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SEARCHING AGRICULTURE'S PAST

The Associates of the National Agricultural Library, Inc. Beltsville, MD 20705

Cover Photo: Columbus discovers a new world, opening an expanded era of exploration, contacts, and new knowledge. (Courtesy Emerson M. Brooks Photo Collection, Special Collections, National Agricultural Library.)

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CONTENTS

PAGE

ALAN E. FUSONIE and DONNA JEAN FUSONIE

Introduction i

JOSEPH EWAN

Finding Audubon's Trudeau Hiding Under the Table and Other Tales 1

CLIFFORD M. FOUST

That Elusive Rhubarb: Some Botanical and Horticultural Aspects Before the Twentieth Century 7

A. E. SMITH and D. M. SECOY

Pest Control Methods Practiced by British Farmers During the 17th and 18th Century 23

MARILYN M. JACOBS

Horticulture in the Mailbox 35

INTRODUCTION

As the Old World advanced and commerce began to flourish, the national quest for power and glory, which usually accompanied the expansion of trade, increasingly embraced the desire for trans-Atlantic contacts. The discovery of the New World attracted the attention of European observers, travelers, and dedicated naturalists. In particular, the early trans-Atlantic foundation for the exchange of plant knowledge was laid, in part, by the collecting activities of explorers, colonists, traders, sea captains, missionaries, and others. The democratization of the gathered agricultural and natural history knowledge was also influenced significantly by the invention of the printing press, the introduction of moveable type, the discovery of less expensive methods for manufacturing paper, and the desire for new and useful information. In 1471, the first printed book of agriculture by Pietro de Crescenzi entitled Ruralia Commoda (Augsburg, Johann Schussler, "circiter" February 16, 1472) was published. This date, 1471, becomes significant because from this point on in history greater emphasis would be placed on rural affairs. In England, the first book on the practice of husbandry entitled Boke of Husbondrye by John Fitzherbert, was published in 1523 during the reign of King Henry VIII.

The discovery of the New World, in fact, led to the introduction of an entirely new range of economic plants to Europe. More than 10 crop plants of world-wide importance resulted from the discovery of the Americas including such staple food crops as beans, manioc, peanuts, potatoes, cotton, pineapple, and tobacco. In 1542, Leonard Fuchs, a physician and one of the "German Fathers of Botany," published the extraordinary herbal work entitled De Historia Stirpium (History of Plants) containing 512 woodcut illustrations based on the actual observation of living plants. Herein, for example, one finds the first illustration of Indian Corn (Tucicum frumentum) as well as the foxglove and the pumpkin gourd. In 1703, the plant Fuchsia was named in Fuchs' honor - a fitting tribute to his popularity. Today, Fuchs' work is considered one of the most famous and beautiful herbals ever published.

From the late 16th century to the late 18th century, it became increasingly apparent in scientific circles that the exchange of both plants and knowledge on both sides of the Atlantic offered challenge and financial risk as well as excitement and potential reward. For example, the naturalist, Thomas Hariot (1560-1621) in his work entitled Brief and True Report of the New Found Land of Virginia (1590), describes the oak, walnut, cedar, cyprus, holly, willow, and elm that he saw in his explorations. Major scientific organizations such as The Royal Society of London For Improving Knowledge provided support and encouragement to its members who embarked on plant collecting expeditions in North America. John Banister (1650-1692), the noted botanist, collected plants and wrote in full detail in his findings. John Bartram (1699-1777), another famous plant collector and botanist, became as avidly involved in plant exchange as he was in his correspondence and in his publications.

Williamsburg became a major meeting place for several notable plant collectors, as well as a unique center for North American garden history. Mark Catesby (1679?-1749), naturalist, traveller, and plant collector in America, lived in Williamsburg at various times between 1712 and 1725, and shipped seeds and plants to and from Europe and America. In the first half of the 18th century, Catesby also authored and illustrated one of the botanical landmarks of America entitled Natural History of the Carolinas, Florida and the Bahama Islands (1731-1743). This particular publication, which included over 100 colored illustrations, stimulated further interest among the British aristocracy to acquire plants from America. The 18th century was a period of close relationships between explorations, natural history illustrations, printed knowledge, and wealthy patrons. Centuries earlier, Petrarch (1304-1374), poet, scholar, and major force in the development of the Renaissance and European culture, may have captured the attitude and taste of the wealthy, the rich, and the well-born for generations to come when he said: "libris satiari nequeo", or, "I never have enough books."

In Colonial America the wealthy and articulate agriculturalists and naturalists often turned their private libraries into active information centers from which agricultural and botanical knowledge was acquired as well as transmitted to others through a variety of mediums such as correspondence, books, journals, the press, and participation in professional societies such as the Philadelphia Society for the Promotion of Agriculture. Society members not only took pride in the growth of their own individual libraries but also fostered through donations the development of the libraries of these societies. The English poet John Donne (1572?-1631) many years earlier in one of his sermons said, "The world is a great volume and man the index of that book." Interest in a measure of control over agricultural and botanical knowledge was readily apparent among the planter class of the newly emerging American Nation.

When the Department of Agriculture was finally established in 1862, Isaac Newton, the first Commissioner of Agriculture, placed near the top of his list the establishment of an agricultural library. It was his belief that "the most valuable work would gradually accumulate by exchange, gift and purchase, forming a rich mine of knowledge." The several superintendents and chiefs employed under Newton had subject interests and from time to time recommended agriculturally related book purchases as research tools. During the past 124 years, Newton's library goal has endured in a meaningful and useful way, for the National Agricultural Library has now assembled a collection of over 1,800,000 volumes, inclusive of original manuscripts, archival materials, rare books, early periodicals, pamphlets, photographs, slides, works of art, audiovisual materials, microforms, and a variety of ephemeral materials. From the first librarian on the Departmental roster, Aaron Burt Gosh, 1867-1869, to the present Director, Joseph Howard, an important part of the collection building process has been the donations and gifts by individual Americans and private organizations.

Today, the National Agricultural Library is developing a Special Collections Reading Room to appropriately dramatize the awareness of

unique agriculturally related research treasures and collections already donated, to encourage future donations, and to provide an inviting and stimulating research environment with a wide-range of services. Exhibits, displays, lectures, talks, and symposia will be used to encourage both the public and private sectors to support the programs of the National Agricultural Library. In keeping with this outlook and direction, this special issue of the Journal of NAL Associates brings together four unique articles. From the joys of botanical book collecting, to the challenging encounter of rare books research which documents early uses of rhubarb, as well as pest control practices to stamp collecting with a horticultural message, these contributions provide interesting reading indeed. Hopefully these articles will stimulate additional retrospective research, for the past is prologue and at times the cutting edge to the present and future.

ALAN E. FUSONIE
DONNA JEAN FUSONIE
Editors

Finding Audubon's Trudeau Hiding Under the Table and other Tales

by

Joseph Ewan*

When did I begin to collect books? In my high school years I took different routes walking to the Piggly Wiggly for groceries, and one of my choices was to pass a secondhand bookstore which had two troughs to catch the eye of the passerby. The bookseller within seemed a trifle shopworn, but in his original binding. He was friendly, and so when I found a copy of the fourth edition of Amos Eaton's Manual of Botany--it was bound in old calf--for five dollars, I asked whether I might pay two dollars on deposit. He said "Surely." There were a few more lawns to be mowed at fifty cents apiece, complete with trim and sweep-up, to make my purchase complete. The copy of Eaton, he said, had belonged to the wife of a Governor of Georgia; thus was my instruction that books are sent out into the world, are possessed and, with luck, live on in a sort of reincarnation born of successive owners. "Let the collector perpetually remember," says John Winterich, in his book Collector's Choice, "that he assumes the stewardship rather than the ownership of his books. All print is one vast lending library;

> The bust out-lasts the throne,--
> The coin, Tiberius."

Not long afterwards I began yielding to other bookstore invitations to come in and browse. Down on Sixth Street in Los Angeles in the twenties, at Lofland and Russell's, I found A. W. Chapman's Flora of the Southern States. When I asked "how much?" the clerk queried "Any plates?" I showed him there were none and so he set the price at seventy-five cents. A tight copy, in that original sandy-colored tesselate binding, it had a letter tipped in as a frontispiece, obviously written by the author on Congress stationery from that Florida town of a melodious name, Apalachicola, once a thriving port metropolis. It was addressed to its first owner, Dr. Joseph Bassett Holder, at Fort Jefferson, Dry Tortugas, Florida. Not until some years later did I discover that the book was a prize: the first first edition of 1860, as John Kunkel Small called it, when he promptly answered my query about the book. Sometime later I paused by Dr. Chapman's cenotaph in the town cemetery, and all those connections interconnected, his loyalty to the Union, John Torrey reading galley proof for the book Chapman was not to see until after the Civil War.

Also on Sixth Street in Los Angeles was Holmes, larger, high ceilings, aisles and islands of books--those walls of books to be scaled only with trolley ladders. Holmes often had several copies of a title, and they

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varied in condition, from having a "working copy" to a near "mint" for the caring customer. Joseph Rock's Indigenous Trees of the Hawaiian Islands, in good condition, was waiting for me for $7.50. After I left UCLA for Berkeley, I discovered a Holmes in Oakland too, again a commodious book store indeed. Imagine my delight in finding three separate fascicles of Daniel Cady Eaton's Ferns of North America in the original wrappers as issued by Samuel Cassino which incredibly! completed the copy I owned that had been bound by a past owner before he had received the final fascicles of his subscription.

Phil Munz of Claremont College was a warm and friendly soul. He smiled as he spoke, and his eyes widened to enlarge any pleasure. Munz knew I was keen on books and sent me a list of those that had belonged to Marcus E. Jones. I was assistant to Professor Jepson at the time, four hours a day, eight to twelve each morning on his Flora of California. Jones had owned de Candolle's Prodromus complete, Pritzel's Thesaurus with interleaved addenda in Jones' own handwriting for dates of publication of botanical works issued in parts, and there were Carl Christensen's Index Filicum, and other desirables. Although Jepson held disparaging views of Jones, and that I would cuddle up to his possessions was not his fond wish for me, yet he agreed to accompany me to his local bank to negotiate a $75.00 advance against my Prudential Insurance policy. The rock of Gibralter had never before meant so much to me.

There has been a gallery of bookmen between the Amos Eaton I bought that day for a mere five dollars, and today's scrounging in catalogues for affordable items. Those bookshops, just like the white marble-topped tables and wire-backed chairs of the old corner drugstore or ice cream parlor, are extinct, or nearly so. A bookshop on Corn Hill in Boston had catacombs where one picked up the extension cord at the bottom of the stairs and trailed it down the passageways to Patagonia or to the Moluccas. The owner once forgot I was there, locked the shop, and went off to lunch! I was oblivious the whole time: he was startled when I reappeared. There were great books for collectors there. William Ellis' Polynesian Researches in four volumes which I knew would please a Swedish collector of South Pacific, as indeed it did. To spot a wanted book for a fellow collector is to confirm the trilogy: dealer and two fellow bibliophiles. Going back to speaking of catacombs, there was one shop on London's Charing Cross Road up from Trafalgar Square. The best things were down those narrow stairs. Down I went. The owner requested me to turn out the lights, close the front door securely if I should leave before his return from lunch. "Just place the books you wish on the counter." Having done as I was told, I left for Foley's across the street, and then especially on to Israel's. On my return I sensed he had forgotten all about me and the books I had left on the counter. "Oh were they your books? Oh! Pity. I sold them to the flutist who plays at the theatre down the street only a bit ago. He often comes in at intermission to browse. He saw them, paid me, and disappeared." There had been a seventeenth century vellum-skinned tome on reptiles. I had never heard of the book, and since I felt secure that I would own it I had not bothered to note the author and title. The show down the street? "The Night of the Iguana."

Once at Israel's there was a set of the English translation by J. R. Forster of Osbeck's A Voyage to China in the window. It was a bit sunburned from years of customer indifference, but to me it looked delectable. The clerk, with some convolutions of the torso extracted Osbeck, and it proved to be a fine copy. Israel's three-decker shop was definitely worth repeated visits. I remember the steep stairways with shelves against the walls and on each landing. One took a step, peered, moved aside from some other customer on his ascent or descent, and peered again. There one spine read "Wight's Indian Plants." India was not my pet, but I early found it profitable to be extraterritorial in book hunting. Here was a presentation copy from William Jackson Hooker of Kew fame to his friend, Charles Lyell the elder. Hooker had composed this volume from plates of different Lyellian connections: an engraved plate of the moss Lyellia and other plants with Lyell associations mixed with portions excised from Hooker's major works--"a mixed bag"--with a portion of Wight's Indian volume all sturdily bound together and inscribed by Hooker but with only his initials, WHJ. The bookseller had failed to recognize this immortal botanist, and had marked the copy "incomplete," priced two pounds, ten shillings.

At Guilford sedate Traylen displayed window treasures for what seemed pots of gold. Across from the town clock there was the ramshackle shop with split levels, several flights to fancy, stacks of stuff on the floor, unsorted odd volumes of sets often scruffy but calling for scrutiny. Lettsom's Naturalists' Companion, third edition with the frontispiece in color, in fine binding, was there for 12s.6d.

What about association copies and provenance files? At the Huntingdon Library in 1960 I discovered what values they can provide for research. Presentation copies may lead the curious investigator to relatives or friends who may have been important in the development of the author's writings. Librarians have told me that association files are a luxury they cannot afford but I hope more libraries will recognize their value. I have enjoyed making my own file from my acquisitions. For example, in a Boulder bookshop I came upon the advance page proof of Dillon Ripley's Trail of the Money Bird which the publisher had sent to William Beebe for review. In a Vancouver bookshop stood the botany notebook kept in the 1840's by Sarah Lindley sitting in on the lectures of her father, University of London Professor John Lindley. With her neat notes were little sketches of flower parts. Beside the notebook was her copy of her father's text Introduction to Botany which she had used in her study. It is a particular pleasure to acquire books directly from authors or collectors when they personally come, to disperse their libraries this side of their obituaries. I have, for example, enjoyed books belonging to the ornithologist, Robert Cushman Murphy enhanced with his bookplate. Or such books as lived and travelled on the Amazon with the botanist H.H. Rusby; or with the intrepid botanical explorer, Ynes Mexia. Their pieces of eight are now in my hands.

For years New Orleans was the home of Harold Leisure who, with his wife Nellie, sold antiquarian books, no paperbacks, to the few winter visitors who ventured into their shop on Toulouse Street in the French Quarter. A small shop, it had a narrow balcony walk, the books on the lower shelves accessible only by crumpling down. Leisure foraged about the south

following leads gained by scrutiny of the newspapers' death columns to garner reliquiae. I bought four volumes of Peter Force's Tracts which the author had presented to his daughter; and there were other memorabilia. One day on the balcony I found a duodecimo bound in library cloth stamped simply "Fortune." I had been watching for books by Robert Fortune ever since I had found my first good Fortune, his Journey to the Tea Countries of China, in a dying bookshop near the Boston Public Library. Fortune had made five daring trips into China between 1843 and 1861 for plants on behalf of the Royal Horticultural Society. Walter T. Swingle had memorialized him with the generic name Fortunella for the kumquat. Leisure's "Fortune" startled me for I had never known of such a duodecimo edition of Robert Fortune. It was an abridged translation into French of two of his early books on his travels in China. From internal evidence it had been bought in Paris over 60 years before by the father of a Newcomb College professor, was unwanted by the college library, and had come to rest Leisurely here. After some fast checking I determined that it was unlisted in the usual bibliographies. I asked the author of an unpublished biography of Fortune, William Gardener, who then lived near the sea in Kent. He determined that the Paris publisher still had a copy in his archives. It had been designed as a volume in a series to sell, and to be read, in the railway coaches, and indeed, this copy had been riding back and forth for some years. I have found no copy in a United States library, and Gardener has found none in Britain. When I took the book down the stairs to Leisure, I was naturally glowing in my find. He was so fascinated by what I could make of my good "Fortune" that he then and there gave me the book with his compliments. After this, what shall I say, kumquat may!

One year the New Orleans symphony book fair was held on Royal Street in the building of the first American bank in New Orleans after the Louisiana Purchase. The floor that evening was crowded with browsers. They were turning the bookturf which sagged the long folding tables set up for the occasion. After I had gleaned the table tops my attention was drawn to a carton of books under a table. All in the French language: they were expected not to sell. Almost the first books I inspected bore the signature on the title page "J. Trudeau," and there were several such signed volumes. I knew that James Trudeau had been born on a plantation in nearby Jefferson Parish, and that he had frequented the markets of New Orleans as a lad. There the stalls featured the market hunters' "bag" brought from the marshes and swamps, destined for the cooking pot. Spread there as so many trays in a museum cabinet were ducks, geese, shore birds, and fat robins, and the sparrow-kind sold in bunches--a flock of many species. There Trudeau had begun to learn about the Louisiana birds. He came to meet the best known ornithological resident of New Orleans, John James Audubon. Later Trudeau visited New Jersey's Cape May to see shore birds. In a flock of terns was a bird of a different plumage; Trudeau collected it and showed it to Audubon who named it for his friend, Trudeau's tern. Incredible shot! That bird was a casual from Argentina which had strayed into the northern hemisphere. One of those books under the table was a volume for a multi-volume European ornithology by C.D. Degland that included gulls and terns. Yes, I took that volume home. It still bears the price in blue crayon, "5 cents." There was also a volume on fossil vertebrates by Cuvier with steel engravings. James

Trudeau, who made egg drawings for Thomas Mayo Brewer, died in 1887. In what trunk these Trudeau books had slumbered during the interim, I have not learned. Book collectors know many mystery stories but seldom all of the players. As Rachel McMasters Miller Hunt has expressed it, "The more one collects, the further back one goes into history and the deeper one delves into the subject."

Joseph Ewan relates some of his interesting encounters in book collecting to the attendees of the 1984 Annual Meeting of the Associates NAL, Inc.

Dr. Ewan invited Associate members and guests to look over some of the rare volumes he brought along from his collection. The Director of NAL, Joe Howard (l.) looks on.

THAT ELUSIVE RHUBARB:
Some Botanical and Horticultural Aspects Before the Twentieth Century

by

Clifford M. Foust*

Rhubarb is a homely plant in spite of its occasional use in gardens as a large background against which to display more exotic blooms. And for those of us nurtured north of the latitude, say, of Washington, D.C., it is also a plant likely to be fondly remembered as providing the main ingredient of succulent early spring tarts, sauces, and pies--"the pie plant"--urged on us by our mothers anxious to purge us of winter humors and general blahs. It then comes as something of a surprise that it played a major role in the development of the science of botany and the practice of horticulture, not to speak of its importance to medical therapeutics, pharmacy, and related disciplines.

Rhubarb was known to the ancients, although it is difficult to say precisely which variety and whence it came. Among 120 or so plants mentioned in the Bible, there is no rhubarb, although Mediterranean physicians, notably the renouned Dioscorides (first century A.D.), employed rhubarb root as a therapeutic drug for a variety of afflictions of the spleen, liver, and kidneys, and as a general stomachic, albeit not as a cathartic or aperient for which uses it became so popular in the seventeenth and eighteenth centuries that a genuine "rhubarb craze" or "mania" was then remarked upon. Dioscorides' mention of rhubarb virtually guaranteed its continued use throughout the Middle Ages.(1)

If we ask the origin of the rhubarb of the ancients or wonder which of the many varieties known today it was, we are immediately thrown into the first of several perplexing puzzles surrounding its natural history. The rhubarb plant of Dioscorides, it seems, was probably native to Southeast Europe and Southwest Asia, regions now of modern Bulgaria, Thrace, Turkey, and the Volga valley of Russia, and that variety came to be known as Rhapontic, i.e. meaning, perhaps, the Rhubarb (Rha) of the Pontic region.(2) Rha has also been taken by some as the original name of the Volga River. Yet from Roman times on, rhubarb root in dried and reduced form was also imported from initially unknown Oriental sources, brought to the Mediterranean world by way of one of several long and difficult routes.(3) The question is then was the Rhaponticum of Europe the same (or essentially the same, with differences accounted for by differences in climate, soil, harvesting, and curing techniques) as that which came from the East? When this first became a clear question we cannot say but by the time of the Renaissance Europeans already looked to discover the sources of the 'true,' the 'veritable,' and the medicinally 'officinal' rhubarb, in order to settle it.

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Marco Polo's report at the end of the 13th century that rhubarb grew in locations in Western China whetted European appetites for exact knowledge of it and of other plants.(4) Columbus, two centuries later, joyously "discovered" rhubarb in the New World (which perhaps helped convince him that he had, in fact, reached the Orient).(5) In the 16th and 17th centuries the search fanned out in all directions: Africa, the Near East, India, across Russia, and even into China itself. All of these efforts failed to provide the evidence needed: roots which matched the medicinal virtues of those long imported, the growing plant itself, its viable seeds, or even observation of it in situ.

Rembert Dodoens, physician-botanist who settled at Antwerp and then Leyden, illustrated the problem for 16th-century Europe. He suspected that there was not one rhubarb plant but, rather, "diverse sorts of Rha," and he distinguished three rhubarbs in his widely influential History of Plants published in 1554.(6) Yet geography and climate, he suggested, may well have made the differences in the several apparently diverse varieties, thus giving rise to a notion--the existence of a single 'true' sort--which survived well into the 18th century. His evidence is thin at best. Rhapontic is described in general and vague terms, prefaced by "as it is thought." And the other two varieties--RhaBarbarum from "Barbary" and "Chinarum" from China or India (the best probably entirely from China)--which could have been known only on the basis of sketchy travellers' accounts and/or dried root specimens of uncertain provenance. Until the 17th century when viable seeds were first brought from Thrace to Southern and Western Europe, most of what was written was academic speculation.

The first major breakthrough came because of the concurrence of two essential developments: the acquisition by Europeans of live rhubarb root or more likely seed, and the emergence of physic or botanical gardens in which it could be planted.

Sometime before 1608 an Italian physician, Francisco Crasso of Ragusa, reportedly obtained seeds of the Rhapontic plant from the Rhodope Mountains of Thrace (near modern Rila, Bulgaria), brought them to Padua and gave them to the noted botanist Prospero Alpini who successfully grew the first clearly identified rhubarb imported to Southern and Western Europe.(7) Seeds of these plants shortly found their way to gardens throughout continental Europe and England; Dr. Mathew Lister, physician to James I, returned to his home with seeds of what he deemed to be Rhaponticum verum: "I dare say it is the very true Rubarb."(8) This was the first

"Rhaponticum," from Alpini's De Plantis Exoticis, 1629. Courtesy of Special Collections, National Agricultural Library.

of many claims over the next three centuries of having acquired and introduced THE true rhubarb. The famed horticulturist John Parkinson quickly asserted that the genuine rhubarb was now available in Britain, although he recorded some doubts: it was not quite "the Rhaponticum which the Merchants have brought us, which we have seen to be longer and slenderer Rhubarb, but of the same colour." Still it was different from the native docks, Patience, Monk's Rhubarb, and other large-leafed plants believed by him and most others to be related to rhubarb and, hence, collectively known as Lapathum (sorrels). Parkinson attributed the failure of Lister's plant to produce roots and rhizomes of the same medicinal value as that brought from the East to reasons similar to those of Dodoens, "our climat making it less strong in working, less heavy, and less bitter in tast," although it did purge gently without the astriction (astringency) of the East Indian or Chinese import. Parkinson thus described Rhapontic in terms which have remained largely unchanged down to the present day.

In spite of these reservations Rhapontic spread quickly to physic and botanic gardens of Western and, for that matter, Eastern Europe. John Bobart, for example, records its cultivation in 1658 in the Oxford Botanic Garden then in existence for only 37 years, and he too accepted it as the Rha verum, referencing Parkinson and John Gerard's Herbal.(9) Paul Ammann had it in the Leipzig medical garden in 1675, noting specifically that it came from the Alpini seed.(10) William Sherrard found it in Tournefort's Royal Garden of Paris in 1687.(11) If it did not measure up to the import, it could only be a matter of different climate and, perhaps, soil which patience, horticultural care, and time would overcome. William Coles, in 1657, reflected the essential optimism of this early day of botanizing: "Our Rubarbe is nothing inferior to that which comes out of China, and in processe of time will be as famous...."(12) And he vented English parochial pride in the products of English gardens, blaming the continued popularity of the imported root only on the cupidity of drug purveyors who stood to gain more profit from pushing the more exotic Oriental import: "...the Druggists extoll the outlandish, that they may gaine thereby the more."

Indeed so relatively common did Rhapontic become that William Lucas' seed and plant catalog dated about 1677, one of the earliest gardening catalogs, advertised it among the "physicall seeds" available at his shop "at the Naked Boy near Stand Bridge, London."(13)

Thus things remained until that wondrous period of botany best marked perhaps by the appointment in 1722 of the inestimable Philip Miller as gardener of the Chelsea Physic Garden, the oldest still surviving botanical garden in Britain and, over the years, one of the most influential in the world.(14) In the several decades before Miller there had been persistent interest in obtaining rhubarb other than Rhapontic, if for no other reason than lingering reservations with regard to its identification as the genuine oriental root. In spite of samples, some dried and some live, from the East and the Near East, Richard Bradley, Cambridge professor of botany, concluded in 1728 "that we may be pretty sure that it (the true rhubarb) is not growing any where in Europe."(15) Miller was even more confident in his judgment: "however cultivated with us," Rhapontic-produced roots (and others as well) failed to match the color, shape, and texture of the Asian

root, and furthermore, lacked its medicinal efficacy. Precisely why this was the case, Miller was at a loss to know, but he did conjecture with that sixth sense which made him the premier gardener of his day that perhaps there were "several Species of Rhubarb, which grow in different Countries."(16) Were that realization not enough of an innovative understanding, he also commented on another essential part of the problem. He was certainly among the first, perhaps the first, to suspect that rhubarb easily hybridized. "From the Seeds of one Plant of the first sort [Rhapontic], which grew by a Plant of this last [Monk's Rhubarb, one of Europe's common docks] I had almost an equal Number of Plants produced intermixed, tho' none of the seeds of the last came to Maturity."(17) It was the early 19th century before hybridization of rhubarb for economic purposes became a common practice and many of the culinary rhubarb plants we know today were bred.

That wasn't the end of Miller's contributions. He received another variety obtained through the great physician and botanist, now in his last year, Herman Boerhaave of Leyden.(18) These seeds were probably descended from some brought back from Siberia by Daniel G. Messerschmidt who explored for the Russian crown between 1720 and 1727. John Bell, the Scottish physician who accompanied a Russian embassy to China a few years earlier, recalled many years later that Messerschmidt returned with these seeds although Messerschmidt himself was never "on the place" where this variety grew."(19) The plant was propagated in the St. Petersburg botanic garden, and its seeds were distributed widely throughout Europe. In Uppsala, Linnaeus received specimens and readily accepted this new variety which, in time, became known as the Rheum undulatum, identified by its highly wavy leaves as the true Chinese rhubarb, Rhabarbarum Chinese verum or Rheum rhabarbarum.(20) In a letter dated 1746 to Linnaeus, Haller, one of his former students, confirmed that this latest candidate for the title of True was "perfectly distinct" from the now well-known Rhapontic and not merely the result of the intermixing of seeds.(21) Linnaeus agreed although he found it difficult to put his finger on specific distinguishing characteristics which thoroughly satisfied him. But it didn't take long before Undulatum, too, was challenged: The Edinburgh botanist Charles Alston reported in 1745 that the seeds he had received of the purported Undulatum had survived, but he came to doubt their authenticity.(22)

About this time yet another variety appeared in Europe, the Rheum compactum, obviously noted for its dwarf size compared with the other grander varieties. Miller recorded that this, at least the fourth distinct variety, came to him from "Tartary," once again through St. Petersburg.(23) Uncertain of Undulatum, he offered the opinion that these roots seemed closer to the dried foreign specimens than any of the others tried hitherto.

By mid-century things were quickening. The great era of botanical discovery was at hand and rhubarb played an important role. European demand for this gentle purgative increased greatly in the decades of the fifties and sixties, as evidenced particularly by the imports to and subsequent re-exports from London.(24) Figures rose and fell, to be sure, but London's imports reached peaks of over 50,000 lbs. in the years 1760 and

1766, and over 67,000 lbs. in 1768. Of these large amounts the bulk was re-exported, mainly to the continent with lesser amounts to the British plantations of the New World. The British East India Company certainly brought the bulk of supplies from Canton and other coastal ports, but imports from St. Petersburg on occasion rivalled those of the Company. From the late 1730's on, the Russian government intensified its interest in the rhubarb trade which long since had been declared a state monopoly, forbidden to private trade on pain of loss of goods at the least and death at worst.

View of the Leyden Botantical Garden, from Herman Boerhaave's Index Plantarum auae in Horto academico Lugduno Batavo reperiuntur, 1710. Courtesy of Special Collections, National Agricultural Library.

The Russian Governing Senate, not content with a portion of Europe's trade, instructed its Rhubarb Commission on the Siberian-Mongolian border to obtain seeds of the genuine plant from their Bukharan (Mongol) trading partners. This was done as early as the late thirties but there is no evidence as to the success of those seeds acquired. In the early fifties, however, some seeds obtained in this manner were planted in the St. Petersburg apothecary garden under the direction of Dr. Hermann Kau Boerhaave, the archiator or chief medical officer of the Russian Court and the namesake of Dr. Hermann Boerhaave, although unrelated.(25) Seeds from these plants were then brought back to Scotland in late 1762 by the successor to Boerhaave as archiator, one Dr. James Mounsey, a physician who long served in Russia but found his services no longer desired on the accession to the throne of Catherine the Great.(26) Mounsey's seeds, given over immediately to Sir Alexander Dick, wealthy physician and president of the Edinburgh College of Physicians, were quickly established as a new variety, the Rheum palmatum, with large leaves which resembled the palm of a hand and a stem which rose from six to eight feet producing a huge and impressive plant. Dick not only planted some of Mounsey's seeds in his own garden at Prestonfield on the edge of Edinburgh, but saw to it that others were distributed to physicians, gardeners, and gentrymen elsewhere throughout Britain. With even more speed and enthusiasm than in the case of earlier varieties, this one was lauded as the True Rhubarb and the promise of Great Benefit to the entire Nation. Dr. David Skene of Aberdeen wrote to the avid plant collector John Ellis. "...if the Plant can be easily propagated this may become an Object of National consequences" or, in the no less extravagent words of Dr. Henry Baker, president of the Royal Society, "...this promises to become a national Advantage, for it seems probable that in a few years we may produce Rhubarb sufficient for home consumption, and some perhaps for exportation."(27)

It soon was bandied about that the development of Palmatum "would save £100,000 yearly to Great Britain," and that was accepted as gospel for some time.(28)

Palmatum hit Scotland and England with a splash, and soon became big time. The Society for the Encouragement of Arts, Manufactures and Commerce (much later the Royal Society of Arts), which was formed in London at a Covent Garden coffee house in March 1754, began to offer premiums for a wide range of perceived material improvements, e.g. the production of madder for commercial dyes and the fattening of hogs with carrots.(29) Rhubarb joined the list and was, for nearly the final three decades of the 18th century, a major item of attention. Beginning with medals struck in 1769 for James Inglish of Hampstead and in 1770 for Mounsey himself, the Society ultimately issued 14 gold medals and 5 silver ones for the planting and nuturing of Palmatum in locations scattered around Britain: from Edinburgh in the north, through Yorkshire in the midlands to Somerset in the West and Kent in the East, with Banbury in north Oxfordshire the key rhubarb plantation in the 19th century. Many projects were extensive including hundreds and even thousands of plants. One Thomas Jones of Fishstreet Hill, London, claimed 3,040 plants in his gardens at Enfield, north of London, and submitted testimonials to that effect. Sir Alexander Dick attested to one root weighing in at 42 pounds! And by 1792 that record had been soundly beaten by Jones' root of undried rhubarb which weighed 73 pounds after 11 years' growth. Palmatum seemed finally to answer the vexatious question, what is the True Rhubarb? Linnaeus' son as readily accepted and described this variety as his father had done with Undulatum. And with China, Tibet, and neighboring lands effectively shut off from prying European eyes and additional varieties, attention shifted to the perfection of this latest candidate in Europe.

Horticultural considerations took over from more purely botanical which was more mundane perhaps but no less consequential for agricultural and human history. Palmatum excited widespread experimentation with soils, soil wetness, plant feeding, planting and harvesting timetables, and methods of curing the product, all of which worked to embellish agricultural techniques. There were no easy efforts at "naturalizing" this rhubarb, not the least difficult of which was that it took years to grow roots large enough for harvesting, but systematic experiments and close observation enabled these gentry farmers to make important conclusions with regard to accommodating foreign plants to a new environment. Although it was originally thought that 6 feet was the necessary space between plants, it was soon agreed that half of that was sufficient, thereby making a critical advance for large-scale commercial growth of medicinal rhubarb. Some growers concluded that moistening seeds in water for 2 or 3 days prior to planting (shades of Trofim Lysenko and his vernalization) stimulated quick germination and avoided destruction of the tender plants by "a fly of a particular kind." They came to recommend planting the seeds in March to assure a sizeable root by autumn, and (Sir Alexander Dick advised) pruning the stems in May to prevent the perfection of flower and seeds which he thought would improve the leaves and, thereby, the roots. Excessive wetness tended to rot roots; consequently, well, drained, loosely packed, loamy soil, well dunged, was generally found to be the best while sand and hard

clay soils were both judged to be inferior. All of these understandings are essentially the same as those we have today, ans seem therefore prosaic, but it should be remembered that it took many false starts and failed efforts before these bits of common knowledge were established.

The eventul goal was commercial exploitation and successful competition with oriental roots imported in these last years of the 18th century in ever increasing amounts. This may be seen in a striking calculation made early in 1780 by none other than Dr. John Hope, physician-botanist-horticulturist of Edinburgh and director of the botanical garden there, and preserved in the Scottish Record Office:(30)

Rhubarb

March 80

one Scotch acre will contain of Rhubarb plants 3 feet point each 6,084
each plant at an average will weigh 10 lb
each acre will produce 60,840 lb

but supposing one 3^{d} fails

3)60,840(20,280
each acre will (contain) produce 40,560 in 4 years,
i.e. annually 4)40,560(10,140 lb annuall w
w^{h} at 1d pr lb is 12)10,140(825 = 41.5 ---
if one acre in 4 years produces 40,560 lb w^{h} produced 1/9 of the dried
according to Lord Hopetoun's calculation 9)40,560(4,505 lb dried
36
45

one acre will produce 4,505 lb in 4 years, i.e. 4)4,505(1,126 lb in 4 years,
i.e. one acre actually will produce 4)1,126(281
8
32

each pound selling at 5/---

Cultivation was one thing but harvesting and curing another. And this was no less a conundrum in the history of rhubarb. Europeans had long known that the root was highly vulnerable to decay and certain pests unless it was promptly and thoroughly dried and, thereafter, transported in humidity-resistant containers. In general East Asians were said to dry the root by cutting it into small wedges or tongue-like slices, penetrating them with holes, and hanging the pieces strung on cord in the sun or within war tents.(31) This did not fully prevent decay or deterioration, as all importers knew, and there was more than enough reason to stimulate trials of drying techniques. The earliest surviving description of one such experiment is that of the Rev. Dr. Stephen Hales of Teddington, a founder of the Society of Arts and best known for his pathbreaking experiments in sap rising. He suggested to the Earl of Bute in 1758 the adaptation of a ventilator he had engineered to dry raw gunpowder: a box one-foot square with a canvas bottom covered with sand into which he introduced hot air.(32)

Hales' method either didn't work very well or the word of it didn't get around, at least not to Alexander Dick who first tried 15 or so years later, to cut the harvested Palmatum roots into thin slices, hanging them by strings on the walls of well-ventilated rooms with only the spring sun as a drying agent. He judged his effort "very unsuccessful," with "an universal mouldiness" not only on the root surfaces but also pervading their substance, effectively ruining them for medical uses.(33) Next he tried rasping the fresh root rather radically, down to the inner portions (24 pounds being thus reduced to 15), slicing that remaining into 10 or 12 thick pieces, and drying them in a "much warmer degree of heat" over a kitchen chimney lintel. This worked, the moisture "was duly overcome" before the root could mold, which reduced the 15 pounds to less than five in three weeks. Successive raspings by his gardener and moderate heat brought his sample "to perfection," or so he claimed.

This business of dehydration was no small matter. First of all, it compelled the development in the earlier 19th century of what came to be known as "drying houses," special rooms heated by stove pipes or brick flues in which the rhubarb is introduced laid on a flat piece of basketing, usually three by two feet wide, suspended over the pipe or flue, at first at a considerable distance from the heat, gradually bringing it closer.(34) The characteristic piercing with holes for stringing was done but only to make the English rhubarb appear uniform with the foreign imports. This successful dehydration of the fragile root was critical, of course, to its preservation for extended periods, especially if shipped abroad, and to its being ground into powder for medicinal uses.

In spite of these significant improvements in the domestication of rhubarb, particularly in Great Britain, the large-scale cultivation for commercial purposes lagged, for reasons not entirely certain even now. In spite of rather grand claims of men like Jones to have grown literally thousands of plants, it seems that after the 1790's cultivation did not continue to expand as might have been expected, based on the initial unrestrained enthusiasms of Dick, Hope, several titled lords, and so many others. At least part of the reason for this was the persistent belief among wealthy users, at least, that the imported rhubarb was simply better and more dependable than English rhubarb, assurances from some medical circles to the contrary.(35) That is to say, perhaps Palmatum was still not the true Rhubarb, or, if it was, it was still faultily cultivated and processed.

There is an exception to this picture, although it too is shrouded with unexpected mystery. In or about 1777, a pharmacist of the parish of Bodicote, near Banbury, north Oxfordshire, apparently began the cultivation of Palmatum, probably provoked by the Society of Arts' offer of prizes, first announced in 1770. Evidently he succeeded; although he was granted only a silver medal in 1789, he won the gold four years later for 800 plants.(36) We cannot establish the extent of his cultivation thereafter but, at his death in 1811, his fields were purchased by one Peter Usher, who became the founding father of something of a rhubarb dynasty, the Usher family continuing to be the principal growers of "English rhubarb" at or near Bodicote for the next 130 years or so!

But which rhubarb? Palmatum? Rhapontic? Or a hybird? When, in 1846, the Scientific Committee for the Advancement of Pharmaceutical Knowledge of the Pharmaceutial Society founded only five years before, began its scientific work with an inquiry into the cultivation of rhubarb, the eminent and widely published physician of London Hospital, Jonathan Pereira, set eight questions, one of which elicited the response, "Only one species is in cultivation for medicinal sale: the Rheum Rhaponticum!"(37) Pereira then solicited an opinion from a Dr. Rye of Banbury, a surgeon and formerly one of his pupils, that Hayward's rhubarb was actually Rhapontic, not Palmatum, in spite of his medals for growing the "genuine Turkey Rhubarb plant," which is to say, China Rhubarb.(38) Rye added that "no other variety or species was ever cultivated at Banbury" and that the second-generation Usher, Rufus, "who is the most intelligent," acknowledged that he had tried "giant rhubarb" without success and, thereafter, grew only Rhapontic. Nearly two decades later, Rufus, after lamenting the "confusedness" informing this varietal matter, suggested that hybridization had occurred years earlier because of germination of plants by seed and, realizing that, he "studiously avoided the use of seed altogether; and the plant has so far receded to its original type, that not once has produced ripened seed during the last 20 years.(39) Rhapontic, we are to believe, reverted to its primitive form.

The cultivation of Rhapontic, rather than the much acclaimed Palmatum, despite its consistently reported imperfection as a drug, wouldn't in itself have been particularly noteworthy except that it now got caught up in a major and touchy public issue of the day, the adulteration of food, drink, and drugs. The U.S. Congress put on the law books in 1848 its first piece of modern "food and drug" legislation, directed at controlling imported substances. Public indignation at the lack of consumer protection mounted in Britain as well and rhubarb and Rufus Usher were swept up in the charges bandied about. Usher was compelled to defend himself and his business in early 1856 before a Select Committee of the House of Commons chaired by William Scholefield of Birmingham. There was general agreement among various pharmacists, chemists, and drug grinders who testified that Usher and one or two of his neighbors produced the great bulk of medicinal rhubarb sold on the London market but they doubted the claim of 20 tons annually ("half as much, 10 tons a year"). They challenged Usher's assertion that his Rhapontic was close to the imported root in its efficacy by such statements as "it produces an irritation in the bowels, but it does no good" and "It has [a medicinal effect] but it must be a most enormous dose which must be taken." They also ridiculed the notion that it was actually or even potentially as valuable as China rhubarb (English rhubarb "fetches about 4 d. a pound; the best Russian rhubarb fetches 11 s. 6 d.").(40) Even more than these things, several experts testified to the adulteration of rhubarb with foreign substances, especially flour and turmeric. And no less serious the cutting of valuable imported rhubarb with the lesser English Rhapontic was charged; one former grinder cited a case of 2 cwt. of Turkey (China) rhubarb and 3 cwt. of English being ground together for sale as pure imported drug.

Usher fought back. In his all too brief testimony one chill day in March 1856, he defined the medicinal efficacy of his English rhubarb

(leaning heavily on the published words of the recently deceased Dr. Pereira), asserted the variability of the imported root in contrast to his more consistently uniform product, and challenged the price quotations in the testimony of others ("it sometimes happens that the minimum price of foreign is below that of English"). Oddly he seems then to have waited another decade before publicly adding to that defense. In a lengthy 1867 piece published originally in the Journal of the Society of Arts, Usher asserted that the cultivation of English rhubarb had expanded greatly from the 10 acres of 1845 to upwards of 40, most of which was shipped abroad, particularly to America and even to Odessa in Russia through which port Chinese rhubarb earlier had come to Great Britain.(41) Usher articulated that persistent British optimism that, if offsets of the 'true' rhubarb could be obtained from China, "we might acclimatise some yielding higher medical properties than any yet cultivated in Great Britain." His reasoning was not without merit: given a wide range in the quality of rhubarb imported it was entirely unlikely that those oriental cultivators had produced the best plant possible. Digging it and dunging it in English gardens might do the trick. Thus Usher wanted it both ways; his English rhubarb was of excellent and competitive quality, but given live roots of the "true," he could do even better.

Why this public relations effort? Perhaps because the reputation of Banbury rhubarb continued under a cloud. A year before his article, for example, W. B. Booth writing in John Lindley and Thomas Moore's The Treasury of Botany charged that genuine and unadulterated Chinese rhubarb, notably that which came by way of Russia, concededly the best, was increasingly difficult to find, most of it being mixed with cheaper roots imported by the British East India Company or grown domestically in England.(42) Most of the latter he specifically identified as from Banbury. Indeed, he continued, "it (Banbury rhubarb) is chiefly used to adulterate the more highly priced Rhubarb, and is the sort sold by itinerant vendors, some of whom carry the delusion still further by arraying themselves in Oriental [i.e. Turkish] costume."

But Usher's fond hopes were not to be fulfilled. To be sure, his son Richard (d. 1898) and at least one more generation of Ushers after him continued to grow rhubarb in Banbury. The firm R. Usher & Co. survived until the Second World War. Nonetheless the domestication of the True medicinal rhubarb in Great Britain and, for that matter, in continental Europe as well did not occur before purgative botanicals came in large part to be replaced by other laxative drugs, such as liquid petrolatum.(43) Rufus Usher's favored Rhaponticum came to be specifically excluded from dispensatories as a source of the drug rhubarb.(44)

There was one more, a final phase in the search for the True rhubarb. Two more plants vied for that label, both notable because they were brought from the deep interior of China and Tibet, the first such since the opening of China by the treaties imposed after the Anglo-Chinese Wars. The long wait for Europeans to observe rhubarbs growing in their native habitat and to carry specimens back to Europe had ended. In 1867, the French consul at Hankow received some plants from several of his countrymen serving as missionaries in Tibet, which he dispatched to Dr. J. Leon Soubeiran, professor of pharmacy in Paris, who in turn gave them over to M. H. Baillon, eminent professor of medicine.(45) Although they arrived in a

badly decomposed state, some slips survived, were planted in Paris and elsewhere in France, and seeds of these quickly made their way to Daniel Hanbury in England, who had them laid down in the Kew Gardens and in his own in Clapton. Baillon figured the plants, analyzed them, and described them at a session of the French Association for the Advancement of Science, Bordeaux, 1872.(46) They immediately became Rheum officinale, Baill. and were soon seen in a wild state high in the mountains of Hupeh by the botanical explorer Augustine Henry. Joseph Dalton Hooker of Kew, however, was not convinced: "...it appears not to be certain that the true Turkey rhubarb of commerce is derived exclusively from this plant," although he conceded "no important discrepancy" between this plant and earlier descriptions of plants growing in China and Tibet.(47)

No sooner had the botanical world settled down than it was roused again by a second claim. Lt. Col. Nikolai M. Przheval'skii (Przewalski), the great Russian traveller and explorer, gathered plants of yet another rhubarb from the mountains of Northwest Mongolia, Tangutia, and Northern Tibet, with a flower stalk said to reach a height of seven to 10 feet.(48) Carried back to St. Petersburg, it was analyzed and described by N.I. Maksimovich (Maximowicz) as Rheum palmatum, var. Tanguticum, who recognized its proximity to the original Palmatum and was convinced that it was, at long last, the particular sort from which the very best Russian dried rhubarb had always been obtained.

That ended the search. Although Eduard L. Regel, Director of the Imperial Botanic Garden in St. Petersburg, hailed Tanguticum as "the best officinal Rhubarb,"(49) others soon concluded that there was no necessary antagonism between these two and that the drug probably, after all, was afforded by both, and maybe other varieties as well. Sir Robert Christison went even further.(50) He noted the neglect of John Hope and his Rheum palmatum in several of the recent pharmacopoeias and materia medicas: "As it seems now almost demonstrable, that Hope's plant is after all the true source of the finest rhubarb root," no apology need be made for resurrecting the 18th century. In the meantime, rhubarb has served as a marvelously illusive vehicle by which the scientific understandings and skills of botany and horticulture were decidedly advanced.

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Pest Control Methods Practiced by British Farmers During The 17th and 18th Century

by

A. E. Smith and D. M. Secoy*

In previous papers, the authors have shown that the forerunners of modern crop protection practices had been established in Europe during the classical period. Mechanical weed control techniques utilizing hoes, sickles, and ploughs were referred to in the classical literature as were the use of seed treatments, fumigations, tree-banding, and the application of a host of inorganic and organic substances, mainly of plant origin, for the control of disease, weeds, and animal pests. Alleviation of crop destruction by pests and disease was also sought by prayer and magic.(1)

It was not until the 16th century that a comparable collection of agricultural literature discusses the increasing concerns to improve the quantity and quality of crop yields by reducing the cereal diseases, weeds, and losses to insects and other animals. During the 18th century the culture of expensive exotic plants, such as pineapples and oranges, became fashionable; from this period, there was an increased interest in effective methods and substances for the control of insect pests and diseases in the gardens and greenhouses of the wealthy. By the end of the 18th century, 24 inorganic substances, 20 organic materials and oil, and approximately 10 plants had been described as being beneficial against crop pests.(2)

Since, for the most part, the early literature on pest control methods was written by scholars, gentlemen farmers, or gardeners employed by the wealthy, it is difficult to assess how extensively pest control measures were being practiced by the general farming community. This paper will discuss several sources which give some access to information on actual procedures in the British Isles.

The first source was that of the "Georgical Committee" of the Royal Society of England, appointed in March of 1664 to survey agricultural practices in all parts of the British Isles.(3) The Committee, consisting of 32 members, resolved to gather information on agriculture and gardening from all of the countries of England, Scotland, and Ireland and, with this aim, topics or "Heads of Enquiries" were drawn up on the subjects of arable lands and meadows. The objectives of the enterprise were set forth as being to collect information on specific topics from skilled husbandmen so that their knowledge might be used for the benefit of British agriculture. Included among the 19 topics under "'arable farming'" were: "Some of the common Accidents and Diseases befalling Corn in the growth of it, being

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Mildew, Blasting, Smut; what are conceived to be the Causes thereof, & what the Remedies?"; "There being other Annoyances, the growing Corn is exposed to, as Weeds, Worms, Flies, Birds, Mice, Moles, &c., how are they remedied?"; and "What are the waies of preserving any stores of separated grain from the Annoyances they are obnoxious to?." Included among the six topics for "'for meadows'" was "The common Annoyances of these Pasture or Meadow Grounds being supposed to be, either Weeds, Moss, Sour-grass, Heath, Fern, Bushes, Bryars, Brambles, Broom, Rushes, Sedges, Gorse or Furzes: what are the Remedies thereof?"(4) These "Enquires" were printed in the fifth number of the Philosophical Transactions, dated July 3, 1665.

The Royal Society was obliged to discontinue its meetings in June of 1665 because of the plague. In the resulting chaos, the findings of the Georgical Committee were never completed or published but several manuscript replies to the "Enquiries" were received and duly filed. These were examined in the Archives of the Royal Society in the early 1930's by Lennard who abstracted their information.(5) Details concerning pest control are very brief and scattered. The main procedure mentioned is that of the treatment of seed wheat by steeping or mixing with brine, lime, or blood. Such practices were reported from parts of Cornwall, Devon, Dorset, Gloucestershire, Kent, and Yorkshire. These treatments were considered to protect the seed wheat from insects, rodents, and smut, as well as promoting germination. A farmer from Yorkshire reported that mildew could be reduced by not putting down manure, while another from Kent said that spreading manure in the winter led to the growth of wild oats and 'kinkle' and advised manuring in the summer when the dung and seeds would rot.(6) Other farmers from Dorset, in order to obtain a cleaner crop, separated wheat or barley seed from other seeds by the use 'of an Engine (called a mill) made with small wires.'(7) The recognition of the importance of changing seed types to reduce smut was noted by Yorkshire farmers who bought seed wheat from Wetherby while the Wetherby farmers bought theirs near York.(8)

In England, the first writer to recommend the steeping of seed wheat in brine solution was Hugh Plat (Platte) who, in 1594, related the story of a farmer who accidently dropped his seed corn in a bay, from which it could not be recovered until the next low tide.(9) The seed, when sown, produced an excellent crop. During the early 17th century, both Plat and Markham advocated treatment of seed wheat before sowing for a healthy crop.(10) The experiments of Sir Francis Bacon provided further impetus for seed steeping.(11) He recorded the germination time and luxuriance of growth of untreated wheat seed compared to seed after treatment for 12 hours in fluids such as human urine, wines, spirits of wine, and solutions of cow, horse, and pigeon dung, bay salt, chalk, and ashes. He noted that some treatments such as those of the dungs, urine, soot, chalk, ashes, and salt improved growth over that of the untreated seed while others, such as wines or spirits of wine, retarded, or prevented germination. Bacon particularly remarked on the fact that all of the treatments were cheap or readily available.(12)

The idea for these early seed steeps seems to have been that of stimulating and strengthening the germination plants. It was not until 1651 that Samuel Hartlib recorded in His Lagacie (an enlargement of Sir Richard

Weston's manuscript on the husbandry of the Low Countries) a new aspect of seed steeping, that of protection of the grain against the fungus disease, bunt.(13) According to Hartlib, the practice involved the pouring of the seed into a tub of water. All floating grain was removed. The seed was then placed on the floor to drain, mixed with dry salt, and then doused with brine before being mixed with lime to dry. Similar treatments were recorded by Walter Blith in 1652 and Adolphus Speed in 1659.(14) The practice of steeping seed against bunt must have been fairly widespread since farmers from seven counties had reported such procedures to the Georgical Committee.

The reasons for steeping are unclear but may have been instigated because Roman authors advised the soaking of all seeds in such substances as the juice of the houseleek, amurca (the lees of olive oil pressings), extracts of wild cucumbers, crushed cypress leaves, powdered horn, or soot to increase yields and reduce attack by animal pests.(15)

As Lennard has noted,(16) the reports come from agricultural leaders of some education. Samuel Colepress, reporting from the West Country, had some knowledge of Greek and Latin, in addition to possessing a microscope. One of the Kentish reporters quoted Ovid. If the level of classical education of the reporters was high, then some of the methods reported could have been obtained from the classical literature. With the advent of printing, the agricultural writings of Cato, Columella, Palladius, and Varro had been collected and printed as Scriptores Rei Rusticae which was widely circulated. The ideas from this book became incorporated into the scholarly writings of the 18th centuries and may have had some influence on farmers such as these.

Such may be the source of the report from Yorkshire of the use of cattle blood as a dressing for wheat seed prior to sowing in order to protect the seed from vermin and 'beinge slaine.' Columella, Pliny, and Ovid recorded the Roman practice of sacrificing a young dog to Robigus to protect wheat from rust.(17)

At the end of the next century, there appeared two series of reports on agricultural practices which included information on the pest control methods used by the British farmers during the late 18th and early 19th centuries. These were the Rural Economy series written by William Marshall and the General View reports organized by the Board of Agriculture.

The first series was written between 1787 and 1798 by the agricultural authority and writer William Marshall, after he had made extended visits to the major agricultural areas of Great Britain. The Rural Economy series describe in detail farming practices being conducted in Norfolk, Yorkshire, Gloucestershire, the Midlands, the West of England, and the Southern Counties.

The second series came from the Board of Agriculture, founded in 1793 by Sir John Sinclair, who became its first president, with Arthur Young as the kingdom surveyed by persons considered competent to record local farming

methods. These General View reports, which appeared in several editions between 1793/4 and 1816, form a complete survey of methods used in large-scale farming in the different parts of Britain.

The major reported concerns about what we now term 'pests' of the farmers were control of weeds, repellence of insect pests of the turnip crop--all important for the winter feeding of cattle--and protection of seed grain against fungal diseases. There are a few other measures mentioned, usually for the control of 'vermin.'

Control of germinating weeds seems to have been carried out by cultural means, with weeds being removed from among the crops by hand, by uprooting with weeding hooks, by hoeing, or by mowing with scythes.(18) The ploughing of fallow land was also a general method of weed control since this practice successfully killed all weeds prior to the sowing of winter cereals.(19) During this era, seed was mainly broadcast by hand or dibbled into the ground, rather than being sown with the horse-drawn seed drill. This implement, developed during the early part of the 18th century by Jethro Tull, planted the seed train in rows. With the introduction of the horse-drawn hoe, at about the same time, it was possible to weed quickly and efficiently between the crop rows. In the late 18th century, however, the use of the seed-drill and horse hoe seems to have been limited to only the most progressive large-scale farmers.(20)

No specific references were made to the sowing of salt for chemical weed control, although this method was being advocated by several contemporary agricultural writers.(21) Plat in 1594 and Markham in 1620 wrote that salt mixed with the seed before sowing would control weeds, as well as stimulae growth.(22) From the literature of the early 18th century, it is apparent that, after experimentation with application rates and timing of treatment, salt was being used as a selective weed killer, with the necessary caution that excessive use resulted in crop damage.(23) Although the use of salt for weed control was being advocated, there is no record of its use in any of the Rural Economy or General View reports. This discrepancy may be related to the high cost of salt. The salt tax at this time was about 3s/6d bushel and there was the transportation cost to inland farms from the coastal salt pans or the salt pits of Cheshire.(24)

During the 18th century, the turnip became an economically important crop as winter feed for cattle. Two serious pests affecting young turnip plants were the 'black canker' (the larva of the turnip sawfly Athalia rosea L.) and the 'turnip fly' flea beetles of the genus Phyllotreta). By the time of the reports under discussion, an extensive literature had appeared suggesting remedies against the latter. Most of these involved seed treatment prior to sowing. It had been reported(25) that the turnip seed should be soaked or treated with sulphur, train oil (boiled fish or whale oil), train oil with lime, or linseed before sowing in order to protect the germinating seedlings. Another suggested remedy was to draw the berried boughs of elder on a harrow over the young turnip plants or over the fields as the seed was being sown, since it was considered that the disagreeable odour from the brused plants would rive the pests away.(26) A further remedy involved the soaking turnip seed overnight in the liquied obtained from bruised elder leaves and then sowing elder leaves with the turnip seed.(27)

From the various county reports, it would appear that some of these remedies were being practiced, with seed treatments being preferred. Farmers in Berkshire added powdered sulphur to turnip seed prior to sowing at a rate of 1 ounce to a quart of seed;(28) in south Wales, the seed was steeped overnight in train oil and then dried with wood ash before sowing.(29) Marshall noted that in Norfolk, farmers had tried coating turnip seed with sulphur or soot to protect the plants from the flea beetle, but the results were not sufficiently encouraging to establish it as general practice.(30) In Norfolk, ducks were let into turnip fields to eat the sawfly larvae or women and children were employed to gather the larvae by hand and crush them.(31)

References to control of other animal pests are few. In Midlothian, arsenic was used to poison rats,(32) while in Lancashire, catchers were employed by several townships to trap and kill moles and rats.(33) Fruit trees in Hereford were protected from browsing cattle and other mammals by being brushed with human feces as a deterrent.(34) This method had first been recommended by John Evelyn in 1664.(35) In the West of England, another remedy reported by Evelyn was being practiced as people sought to control earthworms in lawns, flowerbeds, and garden paths by sprinkling the ground with infusions of walnut leaves.(36) In Fife, farmers attempted to control slugs and insect larvae infesting turnip fields by rolling the fields at night with heavy rollers.(37)

Undoubtedly, the most widely spread pest control measure among farmers of the period was that of seed steeping. This practice, used almost exclusively for treatment of wheat seed, was considered effective not only in promoting germination of the seed and safeguarding the newly sown seed from attack by insect pests, rodents, and birds, but also in protecting the crop from smut diseases, especially 'bunt' (Tilletia sp).

Two main procedures appear to have been in use for treatment of wheat seed. The first involved the placing of the grain in a tub full of 'chamber lye' (stale human and cattle urine), sea water, a brine solution made by adding salt to water until an egg would float, or a mixture of brine and stale urine. The mixture was stirred and the light weed seeds and diseased grain that floated were skimmed off and discarded; the heavier sound seed sank to the bottom of the tub. The steeping time varied from a few minutes to several hours. After steeping the grain was removed from the tub and spread in a thin layer on the ground. Lime, presumably slaked lime although occasionally quicklime (unslaked lime) was advocated, was sieved over the grain and the seed was turned several times with a shovel to evenly coat the seed with lime. The dry seed was sown by being broadcast or dibbled, although in Staffordshire the liming process was sometimes omitted and the steeped seed drilled directly.(38) A refinement of this process was to place the seed to be treated in either an open-ended basket or a riddle. These were then placed in the tub or steeping solution. Light grains were skimmed off as before, and, after soaking, the sound grain could be more easily removed than if the grain had simply been dumped in the tub.

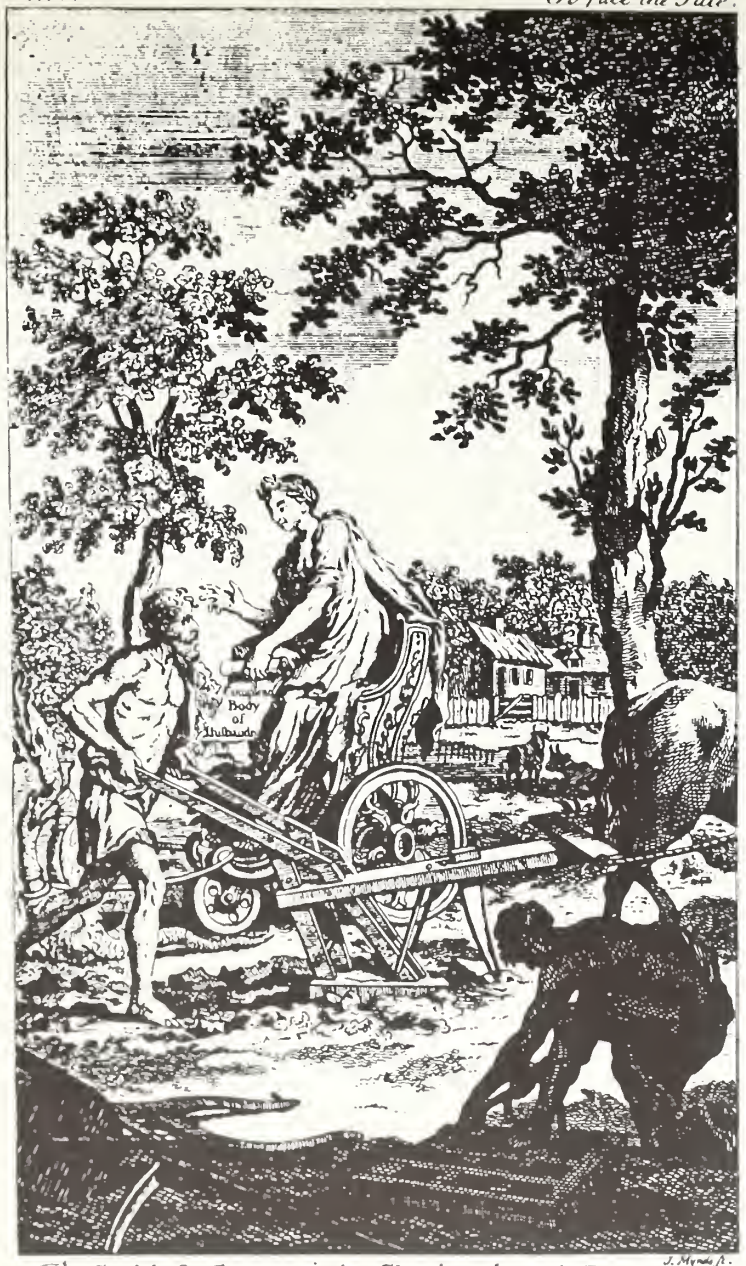
The second, and more laborious, seed treatment procedure was to place the wheat on the floor of the barn and pour the brine, sea water, or stale urine over the grain. The treated seed was then mixed using a shovel and dried by sieving lime from a riddle over the damp wheat. The limed grain was again thoroughly mixed to evenly coat, or candy, the seed. As might be expected, there were a number of minor variations in the methods of seed treatment from county to county.

In addition to the relatively simple "brining and liming" procedures, other seed treatments were mentioned in the Rural Economy and General View reports for the control of smut. The most prevalent involved arsenic, probably as the oxide. Marshall, writing in 1788,(39) noted that in Yorkshire arsenic had been added to steeps for 20 years and had been used by over 100 farmers with success to control smut. The method employed was to boil one ounce of powdered arsenic in a gallon of water for one or two hours. This decoction was cooled and diluted with water or stale urine and used as a seed steep in the normal way. Treatment with lime was thought to be unnecessary, although it was considered that liming made the grain safer to handle for sowing. In Nottinghamshire, a Mr. Wright of Collingham reported that he had never had a smutty crop when wheat seed was steeped in a decoction of arsenic for six to eight hours and then mixed with fresh lime.(40) Young noted(41) that some farmers in Suffolk prepared a strong lye by running water several times through wood ashes and then boiled arsenic in this alkaline extract. The wheat was then steeped in the cooled liquid and treated with lime. This particular process was supposed to render the treated grain nontoxic to birds while still preventing smut.

A practice in Devon(42) involved the addition of unslaked lime to water until the consistency was that of gruel. The seed grain was then plunged into this liquid and left a short period before being removed and spread on the floor to dry. In Norfolk,(43) a seed treatment employed by several farmers was to dissolve salt in a small amount of water to form an almost saturated solution. Quick lime was then slaked in this saline solution and the wheat, which had been moistened with water, was coated liberally with the hot mixture. Young mentioned(44) that in Sussex hot brine was sometimes poured over the wheat before sowing.

The practice of seed steeping continued through the 18th century, becoming more complex. John Mortimer discussed the usage of brine in conjunction with sheep's dung, alum, and urine to prevent smut.(45) Jethro Tull urged the use of brined seed which had been treated with quicklime for use with his seed-drill.(46) During the second half of the 18th century there was a tendency to add copperas (ferrous sulphate) and other materials to the steeping solution. Thomas Hale maintained that copperas afforded protection against smut, insects, and birds and resulted in an even germination of the treated seed.(47) More complex recipes, such as that of Charles Varley,(48) included bay salt and copperas, in addition to human feces and urine, oxens' bile, train oil, bruised garlic, and saltpetre in the steeping solution, with the grain then being dried with soot and quicklime, before sowing.

Vol. I. *To face the Title.*



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The work of Mathieu Tillet, the Abbé Tessier and Bénédict Prévost in France during the second half of the 18th century established the infective nature of bunt and the fungal spores were shown to be sensitive to acids, alkalies, copper, and other metal salts.(49) Thus, the different seed steeps would have varied as effective control measures. The simple dumping of the seed into brine or urine, with flotation of lighter weed seeds and diseased or partly eaten grain would have led to a cleaner crop. Salt itself is ineffective against fungal diseases, but stale urine and lime, both of which are alkaline, could have given a measure of protection against bunt and certain other fungal diseases, by preventing activation of the fungal spores adhering to the seed.

Arsenical compounds have fungicidal properties, therefore, steeps containing arsenic should have been successful for destroying bunt and other fungal spores on the wheat prior to sowing.(50) Arsenical compounds are also very toxic to vertebrates and Sinclair objected to the use of such steeps, not only because of the danger to humans, but also because game birds, particularly pheasants, which ate the treated grain were poisoned.(51) In France, the use of arsenic in seed treatments was banned following human deaths resulting from high levels of arsenic in bread.(52)

Heat is an excellent means of destroying fungal spores, so hot brine, as mentioned by Young,(53) and the treatment of wheat with the hot slurry prepared by slaking lime in strong brine,(54) if the solution were sufficiently hot, should have been particularly effective in destroying spores adhering to the seed coats. For this reason, the use of quick lime as the drying agent would have been more effective for disease control than the slaked lime since heat is generated when quick lime is wetted. With the development of effective remedies such as copper treatments of seeds, the practice of brining and liming declined and was no longer used after the middle of the 19th century.

From the details provided by the Rural Economy and General View accounts, generalization as to the extent of the practice of pest control measures, other than those of seed treatment, does not seem possible. Given the varied backgrounds of the surveyors, some pest control practices may not have been considered worthy of mention. It also seems probable that the opinions gathered were those of the major land-owners, not small-scale farmers.

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HORTICULTURE IN THE MAILBOX

by

Marilyn M. Jacobs*

On July 18, 1985, at the annual meeting of the Associates of the National Agricultural Library, Inc., Dr. Albert A. Piringer was introduced as the guest speaker. Many of us in attendance knew Dr. Piringer as the Chairman of the Horticultural Science Institute (Agricultural Research Service, USDA). We knew also of his successful and distinguished career in directing horticultural research and studying ornamental plants. To digress just for a moment, when contacted for this speaking engagement, Dr. Piringer gladly accepted the invitation and said "I'll talk to your Associates about phytophilatley." My non-scientific mind was going to have to go to the dictionary for this one. I, of course, did not find "phytophilatley." But "phyto" meant plants, and "philately" meant the collection and study of postage stamps. What those of us in the audience didn't know and were soon to discover was that Dr. Piringer's scientific career had spilled over into a most unusual hobby--stamp collecting! But not just any stamps. This unique collection contained some of the most beautiful and unusual horticulturally related stamps that had been gathered from around the world. Through narrative and slides, plant lovers and stamp collectors alike were treated to a most entertaining presentation. A quick historical review of postage stamps and collecting will facilitate an appreciation of Albert Piringer's very special stamp collection.

The Goddess Flora--honoring the Garden Clubs of America. This stamp, on file at the National Agricultural Library, contains a wide variety of horticulture--fruits, flowers, vegetables, and even a balled and burlaped shrub (lower right corner). It was issued in 1958.

Postage Stamp History

With today's miracle of instant communication, it is easy to take for granted the slow development of our postal system. The drum signal of the African native, the smoke signal of the American Indian, carrier pigeons, the Roman road, pony express, steamboat, railway, and airplane--all have been stages in the process of enabling man to communicate.

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Herodotus, an early Greek historian, described the Persian messengers by writing, "Neither snow/nor rain/nor heat/nor gloom of night stays these couriers from the swift completion of their appointed rounds." Today, these words are inscribed on the central post office building in New York City and most all of us subscribe to that statement, at least when it comes to the delivery of our own mail. Dr. Piringer certainly did not allow these natural elements to impede his hobby, for he now has several thousand stamps in his collection and it is still growing.

Development

The first official postal system in the American Colonies was established in 1639. The Massachusetts Bay Colony gave a tavern owner 1 cent for each letter sent to or mailed from England. Official postal services in Europe had begun as early as the late 1400's. In 1692 King William III of England gave a colonial official the sole right to provide postal services in the American Colonies and Andrew Hamilton created the first national postal system. In 1775 the Continental Congress named Benjamin Franklin as the first postmaster general of the United States. It wasn't until 1840, however, that the first postage stamp made its appearance in Britain. A profile of Queen Victoria was used on the stamp for more than 60 years, the longest recorded continuous use of a basic design.

First Stamps Issued

With the rapid growth of postal services in the United States, Congress issued the firt U.S. postage stamps in 5- and 10-cent denominations on July 1, 1847. The design for the 5-cent value was fittingly a portrait of Benjamin Franklin and the 10-cent stamp portrayed George Washington. No one knows when stamp collecting started but philatelists agree that it probably occurred right after the first stamp was issued. It is known, though, that the first stamp catalog was published in 1864 by an Englishman named Mount Brown. Piringer began his collection about 35 years ago and has completed 36 albums; many more await sorting and cataloging, however.

The most conservative of stamp-issuing nations has been Britain, producing just over 670 major varieties in 132 years. In contrast, the United States released 1,500 regular and commemorative stamps in 132 years. The top award, however, goes to Russia which has released close to 3,900 postage stamps over a period of 130 years. Albert Piringer's collection contains dozens of botanical stamps issued by Russia.

Stamp Collecting, or Philately

Collecting stamps is one of the most popular collecting hobbies in the world. For nearly 100 years postage stamps were made primarily to prepay mail charges. Recognizing the tremendous potential of stamps as a message medium,

From the United States this special, issued in 1971, depicts John Chapman, better known as "Johnny Appleseed."

however, every postal administration began, in the mid-20th century, to issue many more special or commemorative stamps than were required for use in just mailing correspondence. Special stamps were issued to publicize a nation's past or current accomplishments, to advertise its export products, or to honor famous citizens.

Topical Specialities

As the number of new stamps increased, stamp collectors' attempts to fill their albums with all of the stamps from the entire world became next to impossible. Not to be discouraged, however, philatelists narrowed the scope of their collections, for example, to stamps of a single country or subject, geographically or politically related lands, or specific issues of a single nation. A very positive change occurred in the 1940's when a French educator suggested to his pupils that they collect stamps according to the pictures on them. His theory was that not only would they be easier to obtain, but also they would be highly educational.

It was shortly after this that the American Topical Association (ATA) for collectors was organized. Those who pursue a topical specialty collect only stamps with a specific type of picture, regardless of the country of issue. This is exactly what our guest speaker has done; his speciality of horticulturally-related stamps going hand-in-hand with his career. Dr. Piringer is also a member of the American Topical Association as well as the cosmopolitan American Philatelic Society, and the British-Caribbean Philatelic Study Group.

A stamp, from the Netherlands, showing a marigold. As far as is known, there have been only 8 designs in the world issued depicting marigold flowers.

This first stamp using a mushroom as the main design was issued in 1938 from Czechoslovakia. Today there are about 200 stamps from 40 countries that depict mushrooms.

Stamps for Fun and Profit

A collection may have started as just an enjoyable hobby. Somewhere along the way, no doubt, the collector began to look at this project with a gleam in his eye and a question on his lips--are any of these beautiful stamps valuable? The horticultural collection assembled by Albert Piringer was one of the most colorful and interesting that I have seen. The stamps shown above were acquired because of their topics. I did not ask Dr. Piringer if his stamp of the marigold from the Netherlands, for instance, was valuable. But it is very unusual, since collectors know of only eight marigold designs worldwide. My curiosity led me to explore what makes a stamp valuable. It was easy to deduce that rarity increases the value, if not monetarily than certainly by virtue of the fact that one posseses a stamp of which there are only a few.

Some very remarkable sums have been paid for postage stamps and a stamp's value is not necessarily diminished if it has been placed on an envelope and sent through the mail. A 5-cent American stamp issued in 1847 was sold for $200,000 in 1975 and resold for $1 million some years later. The celebrated one-penny magenta issued by British Guiana in 1856 is considered "the world's most valuable stamp." Its unique and interesting philatelic history shows that ownership of this stamp has changed no less than eleven times. It was confiscated by the French government, auctioned off, and the proceeds applied to the German reparations debt. It has been in a museum and consigned to a New York department store's stamp section. The last record that I was able to find shows that $1 million was paid for the privilege of owning this very plain stamp.

Philatelists, in their search to fill their albums, study many things such as the paper and ink used, the way the stamps are separated, the printing process, and the way they are used. Sometimes errors are made in printing stamps. Such stamps are usually rare and may become very valuable. In 1918 about 100 24-cent U.S. airmail stamps were issued with the airplane mistakenly printed upside down. One of these stamps was sold at an auction in 1977 for $62,500.

The Horticulture Collection

The Garden of Carl Linnaeus, Hammerby, Sweden, issued in 1963.

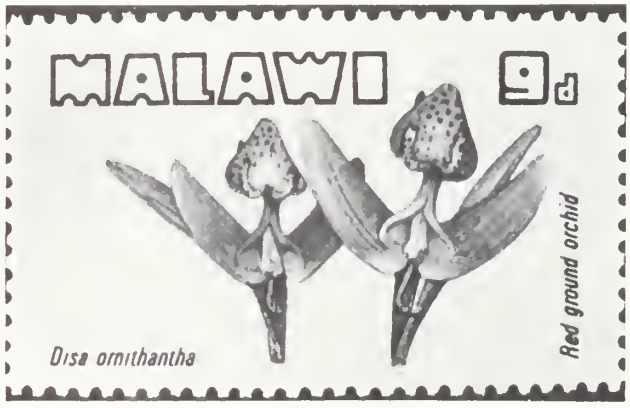
Horticulture, while considered a topical stamp specialty, is still quite a broad topic. How appropriate then that Dr. Piringer began his presentation with this incredibly detailed stamp. Linnaeus, considered the father of plant nomenclature, is featured here in his garden. With a herbarium sheet tucked under his arm, he surveys all that grows there. As we watched the slides appear on the screen, each one seemed more beautiful than the next. It was true, viewing this specialized collection was indeed an education. We saw stamps from Monaco, Japan, China, Russia, Malawi, the Falkland Islands, and Barbados. There were stamps from all over the world: commemoratives honoring the U.S. Garden Club of America; the 1974 Winter International Garden Show in Austria; and the planting of a maple tree--a U.S. Arbor Day commemorative. An unusual stamp from Czechoslovakia issued in commemoration of Karel Capek, a famous garden writer, was a favorite of mine. Fruits and vegetables of every description told the story of agricultural practices around the world. Perhaps the most spectacular stamps of all, however, were the flowers: floral bouquets, U.S. State flowers, and flowers from such countries as the Belgian Congo, Nepal, Austria, and Bolivia--all were vividly alive in glorious colors.

I present you now with a selection of some of these beautiful stamps. Art, science, and history were well-demonstrated through this horticultural stamp collection.

An actual repreaentation of horticultural practices during the reign of Queen Hutsuphut (about 3,000 years ago). Thia atamp shows the first example of "ball and burlaping" and tranaplanting of plant material from Somalia to Egypt. Thia illustration was taken from a frieze in Egypt and includes ships sailing in the Red Sea. The plant material is either frankincenae or myrrh.

Luther Burbank--from a set of famous Americans. This horticulturalist introduced the russet potato and the Santa Rosa plum. His philosophy in producing great potatoes was to "plant a lot of seeds and the strong ones will crowd the weak ones out."

From St. Helena showing a gardener spraying for pest control.



The most popular flower to show up in stamps has been the orchid. Three samples here (l. to r.) include one from Russia issued in 1971, a Red Ground Orchid common in southern Africa, and the Dog Orchid from the Falkland Islands in the South Atlantic.