OPUNTIA

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TANGIBLES
by Dale Speirs

Introduction.

I never invested in the dot.com boom because it seemed wrong to buy into companies that had no product, no sales, and no physical presence beyond some leased office space. WIRED magazine kept telling us that profits didn't matter, and we all know how that turned out. I missed the real estate boom of the early 2000s because I had paid off my house in 1997 and my 1950s-era bungalow was all I needed (and still live in), not some McMansion with granite counter-tops and stainless-steel appliances.

When I began investing, I was timid at first, buying only term deposits that were safe but barely kept up with inflation. My investing philosophy eventually changed, based on the idea that tangibles still matter. You can have your e-books and iPhones, but they are dependent on someone mining the substances they are made of. You can travel by bus or bicycle, but unless you have a 80-hectare vegetable garden with laying hens and milk cows grazing on a quarter-section of pasture, at least some of your food was delivered in trucks fueled by diesel. You can telecommute, but your apartment or house is not heated by electrons but by natural gas or heating oil. (Solar power, you say? What are the

panels made of?, I reply.) In short, tangible goods will always be with us, especially food. That was my conclusion at the turn of the millennium, and therefore I have slowly and gradually been building up a portfolio of investments in tangible things. In a word, commodities. Boring? If you don't mind being tossed about on stormy economic seas and worrying about your old age because you only had paper, then yes it is.

The Search For Substance.

I bought a copy of COMMODITIES FOR DUMMIES by Amine Bouchentouf (2007, trade paperback), which covers thirty of the most frequently traded commodities. The three main categories of commodities are energy, metals, and agricultural products, subdivided by Bouchentouf into 32 categories which trade freely. This is an important point because there is too much work investing in commodities that do not trade on open markets, firstly because you can't determine a fair price, and secondly because they have low liquidity if you can't locate a buyer nearby.

Most people think of commodity trading in terms of futures trading. A futures contract is a promise by a producer that it will deliver x amount of a commodity for a fixed price on a future date. That date could be next month, next year, or five years from now. This guarantees the buyer a fixed price and the seller a minimum price.

There are other ways to invest in commodities, though. Taking actual delivery of the commodity immediately on sale generally only works for manufacturers who use the stuff, although it is common for gold bugs to demand delivery because it is easy to store. ($1 million in gold bullion can be stored in a shoe box, although you might have trouble lifting it.) Few investors can or want to store 40,000 lbs of frozen pork bellies or 100,000 barrels of oil. Buying for immediate delivery is called buying in the spot market, because you pay for the commodity on the spot and take delivery on the spot.

Many investors buy shares as a proxy in companies that produce commodities. One can also buy into suppliers who service a commodity industry. Of the latter, Bouchentouf tells the fascinating story of Samuel Brannan, a storekeeper who became California's first millionaire during the 1848 gold rush (read 'billionaire' in today's money). He was the third man to learn there was gold at Sutter's Mill but he never dug for gold himself. Instead, he quietly and quickly went about the state buying up all the stock of shovels, picks, and pans that he could get. Once he cornered the market, he shouted the news as loudly and widely as he could that there was gold in them thar hills. This ignited the rush, and Brannan was the only man who could supply tools to the miners, at his price of course.

Why Commodities Matter.

Historically, commodity prices went up and down, up and down, in cycles. But about the millennium, a strange thing happened. Commodities still fluctuated, but instead of returning to previous lows, they bottomed out at higher levels, then resumed their climb. Instead of commodity prices resembling a sine wave when graphed, they resembled an ascending staircase. There were two reasons: population growth, and peak production. The population of Asian countries has steadily increased, Saudi Arabia went from 7 million people in the 1970s to 30 million today, and all of them want a better life with a large-screen television set and meat on the dinner table instead of a handful of rice. That means all kinds of commodities are needed to feed people, make things for them, and provide the energy to run the gadgets and heat/cool the house.

At the same time, many commodities began to become scarcer, at least at cheap prices. Peak Oil happened in the USA in 1970 and worldwide circa 2006 to 2008. Less well known is that worldwide Peak Gold happened in 2001. By the middle of this century, we will have had Peak Everything. The remaining reserves of commodities will be more expensive to produce, scarcer, and more costly as daily production falls. All the easy deposits have been found and mined. All the good farmland has been cropped and much of it subsequently destroyed by urbanization. This does not mean there will be shortages, only that the prices will go up and people will spend a larger proportion of their income on them.

Commodities are considered a safe haven during troubled times. They are also widely viewed as a hedge against inflation when measured in uninflated dollars, unlike stocks or savings accounts. Brokers and bankers nonetheless have convinced retail investors that stocks are better investments over the long run, despite the evidence to the contrary. They do this because they earn their commissions from churning your account, but if you buy and hold commodities, they make nothing.

Risky Business.

Bouchentouf discusses some of the risks of investing in commodities, although he makes the point that they are still safer than stocks. Leverage, which is buying commodities or stocks on borrowed money, can multiply profits but also wipe out the investor if they go the wrong way. Geopolitical risk is a problem when companies spend billions developing a mine or oilfield, only to have the Generalissimo nationalize them without compensation or a war erupt. Russia did this to British Petroleum in Siberia, and in 2009 the Congo government did it to a gold mining company just as the mine opened. Speculators can gang up on resource companies and run them into the ground just to make a profit on the commission. All of this requires due diligence,

that is, to do the research into the company,

how it operates, and the kind of people running it. Some commodities are inherently unstable in price because they can't be easily stored (natural gas, certain species of crops, live cattle). Those sorts of commodities are better for day traders, not buy-and-hold investors. It works both ways though. If a commodity is mainly found in an unstable country, and a coup d'etat cuts off the supply, the price will go through the roof. If you did the research and noticed the increasing civil unrest and street fighting before other investors, you can get in before the price soars. Wheat traders were happy to hear about the recent crop failure in Russia, and rice traders did well when India and other tropical countries temporarily banned exports of rice.

Ways And Means.

Since most people, myself included, do not have the capability to sit all day hunched over the computer making trades and trying to outwit the Wall Street banksters, Bouchentouf discusses what to look for in a financial advisor. Mutual funds are available that specialize in one or a few commodities. By their nature, they are long-term investors operating on a buy-and-hold philosophy. They discourage in-and-out investors and even penalize them.

More volatile are ETFs, which are designed to track the commodity on a second-by-second basis, and can be day traded. ETFs own the actual commodity, or at least claim to, although few

are audited to see if they have as much as they claim. This is better if you want to speculate in wheat without having to build a silo in your backyard. If you want to invest in uranium, for example, no government will allow you to take physical delivery unless you own a nuclear power plant, but buying into a uranium ETF is the next closest thing. The share price is set to a unit of the commodity minus a management and storage fee. For example, gold ETFs are usually set so that one share equals one-tenth of an ounce of gold. Since ETFs are seldom audited, they are not a buy-and-hold investment, and even the day traders don't stay more than a few days in them before cashing out their profit. It is not that ETFs are considered to be criminal organizations, but if there is a run on one of them, they will not be able to cash out all the shares if they aren't 100% invested in their commodity.

Another form of investment are limited partnership units, where the investor receives cash flow from the commodity business. I have these in conventional oil, whereby I and other investors have units in actual producing wells and get a fixed portion of the gross income from the oil it pumps. This is different from owning shares in a company where if you get a dividend, you are sharing the overall net profit of the company, not the specific unit that produces the income. My experience has been that it is difficult to find good limited partnerships because the best ones are never publicly advertised and sell out quickly.

Index funds are mutual funds that are not actively managed but simply own one of everything on the futures market. This means you can never do worse than the market, but neither can you do better. If the market tanks, you lose. If the market is booming, you can ride with it to the top. Some funds are specific to a certain category of commodities, such as agricultural or metals, and others buy futures across the board. One disadvantage is that if you are interested in a commodity such as steel that is not traded as futures, then you can't use these funds. The most important index that funds track is the Commodity Research Bureau (CRB) index, which is considered the commodity equivalent of the Dow Jones stock index.

Process Makes Perfect.

Bouchentouf then discusses how commodities exchanges work. They originally began in the 1800s as a place for agricultural products such as wheat, butter, milk, and cheese, then widened out to include other things that could be standardized in quality and quantity. The advantage is that pricing is in the open where both buyers and sellers can see what is going on. Things that can't be standardized don't have futures markets, such as diamonds. Some of the trading is between producers and manufacturers, but speculators tag along for the ride. Speculators can influence the market somewhat but ultimately someone has to take delivery and that someone establishes the final price. Speculators who forget that will wind up bankrupt. Although futures trading is condemned by some for volatility, it has been demonstrated that commodities which do not trade have more volatility because no one knows how much is available or what others are paying for it.

From there, Bouchentouf explains the process of buying and selling on public markets. There is quite a chain of people and processes involved for even a simple "buy at market" order. The broker's clerk takes the order from a client by phone or e-mail, then sends the order down to the floor broker who actually executes the order in the pit. I was interested to read that the hand gestures that traders make in the trading pit are actually American sign language. The open-outcry method is still used despite computer trading, but is slowly declining. Once two brokers (a buyer and a seller) agree on the sale, a receipt is thrown to a floor clerk known as the card clocker. The clocker wears goggles to protect his eyes from flying cards, and time-stamps the orders at a rate of about 1,000 per minute. A floor runner then takes the cards and runs them to a data entry clerk. A price reporter then inputs the information to the display board on the floor for benefit of the traders. It is easy to see why the open-outcry method is giving way to computerized trading, although it will be a sad day when no one can impress friends by telling them "My son is a card clocker in Chicago".

The 'D' Word.

Not everyone who trades in commodities wants the actual stuff piling up around the office, so commodity traders usually deal in derivatives such as futures contracts or options. Derivatives are any financial paper derived from a stock, bond, or commodity. The ones that triggered the Panic of 2008 were mortgage derivatives, known as mortgage-backed securities (MBSes), not the same thing as futures or options. By themselves, MBSes were not dangerous but one company, AIG, ended up insuring or guaranteeing 90% of the mortgage derivatives in the world. When Bear Sterns and Lehman Brothers defaulted on their MBS issues after the housing bubble burst, AIG didn't have a hope of paying off, which triggered a massive bank run that spread around the world and caused the Panic of 2008.

Futures.

Futures contracts trade on exchanges or privately, the latter being known as over-the-counter (OTC). Individual investors trade futures on the exchanges, while companies who produce or consume the commodity in very large amounts bypass the exchanges and deal face-to-face in the OTC market. For example, an oil company may issue futures contracts for 10 million barrels of kerosene (jet fuel), which are purchased OTC by airlines wishing to lock in a fixed price. OTC deals involve actual delivery, while exchange-traded futures are mostly settled up in cash or rolled over to the next month.

Ideally, producers will only hedge part of their production to ensure that they earn at least their expenses. If they think the market will decline, they will issue more futures contracts to lock in a higher price. The buyer likewise wants to stabilize their costs, but have to be careful not to hedge too much in case the price drops and they end up overpaying.

Sometimes this backfires. In late 2009, Barrick Gold, the largest gold-mining company in the world, was forced to buy back billions of dollars of gold futures it had issued years earlier selling its future gold production for $300 to $400 an ounce, only to see the price pass $1,000. This meant that most of Barrick's future production consisted of gold being sold $700 below market value, a disastrous exercise in hedging. Those who bought the futures were laughing all the way to the bank. Some airlines panicked in early 2008 and overbought kerosene (which is what jet fuel is) for future delivery at a high price when oil was $100 per barrel, then watched as the price of crude collapsed. More than one corporation vice-president has lost his job because of a bad bet.

Not everything has a futures contract. The contracts for substances that are traded are standardized for easier quoting and trading. For example, crude oil is sold in contracts of 1,000 barrels each, so buying ten contracts gets you 10,000 barrels.

Ethanol is sold in contracts of 29,000 American gallons, which happens to be the capacity of a railroad tank car. Frozen pork bellies are sold in 40,000 pound contracts, which is the carrying capacity of a refrigerated boxcar. Some contracts such as oil and gold can be traded for any future month or even years ahead. Other types, mostly agricultural, only trade in certain months of the year depending on when they are harvested. Contracts also designate where the commodities will be delivered. For example, crude oil contracts in the USA are FOB Cushing, Oklahoma, while Canadian crude oil is FOB Hardisty, Alberta.

All futures contracts have an expiry date, at which time delivery must be made and accepted, or else settled in cash. Investors who buy futures contracts dated many months or years in the future are said to be long on the market. Like stocks, futures contract can be bought on margin, that is, by only putting up part of the money. $1,000 might buy you a contract nominally worth $10,000. The exact extent of margin depends on your broker and your credit. If the price of the contract goes up, you can pay the rest off with your profits. If the price goes down, you are still on the hook for $9,000 and can easily be wiped out. Margin debts are recourse loans, meaning the broker can come after your other assets or garnishee your wages to get the owed money. Nonetheless, people still bet on margin because they think they are smarter than the market. It is better to pay full cash for a contract, as you then can sit out any fluctuations without having to panic.

If futures contracts are higher than the spot market, they are said to be in contango. (An old British word that no one knows the origin of.) If the spot market is higher than the futures market, then they are said to be in backwardation. At one time, contango and backwardation used to be related to anticipated supply of a commodity. If a commodity was thought to be getting scarce, it would go into contango, that is, if you wanted it delivered in the future, you had to pay a higher price. If, however, a glut was anticipated next harvest season because of a bumper crop or an economic slowdown meant that too much copper was being mined, then the contracts went into backwardation and you could get it cheaper if you waited.

Nowadays because the Wall Street banksters are gaming the market, there may not be any logical reason for the contango or backwardation. Gold and silver production peaked years ago, but futures in them are in backwardation because the traders are short-selling them. This means that if you go to a coin dealer to buy gold bullion, that is, buy on the spot market, you will pay more than the futures price. Crude oil, which has also peaked, is in contango; you can buy it cheaper now out of a pipeline than in the future.

Commodities futures can also be traded by using options. An option is the right but not the obligation to buy or sell a futures contract at a specific price during a time period.

If you don't exercise the option before it expires, then you lose the premium you paid for it. Say, for example, a contract is selling for $10 and you pay $2 for an option to buy it at $15, thinking that the price will go up to $20 after the purchase. Your cost was $17 to buy a contract worth $20, for a net profit of $3. The person who sold you the contract gets a profit of $5 by selling it to you for $15 when his cost was $10. If, however, the contract crashes down to $5, you let the option expire unused, leaving you out $2. The person who owned the contract and sold you the option earned $2 for nothing but lost $5 on the contract. Options are essentially investors betting against each other.

If you think prices on a contract will rise, the option to buy it is known as a call option. The option to sell your contract is known as a put option, and guarantees you a minimum price in a down market. In 2009, the Chinese government announced they will be steadily buying gold for their reserves, as a result of which gold went over US$1,000 an ounce and stayed there. This is humourously referred to as the Beijing Put by gold bugs, since it guarantees a minimum price for gold.

Minding Your T's And A's.

Investors and speculators fall into two camps, the fundamentalists and the technical analysts or TAs. Fundamentalists (I am one) invest in commodities on a buy-and-hold basis, looking at the

fundamentals such as current production, existing stockpiles, predicted demand, and producing company operations. We buy for a long term, a flexible definition that may mean six months from now or a decade from now. As an example, fundamentalist gold bugs who buy gold mining company stocks will analyze mine production, what the quality of the ore is, expected lifetime of the mine, and quality of the management.

The opposite of a fundamentalist is a TA. These people ignore the fundamentals and instead follow charts and trends. TAs try to predict the market based on the charts of the stocks or futures. Charts are slightly better than random chance for the near future, not more than a few days, so TAs are day traders. By mapping trend lines such as moving averages, support lines, resistance lines, and volume traded, it is possible to predict short term moves of a futures contract, assuming that the Wall Street banksters aren't gaming the market that day. A support line is a price below which the commodity does not go, such as $20 for crude oil (because production would stop), or $1,000 for gold (because of the Beijing Put). A resistance line is the price at which most speculators temporarily stop buying because they think it too high. A sudden shortage of a commodity or increase in demand will break the resistance line and if the price stays above it for a few weeks, the old resistance line becomes the new support line.

TAs love to find patterns in the zig-zag charts of prices, but my observation is that this is mostly ex post facto rationalization. People like to see patterns in noisy statistical data. I noticed when reading TA newsletters that the analysts spend half their time predicting what the market will do tomorrow, and the other half explaining why yesterday's market didn't follow the prediction. To be fair to them, TA was designed for honest markets with believable data, not the fraud-ridden markets of today where the banksters are gaming the market.

Crude People.

In the second half of this book, Bouchentouf discusses specific types of commodities, starting with crude oil, the most important of all commodities and the most heavily traded. Some of the background information he provides is suspect, and while he mentions Peak Oil it is obvious he does not understand it completely. From an investment point of view, however, his recommendations are okay even if they are conventional (pardon the pun). For the average investor, the big petroleum companies are the best, either buying their stocks individually or as part of ETFs or mutual funds. The highest gains but the highest risks are in emerging countries such as Africa or central Asia where big oil plays are underway. These are not suitable for the retail investor because of the propensity of such countries to war with their neighbours, internal strife, or corruption that makes Wall Street look honest by comparison. Oilfield service companies are good investments, as are refineries and pipeline operators. Shipping companies that operate oil tankers are subject to cyclical economics and are riskier to invest in.

Bouchentouf devotes a chapter to natural gas (methane). Even for day traders, natural gas is extremely volatile on the futures market, and not recommended for direct trading by retail investors. Currently there is a glut on the North American market because of over-production from shale gas, depressing prices. Shale gas wells deplete very rapidly, so the price is expected to turn around in a couple of years, especially if there are cold winters and hot summers (natural gas is burned to produce electricity to run air conditioners). The safest method of investing is in companies that run the pipelines and distribute natural gas to end users.

The coal economy began its first collapse in 1912 when Winston Churchill, at that time the First Sea Lord, ordered the British navy to change its ships from coal to oil and the rest of the world's navies followed suit. The second collapse was after World War Two when the railroads went diesel and residences were heated by natural gas or heating oil. Since then, coal has been mostly used in electrical generation and steel production. With the advent of Peak Oil, coal's fortunes seem to be on the rise again. Coal futures are available but are relatively illiquid, meaning they don't trade often. The vast majority of trades are between the big mines and the big users (utilities and steel), and the small trader is ignored. Therefore it is better to buy shares in the coal mining companies.

Uranium has been in a bull market since the millennium but retail investors can't buy it for immediate delivery, and trying to do so will get you a visit from the Men In Black. The alternative is buying shares in a small group of mining companies that are producing uranium. The best site for uranium is the Athabasca basin in northern Saskatchewan, which produces 30% of the world's uranium. (Not to be confused with the Athabasca Tar Sands in northern Alberta, part of the same river drainage system but in a completely different geological deposit.)

Electricity actually has futures contracts in 40 megawatt-hour increments, but the usual approach is to invest in utility companies. Electrical utilities are a traditional widows-and-orphans investment because they pay steady dividends. Solar and wind power are up-and-coming investments but are still extremely speculative. Maybe for your grandchildren when they are adults, but not for the Boomer generation.

Heavy Metal.

Metal investing is classified into precious and base metals. Precious metals are gold, silver, platinum, and palladium. Base metals are copper, zinc, iron, aluminum, nickel, and anything else that you don't need an armed guard to protect.

Precious metals are best owned as physical metal, not as paper promises such as ETFs or futures. Notwithstanding that, many gold or silver bugs buy stocks in gold mining companies as well. Silver is more volatile than gold in price, but gold is subject to price-fixing by central banks who don't want the public to realize how much fiat currencies have depreciated. This price-fixing began to fail a few years ago, first because in 2006 the majority of physical gold in the world became owned by private individuals, and then secondly because of the Beijing Put. Platinum and palladium are more industrial metals than precious metals, and are particularly used for catalytic convertors in motor vehicle emission control systems.

Investing in base metals means futures contracts or mining shares. You can store gold coins in your safe-deposit box but zinc and copper only trade in 25-ton lots, nickel in 6-ton lots, and aluminum in 25,000 ton lots. Even if you own a farm with lots of room in the back forty, the delivery charges would kill your profit. Bouchentouf goes through the list of base metals but I won't bore you with the repetitious details. They have one thing in common; their prices have been steadily increasing over the past decade.

The world's most important base metal is steel (basically carbonized iron with a bit of molybdenum in it) but there are no futures contracts for it. The best method of investing in it is to buy shares in steel companies. China produces more steel than the next four countries (Japan, USA, Russia, South Korea) combined.

Keeping Them Down On The Farm.

I haven't invested in agricultural commodities because as a farm boy I had personal experience with the volatility of crop prices. Unlike metals and most types of energy sources, which are non-renewable resources, crops and livestock can be renewed from the land. A Canadian farmer might lose money on his harvest because the Americans harvested a glut of wheat, but make good money if the Australians had a drought (which happened a couple of years ago). Disease or insect pests are good for investors but a bountiful harvest can ruin the bet.

Bouchentouf starts off with coffee, which has been in a bear market for the past decade, so futures contracts are probably not the best investment. One could instead buy into national coffee shop chains, since evidently many people like $5 cups of coffee with foam and chocolate sprinkles on top. Cocoa, frozen orange juice, and sugar are available as futures but are very volatile, more suitable for day traders than as an investment.

Corn is extremely volatile, especially after the American government began subsidizing it for ethanol production. Wheat was the humankind's first commodity traded as such. The earliest known writing in the world, from Sumeria, is a receipt on a clay tablet for a wheat trade. Soybeans are another widely traded crop. All of these fluctuate considerably in price and make crude oil or silver seem like straight-line averages by comparison.

Livestock are even worse for volatility because while a crop harvest can be stored until better times, animals must be fed if waiting for an improvement in prices. Cattle futures are unusual because they are the living animals, either live cattle contracts (for the slaughterhouse directly) or feeder cattle (young calves to be fattened). The national markets are not the actual trades themselves but an index of local auction marts across the country, so one buys a contract based on the previous week's average of farm sales.

Hogs are sold as the meat, not the living animal, in the form frozen pork bellies (bacon) or lean hogs (the other meat cuts). These contracts are not as liquid as other commodities because most of the trades are done between the big companies, who do not deign to notice the small retail investor. If ever I decide to invest in agricultural commodities, I will not buy futures direct but rather shares in agribusinesses and food companies.

Epilogue.

As we move forward through the Great Recession and probably into a Greater Depression, it becomes more important for average people to be more active in learning about investing, not just buying term deposits that pay less than the rate of inflation.

Firstly, pay off your debts and live below your means. Pay yourself first, meaning you should be setting aside 10% of your income for investing before you pay your bills, buy that DVD, or take that trip to a science fiction convention. Turn off the television set and read up on investing. Resist the temptation to say that it is too complicated or you're too busy. There are lots of primers such as this book on commodities, and you aren't that busy, just unorganized and not setting your priorities right. I also highly recommend the Rich Dad, Poor Dad series of books, and Napoleon Hill's classic book THINK AND GROW RICH, which I wish I had read as a young man rather than when I was in my 50s.

by Dale Speirs

Steampunk has become a genre in its own right, not just a type of AH. These stories actually date back to the Victorian era when they were modern scientific romance, not AH. The apogee of the original steampunk was from about 1880 to 1914. THE STEAM MAN OF THE PRAIRIES by Edward Ellis, published in 1868, is generally considered as the start of steampunk, notwithstanding isolated stories prior to that date as far back as the Greek myth of Talos, the giant bronze man who patrolled the shores of Crete. The Victorian age referred to self-reliant machines as automata, as the word "robot" wasn't introduced into the English language until 1923, from Karel Capek's play R.U.R.

STEAMPUNK PRIME (2010, trade paperback, edited by Mike Ashley) is an anthology of Victorian and Edwardian era stories. Leading off is the 1909 story by Henry Hering "Mr. Broadbent's Information", about a hack writer who churns out a novel every three months. He lives in the moors of England but is constantly annoyed by escaped prisoners from Dartmoor and escaped automata from a local mad scientist. The writer takes an escaped automaton in as an amanuensis to help him speed up production of his novels. The scientist finds out and the automaton is forced to return to the lab. The story is in a wry humourous style that holds up well despite the century since.

"The Automaton" is a 1900 story by Reginald Bacchus and Ranger Gull (yes, those were their real names) about a chess-playing automaton. It was modeled after a real-life automaton known as The Turk, which was eventually exposed as a fraud. The story follows that much of the reality but the fraud is undone by the ghost of a murdered chess player.

There is a saying that it's not real AH unless there are zeppelins, and the 1900 story "The Abduction Of Alexandra Seine" by Fred C. Smale bears this out. The story wasn't literature even back then, with too many incredible coincidences, unbelievable devices, and forced dialogue. It involves a world where everyone has aircars (read: mini-dirigibles) but the author hasn't thought through the consequences. Instead, it is a simple Tom Swift style of story with an aircar chase to rescue a young maiden in distress after a mid-air battle against the villain.

"The Gibralter Tunnel" is a 1914 story by Jean Jaubert about the first tunnel between Europe and Africa. The first train is making its maiden run through the tunnel, which was so shoddily constructed that the seawater was already leaking through the walls. The leaks become a flood and short-circuit the third rail, trapping the train as the water rapidly rises. The engineer does the opposite of spot-welding a bus-bar by knocking the third rail loose so that it electrolyzes the seawater and produces huge quantities of chlorine gas that pops the train out of the tunnel like a cork from a wine bottle. Another Tom Swift story.

"From Pole To Pole" by George Griffith was written in 1904 before any explorer had reached either the North or South Poles. It is a hollow world story which postulated that there was a giant tunnel running from one pole to the other. The explorers in this story head to the South Pole to find the tunnel and to explore it by dropping down the hole in a specially-built craft. They would fall to the centre of the planet and then coast up to the other pole. They recognized that because of air resistance it wouldn't be possible to coast all the way up to the North Pole. In the absence of any action, they would fall back and oscillate around the centre until finally coming to rest, by which time they would have starved to death. To insure they make it up the other side, and also to get back home, as the craft reaches the fall-back point they deploy balloons to float them the rest of the way.

Unfortunately there was a miscalculation, and despite shedding excess ballast they need to lose some more weight so the balloons can lift them up to the North Pole. One of their company, the Professor, does the math for the cold equations and makes the supreme sacrifice by jumping out and letting himself fall back to the centre of the Earth so the balloons can lift the others to freedom. He doesn't say that he is just going outside and may be some time (because the story was written in 1904 and who knew then?) but the British Empire

was full of idiots who sacrificed themselves for a noble cause. One thing I liked about this story was that the author had obviously thought out the details.

"The Deep Of Time" by George Parsons Lathrop is an 1897 utopian story. A secret organization preserves volunteers and wakes them up 300 years in the future. The world of 2201 has airships, giant radios to communicate with Mars, and a libertarian government where all the politicians are pure at heart and think only of the public good. In short, extreme fantasy. The hero from three centuries past gets the traditional lecture tour on Earth, followed by Martians showing up and lecturing as well. There are data dumps at the slightest provocation. The funniest to me was the use of the Penokee ridge in Wisconsin as a giant electrical coil for a radio. The ridge is a concentrated iron ore deposit about 70 km long, around which the denizens of the future have wrapped huge lengths of copper wire to make an electromagnetic coil to make a radio to communicate with Mars.

"The Brotherhood Of The Seven Kings" by L.T. Meade and Robert Eustace was part of a detective series that was one of many that rushed in to fill the gap left when Sir Arthur Conan Doyle killed off Sherlock Holmes. This story was published in 1898 in the STRAND MAGAZINE. A young boy has been kidnapped, and his father, a single parent, is dying from some mysterious disease and may never be able to testify in the case. The detective discovers that a villain has rented the apartment adjacent to the father and is bombarding him with an overdose of X-rays.

"The Plague Of Lights" by Owen Oliver is a 1904 story about an invasion of aliens who are bright lights that settle into humans and parasitize them. Not a steampunk story. Neither is the next one, "What The Rats Brought" by Ernest Favene, a 1903 story about the plague sweeping across Australia and a flood of vampire bats (the actual species, not fantasy) coming in from the tropics to feast on the victims.

"The Great Catastrophe" by George Davey is a 1910 story set in England 200 years from then or, from our perspective, a century from now. There are lots of airships, so that's alright then, as well as self-guided cars and electrical everything. It's the latter that causes the catastrophe, when central London is gutted by a giant green electrical flame that touches off a mass panic and riot. In 1910, electricity was still the next big thing, and people worried about it leaking out of sockets and souring the milk. The story is incomplete, describing the green flame and its destruction but not following up on what it was or why it happened.

"Within An Ace Of The End Of The World" by Robert Barr is a 1900 story about the development of a process to make food directly from the atmosphere. This sucks out enough nitrogen to

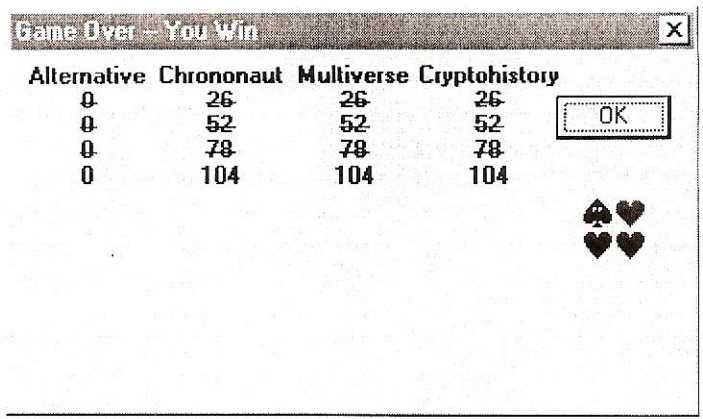
change the balance of elements and increase the percentage of oxygen to the point where the planet catches fire. Only a few survivors remain and civilization rebuilds itself into a new utopia. I saw the plot coming because I have a horticultural degree and studied nitrogen fixation, and because, being the son of a palaeontologist (my mother had several fossil species named after her), I knew that there had been periods in the Earth's past when the oxygen concentration actually increased enough to start worldwide forest fires. Nonetheless there are some holes in the plot, although this would have made a good B-grade sci-fi movie back in the 1950s.

"The Interplanetary Rupture" is a 1906 story by Frank L. Packard about an interplanetary war in 3102 AD. It is one of the earliest space opera stories, with Earth and Mercury fighting a war. Much of the story is taken up with a blow-by-blow account of battleships and transports maneuvering in set-piece actions that could be cut and copied verbatim into a story about a naval battle on the Spanish Main.

"The Last Days Of Earth" by George C. Wallis is a 1901 story set 13 megayears into the future. The last human couple are agonizing whether or not they should use a starship to escape the dying Earth. They finally pluck up the courage to do so. Not a steampunk story, and not much of any kind of story.

The final story in this anthology is set on board an airship in 2016, so it must be AH. "The Plunge" by George Allan England is a 1916 account of the wreck of a zeppelin over the Pacific Ocean that has been fatally punctured by a meteorite. It is slowly going down in flames as its gas bags use hydrogen instead of inert helium. The story revolves around a couple who met during the flight and was obviously based on the sinking of the Titanic.

To sum up the anthology, most of the stories were fairly good reading, although most were not strictly steampunk but more like AH or future histories.



Ellis, E.C., et al (2010) **Anthropogenic transformation of the biomes, 1700 to 2000.** GLOBAL ECOLOGY AND BIOGEOGRAPHY 19:589-606

"*In 1700, nearly half of the terrestrial biosphere was wild, without human settlements or substantial land use. Most of the remainder was in a seminatural state (45%) having only minor use for agriculture and settlements. By 2000, the opposite was true, with the majority of the biosphere in agricultural and settled anthromes, less than 20% seminatural and only a quarter left wild. Anthropogenic transformation of the biosphere during the Industrial Revolution resulted about equally from land-use expansion into wildlands and intensification of land use within seminatural anthromes. Transformation pathways differed strongly between biomes and regions, with some remaining mostly wild but with the majority almost completely transformed into rangelands, croplands and villages. In the process of transforming almost 39% of earth's total ice-free surface into agricultural land and settlements, an additional 37% of global land without such use has become embedded within agricultural and settled anthromes.*"

Calais, E., et al (2010) **Triggering of New Madrid seismicity by late-Pleistocene erosion.** NATURE 466:608-611

"*The spatiotemporal behaviour of earthquakes within continental plate interiors is different from that at plate boundaries. At plate margins, tectonic motions quickly reload earthquake ruptures, making the location of recent earthquakes and the average time between them consistent with the faults' geological, palaeoseismic and seismic histories. In contrast, what determines the activation of a particular mid-continental fault and controls the duration of its seismic activity remains poorly understood1. Here we argue that the concentration of magnitude-7 or larger earthquakes in the New Madrid seismic zone of the central United States since the end of the last ice age results from the recent, climate-controlled, erosional history of the northern Mississippi embayment. We show that the upward flexure of the lithosphere caused by unloading from river incision between 16,000 and 10,000 years ago caused a reduction of normal stresses in the upper crust sufficient to unclamp pre-existing faults close to failure equilibrium. Models indicate that fault segments that have already ruptured are unlikely to fail again soon, but stress changes from sediment unloading and previous earthquakes may eventually be sufficient to bring to failure other nearby segments that have not yet ruptured*"