

“Science World”

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“Disney World” is for children and the people who follow them from place to place, their parents and guardians and other odd types. There should be a place where adults, at least those who behave like adults, can go to have some fun. I here suggest and describe an entertainment park where grown-up scientists can lose themselves among activities that are stimulating, informative, and perhaps useful – I call it “Science World.” Let’s begin with finding a parking place.

Parking lot: This would be so spacious that one would simply have to drive in and park. Sections and rows would not be numbered or lettered and not otherwise identified, so that the first real challenge (and the last) would be to re-locate one’s vehicle. Each night after the first day of the grand opening of the park, vehicles not retrieved by 10 PM would be towed away their identification numbers removed, and then sold, but only to people who had attended Science World within the previous year.

ATTRACTIONS

The Great Hall of Genetics: Who hasn’t thought of wonderful gene combinations, amalgamations that would combine the best of this and that? For examples, a green vegetable that tastes like something other than a green vegetable, a cough medication that tastes like champagne, or a pine tree with wood like oak. In the “Great Hall of Genetics,” one could try making any combination of genes. You might want to construct a non-pathogenic but infectious virus containing a gene that specifies production of a protein that acts like botulinum toxin and removes all wrinkles from skin; a world-wide epidemic of this virus could ruin the cosmetics industry, however. No good deed goes unpunished.

Another possibility would be to insert into a crustacean such as krill (*Meganyctiphanes norvegica*) a gene that specifies production of a protein of a pathogen. The crustacean could be grown to large quantities in vats, concentrated,

made into small cubes, and lyophilized. If an epidemic of that pathogen were to be predicted or had already been recognized, people could simply chew and swallow a few cubes and they would be protected from the scourge. Those who do not eat crustaceans for religious or allergic reasons would be left out in the cold and bioterrorists would be even angrier than they are now.

Chemistry World: Remember when you were very young and would mix things together to see what happened? In “Chemistry World”, you could do that and do it in a much more sophisticated manner. As there already are instructions on the web regarding the construction of an atomic bomb (1,2), trying chemistry would be mere child’s play. You might want to build a truly terrifying (all in fun, however) weapon, but it would have to be self-replicating (like an atomic bomb) to be of much practical use. Naturally, this would require collaboration with the collegial folks wandering around “Virus World”.

Virus World: How much fun can one person have in an afternoon? When Barbara McClintock published her classical work on “jumping genes” (now called “transposons”), an intellectual door was opened and we recognized that genes were not just sitting there, boringly and perpetually specifying products (3). By now we know about retrotransposons, P elements (important in bacteria for antibiotic resistance), Tn10 (a transposable element that is a sequence of DNA capable of mediating its own movement through the DNA of its host organism), insertion sequences, signature-tagged mutagenesis, and more. It has been shown that some diseases are caused by transposons, including but not limited to hemophilias, porphyria, predisposition to cancers, severe combined immunodeficiency, and Duchenne muscular dystrophy. The mariner-class transposons piggyBac and Sleeping Beauty, active in mammalian cells, are being studied for use in human gene therapy. Transposons are useful tools to alter DNA inside living organisms, but the deleterious effects they cause apparently have led their hosts to defend themselves against them

by producing piwi-interacting RNAs and small interfering RNAs, which silence transposable elements after they have been transcribed. Bacteria may undergo high rates of gene deletions in order to spit out transposons and viruses from their genomes. Eukaryotes have developed RNA interference mechanisms to reduce transposon activity. Because transposons and viruses share features in their genomes and in their biochemical activities, it has been speculated that they have common ancestors. Some of these ancestors may have been politicians.

Viruses are well known to reassort and to recombine their genes. Modern techniques allow us to manipulate viruses by inserting into their genomes any of many genes, even non-viral genes. Particularly useful are nucleotide sequences that can do things the intact virus never dreamed of doing. Want to insert the selectively immunosuppressive envelope glycoprotein of an ebolavirus (4) into influenzavirus A H5N1? Given that it has been suspected that the 1918 influenza epidemic was caused as much by the immunological response of the host as by the virus itself (5), this could be great fun.

Physics World: A couple of dried prunes (*šljiva*) ought to get you through here.

Entomology World: Wonderful possibilities are in store for you in Entomology World. The afternoon would fly, flutter, or buzz by. Undoubtedly you will want to be working with beetles, which are the insects having the largest number of recognized species (>350,000). [It was J.B.S. Haldane who said, "The creator, if He exists, must have an inordinate fondness for beetles."] What can one do with beetles? What can one NOT do with beetles? Open them and see what makes them tick. Race them against each other. Throw them in the air and observe how often they land on their feet. Determine whether there are male "Lady beetles." Establish whether "Japanese beetles" can sing karaoke. Paint male beetles one color and female beetles another color, then introduce some male beetles painted the color of the female beetles. All this and more, to the repetitive strains of "I want to hold your hand."

Anthropology World: In Pearl Buck's wonderful novel "Peony," she describes Jewish life in the city of Kaifeng (Henan Province) in the 1850s (6). In "Anthropology World," you could investigate the current status of the Jewish community of China. There now are only a few of them and it is difficult for them to find kosher items in the markets but they hang on, as always. I suppose that their neigh-

bors throw rocks at their windows but do not remember why. More information would be fascinating.

Or you could play a computerized board game, "Where are they now?", in which players try to locate as many as possible of the Nazis who moved to Argentina, Paraguay, Brazil, Chile, Bolivia, and Norway. Mock trials could be held, followed by mock hangings.

Or you could characterize the behavior or misbehavior of football fans from England, possibly studying their genetic traits and determining whether they correlate with support of a monarchy.

Or you could try to determine whether evolution has occurred among members of the species *Homo sapiens*.

Uncontrolled Science World: Here is where you could really have some fun. Given that in this building you can design any experiment you want and you can use or not use whatever control groups you want, you could opt to not include controls. Whereas the many (and varied) conclusions would not be worthwhile publishing in legitimate periodicals, they could be published in non-professional periodicals, such as daily or weekly newspapers anywhere in the world, Middle East pamphlets, and Vatican documents (to be stored away on dusty shelves for no fewer than 200 years, after which all but single copies would be brought into the light and burned). There are so many journals in print or on line these days which publish stuff that would have been unpublishable just a few years ago, you would have only a little trouble finding one that would accept "junk science." The *Croatian Medical Journal* is not one of these.

Social and Behavioral Sciences World: This would be housed in a very small building, which is sufficient to accommodate all that is definite about research in these fields of study, and comprising all that is certain about the many conclusions that have been drawn from them. The history of hypothesis generation, followed by experimentation to test these hypotheses, the results and subsequent theories that arise from all this, and then the predictions that can be made – all could be handled by the computers at the carrels along the wall. Take earphones; there will be echoes in here.

Editorial World: What can make an afternoon (and evening and the next morning and for weeks after that) pass more quickly than editing scientific manuscripts? First you grab

2 or 3 manuscripts off the top of the huge file on the main desk. Then you procure a pen with red ink. It is best if you do not understand the topic of the manuscript.

First, make some unreadable marks on the first page. This tends to get the senior author on defense, which means s/he would not be on offense.

Next, remove commas wherever they are found and insert commas where they do not belong. Addition (or deletion, it doesn't matter) of semicolons is always good for a laugh.

Then suggest that the author revise both the Results and Discussion sections, such revisions to include both removal of perfectly good and understandable data and replaced with ideas that are not only not those of the authors but are really stupid ones.

Finally, reject the manuscript and tell the authors they should have submitted this mess to *Acta Retracta*.

If the senior author is young and creative, all this will have a greater impact, discouraging him or her from continuing in the field and thereby reducing the competition. It doesn't get any better than this and it is all done anonymously, so you can play small jokes on your colleagues, former friends, and soon-to-be former friends.

Nutrition World: Our relatives, our friends, our enemies, and our governments continuously nag us about our eating habits, tell us what is good for us, tell us what is bad for us, and try to get us to eat broccoli, then change their minds and tell us what was thought to be bad for us is not and what is thought to be good for us is not. It might be best to just ignore all these sources and find a chocolate bar. In Nutrition World you could measure the number of calories, total number of grams of fat, cholesterol and sodium, protein, vitamin contents, and general nutritional value using various instruments, which whirr, flash, sparkle, and scream "It's alive. It's alive." However, those values are not shown anywhere. Instead, there would be a floor plan of Nutrition World showing where the bar is.

Taxonomy World: There are few things less important and more controversial than taxonomy. Certainly, we all need to know where things belong in the great scheme of things, which is the purpose of taxonomic placement. However, since few people understand taxonomy and even fewer pay any attention at all to the taxonomic con-

structs devised over hundreds of years by serious students of nomenclature you, as one of these latter day Luddites, could wreak considerable havoc without having anyone treat you as though you were unenlightened.

First, ignore italicization of species names. This puts you in a class with the Great Unwashed, the majority. Next, italicize words that should not be italicized. This tends to make people think you know what you are talking about when, in fact, you haven't a clue. You could even write for publication a manuscript using words and terms such as: hierarchy, set theory, nomina, lineages, clade, ontological and metaclass, and you can feel free to write such statements as "Extinct is a property we want to inhere in certain taxa only when all their individual constituents are dead." (7) without anyone disputing you.

From the friendly confines of "Taxonomy World," and given a laptop computer and access to a telephone line, one could rid the world of silly common names, such as "horse," "donkey," and "mule" and, instead, give them more tidy and logical names, such as Equus 1, Equus 2, and Equus 1.5. Moreover, rather than giving individual names to all the beetles, they could simply be numbered, or they could all be called "beetles," which is less confusing anyway. How much enjoyment is one allowed in this world?

As proposed by me, the self-proposed superintendent of "Science World," I would welcome you and show you to the "Science World Shop," where you will be welcome to purchase any or all of the fascinating and valueless articles for sale: t-shirts, of course, with Charles Darwin's image on one side and George Bush's on the other side; light microscopes that do not function; neutron accelerators (on sale); chemistry kits that can be used to stink up your parents' basement; questionnaires to be used to obtain useless and misleading survey data; biofeedback machines, purported to be able to cure your paranoia; salt and pepper shakers in the shapes of two beetles that appear to be identical but are not; and even more.

We look forward to seeing you soon.

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