

Introduction

The fossil wood flora of Egypt has been dealt with by many authors (**Unger, 1858-1859; Carruthers, 1870; Schenk, 1883; Lyons, 1894; Stenzel, 1904; Newton, 1909; Schuster, 1910; Kräusel & Stromer, 1924; Barthoux & Fritel, 1925; Edwards, 1931; Kräusel, 1939; Boureau, 1950; Kaul, 1960; Louvet, 1973; El-Saadawi, 1979, 2006; Dupéron-Laudoueneix & Lejal-Nicol, 1981; Boureau et al., 1983; Süss, 1987; Youssef, 1993, 2002; Dupéron-Laudoueneix & Dupéron, 1995; Kamal El-Din, 1996, 1999, 2002, 2003; Youssef et al., 2000; Kamal El-Din & Refaat, 2001; El-Saadawi et al., 2002, 2004; El-Saadawi & Kamal El-Din, 2004; Kamal El-Din & El-Saadawi, 2004; Youssef & El-Saadawi, 2004; Kedves et al., 2004a,b; Kamal El-Din et al., 2006; El-Faramawi, 2008**). According to these authors there are 75 fossil wood taxa reported from different horizons belonging to different ages (from Permian-Triassic to Quaternary) (see Text-Fig. (1) for sites of fossil wood and Table (1) for names of taxa, their ages & localities).

Text-Fig. (1): Map showing sites of collection of fossil wood in Egypt

1- Gebel Hadahid, 2- Wadi Araba, 3- Suez, 4- Gebel Geneffa, 5- Gebel Shabraweet, 6- Turra, 7- Gebel Ahmer and Bir El-Fahm, 8- Mokattam, 9- Qattamiya, 10- Wadi Ankebieia, 11- Wadi Sannor, 12- Fayum, 13- Birket Qarun, 14- Widan-El-Faras, 15- Gebel Qatrani, 16- Gebel El-Khashab (Northern Petrified Forest & Southern Petrified Forest), 17- Giza Pyramids & West of Giza Pyramids, 18- Tall El Zalal, 19- Gebel Ruzza, 20- Qart El-Raml, 21- Wadi Faregh, & Garet Aujân, 22- Deir-Baramus, 23- Wadi Natrun, 24- Bir Lebuk, 25- Moghara, 26- Bahariya, 27- Gebel Hufhuf, 28- Farafra Oasis, 29- Gebel Amuna, 30- Dakhla Oasis, 31- Regenfled South Dakhla, 32- Kharga Oasis, 33- Baris, 34- Esna, 35- Aswan, 36- Road between Esna and Wadi Halfa, 37- Garf Hussein, 38- Sinn-El-Kaddab, 39- Korosko, 40- Abu Ballas, 41- Gilf Kebir, 42- Gebel Kâmil in South Western Egypt.

Sixty-four out of the seventy-five fossil species are angiosperms (48 dicots & 16 monocots) and only 11 are gymnosperms, see Table (1)

Table (1):

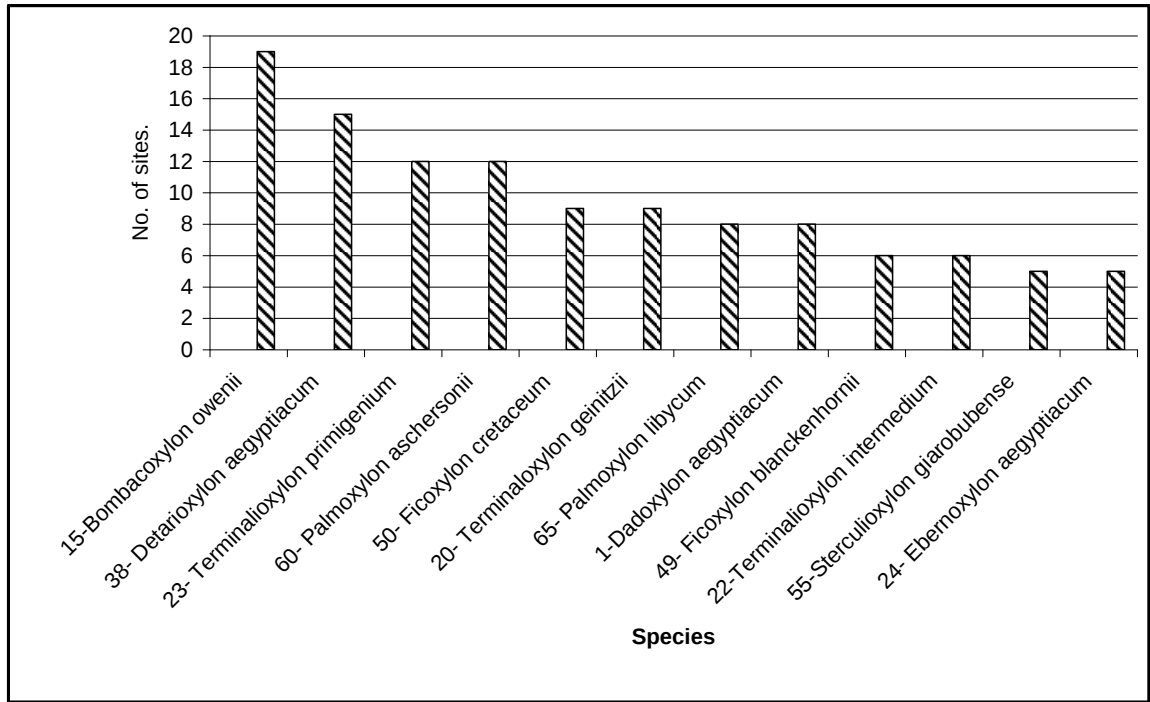
Petrified wood flora of Egypt: recorded taxa, their ages and localities. Per.-Tri. = Permian-Triassic, Jur. = Jurassic, Upp. Jur.-Low.Crec.=Upper Jurassic-Lower Cretaceous, Low. Cre. = Lower Cretaceous, Upp. Cre. = Upper Cretaceous, Paleo. = Paleocene, Eoce. = Eocene, L. Eoc.-E.Oligo.=Late Eocene-Early Oligocene, Oligo. = Oligocene, Mioc. = Miocene, Plioc. = Pliocene, Pleis. = Pleistocene. 1- Gebel Hadahid, 2- Wadi Araba, 3- Suez, 4- Gebel Geneffa, 5- Gebel Shabraweet, 6- Turra, 7- Gebel Ahmer and Bir El-Fahm, 8- Mokattam, 9- Qattamiya, 10- Wadi Ankebieia, 11- Wadi Sannor, 12- Fayum, 13- Birket Qarun, 14- Widan-El-Faras, 15- Gebel Qatrani, 16- Gebel El-Khashab (Northern Petrified Forest & Southern Petrified Forest), 17- Giza Pyramids & West of Giza Pyramids, 18- Tall El Zalut, 19- Gebel Ruzza, 20- Qaret El-Raml, 21- Wadi Faregh, & Garet Aujân, 22- Deir-Baramus, 23- Wadi Natrun, 24- Bir Lebuk, 25- Moghara, 26- Bahariya, 27- Gebel Hufhuf, 28- Farafra Oasis, 29- Gebel Amuna, 30- Dakhla Oasis, 31- Regenfild South Dakhla, 32- Kharga Oasis, 33- Baris, 34- Esna, 35- Aswan, 36- Road between Esna and Wadi Halfa, 37- Garf Hussein, 38- Sinn-El-Kaddab, 39- Korosko, 40-Abu Ballas, 41-Gilf Kebir, 42- Gebel Kâmil in South Western Egypt.

Fossil wood Taxa	Per.-Tri.	Jur.	Upp. Jur.-Low.Cre.	Low. Cre.	Upp. Cre.	Tertiary						Quaternary	Locality	References
						Paleo.	Eoce.	L. Eoce.-E.Oligo.	Oligo.	Mioc.	Plioc.	Pleis.		
"Gymnosperms"														
Araucarian and mixed coniferous wood														
1- <i>Dadoxylon (Araucarioxylon) aegyptiacum</i> (Unger) Kräusel					+								2, 26, 27, 30, 32, 34,36, 39	Kräusel, 1939, Kräusel & Stromer, 1924
2- <i>Dadoxylon (Araucarioxylon) dallonii</i> (Boureau) Dupéron-Laudoueneix & Lejal-Nicol		+											41	Dupéron-Laudoueneix & Lejal-Nicol ,1981
3- <i>Dadoxylon (Araucarioxylon) mokattamensis</i> (Kräusel & Stromer) Kräusel									+				7, 15	Kräusel & Stromer, 1924
4- <i>Dadoxylon sudanense</i> Dupéron-Laudoueneix & Lejal-Nicol	+												41	Dupéron-Laudoueneix & Lejal-Nicol ,1981
5- <i>Protophyllocladoxylon leuchsii</i> Kräusel					+								32	Kräusel,1939
Family: Araucariaceae														
6- <i>Agathoxylon lifiyii</i> Youssef, El-Saadawi, Kedves & Mostafa					+								32	Youssef et al., 2000
7- <i>Agathoxylon</i> sp.					+								32	Kedves et al., 2004 b
Family: Cupressaceae														
8- <i>Cupressinoxylon</i> sp.?					+								26, 27	Kräusel,1939
Family: Podocarpaceae														
9- <i>Mesembrioxylon (Podocarpoxylon) aegyptiacum</i> (Kräusel) Boureau = <i>Podocarpoxylon aegyptiacum</i> Kräusel, 1939									+				8	Kräusel ,1939, Boureau, 1950
10- cf. <i>Podocarpoxylon</i> sp.					+								37, 38	Kedves, et al. 2004a
11- <i>Metapodocarpoxylon libanoticum</i> Dupéron-Laudoueneix & Pons, 1985 = <i>Xenoxylon saadawii</i> Youssef, 2002			+										42	Youssef, 2002
"Angiosperms" Dicots														
Family: Anacardiaceae														
12- <i>Glutoxylon (Guttiferoxylon) symphonioides</i> (Bancroft) Lemoigne										+			16, 17, 21, 25	Kräusel ,1939
Family: Bombacaceae														
13- <i>Bombacoxylon khashabii</i> Kamal El-Din (unpublished)										+			16	Kamal El-Din, 1996
14- <i>Bombacoxylon osmanii</i> Youssef (unpublished)										+			17	Youssef, 1993
15- <i>Bombacoxylon owenii</i> (Carr.) Gottwald									+	+	+	+	3,4,5,6, 8,9, 10, 11,12, 13,16,17, 21, 22,23, 24,25, 26	Carruthers, 1870, Schenk, 1883, Schuster, 1910 Kräusel, 1939, Youssef, 1993 Kamal El-Din, 1996, 2002

Family: Boraginaceae														
16- <i>Cordioxydon barthelii</i> Süss							+						40, 33	Süss, 1987
Family: Celastraceae														
17- <i>Celastrinoxylon celastroides</i> (Schenk) Kräusel						+							28	Kräusel, 1939 Kamal El-Din, 2003.
18- ? <i>Celastrinoxylon</i> sp						+							26, 27	Kräusel, 1939
Family: Combretaceae														
19- <i>Combretoxydon</i> sp											+		17	Dupéron-Laudoueneix & Dupéron, 1995
20- <i>Terminalioxylon geinitzii</i> (Schenk) Müller-Stoll & Mädel										+	+	+	7, 8, 9, 15, 16, 17, 21, 23, 25	Kräusel, 1939, Youssef, 1993, Kamal El-Din, 1996.
21- <i>Terminalioxylon edwardsii</i> (Kräusel) Müller-Stoll & Mädel										+	+		16,17	Kräusel, 1939
22- <i>Terminalioxylon intermedium</i> (Kräusel) Müller-Stoll & Mädel						+				+	+		14, 17, 26, 27, 31, 35	Kräusel, 1939, Youssef, 1993, El-Saadawi & Kamal El-Din, 2004
23- <i>Terminalioxylon primigenium</i> (Schenk) Müller-Stoll & Mädel										+	+		8, 10, 12, 13, 14, 15, 16, 17, 21, 22, 24, 29	Kräusel, 1939, Kamal El-Din, 1996, El-Saadawi & Kamal El-Din, 2004
Family: Ebenaceae														
24- <i>Ebenoxydon aegyptiacum</i> Kräusel										+	+		7, 8, 9, 15, 16	Kräusel, 1939
25- <i>Ebenoxydon ebenoides</i> (Schenk) Edwards						+							29, 31	Edwards, 1931, Kräusel, 1939
26- <i>Euebenoxydon saharicum</i> Süss							+						40, 33	Süss, 1987
27- <i>Euebenoxydon</i> sp (unpublished)						+							35	Youssef, 1993
Family: Fagaceae														
28- <i>Quercoxydon retzianum</i> Kräusel										+			8	Kräusel, 1939
Family: Guttiferae														
29- <i>Guttiferoxydon fareghense</i> Kräusel											+		21	Kräusel, 1939
Family: Leguminosae														
30- <i>Acacioxydon vegae</i> (Schenk) Kräusel										+			8	Kräusel, 1939
31- <i>Azelioxydon kiliani</i> Louvet										+			9	El-Faramawi, 2008
32- <i>Azelioxydon welkitii</i> (Lemoigne & Beauchamp) Lemoigne											+		19	Kamal El-Din & El-Saadawi, 2004
33- <i>Andiroxydon pyramidum</i> Youssef (unpublished)											+		17	Youssef, 1993
34- <i>Copaiferoxydon migiurtinum</i> (Chiarugi) Müller-Stoll & Mädel										+			9	Youssef, 1993, El-Faramawi, 2008
35- <i>Cynometroxylon schlagintweitii</i> Müller-Stoll & Mädel											+		19	Kamal El-Din & El-Saadawi, 2004
36- <i>Cynometroxylon tunesense</i> Delteil-Desneux										+			9	El-Faramawi, 2008
37- <i>Dalbergioxydon dicorynioides</i> Kräusel										+			8, 9, 16, 17	Kräusel, 1939, El-Faramawi, 2008
38- <i>Detarioxydon aegyptiacum</i> (Unger) Louvet							+	+	+	+	+		1, 7, 8, 9, 10, 11, 12, 13, 16, 17, 21, 25, 26, 29,32	Kräusel, 1939, Youssef, 1993, Kamal El-Din, 1996 Kamal El-Din and Refaat, 2001 El-Faramawi, 2008
39- <i>Leguminoxylon albizziae</i> Kräusel											+		21	Kräusel, 1939
40- <i>Mimosoxydon calpocalycoides</i> Lemoigne									+				9	El-Faramawi, 2008
41- <i>Mimosoxydon forestii</i> Youssef (unpublished)										+			9	Youssef, 1993
42- <i>Mimosoxydon tenax</i> (Felix) Müller-Stoll & Mädel (unpublished)											+		16	Kamal El-Din, 1996
43- <i>Pahudioxydon</i> sp (unpublished)											+		16	Kamal El-Din 1996
44- <i>Tetrapleuroxydon acaciae</i> (Kräusel), Müller-Stoll & Mädel										+	+		9, 17,29	Kräusel, 1939
45- <i>Tetrapleuroxydon</i> sp (unpublished)										+			9	Youssef, 1993
46- <i>Tetrapleuroxydon zaccarinii</i> (Chiarugi) Müller Stoll & Mädel									+				9	El-Faramawi, 2008

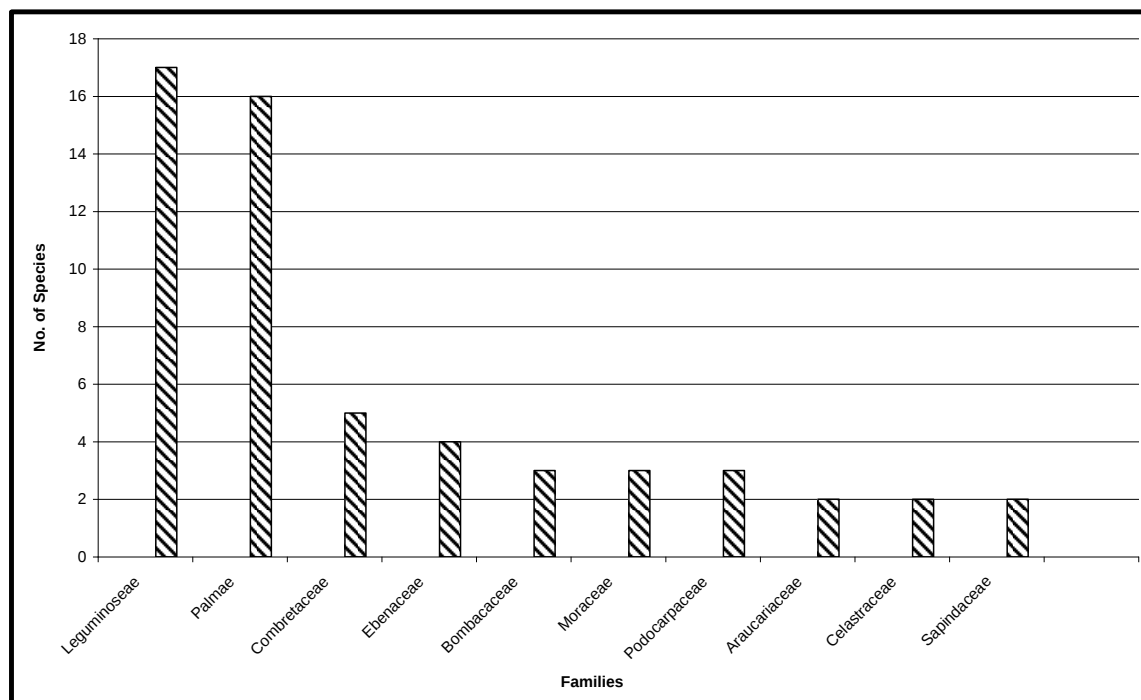
Family: Malvaceae													
47- <i>Hibiscoxylon niloticum</i> Kräusel				+								30, 32	Kräusel, 1939
Family: Monimiaceae													
48- <i>Antherospermoxylon aegyptiacum</i> (Schenk) Kräusel									+			8, 9	Kräusel, 1939
Family: Moraceae													
49- <i>Ficoxylon blanckenhornii</i> Kräusel									+	+		7, 9, 12, 15, 16, 25	Kräusel, 1939
50- <i>Ficoxylon cretaceum</i> (Schenk) Kräusel				+					+	+		9, 15, 16, 17, 21, 24, 25, 28, 35	Kräusel, 1939, Kamal El-Din, 2003.
51- ? <i>Ficoxylon</i> sp					+							28, 31	Kräusel, 1939
Family: Proteaceae													
52- <i>Proteoxylon chargeense</i> Kräusel					+							7, 15, 32	Kräusel, 1939
Family: Sapindaceae													
53- <i>Sapindoxylon stromeri</i> Kräusel									+	+		13, 15, 17	Kräusel, 1939
54- <i>Sapindoxylon</i> sp (unpublished)										+		17	Youssef, 1993
Family: Sterculiaceae													
55- <i>Sterculioxylon giarobubense</i> (Chiarugi) Kräusel									+			7, 8, 13, 21, 29	Kräusel, 1939,
Family: Tamaricaceae													
56- <i>Tamaricoxylon africanum</i> (Kräusel) Boureau, 1951 (= <i>Gynotrochoxylon africanum</i> Kräusel, 1939)									+			12, 15	Kräusel, 1939, Koeniguer, 1974
Family: Ternstroemiaceae													
57- <i>Ternstroemioxylon dachelense</i> Kräusel				+								30	Kräusel, 1939
Family Anacardiaceae or Lauraceae or Moraceae													
58- "Farafra Oasis wood 1FO"					+							28	Kamal El-Din et al., 2006
Family Sonneratiaceae or Betulaceae													
59- "Farafra Oasis Wood 6FO"					+							28	Kamal El-Din et al., 2006
"Monocots"													
Family: Palmae													
60- <i>Palmoxylon aschersonii</i> (Schenk) Kräusel & Stromer						+	+		+	+	+	1, 3, 9, 12, 16, 17, 19, 20, 21, 23, 24, 25	Stenzel, 1904, Kräusel & Stromer, 1924, Kräusel, 1939, Kaul, 1960, Louvet, 1973 Boureau et al., 1983, Youssef, 1993, El-Saadawi et al., 2002
61- <i>Palmoxylon compactum</i> Sahni										+		19, 23	El-Saadawi et al., 2004
62- <i>Palmoxylon geometricum</i> Sahni									+	+		15, 16, 19, 20	El-Saadawi et al., 2004
63- <i>Palmoxylon indicum</i> Sahni										+		16	El-Saadawi et al., 2004
64- <i>Palmoxylon lacunosum</i> (Unger), Felix						+	+		+	+	+	7, 9, 12, 16	Kräusel & Stromer, 1924, Kaul, 1960 Kamal El-Din, 1996
65- <i>Palmoxylon libycum</i> (Stenzel) Kräusel & Stromer						+	+		+	+	+	1, 9, 13, 16, 17, 21, 22, 23	Stenzel, 1904 Kräusel & Stromer, 1924, Kräusel, 1939, Youssef, 1993, Kamal El-Din, 1999, El-Saadawi et al., 2002.
66- <i>Palmoxylon natrui</i> Kamal El-Din (unpublished)										+		23	Kamal El-Din, 1999
67- <i>Palmoxylon pondicherriense</i> Sahni									+			15	El-Saadawi et al., 2004
68- <i>Palmoxylon pyriforme</i> Sahni							+			+		9, 19, 20	El-Saadawi et al., 2004
69- <i>Palmoxylon ramli</i> Kamal El-Din (unpublished)										+		20	Kamal El-Din, 1999
70- <i>Palmoxylon rewahense</i> Sahni										+		20	El-Saadawi, et al., 2004
71- <i>Palmoxylon ruzzi</i> Kamal El-Din (unpublished)										+		19	Kamal El-Din, 1999
72- <i>Palmoxylon stromeri</i> (Kräusel) Kräusel (= <i>P. lacunosum</i> var. <i>Stromeri</i>) Kräusel					+							34, 35, 36	Stenzel, 1904, Kräusel & Stromer, 1924, Kräusel, 1939, Kaul, 1960
73- <i>Palmoxylon wadiai</i> Sahni										+		19, 20	El-Saadawi, et al., 2004
74- <i>Palmoxylon zalati</i> Kamal El-Din (unpublished)									+	+		18	Kamal El-Din, 1999
75- <i>Palmoxylon zitteli</i> Schenk					+							30, 32, 33	Schenk, 1883, Stenzel, 1904, Kräusel & Stromer, 1924, Kräusel, 1939, Kaul, 1960
Total No. of species /age	1	1	1	4	16	5	5	3	30	36	6	2	

Data presented in previous Table (1) show that gymnosperm fossil woods are distributed in three families and six genera, ranging in age from Permian-Triassic to Oligocene, but they have been most widespread in the Cretaceous age. *Dadoxylon aegyptiacum* is the most widespread species of gymnosperm woods in Egypt (eight sites, see histogram 1). Dicot fossil woods are distributed in 17 families and 29 genera and are reported from different strata ranging in age from Cretaceous to Quaternary. The family Leguminosae represents the largest family in the dicot fossil woods; it has 11 genera and 17 species (see histogram 2) and *Bombacoxylon owenii* is the most widespread species of dicot fossil woods (19 sites, see histogram 1). Monocot fossil woods belong to one family and one genus. The age of *Palmoxylon* in Egypt extends from Late Cretaceous to Late Tertiary (Pliocene). Only *Palmoxylon stromeri* and *P. zitteli* are of Late Cretaceous age and come from the southern part of Egypt. *P. aschersonii* is the most widespread species of *Palmoxylon* in Egypt (12 sites, see histogram 1).



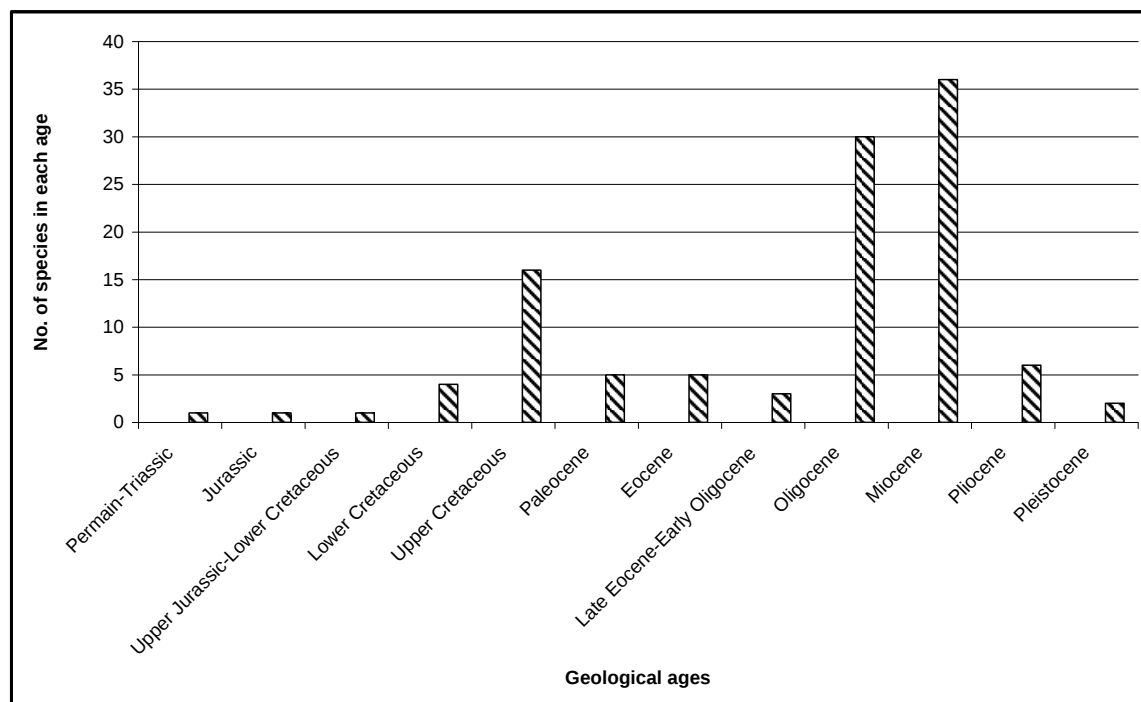
Histogram (1): The 12 species which occur in five or more sites (numbers preceeding species names are as in Table 1 above).

Histogram (1) above shows that only 12 species, each occurs in five or more and up to 19 sites. Sixty-three species are less frequent; they were found in four or less sites and down to only one site (39 species).



Histogram (2): Families represented by two or more species and number of species in each family.

Histogram (2) above shows that out of the 10 families possessing two or more species each, seven are dicots of which Leguminosae is the largest with 17 species. The families that have less than two species each are 11 families.



Histogram (3): Number of species recorded for each geological age.

Histogram (3) above shows that the richest geological ages where the largest number of fossil wood species were recorded are Miocene (36 species) and Oligocene (30 species) whereas the poorest geological ages where the least number of species were recorded are Permian-Triassic, Jurassic and Upper Jurassic-Lower Cretaceous; each has (one species), (see also Table 1).

One should expect to find more wood species in Egypt (than the 75 reported up till now) since fossil trunks are observed by hundreds in both the Western and Eastern Deserts of the country.