INTRODUCTION

Review of Bible Plant Literature

Publications on Bible plants are a small part of the vast corpus of biblical literature. Botanically, they are an inchoate group of plants from diverse plant families with varying agronomic features and differing ecologies, considered as a group only by their inclusion in the scriptures. The reason for relatively few publications is simply that Bible plants have little impact on either Christian doctrine or praxis.

However, knowing these plants helps us understand the content and imagery of the scriptures. To quote from the first American writing on the subject, "in every part of the sacred writings images are introduced from the works of nature, and metaphors drawn from the manners and economy of animals, the growth of trees, and the properties of plants; and unless we know precisely the animal, tree, or plant referred to, we cannot discern the propriety of the allusion, nor be suitably impressed with the full force of the doctrine, precept, or narrative, which it was intended to illustrate. But these things, judiciously explained, serve to clear up many obscure passages, solve many difficulties, correct many wrong interpretations, and open new beauties in the sacred volume" (Harris, 1824, ii). For example, the "judicious explanation" of the deep red color of pomegranates helps when likening that fruit to the cheeks of the beloved in Song of Songs 4:3, and realizing that cedar of Lebanon is the largest tree known to many of the ancients makes its image as a powerful ruler understandable (e.g., Ezekiel 31:3). Crop plants, on the other hand, being more quotidian, often require less judicious explanation.

There are libraries of information on crops vital to civilization such as wheat, barley, olive, legumes, and flax. These were – and are – essential for food, forage, and fiber. On the other hand, some of the lesser known plants, such as galbanum, aloeswood (usually translated as "aloes" in most English versions), and gum, have received relatively little attention, from either biblical scholars or botanists. Even the well-known mustard is remarkably understudied, at least from an ethnobotanical standpoint.

Reviews of biblical plant literature are few. In his classic bibliography of botany, Jackson (1881) included a brief section on Bible plants. Prior to that,

Royle (1846) provided a brief but cogent review of early work. The most recent and exhaustive review of work during the past four centuries is *Plants of the Bible*, published 60 years ago and containing references to approximately 550 books and journal articles almost exclusively from Western literature (Moldenke and Moldenke, 1952). The first American book had about 150 references (Harris, 1824), and the present work has 149. In the present review, major works with continuing influence are emphasized, as are factors that have shaped thinking on the topic.

Who studies Bible plants? The short answer is divines and botanists. But the panoply of writers includes artists, herbalists, agriculturalists, encyclopedists, and people with an interest in natural history and, recently, in natural foods. Among them are famous botanists (Linnaeus, Balfour), a cleric appointed as librarian to George Washington (Harris), a leader in the British Chartist movement, a precursor to modern labor unions (Carpenter), a woman who was the first person to personally record an earthquake in Chile (Callicott), and writers with a commercial bent. At least four authors (Balfour, Callicott, Cook, and Hasselqvist) produced their volumes posthumously or during the last days of their lives or else died while in pursuit of plants. However, most contributions, certainly the most meaningful, have been by plant scientists and theologians.

This specialized area of study fits comfortably into neither a botanical nor a theological framework. Most Bible scholars and theologians have, at best, limited experience and knowledge of botany and, conversely, even fewer botanists have theological training. Quoting again from the father of American Bible botany who, in turn, is paraphrasing the famous explorer James Bruce (1730–1794), putative discoverer of the source of the Blue Nile, "many learned men have employed themselves with success upon these topics, yet much remains still to do; for it has generally happened that those perfectly acquainted with the language in which the Scriptures were written have never travelled, nor seen the animals of Judea, Palestine, or Arabia; and again, such as have travelled in these countries and seen the animals in question, have been either not at all, or but superficially acquainted with the original languages of Scripture" (Harris, 1824, vii). Bruce was speaking of animals, but the same is true of plants.

Any controversy concerning Bible plants results less from philology or literary structure, contra Trever (1959), who states, erroneously, that most books on Bible plants were written by botanists – if such were true, there might be less controversy – rather the misinterpretations are usually based on ignorance of the features of the plants and how local people used them. This is due to several factors, geographical and historical. First, many plants in Holy Writ do not grow in northern Europe, the site of most research on the topic, at least since the Reformation. And several of the best-known plants and plant products in the Bible grow neither in Europe nor in the Levant but

in regions farther afield. Good examples of well-known plants never grown in the Middle East are frankincense and aloes (aloeswood), plants that most Bible readers would recognize.

A History of Bible Plant Research

The following brief overview is chronological, beginning with the ancient Greeks and Romans and progressing through the late Renaissance, Linnaeus and his students, and the development and broadcasting of biblical encyclopedias and dictionaries, culminating in the Moldenkes and their successors. My goal is to show the evolution of our present conceptions – both understandings and misunderstandings – of Bible plants and how changes in the epistemology of science affected interpretation.

Ancient Greeks and Romans

An invaluable source of information on Bible plants – indeed, on any plant used in ancient times – is Greek and Roman writers. The earliest is Theophrastus (ca. 371–ca. 287 B.C.), who was a student of Plato and Aristotle and was best known for his *Enquiry into Plants*, an encyclopedic review of botanical information. Pliny the Elder (A.D. 23–79) was a Roman citizen who wrote *Naturalis Historia* (*Natural History*), producing an exemplar for many successive works. He founded the science of natural history, which reached its zenith in the late 1800s. Also writing in Latin, Dioscorides (A.D. 40–90) penned the classic *Materia Medica* on plants used in medicine. So influential was this work that well into the twentieth century, a course on materia medica was required of medical students. His book is one of few volumes remaining in circulation for almost 2,000 years.

The contributions by ancient authors can shed much light on Bible plants, especially on plants no longer grown or that are utilized in different ways. Accordingly, any of the major works discussed subsequently draws on Theophrastus, Pliny, and Dioscorides. Much of the information from the ancients was preserved and transmitted by Arab authors, who also transmitted additional notable original contributions not discussed here.

The Late Renaissance

The earliest botanist to study Bible plants in situ was Leonhard Rauwolf (Rauwolff) (died 1596), who visited Jerusalem and Baghdad, among other places – the first European plant scientist to do so (Dannenfeldt, 1968). Rauwolf's herbarium is still extant, and the plants he collected provide insight into both local plants and those traded from farther east, including the way these plants were used. He was trained in traditional Aristotelian pedagogy at the University of Montpelier, where the curriculum in medical education was

based on Aristotle, Galen, Avicenna, Dioscorides, and other classical writers (Dannenfeldt, 1968). Thus Rauwolf represents a vestige of the classical or Aristotelian school.

Up to the time of the Reformation, virtually all botanical knowledge in Western Europe was based on Aristotelian thinking. This changed in the late Renaissance, when science became more objective.

To combat the pervasive influence of Aristotle and its perceived threat to the integrity of the scriptures, there was a movement in the late 1500s to bring philosophy and physics (physics as understood in the original sense, as incorporating the natural world, not just the study of energy) into line with the teaching of the Bible, an approach called *Christian* or *pious philosophy* and also known as *mosaic physics*. The impact of this epistemological shift is important because it resulted in an attempt to conform the natural world – in our case, plants – to theological rather than scientific thinking. Put another way, this development confused the study of the Bible with the study of science. This broad topic is reviewed by Blair (2000), but for our purposes, what is important is how this was applied to natural history, that is, the study of nature as found in the sacred pages during the late Renaissance. Blair reviews the work of Johann Amos Comenius (1592–1670), who provided a list of writers considered to be good examples of Christian philosophers, including the Dutch botanist Levinus Lemnius.

Lemnius (the Latinized form of Lievens Lemmens) (1505–1568) wrote the first comprehensive treatment of all plants in the scriptures. Trained as a theologian, he later became a physician, a contemporary prerequisite to a botanical career. Lemnius wrote several books on a diversity of theological and medical topics and, in 1568, published a treatment of Bible plants in Latin that was widely circulated in several editions and languages (Blair, 2000). It appeared in an English translation by Thomas Newton in 1587 as *An herbal for the Bible: Containing a plaine and familiar exposition of such similitudes, parables, and metaphors, both in the olde Testament and the newe, as are borrowed and taken from herbs, plants, trees, fruits and simples, by obseruation of their vertues, qualities, natures, properties, operations, and effects: and by the holie prophets, sacred writers, Christ himselfe, and his blessed Apostles vsually alledged, and into their heauenly oracles, for the better beautifieng and plainer opening of the same, profitably inserted*. I cite the entire quaint title to show that the purpose of the book was not just an explication of Bible plants; it also included *simples*, an archaic term for medicinal plants, "their vertues, qualities, natures, properties, operations and effects" referring to medical usage. In other words, Lemnius had produced a sequel to Theophrastus and, in the tradition of pious natural philosophy – noted earlier – linked it with the scriptures. His was an herbal rather than an exegetical work, but it was an herbal with spiritual significance.

Lemnius's work preceded that of the best-known English herbalist, John Gerard (1545–1611/12) whose classic *Great Herball, or General Histoire of*

Plantes appeared in 1597 (Woodward, 1994). Gerard included numerous Bible plants in his book, a work remaining a favorite for herbal remedy even after four centuries. He does not mention the work of Lemnius, though Gerard is recognized for not acknowledging his sources (Woodward, 1994). Lemnius's book was the standard reference for Bible plants and their simples for almost two centuries.

Shortly after Lemnius, *Silva allegoriarum totius sacrae scripturae* was published (Lloret, 1622).

Trees have received special attention, perhaps because of their prominent imagery in the Bible – the tree of the knowledge of good and evil, the tree of Calvary, and the tree of life in the last book of the Bible.

As Arber (1912) notes, the production of herbals immediately followed the advent of moveable-type printing. The earliest herbals were a continuation of Aristotelian science, produced simply by printing existing manuscripts. This changed dramatically with the advent of Linnaeus.

Linnaeus and the Expansion of Botanical Knowledge

Both Lemnius and Gerard published before the establishment of the science of botany as it is presently understood. In 1753, the great Swedish botanist Carolus Linnaeus, also known as Karl von Linné (1707–1778), published *Species Plantarum*, a work universally accepted as the starting point for plant nomenclature. Linnaeus studied at the University of Uppsala, where he was tutored by Olaf Celsius (1670–1756), a professor of theology. Celsius's (Latinized as "Celsii") opus magnus was *Hierobotanicon, sive de plantis Sacrae Scripturae, dissertationes breves*, an extensive review of plants of the Bible published in 1748 (Celsius, 1748). Replete with Hebrew, Greek, Arabic, Syriac, and abundant references to earlier work, especially that of the classic Roman and Greek observers of nature like Dioscorides, Theophrastus, and Pliny, this remained the standard reference on Bible plants for a century. Having trained with Celsius, it is easy to understand the source of Linnaeus's interest in biblical botany.

This interest continued after Celsius's death. Linnaeus was asked to review the botanical entries for a new translation of the Swedish Bible (Fries, 1907). Like his mentor, Linnaeus was effective at instilling enthusiasm for Bible plants in his pupils.

One such student was Frederik Hasselqvist (Hasselquist) (1722–1752). Under Linnaeus's tutelage, Hasselqvist's doctoral research was a study of plants of the Holy Land and surrounding regions. He also studied birds, insects, fish, and other organisms, many of which he scientifically described for the first time. Tragically, Hasselqvist died in Smyrna (modern Izmir, Turkey), and Linnaeus published the results of his travels posthumously as *Iter Palestinum*, which appeared in various translations and editions

(Hasselqvist, 1756). Linnaeus explains in the introduction to *Iter Palestinum* that he inspired his ill-fated student to the study of Bible plants. He later apparently regretted the untimely death of this young scientist (Blunt, 2001).

Hasselqvist, like Rauwolf, was one of the few early plant scientists actually to visit biblical lands. As a result, his observations are of historical value as many of the major crops have changed since his day. For example, he noted the cultivation of flax, which is presently virtually unknown in the Levant. He also describes forests that have since been cut. Hasselqvist's travelogues were widely read and inspired further work.

The Eighteenth Century, Exploration, and Biblical Dictionaries

Exploration of biblical lands increased during this time. The Levantine coast was well known to Europeans, especially to merchants, who regularly traded in the port of Tripoli (in present-day Lebanon) and the markets of Damascus and Aleppo. But few traveled far inland, and even fewer reported on the natural history of the region.

In addition to Rauwolf, having the greatest botanical impact were the travel reports of Hasselqvist and Peter Forskål (1736–1763), who, like Hasselqvist, died overseas in pursuit of natural history (Hansen, 1964). Although Hasselqvist and Forskål were trained naturalists, other travelers returned with information on plants and their uses in the Middle East. Working in northern Syria, Alexander Russell (ca. 1715–1768), a British physician, documented agricultural crops and practices (Russell, 1756).

One of the repositories of this expanded knowledge was encyclopedias (or dictionaries – I use the terms interchangeably). By the time of Linnaeus, biblical encyclopedias were being produced in increasing numbers (Sheehan, 2003). This continued apace as further exploration, philological studies, and new findings in archeology and science fueled the incremental advance in knowledge facilitated by increased production of books. A major contribution was the biblical dictionary of the French Benedictine Antoine Augustin Calmet (1672–1757), one of the first such volumes by a Roman Catholic. Calmet wrote in the pious philosophy tradition, that is, reconciling the natural world with the teachings of the Bible.

The original iteration of this work appeared in the first quarter of the eighteenth century. It was a great success and was translated into several European languages. The first English translation with additions was published by Charles Taylor as Calmet's *Great Bible Dictionary*, which had several editions. For our purposes, the 1814 edition is the most pertinent as it deals with natural history (Taylor, 1814). Much additional information was added to Calmet's work in the numerous editions and revisions that appeared in the first half of the nineteenth century, although it is not always clear who contributed what. Numerous other biblical dictionaries, with varying

treatments of plants largely taken from previous writers, appeared throughout the eighteenth and nineteenth centuries. A surprising number of these titles are still in print, most of which placed emphasis on the plants, animals, geology, and minerals of the Bible – in other words, on natural history.

The use of the term *natural history*, apparently first applied to the study of the Bible by Taylor (1814), reflects the status of biology during that era. From the seventeenth century until the present, the term has referred to a discipline dealing largely with the careful observation of nature, even if it is not clear how much of the added information is original.

The Nineteenth Century and the Prominence of Natural History

Fewer than 25 years after Hasselqvist's work was published, the first American book on Bible plants appeared in 1793 and was written by Thaddeus M. Harris (I have not located a copy of this work). Harris (1768–1842) was a clergyman in the Congregational Church. After graduating from Harvard University, he was offered employment as librarian to George Washington (Bush, 2008) but declined because of health problems.

His first edition was a great success, and in 1824, he published an expanded edition titled *Natural History of the Bible* (Harris, 1824). (For a contemporary review of Harris' book and its strengths and weaknesses, see Anonymous, 1824.) Like Linnaeus before him, and like his contemporaries, Harris emphasized the need to see the plants in their native settings, information "which can be obtained only on the spot and by personal inspection." Harris was familiar not only with the writings of the ancients and the contributions of Forskål and Hasselqvist but also with the reports of travelers such as Leonhard Rauwolf and Bruce. Harris' work was republished numerous times on both sides of the Atlantic, often with additions and critical comments (e.g., Anonymous, 1833). Following Harris, most publications were guides based on reviews of previous work, usually updated with information from contemporaries and knowledge garnered by travelers.

An example of a compiled dictionary is *Bible Natural History*, published by Francis A. Ewing (1805–1857), a New Jersey physician (Ewing, 1835). This work anticipates later biblical encyclopedias in giving comprehensive coverage of all the biota and minerals of the Bible, drawn chiefly from other works. This is an oft-repeated phenomenon, that is, taking information from the ancient writers, conflating it with the work of more contemporary authors, and publishing it under a new title.

At least one book for children was produced in the first half of the nineteenth century: *The Trees, Fruits, and Flowers of the Bible* (Cook, 1846). Earlier, Harriet Newell Cook, née Rand (1814–1853), had produced a book on biblical animals, with over 30,000 copies being published in English alone and with translations into other languages (Sigourney, 1853). Numbers for the plant

book are not available. Like Maria Callicott, Cook's book was her last and, in fact, was completed by someone else.

The Middle East was becoming better known, and botanical exploration and research reached new heights by the beginning of the nineteenth century. On the other hand, relatively few exegetical works dealing with Bible plants were published. Chief among these were Rosenmüller's *Minerology and Botany of the Bible* (published in English in 1840). Ernst Frederick Karl (Carl) Rosenmüller (1768–1835) was an orientalist who wrote many books on travel, Arab literature, and a diversity of other subjects. His scholarly treatment is still useful today, although, as could be expected from a nonbotanist, some of the information he presents is more philologically than plant oriented. One example is the wild gourd (2 Kings 4:39), which Rosenmüller considered to be the squirting cucumber, *Ecballium elaterium*. When ripe, this could hardly be easily collected because of the explosive nature of the fruits. This is one of many examples of philologists and theologians writing about plants with which they had little, if any, contact. Later, Rosenmüller published a volume on the natural history of the Bible and, after that, a volume on the animals of the Bible.

In contrast to many of his contemporaries, John Kitto (1804–1854) compiled an original biblical dictionary rather than one largely borrowed from past sources. His *Cyclopedia of Biblical Literature* was apparently first published in England in 1845. The most widely distributed version was published in the United States in 1880 (other editions may exist). For this work, Kitto enlisted the aid of the well-known ethnobotanist John F. Royle (1798/1799–1858). Royle was born in British India and became professor of materia medica at King's College. His entries reveal careful scholarship, including acquaintance with Aramaic, Hebrew, and Greek texts as well as reviews of previous treatments. These were enriched by his own experience in economic botany. Although these treatments should receive more attention than they have by other Bible plant scholars, Royle's lack of firsthand experience with Mediterranean vegetation is evident. Despite this major contribution, Royle is not cited in the Moldenkes' book (Moldenke and Moldenke, 1952).

The volume *Scripture Natural History*, by William Carpenter (1797–1874), was first printed in London; the earliest edition I have found is dated 1828. Neither a cleric nor a botanist, Carpenter was a prominent figure in the Chartist movement in England, an eclectic who wrote on a wide variety of topics. An American edition, heavily edited by Gorham D. Abbot (1807–1874), was first published in 1833 (Carpenter and Abbot, 1833) and is the best-known edition of this work. The book is of interest less from a botanical viewpoint than as an example of the fascination with natural history and its application to the Bible, yet another example of mosaic physics. Gorham politely excoriates Carpenter on a variety of what appear to be trivial points. The edited version also shows how rapidly such a work was imbibed and

reissued. Gorham, a Presbyterian theologian, apparently had some theological disagreements with Carpenter, who may have been a Wesleyan, if he is the author of a collection of sermons by John Wesley (Carpenter, 1840). It is unfortunate that the recent reprint of *Scripture Natural History* (by Kessinger) erroneously ascribes the work to W. B. and J. E. Carpenter, father and son, a physiologist and a theologian, respectively, with no known relation to the actual author of *Scripture Natural History*.

After Linnaeus, the first books on Bible plants written by a professional botanist were apparently those of Balfour (1808–1884), who was the Regius Keeper of the Botanic Garden in Edinburgh and one of the leading botanists of his day. His first book (Balfour, 1857) treats only woody plants, each illustrated with watercolor prints. In his preface to this book, Balfour notes, "It is to be regretted that, of the numerous visitors at the present day to the Holy Land, few have turned their thoughts in this direction, and that thus many valuable opportunities for acquiring botanical information have been lost. The Botany of the Bible can be fully worked out only by those who travel in Eastern countries." Balfour's second book, *The Plants of the Bible* (Balfour, 1885, iv), covers the remainder of the plants and was published posthumously. Despite being the products of a respected botanist, little is original in either of Balfour's volumes, both of which were produced for the general public. Balfour was likely the last author on Bible plants trained, like virtually all professional botanists of the day, as a physician

Two missionary–scientists with botanical training contributed to biblical dictionaries in the second half of the nineteenth century. They were members of the faculty of the nascent Syrian Protestant College, now the American University of Beirut: Cornelius van Dyck (1818–1895), who wrote entries for the Smith Bible dictionary (Smith, 1860–1863), and his colleague, George Edward Post (1838–1909), who added some notes to van Dyck's articles in later editions of the Smith dictionary and wrote more expansive treatments of Bible plants and animals for the Hastings Bible dictionary (Hastings, 1901). An abridged edition was still in print in 2010. Post was one of the fathers of the American University of Beirut and a professor there until his death. Trained as a cleric, physician, dentist, and botanist, Post wrote the first modern flora of the Middle East (Musselman, 2006). Because of his credibility as a scientist resident in the Levant, Post exerted great influence on how Americans viewed Bible plants.

Some of the most widely used books on Bible natural history were written by clerics who lived and worked in the Middle East. The contribution of H. B. Tristram (1822–1906) as a careful observer of nature in the Holy Land is noteworthy. Eventually appointed canon of Durham Cathedral, Tristram was a clergyman with a keen interest in natural history, especially ornithology (Mearns and Mearns, 1988). His *The Natural History of the Bible* first appeared in 1867; the seventh edition is apparently the most widely

distributed (Tristram, 1883). It remains one of the most influential sources of information on Bible plants in the Holy Land, as evidenced by recent reprinting. Tristram spent almost a year traveling throughout the Levant and published numerous books in addition to the one on natural history. Further understanding of the lands of the Bible was provided by the works of the American cleric W. M. Thomson (1806–1894); H. M. Field (1822–1907), who was also an American cleric and wrote books on his extensive travels; and the Irishman J. L. Porter (1823–1889), a missionary. These volumes were widely distributed and had a great impact on Bible readers interested in the Middle East. Several are still in print.

George Henslow (1835–1925), an Englishman, wrote several treatments of Bible plants (Henslow, 1896, 1906; there are, no doubt, other editions). He was a clergyman with considerable training in botany, as is evidenced by his election as a fellow of the Linnaean Society. His father, J. S. Henslow, was one of the teachers of Charles Darwin at Cambridge. Henslow drew heavily on the observations of Tristram but also visited, at the least, Egypt and Malta and so had some firsthand information on Bible lands. The 1889 production by Alfred Knight (1861–1931), a British botanist, again utilizes information from travelers in the Holy Land as well as references to earlier works. The treatment of the mustard plant is one of many examples of confusing imagery with botanical reality (Knight, 1889), a further attempt to forge botanical facts into the mold of scripture.

Thus, by the end of the nineteenth century, treatments of Bible plants drew on ancient sources as well as an increasing number of reports from travelers to biblical lands. This was coupled with a rapidly expanding body of botanical knowledge.

The Twentieth Century and Scientific Contributions

Books on Bible plants in the early twentieth century had increased numbers of photographs yet little new information. Wilfred Edward Shewell-Cooper (1900–1982) was a British organic gardener and a pioneer of no-dig gardening, so it is not surprising that his book, *Plants, Flowers, and Herbs of the Bible* (Shewell-Cooper, 1977), with a foreword by Billy Graham, should have a sizable chapter on gardens. About the same time, Winifred Walker's beautifully illustrated book appeared, with watercolors by the author (Walker, 1979). Some of the entries, such as sorghum for hyssop, are erroneous. Walker was a well-known artist who wrote several books on biblical topics. Other treatments with artwork include that by Paterson and Paterson (1986) and the beautifully illustrated book by Anderson (1956). The most recent production of a well-illustrated Bible plants book is a French volume by Maillat and Maillat (1999), intended to aid the Bible reader with many color images but with no cited literature.