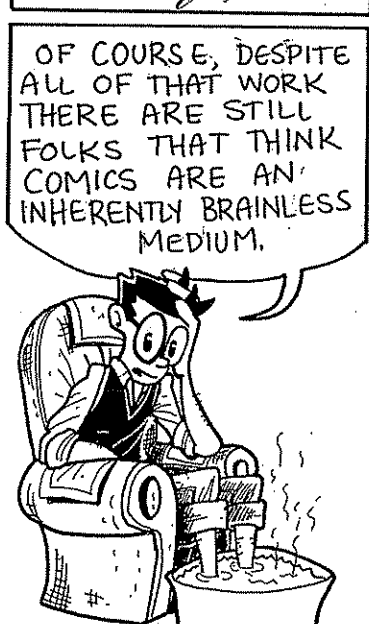
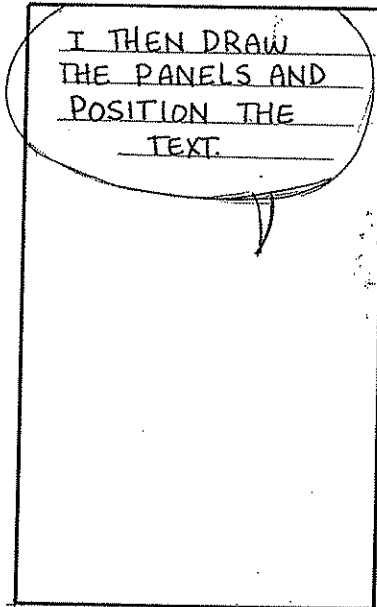
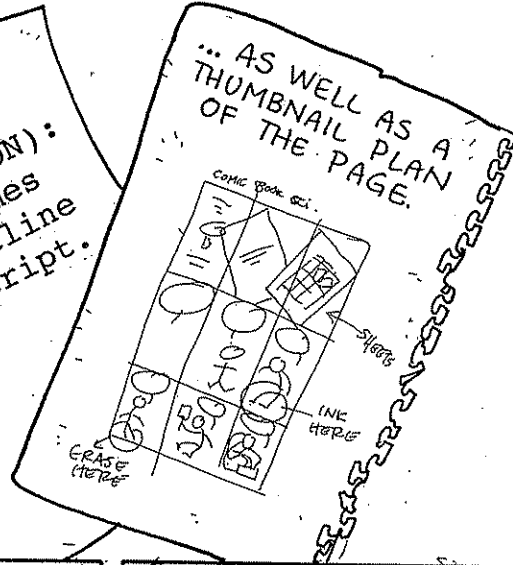
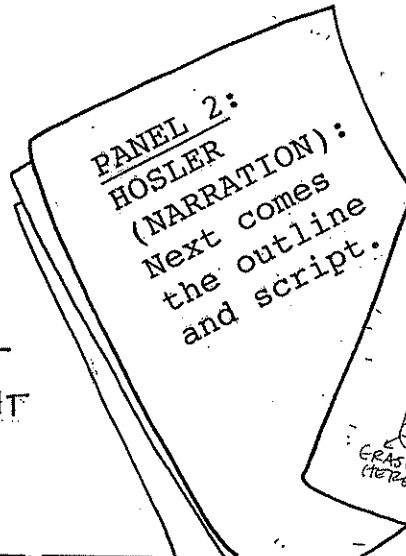


COMIC BOOK SCIENCE by JAY HOSLER

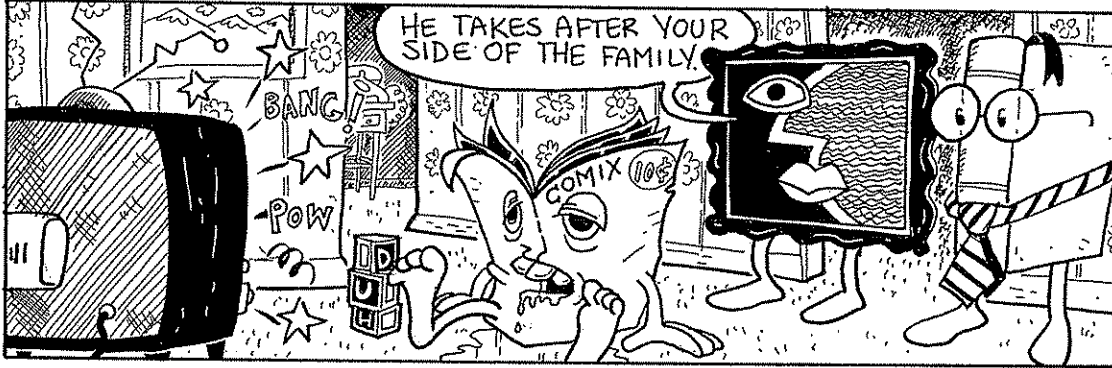
IT STARTS WITH AN IDEA.



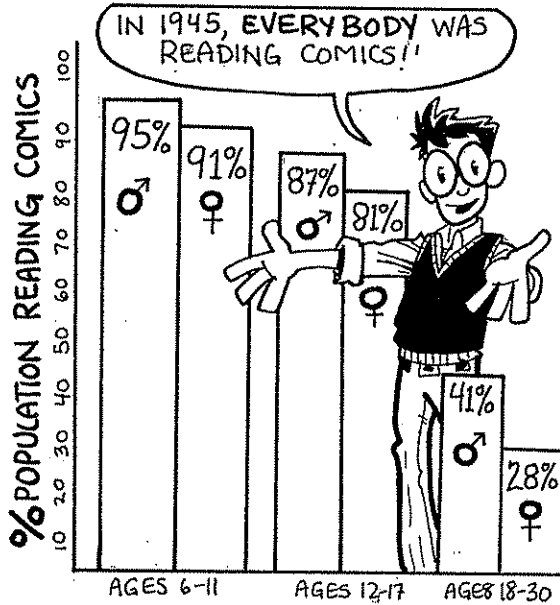
(THIS INEFFICIENT INCANDESCENT LIGHT BULB MAKES AN IDEAL ICON FOR THE CREATIVE PROCESS)



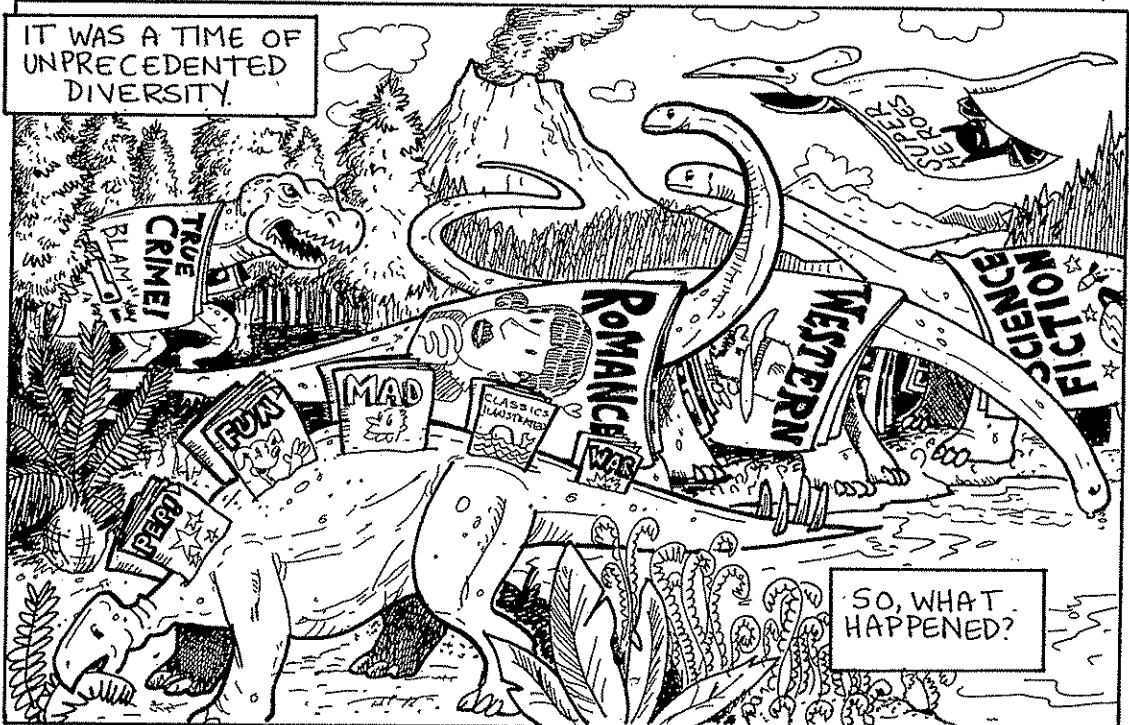
SOME STILL CONSIDER THIS UNION OF ART AND LITERATURE AS READING MATERIAL ONLY FIT FOR SLACK-JAWED MOUTH BREATHERS.



BUT THIS PERSPECTIVE IS MORE THE PRODUCT OF HISTORICAL CIRCUMSTANCES THAN THE INTRINSIC NATURE OF COMICS.



EDUCATORS WERE STARTING TO USE COMICS IN THE CLASSROOM WITH SURPRISING RESULTS.



IN 1954, A BIG ASTEROID NAMED FREDRIC WERTHAM TUMBLED TOWARD THE WORLD OF COMICS



HIS BOOK, SEDUCTION OF THE INNOCENT, ARGUED THAT COMIC BOOKS WERE A MAJOR SOURCE OF JUVENILE DELINQUENCY.



WHEN THE WERTHAM ASTEROID HIT, IT PROVOKED SENATE HEARINGS. PARENTS WERE HORRIFIED BY THE COMICS WERTHAM PUT ON DISPLAY.

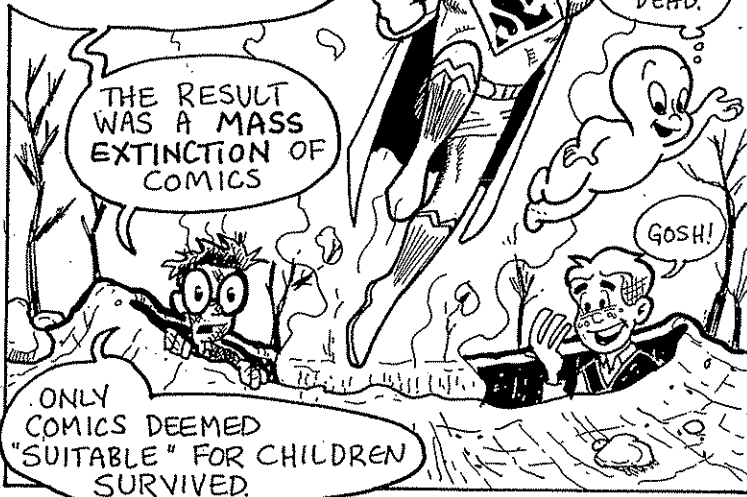


COMIC BOOK BURNINGS FOLLOWED.

IN THE END, THE COMIC INDUSTRY ACCEPTED A SELF IMPOSED CENSORSHIP PROGRAM CALLED THE COMICS CODE AUTHORITY (CCA).



THE CCA SEAL WAS ONLY PLACED ON COMICS JUDGED TO BE "WHOLESOME."



UNDER THESE CONDITIONS, THE CREATIVE POTENTIAL OF COMICS WAS SEVERELY RESTRICTED.



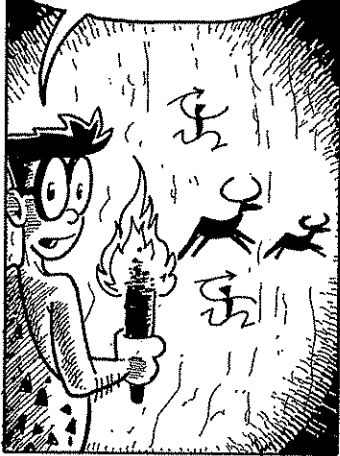


BUT THAT WAS FIFTY YEARS AGO.

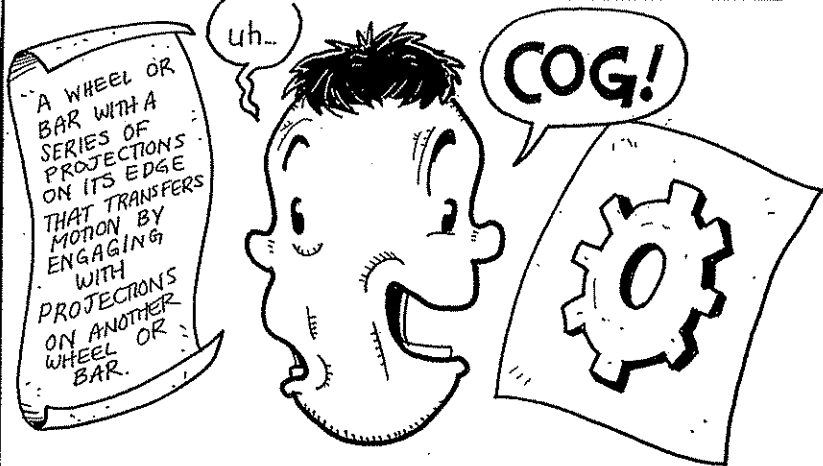
SINCE THEN, COMIC BOOKS HAVE DIVERSIFIED AND MATURED EVEN IF PUBLIC OPINION HAS NOT

WITH THEIR UNIQUE SYNTHESIS OF WORDS AND ART, COMICS EXPRESS THOUGHTS AND IDEAS IN WAYS OTHER MEDIUMS CANNOT. IN FACT, I WOULD ARGUE THAT COMICS HAVE BEEN ESSENTIAL TO OUR UNDERSTANDING OF THE NATURAL WORLD.

BY SOME ESTIMATES, HUMANS WERE USING IMAGES 25,000 YEARS BEFORE WE DEVELOPED WRITTEN LANGUAGE.



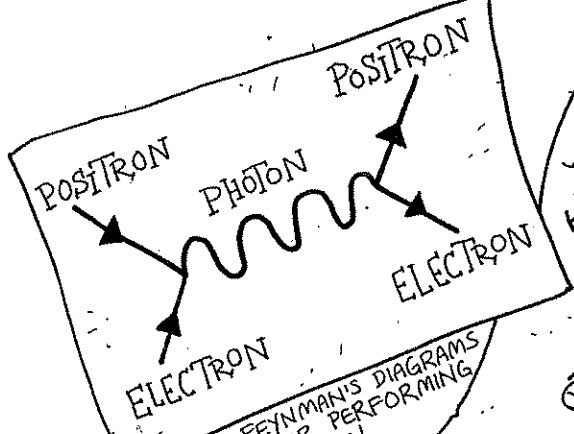
WE ARE, BY OUR VERY NATURE, VISUAL CREATURES AND WE RELY ON IMAGES AS A QUICK MEANS OF ACQUIRING INFORMATION.



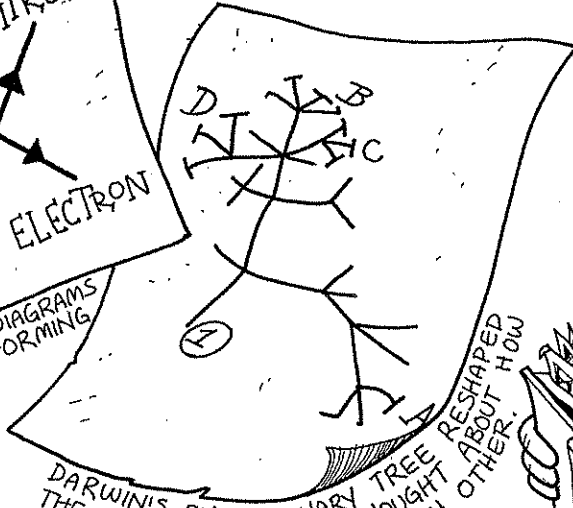
A WHEEL OR BAR WITH A SERIES OF PROJECTIONS ON ITS EDGE THAT TRANSFERS MOTION BY ENGAGING WITH PROJECTIONS ON ANOTHER WHEEL OR BAR.

COG!

PICTURES HAVE HELPED ADVANCE SEVERAL FIELDS OF SCIENTIFIC STUDY AND ARE AN ESSENTIAL COMPONENT OF SCIENCE EDUCATION.



RICHARD FEYNMAN'S DIAGRAMS ARE USED FOR PERFORMING CALCULATIONS IN QUANTUM FIELD THEORY.



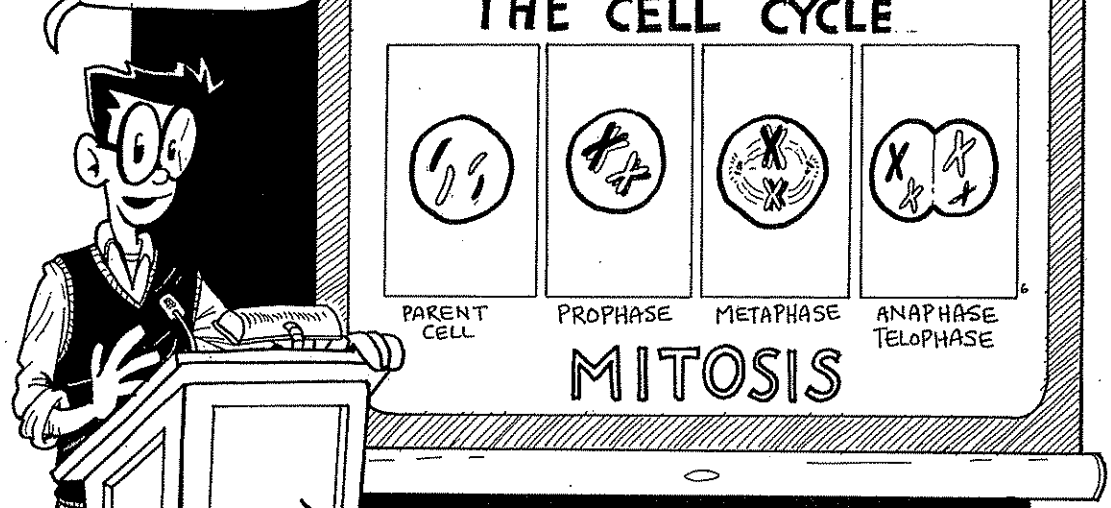
DARWIN'S EVOLUTIONARY TREE RESHAPED THE WAY BIOLOGISTS THOUGHT ABOUT HOW SPECIES ARE RELATED TO EACH OTHER.



SO, WHERE DO COMICS COME IN?

IN HIS BOOK, UNDERSTANDING COMICS, SCOTT McCLLOUD DEFINES COMICS AS "JUXTAPOSED PICTORIAL AND OTHER IMAGES IN DELIBERATE SEQUENCE, INTENDED TO CONVEY INFORMATION AND/OR AN AESTHETIC RESPONSE IN THE VIEWER."⁵

IF WE ACCEPT THIS DEFINITION, THEN SCIENCE HAS BEEN USING COMICS TO EXPLAIN CONCEPTS FOR CENTURIES.



SO, WHAT IF WE TAKE THINGS A STEP FURTHER AND USE A COMIC BOOK STORY TO ILLUSTRATE CONCEPTS IN SCIENCE?

I POSED THIS QUESTION WHEN I SPOKE AT A LUNCH MEETING WITH SOME RETIRED FACULTY.

A TERRIBLE IDEA

THIS IS THE END OF EDUCATION.

...gulp...

NOW, TO BE FAIR, THAT WAS JUST ONE COMMENT

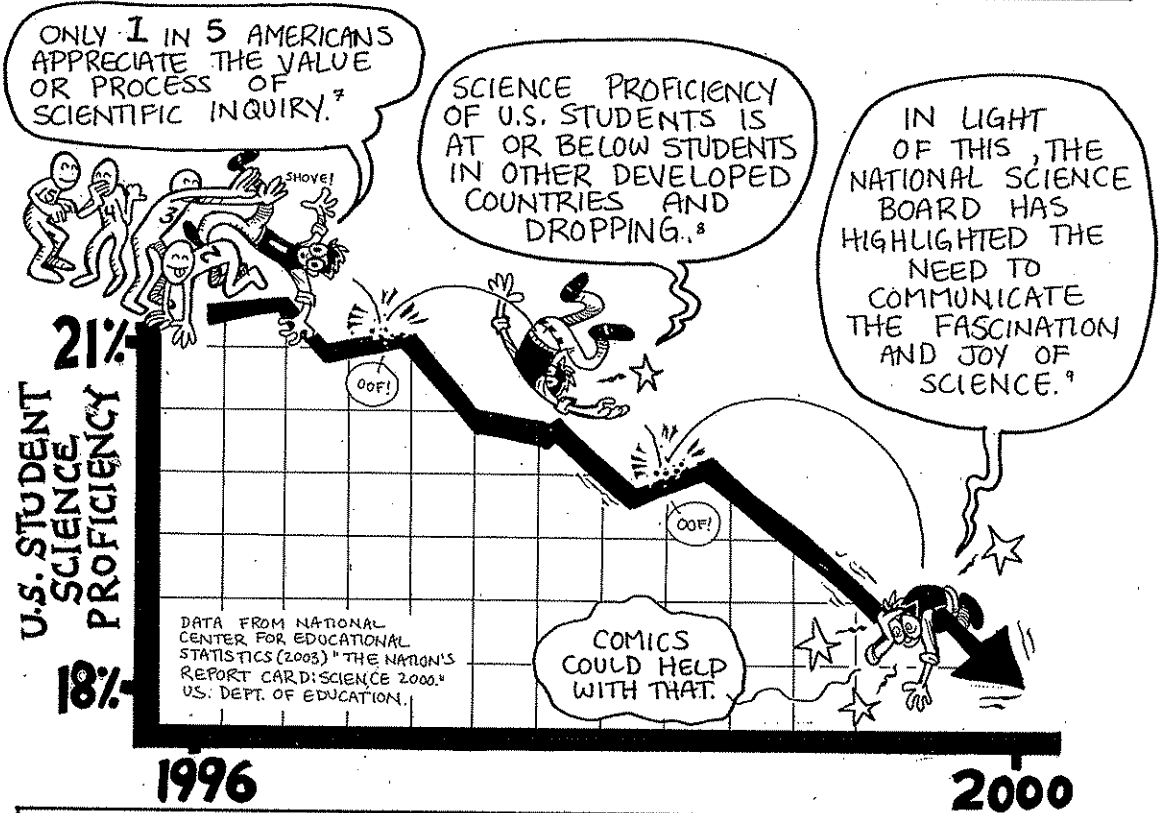
BUT IT MADE ME THINK.

(and sweat)

MY PRIMARY GOAL AS AN EDUCATOR IS FOR MY STUDENTS TO UNDERSTAND SCIENCE.

IF WE CAN ACCEPT THAT THERE IS NOTHING INHERENTLY JUVENILE ABOUT COMICS, THEN THEY BECOME A POTENTIALLY POWERFUL TOOL FOR TEACHING SCIENCE.

AND WE NEED ALL OF THE TOOLS WE CAN GET.



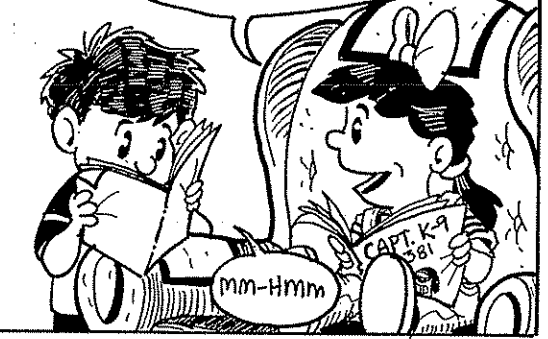
RESEARCH INDICATES THAT INSTRUCTORS WHO USE COMICS FOUND THAT THEY INCREASED STUDENT INTEREST AS WELL AS THE MOTIVATION TO READ.

COMICS ALSO IMPROVED READING PERFORMANCE AND RETENTION COMPARED TO NON-ILLUSTRATED TEXT.^{10,11}

COMICS TELL STORIES AND WE'VE BEEN USING STORIES TO INSTRUCT FOR AGES. WE CAN REMEMBER COMPLEX OR STRANGE THINGS BECAUSE THAT INFORMATION IS SITUATED IN A NARRATIVE.^{12,13,14}

DO YOU REMEMBER WAY BACK IN ISSUE #267 WHEN CAPT. K-9 TRAPPED THE BRICK LORD OF IGNATZIO IN THE SEVENTH DIMENSION OF KOKONINO?

DIDN'T HE HAVE TO USE THE ORB OF GRIMALKIN?



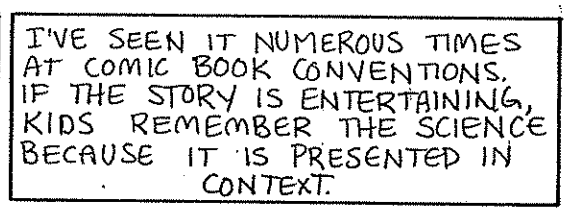


SO, IT ISN'T TOO HARD TO IMAGINE USING COMICS AS AN INTERMEDIARY FOR NEW, SOMETIMES CHALLENGING, IDEAS FROM THE NATURAL SCIENCES.

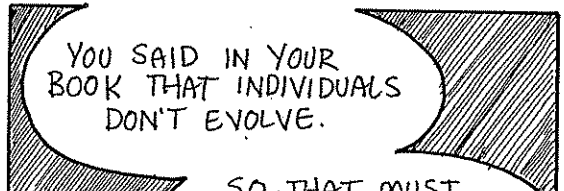
INSTEAD OF THE ORB OF GRIMALKIN, LET'S SAY AN ADVENTURE CENTERED ON A CONCEPT LIKE...uh... NATURAL SELECTION.

..JUST TO PICK SOMETHING COMPLETELY OUT OF THE BLUE...
=AHEM?

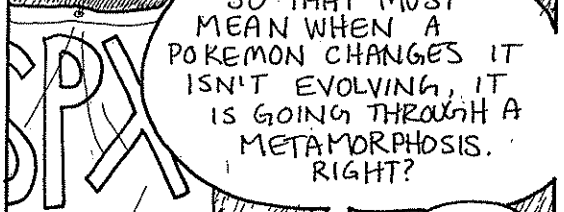
A CHARLES DARWIN COMIC BOOK?



I'VE SEEN IT NUMEROUS TIMES AT COMIC BOOK CONVENTIONS. IF THE STORY IS ENTERTAINING, KIDS REMEMBER THE SCIENCE BECAUSE IT IS PRESENTED IN CONTEXT.



YOU SAID IN YOUR BOOK THAT INDIVIDUALS DON'T EVOLVE.



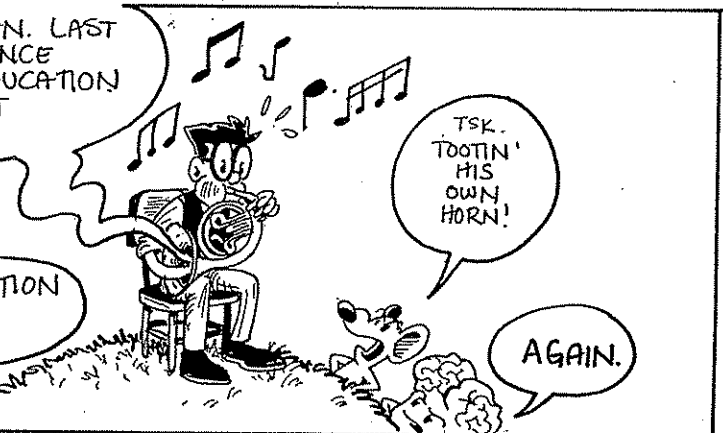
SO THAT MUST MEAN WHEN A POKEMON CHANGES IT ISN'T EVOLVING, IT IS GOING THROUGH A METAMORPHOSIS. RIGHT?



RIGHT.

THE IDEA IS CATCHING ON. LAST YEAR, I CREATED TWO SCIENCE COMICS FOR A LINE OF EDUCATION COMICS FROM HARCOURT PUBLISHING.¹⁵

I ALSO RECEIVED A GRANT FROM THE NATIONAL SCIENCE FOUNDATION TO BEGIN DEVELOPING A BIOLOGY TEXTBOOK IN COMIC BOOK FORMAT.



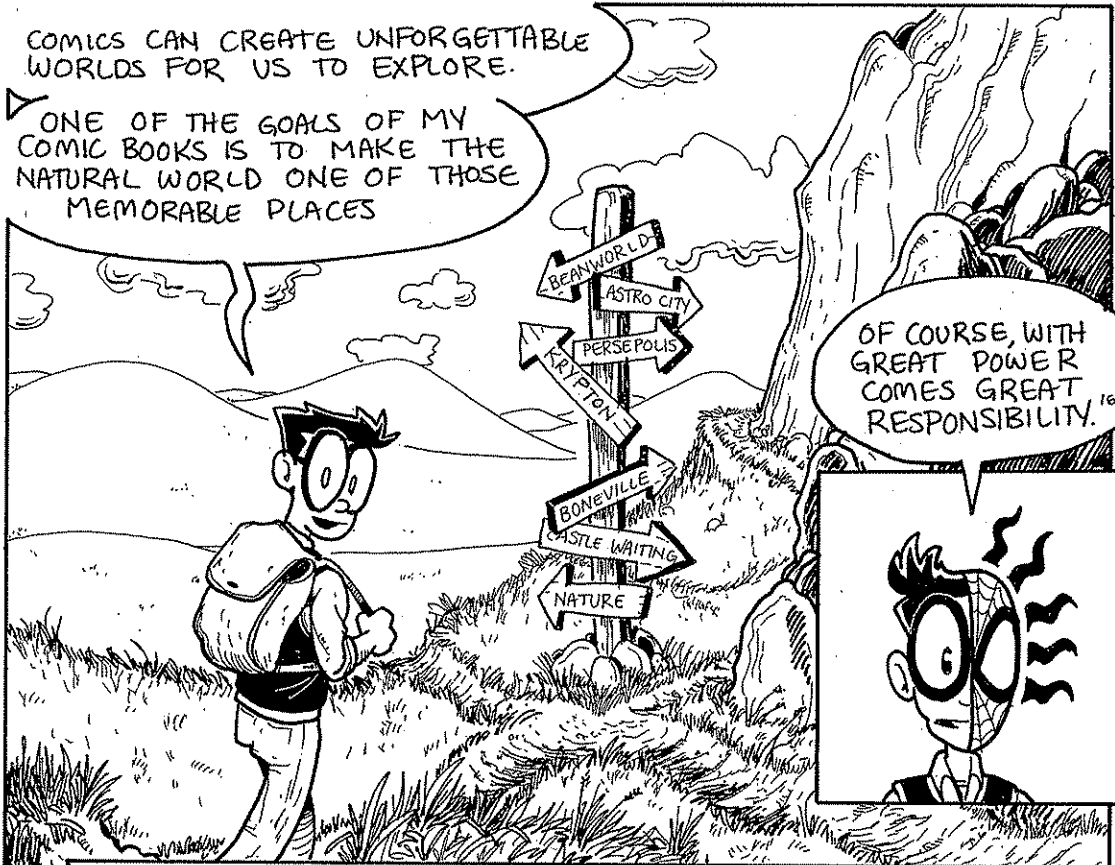
TSK. TOOTIN' HIS OWN HORN!

AGAIN.

COMICS CAN CREATE UNFORGETTABLE WORLDS FOR US TO EXPLORE.

ONE OF THE GOALS OF MY COMIC BOOKS IS TO MAKE THE NATURAL WORLD ONE OF THOSE MEMORABLE PLACES

OF COURSE, WITH GREAT POWER COMES GREAT RESPONSIBILITY.¹⁶



FROM AN EDUCATIONAL STANDPOINT, THE IMAGES AND SITUATED NARRATIVES OF COMICS AND CARTOONS ARE SO POWERFUL THAT THEY CAN ACTUALLY MAKE THINGS WORSE IF EMPLOYED CARELESSLY.

THAT REMINDS US, DAD, WE JUST WATCHED A BUG'S LIFE AND WE HAVE A QUESTION.

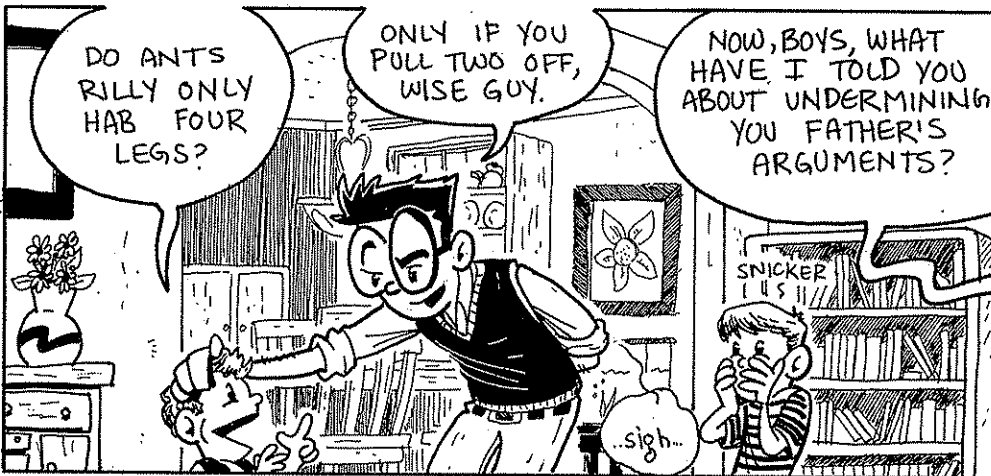


..oh, no..

DO ANTS RILLY ONLY HAB FOUR LEGS?

ONLY IF YOU PULL TWO OFF, WISE GUY.

NOW, BOYS, WHAT HAVE I TOLD YOU ABOUT UNDERMINING YOU FATHER'S ARGUMENTS?



..sigh..

END.

NOTES

- ¹Bradford Wright, *Comic Book Nation: the transformation of youth culture* (The Johns Hopkins University Press, Baltimore, Maryland, 2001), 57.
- ²K. Hutchinson, "An experiment in the use of comics as instructional material," *Journal of Educational Sociology*, 23 (1949), 236-245.
- ³Wright, *Comic Book Nation*, 157-164.
- ⁴M. Massironi, trans. N. Bruno, *The Psychology of Graphic Images: Seeing, drawing and communicating* (Mahwah, NJ: Lawrence Erlbaum Associates, Publishers, 2002).
- ⁵S. McCloud, *Understanding comics: The invisible art* (Northampton, MA: Kitchen Sink Press, 1993).
- ⁶Redrawn from an image of mitosis on p. 230 in *Biology, 7th Edition* (2005) by Raven, Johnson, Losos and Singer. McGraw Hill.
- ⁷National Science Board: *Communicating Science and Technology In the Public Interest: NSB-00-99* (The National Science Foundation, Arlington, VA, 2000).
- ⁸National Center for Education Statistics, *The Nation's Report Card: Science 2000 Institute of Education Sciences* (U.S. Dept. of Education, Washington, DC, 2003).
- ⁹National Science Board, *Communicating Science and Technology In the Public Interest*.
- ¹⁰L. B. Gambrell, and P. B. Jawitz, "Mental imagery, text illustrations and children's story comprehension and recall," *Reading Research Quarterly*, 28 (1993): 264
- ¹¹W. Sones, "The comics and instructional method," *Journal of Educational Sociology*, 18 (1944), 232-240
- ¹²R. N. Caine, and G. Caine, *Making connections: Teaching and the human brain*. Dale Seymour Publications; Revised edition, (1991).
- ¹³G. L. Dillon, *Constructing texts*. Bloomington: Indiana University Press, (1981).
- ¹⁴D. M. Wirth, and J. A. Gamon, "The Art of Situated Narrative: A Tool to Teach Environmental Ethics," *Journal of Vocational Education Research*, 24 (1999), 45-61.
- ¹⁵This is part of a line of education comics (called Lynx) targeted for reluctant middle school readers and advanced elementary school readers. Each comic in the line is paired with a non-fiction reader. The first comic I did in the series was called *Zoo Break* and focuses on animal intelligence. The second comic examines life in marine environments and is called *UFO: Unidentified Floating Objects*. The line is released from an imprint of Harcourt Achieve called Steck-Vaughn.
- ¹⁶This famous line was written by Stan Lee in the first appearance of Spider-Man in the anthology comic book *Amazing Fantasy #15* (August, 1962). This was the last issue of *Amazing Fantasy*, but the Spider-Man character born in the 11-page story obviously lives on.