

OPUNTIA

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HUMAN EVOLUTION: PART 7. WE LEARN TO WRITE

by Dale Speirs

Written language is the greatest achievement of humans. The past can communicate to us by the written word, and we can communicate to the future. Animals cannot. Dogs mark their territory with urine and get an idea of how long it has been since their competitors were there by the strength of their scent, but they cannot leave a message that they were there on May 4, 1999.

Human languages also allow reference to other places and times [14]. Bees communicate pollen sources by their tail-wagging language, but they cannot sit around the hive like four Yorkshiremen and complain "It were different back when, but you tell that to the young 'uns today and they don't believe you.". Spoken and written word processing by the human brain are two separate processes. Normally they operate autonomously, connected only under conscious conditions [32].

Writing separated humans from all other animals and triggered civilization to develop beyond the village level, since it allows communication at a distance not only in space but in time. Written language allows generalization. Memorization of vast amounts of data is done by association with specific things, but there is a limit. With sheets of papyrus side by side, one can contemplate generalities without being forced to divert time and energy into

remembering masses of numbers or lists of names and places. Many methods of writing were developed, but the one that succeeded the most was the alphabet, surpassing syllabics, hieroglyphics, and pictographs.

John Man covers the origin and development of the alphabet in the western world, the only place where the alphabet developed independently and that only once [33]. He places the origin in ancient Egypt, and from there follows its spread along the trade routes to the rest of the Mediterranean and thence to Asia. China had its ideographs, but they are not as efficient and easy to use as an alphabet.

John Man proposes three laws for the origin and development of writing:

- 1) In a writing system, complexity knows no bounds and imposes none.
- 2) A writing system will last as long as its culture, unless changed by force.
- 3) New writing systems emerge only in new, young, ambitious cultures.

Why was the alphabet so successful? John Man borrows the concept of the selfish gene from Richard Dawkins, and proposes that alphabets are memes, self-propagating ideas that overwhelm less virulent forms of writing. They spread like a virus from ancient Egypt, mutating from modified hieroglyphics and adopted by marginal societies that found them superior and with less

cultural baggage than established systems.

From Egypt, the idea of the alphabet went to Phoenicia, then to Greece. It was a bottom-up revolution, as the utility of an alphabet was best appreciated by shopkeepers, ship owners, and front-line bureaucrats. The upper echelons, who did not have to deal with the details, saw no need of it, as they were not the ones who actually had to keep track of sheep sales or how many amphorae of wine were to go to Tyre.

For the Greeks, the killer app was Homer. Much has been made of the fact that ancient poets memorized huge epics, but they did so from necessity. There is no doubt that Homer would be forgotten today had his works not been transcribed into a Greek alphabet. (Incidentally, John Man disposes of the myth of the blind bard; there is no solid evidence that Homer was blind.) The new generations saw no need to memorize if pieces of papyrus could save them the trouble. Better yet, an alphabet allows transmission of knowledge to future generations as yet unborn without the need for a teacher to drill a student by rote.

Sidestepping Biological Evolution.

Humans evolved another significant trait, that of extended life spans. There was an increase in the number of long-lived humans by the Paleolithic era [50], and again in the 1900s. For comparison, only a few other large animals can live as long or

longer than humans. Animals associated with humans, such as dogs, cats, horses, hogs, and cattle, are considered old by their 20s. Extended life span allows better learning and more experience in what works and what doesn't. This is partly genetic and partly cultural.

Cultural evolution allows sidestepping biological evolution and advancing in non-genetic ways. Culture provides the ability to share knowledge and inventions that are not dependent on genetic mutation [52]. Some animals tend gardens, such as ants, but they do not exchange seeds with neighbouring colonies or mail them across a continent to Aunt Susan for her garden. Only humans developed that idea through cultural transmission.

The greatest change in human evolution was the development of culture that could be transmitted through time and space, and which involved educating the young beyond simply learning how to pounce on prey and render it with bloody tooth and claw. Culture is an educational system for peers and offspring that can be inherited not through genes but through memory. Humans can teach their young not only by example or language but by approval or disapproval [51].

Homo sapiens has been the only humanoid species for the last 25,000 years. Multiple species of hominids have co-existed since the genus *Homo* originated 2,500,000 years ago. 100,000 years

ago, the behaviour of *H. sapiens* and *H. neanderthalensis* was apparently the same. By 40,000 years ago, *H. sapiens* had developed cave paintings and grave goods, and by 30,000 years ago, *H. neanderthalensis* was extinct. Development of language by *H. sapiens* is believed to be one cause, as this gave it a large advantage over *H. neanderthalensis* [16]. Another advantage is that humans developed trade, which allowed specialization and more efficiency [63]. Neanderthals did not; they may have had some physical capabilities but could not overcome their environment with economic institutions as did humans.

[to be continued]

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ROADSIDE MEMORIALS OF ALBERTA: PART 2

by Dale Speirs

(Part 1 appeared in issue #71.5 in 2012.)

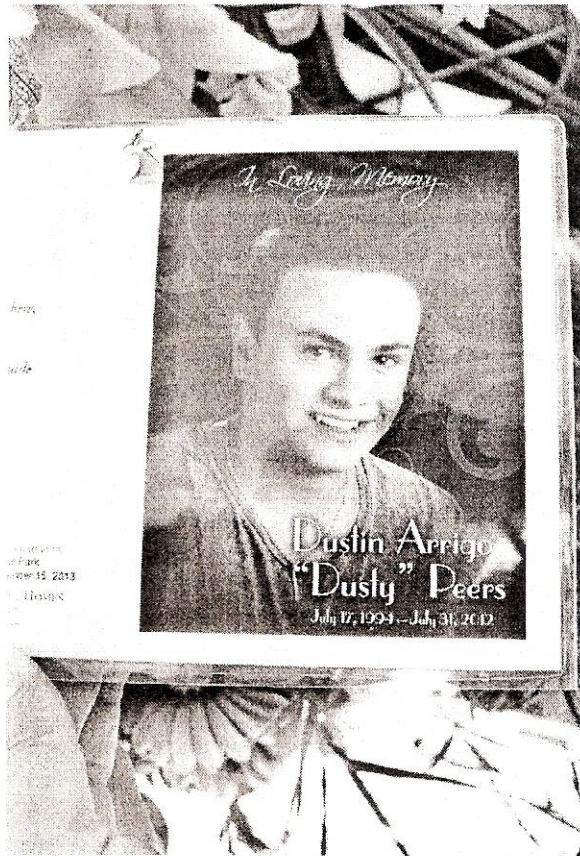
July 31, 2012, on Highway 8, inside Calgary limits but still rural. A young man who had just turned 18, just graduated from high school, and was only a short distance from home. Dustin Peers was texting while driving. He looked down at his smartphone for a few seconds, which at highway speeds was time enough for his car to drift across the centre line and hit an oncoming semi-trailer



head on. He was pronounced dead at the scene. You are never more than one breath away from the grave. Police said it was the first definitely proven death in Alberta due to distracted driving while texting.

While I photographed the flower-laden roadside cross, a car pulled over onto the shoulder of the highway. A distraught woman got out and came over to me. "Are you Dustin's father?" she asked, in an emotional voice. I replied no, I was just photographing the cross. "Why?", she asked. It was a moment I had been expecting for years. I have photographed roadside memorials for more than a decade, and have several hundred pdf files, indexed by locality and where possible with copies of news reports about the death. My idea is that someday I will publish them in an ebook as a free pdf, for the historical record. Most such memorials seldom last two years. Eventually the family quits coming by on the death anniversary or birthday, the memorial becomes neglected, and Roads Dept. workers remove the remains. I always knew that someday I would be photographing a memorial when a family member came by and saw me.

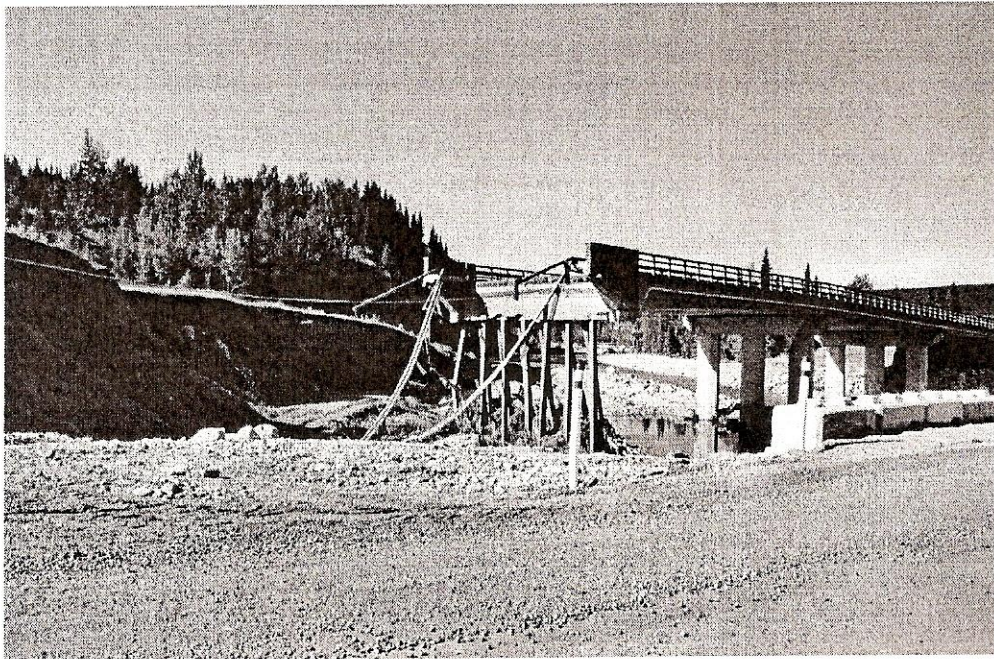
I talked with the lady. She said her son had been killed two days later just down the highway in a separate accident (no roadside cross for him). She wanted to talk to Dustin's family but they never returned her calls. I tried to calm her as we stood there on the shoulder. Her eyes were fogged with tears as we parted.



THE GREAT FLOOD OF 2013: MORE PHOTOS

by Dale Speirs

As I travel around southwestern Alberta, the proof that the great flood of June 21 was far out of the ordinary becomes increasingly evident. I took a trip into the eastern Kananaskis mountains, a half-hour's drive from Calgary.



Highway 66 is open again after a fashion. Its bridge over the Elbow River, a tall massive concrete structure, was battered by countless spruce trees washed downstream until one set of pillars gave way and the bridge collapsed. A temporary one-lane Bailey bridge has been put into place, from which I photographed the damaged structure, now propped up by I-beams. -6-

Just upstream of the bridge is the junction of the Elbow River and its tributary the Little Elbow River. On the banks of the latter was a small unpretentious lake called Allen Bill Pond. It was popular with families as a picnic site because it was a safe place for children to splash around in the shallow water while Dad did some trout fishing on the river and Mom sunbathed on the banks of the pond.

The Little Elbow River got tired of detouring around the pond, and during the great flood destroyed it completely. A couple short fragments of a pathway remain but where the pond once was is the new permanent course of the river. If you had never been there before, you would never have known there once was a pond.

On another day,
I went to the
Kananaskis
River valley on
the other side of
the mountain
range.

Evan-Thomas
Creek flows out
of the mountains
into the river. It
used to go under
this pedestrian
bridge. In the
flood, it not only
doubled its
width, it carved
a new course,
leaving the
bridge high and
dry over gravel
and tree stumps.

TO GREATNESS HE WAS BORN

by Dale Speirs

Ted Cruz is a Republican senator from Texas about whom few Americans had heard of, and no Canadians. He apparently has presidential aspirations. In mid-August 2013, he created a stir by announcing that he was going to repudiate his Canadian citizenship, having been born in 1970 in Calgary of an American mother and Cuban father. He will henceforth rely on his American citizenship gained from his mother so that he can be considered a "natural-born American" and thus be eligible for the Presidency. This has stirred up the birthers in the USA, although if Cruz fails to make it past the early primaries, they will turn their attention elsewhere. There are no birthers in Canada since naturalized immigrants can be elected to the House of Commons. Canada's first Prime Minister was an alcoholic Glaswegian. But the Americans like to create artificial crises such as debt ceilings (which other nations don't have; they just keep spending) and the fuss over the definition of "natural-born".

The fact that Rafael Edward (Ted) Cruz is a Cowtownner caused a sensation here in Calgary. His father Rafael Bienvinido Cruz was a geophysicist working in Calgary's petroleum industry, operating a seismic data company, but he is nowadays a pastor in Dallas. His mother is Eleanor Elizabeth Wilson, of the Delaware Wilsons. Ted arrived in our fair city on 1970-12-22 just in time for

Christmas. The family returned to the USA when he was four, where he has resided ever since.

-8-

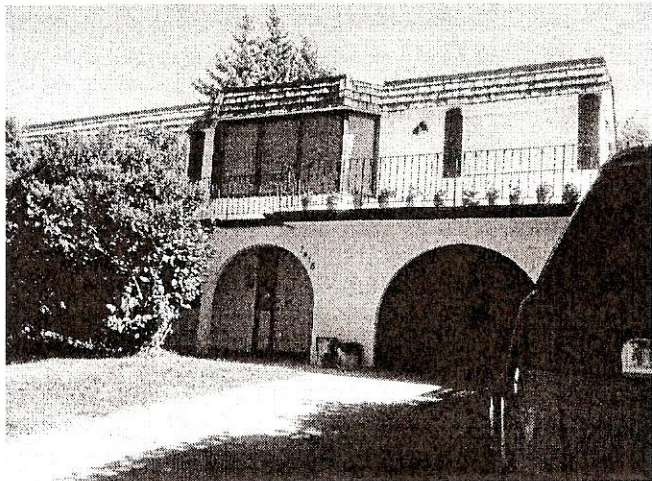
Now it happens that I am a very experienced historical researcher, currently working on the postal history of Alberta. Since there couldn't have been many Rafael B. Cruzs in Calgary in 1970, it was an easy matter to visit the Central Branch of the Calgary Public Library, and consult the Henderson Directories they have in their Local History Room. Well actually not that easy. The Central Branch was hit by the Great Flood of June 21 and didn't re-open until September 3 after millions of dollars of repairs. Fortunately the Local History Room is on the fourth floor. And bingo!, there was indeed a Cruz (the only one) listed.

ted Steel Co h231 56th av NE
Cuthbert Murray DND r1910 25A st SW
Cruz Rafael B h1416 29th st NW
Cry Peter (Doreen) locksmith Head's
Lock & Key Wks r4215 18th st SW
Cryderman John N (Phyllis) geol Imperial
Oil Ltd h22 Varwood pl NW
" Jone B tchr Wm Aberhart High Sch



The street address was 1416 - 29 Street NW, in the St. Andrew's Heights neighbourhood. I was very surprised because I've been

past that address hundreds of times. The house is directly across from the Foothills General Hospital, and 29 Street NW is today a major connector road between the Trans-Canada Highway and Memorial Drive. Back in 1970, Calgary was less than half the size it is now, so St. Andrew's Heights was a middle-distant suburb, not on the city limits but neither was it the high-priced inner-city neighbourhood it is today. If Ted Cruz makes it into the White House, I can thus lay a tiny and insignificant claim to having been past his birthplace many times. I went by and took a picture of the house, a bland two-story hacienda style.



Chester Arthur was the only American President so far who was Canadian by birth, from Québec. Ted Cruz will have to formally renounce his Canadian citizenship since it is a birthright and remains with him unless he does something about it. Here in Calgary, we're all cheering for him regardless to win the Presidency. After all, the Prime Minister of Canada and the Premier of Alberta are both Calgarians, so if we can take Washington, D.C., it will be a perfect hat trick.

WHAT IS FAPA?

I circulate OPUNTIA through a science fiction apa called Fantasy Amateur Press Association (FAPA). For those of you receiving this issue who do not know what an apa is, please read on.

Modern zine publishing as we know it today began in the middle 1800s as cheap, home-use printing presses became available to the general public. Zinesters developed a distro method called the amateur press association (apa) where members sent x number of copies of their zine to a central mailer (also known as the official editor). The zines are collated into bundles, and each member gets back one bundle of everyone's zines. There is an annual fee to cover postage, but this works out cheaper than mailing individual copies.

Apas have a minimum level of activity required, such as publishing 8 pages a year. It must be emphasized that apas are not for passive subscribers; you must commit to the minimum activity level or you will be booted out.

The oldest apa is the National A.P.A., founded 1876. FAPA was founded in 1937. Details from Robert Lichtman, 11037 Broadway Terrace, Oakland, California 94611-1948. In addition to articles, there will be mailing comments on other apazines in the last FAPA bundle. I quote the remark I am commenting on or otherwise make the context clear, so hopefully an outsider can still read the comments with interest.

COMMENTS ON FAPA #304

FAPA bundle #304 received in Calgary on September 4. The Clear-Cut Award for the most zine pages in the bundle goes to John Coker with 33 pages.

Number One #20 *“Rock and Roll music came out in the 1950s and has since evolved to the point that I’m not sure what the actual definition is any more.”* Besides the obvious comparison to SF, which underwent the same evolution, it applies to many other hobbies. I am quite active in organized philately, which from the 1850s until the post-WW2 era was only about traditional stamp collecting where philatelists collected stamps of a country

or countries and stuck them in albums.

Then postal history bloomed, the study of how the mails actually operated, illustrated by covers (envelope plus stamp plus postmark). In the late 1950s, topical collecting became popular because there were enough stamps that one could collect cats on stamps, flowers on stamps, etcetera. Now there are hundreds of philatelic specialist societies and study groups.

The Devil’s Work #163 Re: the question of what apas sprang from sports pulps. That I don’t know, but there are/were some sports apas. Mark Strickert has mentioned baseball apas in some of his zines.

Stories From The First Fandom Archives #2 I enjoyed the collection of reminiscences by people who were there in fandom in the 1930s. I will file this separately in the historical section of my bookshelves with the previous issue.

Snickersnee No need to be defensive about using a computer for decades instead of upgrading every few years. I prepare OPUNTIA on a 1998 Toshiba Satellite laptop running WordPerfect on Windows 95.

Entropy Blues #6 Putting old zines on Websites so that others can see them is commendable. I don’t know how many will be

converted to the cause. Philatelic societies have been doing this for year but no trend is visible. Free back issues of the CANADIAN PHILATELIST are available at www.rpsc.org and BNA TOPICS at www.bnaps.org. Browse them online or download the pdfs. Let me know if they convinced you to become serious about stamp collecting. No one in my family is interested in zines, so I've scanned all the back issues of OPUNTIA and NOPALEA, and will eventually put them online somewhere.

For non-FAPA readers, Graeme Cameron's archive of Canadian zines is www.cdnsfzinearchive.org. There is, of course, the international zine archive at www.efanzines.com

"... the source of "the flood" in assorted religious literature." Since every human society depends on water, and all rivers and lakes overflow from time to time, I don't believe that there is one single source for flood legends. Noah's Flood was probably based on either the flooding of the Arabian Gulf at the end of the Ice Ages, or the flooding of the Black Sea. Underwater archaeologists report hundreds of settlements along coastlines that were immersed when sea levels rose after the continental ice sheets melted. The Great Flood of 2013 in southwestern Alberta will increase in severity in the retelling by those who are now young couples but fifty years from now will tell their grandchildren about the time when all the skyscrapers of Calgary were completely underwater and 100,000 citizens drowned. (Lest

someone reading this years from now misinterprets me, the actual Great Flood just swamped the ground floors and only five people died.)

Edgar's Journal #12 A useful reference as always. The fact that Edgar Allan Poe moved around so much should encourage the tourist industry around him since so many places can claim him as one of their own, even if he only ever stayed the night while en route elsewhere. It is like the old Scottish joke "Samuel Johnson slept here." What impressed me about your list of Poe's residences is that he seldom spent more than two or three years in any city before moving on. I didn't realize how peripatetic he was until I read the list. One question about the list: You write that he lived in Irvine, Scotland, but on the map of his residences you place Irvine in the Irish Republic.

Nice Distinctions #24 Re: your local newspaper being unable to handle personal names that had a space in them. Canada Post does not allow apostrophes in post office names, but was forced to allow exclamation marks in the case of Saint Louis du Ha! Ha!, Québec, which as far as I know is the only town name anywhere where the exclamation marks are legally part of the name. The problem I have is people who think the possessive of Speirs is "Speir's", rather than "Speirs's".

LETTERS TO THE EDITOR

[Editor's remarks in square brackets]

FROM: Joseph Nicholas
15 Jansons Road
Tottenham, London N15 4JU, England

2013-07-21

You don't say how much of Alberta was officially declared a disaster zone but perhaps it didn't need to be. Perhaps the province is wealthy enough to fund its own clean-up without needing to access federal funds?

[We're not that rich. Both the province and the federal government will be providing financial assistance to municipalities. For those with a map at hand, the flooded area was southwestern Alberta between Highway 2 and the British Columbia border, from the Trans-Canada Highway to Highway 3 down in the Crowsnest Pass. There were a few flooded outliers on the Bow River, such as the Siksika tribal Reserve far east downstream of Calgary. The flooded area was about 150 km north-south and about 60 km east-west in size. Average river height during the flood in southwestern Alberta was five metres above normal level, in a land where most riverbanks are only one or two metres high. I've since done some driving around the foothills and was astonished at how high and how wide the flooded streams were. The city of High River looked like a war

zone. Two months after the flood, there were still large sections of High River that had standing water because the city is below the level of the river. Calgary floodwaters quickly drained naturally but High River has to be pumped out. Paved rural highways everywhere have gravel patches temporarily filling washouts. Many streams changed their courses permanently, eroding in one day a deep new channel across fields or suburbs.]

-12-

I noticed your reference to "first responders" and wondered again at the provenance of this term. It seems to have become common currency in North America for what used to be called the emergency services, and still are here in the United Kingdom, although the term is also cropping up here from time to time. It seems somewhat oxymoronic. What would be the point of second responders? What could they achieve showing up after the incident? Unless, perhaps, there really are second responders, whose principal job is to clear up the mess after the first responders have put out the fires, removed the dead and injured, established cordons around the site, and the like. I've never heard the term "second responders", so can't see why or how the clear, common-sense "emergency services" is no longer deemed sufficient.

[I've never heard that term either, but I was one of them myself during my last decade with the Calgary Parks Dept. as Trouble

Calls Supervisor. Emergency services is an encompassing term for both those immediately on the scene (police, fire, ambulance) and those who clean up afterwards (tow truck drivers, fallen tree removals, demolition and renovation contractors). A typical second-response call I received hundreds of times during my career would come in on Sunday mornings after the police had dealt with a drunk driver who went off the road and slammed into a tree. I would get there after the driver was taken off to jail, hospital, or morgue (as the case may have been), and the tow truck driver took away what was left of the car. I would then chainsaw the tree into logs and brush and haul it away.]

FROM: Lloyd Penney
1706 - 24 Eva Road
Etobicoke, Ontario M9C 2B2

2013-08-04

[A few weeks after the great flood in Alberta, Metro Toronto got whacked, as Lloyd explains.] Our flooding came from a line of thunderstorms that flooded thousands of basements, covered many roads, snarled traffic for hours, and cut the power off for many, including us. We lost power for 36 hours, which meant no water, for in our apartment building we have electric pumps to push the water up so high. We were lucky in that we lost just a few things in the freezer but it was estimated that over \$100 million in possessions were lost, probably two or three times that to repair

everything, and a few houses will have to be torn down. Just a taste of what Calgary had to deal with, but it didn't make it any easier.

[On August 20, Alberta Premier Alison Redford announced that southwestern Alberta's total damage to public infrastructure and responder assistance overtime will cost the province \$5 billion. Water damage by overland drainage is not covered by insurance companies in Canada, so property owners will bear the largest part of costs, at least \$2 billion. It is estimated that Canada will take a 1% hit to its economy this year because of the flood in Alberta, not just because of the damage but also because of lost economic activity.]

Our own World Wide Party on June 21st wasn't much of a party, but we did what we usually seem to do, pause in our busy schedule to relax and toast the fanzinish sliver of what passes for fandom these days. We toasted all, but were mostly glued to the television to see CBC's coverage of this disaster.

Mayor Naheed Nenshi was indeed the man of the hour. He was the face of Calgary recovering and was the man in charge; still is. He could probably be mayor for the rest of his life. Meanwhile, with our own flooding, Mayor Rob Ford was too busy fighting against the will of other councillors to get his way on transit concerns.

Some made the mention that he didn't seem to care, and I think that's quite true.

[In Calgary, good mayors usually hold office for three terms before stepping down. Even before the flood, Nenshi was widely expected to be re-elected in the municipal elections this coming October 21st. As far as I know, Calgary is the only large North American city with a Muslim mayor, which certainly annoyed the chattering classes in Toronto when, at about the same time Nenshi was first elected here, Rob Ford, the epitome of rednecks, was elected there. There is a joke that the two cities elected each other's mayor.]

It seems that every city now has their own Comic Con. Besides the huge Fan Expo in Toronto, I could go to the Ottawa Comic Con, Montréal Comic Con, Oshawa Comic Con, and Niagara Falls Comic Con. I could, but I don't. We'd be probably at least 15 to 20 years older than anyone else there, and these events simply don't cater to any of our current interests. Recently found out on Facebook there is a Dragon*Con Over 40 group.

[What I like about the Comic Cons is that they bleed off the costumers and media fans and let us who read books enjoy quieter, smaller, and friendlier conventions. Even if I was interested, I would hesitate to go to a Comic Con lest someone think I was a dirty old man ogling all those Sailor Moon girls.]

FROM: Murray Moore

2013-08-10

-14-

1065 Henley Road

Mississauga, Ontario L4Y 1C8

The equivalent of Albertan cosplay during the Stampede would be on Simcoe Day weekend with Ontarians dressing as farmers and British soldiers.

Fantasy Amateur Press Association is attracting members, a conclusion I reach by reading your response to two FAPAZines each numbered #1.

[I don't think the Papernet is going to become totally extinct. Those who publish "questionable" zines in the eyes of authorities or potential employers are a lot safer on the Papernet, where the boss or police inspector has to know that your zine exists in the first place and then do a physical intercept. Those who publish ezines or blogs can be found by a Google search even if the searcher didn't know you published it. Never mind the police; it is now standard practice for employers to do a search on your name as part of screening candidates for a job. If your zine covers radical politics, gay/lesbian issues, or anything else deemed unrespectable, you would be quietly dropped from the first screen of candidates. Not only would you not make the short list, you would never know why.]

FROM: Ned Brooks
4817 Dean Lane
Lilburn, Georgia 30047

2013-08-08

I'm surprised you could only find two typewriter stories, but my memory only retrieves John Kendrick Bangs' novel THE ENCHANTED TYPEWRITER and a recent movie RUBY SPARKS, where the protagonist falls in love with a girl created by him typing a story about her in his typewriter. This was an original screenplay by Zoe Kazan.

[I'm waiting for someone to do an anthology of typewriter stories. There seem to be anthologies for everything else, from NASCAR romances to Old West steampunk.]

I Also Heard From: John Held Jr, Loran Frazier, Stuart Stratu, Theo Nelson

SEEN IN THE LITERATURE

Schwartzman, D., and G. Middendorf (2011) **Multiple paths to encephalization and technical civilizations.** ORIGINS OF LIFE AND EVOLUTION OF BIOSPHERES 41:581–585

"We propose consideration of at least two possible evolutionary paths for the emergence of intelligent life with the potential for technical civilization. The first is the path via encephalization of homeothermic animals; the second is the path to swarm intelligence of so-called superorganisms, in particular the social insects. The path to each appears to be facilitated by environmental change: homeothermic animals by decreased climatic temperature and for swarm intelligence by increased oxygen levels. ... The long-term cooling history of the Earth's biosphere correlates with the timing of major events in biotic evolution, e.g., the emergence of phototrophs, eucaryotes and Metazoa apparently occurred when temperatures reached their maximum tolerable values for these organisms, i.e., 70°C (3.5 gigayears ago), 60°C (2.8 gigayears ago) and 50°C (1–1.5 gigayears ago) respectively. ... Given an upper temperature limit for vertebrate growth, indeed homeothermic animals, is about 10°C below the limit for Metazoa, the surface temperature history of the biosphere suggests an even narrower window exists for maximum encephalization, roughly 500 million years ago through the present when climatic cooling became sufficient to allow additional and efficient heat loss from the large energy-intensive brain resulting from the burst in encephalization. During this period, encephalization is observed in hominid evolution, as well as for other groups of homeothermic animals including birds and toothed whales in the Cenozoic, and perhaps even for the mammal-like "reptiles" in the Permo-Carboniferous. ...

We suggest that fire and cooking combined with climate to release brain size constraints. If climatic cooling was indeed a releaser for bigger brains, it may well have had a synergistic effect, i.e., colder nights would have favored more fire use with greater opportunities for cooking, thereby providing more easily digestible food. This may have then freed energy for the brain, allowed for a reduction in jaw size and concomitant increase in other areas of the skull. The critical overheating challenge for bigger brains came during periods of diurnal activity, especially during the heat of the day if our ancestors were so compelled to obtain food then. So with onset of a glacial epoch or migration to higher elevations colder nights should have required fires to keep warm, while temperatures during activity were low enough for bigger brains to emerge, even with some pre-adaptations for cooling such as sweating and the cranial radiator, both plausibly present in the proximate ancestor to Homo. ... Insect physiology entails the diffusion of oxygen through their tracheal system, thus gigantism, especially for flying insects, imposes an oxygen demand likely only satisfied by higher ambient levels. While bigger insect brains are likely correlated with bigger bodies in general, it is recognized that mushroom bodies in the insect brain (there are two in each brain) function as the higher processing centers, particularly for those insects with generalist feeding habits. Remarkable structural, functional and developmental convergence between insect mushroom bodies and the higher brain centers of vertebrates is noted. In the Carboniferous the

evolutionary radiation of diverse orders of insects including the common ancestor of modern cockroaches and termites resulted in the emergence of diverse mushroom body structures, the necessary condition for the evolution of social insects. Was the Carboniferous rise of atmospheric oxygen a trigger for these evolutionary developments, along with insect gigantism? Thus, an outstanding question is whether there is an atmospheric oxygen level for insect encephalization that is analogous to the climatic temperature constraint for warm-blooded animals? Did the insect giants of the Carboniferous show a burst of encephalization analogous to that of homeothermic animals?"

Speirs: So the questions are: Were humans ready to develop civilizations at the end of the Ice Ages anyway, or did the Ice Ages make us what we are today? If we plant too many trees to prevent global warming, will the excess oxygen produce giant dragonflies that can think? Here are some interesting speculations for alternative histories.

Not connected with this paper, but I'm still waiting for those giant ants and Godzillas to show up from Chernobyl and Fukushima. Surely at least one Japanese man must have been bitten by a radioactive spider. Why haven't any of the reactor technicians trying to contain the radiation turned into superheroes or supervillains? Was Hollywood wrong?