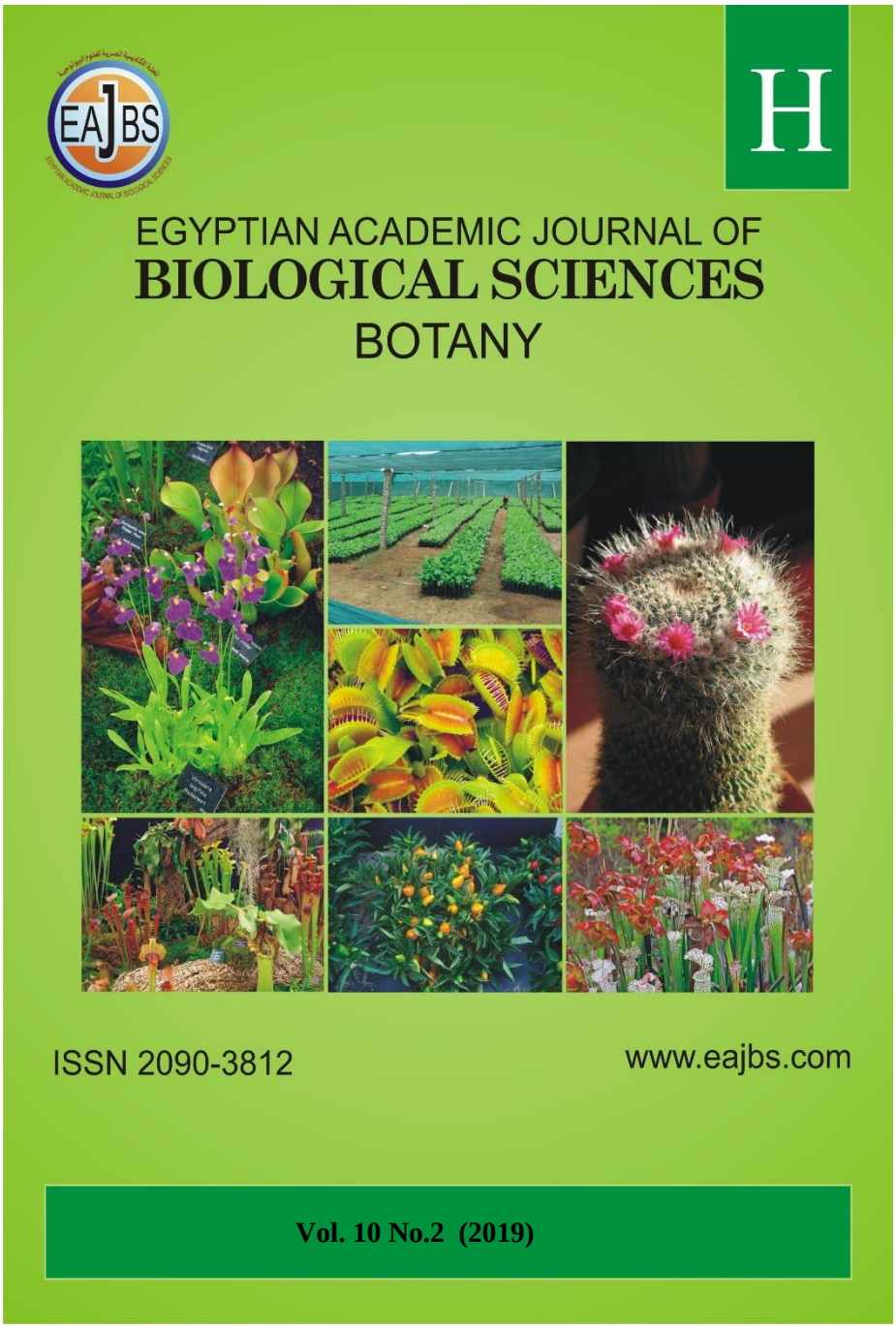

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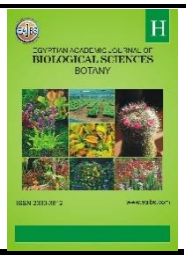

An annotated checklist of Saudi Arabian mosses

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ABSTRACT

A list is given for the mosses known, till now, from Saudi Arabia. It comprises 122 taxa belonging to 51 genera, in 21 families and 10 orders under class Bryopsida. This list is the first to show the distribution of mosses in different Saudi Arabian phytogeographical regions. This article provides significant annotations regarding distribution of the moss taxa, dominance, rarity, and other relevant information. Moreover, it is the first in providing a list of synonyms of all mosses reported in publications dealing with this country.

INTRODUCTION

Saudi Arabia is located between longitudes 34º 40´ and 55º 45´ E and latitudes 15º 45´ and 34º 35´ N (Migahid and Hammouda, 1974). It is the fifth-largest in the Asian Continent and the largest country in Southwest Asia. It comprises the main bulk of Arabian Peninsula (about its four-fifths) and occupies approximately 2,150,000 km^2 (Chaudhary, 2001).

Many botanists (e.g. Migahid and Hammouda, 1974; Migahid, 1978; Al-Nafie, 2004) divided Saudi Arabia according to the landscape, climate and vegetation into 9 phytogeographical regions, namely: North Hejaz (NH), Northern region (N), Nefud region (NF), Eastern region (E), west Najd (Njw), east Najd (Nje), South Hejaz (SH), Southern region (S), Al-Rubi Al-khale "Empty Quarter" (R) see. Figure 1.

On the other hand, Kürschner (2000); Elnesr and Alazba (2013) divided the country according to altitude where referred to that SH region is the highest in the country with elevation more than 2000m above sea level, while NH and S range in height from 1000 to 2000m. The rest regions i.e. N, Nje, Njw and NF range in height from 500 to 1000m, E from 200 to 500m, R from 0 to 200m (Kürschner, 2000).

From the ecological side, the central and eastern parts of Saudi Arabia consist of rocky and sandy deserts (about 33% of the country consists of sand dunes forming sand deserts), while the western part of the country has valleys with mountains ranging in width from 10 to 40 km (Chaudhary, 2001).

From the climatological side, Saudi Arabia is arid to semi-arid with warm to hot months for most of the year. The average annual rainfall in most central (south of Nje and Njw), northern (north of NH, N) and eastern parts (E, R) is less than 100 mm; while it has been recorded in north of Najd and NF regions to reach 100-200 mm; whereas the S, SH and south of NH regions have the highest average of annual rainfall of up to 500 mm or more in

highest mountains (Kürschner, 2000; Almazroui *et al*., 2012). The average annual temperature is 33.4°C in summer and 14°C in winter; but it is worth to mention that there is a wide difference in temperatures in different areas and also at different altitudes (Kürschner, 2000). Most areas of the country have low humidity except coastal areas which have over 90%.

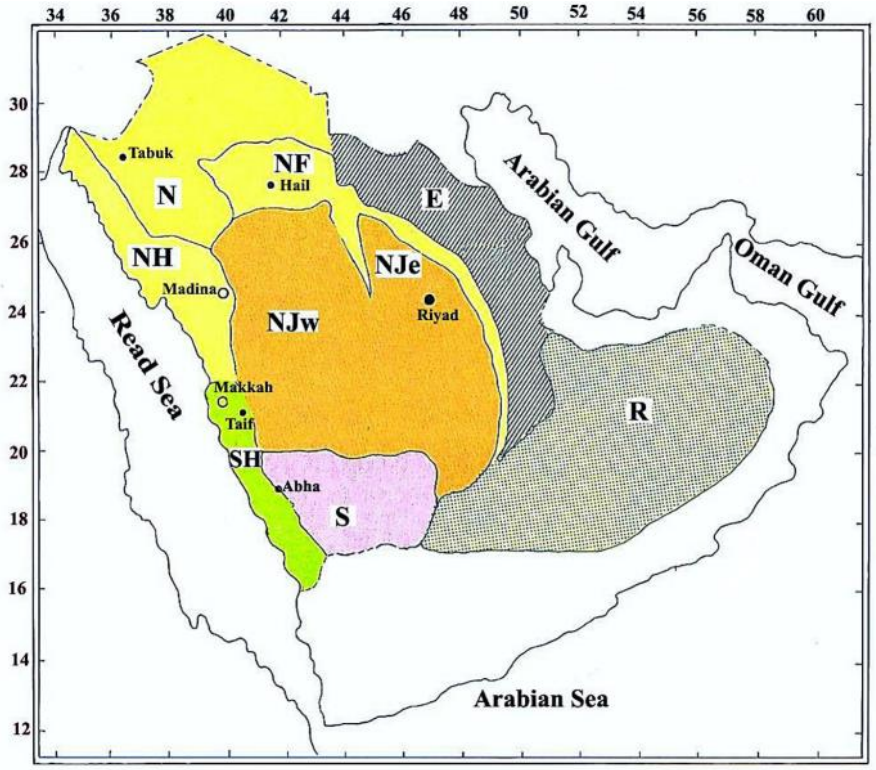

Fig.1: Map showing the different phytogeographical regions of Saudi Arabia (according to Migahid and Hammouda, 1974): North Hejaz **(NH)**, Northern region **(N)**, Nefud **(NF)**, Eastern region **(E)**, west Najd **(Njw)**, east Najd **(Nje)**, South Hejaz **(SH)**, Southern region **(S)** and Al-Rubi Al-khale **(R)**.

The very large area and the variable environments and topography of the country is reflected in the moss diversity, where 122 taxa belonging to 51 genera in 21 families and 10 orders have been reported (Frey and Kürschner, 1982; Frey and Kürschner, 1987; Frey and Kürschner, 1988; Frey and Kürschner, 1991; Kürschner, 2000; Kürschner *et al.*, 2001; Refai, 2001; Kürschner and Frey, 2011; Kürschner and Ochyra, 2014; Taha and Shabbara, 2019; Taha *et al.*, 2020). Further investigation would naturally add new records.

This paper presents the first list that is confined to only Saudi Arabian mosses since earlier lists included the bryoflora of Saudi Arabia as a part of wider geographical areas e.g. Arabian Peninsula (Frey and Kürschner, 1991; Kürschner, 2000). The list is up to date, annotated and includes all moss taxa known from Saudi Arabia till now with their distribution in different phytogeographical regions. The distribution given here is mainly based on data obtained from Kürschner (2000), Kürschner *et al.* (2001), Refai (2001), Abo Salama *et al.* (2005), Kürschner and Ochyra (2014), Taha and Shabbara (2019) and Taha *et al.* (2020). It is worthy to mention that the list includes up to date accepted names of the reported moss taxa after the many changes that occurred in the last years.

Names of the 122 taxa (all under class Bryopsida), their families and their distribution in 8 out of the 9 phytogeographical regions of Saudi Arabia (Al-Rubi Al-khale "Empty Quarter" region is excluded where no mosses have been recorded from it) are given in Table 1 below. While names of the 10 orders and the 21 families and the number of taxa each includes follow in Table 2.

Table 1. Distribution of the 122 moss taxa in the eight studied phytogeographical regions of Saudi Arabia. Names of taxa are arranged alphabetically and referred to their families. +: Report based on publications from 1982 to 2000; ☼: Recorded after 2000 and before 2018; ◄: Recorded only after 2018; ◙: Recorded in Saudi Arabia without reference to any locality. Abbreviations of regions names are as follows: NH= North Hejaz, N= Northern region, NF= Nefud, E= Eastern region, Njw= west Najd, Nje= east Najd, SH= South Hejaz, S= Southern region

Taxa	Regions								Total no. of regions
	NH	N	NF	E	Njw	Nje	SH	S	
1. *Alleniella* S.Olsson, Enroth & D.Quandt (Neckeraceae)									
besseri (Lobarz.) S.Olsson, Enroth & D.Quandt							+		1
2. *Aloina* Kindb. (Pottiaceae)									
aloides (Koch ex Schultz) Kindb.	+								1
rigida (Hedw.) Limpr.	+		+	+			+	+	5
3. *Anomobryum* Schimp. (Bryaceae)									
julaceum (Schrad. ex P.Gaertn.*et al.*) Schimp.							+		1
4. *Barbula* Hedw. (Pottiaceae)									
bolleana (Müll.Hal.) Broth.	+		+				+		3
indica (Hook.) Spreng.								+	1
5. *Bartramia* Hedw. (Bartramiaceae)									
stricta Brid.							+	+	2
6. *Brachymenium* Schwägr. (Bryaceae)									
exile (Dozy & Molk.) Bosch. & Sande Lac.						+	+	+	3
7. *Braunia* Bruch & Schimp. (Hedwigiaceae)									
secunda (Hook.) Bruch & Schimp.							+		1
8. *Bryum* Hedw. (Bryaceae)									
arachnoideum Müll. Hal.								+	1
argenteum Hedw.				+		+	+	+	4
dichotomum Hedw.			+			+	+	+	4
☼*funkii* Schwägr.	☼	☼							2
turbinatum (Hedw.) Turner	+						+	+	3
9. *Campylopus* Brid. (Leucobryaceae)									
pilifer Brid.							+		1
10. *Cratoneuron* (Sull.) Spruce (Amblystegiaceae)									
filicinum (Hedw.) Spruce							+		1
11. *Crossidium* Jur. (Pottiaceae)									
aberrans Holz. & E.B.Bartram							+	+	2
crassinervium (De Not.) Jur.	+						+	+	3
davidai Catches.						+	+	+	3
deserti W. Frey & Kürschner	+		+			+			3
laxefilamentosum W.Frey & Kürschner						+			1
☼*laevipilum* Thér. & Trab.			☼						1
squamiferum (Viv.) Jur. var. *pottioideum* (De Not.) Mönk.	+		+			+	+	+	5
squamiferum (Viv.) Jur. var. *squamiferum*			+						1
12. *Didymodon* Hedw. (Pottiaceae)									
acutus (Brid.) K.Saito	+						+	+	3
australasiae (Hook. & Grev.) R.H.Zander	+		+		+	+	+	+	6
cordatus Jur.								+	1
luridus Hornsch.	+		+				+		3
rigidulus Hedw.			+			+	+	+	4
tophaceus (Brid.) Lisa	+						+		2
umbrosus (Hook. & Grev.) R.H. Zander	+								1
vinealis (Brid.) R.H.Zander			+				+		2

.

Table 1 continued

Taxa	Regions								Total no. of regions
	NH	N	NF	E	Njw	Nje	SH	S	
13. *Encalypta* Hedw. (Encalyptaceae)									
intermedia Jur.	+						+	+	3
vulgaris Hedw.	+						+	+	3
14. *Entosthodon* Schwägr. (Funariaceae)									
attenuatus (Dicks.) Bryhn	+						+		2
duriaei Mont.				+					1
muhlenbergii (Turner) Fife	+						+	+	3
pulchellus (H.Philib.) Brugués	+						+		2
15. *Eucladium* Bruch & Schimp. (Pottiaceae)									
verticillatum (With.) Bruch & Schimp.	+						+		2
16. *Fabronia* Raddi (Fabroniaceae)									
abyssinica Müll. Hal.							+	+	2
ciliaris (Brid.) Brid.							+	+	2
pusilla Raddi	+								1
socotrana Mitt.							+	+	2
17. *Fissidens* Hedw. (Fissidentaceae)									
arnoldii R.Ruthe	+					+	+	+	4
bryoides Hedw. subsp. *bryoides*							+	+	2
bryoides subsp. *schmidii* (Müll. Hal.) Nork								+	1
crassipes Wilson ex Bruch & Schimp. subsp. *crassipes*							+		1
◄*crispulus* Brid.								◄	1
crispus Mont.							+		1
sciophyllus Mitt.								+	1
viridulus (Sw.) Wahlenb.	+		+				+	+	4
18. *Fontinalis* Hedw. (Fontinalaceae)									
hypnoides Hartm.							+		1
19. *Gemmabryum* J.R. Spence & H.P. Ramsay (Bryaceae)									
violaceum (Crundw. & Nyholm) J.R. Spence						+			1
20. *Grimmia* Hedw. (Grimmiaceae)									
anodon Bruch & Schimp.								+	1
laevigata (Brid.) Brid.								+	1
lisae De Not.								+	1
orbicularis Bruch *ex* Wilson	+		+						2
pulvinata (Hedw.) Sm.	+		+						2
◙ *tergestina* Tomm. ex Bruch & Schimp.									◙
trichophylla Grev.								+	1
21. *Gymnostomum* Nees & Hornsch. (Pottiaceae)									
calcareum Nees & Hornsch. var. *calcareum*	+								1
mosis (Lorentz) Jur. & Milde	+		+						2
viridulum Brid.	+					+			2
22. *Gyroweisia* Schimp. (Pottiaceae)									
reflexa (Brid.) Schimp**.**	+								1
tenuis (Hedw.) Schimp.	+						+		2
23. *Hydrogonium* (Müll. Hal.) A. Jaeger (Pottiaceae)									
fontanum (Müll. Hal.) A. Jaeger							+		1
24. *Hymenostylium* Brid. (Pottiaceae)									
recurvirostrum (Hedw.) Dixon								+	1
◄25. *Hyophila* Brid. (Pottiaceae)									
◄*baginsensis* Müll.Hal.								◄	1
26. *Hypnum* Hedw. (Hypnaceae)									
☼*cupressiforme* Hedw. var. *cupressiforme*							☼		1
vaucheri Lesq.							+	+	2
27. *Imbribryum* N.Pedersen (Bryaceae)									
alpinum (Huds.ex With.) N.Pedersen							+		1

Table 1 continued

Taxa	Regions								Total no. of regions
	NH	N	NF	E	Njw	Nje	SH	S	
28. *Leptodon* D.Mohr (Leptodontaceae)									
smithii (Hedw.) F.Weber & D.Mohr							+		1
◄29. *Leptophascum* (Müll. Hal.) J.Guerra & M.J.Cano									
◄*leptophyllum* (Müll. Hal.) J.Guerra & M.J.Cano.								◄	1
30. *Leucodon* Schwägr. (Leucodontaceae)									
dracaenae var. *schweinfurthii* (Müll. Hal.) M. Fleisch.							+	+	2
31. *Microbryum* Schimp. (Pottiaceae)									
davallianum (Sm.) R.H.Zander	+								1
starckeanum (Hedw.) R.H.Zander	+								1
32. *Orthotrichum* Hedw. (Orthotrichaceae)									
anomalum Hedw.							+		1
diaphanum Schrad. *ex* Brid.							+	+	2
33. *Oxyrrhynchium* (Schimp.)Warnst. (Brachytheciaceae)									
speciosum (Brid.) Warnst.							+	+	2
34. *Philonotis* Brid. (Bartramiaceae)									
caespitosa Jur.							+	+	2
35. *Physcomitrium* (Brid.) Brid. (Funariaceae)									
niloticum (Delile) Müll. Hal.								+	1
◄36. *Plaubelia* Brid. (Pottiaceae)									
◄ *involuta* (Magill) R.H.Zander								◄	1
☼**37. *Pohlia* Hedw. (Mniaceae)**									
☼*melanodon* (Brid.) A.J.Shaw		☼							1
38. *Pseudocrossidium* R.S.Williams (Pottiaceae)									
replicatum (Taylor) R.H.Zander							+	+	2
porphyreoneurum (Müll. Hal.) R.H.Zander							+	+	2
39. *Pseudoleskea* Schimp. (Leskeaceae)									
leikipiae (Müll. Hal.) Paris							+	+	2
leskeoides (Paris) Müll. Hal.								+	1
plagiostoma var. *attenuata* Müll. Hal.							+	+	2
plagiostoma Müll. Hal. var. *plagiostoma*							+	+	2
40. *Ptychostomum* Hornsch. (Bryaceae)									
capillare (Hedw.) Holyoak & N.Pedersen								+	1
☼*imbricatulum* (Müll. Hal.) Holyoak & N.Pedersen			☼						1
moravicum (Podp.) Ros & Mazimpaka							+		1
☼*pseudotriquetrum* (Hedw.) J.R. Spence & H.P. Ramsay							☼		1
41. *Racopilum* P. Beauv. (Racopilaceae)									
capense Müll. Hal. ex Broth.							+	+	2
42. *Rhynchostegium* Schimp. (Brachytheciaceae)									
riparioides (Hedw.) Cardot							+	+	2
43. *Schistidium* Bruch & Schimp. (Grimmiaceae)									
crassipilum H.H. Blom							+		1
44. *Sciuro-hypnum* Hampe (Brachytheciaceae)									
flotowianum (Sendtn.) Ignatov & Huttunen							+		1
45. *Scorpiurium* Schimp. (Brachytheciaceae)									
circinatum (Bruch) M.Fleisch.& Loeske							+	+	2
46. *Syntrichia* Brid. (Pottiaceae)									
caninervis Mitt. var. *caninervis*		+							1
fragilis (Taylor) Ochyra							+	+	2
laevipila Brid.							+	+	2
princeps (De Not.) Mitt.	+								1
ruralis (Hedw.) F.Weber & D.Mohr var. *ruralis*								+	1
47. *Timmiella* (De Not.) Limpr. (Pottiaceae)									
barbuloides (Brid.) Mönk.	+	+	+			+	+	+	6

Table 1 continued

Taxa	Regions								Total no. of regions
	NH	N	NF	E	Njw	Nje	SH	S	
48. *Tortella* (Müll.Hal.) Limpr. (Pottiaceae)									
humilis (Hedw.) Jenn.								+	1
inclinata (R.Hedw.) Limpr. var. *inclinata*				+				+	2
☼*inflexa* (Bruch) Broth.							☼		1
malacophylla (Müll. Hal.) Paris							+	+	2
squarrosa (Brid.) Limpr.							+	+	2
49. *Tortula* Hedw. (Pottiaceae)									
atrovirens (Sm.) Lindb.	+	+	+		+	+	+	+	7
brevissima Schiffn.			+						1
cuneifolia (Dicks.) Turner							+		1
inermis (Brid.) Mont.	+						+		2
mucronifera W.Frey, Kürschner & Ros			+			+		+	3
muralis Hedw. var. *muralis*	+							+	2
pallida (Lindb.) R.H.Zander	+								1
revolvens (Schimp.) G.Roth	+		+						2
☼*viridifolia* (Mitt.) Blockeel *et* A.J.E.Sm		☼							1
50. *Trichostomum* Bruch (Pottiaceae)									
brachydontium Bruch		+						+	2
crispulum Bruch	+						+	+	3
51. *Weissia* Hedw. (Pottiaceae)									
condensa (Voit) Lindb.	+					+	+	+	4
controversa Hedw. var. *controversa*	+						+	+	3
Total	**41**	**7**	**21**	**4**	**2**	**16**	**72**	**67**	

ANNOTATIONS

A. Based on Data in Table 1 above, the Following Annotations Were Listed:

1. This list is the first to show the distribution of mosses in different Saudi Arabian phytogeographical regions.

2. The regions can be arranged, regarding their relative richness in moss taxa in a descending order as follows: SH =72, S =67, NH =41, NF =21, Nje =16, N =7, E =4 and Njw =2. This arrangement correlates well with the average annual rainfall and elevation a.s.l.

3. The western southern part of Saudi Arabia (SH and S regions) has more than 76 % of Saudi Arabian moss flora (highest elevation and highest annual rainfall).

4. *Tortula atrovirens* is the most widespread species in Saudi Arabia being recorded in 7 out of 8 phytogeographical regions, followed by *Didymodon australasiae* and *Timmiella barbuloides* in 6 regions.

5. More than 75% of the moss flora of Saudi Arabia can be considered rare (of limited distribution) being recorded in only one or two regions.

6. This list put together all scattered publications dealing with the Saudi Arabian moss flora from the start (1982) until now.

7. One hundred and ten taxa (about 90% of the moss flora of Saudi Arabia) were recorded in publications from 1982 to 2000, given the symbol + (based on Kürschner, 2000).

8. Eight taxa (ca. 6.5%) were recorded after 2000 and before 2018 (through eighteen years), given the symbol ☼ (based on Kürschner *et al.*, 2001; Refai, 2001; Kürschner and Ochyra, 2014).

9. Four taxa recorded only after 2018 (through two years), given the symbol◄ (based on Taha and Shabbara 2019; Taha *et al.*, 2020).

10. Only one taxon namely; *Grimmia tergestina*, given the symbol ◙, was recorded from Saudi Arabia without reference to any locality in the original publication (Muñoz and Pando, 2000), it was not reported again from Saudi Arabia.

B. Based on Data in Table 2 below, the Following Annotations Were Listed:

1. The 10 orders can be arranged in a descending order regarding the number of taxa representing each as follows: Pottiales (59), Hypnales (19), Bryales (16), Dicranales (9), Grimmiales (8), Funariales (5), Encalyptales (2), Orthotrichales (2), Hedwigiales (1), Hypnodendrales (1).

2. Hypnales is the largest order in the number of families; it is represented by 9 families followed by Bryales 3 families, Dicranales 2 families, while the rest seven orders are represented by only one family each.

3. Pottiaceae is the largest family being represented by 59 taxa (ca. 48% of Saudi Arabian moss flora) followed by Bryaceae by13 taxa (ca. 11 %).

Table 2: Names of the 10 orders and 21 families representing the moss flora of Saudi Arabia and the number of taxa under each.

Order	No. of Taxa	Family	No. of Taxa
1. Pottiales M. Fleisch.	**59**	**Pottiaceae** Hampe	**59**
2. Hypnales W.R. Buck & Vitt	**19**	**1. Brachytheciaceae** Schimp.	**4**
		2. Fabroniaceae Schimp.	**4**
		3. Leskeaceae Schimp.	**4**
		4. Hypnaceae Schimp.	**2**
		5. Amblystegiaceae Kindb.	**1**
		6. Fontinalaceae Schimp.	**1**
		7. Leptodontaceae Schimp.	**1**
		8. Leucodontaceae Schimp.	**1**
		9. Neckeraceae Schimp.	**1**
3. Bryales Limpr.	**16**	**1. Bryaceae** Schwägr.	**13**
		2. Bartramiaceae Schwägr.	**2**
		3. Mniaceae Schwägr.	**1**
4. Dicranales M. Fleisch.	**9**	**1. Fissidentaceae** Schimp.	**8**
		2. Leucobryaceae Schimp.	**1**
5. Grimmiales M. Fleisch.	**8**	**Grimmiaceae** Arn.	**8**
6. Funariales M. Fleisch.	**5**	**Funariaceae** Schwägr.	**5**
7. Encalyptales Dixon	**2**	**Encalyptaceae** Schimp.	**2**
8. Orthotrichales Dixon	**2**	**Orthotrichaceae** Arn.	**2**
9. Hedwigiales Ochyra	**1**	**Hedwigiaceae** Schimp.	**1**
10. Hypnodendrales N.E. Bell, A.E. Newton & D. Quandt	**1**	**Racopilaceae** Kindb.	**1**
Total	**122 Taxa**	**21 Families**	**122 Taxa**

List Of Synonyms of All Moss Taxa Reported from Saudi Arabia Arranged Alphabetically Based on Frey And Kürschner (1991); Kürschner (2000); Kürschner and Frey (2011):

Barbula acuta (Brid.) Brid. = ***Didymodon acutus* (Brid.) K. Saito**

Barbula cordata (Jur.) Loeske = ***Didymodon cordatus* Jur.**

Barbula trifaria (Hedw.) Mitt. = ***Didymodon luridus* Hornsch.**

Barbula trifaria var. *desertorum* (J. Froehl.) S. Agnew = ***Didymodon rigidulus* Hedw**.

Barbula vinealis Brid. = ***Didymodon vinealis* (Brid.) R.H. Zander**

Bryum bicolor Dicks. = ***Bryum dichotomum* Hedw.**

Bryum caespiticium Hedw. var. *caespiticium* = ***Ptychostomum imbricatulum* (Müll. Hal.)**

Bryum capillare Hedw. = ***Ptychostomum capillare* (Hedw.) Holyoak & N. Pedersen**
Bryum flaccidum auct non. Brid. = ***Ptychostomum moravicum* (Podp.) Ros & Mazimpaka**
Bryum moravicum Podp. = ***Ptychostomum moravicum* (Podp.) Ros & Mazimpaka**
Bryum muehlenbeckii Bruch & Schimp. = ***Imbribryum alpinum* (Huds. *ex* With.) N. Pedersen**
Bryum subelegans Kindb. = ***Bryum flaccidum auct non.* Brid.**
Bryum syriacum Lorentz = ***Bryum turbinatum* (Hedw.) Turner**
Bryum violaceum Crundw. & Nyholm = ***Gemmabryum violaceum* (Crundw. & Nyholm) J.R. Spence**
Cirriphyllum reichenbachianum (Huebener) Wijk & Margad. = ***Sciuro-hypnum flotowianum* (Sendtn.) Ignatov & Huttunen**
Crossidium asirense W. Frey & Kürschner = ***Crossidium davidai* Catches.**
Eurhynchium speciosum (Brid.) Jur. = ***Oxyrrhynchium speciosum* (Brid.) Warnst.**
Fissidens arabicus Pursell et Kürschner = ***Fissidens sciophyllus* Mitt.**
Fissidens bambergeri Schimp. *ex* Milde = ***Fissidens viridulus* (Sw. *ex* anon.) Wahlenb. var. *viridulus***
Fissidens bryoides subsp. *inconstans* (Schimp.) P. de la Varde = ***Fissidens viridulus* (Sw. ex anon.) Wahlenb. var. *viridulus***
Fissidens schmidii Müll. Hal.= ***Fissidens bryoides* subsp. *schmidii* (Müll. Hal.) Nork.**
Funaria muhlenbergii Turner = ***Entosthodon muhlenbergii* (Turner) Fife**
Funaria pulchella H. Philib. = ***Entosthodon pulchellus* (H. Philib.) Brugués**
Grimmia pulvinata var. *africana* (Hedw.) Wilson = ***Grimmia pulvinata* (Hedw.) Sm.**
Grimmia pulvinata var. *pulvinata* = ***Grimmia pulvinata* (Hedw.) Sm. Holyoak & N. Pedersen**
Gymnostomum luisieri (Sérgio) Sérgio ex Crundw. = ***Gymnostomum viridulum* Brid.**
Homalia besseri Lobarz. = ***Alleniella besseri* (Lobarz.) S. Olsson, Enroth & D. Quandt**
Hydrogonium ehrenbergii (Lorentz) A. Jaeger = ***Barbula bolleana* (Müll. Hal.) Broth.**
Micropoma niloticum (Delile) Lindb. = ***Physcomitrium niloticum* (Delile) Müll. Hal.**
Neckera besseri (Lobarz.) Jur. = ***Alleniella besseri* (Lobarz.) S. Olsson, Enroth & D. Quandt**
Platyhypnidium riparioides (Hedw.) Dixon = ***Rhynchostegium riparioides* (Hedw.) Cardot**
Pleurochaete malacophylla (Müll. Hal.) Broth. = ***Tortella malacophylla* (Müll. Hal.) Paris**
Pleurochaete squarrosa (Brid.) Lindb. = ***Tortella squarrosa* (Brid.) Limpr.**
Pottia davalliana (Sm.) C.E.O. Jensen = ***Microbryum davallianum* (Sm.) R.H. Zander**
Pottia propagulifera Herzog = ***Tortula pallida* (Lindb.) R.H. Zander**
Pottia starckeana (Hedw.) Müll. Hal. = ***Microbryum starckeanum* (Hedw.) R.H. Zander**
Schistidium apocarpum (Hedw.) Bruch & Schimp. = ***Schistidium crassipilum* H.H. Blom**
Semibarbula orientalis (F. Weber) Wijk & Margad. = ***Barbula indica* (Hook.) Spreng.**
Syntrichia inermis (Brid.) Bruch = ***Tortula inermis* (Brid.) Mont.**
Syntrichia pagorum (Milde) J.J. Amann = ***Syntrichia laevipila* Brid.**
Tortula caninervis (Mitt.) Broth. = ***Syntrichia caninervis* Mitt.**
Tortula fragilis Taylor = ***Syntrichia fragilis* (Taylor) Ochyra**
Tortula laevipila (Brid.) Schwägr. = ***Syntrichia laevipila* Brid.**
Tortula pagorum (Milde) De Not. = ***Syntrichia laevipila* Brid.**
Tortula porphyreoneura (Müll. Hal.) C.C. Towns. = ***Pseudocrossidium porphyreoneurum* (Müll. Hal.) R.H. Zander**
Tortula ruralis (Hedw.) P. Gaertn., B. Mey. & Schreb. = ***Syntrichia ruralis* (Hedw.) F. Weber & D. Mohr**
Trichostomopsis aaronis (Lorentz) S. Agnew & C.C. Towns. = ***Didymodon australasiae* (Hook. & Grev.) R.H. Zander**

Trichostomopsis australasiae (Hook. & Grev.) H. Rob. = ***Didymodon australasiae*** **(Hook. & Grev.) R.H. Zander**

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REFERENCES

Abo Salama, U. Y.; Al-Humiany, A. A. and Shabbara, H. (2005). Towards a moss flora of Taif and its vicinities, Saudi Arabia.1-Funariaceae. Taeckh. 25: 1-14.

Almazroui, M.; Islam, M. N., Jones, P. D.; Athar, H. and Rahman, M. A. (2012). Recent climate change in the Arabian Peninsula: seasonal rainfall and temperature climatology of Saudi Arabia for 1979–2009. Atmospheric Research 111: 29-45.

Al-Nafie, A. (2004). Geobotanical of Saudi Arabia. Najoum Al-Maaref Press, Riyadh, Saudi Arabia. [In Arabic.]

Chaudhary, S. A. (2001). Flora of the Kingdom of the Saudi Arabia. vol. III. Ministry of Agriculture and Water, Riyadh, Saudi Arabia.

Elnesr, M. and Alazba, A. (2013). Effect of climate change on spatiotemporal variability and trends of evapotranspiration, and its impact on water resources management in the Kingdom of Saudi Arabia. INTECH Open Access Publisher, chapter 11: 273-296.

Frey W. and Kürschner, H. F. (1982). The first records of bryophytes from Saudi Arabia. Studies in Arabian bryophytes 1. Lindb. 8: 157-160.

Frey, W. and Kürschner H. F. (1987). A desert bryophyte synusia from the Jabal Tuwayq mountain systems (Central Saudi Arabia) with the description of two new *Crossidium* species (Pottiaceae). Studies in Arabian bryophytes 8. Nova Hedw. 45: 119-136.

Frey, W. and Kürschner H. F. (1988). Bryophytes of the Arabian Peninsula and Socotra. Floristics, phytogeography and definition of the Xerothermic Pangaean element. Studies in the Arabian bryophytes 12. Nova Hedw. 46: 37-120.

Frey, W. and Kürschner H. F. (1991). Conspectus bryophytorum orientalum et arabicorum. An annotated catalogue of the bryophytes of Southwest Asia. Bryoph. Bibl. 39:1-181.

Kürschner, H. (2000). Bryophyte flora of the Arabian Peninsula and Socotra. Bryoph. Bibl. 55.

Kürschner, H.; Buck, W. R. and Sollman, P. (2001). Two tropical species new to the bryophyte flora of the Arabian Peninsula: Additions to the bryophyte Flora of the Arabian Peninsula and Socotra 2. Nova Hedw. Band 73, Heft 1-2: 253–259.

Kürschner, H. and Frey, W. (2011). Liverworts, Mosses and Hornworts of Southwest Asia (Marchantiophyta, Bryophyta, Anthocerotophyta). Nova Hedw. 139: 240pp.

Kürschner, H. and Ochyra, R. (2014). Novelties in the moss flora of Oman, Saudi Arabia and Yemen, Including the most Outstanding *Vesicularia montagnei* (Bél.) Broth. (Hypnaceae). Crypto., Bryol. 35(1):93-97.

Migahid, A. M. and Hammouda, M. A. (1974). Flora of Saudi Arabia. Riyad University, 574 p.

Migahid, A. M. (1978). Flora of Saudi Arabia. Riyadh University Publication, vol. I. 2nd ed.

Muñoz, J. and Pando, F. (2000). World synopsis of the genus *Grimmia* (Musci, Grimmiaceae). Missouri Botanical Garden Press. Vol. 83, printed in U.S.A.

Refai, M. S. (2001). New records to the bryoflora of Saudi Arabia. Taeckh. 21(1):173-186.

Taha, M. A. and Shabbara, H. M. (2019). New *Fissidens* species to moss flora of Saudi Arabia. Egypt. J. Bot. 59: in press.

Taha, M. A.; Shabbara, H. M. and Aseeri, M. M. (2020). New Pottiaceae genera to the moss flora of Saudi Arabia and the Arabian Peninsula. Crypto., Bryol.: In press.

ARABIC SUMMARY

قائمة محققة للحزازيات السعودية مع حاشية تفسيرية

مي أحمد طه

قسم النبات-كلية العلوم-جامعة عين شمس-جمهورية مصر العربيه

يشمل هذا العمل قائمة الحزازيات المعروفة حتى الآن من المملكة العربية السعودية والمكونه من 122 وحده تصنيفيه حزازيه تنتمي إلى 51 جنسًا، في 21 عائلة و10 رتب تحت طائفة الـ Bryopsida. وتعد هذه القائمة هي الاولي في ايضاح توزيع الأصناف الحزازيه في المناطق الجغرافية المختلفة بالمملكة العربية السعودية. ويقدم هذا المقال تعليقات توضيحية مهمة تتعلق بتوزيع الأصناف الحزازيه والسياده والندرة وغيرها من المعلومات ذات الصلة. علاوة على ذلك، فإن العمل الحالي هو الأول في توفير قائمة بمرادفات أسماء جميع الحزازيات المعروفة من المملكة