

#### XIV.—THE VITALITY OF SEEDS FOUND IN THE WRAPPINGS OF EGYPTIAN MUMMIES.

BY JOHN PHILIPSON.

[Read on the 31st October, 1888.]

At the monthly meeting of our Society on September 28th, 1887, some conversation which passed between the chairman and the late Captain Robinson came near reviving the far-famed controversy respecting the germinating possibilities of mummy wheat, in the same manner that it had been renewed by Professor Judd at the Geological Society, early in the summer of 1886.

I confess to a more than ordinary interest in the subject, as I was aware of some instances of reputed mummy wheat having been successfully grown in our own locality, but as I am not one of those who venerate the story simply because it is old, I set to work to collect such evidence as might explain two problems that presented themselves, viz.:—1st, Would seeds retain their germinating powers during a period of two thousand or three thousand years? and 2nd, have plants ever been raised from such seeds?

The whole matter turns upon the character of the seeds which have been discovered in the folds of mummy wrappings. I have ample proof that plants have been raised from such seeds not only in the south of England, but in this neighbourhood, and it only remains for the spurious or genuine nature of these seeds to be decided to set the matter at rest. It is, of course, impossible to obtain absolute proof in such a matter, but there are those who have not hesitated to assert that the Arab with his characteristic cunning has placed modern seeds within the folds of the mummy cloths. Nothing is easier than to make a declaration of this kind. Crafty though he may be, the Arab would not take this trouble until he knew that there was something to gain by it—*i.e.*, until he had heard of the finding of genuine seeds and the interest evoked by their discovery. There were, however, three cases in which the receptacles—two sarcophagi and a vase—could not possibly have been tampered with, and the knowledge of these instances encouraged me to follow

up the subject, with the result that I am able to lay before you what I consider sufficient evidence to prove that what is known as mummy wheat has been raised from seeds more than two thousand years old.

Experiments without end have been made to show for what length of time seeds will retain their vitality; but the trials made under the auspices of the British Association by the late Mr. Strickland, Professor Henslow, Dr. Lindley, and Dr. Daubeny, were so extensive and were conducted with such care that they overshadow in importance all experiments of a like nature, and will in the future, as I have no doubt they have in the past, be regarded as conclusive by the majority of people.

I find, however, that there are authorities who are extremely reluctant to accept as final the evidence furnished by these trials, as so many instances are on record to prove that seeds will retain their vitality for very much longer periods than would appear to be the case from the British Association's experiments, which commenced in 1834, and lasted more than twenty years. In saying so I do not refer to seeds which may have retained their vitality for thousands of years, but to cases where they have undoubtedly done so for more than a century.

The British Association's experiments extended to 71 natural families and 288 genera, including nearly all the kinds of vegetables cultivated for culinary and other domestic purposes. One hundred seeds of each kind were generally sown. If any of these germinated, a smaller number of the same were experimented upon again after a lapse of five years and so on, as long as any came up. In this way it was found that the greater number of species had lost their vitality altogether after being kept ten years. It was, however, ascertained that no less than 34 species, or about one-seventh of the whole number retained their vitality after ten years, 20 species, or about one-fourth, after twenty years, but that the only species that reached twenty-five, twenty-six, or twenty-seven years belonged to the natural families leguminaceae, malvaceae, and liliaceae.

Having in view what is known of vegetable physiology we cannot suppose that the vitality and germinative powers of the seeds of phanerogamic plants can be indefinite. A seed, like an egg, is a living organism, even when it seems to be immovable and inert. As

a living organism it breathes, that is to say, it wears itself out. The first condition of life is the first condition of death. If a seed breathe for an indefinite period without at the same time being able to feed itself, it will die, burnt up, but it is certain that when the adjuncts are such as to induce the immovable and inert condition, then the seed may preserve its vitality during a certain period. This period is very variable for different plants, and often variable for the same plants, according to circumstances.

The conditions under which the seeds of mummy wheat have been found are in the highest degree favourable to the preservation of the dormant state, a perfectly hermetical exclusion from the action of the oxygen of the air and from moisture, in a climate the aridity of which is well known, must have conduced to the preservation of the vital powers of seeds, which, though having the life-germ very close to the surface and but thinly protected, are known to yield an extremely hardy plant, whose vitality is not easily destroyed.

My friend Señor Batalha Reis has reminded me that one of the most celebrated of French horticulturists says he does not believe in the possibility of the germination of grains of wheat kept for two thousand years, but he at the same time notes without contestation the fact of the preservation of germinative powers of seeds for upwards of a century. There is an interesting relation between the duration of the germinating power in seeds and the quantity of matter which water can extract from them by simple prolonged immersion.

Darwin found that the vitality of seeds would resist for a considerable time immersion in salt water, and he arrived at the conclusion that carried in the less swift currents of the ocean they would remain unchanged while travelling 1,600 kilometres. Absence of moisture in seeds renders them insensible to heat and cold, consequently they can be transported without accident to climates where the plants that produced them would immediately perish. It is stated that a portion of the oats eaten by a horse have germinated on the dunghill; and Darwin tells us that three spoonfuls of mud taken from a pond produced after six months' cultivation at least 537 plants. There is also the fact that the duration of life in the seed may be shortened or lengthened by the presence of certain substances.

Professor Vogler of Munich demonstrated how certain things

stopped the germination; prussic acid retards it in a notable way, while a solution of potash has hastened the germination of seeds. Professor Vogler made to germinate very old seeds, which were considered dead, by treating them with camphor water. All experience goes to show the futility of such experiments as those made by the British Association. The results must ever be uncertain and unconvincing.

Professor Brady informs me that there is nothing remarkable in the statement that plants will resist the action of water heated to 140 degrees F. He has often taken animals and plants of quite high organization living, and multiplying in the engine ponds of collieries in this district, where he has measured more than 100 degrees, and he has no doubt that at times the heat will be considerably greater than this.

We have all heard of the Celtic tombs, near Bergerac in France, and of the seeds discovered under the head of a skeleton buried there twenty centuries ago. There had been placed in a cavity, cemented and covered by a block, a small quantity of seeds, which, sown with particular care, germinated and yielded heliotrope, trefoil, and blue bell.

Canon Greenwell does not entertain the belief that corn taken from the tombs has ever germinated, and has drawn my attention to the case where it was proved to be modern corn that had been palmed off by the Arabs as old. Canon Greenwell has only once found any seed in the graves of Ancient Britons. In this instance, some seeds, apparently juniper berries, had been buried with a child, and they were certainly beyond the power of germinating. On the other hand, my correspondent instances well-known cases of some seeds retaining their reproductive nature during long periods of concealment. One of the most wonderful is that of white clover. Whenever a piece of moorland with ling is broken up, especially when lime is used, a splendid crop of white clover is the result, and in some cases, where very old grass land has been ploughed out, the land has, in the next year, been covered with wild mustard.

Canon Greenwell's experience is somewhat similar to that of the well-known Dorset antiquary and philologist, the Rev. Wm. Barnes, B.D., who records the fact of raspberry seeds having been taken from

the contents of the colon of a man buried in a cist of the Romano-British period. He says, however, that some of these seeds were planted in a pot at equal distances and at marked spots, and placed under the care of a German gardener who knew nothing of the seeds or of the object of the experiment. In a few weeks four of the marked spots yielded young plants, of which one died; but the others thrived and bore leaves, if not fruit.

A similar, if not the same, case was investigated in 1852; and Dr. Lankester informed the British Association in the following year that, although doubt had been cast upon the case, there seemed no reason to doubt that the seeds thus buried for centuries had germinated. Dr. Royle was present when the original mass of matter from the stomach of the dead person was brought to Dr. Lindley in London, and when the raspberry seeds were discovered in it, and he had no doubt of the correctness of the conclusion that the seeds which had been swallowed and buried had germinated after the lapse of centuries. The offspring of these seeds is now to be seen in the gardens of the Horticultural Society.

Mr. C. Corder of Chirton informs me of a case where a large wood, no doubt a part of the primeval forest of the country, was stubbed, and the next year the land was covered with wild oats, although it had never been known to grow anything but timber and underwood previously. The seeds are believed by Mr. Corder to have lain in the ground since our first parents sowed their wild oats.

In this locality we have many homely examples of the vitality of seeds. One is the small, fir-like plant—one of the *equisetums*—about 2 inches high, which grows so thickly on some railway embankments. Mr. J. Robinson has drawn my attention to one instance of a newly constructed railway between Seaton Delaval Colliery and New Delaval Colliery, where the first mile was almost entirely constructed of small coals or coal dust which was thickly overgrown with this plant, while on the other section, which was constructed from the stones and ashes from the burnt stone heaps, no such plant sprang up, and for years no vegetation whatever was seen. Mr. Robinson, though favourable to the theory, admits that it is impossible to prove that the seeds have lain in the Coal measures from the early days when the vegetable substances were changed into mineral. We have another admirable

illustration in the rank weed coltsfoot, the first and often the only sign of vitality on ground that has perhaps never been disturbed. A correspondent of mine says, if we observe a cutting 50 or 100 feet deep, the first thing seen is coltsfoot. Where has it been? Why did it not die and go to decay?

Another well-known instance is recalled. After the old Royal Exchange of London was burnt, the remains of a still older building were found beneath. These were removed, and when the long-buried earth was turned over charlock sprang up. Perhaps Dr. Bruce or some other gentleman present knows what building previously occupied the site, and may enable us to form an opinion as to how long the buried seeds had retained their vitality.

Mr. R. G. Bolam of Berwick has informed me that many years ago a farmer in the neighbourhood of Alnwick, on ploughing up the site of an old camp, turned up a quantity of oats, which soon produced a large crop, and for years afterwards these were known as Roman oats, from the supposition that the camp was a Roman one. Mr. James Hardy, the Secretary to the Berwickshire Naturalists' Club, also refers to this and other similar incidents. That the vitality of seeds is marked by the greatest irregularity cannot be denied. Delicate fern spores, though easily wafted about by currents of air, are endowed with an extraordinary power of endurance, which accounts for their wide geographical distribution. Numerous cases of their isolated appearance at Kew and other places which I could quote are a sufficient proof of their vitality.

The remains of no less than fifty-nine species of flowering plants from mummy wrappings in Egypt have been identified. The flowers have been wonderfully preserved—even the delicate violet colour of the larkspur and the scarlet of the poppy, the chlorophyll in the leaves, and the sugar in the raisins, remaining. On the other hand, I learn from my friend Professor Simmonds that Mons. Velmorin of the firm of Velmorin, Andrieux & Co., the most eminent seedsmen of the world, has made experiments in the propagation of wheat seeds, and has never succeeded in growing a single seed that was older than ten years. His father made very careful trials with mummy wheat, and found that not one grain grew when sowed in earth previously heated

so as to kill any seeds that might by chance be mixed with it. He was led to that precaution by remarking that in all reports of previous trials where those mummy seeds were reported to have grown, the plants developed from them were identical with some variety usually grown in the country where the trials took place. From this he inferred that not the mummy seed grew, but some native wheat of which the seed was accidentally buried in the earth.

I may here hazard a remark upon what seems to me to be a striking peculiarity, to use no stronger term, in this and several other cases of a like nature. It has generally been a wheat seed that has been accidentally buried in the soil. Other seeds have not put in an appearance. Once it was maize that sprang up, but in the other cases I have come across the offending seed has invariably been wheat. The coincidences are remarkable. So far as I have been able to discover, suspicion as to the genuineness of the seeds was first aroused when some seeds, taken from a mummy case in Egypt, and supposed to be grains of wheat, were submitted to examination and determined to belong to the species of maize, an American plant, said to be unknown to the ancient Egyptians. This necessitated the belief that the subjects of the Pharaohs were engaged in commerce with America three thousand years ago, but it is curious that this maize differed from the common maize in having a much narrower seed and a highly developed calyx.

I have endeavoured to show that although seeds are not easily preserved in a living state for a great number of years, there are what Professor Henslow calls 'remarkable exceptions' where they have lain unharmed for centuries. Egyptian monuments admirably fulfil the conditions necessary to preservation as in a sarcophagus, or hermetically sealed vase, they would be protected from the air and from variations of temperature or humidity.

I now propose to deal with some cases which in my opinion, prove that such exceptions have occurred more than once with seeds taken from mummy wrappings, and by persons in this country. These seeds have yielded what has long been known as 'mummy wheat' a plant having a compound spike, a distinguishing characteristic by which it is readily known, but which is not altogether permanent,

ears averaging seven inches in length and from fifteen to twenty on each root. Of the several cases I intend to quote, cases that have occurred in this and other parts of England, I shall rely principally upon three instances. In the local cases the mummy wrappings from which the seeds were taken may possibly have been tampered with; there is no proof either one way or the other, but I shall show conclusively that wheat plants entirely different from all known cultivated kinds have been raised in our own county from such seed. However, in the cases of Mr. M. F. Tupper, of Mr. Strutt, and of Mr. McGregor there can be no doubt. In the former the links in the chain are complete. Daubeney could find no fault with the evidence, and the care which Mr. Tupper exercised in the planting and propagation of the seeds removes the matter from the region of suspicion. I give as briefly as possible the story as related by Dr. Masters, the editor of the *Gardeners' Chronicle*, who with much kindness and consideration has given me all the assistance in his power. The history of this wheat was given by Mr. Martin Farquahar Tupper, a most exact and conscientious man, in the *Times* of September, 1840, and to that gentleman we are indebted for the additional facts which we are now able to communicate. This by the way appeared in the *Gardeners' Chronicle* in 1843.

Sir Gardiner Wilkinson, when in the Thebaïd, opened an ancient tomb, which had probably remained unvisited by man during the greater part of three thousand 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 Mr. Pettigrew, who presented Mr. Tupper with twelve grains of the venerable harvest. Mr. Tupper says: "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. On the 7th of March, 1840, I 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 unseen lurking in the soil. Of the twelve, one only germinated, the blade first becoming visible on



April 22nd, the remaining eleven after long patience I picked out again; and found in every instance that they were rotting in the earth, being eaten away by a number of minute white worms. 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 develop on the 5th of July; a second ear afterwards made its appearance, and both assumed a character somewhat different from all our known varieties. Their small size and weakness 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; however, the season of the sowing—spring instead of autumn—will furnish another sufficient cause. The two ears on separate stalks were respectively two and a half and three inches long, the former being much blighted, and the stalk about three feet in height. 'If, and I see no reason to disbelieve it,' says Tupper, 'if this plant of wheat be indeed the product of a grain preserved since the time of the Pharaohs, we moderns may, within a little year, 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.'

Here we have no link missing in the chain of evidence. Sir Gardiner 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, watched it, and reared it. What better proof can we require? Unless it be alleged that the grains, after all, may have been changed somewhere on the road between the Thebaïd and Mr. Tupper's garden. But upon this point Mr. Tupper expressly says, in a passage we have not quoted, that the grains which he sowed were brown and shrunk, which is a just description of some that we, too, have seen from Sir Gardiner Wilkinson, but which would not apply to any modern wheat. They looked, indeed, as if they had been scorched.

There are other proofs less direct, but equally conclusive, as to the antiquity of the seed sown by Mr. Tupper; but I think it unnecessary to dwell longer upon this marvellous example further than to say that as Professor Henslow expressed some doubt as to the genuineness of

the seeds experimented upon by Mr. Tupper, I asked my friend Miss Jackson of Guildford to make inquiry of Mr. Tupper's daughter, Mrs. Clayton Adams, who writes to me stating that she has spoken to her father on the subject, and, although an invalid, he is much interested in hearing mention made again of his mummy wheat, and that both he and Sir Gardiner believed the seed to be genuine. Miss Jackson's uncle, Dr. Napper, also writes to say that he remembers the first planting and propagation of the wheat at Albury. The second case which I regard as incontestable, is that of Mr. Joseph Strutt, who in 1839 showed at an exhibition in Derby, held upon the premises of the Mechanics' Institute, a very fine Egyptian mummy, which he afterwards left at the Derby Museum. Through the courteous co-operation of the Hon. Frederick Strutt, son of the late Lord Belper, I have been in communication with some members of the family upon the subject, and they have favoured me with some information respecting this incident that has not yet been published. Mr. Douglas Fox, a brother of Sir Charles Fox, and a well-known medical man in Derby, of which place he was twice mayor, unrolled Mr. Strutt's mummy, and took some wheat seeds out of its hands. These he gave to Mrs. Jedediah Strutt, who did not plant them at once, but kept them a few days. She first planted some in the pleasure grounds at Green Hall, and from the proceeds she planted a small plot in the paddock.

In 1843 a second exhibition was held in Derby, in the Athenæum Buildings, for the benefit of the town and county museum, and Mrs. Jedediah Strutt here showed the growing wheat, the entry in the catalogue reading thus: '320. Wheat grown from grains recently found in the coffin of an Egyptian mummy.' I have in my possession the written statement of Mrs. Norton, sister-in-law to Mr. Douglas Fox, certifying to the truth of the story. I have, moreover, a letter from Mr. George Bailey, a member of the council of the Derby Antiquarian Society, stating that he saw wheat which had been propagated from the produce of the original seeds growing in the garden of Mr. Webster of Derby. This case is as well authenticated as Mr. Tupper's, and in some volumes of *Notes and Queries* I have been glad to find confirmatory evidence. It was discussed in that periodical, and some correspondents who had seen the same wheat growing described it as having bearded ears, and more than one ear upon each stalk.

The third case is that of the Duke of Sutherland, who brought a sarcophagus in his own yacht from Egypt, and as it was not opened until reaching this country, it is difficult to understand how there can have been any deception in this particular instance. Mr. J. Macgregor of Blackheath, known as 'Rob Roy,' writes thus to Dr. Bruce: 'The Duke of Sutherland asked some friends to see the sarcophagus, and I was one of them. It was closely examined, and seemed quite unbroken. When we took off the heavy lid we found much corn in the folds of the dress. I was living then in the Temple, where I resided twenty years. The Temple gardener carefully sowed some of the seed, and watered it, and some weeks afterwards it sent up a shoot, which is now in my house. I will gladly show them if you come here after good notice.'

The mummy presented to the Literary and Philosophical Society by the late Mr. John Bowes Wright, and which is now in our Natural History Museum, was unwrapped on March 8th, 1830, in the presence of Drs. Baird, Greenhow, Fife, and Messrs. Bruce, Hall, Wailes, and others, and seeds were found in the cerement. Some of these seeds were taken by the late Mr. Jno. Hall, corn merchant, to Jno. Crossling, gardener to Mr. Thos. Riddell of Felton Park. Under his care they grew well to a certain point, each stalk bearing several heads—but they never ripened. Mrs. Hall, who now resides at Brandling Park, visited Felton Park with her husband for the purpose of seeing the wheat, and I have her written certificate to this effect, as also that of her daughter (Miss Eastwood Hall), respecting matters told her by her father in relation to this wheat. Mr. Crossling, who was one of the most successful gardeners of his time, occasionally contributed to the press papers on horticultural subjects, but he appears to have published nothing on this event. His son, Mr. Ralph Crossling of the Penarth Nurseries, says the plants resembled in many ways the bearded many-headed wheat that can at present be procured in the East. Mr. Gifford Riddell of Felton Park, the son of Mr. T. Riddell, writes to inform me that his father always referred to this event with the liveliest interest, and looked upon the seeds as being perfectly genuine; and Mr. Robert Donkin of Rothbury says he knows that the late Mr. Crossling planted the seeds, and often heard him relate that they grew; and more than this, Mr. Donkin had invitations to visit Felton Park to see the plants.

I may now explain that my interest in this subject arose from the fact that in my youth—about 1846 or 1847, I believe—accompanied by my mother, I visited Mr. and Miss Archbold at Fenham Gardens, and that the growing of mummy wheat was one of the topics of conversation. Miss Archbold presented me with a head of corn, which has happily been preserved in a cabinet at home, and which I now submit; and I would for a moment direct attention to the striking resemblance borne by this ear to those shown in a drawing which depicts wheat grown by R. Enoch of Stow-on-the-Wold from grains brought from Thebes by a member of the family of Sir Wm. Symonds, and which wheat was described in the *Illustrated London News* of September 22nd, 1849. The knowledge of Mr. Archbold's experiments led me to put myself in communication with Mr. Matthew Henderson, who acted as gardener to Mr. Archbold fifty years ago, and remained in the service of the family until they all died. Mr. Henderson says that his master grew some wheat which had been got from an Egyptian mummy. The plants were three or four feet high, and had drooping heads with long awns like barley, and had two or three smaller heads growing out of the larger. The chaff was downy, and held the wet, so that it was unsuitable for this climate. The wheat was certainly different from any other that Mr. Henderson had seen before or since. Miss Wailes of this town writes to tell me that, about 1832, when she resided in Westgate Road, her brother, the late Mr. Geo. Wailes, assisted at the unwrapping of the mummy given by Mr. Wright. He showed her some corn seeds which were taken from the hands of the mummy. These were sown in a pot, and placed in the greenhouse, where they grew to a considerable height, but did not ripen.

The mummy presented by Mr. Thomas Coates, Haydon Bridge, October, 1821, is still unopened, and is preserved in our Museum in a glass case, and I look forward to the day when it may be opened, and yield further proof of genuine seed being found in the wrappings. The inscription on the case was translated by the late Mr. John Bruce, and is to be found, together with a plate, in the *Newcastle Magazine*, No. 26, vol. iii. Mr. John Bruce also gave Mrs. Bruce, the wife of Dr. Bruce, our venerable Vice-President, a piece of the cerement which he saw taken off the mummy, and this, together with some ears of corn raised from mummy seed, and presented to Mrs. Bruce about the same time, I have the pleasure to place upon the table.

In the autumn of 1859 the late Mr. Wm. Wailes of Saltwell handed to his gardener, John Cant, now at St. Andrew's Cemetery, some mummy-wheat seeds, which he had obtained from a friend, and which were said to be more than two thousand years old. The gardener sowed them in a flower pot and placed it under glass. Every seed vegetated, became strong and healthy looking, and in the following year the plants were placed in a sheltered spot in the garden, where they grew well and produced a number of large ears, requiring the assistance of sticks to protect them from the wind. When the power of the sun declined the plants assumed an unhealthy appearance, and not a single ear came to maturity, causing Mr. Wailes to conclude that our climate was unsuitable to their propagation.

Considering the character and attainments of the men who interested themselves in the local experiments, it is difficult to believe that the seeds can have been other than genuine. Messrs. William and George Wailes were botanists of some note, and were in constant correspondence with Professor Sedgwick and men of kindred tastes. Mr. Hall was a gentleman of the highest character. He saw the mummy unwrapped, and took the seeds out himself; and his widow states that Mr. Hall got a portion of the cloth as well as the seeds, which he saw planted and raised as already described.

Mr. Gordon Douglas of Thames Ditton informs me that in the year 1848 his father obtained some mummy wheat from a friend. It was planted in the garden, grew, and ripened, and for a number of years the produce was sown. In 1878 Mr. Gordon Douglas himself planted some mummy-peas, which came up, and he still continues to sow them. Four years ago, Mr. Douglas was given some mummy-wheat when in Egypt, and was also successful in propagating it. Mr. Douglas regards the whole three cases as above doubt or suspicion, and particularly the last, as in this instance the seed was given to him by a high Egyptian official.

I have another and, if I may so term it, a more modern instance to bring under your notice, and although, as was once remarked by the President of the Brighton Natural History Society, Englishmen are apt to take affirmations emanating from the other side of the Atlantic *cum grano salis*, there is little doubt about the genuineness

of the case I am about to quote. A few years ago some extraordinary archaeological discoveries were made in the far Western States and new territories of America. In the town of Payson, Utah territory, several ancient mounds were discovered, and in one of them was found a large skeleton whose framework measured six feet six inches; together with the skeleton were a huge iron weapon, a large stone pipe, etc. The floor of the mound was covered with a species of hard cement, to all appearance part of the solid rock which was found to be but the corner of a box similarly constructed in which were found about three pounds of wheat kernels, most of which dissolved when brought into contact with the light and air. A few of the kernels in the centre of the heap looked bright and retained their freshness on being exposed. These were carefully preserved and planted, and I have in my possession a letter from Mr. Amasa Potter, the farmer who planted them, and has continued to grow the produce, a specimen of which I have the pleasure to exhibit. He can give numerous references to many of his neighbours who saw and handled the wheat, witnessed the planting, growth, and the ingathering of the bulk from which the sample on the table is a portion. It has been sent to me by my friend Mr. Dennet of Brighton, author of a paper on 'The Germination of Wheat.' Mr. Potter says that scientific men in the United States have been unable to find any wheat exactly resembling it, and he adds that the facts have never been doubted by those travellers who have visited the scene of the discoveries.

My attention was drawn to the *Graphic* of September 12th, 1874, by Mr. T. Waddington. It gave an account of what has since been known as the Andersonian mummy-pea, and related how about three years previously General Anderson, who was staying at the Government House Hotel, Guernsey, presented Mr. John Gardner, the proprietor, with three peas from a number he had collected in Egypt, and supposed to be two or three thousand years old. The following year Mr. Gardner had them sown, and was successful in rearing two plants, and the year after was still more fortunate. In 1874, he had a large patch, some of the plants were seven feet high, the stems being of an unusually large size, with flowers of a beautiful pink and white colour. The stalk of the Egyptian pea is peculiar. Near the ground it is attenuated, but

at the summit it is several sizes thicker, so that it appears a necessity to support it, and the more so as the pods are clustered together at the head of the plant instead of being like the ordinary peas, distributed along the stalk. Mr. Waddington has kindly forwarded me a few of the peas raised from this plant.

My friend Dr. Embleton has received mummy peas from two different sources, one lot from Alderman Hamond and a number from some friends in the south of England. Alderman Hamond says that there is no pea equal to them in size, flavour, and colour when boiled, and that they grow to a height of twelve feet and have very thick stalks. I have little hesitation in ascribing both supplies to one source, viz., the Island of Guernsey, where the Andersonian peas were originally grown.

It is not my intention to further multiply the number of instances where it is claimed that wheat and peas have been grown from genuine mummy seeds. There are many others on record both in England and on the Continent; but I will merely mention that at a sitting of the French Academy of Science in 1849, Mons. Guénin Maneville submitted several stalks of wheat more than six feet high, which were grown from five grains found in an old Egyptian tomb. When sown the first ear yielded, it is asserted, 1,200 for one.

Again, Mrs. Backhouse of Sunderland has some wheat that was grown from mummy seeds by her late husband; and, although she cannot prove it, the family never had any doubt whatever as to its genuineness. Curiously enough, they tried to grow some of the fresh seed they got, but the second generation quite refused to germinate. At Ushaw College, too, some forty years ago, there was a field of mummy wheat that had been raised from a few seeds. The Very Rev. Monsigneur Witham has told me that he remembers it; and the Rev. Dr. Gillow of St. Cuthbert's College writes to me saying that he cannot remember where the seed was found, or by whom it was first sown, but he knows that the produce was called mummy wheat, and it is also remembered by Mr. Balfour, the florist, who takes an interest in this subject, and through whose kindness I am able to show the Andersonian pea plant on the table.

I have now placed before the meeting the evidence which by some considerable labour I have collected, and to the best of my ability in-

vestigated. It may be argued that the agreement, although strong, does not amount to a demonstration, and I admit that there is a strong array of opinion against me, but it is opinion only; and although men may agree, they may be agreed in error. However, I do not hesitate to quote the opinions of eminent men upon this subject, and I have therefore added to this paper a synopsis of the views of several eminent scientists with whom I have recently been in communication.

In conclusion, I wish to express my warm appreciation of the kindness of the many professors and learned gentlemen who have, in several instances at a considerable sacrifice of time, given me the results of their experience, and I am indebted to Mr. McDonald of the *Newcastle Chronicle*, and Mr. Dawson of the *Newcastle Journal*, for references to several leading authorities. I also wish to thank my friend Mr. Foggett, who has rendered me valuable assistance in the preparation and arrangement of this paper, which, although far from perfect, may be useful in encouraging further investigation.

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#### NOTE.

In August, 1888, when the cylinders were being sunk for the foundations of the Co-operative Wholesale Society's flour mill at Dunston, some hazel nuts were found at a depth of nearly 30 feet below the bed of the river, among what is shown on the plan of the strata as 'sand and water.' No particular attention was paid to them at the time, and a bucketful was emptied on to the heap.

In the spring of 1889, Mr. Armstrong, the clerk of the works, found that one of the nuts had sprouted. It was planted in a pot, and was taken care of by Mr. Bailey, the Secretary of the Co-operative Wholesale Society, who has also preserved a number of the nuts. That gentleman transferred the plant to Mr. Henry Wallace of Trench Hall, in whose possession it is at the present time—August, 1890. The gardener at Ravensworth placed it in another pot, and it is now over a foot high. It appears to be a common hazel, like those of the present day, but the leaves are larger. Mr. Wallace thinks this may be owing to the good treatment it has received. Mr. Garbutt of Dunston Lodge is also familiar with the whole of the incidents. In



addition to the information respecting this extraordinary case, Mr. Wallace has brought to my knowledge two instances of prolonged vitality quite as interesting as some I have cited above.

One of the grass parks at Ravensworth was known to have been in old or permanent grass for 80 years at least. The grass was not doing well, so it was decided to plough it out and sow it with oats, but the oats were completely smothered with wild mustard. There were not six inches of the 10 acres free from the plant. The mustard seed must have been buried in the ground when the land was last ploughed, and must have been there for certainly 80 years.

On Lord Ravensworth's Eslington estate there is a large forest of old Scotch firs on Thrunton Crag. Those trees must have been 150 years old, and at one place the tops nearly touched, so that the sunlight was excluded and the ground below the trees was quite bare. About 20 years ago a large number of the firs were cut down, letting in the light and air, and in the following year that part where the timber had been thinned was covered with young birch seedlings. There were no birch trees near to seed, and Mr. Wallace's opinion, with which no one can disagree, is that the birch seeds had lain in the land from the time when the young Scotch firs had been planted.

I am pleased to be able to record these cases of local interest, which are vouched for on Mr. Wallace's authority.—J. P.

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#### AN APPENDIX

CONTAINING THE VIEWS OF A NUMBER OF EMINENT AUTHORITIES UPON THE POSSIBILITY OF THE GERMINATION OF MUMMY WHEAT.

*Dr. Georg Schweinfurth, Cairo.*—This eminent botanist informs me that seeds from Egyptian mummies are always unable to germinate, as their chemical composition has changed, and that there is no reasonable inducement to believe in the possibility of germination.

Dr. Schweinfurth says that all the examples of raising grain from such seeds are due to mystifications partly by the Arabs, who prepare mummies specially for travellers. He has analyzed many seeds and grains taken from Egyptian remains, but never esteemed them worthy of an experiment in the garden. Dr. Schweinfurth classes the tradition of mummy wheat in the same category as crocodiles' tears.

*Prof. Babington, Cambridge.*—Has no belief in the germination of any grain really placed in a mummy by the ancient Egyptians. He has seen grain really

so placed, and it was so impregnated with bitumen, or something of that kind, that there was no chance of vitality remaining. Nevertheless, it was sown, but without result. If any person who has given sufficient attention to the subject, and taken the utmost possible care that no mistake can have happened, produces the grain, he (Professor Babington) may be led to reconsider the question.

*Prof. Tanner, Queen's College, Birmingham.*—In his prize essay on 'The Mechanical Construction of the Soil favourable for the growth of Seed,' printed in the *Journal of the Royal Agricultural Society of England*, Vol. 21, part 1, 1860, page 47, says :—'The conditions which control the growth of seeds are the presence of air, moisture, and warmth, and, to produce healthy germination, all are required in definite proportions. When seed is protected from these agencies it will retain its powers of growth for long periods of time. Thus wheat preserved in Egyptian mummies between three thousand and four thousand years has, after that lapse of time, germinated, and produced a large increase. The preservation of the power of growth is entirely dependent upon the seed being kept from these agencies, which would excite its vital energy.'

*Sir Chas. Lyell.*—In his *Principles of Geology*, 9th edition, page 587, thus writes :—'The fruits, seeds, and other portions of twenty different plants, and, amongst them, the common wheat, was procured by Delille from closed vessels in the sepulchres of the kings. The grains of wheat not only retained their form, but also their colour, and no difference could be detected between this wheat and what now grows in the East and elsewhere.' In a note to this passage he says :—'I by no means wish to express an opinion that seeds cannot retain their vitality after an entombment of three thousand years; but, one of my botanical friends who entertained a philosophic doubt on this subject being desirous of ascertaining the truth of three or four alleged instances of the germination of 'mummy wheat,' discovered, on communicating with several Egyptian travellers, that they had procured the grains in question, not directly from the catacombs, but from the Arabs, who are always ready to supply strangers with an article now very frequently in demand. The presence of an occasional grain of Indian corn or maize, in several of the parcels of grain shown to my friend as coming from the catacombs, confirmed his scepticism.'

*M. Rifaud.*—A recent and laborious investigator of the antiquities and natural history of Egypt, brought to Europe a large collection of various seeds, bulbs, and other parts of plants which he had found in the catacombs, and all of these were deprived of any vegetating power.

*Geo. Murray, British Museum.*—At the request of Professor Bower, Mr. Murray has kindly communicated to me his views on the subject. He remarks that, without doubt, the assertions respecting the germination of mummy seeds have been made in good faith, but they have never been made by a competent experimenter. An experiment of this kind must be carried out with as much care as the cultivation of bacteria.

1. It must be ascertained beyond all doubt that the material to be experimented with is absolutely genuine.

2. That its cultivation be carried out beyond all risk of contamination either from seeds already present in the soil, or from seeds subsequently planted therein.

3. The experiment must, therefore, be made in closed cases, and with soil which has been boiled, or raised to a temperature known to be fatal to all seeds. Then only may the mummy seeds be planted.

4. The experimenter must be a man qualified by previous botanical research.

At present, Mr. Murray is as much prepared to believe in the reanimation of the *Ichthyosaurus* as in the vitality of mummy seeds.

*Prof. Bentley.*—In a letter to my friend, Mr. Alfred Wright (of Messrs. Brady & Martin's) says so far as I know, as stated in my Manual, *there are no well authenticated instances of wheat taken from Egyptian mummies, which have been untampered with, germinating.*

I have heard nothing since to alter the opinion thus expressed. You will notice that I say *untampered with*. I do not dispute the statement of such men as Pettigrew, and doubtless, Wailes, as to wheat grains having germinated after being taken from mummies, but in such cases I cannot but believe that such grains were introduced accidentally, or otherwise, at some subsequent period, and do not, therefore, correspond in age to the mummies.

*Thos. Gibbs & Co., Seedsmen to Her Majesty.*—Have generally stated that they side with the views held by the British Association in 1842 and 1857, feeling convinced that all vitality must be destroyed in seeds that have lain thousands of years undisturbed.

*Sir Samuel Baker, the distinguished African Traveller and Explorer.*—During many years has made enquiries in Egypt respecting the germination of seeds taken from mummy coffins, and has found that grains of ordinary modern wheat are purposely mixed with wheat taken from the pots in the tombs. Sir Samuel says:—'There is no curiosity that Arabs will not supply according to the credulous demand. Of course, there are certain seeds which retain their vitality for an extraordinary period, although the actual time has never been satisfactorily proved. My experience does not lead me to think that seed will retain its vitality if hermetically sealed, and I have found that the common practice of English seedsmen of packing seeds in soldered tins for shipment to foreign countries will destroy many varieties.'

*Sir J. D. Hooker.*—In his *Primer of Botany* implies that this vitality, which has been often stated, and believed in by many, is devoid of all foundation.

*Drummond & Son.*—The well-known seedsmen of Stirling, say that while the question has been complicated by the introduction of so-called mummy wheat, mummy peas, etc., which were, undoubtedly spurious, although cultivated under those names by a considerable number of growers, there is every reason to believe that seeds have preserved their vitality for a period quite equal to that of the Egyptian mummies, and they know of no reason why they should not do so associated with them. They instance a case where experiments have recently been made with seeds found under a natural deposit of mud more than

twenty feet thick, and on which buildings have been subsequently erected. Some of these seeds germinated, and their age was, undoubtedly, many centuries.

*Prof. Carruthers, Natural History Museum, South Kensington.*—Has no hesitation in saying that all the stories of grains taken from mummy cases which were as old as the mummies, having germinated, are without foundation.

From his own experiments, and the experiments of others, he says there can be no doubt that the seeds of wheat lose their power of germination after being kept eight or ten years. All grains examined by him in the British Museum have been in a state utterly incapable of germination. Having investigated two cases of supposed germination, he found them untrustworthy. One was the case of Mr. John McGregor, 'Roy Roy' who germinated two plants of *oats* from a mummy, a grain unknown in Ancient Egypt.

*Thos. Hogg, Hope Park, Coldstream.*—Informs me that a friend of his succeeded to a very old established business in the seed trade, and found in a drawer belonging to the old firm a small sample packet of red clover seed, dated about one hundred years back.

The seeds were so discoloured from age that it had little, if any resemblance to clover seed, and, for amusement, he sowed some, and, to his astonishment, it grew perfectly well. It had lain where the air could not reach it, otherwise its vitality would have been destroyed.

*Dr. Surtees, Stamfordham.*—Writes that he had stowed away some cabbage seed and forgotten it for thirty years, but, upon finding it, he sowed it, and raised some very good cabbages.

*Prof. Herschel, Newcastle.*—Who made some experiments with an ear of mummy wheat given to him by his father, Sir J. Herschel, Bart., was unsuccessful in reviving it, and considers that true mummy wheat really taken out of mummy wrappings will not germinate, and that cases of the opposite must have occurred with spurious specimens of the kind only.

*W. J. Carr, Ebchester Hall.*—Has kindly put in writing for me an account of the germination of his Greek poppy, from which the following is an extract :—'Some five or six years ago, I heard that a yellow flower, resembling a poppy, had been found growing on land from whence some heaps of mineral matter had been removed a short time before. This took place in a district called the Laurium, in Attica, four or five miles from Cape Sunium, and some forty miles from Athens; the lead and silver mines of the Laurium were worked by the ancient Greeks. One of the Greek historians mentions, I think, that they were worked in the time of Pericles, and that the Greek navy, doubtless the Athenian navy, was kept up by the produce of these mines. The great extent of the underground workings, and the enormous quantities of refuse left in heaps on the surface show that the mines must have been in operation for very many years, possibly for centuries. In recent times, it has been discovered that these heaps, some consisting of slag or scoria from the ancient furnaces, and others of the rejected portion of the ore, still contained sufficient lead and silver to

make it worth while to smelt them in the improved furnaces of to-day. A company has now been working up the ancient heaps for some years, and it was after the removal of one of them that the yellow poppy appeared. It is impossible to say how long the heap had lain undisturbed, but the probability is that it had been untouched for two thousand years or more, as there is no record of the mines having been worked since the time of the ancients. The flower was quite unknown in the district, and I believe in any part of Greece, until the removal of the heap allowed it to reappear. I procured some of the seed for Mr. Norman Cookson, who succeeded in getting it to grow and flower. Seed was also sent to the curator of the Botanical Gardens at Birmingham.'

*Prof. Oliver, Kew.*—Has never himself attempted to grow mummy wheat, and points out that in all the alleged cases of germination there has been some flaw in the evidence.

*Rev. Dr. Tristram, Sir James Hooker, and Professor Forster, Cambridge.*—Canon Tristram has conferred with these two gentlemen, two of the first botanists of the age, and they agree that there is no proof whatever of such prolonged vitality of seeds, and that it is contrary to all experience. Canon Tristram has known Arabs, in Egypt, offer blackened grains to travellers as mummy wheat.

*P. Barr, Covent Garden.*—Received some mummy seeds from the late Captain Robinson, when he returned from Egypt. These were sowed by his man, at Tooting, and he reports that not one seed vegetated, but rotted.

*Professor Balfour.*—Does not believe in the germination of seeds which have been taken from a mummy that has not been tampered with.

*Miss Edwards, of the Egypt Exploration Fund.*—Can testify that the late Erasmus Wilson planted a pea found in a mummy case (or among food offerings), and that it grew to an extraordinary height up and along the verandah of his house at Westgate-on-Sea. He sent Mr. Edwards a few leaves on a tendril from it, in a letter, and he called it his magic beanstalk, because of its rapid growth.

*J. Backhouse, the Nurseries, York.*—Is quite of opinion that certain seeds, under suitable conditions, are possessed of extraordinarily long continued vitality, and thinks it is not improbable that, in some cases, seeds from unwrapped mummies would germinate.

*Professor Wright, Trinity College, Dublin.*—Says 'while some well authenticated instances exist as to the vitality of seeds after a long preservation, yet I have not been able to satisfy myself as to the truth of the phenomenon of growth in mummy wheat or peas. As to the pea brought to your friend, Mr. Barr, surely there is no evidence, in the strict sense of the word, of its antiquity. While, of course, the many failures to grow mummy wheat do not settle the question, yet, in the absence of even one well scientifically authenticated fact of such having germinated when contemporaneous with a pre-Christian mummy, I am inclined to be sceptical as to such; a scepticism, of course, to alter into a belief when the contrary is proved.'

*A. L. Savory, the well-known Chemist.*—Writing respecting the specimen of mummy wheat in the Museum of the Pharmaceutical Society at Bloomsbury Square, which was presented by his grandfather, the late John Savory, a former president of the society, says: 'Not only was he (the late John Savory) much interested in antiquities himself, but he was also very intimate with a gentleman of the name of Pettigrew, an antiquary of some considerable note, and an authority on mummies. From what I can learn it may be fairly assumed that the seed is perfectly genuine.'

*W. Flinders Petrie, the originator of the Egyptian Exhibition in London.*—Has with great courtesy, sent me a quantity of ancient seeds found by himself, but he has not tried any experiments with them, as it would be useless, the wheat having been stored by ants, and the germs having been eaten away. Mr. Petrie has not found any seeds on his mummies, nor are there any amulets or scarabs on mummies of the Ptolemaic and Roman age. An Egyptian friend of Mr. Robert Clephan's has written to say that the pyramid wherein Mr. Petrie believes the body of Amenhat III. to repose, is built of crude bricks, double the dimensions of ordinary bricks; and, as the Ancient Egyptians could not make bricks without straw, one may find wheat and barley in the bricks at the present day.

*T. Nickle Nichols, British Museum.*—In his bibliographical studies relating to Ancient Egypt, has met with many works and papers on the subject of the germination of mummy seeds, and refers to No. 1 for 1859, No. 5 for 1861, and No. 6 for 1861, of the *Bulletin de l'Institut Egyptien*, a collection of valuable papers on Egypt, published at Alexandria, Marseilles, and Cairo.

*Notes and Queries.*—References to the subject are to be found in the 1st series, Vol. V. pp. 417, 538, 595, and Vol. VI. pp. 65, 513; in the 6th series, Vol. II. pp. 306, 415, 452; Vol. III. pp. 135, 158, 212, 278; and Vol. IV. p. 173.

*Baron Voght*, in an article on the 'Depth at which Seeds should be deposited in the Soil' (*Gardener and Practical Florist*, 1844, page 503) says that, if seeds be placed by accident or design at such a depth in the earth as to be out of the influence of the air, and though they may be surrounded by the requisite degrees of heat and moisture, they will, nevertheless, remain dormant. Seeds will germinate in the air if moist, but will remain uninjured and unaltered so long as the air is perfectly dry.

*Kemp—Annals of Natural History, Vol. XIII. page 89.*—In McIntosh's *Book of the Garden*, Vol. II. p. 312, 'Vitality of Seeds,' we find Kemp quoted on the discovery of seeds of plants, which, upon vegetating, were found to be those of *Polygonum Convolvulus*, *Rumex Acetosella*, and a species of *Atriplex*. The seeds were found in the bottom of a sandpit twenty-five feet deep, about a quarter of a mile west of Melrose, and were embeded amongst decayed vegetable fibres, resting on a stratum of fine sandy clay eight inches thick. Under this stratum was a mass of gravel, on a mound of the boulder formation, ninety feet in thickness, and which Mr. Kemp supposes was formed by the action of glaciers.

Mr. Kemp's theory is that the river Tweed, now at some distance, and fifty or sixty feet above the level of the sand quarry, had anciently run in this direction, or that there had been a large lake; and, adds Mr. Kemp, in estimating the probable antiquity of the seeds, when we reflect on the time necessary to have worn down the barrier of trap rock, and to have drained so large a lake, which must have stood at its highest level whilst the thin layers of sand were deposited over the bed with the vegetable remains, the antiquity of these seeds is truly astonishing, and it is most wonderful that they should have retained their vitality.

*The Andersonian Pea.*—In the course of the late explorations in the ancient ruins of Egypt, Gen. Anderson, a traveller, found enclosed in a sarcophagus, besides a mummy, a few dry peas, which must have been at least three thousand years old. These he preserved carefully, and on his return to Great Britain, planted in the rich soil of the island of Guernsey. The seeds germinated, and the plants soon appeared, from which, at maturity, sufficient peas were gathered to plant a large tract of ground the following season. Some of the plants thus raised have attained a height of over six feet, and have been laden with blossoms of exquisite odour, and of a delicate rose tint. The peculiar feature of the growth is the stem, which is small near the root, but increases greatly in size as it ascends, requiring a support to sustain it upright. The pods, instead of being distributed around all parts of the stem as in the ordinary plant, are grouped about the upper extremity. The vegetable, it is said, belongs to the ordinary garden variety; but, from its presenting the very distinctive differences above noted, seems worthy of close botanical examination. The peas are of a remarkably fine flavour, excelling in delicacy those of the choicest known varieties.—*Indian Agriculturist*, 1876.

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[NOTE.—The foregoing paper on 'Mummy Wheat' has been printed at the expense of Dr. Bruce, F.S.A., Vice-President.]