

# 'Mummy wheat' at Albury

by W R TROTTER

*During the 19th century, there were many claims to have germinated wheat seed found in Egyptian tombs of the Pharaonic period ('mummy wheat'). With one exception, all these claims are meagre and unconvincing, and were soon discredited. Martin Tupper, however, gave a detailed account of his experiment with mummy wheat at Albury; his claim to have propagated it through several generations was widely accepted by reputable authorities at the time, and deserves to be re-examined.*

The tombs of ancient Egypt were first explored by French archaeologists during Napoleon's occupation of that country. After the end of the Napoleonic wars they became the goal of many enterprising travellers with a taste for antiquity. During this period many more tombs were opened up; among their contents grains of corn were often found, either in a receptacle or clutched in the hand of a mummified corpse. Some of this seed was brought back to Britain and other European countries, and many people of curious or romantic temperament could not resist the temptation to see whether it would germinate. Martin Tupper was both curious and romantic, and was carried away by the prospect that he might shortly be able to 'eat bread made of corn which Joseph might have reasonably thought to store in his granaries, and almost literally snatch a meal from the kneading troughs of departing Israel'.<sup>1</sup> Many others had similar visions, which were naturally encouraged by the Arab guardians of the tombs, who readily provided, at a price, 'authentic' sealed jars of mummy wheat for tourists to sow in their gardens when they got home; while the less adventurous were catered for by an English nursery which sold seed – at £1 for 10 grains – derived from 'a small bag of wheat' found in the hand of a mummy.<sup>2</sup> There were therefore strong pressures in favour of getting positive results, and it is not surprising to find that the columns of the *Gardeners' Chronicle*, during the 1830s and 1840s, contain several claims – none of them at all well substantiated – to have germinated mummy wheat. After that these claims gradually evaporated, and by the time of King-Parks' comprehensive review in 1885<sup>3</sup> they were discredited by most authorities. King-Parks described in detail what he considered were the three 'best known cases of supposed germination': these were by Count von Sternberg,<sup>4</sup> President of the Natural History Museum of Prague; by C A Johns<sup>5</sup> (1811–74), author of the well-known *Flowers of the Field*; and an unpublished account of a mummy which was unwrapped by Samuel Birch (1813–85) at the British Museum. In all three cases seed was found in close association with a mummy, from which one or more plants of wheat were said to have been grown. King-Parks was able to give detailed reasons for not accepting these claims, and they were in fact all in different ways sketchy and inadequate. He also consulted a number of leading authorities, and found that they were equally sceptical.

What is most surprising about King-Parks' review is that it makes no mention of Tupper's experiment, which was far more carefully executed and more fully documented than any of the others. It is difficult to avoid the suspicion that King-Parks may have felt that it rather spoils his case.

## **Martin Farquar Tupper (1810–89)**

Martin Tupper, son of a prosperous London physician, was qualified to practise both as a clergyman and as a lawyer, but was unable to follow either profession because of a severe stutter. Instead, he expressed his thoughts in writing. He wrote profusely, in both prose and verse, on a great variety of subjects; the work that made him famous, at an early stage in his career, was *Proverbial Philosophy*, a collection of trite homilies in quasi-verse which is now

quite unreadable but which had a prodigious success with the early Victorian public, both here and in America. His novel, *Stephan Langton*, went through 23 editions, and is still of some local interest, since most of the action takes place in the neighbourhood of Albury. Towards the end of his life Tupper published a not entirely reliable autobiography;<sup>6</sup> Derek Hudson<sup>7</sup> has provided a more trustworthy account of his career.

Although Tupper now appears somewhat of a figure of fun (and indeed some of the later Victorians regarded him in the same light<sup>8</sup>), he nevertheless had some solid achievements to his name, and the fact that he was elected to the fellowship of the Royal Society in 1845, and also received a number of foreign distinctions, shows that he was taken seriously in contemporary intellectual circles. He took a serious and active interest in local archaeology, and was a founding member of the Surrey Archaeological Society. He was the first to excavate at Farley Heath, where he correctly identified the Roman site<sup>9</sup> (though he thought it had been a fortified camp, rather than a temple).

In 1839 Tupper inherited Albury House.<sup>10</sup> Shortly before that he had acquired 12 grains of corn from an Egyptian tomb. He now had a garden, he was keenly interested in antiquarian matters, and so it is not surprising that before very long he had planted his 12 seeds, and was watching eagerly to see if anything would emerge.

### Tupper's experiment

In the very long letter to *The Times*,<sup>1</sup> in which he described his experiment in great detail, Tupper gave the following account of how he had come by his 12 grains of corn: 'In 1838 Mr Pettigrew,<sup>11</sup> the well-known lecturer on Egyptian antiquities, gave me out of two small glasses in his private museum six grains of wheat and as many of barley, furnishing me at the same time with the following information as regards their history: Sir Gardner Wilkinson,<sup>12</sup> during his recent travels in the Thebaid, opened an ancient tomb (which had probably remained unvisited by man during the greater part of 3000 years), and from some alabaster sepulchral vases therein took with his own hands a quantity of wheat and barley that had been there preserved. Portions of this grain Sir G Wilkinson had given to several of his antiquarian friends, and among them to Mr Pettigrew, who, as I have already stated, made me a sharer in the venerable harvest. Until the spring of 1840 the 12 corns of which I so became possessed remained among certain contemporary bronzes and images in their separate paper box, but about that time, finding myself in the country and much occupied in horticultural pursuits, I bethought myself of those ancient seeds, and resolved to try my fortune in rearing them.'

Tupper then went on to describe the precautions he took to ensure that any seedlings that might appear had come from the Egyptian seed, and not from chance intruders: 'I ordered four garden pots of well-sifted loam, and, not content with my gardener's care in sifting, I emptied each pot successively into an open newspaper and put the earth back again, morsel by morsel, with my own fingers. It is next to impossible that any other seed should have been there. I then (on the 7th March last) planted my grains, three in each pot, at the angles of an equilateral triangle, so as to be sure of the spots where the sprouts would probably come up, by way of additional security against any chance seed lurking in the soil.'

The first account we have of the results of Tupper's experiment is contained in a letter from Rev George Handford<sup>13</sup> to Captain James Mangles,<sup>14</sup> dated 13 August 1840:<sup>15</sup>

My dear Sir,

Mr Holme<sup>16</sup> mentioned today in the course of conversation, that the celebrated Egyptian traveller, Sir G Wilkinson, is staying with you in London. It occurs to me that perhaps he may not be aware of the success which, in *one solitary instance* has attended the sowing of the Barley and Wheat taken by *him* from one of the *Catacombs*. Mr Tupper of Albany<sup>17</sup> in this neighbourhood shewed me a plant of wheat which he had succeeded in raising from the *seed in question*. It is now in ear very small and sickly, and if ever it arrives at maturity will produce at most about six or seven grains. It is of the bearded variety called in this country Egyptian

Wheat. The Barley, and all the rest of the wheat perished, being eaten by a small white worm hatched in great numbers in the substance of the seed itself. Tupper tells me the same fate has attended all the grains sown by other experimenters – as an entomologist he has no knowledge of the worm which proved so voracious after his long sleep of 3000 years. I have not space and time now to tell you how careful Mr Tupper has been to avoid all possibility of mistake. His own veracity is unimpeachable. He obtained the seed from Mr Pettigrew.

Believe me, My dear Sir,  
yours very faithfully,  
George Handford

On 22 August, Handford reported again to Mangles: ‘. . . You will be glad to hear that the venerable Plant is “as well as can be expected”; every care is taken of it, and there seems to be little doubt of its reaching the mature dignity of harvest . . . How strange that we should be able to handle what Pharaoh perhaps ought to have eaten!! The time which has elapsed since that seed was deposited in the coffin at Thebes is probably half the duration of the world . . .’

Soon after receiving Handford’s first letter, Mangles had evidently passed the news on to Dr John Lindley,<sup>18</sup> the famous botanist, who replied on 22 August:<sup>19</sup>

Dear Captain,

If it is bien avéré, not only that the Wheat came out of the tombs at Thebes, but that it was not put there by some Rogue of an Arab, I should very much like to have some to grow

Tupper first announced the success of his experiment in the long letter to *The Times*,<sup>1</sup> which has already been quoted. This appeared on 9 October 1840, and was apparently prompted by a garbled account of a lecture by Pettigrew, who had been misrepresented as having germinated the wheat seed himself.<sup>20</sup> After describing the precautions he had taken when the seed was sown, Tupper’s letter continued: ‘Of the 12, one only germinated, the plant in question, the blade first becoming visible on the 22nd of April. . . . My interesting plant of wheat remained in the atmosphere of my usual sitting room until change of place and air seemed necessary for its health, when I had it carefully transplanted to the open flower bed, where it has prospered ever since. The first ear began to be developed on the 5th of July . . . its appearance, in most respects, similar to that of a rather weakly plant of English wheat – that called by farmers “bearded” . . . still I have no hesitation in expressing my own certainty that it is the product of one of the identical corns given to me by Mr Pettigrew. A second ear has made its appearance since this was written, and both have assumed a character somewhat different from all our known varieties . . . The slight differences observable are, that the ears are less compact, the grains rather plumper, and the beards more thornlike than happens in common cases . . . The small size and weakness of the plant may in one light be regarded as collateral evidence of so great an age, for assuredly the energies of life would be but sluggish after having slept so long . . . There are two ears on separate stalks; they are respectively 2½ and 3 inches long, the former being much blighted, and the stalk is about three feet in height.’

From the two ears Tupper obtained 27 seeds. In the spring of 1841 he sowed 14 of these in his own garden; it is not known what happened to the rest. The crop in his garden was far more vigorous and prolific than that of the previous year, and yielded at harvest more than 100 large ears, from 6 to 8½in long. Tupper distributed many of these for others to try, but retained some from which he grew further crops in subsequent years.<sup>21</sup>

### The sequel

The abundant harvest of 1841 enabled Tupper to demonstrate the success of his experiment by distributing ears of corn on a wide scale. The longest ear of all went to the Prince Consort, and was acknowledged by a note: ‘The Prince is much obliged for this curious specimen, and proposes to raise more seed from it’. Others went to ‘a multitude of gentles and nobles’, accompanied by a circular letter which described the experiment, and concluded: ‘The present

portion of the crop in 1841 is offered, with Mr M F Tupper's compliments, to — as a person likely to feel interested in so curious, perhaps so unique, a subject'.<sup>22</sup> One of the recipients was Michael Faraday; Tupper wrote to him again in June 1842, giving further details of the crop. It so happened that this letter arrived just as Faraday was about to give an evening lecture at the Royal Institution. Although the lecture was on a very different subject (lithography and lithotinting), he concluded it by reading out Tupper's letter to the audience of 700 people, who 'received the information with great interest', and announcing that one of the ears of wheat had been put on display in the Library.<sup>23</sup>

The key figure in determining how the news would be received by the scientific community was the botanist, Dr John Lindley, who, as was recorded earlier, had been one of the first to hear about Tupper's experiment. His initial response<sup>19</sup> had been cautious but interested. Soon afterwards, it became clear that he was completely converted; in a letter to Tupper<sup>24</sup> he wrote: 'It is curious that of all the so-called instances of Mummial wheat yours should be the *only* one to which credence can be safely given. Many are no doubt Arab frauds.' In his capacity as editor of the *Gardeners' Chronicle*, he described the experiment in great detail, giving full credit to Tupper, whom he described as 'a most exact and conscientious man'. Lindley was satisfied that there was 'no link lost in the chain of evidence. Sir Gardner Wilkinson himself opened the tomb, and with his own hands emptied the alabaster vase; of its contents he gave a portion to Mr Pettigrew, who gave it to Mr Tupper, who himself sowed it. What better proof can we require?'<sup>25</sup>

Lindley's article was accompanied by an illustration of an ear of Tupper's 1841 crop. He described it as 'so like a good sample of Colonel Le Couteur's Bellevue Talavera that even the experienced eye of that gentlemen is unable to detect a difference'. Lindley commented on the greatly increased vigour of the second and subsequent generations: 'This, as Mr Tupper observes, corroborates the idea of a re-awakening from so long a sleep, as if the Wheat had been gradually returning to its pristine vigour'. The prolonged viability of the seed was attributed to the dryness of the atmosphere in the tomb.

In the years immediately following this pronouncement, the only correspondent to express any doubts ('these plaguy Arabs will do anything in the world for Bachshish, especially with an Englishman') was immediately crushed by Lindley: 'We think Mr Tupper's case beyond question'.<sup>26</sup>

The first serious challenge to Tupper's claims came in 1846, from J S Henslow (Darwin's mentor) who at that time combined the post of Professor of Botany at Cambridge with that of vicar of the village of Hitcham. Henslow took a serious and practical interest in agricultural matters, and so it was natural that Tupper had sent him a sample of the seed from his second generation of wheat. Henslow sowed this seed in his garden, along with several varieties of modern wheat, and reported the results in a letter to the *Gardeners' Chronicle*.<sup>27</sup> Of the variety called Bellevue Talavera he remarked: 'This variety was specially remarkable for exceeding in length of straw, and for flowering much earlier than any of the other varieties in my garden. In this, and in all other particulars, I could not observe the slightest difference between the Bellevue Talavera and the Mummy Wheat. Both, also, were attacked more vigorously than the rest by rust and mildew.'

Henslow went on to say that he had 'long suspected the possibility of a flaw in the testimony upon which this one grain is supposed to have been so old as Mr Tupper and Sir G Wilkinson believed it to be'. He knew of a previous occasion on which Wilkinson had been asked to supply seeds of mummy wheat for experiments by a committee of the British Association. The sample which was provided was found to be contaminated with maize seed, and led to the conclusion that it 'had certainly been tampered with before it came into Sir G W's possession'.

Henslow's letter does not seem to have worried Tupper, for he wrote on the copy in his scrapbook: 'Professor Henslow is singularly inconclusive'. But it probably raised some doubts in Lindley's mind. He made no immediate comment, but nine years later, in an editorial on the prolonged viability of seeds, he wrote<sup>28</sup> 'To the doubtful class we must refer all mummy Wheat, the history of which was formerly given in our columns (p 757, 1846)' [this is a reference to Henslow's letter] 'for although we do not regard the reasons for disbelieving its authenticity

quite sound, nevertheless we may allow that some suspicion attaches to it'. Lindley did, however, retain his belief in the viability of *some* seeds (he had been particularly impressed by the apparent survival of raspberry seeds from a Bronze Age barrow near Dorchester<sup>29</sup>), and this made him unwilling to reject Tupper's evidence totally.

It is difficult to know what Wilkinson thought about all this. I could find no reference to Tupper's experiment in any of Wilkinson's books about ancient Egypt. Tupper's scrapbook contains two letters from him, dated 13 and 17 April 1852, but these seem to suggest that Wilkinson either knew very little about Tupper's experiment or else had forgotten all about it. In these letters he enquired of Tupper 'From what seed yours was raised, by whom brought from Egypt, and from whom you had it and in what year – whether you examined the grains before they were sown and if they all appeared to be exactly similar – so that no one may say a chance seed of modern wheat had got into the old wheat . . . I am obliged to give an answer immediately to a friend of mine for whom I have promised to obtain all the information I can on the subject'. It is of course possible that Wilkinson is referring to some later experiment, but if so, there is no mention of it anywhere by Tupper himself.

### Discussion

A significant conclusion, which seems to have escaped the notice of contemporary observers, emerges quite clearly from the surviving evidence: Tupper's original plant of wheat was a completely different variety from the subsequent crops which were supposedly bred from it. The original plant was short, weak and sickly; the plants grown in subsequent years were, according to both Henslow and Colonel Le Couteur, indistinguishable from Bellevue Talavera, which is tall and vigorous. Two ears produced by the original plant were 2½ and 3in long, compared with 6–8½in of the 1841 crop. These differences were explained by both Tupper and Lindley by saying that they were to be expected if the plant was 'awakening from a long sleep'; but this explanation is not genetically acceptable. Even more significant is the fact, attested by both Handford and Tupper, that the original plant was bearded, whereas Bellevue Talavera (which resembled Tupper's subsequent plants so closely that it could not be distinguished by experienced observers) was beardless.

It also follows that, apart from the original plant, none of the rest of Tupper's crops could have been derived from mummy wheat, since it is now well established that the staple cereal of ancient Egypt was emmer,<sup>30</sup> which is heavily bearded.

It therefore seems virtually certain that when the second crop was sown in Tupper's garden in the spring of 1841, someone must have supplemented the seed from the original plant (which is very likely to have been sterile) with some fresh seed of Bellevue Talavera. There is no record of Tupper having sown the seed himself; most likely he ordered his gardener to do so. So the gardener<sup>31</sup> becomes the prime suspect. I can find no evidence to incriminate him; but there are precedents. Flinders Petrie,<sup>32</sup> for instance, knew of more than one case where a gardener, wishing to avoid disappointing an employer who had returned from Egypt with samples of mummy wheat, had substituted modern seed in the drill; and, said Petrie, 'it would require a stern moralist to deny him the satisfaction which he fondly anticipates'.

So Tupper's second and subsequent crops can be readily accounted for. The origin of his original plant is much more obscure, and likely to remain so. There is no inherent reason why seeds in general should not sometimes remain viable for the 3000 or so years which have elapsed since the time of the Pharaohs. Viable seeds of the sacred lotus, supposedly 2000 years old, have been recovered from a Far Eastern peat bog; while seeds of the Arctic lupin germinated successfully after lying in permafrost for, it is claimed, more than 10,000 years.<sup>33</sup> These are clearly exceptional instances, and the case of wheat, which has been bred for thousands of generations for ready germination, is very different. At the very most, the viability of wheat seed is measured in decades, rather than centuries, let alone millennia. Thus the longest survivals under experimental conditions found by Harrington<sup>34</sup> in his review were: *Triticum aestivum* (modern wheat), 85% germination after 32 years; *T dicoccum* (emmer), 87% after 31

years. Similarly, Maguire<sup>35</sup> recorded experiments with four varieties of wheat, stored in 1917 and tested 25 years later, with germination rates of 80–88%; after 55 years the rates were 1–6%. And when a batch of wheat seeds, which had been sealed in a glass tube and buried in the foundations of the Nuremburg City Theatre, were tested 123 years later, not a single one germinated.<sup>36</sup>

Thus all recent experience suggests that it is most unlikely that wheat grains from ancient Egypt would still retain their viability. Cytological examination of grains from Egyptian tombs of the Pharaonic period is equally discouraging.<sup>37</sup> Of direct tests of the viability of such seeds, only two are sufficiently well recorded to be worth a mention. The most impressive was that carried out by Flinders Petrie<sup>32</sup> in 1889. He was working at Hawara in the Fayum when he came upon ‘a great store of corn . . . only late Roman in date’. The next day he planted ‘the fullest and finest grains . . . in rows, in every degree of moisture, from soft mud to merely damp earth, in a sheltered place by a canal. Every possible chance was thus in their favour. There was not a trace of sprouting.’ The only possible objection which could be raised to this apparently conclusive experiment is that the nature of the wheat is not specified, and being of Roman date, it may not have been the emmer of the Pharaonic period.

An investigation carried out by another Egyptologist, Sir E A Wallis Budge,<sup>38</sup> in the 1930s was less satisfactory. During his time as Keeper of Egyptian Antiquities at the British Museum he had been exasperated by repeated enquiries by the public about the viability of mummy wheat. So when he retired he decided that he would settle this tiresome question once and for all. He had in his possession a large amount of ‘darkish brown grain, wheat or barley (I know not which)’ obtained from ‘a very pretty 18th or 19th Dynasty tomb at Thebes’, which he had brought home with him in a leather bag. Some of this he gave to Sir William Thiselton-Dyer at Kew, where it was sown in four separate plots, each covered with glass of a different colour. None of it germinated. In the second of his two letters to *The Times*, Budge offered to supply more of the same seed to ‘any responsible authority’ who would be prepared to test its viability. I do not know how many took up his offer, but reports appeared in *The Times* from John Percival<sup>39</sup> of Reading, Smith Brothers<sup>40</sup> of Basingstoke, and Wilfred H Parker<sup>41</sup> of the National Institute of Agricultural Botany at Cambridge. All were negative. This superficially impressive investigation is, however, marred by the fact that the seed had been kept for an unspecified period, possibly as much as 30 years (Budge gives the date on which the corn was obtained from the tomb as 1897 in one account, and 1906 in another), in the damp London atmosphere.

The combined weight of all these negative results is impressive, even though the quality of most of the investigations is poor; and since Tupper’s experiment in 1840 there has been no claim to have germinated mummy wheat that is worth serious consideration. There is therefore a very strong probability that the seed from which Tupper managed to grow his one plant did not originate in the time of the Pharaohs. It was, however, clearly not fresh seed, since the rate of germination was poor, the plant small and weakly, and its seed probably sterile; these are all characteristics of plants grown from aged seed.<sup>36</sup> This exonerates Tupper, and his gardener. Although Wilkinson and Pettigrew are possible suspects, it seems much more likely that fresh seed had been added to the alabaster jar in the supposedly unopened tomb in Egypt, and had deteriorated subsequently in the damp and foggy London atmosphere. So although one cannot entirely exclude the possibility that some extraordinary combination of favourable mutations (or in older terms, a miracle) might have enabled one single seed out of many millions to retain its viability for 3000 years, the commonsense conclusion must be that Lindley’s original scepticism was justified; the seed had been put there by ‘some Rogue of an Arab’.

#### ACKNOWLEDGEMENTS

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## NOTES AND REFERENCES

- 1 Tupper, M F, 1840 in *The Times*, 9 October, 7, col 6.
- 2 *Gardeners' Chronicle*, 1843, 658.
- 3 King-Parks, H, 1885 in *J Sci*, 3 ser, 17, 604.
- 4 Sternberg, K M, Count von, 1835 *Flora, oder allgemeine botanische Zeitung (Regensburg)*, 18 Band 1, 3.
- 5 Johns, C A, 1843 *Botanical rambles*, Soc Promotion Christian Knowledge, 24.
- 6 Tupper, M F, 1886 *My life as an author*.
- 7 Hudson, D, 1949 *Martin Tupper, his rise and fall*.
- 8 W M Thackeray, for instance (according to Tennyson), used to refer to him as 'Farting Tupper' (Knies, E A, 1984 *Tennyson at Aldworth*, 67).
- 9 Goodchild R G, 1938 *SyAC*, 46, 10, has given a full description of the Farley Heath excavation. Tupper's own account is more fanciful; he also expressed his joy in the work in a delightful poem (included in his autobiography, op cit in note 6, 352), which opens with the lines: 'Many a day have I whiled away/Upon hopeful Farley Heath/In its antique soil digging for spoil/Of possible treasure beneath'.
- 10 Albury House (TQ 053 479) lies on the south side of the A248, between Albury Park and the village of Albury.
- 11 Thomas Pettigrew (1791–1865), surgeon and antiquary, was well known for his dissections of Egyptian mummies.
- 12 John Gardner Wilkinson (1797–1875), a pioneer of Egyptology, opened many tombs at Thebes and elsewhere, and also contributed to the study of hieroglyphics. He was in Egypt from 1824 to 1833, and again sporadically from 1842 onwards. The tomb from which Tupper's seed came must have been opened in 1833 or earlier.
- 13 Rev James George Handford (1807–74) was curate of Shere (the next village to Albury) from 1839 to 1845.
- 14 Captain James Mangles, RN, FRS (1786–1867), was a nephew of James Mangles, MP for Guildford. He was well known in antiquarian circles as the author of *Travels in Egypt and Nubia* (1823), and in horticultural circles as the author of *The floral calendar* (1839). He was living in London at the time.
- 15 Copies of Handford's two letters are in Captain Mangles' Letterbooks, now in the Battye Library (479 A), Perth, Western Australia; the Royal Geographical Society has them in microfilm (RGS Archives MF 66).
- 16 'Mr Holme' was probably Henry James Torre (1793–1850), who assumed the name of Holme in 1833 when he inherited his grandfather's estate. In 1817 he married Captain Mangles' cousin Margaret (*Gentlemen's Magazine*, 1, 324). A Henry James Holme, of independent means, was living at Shere in 1837 (electoral roll), and in 1841 (census).
- 17 'Albany' is clearly a mistake for Albury. Letters received by Captain Mangles were copied into the Letterbooks by an unknown scribe, who may not have been familiar with the name Albury.
- 18 John Lindley (1799–1865), Professor of Botany in the University of London, Secretary to the (not yet Royal) Horticultural Society and editor of the *Gardeners' Chronicle*, had classified specimens of the newly discovered Western Australia flora, obtained by Captain Mangles.
- 19 Lindley's letter is also in the Captain's Letterbooks.
- 20 *The Times* 21 September 1840, 7. Tupper's friend, E W Brayley (the Surrey historian) had noticed the mistake, and wrote at once to both Tupper and *The Times*.
- 21 An autograph note, headed 'My Mummy Wheat', in Tupper's scrapbook, now in the Rare Books Library of the University of Illinois at Urbana (ref X828.T8391).
- 22 Quoted by Hudson, op cit in note 7.
- 23 Tupper's letter to Faraday was published in the *Literary Gazette*, 1842, 425. Faraday's reply, describing the audience's enthusiastic reception of the 'good and valuable news', was published in Tupper's autobiography (op cit in note 6, 211).
- 24 Quoted by Hudson (op cit in note 7).
- 25 *Gardener's Chronicle*, 1843, 787. The article is unsigned, but there is no doubt that it was written by Lindley as Editor.
- 26 *Ibid* 1843, 805.
- 27 *Ibid* 1846, 757.
- 28 *Ibid* 1855, 739.
- 29 This was the bowl barrow at Winterbourne Monkton, described in Grinsell, L V, 1959 *Dorset barrows*, Dorset Nat Hist Archaeol Soc, 150, as 'very unsatisfactorily recorded'. The antiquity of the raspberry seeds is very dubious, but Lindley never abandoned his belief in it, and referred to it as established beyond doubt in all his textbooks.
- 30 The review by D M Dixon, 1969, A note on cereals in ancient Egypt, in *The domestication and exploitation of plants and animals* (eds P J Ucko & G W Dimbleby) 131–42, has put together the evidence for supposing that the heavily bearded emmer was the staple cereal of ancient Egypt. In contrast, there is no doubt that the wheat of Tupper's second and subsequent generations was beardless. The clearest evidence for this comes from the second edition of the book by Colonel Le Couteur (who had raised the variety known as Bellevue Talavera on his estate in Jersey), entitled *On the varieties, properties and classification of wheat*, 1872. In this book (p xxi) he described the contents of a showcase which he had exhibited at South Kensington Museum. This contained ears from a wide range of varieties

- of wheat, arranged in groups. Group 6 ('Beardless Spring Wheats') contained his own Bellevue Talavera, and also 'Mummy Wheat. Tomb of the Kings of Thebes, Sir Gardner Wilkinson. Raised at Bellevue from one ear sent by M Tupper Esq, 1846'.
- 31 Tupper's grandson (Rev Martin Tupper) and his wife, who live at Albury, very kindly offered to enquire in the village whether anything was known about the gardener; but without result.
- 32 In an article entitled 'For reconsideration: Mummy Wheat', signed 'WMFP', in *Ancient Egypt*, 1914, **1**, 79.
- 33 Porsild, A E, Harrington, C R, & Mulligan, G A, 1967 *Science*, **158**, 113.
- 34 Harrington, J F, in T T Kozlowski (ed), 1972 *Seed biology*, **3**, 145.
- 35 Maguire, J D, in A A Khan (ed), 1977 *The physiology and biochemistry of seed dormancy and germination*, 224.
- 36 Roberts, E H, 1972 *The viability of seeds*, 29.
- 37 Hallam, N D, in W Heydecker (ed), 1973 *Seed ecology*, 141.
- 38 *The Times* 23 April 1931, 10.; *ibid* 6 September 1934, 13.
- 39 *Ibid* 10 September 1934, 13.
- 40 *Ibid* 8 October 1934, 15.
- 41 *Ibid* 29 October 1934, 10.