OPUNTIA

58.3

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Whole-numbered OPUNTIAs are sercon, x.1 issues are reviewzines, x.2 issues are indexes, x.3 issues are apazines, and x.5 issues are perzines.

Although the USA and many other countries have issued stamps and postmarks depicting opuntias, Canada Post has resisted the temptation until now. Empress, Alberta, is a village in the semi-arid quarter of southeastern Alberta. It recently began using a pictorial postmark that shows an opuntia, albeit with the wrong growth habit. (The two Alberta species of *Opuntia* are creeping plants, not shrubs.) The design also includes what appear to be dryland wheat fields, and a vertical rectangle which surely could not be the monolith from 2001: A SPACE ODYSSEY and therefore must be an old-style grain elevator.

WHAT IS FAPA?

This issue is for the Fantasy Amateur Press Association. (Details from Robert Lichtman, 11037 Broadway Terrace, Oakland, California 994611-1948) 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. 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. FAPA has been going for more than 65 years; the oldest apa is the National A.P.A., founded 1876.

x.3 OPUNTIAs are for FAPA. In addition to articles, there will be mailing comments on other apazines in the last FAPA bundle. I usually quote the remark I am commenting on, so hopefully an outsider can still read the comments with interest.

I HEARD FROM: Henry Welch, Ned Brooks, Chester Cuthbert, Ficus, Kris Mininger, Sheryl Birkhead, Terry Jeeves, Murray Moore

FAPA CLEARCUT AWARD (for most pages published in a mailing) goes to Robert Sabella for 52 pages in FAPA #272.

MAILING COMMENTS ON FAPA #272

FAPA #272 received in Calgary on August 30, 2005.

Picayune Re: the play-writing workshop you attended. This seems much like most writers' workshops I have heard of, except that it is more difficult to get a play performed than a short story published. Isaac Asimov once wrote how he was shocked when a musician told him that she had written a symphony but had never heard it. Asimov said he then truly appreciated being a writer, who could at least read his story as it came out of the typewriter. Too many people stay in workshops as an addiction or social activity.

As far as getting a play produced professionally, it would seem that the best route is to build up a reputation locally with small groups. It seems to me that with modern technology it should be

easier than ever to do radio plays; just record to CDs or podcast, and distribute to build up a reputation. Everybody keeps telling me that the Internet is so much cheaper and more efficient than the Papernet, yet few people can make a profit on-line. Amazon has never made a profit except by burning capital and using creative accounting.

Many zinesters have used their Papernet publications as an entry into professional journalism or editing. The difficulty in this comparison is that the cacophony of the Internet is so loud, and everyone is doing the same thing, so how do you get yourself noticed? Blogs are the latest illustration of Andy Warhol's remark that in the future, everyone will be famous for fifteen minutes. Selling CDs of one's plays via Amazon may not make you wealthy but it can get you on the "long tail" of Internet selling, where word-of-mouth spreads much faster and farther than ever before.

Comments Commence "*Do fanzines for other fields stray as far away from the main line (stamps, etc) as far as SF zines do? I mean, you can read dozens of SF fanzines without ever having SF come up in the entire issue!*" Philately doesn't have fanzines, but does have lots of clubzines, whose executives ensure the editor stays on track. From the SF zines I get, it seems that the personally published zines wander off topic, while the clubzines are more rigourous. If you publish your own issue at your own expense, you can wander, but not if others are paying for it. As the Scottish saying goes, "He who pays the piper calls the tune."

"*At my office, everyone was using Microsoft Word, and couldn't understand why I was so out of it. I just explained that WordPerfect did what I wanted to do easier and faster. Might just have been because I was used to it.*" I use MS Word at work and WordPerfect on my own computer, and it is not a matter of being used to one or the other. WordPerfect is in fact easier and more logical to use.

Alphabet Soup "*I've seen SCIENCE FICTION STUDIES mentioned but only rarely. ... By your description, it sounds like it would appeal to an academic audience.*" It is an academic periodical. The University of Calgary Library takes it, so I skim the table of contents for the occasional article of interest. Most are written in the turgid prose favoured by English literature academics. My favourite article was the one published several years ago in which a Canadian author's novel was analyzed by an American graduate student. She discussed the derivation of place names in the story at great length and surmised how they were derived from mythology of foreign lands. In the next issue was a letter of comment pointing out that those place names were all Canadian towns such as Deseronto, Mimico, and Hull. Laugh, I thought I'd die, but the sad part of it is the graduate student had her paper accepted for an M.A.

Someday a Canadian will write a major fiction novel invoking the name of Louis Riel, and an Ivy League graduate student with a triple-barreled name will do her thesis on it under the impression that Riel is a fictional character intended to be an analogue of Robert E. Lee (or Oliver Cromwell if she is an Englishwoman).

"*Fans don't feud or fuss nearly as much as they once did.*" They still do, but now they do it on-line. This saves the Papernet from being cluttered up by ephemeral verbiage.

Lofgeornost "*But too much of science fiction scholarship, like so much of humanities scholarship in general, seems to be a trivial pursuit of insignificant insights into texts that can't bear the freight of them.*" Too true. This results from the Shakespeare's laundry list syndrome. Since there is nothing new that can be said about Shakespeare, literary graduate students have to plough their own fields, however barren any crop. That is not to say SF shouldn't be taught, only that it shouldn't be analyzed by graduate students who don't know who Louis Riel was.

Visions Of Paradise Re: Margaret Atwood's about-face on SF. She originally started out in the 1960s as the rebellious young leader of what is now known as Canlitcrit, a nationalist movement that wanted to define and then write Canadian fiction. Over the years she has since fossilized into a grande dame who hands down judgements on literature with the solemnity of the Court of Queen's Bench. Her most famous remark is that her dystopian novels are not SF since they don't involve giant squids in space. She, and her fellow snobs, were, of course, judging the best of mainstream literature against the worst of SF, a time-honoured practice that long preceded her. Now she seems to shyly admitting that perhaps that giant squid stuff does have some merit.

Re: your serving on a civil tort jury and having to explain to jury members what should have been obvious. The humourist H. Allen Smith was also a newspaperman in his day job and handled the police/court beat. He watched numerous jury trials. Smith later wrote that the one thing that kept him as an honest man was the thought of having his fate decided by a jury of twelve people of average intelligence.

Re: your mother having swollen ankles and refusing to see a doctor. This is a symptom of congestive heart disease; my mother died of it and swollen ankles were the first sign. Reflexology is quackery; your mother should have an echocardiogram (ultrasound heart examination).

"*Assuming Jack Williamson does die eventually* ... " Like they keep telling us at safety courses, never assume anything.

For FAPA Re: your building furniture for your computer systems. When I bought my laptop in 1998 (I have never owned a desktop computer), I ended up spending more money on new furniture than the computer and peripherals.

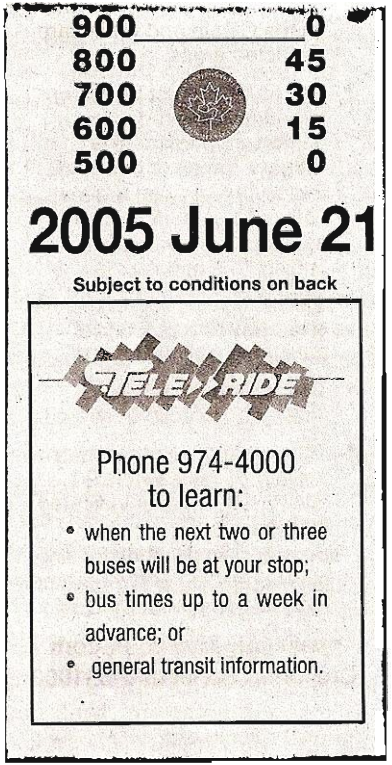
Arimoniiti Your history of SF fandom in Suomi was quite interesting. Being a great admirer of the Strugatski brothers, I was delighted to read about Finnish fans having a gathering called Roadside Picnic.

All other zines Read but no comments.

WORLD WIDE PARTY #12 2005-06-21

The World Wide Party was invented by Benoit Gerard (Québec City), who proposed that at 21h00 local time on June 21st that zine fans should toast each other in the spirit of friendship. The idea is to get a wave circling the world of zinesters celebrating their common connection.

And so I did, at 21h00 Mountain Daylight Time. First, I faced to the east and toasted (with Mountain Dew; I ran out of Coca-Cola) those who had already celebrated. Then I faced south, then north, to toast those in my time zone. Finally I turned to the west and raised my glass to those yet to celebrate. Here's to the Papernet!



A BAD DAY IN NEW YORK CITY HARBOUR: FEBRUARY 29, 1896

by Dale Speirs

Introduction.

It wasn't only just a Leap Day on February 29, 1896. It was a day that New York City port authorities and captains alike wished they had called in sick. A half dozen ships collided or ran aground in thick fog, and the maritime mail section of the Post Office was kept busy. The collisions that took place were as follow [1].

The liner New York ran on shore despite the presence of a pilot on board. As this news reached the harbour, another wreck was happening. The liner La Bourgogne, travelling too fast for conditions, ran down the Ailsa, which had been moored because of the fog. The Ailsa got up speed in an effort to beach itself before sinking, but couldn't make it in time. It sank and the crew and passengers had to take to the rigging to survive [2]. One interesting aspect of the wreck of the Ailsa was that the Postmaster-General of Jamaica, George H. Pearce, was on board.

The liner Guyandotte then collided amidship with the George W. Clyde. The Clyde managed to beach itself before sinking. Finally, the ferryboat Arizona hit the tugboat E.S. Atwood, stripping off its railing in the impact.

The Ailsa was commissioned by the Atlas Line and purpose-built for the West Indies trade. Its capacity was 60 passengers plus freight. The ship was built in Glasgow, Scotland, in 1878 and sailed to New York City for its final fittings [3].

The Ailsa sank while carrying five bags of letters and nine bags of newspapers bound for Fortune Island, Jamaica, and Costa Rica. The tugboat that rescued the passengers was able to sail over the wreck and in between the rigging. Printed labels were used in Jamaica on wreck mail that arrived there, signed by Pearce himself.

After sinking the Ailsa, the La Bourgogne delayed its departure overseas and transferred its 181 bags of mail to the Campanula [4]. It received only minor damage, and mail so transferred was not marked.

So many wrecks were spotted about New York City waters that the harbour was effectively blocked. When the passages were opened again a few days after the disaster, there were 32 steamships and an uncounted number of sailing ships in the lineup to head out to sea. Without doubt, many of these ships were carrying mail but it seems unlikely that any delay markings would have been applied.

Large crowds of sightseers turned out to view the wrecks. Extra trolley cars were put on by the transit authority. Every waterman with a rowboat quickly doubled his prices and began taking rubberneckers out to the ships. A tugboat had to be stationed to warn away souvenir hunters trying to board the wreck of the Ailsa [4].

One If By Land, ...

In summing up the whole fiasco, in the editorial section of the NEW YORK TIMES of the day after Leap Day, the editor wrote a commentary [5] that was brief enough for me to quote it here in its entirety:

"*Steamers and sailing vessels are running ashore in this neighbourhood with a frequency that is almost ludicrous. A lot of Captains seem to have tired of the all-water routes. At any rate, they are making big dents in our coast line, as if they thought coast lines didn't cost anything. It's about time these attempts to rival the overland transportation companies came to an end. Every one of them has failed so far, and these too ambitious nautical persons might as well confess now as later that even the most modern and improved specimens of marine architecture aren't so good, all things considered, as a plain, ordinary wheelbarrow when it comes to getting about on dry land.*"

References.

1] Anonymous (1896-03-01) Four steamships in collision, one aground. NEW YORK TIMES, pages 1 and 2

2] Hoggarth, N., and R. Gwynn (2003) MARITIME DISASTER MAIL. Published by Stuart Rossiter Trust Fund, Bristol, England. Pages 86 to 87

3] Anonymous (1878-01-25) A new steamship in port. NEW YORK TIMES, page 8

4] Anonymous (1896-03-02) The New York floated. NEW YORK TIMES, pages 1 and 3

5] Anonymous (1896-03-01) [untitled editorial comment] NEW YORK TIMES, page 4

SEEN IN THE LITERATURE
noticed by Dale Speirs

Pross, A. (2005) **On the emergence of biological complexity: Life as a kinetic state of matter.** ORIGINS OF LIFE AND EVOLUTION OF BIOSPHERES 35:151-166

"*A kinetic model that attempts to clarify the nature of biological complexification is presented. Its essence: reactions of replicating systems and those of regular chemical*

systems follow different selection rules leading to different patterns of chemical behaviour. For regular chemical systems, selection is fundamentally thermodynamic, whereas for replicating chemical systems, selection is effectively kinetic. Building on an extension of the kinetic stability concept, it is shown that complex replicators tend to be kinetically more stable than simple ones ... The analysis suggest that living systems constitute a kinetic state of matter, as opposed to the traditional thermodynamic states that dominate the inanimate world, and reaffirms our view that life is a particular manifestation of replicative chemistry."

Speirs: Creationists (who now call their myths 'intelligent design' to make it seem scientific) often point out that evolution is a violation of entropy, one of the laws of thermodynamics. Since entropy only exists in a closed system with no energy input, which the Earth is decidedly not, this would otherwise be a violation of physical laws. The fallback position of the slightly more educated creationists is that evolution could not produce more complex organisms such as humans. However, as Pross points out in this paper, evolution is not driven by thermodynamics but by kinetics, which does allow more complex descendants.

Robinson, G.S., et al (2005) **Landscape palaeoecology and megafaunal extinction in southeastern New York State.** ECOLOGICAL MONOGRAPHS 75:295-315

"*Stratigraphic palynological analyses of four late Quaternary deposits comprise a landscape-level study of patterns and processes of megafaunal extinction in southeastern New York State. Distinctive spores of the dung fungus Sporormiella are used as a proxy for megafaunal biomass, and charcoal particle analysis as a proxy for fire history. A decline in spore values at all sites is closely followed by a stratigraphic charcoal rise. It is inferred that the regional collapse of a megaherbivory regime was followed by landscape transformation by humans. ... Rapid overkill on the part of humans initiated the extinction process. Landscape transformation and climate change then may have contributed to a cascade of effects that culminated in the demise of all the largest members of North America's mammal fauna.*"

Gutscher, M.A. (2005) **Destruction of Atlantis by a great earthquake and tsunami? A geological analysis of the Spartel Bank hypothesis.** GEOLOGY 33:685-688

"*Numerous geographical similarities exist between Plato's descriptions of Atlantis and a palaeoisland (Spartel) in the*

western Straits of Gibralter. The dialogues recount a catastrophic event that submerged the island ca. 11.6 ka in a single day and night, due to violent earthquakes and floods. This sudden destruction is consistent with a great earthquake (M>8.5) and tsunami, as in the Gulf of Cadiz region in 1755 when tsunami run-up heights reached 10 m. Great earthquakes (M 8-9) and tsunamis occur in the Gulf of Cadiz with a repeat time of 1.5-2 kiloyears, according to the sedimentary record. An unusually thick turbidite dated as ca. 12 ka may coincide with the destructive event in Plato's account. The detailed morphology of Spartel palaeoisland, as determined from recently acquired high-resolution bathymetric data, is reported here. The viability of human habitation on this palaeoisland ca. 11.6 ka is discussed on the basis of a new bathymetric map."

Speirs: If Spartel island did sink beneath the waves 11.6 kiloyears ago, and Plato wrote about it nine millennia later, this would indicate that human memory about specific events, in the form of legend, can persist at least nine thousand years.

Jurickova, L., and T. Kucera (2005) **Ruins of medieval castles as refuges for endangered species of molluscs.** JOURNAL OF MOLLUSCAN STUDIES 71:233-246

"*Molluscan communities were studied at 114 castles in the Czech Republic. Altogether 70% of the land fauna species of the Czech Republic were found at these sites. It was shown that castles act as islands (positive effect of castle size on species number) and that a high degree of castle disintegration negatively affected species diversity. Limestone as a rock substrate was found to be a very important factor, while the effect of calcium in tree litter was unimportant. Castles present a characteristic set of habitats markedly differing from the surrounding landscape. Thus, they represent significant refugees for many species, as indicated by the high species diversity and the presence of rare and geographically isolated species.*"

Kaplan, E.H., and M. Kress (2005) **Operational effectiveness of suicide bomber detector schemes: A best-case analysis.** PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 102:10399-10404

This study looked at explosive detection equipment designed to detect pedestrian suicide bombers. The authors then calculated the results of such equipment if it was cheap, reliable, and widely deployed. "*Even under such optimistic assumptions, we find that the widespread deployment of suicide bomber detectors will not reliably result in meaningful casualty reductions. Relaxing the best-case assumptions only make matters worse.*

Investment in intelligence gathering

to prevent suicide bombers before they attack seems a wiser strategy than relying on sensor-based suicide detector schemes."

Battaglini, M., et al (2005) **Self-control in peer groups.** JOURNAL OF ECONOMIC THEORY 123:105-134

"*Social influences on self-control underlie both self-help groups and peer interactions among youths. To understand these phenomena, we analyse how observing each other's behaviour affects individuals' ability to deal with their own impulses. These endogenous informational spillovers lead to either a unique "good news" equilibrium that ameliorates behaviour, a unique "bad news" equilibrium that worsens it, or to the co-existence of both. A welfare analysis shows that people will find social interactions valuable only when they have enough confidence in their own and others' ability to resist temptation. The ideal partner, however, is someone with a slightly worse self-control problem than one's own. This makes his successes more encouraging, and his failures less discouraging.*"

Speirs: I don't know why, but when I read this, I instantly thought of science fiction clubs and convention committees. This would also suggest by implication that Internet nerds who don't belong to SF clubs have less self-control.

Liben-Nowell, D., et al (2005)
Geographic routing in social networks.
PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES USA 102:11623-11628

This paper analyses the "small world" network, better known to most people as "six degrees of separation", in which any two randomly selected people can be linked by an average of six connections. For people with a large social network, about one-third of their friendships are independent of geography. I suspect this figure is much higher for mail artists and zinesters.

THE SCIENCE, ART, FRAUD, AND INCOMPETENCE OF PETROLEUM RESERVES

by Dale Speirs

Having recently inherited oil royalties from my mother's estate, the matter of how much petroleum the Earth has is no longer of academic interest for me but a personal interest. My home province of Alberta supplies the largest fraction of oil and natural gas to Canada and eastern USA. Our family royalties come from the homestead lands of my Koski great-grandparents, who came to Canada in 1903 from Finland. In those days, and up until World War One, the government sold land with the mineral rights

included, excepting only coal and precious metals. They didn't bother to keep petroleum rights because there was little demand for it. Nowadays, of course, that is where fortunes are made.

Oil seeps are common around the world, and have long been used as a supply of grease, waterproofing tar, and miscellaneous uses. The first oil well drilled in North America as a going commercial concern (as opposed to local use of seeps for greasing wagon wheels) was in southern Ontario in 1857. The discoverer, W.M. Williams, was drilling for water, and to his disgust, hit oil instead [1]. But he made a virtue of necessity and began commercial production of bitumen.

What, If Anything, Are Reserves?

Once petroleum (defined as crude oil, natural gas, shale oil, and tar sands) became important in the world's economy, people naturally wanted to know how much there was, who had it, and what remained. Almost instantly, everyone began to disagree on what the definition of a reserve was, a disagreement which continues to this day. This has fouled up both environmentalists and petro-executives alike, as statistics about petroleum reserves vary so wildly as to be open to any interpretation. Some see all the wells drying out within the decade, while others see centuries of supplies left. Who is correct? The answer is both and neither, a definite maybe. It also presents a classic problem in defining your definitions and agreeing on standardized terms before commencing an argument.

It is not entirely a matter of definitions, since companies cannot estimate the size of new discoveries until production has been going awhile. It must be remembered that we are discussing pools of oil and gas hidden far below the surface of the Earth. Estimating the size of those pools is like the five blind men trying to describe an elephant from feel.

After a century of the petroleum industry, only now are standardized terms being defined. Beginning in 2002, the Canadian government required all petroleum companies to define reserves as follow [2].
Proven reserve: Has 90% probability of producing or exceeding the amount stated.
Probable reserve: 50% probability of producing the amount stated.
Possible reserve: 10% probability of producing the amount stated.

Many nations deliberately understate petroleum reserves (to allow nationalization at cheaper prices or to deceive enemies), overstate them (OPEC countries, so they can cheat on quotas), or never change them much from year to year (bureaucratic inertia in many Third World countries). Generally the only reliable estimates of reserves are based on

actual sales, but this depends on how many wells are pumping, not what is actually in the ground. Lots of petroleum companies deliberately underestimate reserves for tax reasons (to avoid capital gains taxes) or competition (don't let the other producers know because they might start a takeover bid on the stock market). Others overestimate reserves to bolster their balance sheets and keep their stock price high. The Shell corporation had to fire its CEO in 2004 when he admitted that reserves had been overstated since 1997. After restating its balance sheet, Shell lost 25% of its reserves [11]. Saudi Arabia has grossly inflated its reserve estimates beyond any reasonable geological science.

Defining The Definitions.

Some important qualifications must be added. Reserves are defined on what can be extracted with current technology. Oil fields can be rejuvenated by steam injection (now common in Alberta's conventional oil fields) or by nitrogen gas pressurization (cutting edge technology). The reserves of a given field can suddenly increase after a long decline because new technology allows additional oil to be recovered. This is what happened to the Koski wells, which have been pumping for fifty years and bid fair to carry me into a long and secure retirement thanks to new technology.

Another problem is comparing apples and oranges, or rather oil, gas, and coal. Not only do different companies and nations use different units of measurements, but any given unit does not correspond exactly between types of petroleum, due to differences in density and energy content. In North America, all oil is standardized by comparing with West Texas Intermediate and adjusting the energy content of a particular oil in the statistics. I will try to standardize my statistics as below, based on the United Nations definitions used in its annual surveys of worldwide petroleum production [3].

1 metric tonne crude oil = 1,164 litres = 308 U.S. gallons = 7.32 barrels = 1.16 cubic metres

1 metric tonne bitumen (from tar sands) = 962 litres = 254 U.S. gallons = 6.05 barrels = 0.96 cubic metres

1 metric tonne natural gas = 1,590 litres = 420 U.S. gallons = 10.0 barrels = 1.59 cubic metres

Incompetence: If You Believe That, You'll Believe Anything.

One thing I discovered when I inherited my fraction of the Koski reserves was how much incompetence there is in the petroleum industry. The Koski family is now into its fourth generation (one of which is me), with about 40 family members, each with

different shares in the oil field, known as the Medicine River Unit. The Unit has frequently been bought and sold by oil companies, who often as not botch up the royalty calculations after a takeover. The Estate of August B. Koski has a full-time lawyer who chases after the companies for proper payment. My uncle (who has a share) works in the oilfield servicing industry and makes it a point to occasionally drive by the Unit pumpjacks and physically verify which well is pumping, then compare with the royalty statements. He once discovered that one of our wells was being paid out to a neighbour on the other side of the river, while the best well on our side had been shut down.

When an oil field is sold, the vendor dumps a truckload of accounting data on the buyer and washes its hands of any further royalty payments. The buyer then tries to wade through all the paperwork and re-calculate the royalties, blaming any mistakes on the previous owner. Matters are not helped by the high staff turnover in the petroleum industry. Most staff seldom stay longer than eighteen months with a given company, either because they saw a better job elsewhere or because their company was merged or split in a stock market deal. These are the people who collect the data and report it to a government agency, which then publishes its estimate of petroleum reserves. In short, the normal situation at the front line is that people who don't know what they are doing are supplying the raw data for reserve estimates.

How Much Is Out There?

Crude oil production has stabilized and starting to decline in many areas of the world. Not to panic though, as tar sands and coal can make up the difference. It is generally accepted that we are about halfway through our liquid petroleum supplies at the present rate of use [4]. Some future generation will have to go back to coal, and also use tar sands and shale oil. Those supplies are abundant, so humans still have a couple of centuries of breathing room. Biofuels and wind energy are not even on the map yet but will be as time goes by. As an example, Alberta and Texas are rapidly developing megawatt wind turbine fields. (Calgary's rapid transit system runs entirely on wind-generated electricity.)

The absolute value of crude oil production (in millions of barrels) has been estimated by the American Petroleum Institute as shown in Table 1. These data are only for currently recoverable crude oil, not including coal, shales, or tar sands. You will notice that the production of crude oil has been levelling off or declining. (But don't be alarmed; more statistics to come.)

There is no doubt that conventional crude oil production has peaked, and will gradually decline over the next fifty to one hundred years. Exploration finds lots of smaller pools of oil in well-explored countries like the USA, but the elephant fields are scarcer and scarcer.

Many countries are poorly explored and will undoubtedly add large amounts of reserves [12]. Consumption is increasing around the world to match the increase in reserves, so it is a Red Queen's race.

Table 1: Crude Oil Reserves (megabarrels) (from ref. 5)

Year	USA	Canada	World
1948	21,488	125	68,198
1970	29,632	8,620	530,534
1981	29,805	6,400	651,930
1991	26,254	5,783	999,190
2001	21,765	4,706	1,028,458

Natural gas (which is mostly methane) is a somewhat brighter picture, but the rate of discoveries has slowed [8]. Elephant fields may still be out there but are also becoming harder to find.

Consumption.

When one looks at current-year production (not reserves but actual sales), in 1948 the USA pumped 63.9% of the world's crude oil. By 1999, only 21.3% of crude came from the USA [6]. Still a substantial amount, but no longer a controlling share. The latest standardized consumption figures I have been able to find for all types of petroleum is for the year 1987, with all values set to megatonne oil equivalents. There are some later tables elsewhere but they are non-standardized.

Table 2: Petroleum Consumption In 1987 (megatonnes) (from ref. 7)

Type	USA	Canada	World
Oil	763.4	69.4	2,940.7
Natural gas	432	41.2	1555.8
Coal	452.9	33.4	2386.5

Gulping down fuel like drunken sailors, aren't we?

Not Quite The End Of The World As We Know It.

The world's supply of coal reserves, as estimated in reference 7 for 1987, is given as: USA = 263,843 megatonnes
Canada = 6,578
World = 1,026,147

Since coal can be converted to liquid crude (at varying rates of efficiency), we seem to be safe for a century or so at current rates of consumption just on coal reserves. But wait! There's more!

In a word, bitumen. Bitumen comes from tar sands, the largest single deposit of which is the Athabaska Tar Sands in northeastern Alberta. Table 3 shows the latest estimate of proven recoverable reserves (using current technology) in megatonnes. Strangely enough, the USA is not reported.

Table 3: Bitumen Reserves As At 1997 (from ref. 9)

Country	Megatonnes
Albania	9
Canada	717
China	251
Congo	1
Italy	33
Jordan	5
Madagascar	1
Nigeria	24
Romania	1
Trinidad and Tobago	1
Venezuela	364

Bear in mind again how unreliable worldwide reserve statistics are. Compare all the tables in this article and wonder at the lack of correlation. Alberta has more reliable statistics on its petroleum because the government gets the lion's share of royalties (save for some lucky families like the Koski descendants). Whatever else may be said of government inefficiency and bureaucracy, the provincial tax man is always accurate and efficient. By contrast the Saudi princes lie through their teeth about how much oil they have, and since they are both owners and government, there is no check on their figures. The Alberta Energy and Utilities Board reported in 2001 as follows [10]. Their report was in non-standardized measurements; I have converted to standardized megatonnes so you can compare to the other tables.

Table 4: Alberta 2001 Reserves (from ref. 10)

Type	Reserves	Megatonnes
Crude oil	1.7 gigabarrels	232
Bitumen	315 gigabarrels	52,066
Natural gas	42 trillion cu. ft	972
Coal	34 gigatonnes	34,000

It becomes obvious by comparison with the other tables that reserve figures are highly figured. If you are too ethical to lie, then use statistics.

But What Does It All Mean?

Petroleum statistics are so unreliable that absolute figures are pretty much meaningless. However, if one looks at the magnitudes of the numbers, they are a better indicator of the energy industry. From the magnitudes it becomes clear that we have at least two centuries worth of petroleum, more probably three centuries. When the oil, gas, and coal finally run out, there will undoubtedly have been plenty of time to adapt by converting to biofuels (some Canadian farmers have already switched their diesel tractors to run on canola oil), wind energy (already starting to boom), nuclear power, and miscellaneous sources such as solar (still very inefficient at present day).

So sleep well, don't be ashamed to turn up the thermostat instead of putting on a sweater, and keep driving that SUV.

References.

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