHER GPIIb-IIIa-SPECIFIC ACTIVATION-DEPENDENT MoAbs ARE DIRECTED AGAINST EITHER LIGAND-INDUCED CONFORMATIONAL CHANGES IN THE GPIIb-TIIa COMPLEX (LIGAND-INDUCED BINDING SITES [LIBS]) OR RECEPTOR INDUCED CONFORAAAAH! AAAAAH!



EACH TIME I HAD TO SET UP THE EXPERIMENT AND LABEL THE CELLS, IT TOOK ABOUT 48 HOURS OF WORK. UNFORTUNATELY FOR ME, IT TOOK THREE SEPARATE ATTEMPTS BEFORE I MANAGED TO GET THE LABELING RIGHT AND INCLUDE ALL THE RIGHT CONTROLS.



THIS WAS OBVIOUSLY NOT A GREAT USE OF TIME OR RESOURCES: IF THERE HAD BEEN AN EXPERT WHO WAS WILLING TO DO MY EXPERIMENT FOR ME ON A FEE FOR SERVICE BASIS, EVERYONE WOULD HAVE BEEN MUCH BETTER OFF.

I HAVE THIS CRAZY IDEA. WHAT IF YOU COULD PAY MONEY IN EXCHANGE FOR SERVICES?

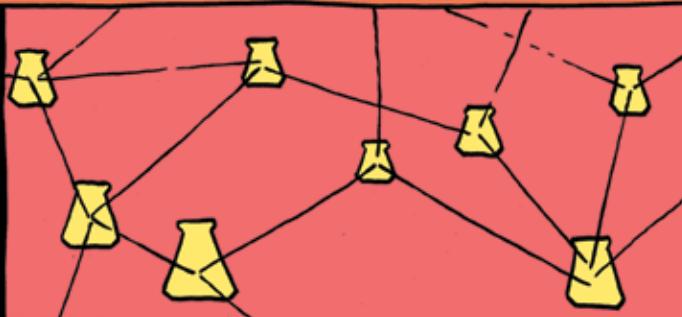
YOU OBVIOUSLY HAVEN'T BEEN IN ACADEMIA LONG.

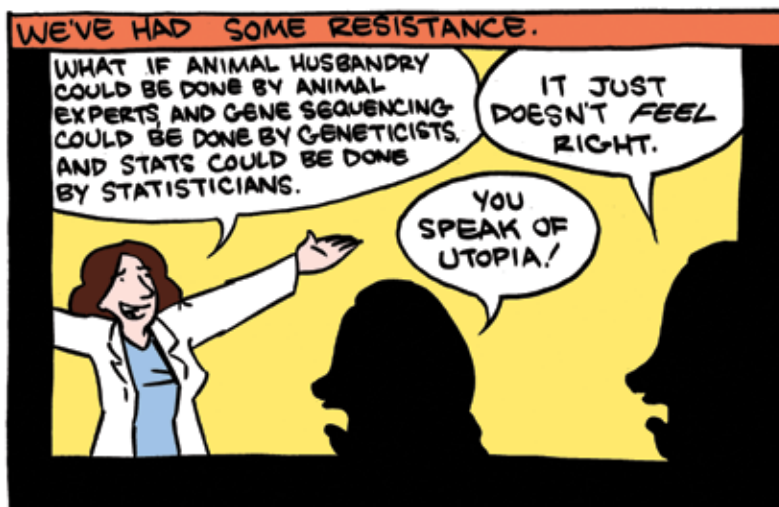
IN THE ACADEMIC SYSTEM, I WOULD HAVE HAD TO BARTER CO-AUTHORSHIP OR SOME OTHER FAVOR TO GET SOMEONE TO DO MY EXPERIMENT FOR ME. SINCE EVERYONE HATES FLOW CYTOMETRY, THAT WOULD BE A PRETTY BIG FAVOR.

THIS PAPER TOOK ME SIX MONTHS TO WRITE. I'LL GIVE YOU SECOND AUTHORSHIP IF YOU DO HALF A DAY OF TECH WORK FOR ME.

MEH.

THIS EXPERIENCE LED ME TO CREATE SCIENCE EXCHANGE: A MARKETPLACE TO SELL YOUR EXPERTISE AND SERVICES. SCIENTISTS GET SERVICES CHEAPER AND MORE EASILY, AND CORE FACILITIES GET USED MORE EFFICIENTLY.





END!



CHRISTINA AGAPAKIS

POSTDOCTORAL RESEARCHER AT
UNIVERSITY OF CALIFORNIA, LOS ANGELES

WORKING WITH AN ODOR ARTIST MADE ME SEE AND SMELL THE LAB IN VERY DIFFERENT WAYS. WE WOULD WALK AROUND THE LAB, OPENING UP TEST TUBES AND PETRI DISHES, SMELLING ALL THE MICROBES GROWING IN THE INCUBATORS.

ARE YOU SMELLING MY VAT OF SLIME MOLD?

FOR SCIENCE!

CARRY ON THEN.

SMELLING WITH A SMELL EXPERT MEANT THAT I HAD TO LEARN TO DESCRIBE ODORS MORE POETICALLY, BEYOND JUST "SMELLS LIKE E. COLI."

MY NOTES →

1. salty poo
2. yeast
3. rubber shoes
4. dust

SISSEL'S NOTES →

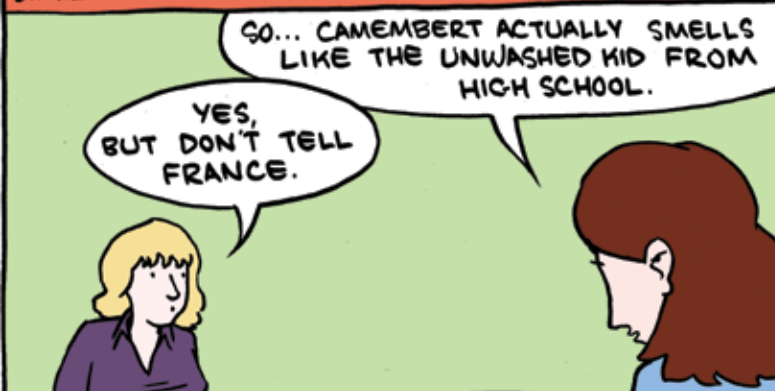
1. rotten wine
2. dog fur
3. wheat bread
4. fish soup
5. cold sake
6. rotten socks
7. dogshit on concrete

I ALSO HAD TO LEARN THAT BACTERIA DON'T SMELL "GROSS." THEY HAVE A SMELL WE OFTEN ASSOCIATE WITH THINGS WE CONSIDER GROSS.

TO PARAPHRASE SHAKESPEARE:
NOTHING STINKS, BUT THINKING
MAKES IT SO!



THE MORE WE RESEARCHED THE SMELLS OF BACTERIA, THE MORE I SAW HOW TRUE THIS IS. THE BACTERIA RESPONSIBLE FOR BODY ODOR AND THE SMELL OF FEET ARE VERY SIMILAR TO THE BACTERIA THAT FLAVOR CHEESE.



EVEN THOUGH THE BACTERIA AND SMELL MOLECULES ARE ALMOST IDENTICAL, IT IS VERY GROSS TO SMELL LIKE CHEESE BETWEEN YOUR TOES, BUT VERY CIVILIZED TO APPRECIATE A CHEESE THAT SMELLS LIKE FEET.



TO EXPLORE THE ART AND SCIENCE OF CHEESE AND SKIN BACTERIA, WE MADE CHEESE WITH OUR OWN MICROBES, SAMPLED FROM BETWEEN TOES AND UNDER ARMS.



THE RESULTS SMELLED LIKE SOUR OLD CHEESE, OCEAN SALT, CAT FEET, FRESH CREAM, LIGHT PERFUME, AN OLD SUBWAY STATION, A CHEESE FACTORY, OR ORANGE JUICE LEFT IN THE FRIDGE TOO LONG.



WE WANTED THESE STINKS TO MAKE YOU THINK— ABOUT ALL THE BACTERIA IN YOUR LIFE. THE BACTERIA THAT HARM. THE BACTERIA THAT HELP.



AND THE BACTERIA THAT MAKE CHEESE DELICIOUS.



END!



DR. PAUL BARRETT

DINOSAUR RESEARCHER
THE NATURAL HISTORY MUSEUM, LONDON

IN 1916, A SET OF DINOSAUR BONES FROM THE BADLANDS OF ALBERTA, CANADA WAS SENT TO THE NATURAL HISTORY MUSEUM BY FOSSIL COLLECTOR C.H. STERNBERG.



ARTHUR SMITH WOODWARD, HEAD OF THE MUSEUM'S FOSSIL COLLECTION, WAS LESS THAN IMPRESSED WITH THE COLLECTION, WRITING TO STERNBERG THAT "...IT CONTAINS NOTHING BUT RUBBISH."

WHAT'S ALL THIS?

OH, JUST SOME JUNK FROM ACROSS THE POND.



AS A RESULT, THE FOSSILS WERE STORED AWAY IN THE BASEMENT WITH ONLY A FEW PARTS BEING UNWRAPPED, THE MAJORITY STAYING IN THE PLASTER CASTS IN WHICH THEY'D BEEN COLLECTED FROM THE BADLANDS.

WHAT'S IN THESE?

MYSTERY DINOSAURS.

YAWN





**END!**



KELLY WEINERSMITH

PH. D. STUDENT
UNIVERSITY OF CALIFORNIA, DAVIS



OTHERS WOULD SLAM INTO MY MASK, THEN GRAB MY FINGER AND TRY TO PULL ME AWAY.

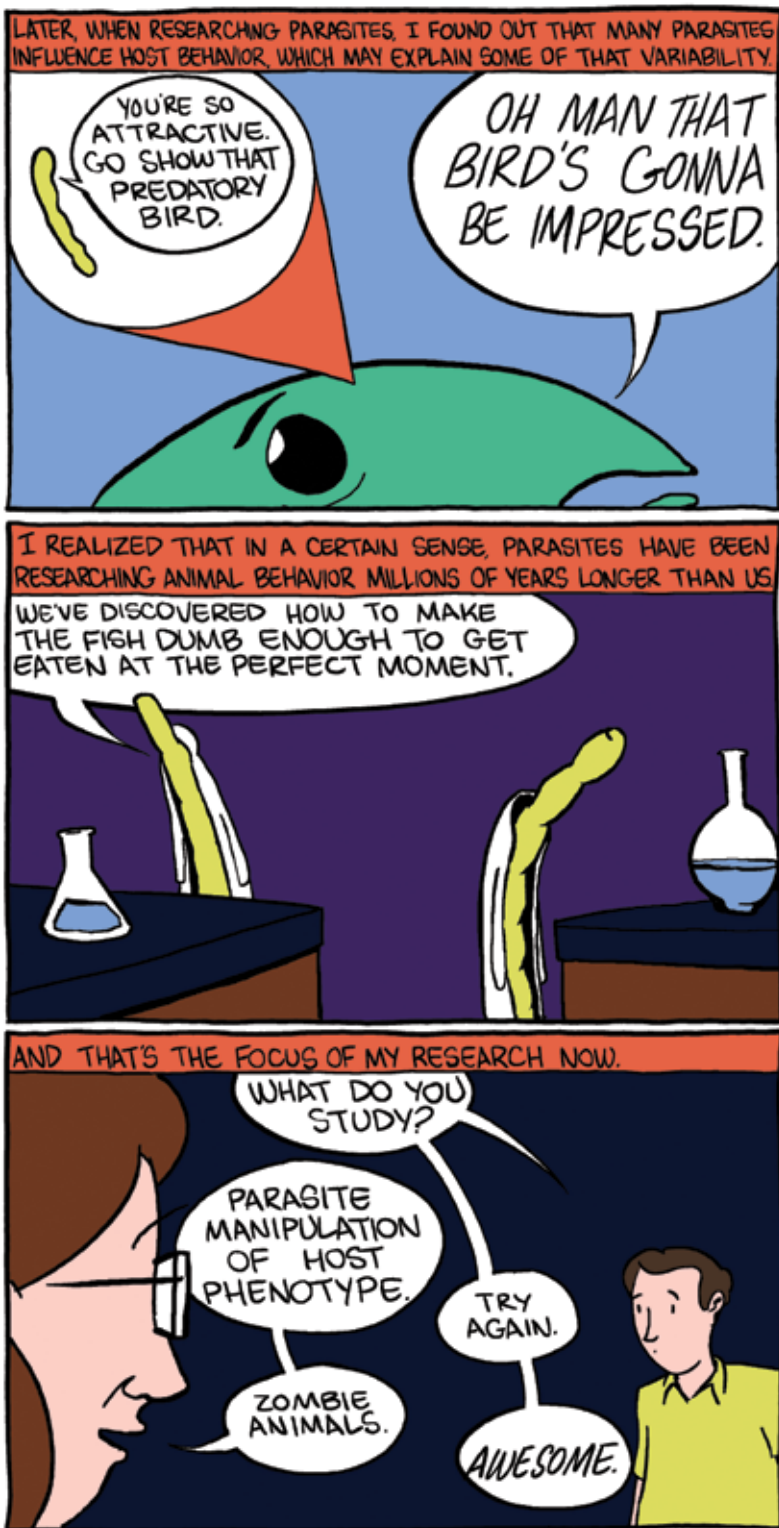


IT WAS AMAZING TO ME THAT BOTH EXTREMES COULD BE PRESENT IN A POPULATION.



IT GOT ME REALLY EXCITED ABOUT BEHAVIORAL VARIATION, THE MECHANISMS UNDERLYING IT, AND THE FITNESS CONSEQUENCES.







breadpig

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