

## APPRAISAL INTO PHYTOCHEMISTRY AND TAXONOMY OF AN OLD PLANT COLLECTION FROM THE MIDDLE EAST

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### تقييم كيميائي وتصنيفي لمجموعة نباتية قديمة من الشرق الأوسط أسامة هنداوي سيد قسم النبات - كلية العلوم - جامعة قطر

زار الرحالة الإنجليزي ريتشارد بوكوك ( ١٧٠٤ - ١٧٦٥ ) منطقة الشرق الأوسط في الفترة ١٧٣٧ - ١٧٤٠ ، وجمع اثناء هذه الزيارة مجموعة نباتات طبية من مناطق في مصر والشام والجزيرة العربية . سبقت هذه المجموعة البعثة الدنماركية ( ١٧٦١ ) والحملة الفرنسية ( ١٧٩٨ ) بزمان في اعطاء وصف لبعض مكونات الفلورا في منطقة الشرق الأوسط . ألفت هذه المجموعة الضوء أيضا على طب الأعشاب الذي كان يمارسه سكان المنطقة قبل مائتين وخمسين عاما .

اهتمت الدراسة بتقديم عرض تاريخي للمجموعة النباتية ولطب الأعشاب الذي مارسه العرب منذ القدم . ألفت الدراسة الضوء على الأسماء العلمية للنباتات كما وردت في قائمة الرحالة ريتشارد بوكوك وأعطت للنباتات أسماءها العلمية ورددتها لفصائلها النباتية الحالية . اهتمت الدراسة أيضا بالأهمية الطبية لهذه النباتات في ضوء مكوناتها الكيميائية معتمدة في ذلك على الكم الهائل من المراجع المعروفة في الكيمياء النباتية للنباتات الطبية .

**Key Words :** Phytochemistry, Taxonomy, Middle East.

### ABSTRACT

The English traveller Richard Pococke (1704 -1765) visited the Middle East during the period 1737-1740 and collected medicinal plants from localities in Egypt and Arabia. This collection gave a description of the Middle East flora long before the Danish and Fench expeditions, and shed light on herbal medicine practiced in the region 250 years ago. Based on their use, medicinal plant in the collection fell into twelve categories that are applicable to contemporary herbal medicine. These plants were assigned their current scientific names, and were referred to their respective families. The history of Arabian herbal medicine have been dicussed, and the value of these plants has been assessed in terms of their important chemical components.

## INTRODUCTION

Arabia has always been fascinating for Europeans and glimpses of the Arabian way of life first came to light through the eyes of pioneer travellers of the sixteenth and seventeenth centuries such as Ludvicio di Varthema and Joseph Pitts who visited the region in 1503 and 1680, respectively. Description of Arabia in the eighteenth and nineteenth centuries appeared in accounts of the Europeans who came to it with various motivations, including travellers, opportunists, agents of foreign powers, scientists, and members of great expeditions [1].

The Danish expedition commissioned by Frederich V, the King of Denmark in 1761 was perhaps the first scientific expedition to the Middle East [2]. Led by Carsten Neibuhr (1732-1815), this expedition presented several maps and an excellent description of the social and political life in the region [3]. Peter Forsskal (1732-1763) a student of the renowned Swedish botanist Carolus Linnaeus (1707-1778) was a member of this expedition. He collected plants in Egypt and Arabia, and gave a list of these plants in his book *Flora Aegyptiaco-Arabica* [4].

The French expedition of 1798 under the command of Napoleon I brought the botanist A. Delile who presented a list of plants collected from Egypt and Sinai. This list appeared in two volumes of the celebrated book *Description De L'Egypte* [5,6]. Description of Middle East flora appeared also in later works such as those of the Russian Ulrich Seetzen (1767-1811), and the German Wilhelm Ruppell (1794-1884) who visited the region during the periods 1806-1809 and 1817-1834, respectively [2].

However, an earlier collection of plants from the Middle East was presented by the English traveller Richard Pococke (1704-1765) who visited the region during the period 1737-1740 and collected plants from Arabia, Arabia Petraea, Egypt, Lebanon, Syria, and Palestine. Born at Southampton in 1704, Pococke matriculated at Corpus College of Oxford in 1720, and graduated B.A., B.C.L., and D.C.L. in 1725, 1731, and 1733, respectively. He was appointed rector of Lismore 1733, was given archdeaconry of Dublin in 1745, and was appointed bishop of Meath in 1765.

Pococke's trip to the Middle East was apparently religious aimed at visiting the Holyland. He arrived at Alexandria in September 1737, visited the Patriarch of Rosetta, travelled up the Nile to Thebes, and crossed Sinai to Jerusalem. He also explored Lebanon, Syria, and Mesopotamia (Fig. 1). From the Middle East he moved to Cyprus, Candia, Asia Minor, Greece, and on his way back to England travelled through Italy, and Germany [7]. Pococke gave an account of the trip in a two-volume book entitled "A Description of the East" [8,9] which was highly esteemed and part of many great book collections [10,11]. In a list with the collection Pococke described the use of some species in herbal medicine practiced in the region 250 years ago.

The present study aims at updating the taxonomy of plant species in the collection, and giving an assessment of the medicinal value of these species using current knowledge in phytochemistry. The study also aims at giving a short account of the trip and an insight into the history of herbal medicine in the region.

## THE PLANT COLLECTION

The plant collection consists of 308 specimens. Although well preserved, Pococke did not describe the methods used for specimen preservation. A list of species in alphabetical order gave the localities of collection, and remarks. The list contained 37 entries less than the collection, as some specimens were repeatedly collected (Table 1). Identification of specimens was apparently carried out after collection and scientific names were given with authorities of renowned French plant taxonomists of that era such as Caspar Bauhin (1560-1624), and Joseph Pitton De Torunfort (1656-1708) (Table 2). These scientific names clearly demonstrated the long and tedious way of nomenclature used before Carolus Linnaeus introduced binomial nomenclature. Moreover, the biography of Pococke indicated that he was educated to pursue a career in the clergy, and that he had a passion for travelling and an interest in plants [7]. Identification of the specimens was, however, work of a professional botanist of whom Pococke gave no account neither in the list nor in the book.

Table 1. Number of plant specimens collected by Pococke in the Middle East and Europe during the period 1737-1741.

Jesuits and Carmelites to Arabia in the eighteenth century [12]. Endeavors of these missions perhaps inspired the clergyman Richard Pococke to collect medicinal plants during his trip to the Middle East.

Country	Number of entries in the list
1. Middle East	
Arabia	9
Arabia Petraea	17
Egypt	9
Jordan	2
Lebanon	18
Mesopotamia	1
Palestine	21
Syria	59
2. Europe	
Asia Minor	9
Cyprus	2
England	21
Greece	20
Holland	5
Hungary	35
Austria	7
Italy	36

### ARABIAN HERBAL MEDICINE

People of Arabia practiced herbal medicine for centuries, and handed this tradition from generation to another. Arabs had contacts with Greeks and Romans and translated into Arabic the Syriac and Hebrew translations of the works of Aristotle, Hippocrates, and Galen. Through these contacts Arabs established pharmacy, added several drugs to their materia medica, and developed outstanding hospitals [12]. Excellent Arab medical centres were established at Alexandria, Baghdad, and Damascus in the tenth century AD, and famous Arab physicians included Albiruni, Albukasis, Alkindus, Avenzoar, Avicenna, Ibn Baytar, Ibn Rushd, Janus Danascenus, Maimonides, and Rhazes. Moreover, herbal medicine is still in practice in the Middle East, and medicinal plants can be obtained at herb markets of most Arab capitals [13,14]. Westernization of Arabian medicine was carried out by translating Arabic manuscripts into Latin, and was helped by Christian medical missions of

Table 2. Medicinal plants collected by R. Pococke in the Middle East during the period 1737-1740. (A = Arabia, AP = Arabia Petraea, E = Egypt, J = Jordan, L = Lebanon, P = Palestine S = Syria).

Species	Scientific Name	Family	Country	Location
<i>Abutilon</i>	<i>Abutilon figarianum</i> Webb.	Malvaceae	S	-
<i>Acetosa vesicaria</i>	<i>Rumex vesicarius</i> L.	Polygonaceae	AP	-
<i>Aristolochia clematidis</i> C.B.	<i>Aristolochia elegans</i> Mast.	Aristolochiaceae	E	-
<i>Asparagus aculeatus</i>	<i>Asparagus officinalis</i> L.	Asparagaceae	S	-
<i>Asphodelus albus</i>	<i>Asphodelus microcarpa</i> Solzm	Asphodelaceae	S	-
<i>Astragalus</i>	<i>Astragalus hamosus</i> L.	Fabaceae	S	-
<i>Atractylis lutea</i>	<i>Atractylis Carduus</i> Forrk.	Asteraceae	S	-
<i>Atriplex</i>	<i>Atriplex Leucoclada</i> Boiss.	Chenopodiaceae	P	-
<i>Balsamina</i>	<i>Impatiens balsamina</i> L.	Balsaminaceae	L	-
<i>Cassia</i>	<i>Cassia italica</i> L.	Fabaceae	E	-
<i>Citron</i>	<i>Citrus aurantifolia</i> Risso.	Rutaceae	E	-
<i>Delphinium</i>	<i>Delphinium ajacis</i> L.	Ranunculaceae	S	-
<i>Echium vulgare</i> C.B.	<i>Echium vulgare</i> L.	Boraginaceae	S	-
<i>Eleagnus orientalis angustifolius</i>	<i>Eleagnus angustifolia</i> L.	Eleagnaceae	S	-
<i>Ephedra</i>	<i>Ephedra elata</i> Decne.	Gnetaceae	J	Plain of
<i>Galium</i>	<i>Galium aparine</i> L.	Rubiaceae	S	-
<i>Glycyrrhiza orientalis siliquis</i>	<i>Glycyrrhiza glabra</i> L.	Fabaceae	S	-
<i>Harmala</i>	<i>Peganum harmala</i> L.	Zygophyllaceae	L	Balbak
<i>Hypericum</i>	<i>Hypericum japonicum</i> Thunb.	Hypericaceae	S	-
<i>Hyocyamus magniflore</i> C.B.	<i>Hyocyamus albus</i> L.	Solanaceae	S	-
<i>Juniperus</i>	<i>Juniperus communis</i> L.	Coniferaceae	S	-
<i>Kali spinosum</i>	<i>Salsola kali</i> L.	Chenopodiaceae	S	-
<i>Lithospermum xelium arvense</i> Tourn.	<i>Lithospermum officinalis</i> L.	Boraginaceae	A	-
<i>Oak.</i>	<i>Quercus robur</i> L.	Fagaceae	L	Mount of
<i>Pastinaca orientalis canescens</i> Tourn.	<i>Pastinaca sativa</i> L.	Apiaceae	S	-
<i>Polygonum</i>	<i>Polygonum multiflorum</i> L.	Polygonaceae	J	Plain of
<i>Reseda</i>	<i>Reseda arabica</i> Boiss.	Resedaceae	E	Sinai
<i>Riccinus</i>	<i>Riccinus communis</i> L.	Euphorbiaceae	P	Jericho
<i>Rubus chamamoros</i>	<i>Rubus sanctus</i> Screb.	Rubiaceae	E	Sinai
<i>Ruta sylvestris</i>	<i>Ruta graveolens</i> L.	Rutaceae	P	Nazareth
<i>Scrophularia</i>	<i>Scrophularia deserti</i> Del.	Scrophulariaceae	L	Balbak
<i>Smyrniium creticum tomentosa</i> Tourn.	<i>Smyrniium olusatrum</i> L.	Apiaceae	S	-
<i>Solanum</i>	<i>Solanum nigrum</i> L.	Solanaceae	E	-
<i>Stachos arabica</i> C.B.	<i>Lavendula officinalis</i> Chaix	Lamiaceae	A	-
<i>Taxus baccata</i> L.	<i>Taxus baccata</i>	Taxaceae	L	Sidon
<i>Zizyphus sylvestris</i>	<i>Zizyphus spina-christi</i> L.	Rhamnaceae	A	-

## MEDICINAL USE OF PLANTS IN THE COLLECTION

Medicinal plants collected by Poccocke fell into twelve categories that are still applicable to contemporary herbal medicine. These plants were assigned current scientific names and referred to their families (Table 2).

### 1. Abortives

*Ricinus communis* L. leaves have been shown to contain amyrrin, stigmasterol, and B-sitosterol [15], and to possess abortive and uterine stimulant effects [16]. *Ruta gravulens* L. leaf decoction has been shown to contain rutin and xanthotoxin [15], and has been used to promote menstruation and ease delivery [14].

### 2. Antifungal

*Atractylis carduus* Forssk. has been shown to contain diterpene glycosides [15], *Impatiens balsamina* L. to contain 2-methoxy-naphthoquinone, and both are effective against fungal infection, of the skin [17].

### 3. Antirheumatic

*Aristolochia elegans* Mast. roots contain aristolochic acid and magnoflorine used to ease rheumatic pain [18], and *Ricinus communis* L. seed castor oil is known to be useful in the superficial treatment of lumbago [19].

### 4. Astringents

Plants used to check secretion discharge or arrest capillary bleeding included *Galium aparine* L. and *Polygonum multiflorum* Leaves of the former contain aperiolosides [18], and roots of the latter contain sesquiterpenes [15]. Both plants are hemostatic and promote healing of wounds. Moreover, *Quercus robur* L. bark contains quericitin, and *Rubus sanctus* Schreb. leaves contain diterpene glycosides, and both have been used in gargles for tonsillitis and pharyngitis [18].

### 5. Bronchodilators

*Eleagnus angustifolia* L. and *Ephedra elata* Decne. contain the alkaloids eleagnine and ephedrine, respectively [15,18], and have been used to treat bronchial asthma [20].

### 6. Demulcents

*Astragalus hamosus* L. buds, and *Citrus aurantifolia* Risso. fruits are known for their soothing effects on mucous membranes and have been used as electuaries to treat cough [18].

### 7. Diuretics

Plants used as renal stimulants included *Asparagus officinalis* L. roots, *Juniperus communis* L. volatile oil, *Lithospermum officinalis* L. seeds, and *Pastaca sativa* L. leaves containing asparagine, camphene, shikonine, and pastinacine, respectively [18].

### 8. Laxatives

Plants that loosen the bowels and stimulate defecation included *Glycyrrhiza glabra* L. containing glycyrrhizine [13], *Rumex vesicarius* L. leaves containing the flavonoid C-glycosides vitexin and orientin [15], *Abutilon figarianum* Webb. [14], and *Zizyphus spina-chriti* L. bark extract containing the alkaloids amphibine, A, B, and F [15].

### 9. Purgatives

*Cassia italica* Miller. leaves contain anthraquinone glycosides and cause evacuation of the bowels without gripping effect [18].

### 10. Spasmolytics

*Asphodelus microcarpa* Solzm., *Hyocyamus albus* L., and *Lavendula officinalis* Chaix. are used to relieve muscular spasms. *A. microcarpa* Solzm. bulbs contain the alkaloids asphodeline, microcarpine, and stachydrine, and *H. albus* L. leaves contain the sedative antispasmodic scopolamine [18]. The volatile oil of *L. officinalis* Chaix. flowers contain the spasmolytic compounds linalool, geraniol, and caryophyllene [13].

### 11. Vermifuges

Plants acting against worms included *Peganum harmala* L. seeds containing the alkaloids harmaline, harmine, and peganine [18]. *Reseda luteola* L. and *Scrophularia deserti* Del. leaves contain the protozoicidal alkaloids luteolin and scrophuline, respectively [18,20].

### 12. Poisonous Plants

Plants described as poisonous by Poccocke fell into two groups. The first group included *Delphinium ajacis* L. seeds, *Echium vulgare* L. leaves, *Salsola R. kali* L. leaves, and *Solanum nigrum* L. unripe berries rich in the alkaloids ajacine, echumine salsoline, and solanigrin, respectively [15,18,21-25]. The second group included plants whose seeds contain toxic compounds such as *Atriplex halimus* L., *Hypericum japonicum* Thunb., *Ricinus communis* L., *Smyrniolum olusatrum* L., and *Taxus baccata*. Seeds of *A. halimus* L. are rich in coumarines [13], whereas those of *H. japonicum* Thunb. contain hypericine that increases sensitivity to light causing sunburn [22]. Seeds of *R. communis* L. contain ricine which in pure form is thought to be among the most poisonous compounds known [14], those of *S. olusatrum* contain eremophilanolide [15], and those of *Taxus baccata* L. contain taxine which has a digitaline-like effect [18].

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