OPUNTIA

57

ISSN 1183-2703 May 2005

OPUNTIA is published by Dale Speirs, Box 6830, Calgary, Alberta, Canada, T2P 2E7. It is available for $3 cash for a one-time sample copy, trade for your zine, or letter of comment. Americans: please don't send cheques for small amounts to Canada as the bank fee to cash them is usually more than the amount. US$ banknotes are acceptable in Canada at par value; what we gain on the exchange rate we lose on the higher postage rate to USA. Do not send mint USA stamps as they are not valid for postage outside USA and I don't collect them.

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.

LETTERS TO THE EDITOR

[Editor's remarks in square brackets]

FROM: Lloyd Penney 2005-03-11
1706 - 24 Eva Road
Etobicoke, Ontario M9C 2B2

Used books have little demand these days, as anyone who runs a used bookstore can tell you. The thrift stores sell them. The used bookstores slowly but surely go away because they lose all their money so gradually. The local dealers have a glut of books they can't sell, and they go out of business too.

[I used to make weekly rounds of Calgary secondhand bookstores up until about 1999, but since then have bought almost all my books over the Internet. I have talked with a number of Calgary book, coin, and stamp dealers and they all agree it is impossible to survive on walk-in traffic alone, this in a city of 1,000,000. All of them sell over the Internet for survival, and keep their storefronts open not for sales but to have people coming in to sell them fresh stock. The dealers agree that the biggest problem is trying to get quality material for re-sale. The Internet does make it viable to sell stock that could never be sold locally My most recent Internet book purchase came from a secondhand bookstore in a small Florida town, and the one before that from Nevada.]

FROM: Chester Cuthbert 2004-12-20
Winnipeg, Manitoba

The most expensive books in my collection are being purchased quickly, but the quantity of cheaper duplicates continues to take up space throughout the house. Bookshops in Winnipeg are going through hard times, so my sales are to American dealers or Canadian collectors.

FROM: Christoph Meyer 2005-03-15
Box 106
Danville, Ohio 43014

I want to know what 'sercon' means.

['sercon' is "serious constructive", a term developed by science fiction (SF) zinesters about sixty years ago. It originally referred to zines that emphasize serious, factual essays and discussions about SF, although the modern meaning is any zine that runs mostly or only serious articles about any subject. Perzines are personal zines, such as diary entries or personal reminiscing about one's life. For the first couple of decades or so of SFdom, the sercon zine was considered the ideal zine. The perzine was around at the same time, but in the 1950s it basically took over as the dominant type in SF fandom, mainly because of a small but

influential group of Irish zinesters. Many zines are both, but as it is easier to rattle off personal stories on the keyboard than to do a serious essay, most zines are nowadays closer to perzines than sercon zines.]

I Also Heard From: Billy McKay, Violet Jones, Jose Roberto Sechi, John Held Jr, Terry Jeeves, Phlox Icona, Martha Shivvers, Joel Cohen, Anna Banana, Ficus, Peter Netmail, Henry Welch, John Hertz, Jim Hayes, Randall Fleming

CHEAT THE PROPHET

G.K. Chesterton, in the opening paragraph of his 1904 novel THE NAPOLEON OF NOTTING HILL, writes about a game called 'Cheat the Prophet': *"The players listen very carefully and respectfully to all that the clever men have to say about what is to happen in the next generation. The players then wait until all the clever men are dead, and bury them nicely. They then go and do something else. That is all. For a race of simple tastes, however, it is great fun."*

"Think of the electrical energy to be wasted on this expensive plaything. Face it; the so-called usefulness is just an excuse for the hobby. The home computer is the model railroad of the future, nothing more."

Science fiction fan Donald Franson, in a letter to the editor published in the April 1978 issue of ANALOG.

THE HISTORY OF OFFPRINTS

by Dale Speirs

Introduction.

When science began evolving as a self-aware discipline out of a mixture of natural philosophy and alchemy in the 1600s, it also developed a new methodology of communication between scientists. Historically the Papernet was used by scientists to share their information and research results, first as letters to each other, then as an exchange of copies of their published research papers, variously called offprints or reprints. In the late 1990s, the Internet became the preferred method of information dissemination, although the Papernet still and probably always will remain a minor component of scientific communication.

This article looks at one aspect of the Papernet, the exchange of offprints. Offprints are extra copies of individual scientific papers that are published in learned journals. They are printed in lots of 100 or whatever quantity the author(s) might order at the time the paper has been accepted for publication by the journal editor. Most learned journals offer a small number of offprints free to the author and charge for extras. Since scientists don't get paid for their articles (in fact, most journals levy a page charge), it is considered fair compensation to provide a batch of offprints.

Before photocopiers, offprints were the only practical method a scientist had of spreading his research around to fellow scientists. A scientist reading an article in a university library might labouriously copy the information by hand, but it was much easier to send a postcard to the author asking for a copy. There are far too many scientific journals for any one person or library to subscribe to, so indexing services sprang up that supply tables of contents in one convenient source [10]. Someone seeing an interesting article title in such periodical compendiums would then send away for an offprint. In such a manner, scientific information flowed freely to even the remotest places.

The word 'offprint' is often used interchangeably with 'reprint', but I make a distinction between them. Offprints of individual articles were produced by the journal printer at the time the journal issue was being printed, from the same plates. A reprint implies the copy was made at a later date. Scientists use either term freely, but for this article I use only the term 'offprint' as being more accurate.

In The Beginning.

Before offprints and learned journals were invented, scientists communicated by handwritten letters, which were often read aloud at the meetings of learned societies.

This helped spread

information but was slow, required faithful attendance at every meeting, could be sabotaged (usually inadvertently by the droning monotone of a poor public speaker), and was subject to the vagaries of the postal service and the recipient of the letter as to whether it actually was delivered and noticed. One common problem was bad handwriting, which could force recipients to give up reading the letter or even worse, result in erroneous information being propagated.

The advent of printing caused a surge of literacy and small texts in the 1500s. Printing was immediately seen to have several advantages [1]. Firstly, it enabled widespread dissemination of texts. It reduced the corruption of those texts from handcopying. Because cheap printed texts could be scattered far more widely than a few handwritten letters, there were more readers who could see them, thus increasing the communication between scientists. A widespread readership also encouraged a more critical attitude to the data, and it was about this time that fables and mythical beasts began to fall out of the realm of science.

By the 1660s, many scientists were printing their letters in the form of pamphlets and chapbooks. As an example, in 1665 the Secretary of the Royal Society in London mentioned receiving a packet of articles printed by a Monsieur Auzout of France, who requested that they be distributed to interested members of the society [2].

Offprints obviously could not exist until learned journals did. The origin of scientific periodicals is surprisingly late and very abrupt [3]. It wasn't until January 1665 that the first such periodical appeared, the JOURNAL DES SCAVANS of France. The editor of that journal had been in the habit of copying letters he received from scientists and passing them on to others. He thought that instead of copying by hand, it would be much easier to print them in a periodical. It was an instant success, and the idea was so well received that other scientific periodicals appeared around the world within a few months. This was one of those ideas that subsequent generations consider obvious, but was not an evident thing at the time. The JOURNAL DES SCAVANS was short-lived, as within four months it was suppressed by the Jesuits, who had quickly recognized the dangers to an established way of life of letting information circulate widely in a mass market. The Papernet then was considered as dangerous to authority as the Internet is today. The second scientific periodical the world saw was PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY OF LONDON, which was inspired by the French journal and began in late 1665. It is still being published, and as far as I know is the longest-running continuously published periodical in the world.

No new form of communication instantly displaces the old forms. There were few scientific periodicals until the 1800s, so scientists still continued to exchange information by letters. The famous

botanist Sir Joseph Banks had about 100,000 letters in the late 1700s, as one example [4]. But as time went by, learned journals proliferated, and the practice of exchanging offprints began.

Offprints Recognized As A Medium Of Exchange.

By the late 1800s, scientists were recognizing the value of offprints. As one botanist remarked in 1892, "*Fortunately there is a growing tendency to have articles reprinted and distributed more or less freely among contemporaries.*" [5]. Offprints were and still are mailed without charge to those requesting them, subject to availability of course. Publishers were slower to acknowledge this, and a 1902 complaint reminded them that offprints were the accepted means of communication between authors [8]. This reluctance is more than likely due to the fact that publishers were expected to assume the cost of printing the offprints. The suggestion has been made that publishers should think of their journals as advertising for the sale of offprints to the general readership [9]. Indeed, some journals do this as an extra line of sales, particularly to educational institutions. SCIENTIFIC AMERICAN, as one example, sells its articles separately or recombined into customized textbooks by theme.

Officially, scientists are supposed to be dispassionate and logical. As anyone knows who has spent even a few days at a university, scientists have emotions and behaviours just like anyone else. (When someone asked Woodrow Wilson what his qualifications were to run for President of the USA, he replied that he had been a college president and federal politics would be a walk in the park after that.) It was soon realized by scientists that offprints were an excellent method of publicizing themselves and staking out their territory of research.

One famous example was that of the historian Frederick Jackson Turner, whose 1893 paper "The Significance Of The Frontier In American History" is considered one of the most important articles on history ever published. Turner was not shy about publicizing his work, and mailed out hundreds of offprints of his articles [6]. It became known that there is a correlation between the number of offprint requests and the number of times that article will be cited by others in their research papers [11]. Citation analysis is an accepted branch of statistics, and is used to rank university departments by prestige, not a minor matter when it comes to attracting the best of scientists or getting research funding. Scientists applying for tenure will have their published work examined for how often it was cited by others, so offprints have a definite impact on careers.

Even unto death it is the case that offprints are important. When a scientist dies or retires, his offprint collection may be inherited in bulk by a colleague, university department, or library. It may

also be redispersed among the scientific community by offering it, in whole or in part, to scientists who wish to obtain offprints issued before their time [12]. In short, it is a form of immortality for a scientist to keep his work circulating through the Papernet.

Offprints are definitely a major part of the Papernet. The number of offprints mailed around the world is staggering. One study [7] concluded that in 1977 about 38 million offprints were mailed worldwide, which rose to 47 million by 1984 and about 100 million by 2000. (There are an estimated 100,000 scientific journals today.)

The distribution of offprint requests reflects the distribution of scientists and the quality of the local postal systems. A 1992 study [25] broke down the distribution of offprint requesters as follows: USA 45%, Canada 8%, western Europe except Britain 22%, eastern Europe 19%, Britain 4%, and Third World 2%. However, this may not be indicative of actual distribution of scientists from the Third World due to the brain drain. It was noted by one researcher that the majority of offprint requests by scientists with Indian names were from outside India [28]. Just as a country of illiterates may still have a high use of the postal system because of public scribes, so it is that many Third World scientists get the offprints they need because they are working full or part time in a university in North America or Europe.

Historically the method of obtaining offprints was to write for them, although since the late 1990s the preferred method is to send an e-mail. Offprints are so important to science that a number of studies have been carried out on how to best to obtain them [13 to 17]. The response rates are roughly the same for postcard requests and letters, although handwritten requests are not as successful. Including a self-addressed return label got higher responses, but not at statistically important levels [31].

A common practice was to use form postcards, which had the request in the form of fill-in-the-blank text and the requester's address. Given the international nature of science, such requests were often multi-lingual. Even better, some scientists had their address on a rouletted part of the postcard so the author could tear it off and tape it to the envelope for a more convenient response. Postcards were often favoured because they were cheaper, easier for the recipient to read, and, in totalitarian countries, easier to get past secret police censorship.

The success rates vary from 60% to 80% on average. A study of those who didn't send requested offprints broke the reasons down as follows [27]:

- initial request claimed not received	35%
- no reprints available	35%
- can't afford to send	25%
- thought they had already sent it	13%
- felt requester should look elsewhere for copy	13%
- only send reprints to colleagues in the field	8.3%
- misplaced request	3.8%
- doubted the requester was serious	3.8%
- put off by impersonal requests	2.9%
- only send if postage supplied	2.9%

I have my doubts about the first reason, which appears to be the old "your cheque is in the mail" excuse. Any postal system that lost 35% of offprint requests would also be losing 35% of ordinary mail, and such a thing could not go unnoticed for long. "can't afford to send" is not entirely unreasonable, for many institutions are on very tight budgets. Some of the refusal reasons are elitist and violate the spirit of international science in refusing to send to unknown researchers. Scientists are expected to know their field and all the major publications in it. Because of the flood of information, it has long been difficult to keep up with the literature even in one branch of science. Researchers therefore establish informal communities and only circulate offprints between themselves [30]. Newcomers or outsiders may have difficulty entering these communities and getting offprints.

Speed is of the essence, for the sooner one gets a request off, the better the chances of getting an offprint. One study even examined if the colour of the postcard will affect the success rate, and concluded that it didn't matter [18]. Authors have only a limited supply of offprints, and a popular article will quickly give out. One study on 27 authors showed that 19 got more than 100 requests for offprints and 4 got at least 500 requests [25].

Success rate in getting an offprint does not seem based on academic rank (ex., graduate student versus sessional lecturer versus tenured professor) but one study showed that male requesters got their offprints slightly faster than female requesters [26].

Disruptions In The Papernet.

Science depends on the steady flow of information through the Papernet. Wars, poverty, poor local postal systems, and totalitarian governments have disrupted the Papernet many times. I will take World War Two as an example of how war disrupted the free flow of offprints and scientific information. Reports from that era show several methods of disrupting the Papernet [19 and 20]. From 1940 onward, offprints sent to occupied France, Spain, Czechoslovakia, Poland, Greece, and Yugoslavia were being returned to sender. In contrast, they were getting through okay to Belgium, Netherlands, Switzerland,

and the Scandinavian countries. The Nazis had a policy of intellectual starvation. In the Soviet Union, the different problem was that research institutes and universities had to relocate away from the advancing war front, or were disrupted by constant staff changes. The best method of getting offprints through was in care of war aid committees such as Red Cross, who kept lists of who was where. After the war was not much better [21 and 22]. European scientists who had been out of touch behind enemy lines were anxious to receive offprints to catch up on what they had missed, but the struggling nations were a long time rebuilding. In 1946, for example, the U.S. Post Office had an embargo to many countries such as Austria on mail other than first-class not exceeding one ounce. Since most offprints weigh more than this, American scientists sending out offprints had them returned to sender. Europeans had their own problems in supplying offprints to Americans. Britain, for example, continued paper rationing long after the war, which cut down on the number of offprints a British scientist could get. One Cambridge University scientist only got 50 offprints but had more than 200 requests from the USA alone [23].

Nor is this an historical problem. Many scientists in Third World countries have trouble getting offprints due to ongoing wars and mail delays [24]. This is especially critical to them since of the 100,000 or so scientific periodicals published today, 80% are in English, and most are far too expensive to subscribe to.

All major scientific journals are now available on-line, so does this mean the end of offprints? Paradoxically, the answer appears to be 'no'. Every on-line journal offers free tables of contents and the vast majority provide brief abstracts of the articles. Only a handful of journals offer full-text articles free of charge, since to do so would gut the subscriber lists. A postcard request is cheaper than buying the article on-line for $15. Inter-library loans are expensive and slow. Therefore offprints are still needed. The Internet is being used especially for the circulation of preprints. A preprint is a draft of a paper before it is published, as opposed to an offprint which is the paper actually published. In fast-moving fields such as computer science or particle physics, where a three-month-old piece of equipment is considered obsolete, preprints are often the only reading material of a researcher, and offprints are for the historical record [29]. This may have the advantage of reducing the flow of information through the Papernet because the cruddy papers are filtered out on the Internet, and only the quality remains on paper.

References.

1] Eamon, W. (1984) Arcana disclosed: The advent of printing, the books of secrets tradition, and the development of experimental science in the Sixteenth Century. HISTORY OF SCIENCE 22:111-150

2] Anonymous (1665) The motion of the late comet predicted. PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY OF LONDON 1:3-4

3] Ornstein, Martha (1938) THE ROLE OF SCIENTIFIC SOCIETIES IN THE SEVENTEENTH CENTURY. Published by University of Chicago Press. 3rd edition, pages 123 to 130, 198 to 209.

4] Cannon, Garland (1975) Sir William Jones, Sir Joseph Banks, and the Royal Society. NOTES AND RECORDS OF THE ROYAL SOCIETY OF LONDON 29:205-230

5] Hitchcock, A.S. (1892) The botanical library of a station botanist. SCIENCE 20:241-242

6] Limerick, P.N. (1995) Turnerians all: The dream of a helpful history in an intelligible world. AMERICAN HISTORICAL REVIEW 100:697-716

7] Tenopir, C., and D.W. King (2000) TOWARDS ELECTRONIC JOURNALS: REALITIES FOR SCIENTISTS, LIBRARIANS, AND PUBLISHERS. Published by Special Libraries Association, Washington, D.C.

8] MacDougall, R. (1902) Reprints of scientific papers. SCIENCE 15:315

9] Friedman, H.J. (1962) Reprints of journal articles. SCIENCE 135:278

10] MacWatt, J.A. (1961) Improving scientific communication. SCIENCE 134:313-316

11] Drenth, J.P.H. (2003) More reprint requests, more citations. SCIENTOMETRICS 56:283-286

12] Gudger, E.W. (1938) Distribution of reprints of papers by the late Bashford Dean. SCIENCE 87:390

13] Seiler, L.H. (1979) On requesting reprints. JOURNAL OF SOCIAL PSYCHOLOGY 107:141-142

14] Hartley, James (1997) Postcard, letter, e-mail? What's the best way to obtain a reprint? SCIENCE COMMUNICATION 19:56-61

15] Leung, A.K.C., et al (1991) Responses to reprint requests: Form letters versus preprinted cards. JOURNAL OF THE NATIONAL MEDICAL ASSOCIATION 83:249-251

16] Ligon, J., B. Thyer, and A. Isaac (1998) Do social work scholars respond to requests for reprints? A study of authors who publish in NASW journals. BEHAVIORAL AND SOCIAL SCIENCES LIBRARIAN 16:19-25

17] Watkins, M.W. (2001) Journal reprints as dissemination of psychological research: Courtesy, obligation, or obsolescence? JOURNAL OF PSYCHOLOGY 135:52-58

18] Hartly, James (2000) Obtaining reprints: Does color help? SCIENCE COMMUNICATION 22:212-218

19] Leake, C.D. (1941) Reprints for European laboratories. SCIENCE 94:586

20] Razran, G.S. (1942) Offprints for the scientific men of Soviet Russia. SCIENCE 96:231

21] Fromm, F. (1946) Notice about sending reprints to Austria. SCIENCE 103:635

22] Salk, Jonas E. (1946) Request for reprints on virus diseases. SCIENCE 104:86-87

23] Anonymous (1949) Requesting reprints from abroad. SCIENCE 109:92

24] Canagarajah, A.S. (1996) "Nondiscursive" requirements in academic publishing, material resources of periphery scholars, and the politics of knowledge production. WRITTEN COMMUNICATION 13:435-473

25] Herbetko, J., and P.L. Munk (1992) Reprint requestors and providers in radiology. JOURNAL OF THE CANADIAN ASSOCIATION OF RADIOLOGISTS 43:283-287

26] Searleman, A., et al (1983) Are the fruits of research available to all? the effects of sex and academic rank on reprint-sending behavior. SEX ROLES 9:1091-1100

27] Ellis, L., and I. Curless (1985) Psychology of the scientist: Noncompliance with reprint requests among behavioral scientists. PSYCHOLOGICAL REPORTS 56:403-406

28] Onuigbo, W.I.B. (1983) Tracing the brain drain with reprint requests. SOCIAL BIOLOGY 30:423-425

29] Traylor, T.D. (2001) The PrePRINT Network: A new dynamic in information access from the U.S. Department of Energy. JOURNAL OF GOVERNMENT INFORMATION 28:249-266

30] Storer, N.W. (1966) THE SOCIAL SYSTEM OF SCIENCE. Published by Holt, Rinehart, and Winston, new York. Pages 144 to 159.

31] Hartley, James (2002) Obtaining reprints: The effects of self-addressed return labels. JOURNAL OF TECHNICAL WRITING AND COMMUNICATION 32:67-73

by Dale Speirs

Introduction.

There was a vogue among the antiquities-minded in Victorian-era Europe of growing wheat or peas allegedly brought back from Egypt in mummies. It was at its height from the 1840s to the 1860s. The subject was much discussed in the pages of journals such as NOTES AND QUERIES. The fad had its initial impetus earlier in the century when Napoleonic troops returned home from Egypt with large quantities of loot. By the late 1800s, enough was known of both wheat seed longevity and of sharp practice in the Egyptian tourist market to have pretty much killed off the idea.

Mummy Wheat.

The stereotypical report of mummy wheat or mummy peas is of an Englishman being given a few grains of wheat certified to have come from a mummy by an impeccable source such as an Earl, a Duke, or, in a pinch, a Lord. From these few grains are built up an immense field of wheat yielding far better than any European crop did. One noticeable thing about all the old reports of mummy wheat was that no one in the British Isles ever apparently got mummy wheat directly; it was always a friend or casual acquaintance who gave it to them. Since most testimonials could

Figure 1: An 1849 illustration of wheat grown from purported mummy wheat. From ref. 17.

not prove the source (today we would do it with DNA sequencing) the anecdotes are basically worthless. That Martin F. Tupper, the well-known author of his time, grew mummy wheat and publicly exhibited it in 1843, says nothing, especially since the seeds were given to him by an unnamed friend [5].

Interesting elaborations of the story arose. At an unspecified date in the late 1800s, an Irish clergyman appeared before the Royal Dublin Society and exhibited bread made from the sowings of mummy wheat [15]. The relator of that anecdote sums up his most impressive proof: " ... and I ate some of that bread." This doesn't prove much since the source of the wheat was whatever was growing in Egypt when the mummy exporter needed some straw for packing material. An 1881 anecdote [9], reporting about the writer's father an unspecified number of decades prior, reported that the sample of mummy wheat in his family came through the following route. Firstly, it was taken from the case the mummy was in, which indicates that the sample was from packing straw. The mummy's owner gave a sample to the directors of the East India Company, one of whom was the father, who then took it to Scotland and grew them on. Another case, reported from memory fifty years previous (which would place it circa the 1830s), said mummy wheat was sown in the grounds of the Horticultural Society [11]. It is not clear whether this was the Royal Horticultural Society or some local group. The crop produced was typical Egyptian wheat.

Sharp Practice And Innocent Carelessness.

In any commercial market, if a demand exists, it will be filled, whether with the real item or fakes. One reason why the mummy wheat industry developed was the profit motive. In 1843, a single seed of second-generation mummy wheat was valued at 2 shillings, an astronomical value even today after inflation [2].

A century ago, tourists returning from Egypt were bringing back mummy seeds such as American corn (!) and various other grains [16]. All of these sprouted readily enough given that they had come from the previous year's harvest.

Some mummy wheat could be innocent mistakes. It was noted in 1880 that wheat seeds collected from some mummies did germinate and produce Egyptian wheat, but it was modern wheat from the straw used to pack mummies for transport [8]. Indeed, this seems to be the most common source of mummy wheat when the importer was legitimate.

Astonishing Yields.

Mummy wheat seemed to produce remarkable crops of exaggerated yield far superior to local cultivars. I confess to being cynical about these reports. This raises the question of why, if such wheat was so wonderful, people didn't just import the wheat and give away the mummy.

Circa 1842, a farmer sowed mummy wheat and discovered it grew a foot higher and was most luxuriant compared to English wheat [4]. In 1847, a Maidstone farmer was said to have produced a plant with 66 ears of grain from one seed of mummy wheat [3]. French farmers did well by mummy wheat. An 1849 sowing produced a return of 1,200 for 1, as against the normal return of 15 to 1 of France in that era. Other sowings reaped 60 for 1 and 556 for 1. Again, these were secondhand reports [6]. In 1852, a Devon, England, farmer cleared 500 to 1 for seeds from a mummy of Thebes [14].

Mummy Peas.

The field of mummy peas was not so commonly cultivated. This may be because it is easier to identify pea cultivars than wheat, so any imposters would be sooner exposed. To the average gardener, one stalk of wheat looks much the same as the next. Nonetheless, the 1899 flower show at Windsor had an exhibit of sweet peas supposedly grown from mummy seed 2,000 years old [20].

An excellent example is an 1899 report by an Englishman who grew mummy peas he obtained from a friend, who said his grandfather brought them to Scotland fifty years previous [19]. The peas, said the naive reporter, looked much the same as the

common partridge field pea. Instead of drawing the obvious conclusion that over the last fifty years the stock had been replaced by a mixup with a modern cultivar, he instead expressed surprise at how little the pea had changed since the ancient pharaohs!

The best method to expose imposters was through a nurseryman. One report [21] was dealt with by a Covent Garden seedsman, who had been given a pea seed guaranteed taken direct from unfolding a mummy. He planted it and it developed into an excellent specimen of the modern cultivar 'Veitch's Perfection'.

Debunkers.

Even in the heyday of mummy wheat, there were doubters. The anecdotes about mummy wheat are unreliable and unproven, and certainly not scientific [12]. An English sceptic of 1857, on hearing the above claims from France, examined modern Egyptian wheat and found it only about half as productive as English wheat [7]. One commentator remarked in 1861 about a stock of mummy wheat supposedly discovered by a Mr. Parkhurst that: " ... it is not unlikely that the original stock ... owes more to Mr. Parkhurst's garden than to the researches of our Egyptian resurrectionists." [1].

An 1880 appeal to an authority at the British Museum produced the reply that they had never found wheat seeds in the bandages of Egyptian mummies [18]. This contradicted a friend-of-a-friend claim remembered two decades afterwards in which it was asserted that people attending a unrolling of a mummy at the British Museum in 1881 saw grains of wheat in the mummy's interior [13]. The friend of the narrator then was given some of the seeds and later grew them on. Despite assertions that the mummy was untouched, it seems probable that the seeds came from straw packing material.

Seed Longevity.

The density of viable buried seeds declines as altitude, latitude, and successional age increases, and decreases with disturbance. The least likely places for long-term survival is the tropical rainforest and arctic/alpine areas [23]. Studies are contradictory but it does appear that many species can remain dormant for up to 100 years, and a very few for centuries at a time.

The single most famous experiment in botany, which is also the world's longest running continuously monitored experiment of any kind, was begun in 1879 by Prof. William Beal at Michigan State University and is still in progress [28]. He buried fresh seeds of 21 different species in open-mouthed, soil-filled bottles, slanted downward so they wouldn't fill with water.

At regular

intervals, a bottle was dug up, the seeds germinated, and the resulting plants pollinated to test their seed set. By the 120-year mark, only two species of weeds germinated.

As it happens, wheat and peas do not appear to be good subjects for long-duration seed dormancy. Those who grew authenticated ancient wheat came up with the same results: nothing sprouted [10]. A commentator in 1880 wrote that most grain seeds failed to germinate after 8 years, although a few of them still germinated after 25 years [8].

An 1899 report on peas showed that they did not germinate after 6 years [22]. Studies on seeds preserved in herbariums or seed banks have shown that few species of vegetables will germinate past 30 to 50 years [33]. Prairie species mostly lost their germination ability by their sixth year of dormancy [31].

A 1967 study [29] on old lemming burrows preserved in the permafrost suggested that the lupine seeds (a member of the pea family) were up to 10,000 years old. This study is doubted by many [30, 34] because it did not control for two important variables, soil movement (which could have brought younger seeds into older deposits) and redistribution by burrowing animals. On the other hand, in 1995 researchers reported that they had grown sacred lotus plants from known-date seeds up to 1,288 years old [27].

The only controlled study of buried seeds, on a variety of archaeological sites in Denmark [32] demonstrated that weedy species were viable 100 to 1,700 years in the soil. The common factor was that the seeds were buried in slightly moist soil which was deficient in oxygen. This is, of course, the exact opposite of Egyptian mummies.

Disturbance Colonizers.

The issue of seed dormancy has long been noted by the average person, because when a piece of land is dug up for some reason, it is observed that plant species not seen before will suddenly appear. It might be, and often is, supposed that the seeds were dormant in the soil and sprouted after being brought to the surface by disturbance. However, it can often be the case that the species are adapted to colonizing disturbed soil via airborne or waterborne seeds.

In the Canadian Arctic, it was noted that placer gold mines, which wash the soil with firehoses, had plant species commonly growing in and around them but nowhere else.

An 1834 essay in CHAMBER'S EDINBURGH JOURNAL discussed various locations in Britain where soil disturbance brought forth plants not seen in decades or centuries [24]. In

1861, an English farmer reported 75 new varieties of oats never seen in the district before, and supposed it was because he had ploughed over an ancient Roman camp [25]. It is more likely that however the oats got there, it was not so long ago, and probably it was the variable weed wild oats. The Romans accomplished many things but carrying 75 types of oats for their horses was not one of them.

In 1875, ancient silver mines at Laurium, Greece, were being worked for the first time in 1,500 years [26]. About 5 hectares of soil was dug up and was suddenly overgrown by *Glaucium serpieri*, a plant previously unknown at the locality.

There is an entire ecological class of plants which specialize in colonizing disturbed areas, and whose seed can be transmitted long distances by wind or water. Most annual crop weeds belong to this class since a grain field is disturbed annually. It thus seems likely that old locations suddenly sprouting new plants owe more to the wind than antiquity.

References.

1] Allport, D. (1861) Herodotus. NOTES AND QUERIES 2nd Series 11:510-511

2] Anonymous (1843) Egyptian wheat. PUNCH 5:143

3] Anonymous (1847-08-28) [untitled] ILLUSTRATED LONDON NEWS 11:135

4] Anonymous (1847) Wheat from seed three thousand years old. LONDON JOURNAL 6:111

5] Anonymous (1856) Germination of seeds. NOTES AND QUERIES 2nd Series 2:117

6] Anonymous (1857) Mummy wheat. NOTES AND QUERIES 2nd Series 3:259

7] Anonymous (1857) Mummy wheat. NOTES AND QUERIES 2nd Series 3:457-458

8] Anonymous (as J.C.M.) (1880) Mummy wheat and mummy teeth. NOTES AND QUERIES 6th Series 2:452-453

9] Anonymous (as H.A.S.) (1881) Mummy wheat. NOTES AND QUERIES 6th Series 3:158

10] Anonymous (as J.S.) (1901-07-22) Obituary. THE TIMES (London), page 6, column 2

11] Atkinson, H.G. (1880) Vitality of mummy wheat. NOTES AND QUERIES 6th Series 2:415

12] Bunker, H.J. (1946-04-04) Seeds from Pharoah's tomb. THE LISTENER 35:425

13] Clark, R. (1899) Mummy wheat. NOTES AND QUERIES 9th Series 4:274

14] Collyns, W. (1857) Mummy wheat. NOTES AND QUERIES 2nd Series 3:379

15] Davies, F.R. (1901) Mummy wheat. NOTES AND QUERIES 9th Series 8:170

16] Dormer, J. (1903) Retarded germination of seeds. NOTES AND QUERIES 9th Series 11:155-156

17] Emery, E. (1849-09-22) Mummy wheat. ILLUSTRATED LONDON NEWS 15:197

18] Sewell, W.H. (1880) Mummy wheat growing. NOTES AND QUERIES 6th Series 2:306

19] Wynne, M.B. (1899) Mummy peas. NOTES AND QUERIES 9th Series 4:198

20] Anonymous (as Astarte) (1899) Mummy peas. NOTES AND QUERIES 9th Series 4:145

21] Marshall, E. (1899) Mummy peas. NOTES AND QUERIES 9th Series 4:198

22] Hussey, A. (1899) Mummy peas. NOTES AND QUERIES 9th Series 4:252

23] Thompson, K. (1978) The occurrence of buried viable seeds in relation to environmental gradients. JOURNAL OF BIOGEOGRAPHY 5:425-430

24] Anonymous (1834) Long vitality of seeds. CHAMBER'S EDINBURGH JOURNAL 2:126-127

25] Anonymous (1861) Ancient oats. NOTES AND QUERIES 2nd Series 11:450

26] Anonymous (1875-05-08) [untitled] HARPER'S WEEKLY 19:383

27] Shen-Miller, J., et al (1995) Exceptional seed longevity and robust growth: Ancient sacred lotus from China. AMERICAN JOURNAL OF BOTANY 82:1367-1380

28] Telewski, F.W., and J.A.D. Zeevaart (2002) The 120-yr period for Dr. Beal's seed viability experiment. AMERICAN JOURNAL OF BOTANY 89:1285-1288

29] Porsild, A.E., et al (1967) Lupinus arcticus grown from seeds of Pleistocene age. SCIENCE 158:113-114

30] Kjoller, A., and S. Odum (1971) Evidence for longevity of seeds and micro-organisms in permafrost. ARCTIC 24:230-233

31] Blake, A.K. (1935) Viability and germination of seeds and early life history of prairie plants. ECOLOGICAL MONOGRAPHS 5:405-460

32] Odum, S. (1965) Germination of ancient seeds. DANSK BOTANISK ARKIV 24(2):5-70

33] Roos, E.E., and D.A. Davidson (1992) Record longevities of vegetable seeds in storage. HORTSCIENCE 27:393-396

34] Godwin, H. (1968) Evidence for longevity of seeds. NATURE 220:708-709