

BOTANICAL EXPLORATION OF SINAI

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ABSTRACT

The history of the botanical exploration of Sinai has been reviewed. It has been divided into the following periods:

- I. Expeditions in the eighteenth century.
- II. Exploration from 1800 till the publication of "*Florula Sinaica*".
- III. Exploration from 1835 till the publication of "*Flora Orientalis*".
- IV. A decade of intensive exploration (1861-1871).
- V. An era of extensive floristic studies (1871-1929) with the publication of the *Flora of Egypt*.
- VI. A period of updating.
- VII. An era of phytoecological studies.

A chronological list of those who contributed to the botany of Sinai and their contribution are given. The motivations and inspiration for the studies undertaken in Sinai are investigated.

INTRODUCTION

The history of Sinai has been the subject of a vast and exhaustive study and of many conflicting theories. Through the crossing of Sinai by Abraham (ca. 2076 B.C.), Joseph (ca. 1887 B.C.), Moses and the children of Israel (ca. 1440 B.C.), the Holy Family (spending more than two years in Egypt) and the Moslems coming from Arabia (639 A.D.), this territory played a paramount role in the establishment and the dissemination of the three Heavenly religions: Judaism, Christianity and Islam. Sinai has been for many centuries the theatre for many acting armies. In the course of history, Sinai has witnessed no less than 52 invading armies moving either to or from Egypt. Since the prehistoric past, paleolithic man migrated across the intercontinental bridge between Africa and Asia, probably in both directions.

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The temples and barracks of Serabit El Khadim and the turquoise and copper mines of Maghara as well as the inscriptions carved in the rocks at Maghara and the discovery of the baboon denoting the moon cult at Serabit El-Kadim prove that the southern part of Sinai was inhabited and the mines were worked by ancient Egyptians in the pre-dynasite days.

The dawn of Christianity brought Sinai, as the site of the Law-giving, into prominence. A large number of theologians have visited Sinai with the object of following the route taken by Moses and his people. However, the flight of the Israelites from Egypt, their number (*cf.* Ibn Khaldoun)⁽¹⁾, the route which they followed and the site of their subsequent wanderings in Sinai are a matter about which there has been so much contention and so many conflicting views.

In the second century, pilgrims and hermits from all parts of the Near East began to concentrate in the Peninsula. Empress Helena visited Sinai in 342 A.D. and ordered a Church, dedicated to the Virgin Mary, and a tower of refuge for the monks to be built. Later, in 542 A.D., Justanian, the Emperor of Rome, ordered very strong and massive walls to be built, enclosing the Church of St. Helena, the tower, Moses well and the monks cells. A chapel was built on the summit of Gebel Musa.

During the fourth century, famous monks and scholars visited Sinai. Notices of Southern Sinai are found in the narratives of Silvanus (365 A.D.), Ammonius (373 A.D.) and Nilus (400 A.D.).

Sinai, in 639 A.D., was the route of the Moslems to Egypt. The Egyptians, as a nation, accepted the religion, the language and institution of the Moslems and embarked on a new course of history. The Moslem geographers, during their travels in the vast Islamic world, crossed Sinai. Many writings about Sinai are given in the Moslem writings, e.g. Ibn Khordadhabeh (end of the ninth century), Al-Istakhry (951 A.D.), Ibn Hauqal (977 A.D.), Al-Moqaddasi (983 A.D.), Al-Massoudi (965 A.D.O.), Ibn Iyas (first decade of the 11th century), Yaqut El-Hamawy (1179-1229 A.D.) Ibn Khaldoun (1332-1406 A.D.) and many others (see Weil 1908)⁽²⁾.

The data and information given in the writings of the afore-mentioned Moslem geographers have been used by travellers and geographers of the next centuries. However, till the seventeenth century, visitors to Sinai were mainly theologians, who endeavoured to solve the mystery of the exact route of the Exodus, the loss of the Egyptian host and the site of wanderings. They were interested in the sacred history and sacred geography. As a by-product of their main object and the interest in biblical plants, a meagre knowledge of the plant life in Sinai has accumulated.

In the eighteenth and nineteenth centuries, scientists in different disciplines, including geographers, geologists, botanists, zoologists, archaeologists, etc. have been attracted to Sinai with various objectives. They were from different nations, including Germans, Austrians, British, French, Italians, Swiss, Irish and Dutch. The majority of these were from German-speaking countries. With the exception of a few scientists, nobody crossed the whole peninsula of Sinai or experienced the harsh summer conditions in the desert. However, all travelled under the most perilous conditions, some of them the victims of disease, hunger and even murder.

The present study aims at giving a historical review of the scientific visits to Sinai, which contributed to our botanical knowledge of this territory. We are mainly concerned with what may be called the modern botanical exploration, i.e. after the establishment of the binomial system for naming the plants by Carolus Linnaeus (1707-1778) in the middle of the eighteenth century. Investigations related to the ecology of the area are also included.

ERAS OF BOTANICAL EXPLORATION

The history of botanical exploration of Sinai can be conveniently divided into the following periods:

- I. Expeditions in the eighteenth century
- II. Explorations from 1800 till the publication of "*Florula Sinaica*" in 1834.
- III. Explorations from 1835 till the publication of "*Flora Orientalis*" in 1867-88.
- IV. A decade of intensive exploration (1861-1871).
- V. An era of extensive floristic studies (1871-1929) with the publication of the *Flora of Egypt*
- VI. A period of updating
- VII. An era of phyto-ecological studies

CHRONOLOGICAL LIST OF TRAVELLERS, COLLECTORS AND BOTANISTS

To facilitate following the history of botanical exploration of Sinai, we give below a chronological list of those who contributed in any way to our knowledge of the flora and other aspects of plant life in Sinai.

I. Expeditions in the eighteenth century

The first modern botanical exploration of Egypt started in 1761⁽³⁾. This was achieved by the Danish expedition under the command of Carsten Niebuhr (1732-1815), a lieutenant of engineers, a mathematician and a practical surveyor. The party arrived in Egypt on September 26, 1761 and spent almost one year in the country. This expedition represents the important start of an era with rich botanical exploration in the Middle Eastern countries. Though Peter Forsskal (1733-1763)⁽⁴⁾, a student of the Swedish botanist C. Linnaeus, himself has not herborized in Sinai, Niebuhr crossed the territory from Suez to St. Catherine Monastery. The "*Flora aegyptiaco-arabica*" written by Forsskal and published by Niebuhr in 1775, although it does not list plants from Sinai, does list numerous species recorded in different localities in Egypt and Arabia which have been recorded later in Sinai by other investigators.

The expedition in 1798, under the command of Napoleon I, visited different parts of Egypt, including Sinai. Delile, who acted botanist, made a splendid collection of plants from Egypt. The official record of the voyage, which appeared under the title of *Description de L'Égypte*", contains one volume of descriptive matter "*Florae aegyptiacae Illustratio*"⁽⁵⁾ and "Folio Atlas of botanical plates, *Flore d'Égypte*"⁽⁶⁾. These records comprise many species that grow in the different terrains of Egypt and Sinai as well.

II. Explorations from 1800 till the publication of "*Florula Sinaica*" in 1834

Ulrich Jaspas Seetzen (1767-1811) was a botanist and a most learned Arabist⁽⁷⁾. In March 1807, he visited Arabia Petra and Sinai, then travelled to Cairo via Suez. His stay in Cairo extended over the period May 1807 to March 1809. He visited Fayoum and then travelled again to Suez, from where he took a ship to Jeddah. He arrived in Mecca on October 10, 1809 and then left for Mocha, from where he sent his last letters. Before realizing his aims to travel to Africa, Seetzen was found dead 2 days after his departure from Taiz in Yemen. During his trips, he adopted Islam temporarily and was qualifying as a *darwish* in the character of *Hajji Musa*, a physician. The account of his travels was published in 1810 in two publications. In 1854-59, this was published in four volumes by Fr. Kruse, Hinrichs and G. Fr. Hermann Mueller. Vol. 4 was edited with comments by them as well as H.L. Fleischer. These volumes contain valuable information about the plants in the areas visited by Seetzen. They were published in Berlin under the title "*Ulrich Seetzen's Reisen durch Syrien, Palaestina, Phoenicien, die Transjordan-Laender, Arabia Petrae und Unter-aegypten*". Vols. 1 and 2 were published in 1854, Vol. 3 in 1855 and Vol. 4 in 1859.

Johann Ludwig Burkhardt (1784-1817), a Swiss from Basel, was one of the eminent travellers in the area⁽⁶⁾. He adopted Islam and learned the Arabic language. For two years (1810-1812) he travelled in Syria, Lebanon and Palestine, going on to Cairo and Nubia. Then in 1814, under the name *Ibrahim Ibn Abd-Allah*, on a pilgrimage to Mecca, he explored Hejaz. In 1815, he returned to Cairo, and in the following year, he set out for Suez, dressed as an Arab, with a Bedouin guide and two camels. He spent several weeks in Sinai, but he did not succeed in reaching Aqaba. Among his accounts is "Travels in Syria and the Holy Land" (1822), which was published after his death in Cairo at the age of 33. This account contains many descriptions of newly discovered landscapes and localities, the description of a journey from Damascus through the mountains of Arabia Petraea and desert E1 Ty to Cairo, in the summer of 1812 (pp. 311-456), and a Journal of a tour in the peninsula of Mount Sinai in the spring of 1816 (pp. 163-174, with 2 maps).

The German scientist of Natural History, Wilhelm Peter Edward Simon Rueppell (1794-1884) travelled in Egypt, Nubia and Kordofan⁽⁷⁾. He visited Sinai four times in the years 1817, 1822, 1826 and 1831. His main aim was to study the fauna of Sinai and to collect samples of its animals. He herborized in Sinai and his plants were located in the Senckenberg Museum in Frankfurt a.M. Work was carried out on these plants and a book published by George Fresenius (1808-1866) in 1834 under the title, "*Beitraege zur Flora von Aegypten und Arabien*"⁽⁹⁾. This publication can be considered the first account of the flora of Sinai which is of any importance. It enumerates on 38 families and 142 species; this includes numerous species new to science. For each species, the locality, altitude and earlier literature are given. There are illustrations of four different species.

Rueppell produced a map of Sinai in 1826 "*Das petraeische Arabien*". He also made astronomical observations. In this connection, A. Ricci, an astronomer, visited Sinai in 1830.

Rueppell conducted smelting experiments at Bir Nasib, on behalf of Mohammed Ali Pasha. He advised the Pasha of Egypt against mining copper, mainly because of the shortage of firewood needed for the smelting furnaces in that "most horrendous desert". Rueppell succeeded in penetrating into regions which no European has entered before him. His book, "*Reisen in Nubien, Kordofan und dem petraeischen Arabien, vorzueglich in geographisch-statistischer Hinsicht*", published in Frankfurt a.M. and Leipzig in 1829, contains the first drawing of the Island of Pharaoh "*Geziret Faraoun*" and the Island of Emrag in the Gulf of Aqaba and of the Medieval fortress of Aqaba. It is to be mentioned that the publications of Rueppell in other fields contributed a great deal to our knowledge of zoology.

Botanical Exploration of Sinai

One of the most eminent scientists, whose works and writings represent a milestone in the scientific exploration of Sinai, is the German, Christian Gottfried Ehrenberg (1795-1876)⁽¹⁰⁾. He is the founder of the study of microscopic organisms. He visited Sinai in the years 1820-25. In 1824, Ehrenberg visited Sinai with Friedrich Wilhelm Hemprich (1796-1825)⁽¹¹⁾. Their plant collections were deposited in the Botanical Museum, Berlin-Dahlem. Ehrenberg published numerous articles on the coral islands, coral reefs and the physiology of coral animals. Both Ehrenberg and Hemprich gave an account of the natural history of Northern Africa and Western Asia in 1828. Recently, Erwin Stresemann (1954)⁽¹¹⁾ wrote an account on the travels of Ehrenberg and Hemprich in the Orient, as given in their letters over the period 1819-26. This account shows the tremendous material sent from Egypt to Berlin by the two explorers.

The most important botanical contribution of Ehrenberg to the botanical exploration of Sinai is his collection of mosses. This collection has been elaborated on by P.G. Lorentz in 1867 in "*Ueber die Moose, die Hr. Ehrenberg in den Jahren 1820-1826 in Aegypten, der Sinaihalbinsel und Syrien gesammelt*"⁽¹²⁾. This publication is one of the best studies on the mosses of the area. It enumerates 43 species with their description and distribution and contains 15 plates with very instructive hand-drawings.

In 1827, Aylmer Bourke Lambert (1761-1842) collected plants from the deserts of Sinai and Aqaba, which are kept at Kew.

Léon Emmanuel Simon Joseph de Laborde (1807-1869), a French nobleman, visited Sinai in 1828. He was an enterprising traveller, antiquarian and skillful artist. In his book, "*Journey through Arabia Petraea to Mount Sinai, and the excavated City of Petra, the Edom of the Prophecies*" (London 1836), he gave numerous sketches of high artistic merit. The book contains important data on the landscape and ancient remains, as well as a new map. Laborde collected many plants, which were described by Delile in 1833 in "*Fragments d'une Flora de l'Arabie-Pétrée. Plantes recueillies par M. Léon de Laborde*"⁽¹³⁾. 85 plant species were given in this paper, including many species new to science. A new genus was given the name *Leobordea* as a dedication to Laborde.

About that time, M.A. Linant de Belleforges journeyed in Siani. Laborde and Linant published a book about their journey "*Voyage dans l'Arabie Pétrée*" (Paris 1830).

James Raymond Wellstedt (1805-1842), a British naval lieutenant, made surveys of the Gulf of Aqaba (1830), the southern coast of Arabia (1833) and Oman (1835). He visited Sinai three times in 1829-30, 1833 and 1836, during which time he made a very large collection of plants. In his own statement, these collections "are now in the

possession of A. Bourke Lambert Esq., V.P.L.S.". Others were sent to J. Lindley, who gave notes on Wellstedt's collection in the Geographical Journal. Wellstedt himself published his "Travels in Arabia" (London 1838).

Peter Martin Remi Aucher (1792-1838) herborized in Sinai in 1830. He was born at Blois in France and studied pharmacy at Orleans and Paris. He pursued his botanical studies in Paris under Jussieu and Desfontaines (1813). After marriage with a young lady named Ely in 1817, he added her name to this own. He undertook a series of journeys from 1830 to 1838 in Turkey, Greece, Egypt, Sinai, Syria and Persia. His extensive and valuable collections were sent to Paris and were soon dispersed over various public and private herbaria in France, Britain and elsewhere. All were made use of in Boissier's *Flora Orientalis*; also published by de Candolle and by Jaubert and Spach. He, himself, published "*Relation de voyage en Orient*" (1843).

The director of the gardens of Ibrahim Pasha at Cairo, Nic Bové (1802-1841), visited Sinai in 1832. He made a rich collection, which was worked on and published by J. Decaisne in his "*Florula Sinaica, Enumération des plantes recueillies par M. Bové dans les deux Arabies, la Palestine, la Syrie et l'Égypte*" (1834)⁽¹⁴⁾. In this important article, Decaisne enumerated not less than 233 species. It also contains very good descriptions and useful information. Bové himself published his account of the journey (*Relation abrégée d'un voyage botanique en Égypte, dans les trois Arabies en Palestine et en Syrie*, An. Sc. Nat., 1 (bot.) p. 72, 161 et 230).

James Trail, a gardner at Chiswick and to the Pasha at Cairo collected plants in Sinai before 1834.

By the end of 1834 and the publication of the papers by Fresenius in Frankfurt a.M. and by Decaisne in Paris about the Flora of Sinai, a reasonable knowledge of the flora of this territory has been accumulated. One can consider the year 1834 as being the start of a new era in the floristic studies in Sinai.

III. Explorations from 1835 till the publication of "*Flora Orientalis*" in 1867-88.

Wilhelm Philipp Schimper (1804-1878) was sent by the "*Naturhistorischen Reiseverein*" of Wuertenburg to Egypt and Arabia. By the end of March 1835, he was in Sinai, where he collected some hundreds of plant species⁽¹⁵⁾. In November 1836, Schimper left from Suez for Jeddah, then he proceeded to Abyssinia. His collections were published by A. Richard in "*Tentamen Florae Abyssinicae, etc.*" (1847-51). In the words of A. de Bary, the Editor of the "*Botanische Zeitung*".

"W. Schimper's Name wird in der Geschichte der beschreibenden Naturwissenschaft auf die Dauer mit Auszeichnung genannt werden. Er hat fuer die

Kenntnis Ostafrikas Erhebliches geleistet. Seine botanischen Sammlungen-mehrere Hundert Arten der Sinai-Flora, mehrere Tausend aus Abyssinien-, ausgezeichnet durch sorgfaeltige Herstellung und genaue Aufzeichnung des fuer die einzelnen Pflanzen Wissenswerten, haben direkt eine wesentliche Foerderung der Pflanzenkunde und indirekt Anregungen zu weiterer Forschung gebracht."⁽¹⁵⁾

The Italian Antonio Figari (1804-1870) explored Egypt for thirty years, herborized in Sinai in 1836-37 and again in 1847 as well as around Mecca in 1849. His plants are in the Herbarium of Florence and were elaborated on by Webb in his "*Fragmenta Florulae aethiopico-aegyptiacae*" (1854). Figari published valuable studies on the geography and geology of the area, either alone or together with A. Henry Husson (1815-1855)⁽¹⁶⁾.

J.R. Roth (1814-1858) visited Sinai, Palestine and Lebanon in 1837 and Aden in 1847. About the same time in the spring of 1837, Gotthilf Heinrich von Schubert (1780-1860)⁽⁷⁾ and J.M. Bernatz visited Sinai. Schubert gave an account of his "*Reise in das Morgenland, 1836 und 1837*" (Erlangen 1838, 39) and Bernatz published 40 views with a text by Schubert in his "*Bilder aus dem heiligen Land... gezeichnet von J.M. Bernatz, mit erlaeuternden Texte von G.H. v. Schubert*" (Stuttgart 1839).

The plants collected by Schubert, Erdle and Roth were written on and published by August Schenk (1815-1891) in "*Plantarum Species quae in Itinere per Aegyptum, Arabiam et Syriam... G.H. de Schubert, M. Erdle et J.R. Roth Colligerunt*" (Monachii 1840)⁽¹⁷⁾. In his introduction to the book, Schenk wrote, "*Plantae in hocce libello enumeratae atque descriptae, a cls. Drs. de Schubert, Erdle et Roth, in itinere per annum 1837 in Orientem suspecto, collectae sunt. Major plantarum pars in Aegypt ad Kahirum, prope Tor et in monte Sinai in Arabia petraea, in Syria prope Hebron et in monte Libanon conquisita est, quum celeritate itineris, varietate rerum naturalium colligendarum et navigatione longiqua peregrinantes impedirentur, quominus plures ad botanicem res spectantes quaerevent ...*" Schenk enumerated 25 algal species, 66 monocotyledonous plants (10 families) and 245 dicotyledonous plants (58 families), with a description of 8 new species. It is noteworthy that A. Schenk published two other papers in 1880 and 1888 on the fossil wood in Egypt, especially in the Lybian desert using material collected during the Rohlfs expedition⁽¹⁸⁾.

Rev. Edward Robinson (1794-1863), an American historian and Biblical scholar, together with Rev. Eli Smith visited Sinai in 1838. They published their "Biblical researches in Palestine, Mount Sinai, Arabia Petraea and Egypt; being a journal of travels in the year 1838, undertaken in reference to Biblical geography" in three

volumes (London 1841). The first volume consists, in the main, of data on the biblical and early Christian features of Southern Sinai. In this volume, sections 2-4, pp. 49-254. is a description of the journey from Cairo to Aqaba via Suez and Mount Sinai. Based on the itinerary of Robinson and Smith, Heinrich Kiepert (1818-1899) prepared a map of the peninsula, 1:800 000 (*Karte der Sinai-Halbinsel und des petraeischen Arabien nach den Itinarien von E. Robinson and Elie Smith, konstruit und gezeichnet von Kiepert, 1840*). It is to be noted that Robinson visited Sinai again in 1852.

By the end of 1838, Joseph Ritter von Ruessiger (1802-1863) journeyed in Sinai. He made very interesting geological observations, which may be considered the first geological information of the peninsula. He published his geognostic results from Cairo to Sinai in 1839. He also published his travels in four volumes (1841-49); Volume III (291 pp., 1847) comprises his travels in Sinai. One of the atlases accompanying his book contains 20 plates for plants⁽¹⁹⁾.

David Roberts, a Scottish artist, contributed to our knowledge of Sinai. He made a journey to the Holy Land in 1839 and published his results in three volumes of magnificent drawings, "The Holy Land, Syria, Idumea, Arabia, Egypt, Nubia" (London, 1842-49). These included an attempted reconstruction of the temple of Serebit El Khadim.

In the spring of 1840, Baron Koller visited Sinai. Extracts from the itinerary of his tour were published in the *Journal of the Royal Geographical Society*, London in 1843, describing an inland route from Mount Sinai to Aqaba.

During the mission sent by His Majesty Friedrich Wilhelm IV to Egypt, Ethiopia and the peninsula of Sinai, Karl Richard Lepsius (1810-1884) visited Sinai twice. He published his important scientific results in 1852 and 1859, comprising his discoveries in Sinai.

The year 1846 witnessed an important event in the field of floristic studies, not only in Sinai, but also in the whole Middle East. In this year, Edmond Boissier (1810-1885) made his great journey in the Near East, through the Nile Valley to Aswan, then to Mount Sinai and through Arabia Petraea to Gaza, Jerusalem and the Dead Sea. He traversed all of Palestine and went to Damascus, Lebanon and Anti-Lebanon, embarked in Tripoli for Latakiah, camped at Mt. Cassius and proceeded through Antiochia to Aleppo and back to Southern Lebanon. The results of these journeys were first published in the "*Diagnosis Plantarum Orientalium Novarum*" (1845-59) and later in his monumental work "*Flora Orientalis*" in five volumes and a supplementary volume (1867-88)^(20,21). These volumes are based on Boissier's own collections as well as those of many others prior to and contemporary with Boissier.

Among the collections from Sinai used by Boissier was that small collection of C. Pinard, but with several new species. Pinard collected in Sinai in 1846.

In 1850, John Hogg (1800-1869), classical scholar and naturalist, gave an account of the geography and geology of Mount Sinai and the adjacent terrains after his visit in 1849.

IV. A Decade of Intensive Exploration (1861-1871)

It is remarkable that the decade extending from 1861 to 1871 has witnessed the important explorations of Sinai. More than 21 scientists and biblical scholars visited Sinai in that decade. These include F.W. Holland and A.S. Noroff in 1861, Fr. Frith and R.S. Poole in 1862, D.D. Smischlow and R. von Kraemer in 1864, H. Brugsch, G. Arconati Visconti and F.W. Holland in 1865, Oscar Fraas and Milne Redhead in 1866, F.W. Holland for the third time in 1867, H. Bauerman, Le Neve Foster, John Keast Lord and the group of the Ordnance Survey: E.H. Palmer, H. Sp. Palmer, C.W. Wilson, F.W. Holland and S. Birch in 1868, Antonin in 1870 and R. Tate and George Ebers in 1871. Their studies covered different fields, including geology, topography, geography, botany, zoology, archaeology, epigraphy and history of the peninsula of Sinai.

Rev. Fredrick Whitmore Holland (1837-1881) is among the main explorers of Sinai. He visited Sinai four times in 1861, 1865, 1867-68 and 1878. During his third visit, he accompanied the group of the Ordnance Survey. Holland's publications from 1865 to 1882, contributed to a great extent to our knowledge of the geography and geology of the peninsula of Sinai.

Abraham S. Noroff published the narratives of his second journey to Sinai in 1861 (Petersbourg 1878, in Russian).

In the spring of 1865, Heinrich Karl Brugsch (1827-1894) visited Sinai and published details of his trip to the turquoise mines in southern Sinai (Leipzig 1868). In 1866, Milne Redhead visited Sinai and wrote notes on its flora (1866)⁽²²⁾.

Oscar Friedrich von Fraas (1824-1897) visited Sinai in 1866. He published his geological observations in 1867.

The geologist Hilary Bauerman (1833-1909) visited Sinai in 1868 and published his notes on the geology of Sinai in 1869. He was accompanied by Sir Clement Le Neve Foster (1841-1904) and John Keast Lord. The latter along with Bauerman collected 31 ferns from Sinai, which are kept at Kew.

The group of the Ordnance of Sinai visited the peninsula in 1868. The important results of the survey were given in the Ordnance survey of the peninsula of Sinai by Maj.-Gen. Sir Charles William Wilson (1836-1905) and H. Sp. Palmer. This publication is in 6 volumes with an atlas of maps (London 1869-72⁽²³⁾). Wilson wrote two publications about the surveys in Sinai in 1873.

George Moritz Ebers (1837-1898) journeyed in southern Sinai in 1871 and published details of his journey (Leipzig 1872).

V. An era of Extensive Floristic Studies (1871-1912)

With the publication of the *Flora of Egypt*

W. Barbey-Boissier (1842-1914), Boissier's son-in-law and pupil and founder of the Herbarium Boissier in 1873, crossed Anatolia and journeyed in northern Egypt in 1873, in Palestine and Syria in 1880 and returned through Cyprus to Izmir. The results of these travels are summarized in his and his wife's, "*Herborization au Levant*" (1882).

Charles Tilstone Beke (1800-1874), an explorer, chiefly of Abyssinia, left for Egypt in December 1873, accompanied by several scientific friends, with the purpose of investigating the true location of Mount Sinai. In his article "*Mount Sinai a Volcano*" (London 1873), Beke bases his theories on all the phenomena accompanying the description of the Exodus and concludes that Mount Sinai was a volcano at that time and therefore should be looked for in the volcanic region to the east, between Aqaba and the Dead Sea. In another article (1873), published in 1874, he wrote "*On the true position of Mount Sinai*". He died soon after his return to England and his widow issued the results of his last journey, "*The late Dr. C. Beke's discoveries in Sinai, in Arabia and of Midian, edited by his widow Emily Beke*" (London, 1878). Among the companions of Beke during his expedition was the geologist John Milne (1850-1913) who collected plants near Aqaba. His collection is kept at Kew. Milne published his "*Geological notes on the Sinaitic Peninsula and North-Western Arabia*" in 1875. The book edited by the widow of Beke contains in App. D, p. 593, Prof. Oliver's determination of plants collected near Aqaba by John Milne, F.G.S., on Beke's expedition to Sinai, (January and February 1874)⁽¹⁹⁾.

Henry Chichester Hart (1847-1908) was invited by Prof. Edward Gordon Hull (1829-1917), Director of the Geological Survey of Ireland, to take part as a volunteer on a geological and surveying expedition to Sinai and Palestine in 1883-84 under the auspices of the Palestine Exploration society. He was chiefly induced to do so on the assurance he received from Prof. Oliver of Kew "*that whatever our continental brethren may have accomplished, few British botanists had as yet turned attention to Sinai*". Hart's botanical results were published in 1885⁽²⁴⁾. His book, "*Some account*

of the *Fauna and Flora of Sinai, Petra and Wadi Araba*" (Dublin 1891)⁽²⁵⁾ summarizes his findings. His plants are at Kew and in the British Museum.

George Edward Post (1838-1909), an American Missionary and Professor of Surgery at Beirut, visited Sinai in 1884. The accounts of his journey and the plants collected from Sinai and other areas in the Middle East are published in the "*Plantae Postianae*" (1890-1900), partly in collaboration with A. Autran). Nobody knew the flora of Sinai better. The "*Flora of Syria, Palestine and Sinai*" (1893-96) is the first standard publication on the flora of this region since Boissier. A second edition in two volumes, edited by J.E. Dinsmore, appeared in 1932-33⁽²⁶⁾.

Henry M. Field, another American, travelled with Post. He offered many botanical notes and published his narratives of his travel from Egypt through the wilderness of Sinai to Palestine (London, 1884).

Paul Friedrich August Ascherson (1834-1913) visited Egypt five times, the first of which was in November 1873, when he accompanied the Rohlf's expedition to the Lybian desert⁽²⁷⁾. During his fourth visit in 1887, Ascherson journeyed in the Isthmic Desert north Sinai. He wrote a paper about the area, "*Die noerdliche Isthmus-Wueste Aegyptens*" (1887)⁽²⁸⁾. He gave an account of the history, geography, geology, plant life, zoology, agriculture and ethnology of the area. It is worthwhile to quote his words about the area. He wrote: "*Mehr als einmal sind auf diesen von dem Blute so vieler Nationen getraenkten Sandfeldern*, p. 315". Ascherson wrote also about the northern locality of the mangrove in Egypt (Bot. Zeitung 61, p. 236, 1903).

Ascherson undertook many journeys to Egypt with his friend George August Schweinfurth (1836-1925), the famous German scientist⁽²⁹⁾. Schweinfurth stayed for a long time in Egypt and established the "*Société Khédiviale de géographie*" on June 2, 1875. This is one of the most active scientific societies in Egypt upto now with the name "*Société géographique d'Égypte*". He published 428 publications in different languages and in various fields, including geography, geology, zoology, botany ...etc., the majority of which are on Egypt⁽³⁰⁾. The most important work, from the point of view of the present investigation, is his book, written with P. Ascherson, called, "*Illustration de la Flora D'Égypte*" (1887-79, Cairo)^(31,32). This is a valuable work, which represents the bases for the next floristic studies in Egypt. Despite its title, it contains neither illustrations nor descriptions; descriptions were only given on some plants diagnosed as new species or varieties.

Alfred Kaiser (1862-1930), a Swiss, enjoys a great reputation for his fabulous knowledge about Sinai⁽³³⁾. He is the only scientist who stayed for some years in Sinai. In June 1886, as a result of the encouragement given by Georg Schweinfurth, Kaiser

visited Sinai and stayed there for 6 months. He travelled in southern Sinai, acquainting himself with the people and their customs. He collected plants, animals, stones and fossils. After returning to Cairo at the end of the year 1886, he stayed there till the 15th March 1887, when he made his second trip to Sinai. During this trip, he accompanied Prof. Johannes Kuno Walther (1860-1937) on his trip to Sinai. The latter was interested mainly in the coral reefs. He published his results in 1888 and 1890. Kaiser returned to Switzerland in 1898, and after training in Zurich and Munich, made his third voyage to Sinai in 1899. He stayed in Sinai till 1900, with an interruption of two years, when he made his famous trip to Central Africa. During his long stay in Sinai, he established a research station at El-Kurum, near El Tor, with a branch in Wadi Badr inside the mountain region. Many scientists visited his place and stayed there for short or longer period. In order to keep it going, Kaiser collected plants and animals and sold them to museums abroad. During this long stay of Kaiser's in Sinai, he lost his first wife, Lina Gujer and a new born boy in a cholera epidemic in 1899. After leaving science for business for almost 2 decades, Kaiser returned again to Sinai for the fourth time in April 1926, accompanied by his second wife, Mathilde Saurer. It was his aim to write a great monographic work on Sinai, its nature, population and history. Kaiser published 9 publications on the various fields of science in Sinai. In his "*Sinaiwueste*" in 1922, are given numerous important details on the natural history of the Sinai peninsula. After Alfred Kaiser's death in April 1930, his family made a donation of his plants collected from 1926-28 to Herbarium Boissier at Geneva. Tackholm (1969)⁽³⁴⁾ writes about this collection: "the finest⁽³⁴⁾ collection ever made on Sinai, and his detailed notes on the vernacular names and uses of every plant, make his collection a mine of information for those interested in linguistic matters or in popular medicine'. However, the collection was without a single Latin name. The collection was determined by Vivi Tackholm and other specialists in 1930-31. Tackholm published a book on the Alfred Kaiser's Sinai herbarium in 1969. She states that there are several rare plants in Kaiser's collection and that it is the only time a wild orchid has ever been found in Egypt.

In the years 1898 and 1899, William Fraeser Hume (1867- and Thomas Barron (1865-1906) from the Survey Department, Ministry of Finance, Egypt, accomplished their topographical and geological studies in South-eastern and Western Sinai. Publications by Hume on Sinai occupy a prominent place among his numerous (over 90) publications on the geology of Egypt. His publications on the Rift Valleys of eastern Sinai and its geology (1901-1904) were followed by his valuable publication on "*The topography and geology of the peninsula of Sinai, south-eastern portion*" in 1906. It comprises important botanical and zoological notes. In App. I, Hume gave 850 readings of meteorological observations (made by Mr. H.G. Skill in the years

1898 and 1899) and analysed them. He also gave a list of the plants recorded in Sinai till 1906, with Arabic names, distribution and the collector's name. The list comprises 527 species of Phanerogams and 123 Cryptogams, including 5 Pteridophytes, 23 Bryophytes, one fungus, one lichen and 93 algae. The plants collected by Hume or Barron were mainly identified by G. Schweinfurth. However, Hume made use of the collections and publications of Kneucker.

Barron published his work, "*The topography and geology of the peninsula of Sinai, western portion*" in 1907. He gave an account of the meteorology observed and the vegetation, as seen during the six months in which the party was at work in the peninsula.

Andreas Kneucker of Karlsruhe in Baden, the editor of the *Allgemeinen Botanische Zeitschrift* made his first trip to Sinai from 27th March to 13th April 1902. During his journey from El Tor to Suez through the central mountain range, Kneucker collected 273 species of Phanerogams, 20 species of Bryophytes, no less than 14 being new to the peninsula and 29 algae. Kneucker published an account of his expedition (1902)⁽³⁵⁾ and (1903)⁽³⁶⁾ and a list of the collected plants (1904)⁽³⁷⁾. Bornmueller published some new species found by Kneucker in Sinai (1903 and 1908). Kneucker visited Sinai for the second time in the spring of 1904 and wrote an account of his journey the same year.

In 1908, a very interesting study of the flora of El Tor was published by the German botanist Reno Muschler. This paper, "*Beitrag zur Kenntnis der Flora von el Tor*"⁽³⁸⁾, gives a list of 204 species with information on their literature, synonyms, Arabic names, localities and distribution. It comprises a short account of the history of botanical studies in El Tor, the physiognomy of the flora and the relation of the flora of this territory to that of the adjacent areas.

Muschler, in 1912, published the first account of the flora of Egypt in English⁽³⁹⁾. With the support of P. Ascherson and G. Schweinfurth, who were acquainted with the flora of Egypt. Muschler wrote his "*Manual Flora of Egypt*". It contains descriptions of 1503 plant species, their Arabic names, localities and their general distribution. Keys on the species, genera and families are given. At the end of the book, there are 7 appendices comprising: 1. Botanical discovery of Egypt, 2. Phytogeography and geology, 3. Tabular view of the distribution of the species in the different terrains in Egypt, 4. Tabular view of the distribution of the Egyptian plants in the Mediterranean basin, 5. List of the most frequently cultivated and garden plants of Egypt, 6. Glossary and 7. Alphabetical list of Arabic names of plants. In this, Muschler enumerated 1503 plant species, while the number of species known to occur in Egypt till 1889 was only

1316. The Manual flora of Egypt by Muschler used lavishly the descriptions given in *Flora Orientalis* of Boissier. However, Muschler's Flora represented the bases of the floristic and other botanical studies in Egypt till the 1950's, when another Manual Flora of Egypt was published by two Egyptian botanists A. Montasir and M. Hassib (Cairo 1956)⁽⁴⁰⁾ and the Student's Flora of Egypt by Vivi Taeckholm and M. Drar (1956)⁽⁴¹⁾.

With the appearance of Post's and Muschler's Flora, considerable knowledge has accumulated on the Flora of Sinai.

During the First World War in 1915-1916, Paul Theodor Range (1879-1952)⁽⁴²⁾, a German geologist, took part in the acting military processes in northern Sinai on the side of the Turkish army. Range carried out numerous studies in the Isthmic desert and published in the fields of geology, meteorology, hydrology and botany of the area. His paper, "*Flora der Isthmus Wueste*" is a very instructive article⁽⁴³⁾. He collected about 250 plant species from this territory, the majority of which were from the Maghara ca. 40 km. from the Mediterranean coast. The collection was mainly identified by G. Schweinfurth in Berlin in winter 1916-1917. Range gave an introduction in his paper on the ecology and geological setting of the area and their relation to plant life. He enumerated 240 species and gave a table showing the distribution of these in Sinai, Egypt and Palestine. He compared his collection with those of Ascherson, Barbey and Fourtau. At that time, the number of species known from Sinai, including the Isthmic desert, was 803. It is to be noted that only 526 species were known in 1906. The paper by Range is very interesting and presents useful information about the flora of the Isthmic desert.

It is interesting to know that the first Egyptian who wrote about the Egyptian Flora was Ali Ibrahim Ramis. He was a German-taught surgeon. His interest in the floristic studies was inspired by his German teachers in Munich, namely, the two botanists, Gobel and Solereder. Ramis published the "*Bestimmungstabellen zur Flora von Aegypten*" (Jena 1929)⁽⁴⁴⁾. His publication is based on the flora written by R. Muschler. The keys for the Egyptian Flora given by Ramis comprise the plant species recorded in Sinai till that time.

VI. A Period of Updating

In the year 1926, after the establishment of the Egyptian University, some foreign staff members were working for the different departments. Among those working for the Department of Botany were the Swede Gunnar Taeckholm and his wife Vivi. Since then, they started establishing the herbarium at that department. After the death of Gunnar Taeckholm, his wife continued the work they had started. She

accomplished very much in floristic studies undertaken in Egypt. Her stay in Egypt extended over the period 1926-78, with the exception of a few years during the Second World War. One of the earliest contributions of V. Taeckholm was a paper on new records in Sinai in 1932⁽⁴⁵⁾. Her biggest contribution to the Flora of Sinai was her study on the collection of Alfred Kaiser, which appeared in 1969⁽³⁴⁾.

In collaboration with the Egyptian botanist Mohammed Drar (1894-1964), Taeckholm published four volumes on the Flora of Egypt containing the monocots and some dicotyledonous families. These volumes represent a milestone in the floristic studies in Egypt (Cairo, 1941, 1950, 1954, 1969)^(46,47,48,49). They include the plants recorded in Sinai which belong to the investigated families.

M. Drar was the founder and director of the three important botanical gardens in Cairo. He established the botanical section, garden, library and herbarium of the Agriculture Museum, where his large collections from Egypt and the Sudan are still kept.

In the year 1956, the "*Students Flora of Egypt*" by Taeckholm and Drar appeared⁽⁴¹⁾. This contains the plant species known to have been recorded in Sinai till that time. In 1974, a new and revised edition of this flora was published by the University of Cairo⁽⁴¹⁾. It contains numerous hand drawings for many plants, including those from Sinai.

The first volume of the "*Manual Flora of Egypt*", by the Egyptian botanists A. Montasir and M. Hassib, appeared in 1956⁽⁴⁰⁾. It contains the dicotyledonous families.

With the appearance of these flora, a reasonable amount of knowledge on the flora of Sinai has accumulated. Other lists of plants from different parts of Sinai contributed to this knowledge, e.g. the articles written by Y. Shabetai in 1940⁽⁵⁰⁾, L. Boulos (1960)⁽⁵¹⁾ on some parts in north Sinai, El Hadidi (1969)⁽⁵²⁾ on the flora of mountainous region and El Hadidi *et al.* (1969)⁽⁵³⁾ on the weed flora of southern Sinai.

During the occupation of Sinai by the Israeli army, some botanists from the Hebrew University carried out some taxonomical studies on plants from Sinai, e.g. Danin (1969-72)^(54,55).

VII. An Era of Phyto-ecological Studies

Since 1935, the botanists visiting Sinai broached another subject of botanical studies. The first important phytosociological study in Sinai was undertaken by Zohary (1935)⁽⁵⁶⁾. The same author published another article in the same field in 1944⁽⁵⁷⁾. Though the expedition of the Hebrew University to southern Sinai in the 1920s is not

of botanical interest, yet its results given by Bodenheimer in 1928 comprise data of ecological value. The main aim of that expedition was to solve the problem of the Biblical Manna.

M. Hassib, in his study on the distribution of plant communities in Egypt, gives an account of those recorded in Sinai⁽⁵⁸⁾.

In the early fifties of this century, after the establishment of the Desert Institute in Cairo, some studies were undertaken in Sinai in different field of science. Those related to botany and plant ecology include: soil science, plant ecology, water resources, etc. These studies were mainly carried out in northern Sinai^(59,60). Since the fifties, the plant ecological investigation in Sinai have been very limited. Migahid *et al.* (1959)⁽⁶¹⁾ published a good article on the plant ecology of some wadis in southern Sinai and Batanouny (1968)⁽⁶²⁾ wrote a limited study about the ecology and plant communities on the coastal dunes in northern Sinai. cursory botanical studies were carried out by Danin^(63,64). He wrote a book on the desert vegetation of Israel and Sinai⁽⁶⁵⁾, in which he gave a good treatise on the distribution of many plant species in Sinai.

EPILOGUE

The history of the exploration of Sinai is unique as the peninsula of Sinai itself. The motivations and inspiration for the studies undertaken in Sinai are special ones. All kinds of motivation are involved, including religious, scientific, political and military.

The turquoise and copper mines of Maghara give the evidence that the ancient Egyptians were the first to explore this part of Egypt. Christianity brought Sinai, as the site of the Law-giving, into prominence and famous monks and scholars visited Sinai. Since then, numerous missions visited Sinai, mainly theologians, who endeavoured to solve the mystery of the exact route of the Exodus and many issues in the Bible. As a part of the vast Islamic World since 639 A.D. and as a pilgrimage route to Mecca for all Moslems from the western territories, Sinai attracted the attention of the Moslem geographers. Valuable geographical information on Sinai was given in the writings of these geographers.

Religious inspiration has been one of the main reasons behind many expeditions to Sinai. One of the main expeditions to the Orient, Sinai included, was the Danish expedition (1761). The idea of this expedition was mooted by the Hebraic Professor J. David Michaelis (1733-1815) of Goettingen University. It was at a time when the literal truth of the Bible was just beginning to be challenged by scholars. The expedition undertook the task of searching for knowledge which might lead to a more accurate understanding and interpretation of the Scriptures. Though the botanist

participating in this expedition had not herborized in Sinai, yet his account of the flora of Egypt and Arabia (1775)⁽⁴⁾ represents a good basis for further floristic studies in Sinai.

Since the early decades of the eighteenth century, Sinai has been a focal point for studies and research. Though some explorers were serious archaeologists, Aegyptologists, Arabists, geologists, zoologists, botanists, etc., yet, several, of them had an ulterior motive in trekking into Sinai under harsh conditions. It is believed that political and military aims, disguised as scientific motivation, are the main reason for many studies. Sinai has been considered a part of the Holy Land or the *Morgenland*. In Europe, some societies and institutions have been established to study the various Palestinian affairs. These were interested in Sinai as well. A "Palestine Exploration Society" and a "*Gesellschaft fuer Palestina-Forschung*" have been established in Britain and Germany respectively. Even some specialized periodicals appeared in Germany, e.g. "*Zeitschrift deutsch. Palaestina-Vereins*". It seems to be very important to study the history of these societies and journals in order to elucidate the political reasons for the exploration of Sinai. The voluminous work of the Ordnance of Sinai in 1868 would be considered as having political and military motivation, even though impressive scientific results in various fields have been given.

Due to various intricate reasons, Sinai was a main field of studies in various disciplines in European Universities and Scientific Centres. The history, geography, etc. of Sinai were the themes of dissertations in Europe, e.g. Weil, 1908⁽²⁾.

Spying was an ulterior motive for trekking into Sinai. Some English explorers, spying on the Turks, used exploration, archaeology and surveying to conceal their real mission. Berstein (1979)⁽⁶⁶⁾ cites an example: "the Woolley (Sir Charles Woolley) and Lawrence (T.E. Lawrence) expedition in early 1914 to the Turkish fringes of the Sinai was ostensibly undertaken for scientific research but was actually launched at the instigation of Lord Kitchner, the British Secretary of State of War, who was concerned about the German-inspired Turkish buildup in the area." On the other side, Paul Range, a German geologist working for the Turkish Army, contributed a lot to the knowledge of geology, hydrology, botany and meteorology of northern Sinai, especially the Isthmic Desert^(42,43).

The colonialism of the European countries was a main reason for the discovery of natural resources in many countries, including Egypt. The British Naval Forces, crossing the Suez Canal to the Far East, initiated several investigations along the coasts of Sinai. At the beginning of the century, some British geologists accomplished various studies in Sinai. Oil and minerals in Sinai were the main attractions.

Over a period extending from 1907-1946, Sinai was administered by British Governors, namely, Alfred C. Parker from 1907-1923, Claud J. Jarvis from 1923-1936 and Hemersly from 1936-1946. Jarvis wrote many books about Sinai, in which his colonialistic ideas found expression. Generally, the British Governors did their best to try and isolate Sinai from Egypt; however, they were not successful. As a result of their policy, Sinai remained a place which was not easily accessible to Egyptians from the rest of the country. It was necessary for any Egyptian to get permission from the Frontiers' Forces in order to visit Sinai. This was the situation till 1967. In the early sixties, the Supreme Council of Science in Cairo published a book (in Arabic) containing some accounts on different aspects in Sinai. At that time this book was of restricted distribution. However it contains nothing more than the information and records of previous investigations. Doubtless, this policy resulted in an obvious decline in surveying and research activities in Sinai. The establishment of the Desert Institute in Egypt created a new era in the botanical and other studies in Sinai, which were mainly undertaken in the 1950s. However, the everchanging policy and the affiliation of this institute to different ministries and organizations since its establishment, hampered its activities.

During the Israeli occupation of Sinai, the botanical studies were fragmentary. The main contributions were in the field of floristic studies. Generally, the contributions to the botany of Sinai since the publication of P. Range's paper on the Flora of the Isthmic Desert are limited. This is true despite the transportation facilities available and the progress in science achieved in this field. The studies undertaken since that time till now have been carried out by scientists visiting Sinai for short periods. The policy adopted by the British Governors and the military activities are two main reasons for the hasty studies with little contribution. In the last three decades, hundreds of books have been written about Sinai. Almost all offer no scientific contribution, instead are about politics and contain insinuating remarks. Some however have well produced photographs. The restless situation in Sinai and policies have hampered scientific activities in this territory.

Sinai needs intense, continuous and meticulous botanical and phyto-ecological studies. This can be accomplished only by dedicated scientists, from independent institutions and an independent budget. *A. priori*, a library containing everything that has been written about Sinai in all languages, should be established.

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REFERENCES

- (1) **Ibn-Khaldun, Abdel Rahman. 1982.** The prolegomena (Al-Moqaddima). Kitab Al-Ibar. Dar Al-Kitab Al-Libnani and Maktabat Al-Madares. Beirut. (in Arabic).
- (2) **Weil, R. 1908.** Le persqu'ille du Sinai. École Pratique des Hautes Études. Bibl. Sci. Hist., Fasc. 171. Paris.
- (3) **Niebuhr, M. 1972.** Travels through Arabia and other countries in the East. English translation by Robert Heron. 2 vols. Edinburgh.
- (4) **Forsskal, Peter. 1775.** Flora aegyptiaco-arabica, sive Descriptiones plantarum, quas per aegyptum inferiorum et Arabiam felicem detexit illustravit Petrus Forsskal.. Post mortem edidit Carsten Niebuhr Accedit tabula Arabicae felicitis geographico-botanica. Hauniae, ex officina Moelleri. 32, cxxvi p, 11,220 p, 1 map.
- (5) **Delile, Alire Raffeneau. 1809-28.** Florae Aegyptiacae illustratio. In: France-Commision des Monuments d'Égypte. Description de l'Égypte. Paris. Histoire Naturelle, tome 2, 49-82.
- (6) **Delile, Alire Raffeneau. 1809-28.** Flore de l'Égypte, explication des planches. In: France-Commision des Monuments d'Égypte. Description de l'Égypte. Paris. Histoire Naturelle, tome 2, p. 145-320.
- (7) **Poggendorff, J.C. 1863.** Biogeographisch literarisches Handwoerterbuch zu Geschichte der Exacten Wissenschaften. 2. Bd. Verlag von Johen Ambrosius Barth., Leipzig.
- (8) **Burckhardt, J.L. 1822.** Travels in Syria and the Holy land. J. Murray, London. xxiii+668 pp. with 3 maps and 3 plates.
- (9) **Fresenius, Georg. 1834.** Beitrage zur Flora von Aegypten und Arabien. Museum Senckenbergianum. Frankfurt a.M., pp. 9-94 with plates IV and V, and pp. 165-188 with plates X and XI.
- (10) **Zaunick, R. 1959.** Ehrenberg, in Neue deutsch. Biographie. Publ. Duncker und Humboldt, Berlin. pp. 349-350.
- (11) **Stresemann, E. 1954.** Hemprich und Ehrenberg. Reise Zweir naturforschender Freunde im Orient geschildert in ihren Briefen aus den Jahren 1819-1826. Abhandl. d. deutsch. Akad. d. Wissenschaften zu Berlin. Klasse f. Math. u. allgemeine Naturwissenschaften. 1954, no. 1, 177 pp.

- (12) **Lorentz, P.G. 1868.** Ueber die moose, die Hr. Ehrenberg in den Jahren 1820-1826 in Aegypten, der Sinaihalbinsel und Syrien gesammelt. Physik. Abhandlung. d. koeniglichen Akad. d. Wissenschaften zu Berlin. 1867:1-157 + 15 plates.
- (13) **Delile, M. 1833.** Fragments d'une Flore de l'Arabie-Pétrée. Plantes recueillies par M. Léon de Laborde, Extrait du voyage dans l'Arabie Pétrée, par M. Léon de Laborde; chez Giard, rue Parea Saint. Andre-des-Arts. no. 5, Paris. 1833.
- (14) **Decaisne, M.J. 1834.** Énumération des plantes recueillies par M. Bové dans les deux Arabies, la Palestine, la Syrie et l'Égypte. Ann. sci. Nat., ser. 2. 2:5-18, 239-270.
- (15) **De Bary, A. 1879.** Personalnachricht: W. Schimper. Bot. Zeitung 37(15): 240.
- (16) **Figari, A. and A.H. Husson. 1895.** L'exploration scientifique de l'Égypte sous le regne de Mohammed Ali. IV. Considérations générales sur la géographie botanique de l'Égypte, de la vallée d'Égypte et de ses dependences. Rev. d'Égypte, le Caire, pp. 517-544.
- (17) **Schenk, A. 1840.** Plantarum Species quas in itinere per Aegyptum, Arabiam et Syriam cli. viri G.H. de Schubert, M.Erdl et J.R. Roth collegerunt. Typis Doctoris Caroli Wolf., Monachii, pp. 46.
- (18) **Drude, O. 1891.** August Schenk. Ber. detsch. bot. Gesellschaft. 9: (15)-(26).
- (18) **Keldani, E.H. 1941.** A bibliography of geology and related sciences concerning Egypt up to the end of 1939. Dept. of Survey and Mines, Ministry of Finance, Egypt.
- (20) **Boissier, Edmond. 1867-84.** Flora orientalis siva enumertio plantarum in Oriente a Graecia et Aegypto ad Indiae fines hucusque observatarum. Basileae, H. Georg. Five volumes.
- (21) **Boissier, Edmond 1888.** Supplementum editore R. Buser. Genevcae et Basileae. H. Georg. 2pl. xxxiii, 466 pp. 1 plan, 5 pl., 1 port.
- (22) **Redhead, R.M. 1866.** Notes on the flora of the desert of Sinai. Journ. Linn. Soc. 9:208-235.
- (23) **Wilson, C.W. and H.S. Palmer. 1869-72.** Ordnance survey of the peninsula of Sinai. In 6 vols., with an atlas of maps. London.

- (24) **Hart, H.C. 1880-86.** Report on the botany of Sinai and S. Palestine. Transact. of the Royal Irish Academy. 28, p. 373-452 and 3 pl. Dublin.
- (25) **Hart, H.C. 1891.** Some account of the fauna and flora of Sinai, Petra and Wadi Arabah. 255 pp.
- (26) **Post, G.E. 1932-33.** Flora of Syria, Palestine and Sinai. Edit. 2 by John Ed. Dinsmore, Vol. I:43+639 pp., 1932; Vol. II:18+928: 774 text fig.+5 k., Beirut.
- (27) **Wittmack, L. 1913.** Paul Ascherson. Ber. deutsch. bot. Gesellschaft. 31:102-110.
- (28) **Ascherson, P. 1887.** Die noerdliche Isthmus-Wueste Aegyptens. Verhandl. f. Erdkunde zu Berlin. 14:313-322.
- (29) **Busse, W. 1925.** Georg Schweinfurth. Ber. deutsch. bot. Gesellschaft. 43: (74)-(111).
- (30) **Schweinfurth, G. 1916.** Veroeffentlichte Werke, Landkarten, Aufsaezte und Briefe 1858-1916 von Prof. Dr. G. Schweinfurth. Berlin.
- (31) **Ascherson, P. and G. Schweinfurth. 1887.** Illustration de la Flore d'Égypte. Mémoires de l'Institut Egyptien. Vol. II, p. 25-260 (as vol. 1889).
- (32) **Ascherson, P. and G. Schweinfurth. 1889.** Supplement a l'illustration de la Flore d'Égypte. Mémoires de l'Institut d'Égypte. Vol. II, p. 745-821.
- (33) **Kaiser, A. 1922.** Die Sinaiwueste. Mitt. Thuring. Naturf. Gesell. 24, 106 pp.
- (34) **Taeckholm, Vivi. 1969.** Alfred Kaiser's collection in Sinai. Publ. Herb., Uni. Cairo.
- (35) **Kneucker, A. 1902.** Botanische Reise durch die Sinaihalbinsel. Allg. bot. Zeitschrift 8 (7-8):125-130, (9-10): 155-159.
- (36) **Kneucker, A. 1903.** Botanische Ausbeute einer Reise durch die Sinaihalbinsel vom 27. Maerz bis 13. April 1902. Allg. bot. Zeitschrift 9(7-8):125-129, (9): 146-151, (10):165-167, (11):184-189, (12): 203-204 und 1904. 10(1-2):4-6.
- (37) **Kneucker, A. 1904.** II. botanische Reise nach der Sinaihalbinsel. Allg. bot. Zeitschrift. 10 (5-6):95-96, (10):161-164, (12): 200-204.
- (38) **Muschler, R. 1908.** Beitrag zur Kenntnis der Flora von "el-Tor" (Sinai-Halbinsel). Verhandl. bot. Vereins d. Prov. Brandenburg. 49 (1907): 66-146.

- (39) **Muschler, R. 1912.** A manual flora of Egypt. With preface by P. Ascherson and G. Schweinfurth. Berlin, R. Friedlaender u. Sohn. 1312 pp. in 2 vols.
- (40) **Montasir, A.H. and M. Hassib. 1956.** Manual flora of Egypt. Vol. I: Dicotyledneae. Fac. Sci., Ain Shams. Univ., Cairo.
- (41) **Taeckholm, Vivi (in collaboration with M. Drar) 1974.** Students' Flora of Egypt. Univ. of Cairo (First Ed. in 1956).
- (42) **Poggendorff, J.C. 1959.** Poggendorff's biographisch-literarisches Handwoerterbuech. Bd. VII a, Teil 3:L-R, p. 671-672. Berlin.
- (43) **Range, P. 1921.** Flora der Isthmuswueste. Gesell. fuer Palaestina-Forschung. 7. Veroeffentl. 44 pp.
- (44) **Ramis, Aly Ibrahim. 1929.** Bestimmungstabellen zur Flora von Aegypten. Jena. 221 pp.
- (45) **Taeckholm, Vivi. 1932.** Some new plants fom Sinai and Egypt. Svensk. bot. Tidskrift 26: 370-380.
- (46) **Taeckholm, Gunnar and Vivi, in collaboration with Mohammed Drar. 1941.** Flora of Egypt Vol. I. Bull. Fac. Science, Fouad I Univ., Cairo. Vol. 15,574 pp.
- (47) **Taeckholm, Vivi and M. Drar. 1950.** Flora of Egypt. Vol. II. Bull. Faculty Sci., Fouad I Univ., Cairo., 17.
- (48) **Taeckholm, Vivi and M. Drar. 1954.** Flora of Egypt. Vol. III. Bull. Fac. Sci., Cairo Univ., 30.
- (49) **Taeckholm, Vivi and M. Drar. 1969.** Flora of Egypt. Vol. IV. Bull. Fac. Sci., Cairo Univ. 36.
- (50) **Shabetai, J.R. 1940.** Contribution to the flora of Egypt. Plants collected from southern Sinai in April 1937. Techn. and Sci. Service. Foud I Agric. Mus., Agric. Egypt. Bull. No. 234., 84 pp.
- (51) **Boulos, L. 1960.** Flora of Gebel El-Maghara, North Sinai. Herbarium, Min Agric. UAR, Special Publ. 24 pp.
- (52) **El-Hadidi, M.N. 1969.** Observations on the flora of the Sinai mountain region. Bull. Soc. Géogr d'Égypte. 40: 123-155.
- (53) **El-Hadidi, M.N., Kosinova, J. and J. Chrtek. 1969.** Weed flora of Southern Sinai. Acta Univ. Carolina Biologica. 1969: 367-381.

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- (54) **Danin, A. 1969.** A new *Origanum* from the Isthmic Desert (Sinai) (*Origanum isthmicum* sp. n. Israel J. Bot. 18:191-193.
- (55) **Danin, A. 1972.** Mediterranean elements in rocks of the Negev and Sinai deserts. Notes Roy. Bot. Gard. Edinb. 31:437-440.
- (56) **Zohary, M. 1935.** Die phytogeographische Gliederung der Flora der Halbinsel Sinai. Beih. bot. Cbl., Abt. B. 52:549-621.
- (57) **Zohary, M. 1944.** Vegetation transects through the desert of Sinai. Palest. J. Bot. Jerusalem. 3:57-78.
- (58) **Hassib, M. 1951.** Distribution of plant communities in Egypt. Bull. Fac. Sci., Egypt. Univ. 29:60-261.
- (59) **El-Gabaly, M.M. 1954.** The soil, water supply and agriculture in north eastern Sinai. Bull. Inst. du Désert d'Égypte. 4:125-153.
- (60) **Paver, G.L. and J.N. Jordan. 1956.** Report of the Ministry of Public Works on reconnaissance hydrological and geological observations in north Sinai coastal area of Egypt. Publ. de L'Institut du Désert D'Égypte. 90 pp.
- (61) **Migahid, A.M., Shafei, M.A., Abdel Rahman, A.A. and M.A. Hammouda. 1959.** Ecological observations in western and southern Sinai. Bull. Soc. Geogr. d'Égypte. 32:165-206, and 5 plates.
- (62) **Batanouny, K.H. 1964.** Sand dune vegetation of El-Arish area. Bull. Fac. Sci. Cairo Univ. 39:11-23.
- (63) **Danin, A. 1974.** Notes on the vegetation near Suez and Fayid (Egypt). Israel J. Bot. 23:226-236.
- (64) **Danin, A. 1978.** Plant species diversity and ecological districts of the Sinai desert. Vegetatio 36:83-93.
- (65) **Danin, A. 1983.** Desert vegetation of Israel and Sinai. Cana Publ. House, Jerusalem. 148 pp.
- (66) **Bernstein, B. 1979.** Sinai. The great and terrible wilderness. Weinfeld and Nicolson, London. 265 pp.

الاستكشافات النباتية في سيناء

كمال الدين حسن البتانوني

استعرضت الدراسة تاريخ الدراسات النباتية في شبه جزيرة سيناء ، وقسمت مراحل الاستكشاف إلى فترات يتميز كل منها بإنجاز أو اتجاه معين ، على النحو الآتي :

- ١ - البعثات في القرن الثامن عشر .
- ٢ - الاستكشافات من عام ١٨٠٠م حتى نشر أول دراسة خاصة عن فلورا سيناء .
- ٣ - الاستكشافات من عام ١٨٣٠م حتى نشر الفلورا الموسوعية الضخمة عن بلدان الشرق للعالم بواسيرير خلال السنوات من ١٨٦٧ حتى ١٨٨٤ .
- ٤ - عقد من الاستكشافات المكثفة (١٨٦١ - ١٨٧١) .
- ٥ - عصر من الدراسات الشاملة للفلورا (١٨٧١ - ١٩٢٩) وظهور مؤلفات عن الفلورا المصرية .
- ٦ - فترة التحديث .
- ٧ - عصر الدراسات البيئية النباتية .

وفي كل من هذه الفترات ، قدمت الدراسة عرضاً مسلسلاً لكل من : العلماء والدارسين وجامعي النباتات وذوى التخصصات المختلفة الذين أسهموا في الدراسات النباتية وما يرتبط بها من علوم . وقد وُضِّحَ قرين كل منهم ما نشره من مؤلفات وبحوث منذ ١٧٧٥ حتى الآن . كما ناقشت الدراسة الحوافز والدوافع وراء اجراء الدراسات العلمية في شبه جزيرة سيناء .