

An Annotated Check-list of the Hepaticae and Anthocerotae of Turkey

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Résumé – Cette étude présente la liste des 3 anthocérotes et 169 hépatiques (représentant 66 genres) présentes en Turquie. La distribution de chaque espèce est donnée selon le système de carrés (Henderson, 1961). *Fossombronia wondraczekii* (Corda) Lindb. est rapporté comme nouveau pour la flore de la Turquie. En outre, 13 espèces sont des nouveaux records pour 5 carrés de la Turquie. La taxonomie, la synonymie et la distribution de nombreux taxons sont brièvement discutés dans une série de notes.

Check-list / Distribution / Hépatiques / Anthocérotes / Turquie / Nouveau report / *Fossombronia wondraczekii*

Abstract – The present list includes 3 hornworts and 169 liverworts taxa in 66 genera that occur in Turkey. The distribution of each species by the grid-square system of Turkey is presented. The liverwort *Fossombronia wondraczekii* (Corda) Lindb. is reported as new for the liverwort flora of Turkey. In addition, 13 species are new records for 5 grid square of Turkey. In 44 annotations, the taxonomy, synonymy and distribution of many taxa are discussed briefly, based mainly on recent references.

Check-list / Distribution / Liverworts / Hornworts / Turkey / New Record / *Fossombronia wondraczekii*

INTRODUCTION

The first records of Turkish liverworts were published by Wettstein (1889), who listed two species from Turkey, *Marchantia polymorpha* L. and *Fimbriaria elegans* Spreng. Schiffner (1896, 1913) reported eleven species. In 1900, Fritsch and in 1905, Penther & Zederbauer added three further species. Bornmüller (1908, 1931) mentioned four liverwort species. Handel-Mazetti (1909) recognized forty liverwort species from the Northeast Black Sea Region. In the

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next 50 years only three further liverwort species were recorded in Turkey (Reimers 1927). Henderson (1961, 1963) and Henderson *et al.* (1955, 1969) added sixteen liverworts species. In addition Jovet-Ast (1957), studied *Ricciaceae*, and Robinson-Godfrey (1960) reported four new species. Between 1967 and 1970 Walther, who especially studied in Western Anatolia, added twenty seven liverworts species. Crundwell and Nyholm (1979) listed twenty two new species. Thus, at the beginning of 1980, the number of liverworts and hornworts species recognized for Turkey was 132.

Till 1980 no Turkish botanists studied liverworts or hornworts. The first bryological study in Turkey by local botanists led to the record of *Pellia neesiana* (Gottsche) Limpr. (Gökler *et al.*, 1984). Two years later, Gökler *et al.* (1986) listed 134 liverwort and hornwort taxa for Turkey. Çetin and Yurdakulol (1986) reported occurrences of the liverworts *Mylia taylorii* (Hook.) Gray and *Barbilophozia hatcheri* (Evs.) Loeske var. *grandiretis* Buch. in Yedigöller National Park. *Porella obtusata* (Taylor) Trevis. (Dicks.) C. Jens. was recorded by Gökler and Öztürk (1987). In 1988, Çetin was able to list 145 liverwort and hornwort taxa for Turkey, including *Riccia papillosa* Moris. Gökler and Öztürk (1989) studied the liverwort flora of the Black Sea Region and newly recorded *Bazzania trilobata* (L.) Gray. Gökler (1989) reported *Lejeunea lamacerina* (Steph.) Schiffn. Seçmen *et al.* (1989) reported *Ricciocarpos natans* (L.) Corda. Çetin (1989a) recognized *Porella pinnata* L. as additions to the liverwort flora of Turkey. Finally, Gökler and Öztürk (1991) listed 145 liverwort and hornwort species from Turkey, and provided information on the distribution range of the species using the grid square system.

Later, Gökler and Aysel (1998) recognized *Riccia fluitans* L. from İzmir-Selçuk. Müller (1998) added *Bazzania flaccida* (Dum.) Grolle and *Leiocolea bantriensis* (Hook.) Joerg. to the liverwort flora of Turkey. Gökler *et al.* (2000) reported a new liverwort species, *Riccia crozalsii* Lev., in the West of Anatolia. Papp (2004) observed three further liverworts species in Turkey, *Harpanthus scutatus* (F. Weber *et* D. Mohr) Spruce, *Nardia scalaris* Gray and *Scapania subalpina* (Nees *ex* Lindenb.) Dumort. Keçeli (2004), Keçeli *et al.* (2004) and Keçeli and Çetin (2005, 2006) reported four further liverworts, *Pedinophyllum interruptum* (Nees) Kaal., *Riccardia latifrons* (Lindb.) Lindb., *Ptilidium pulcherrimum* (G. Web.) Vain. and *Cephaloziella dentata* (Raddi) Steph. Kürschner and Erdağ (2005) published a checklist of Turkish liverworts (163 species and infraspecific taxa) and hornworts (3 species). One year later, Kürschner and Parolly (2006) added the liverwort *Eremonotus myriocarpus* (Carrington) Lindb. Keçeli and Abay (2007a, b) observed *Pallavicinia lyellii* (Hook.) Carruth. and *Telaranea europaea* Engel & Merr. F in the Northeast Black Sea Region-Rize. The last study about liverwort and hornwort distribution has been published by Ros *et al.* in 2007. In this study, all liverworts and hornworts recognized in the Mediterranean countries and Bulgaria by 2007 were summarized in an annotated checklist list. The list comprised 3 hornworts and 164 liverworts from Turkey. Recently, Ezer *et al.* (2008) reported *Frullania fragilifolia* (Taylor) Gottsche, Lindendb. *et* Nees from Mount Musa, Samandağ (Hatay). Keçeli *et al.* (2008) reported *Scapania paludosa* (Müll. Frib.) Müll. Frib. from Kaçkar Mountains National Park, Northeast Black Sea Region-Rize. The present study includes three hornworts and 169 liverworts taxa from Turkey. The liverwort *Fossombronina wondroczeikii* (Corda) Lindb. is recorded as new for the Turkish liverwort.

For a long time, studies on the systematics of liverworts and hornworts were mainly based on morphological characters that could be observed using light

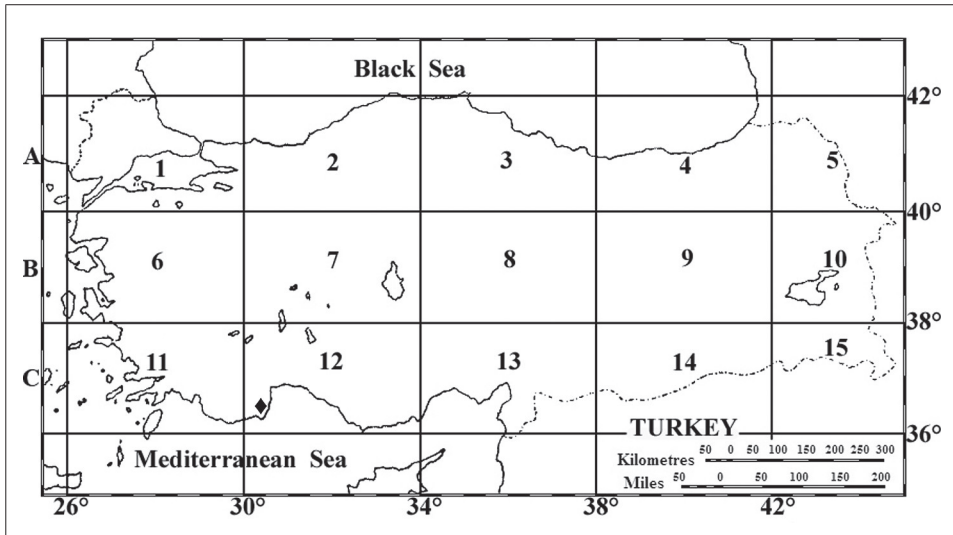


Fig. 1. The grid-square system of Turkey map according to Henderson (1961).

and electron microscopy. In the last 20 years, DNA sequence data have been employed in phylogenetic reconstructions of liverworts and hornworts. Several recent molecular phylogenetic studies based on DNA sequence data led to new insights in the systematics of liverworts and hornworts. In these studies long-standing hypotheses on liverwort and hornworts evolution have been questioned, and new relationships of various groups of liverworts and hornworts were suggested (e.g., He-Nygren *et al.*, 2006; Hentschel *et al.*, 2006; Heinrichs *et al.*, 2005; Davis, 2004; Stech *et al.*, 2003). However, it is still not possible to adopt a species level classification system that is completely based on morphology and molecular evidence.

Accepted names of liverworts and hornworts are mostly based on Grolle & Long (2000). The authors of plant names are given according to Brummit & Powell (1992). In all 172 taxa are treated and information on their distribution is given according to a grid-square system of Turkey introduced by Henderson (1961) (Fig.1).

ANNOTATIONS

1- Syn: *Metzgeria pubescens* (Schrank) Raddi.

2- The species *Asterella elegans* (Spreng.) Trevis. has been recorded from grid-square C12 of Turkey by Wettstein (1889) and Bornmüller (1931). Afterwards, Frey *et al.* (1991) reported that the species was a misidentification of *Mannia androgyna* (L.) A. Evans.

3- The species *Asterella lindenbergiana* (Corda ex Nees) Arnell has been recorded from grid-square C11 of Turkey by Gökler & Öztürk (1991). Afterwards, Kürschner (1996) reported that the species was a misidentification of *Corsinia coriandrina* (Spreng.) Lindb.

4- Syn: *Barbilophozia hatcheri* (A. Evans) Loeske var. *grandiretis* H. Buch ex Lammes.

Table 1: The distribution list of the liverworts and hornworts (●) symbols signify former reports; (■) symbols signify new records for individual square; (◆) symbol signifies new record for Turkey. The list is supplemented by an annotation part.

No	Taxa	The Distribution of The Liverworts and Hornworts in Turkey														
		A					B					C				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Hepaticae																
1	<i>Aneura pinguis</i> (L.) Dumort.				●							●	●			
2	<i>Anthelia julacea</i> (L.) Dumort.				●											
3	<i>Apometzgeria pubescens</i> (Schrank) Kuwah. [1]		●	●	●											
4	<i>Asterella</i> [2, 3] <i>gracilis</i> (F. Weber) Underw.	●											●			
5	<i>Athalamia hyalina</i> (Sommerf.) Hatt.	●						●					●			
6	<i>Athalamia spathysii</i> (Lindenb.) Hatt.												●			
7	<i>Barbilophozia attenuata</i> (Mart.) Loeske				●											
8	<i>Barbilophozia barbata</i> (Schmidel ex Schreb.) Loeske		●		●		●									
9	<i>Barbilophozia hatcheri</i> (A. Evans) Loeske	●	●		●		●									
10	<i>Barbilophozia rubescens</i> (R.M. Schust. et Damsh.) Kartt. et L. Söderstr. [4]		●													
11	<i>Bazzania flaccida</i> (Dumort.) Grolle				●											
12	<i>Bazzania tricrenata</i> (Wahlenb.) Lindb.		●		●											
13	<i>Bazzania trilobata</i> (L.) Gray		●		●											
14	<i>Blasia pusilla</i> L.			●	●											
15	<i>Blepharostoma tricophyllum</i> (L.) Dumort.		●		●	■										
16	<i>Calypogeia arguta</i> Nees et Mont.	●	●		●		●									
17	<i>Calypogeia azurea</i> Stotler et Crotz [5]	●			●											
18	<i>Calypogeia fissa</i> (L.) Raddi	●	●	●	●		●						●			
19	<i>Calypogeia muelleriana</i> (Schiffn.) Müll.Frib.				●											
20	<i>Calypogeia sphagnicola</i> (Arnell et J.Perss.) Warnst. et Loeske	●										●				
21	<i>Cephalozia bicuspidata</i> (L.) Dumort.	●	●		●							●				
22	<i>Cephalozia catenulata</i> (Huebener) Lindb.				●											
23	<i>Cephalozia pleniceps</i> (Austin.) Lindb.	●			●											
24	<i>Cephaloziella baumgartneri</i> Schiffn.	●			■		●					●				
25	<i>Cephaloziella dentata</i> (Raddi) Steph.		●													
26	<i>Cephaloziella divaricata</i> (Sm.) Schiffn.				●		●					●				
27	<i>Cephaloziella hampeana</i> (Nees) Schiffn.				●		■					●	●			
28	<i>Cephaloziella rubella</i> (Nees) Warnst. [6]															
29	<i>Cephaloziella stellulifera</i> (Taylor ex Spruce) Schiffn.	●					●					●				
30	<i>Cephaloziella turneri</i> (Hook.) Müll.Frib. [7]	●														
31	<i>Chiloscyphus pallescens</i> (Ehrh. ex Hoffm.) Dumort. [8]	●	●	●	●		●									
32	<i>Chiloscyphus polyanthos</i> (L.) Corda [9]	●	●		●	●	●					●				

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		A					B					C				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
33	<i>Cladopodiella fluitans</i> (Nees) H.Buch	●					●									
34	<i>Cololejeunea calcarea</i> (Lib.) Schiffn.		●													
35	<i>Cololejeunea rossettiana</i> (C. Massal.) Schiffn.		●		●											
36	<i>Conocephalum conicum</i> (L.) Dumort.	●	●	●	●	●			●			●	●			
37	<i>Corsinia coriandrina</i> (Spreng.) Lindb.		●						●			●	●			
38	<i>Diplophyllum albicans</i> (L.) Dumort.		●		●	●										
39	<i>Diplophyllum taxifolium</i> (Wahlenb.) Dumort.				●											
40	<i>Eremonotus myriocarpus</i> (Carrington) Pearson				●											
41	<i>Fossombronia angulosa</i> (Dicks.) Raddi	●	●		●				●			●	●			
42	<i>Fossombronia caespitiformis</i> De Not. ex Rabenh. subsp. <i>caespitiformis</i>								●			●	●			
43	<i>Fossombronia caespitiformis</i> subsp. <i>multispira</i> (Schiffn.) J.R. Bray et D.C. Cargill [10]	●										●				
44	<i>Fossombronia foveolata</i> Lindb. [11]															
45	<i>Fossombronia pusilla</i> (L.) Nees	●	●	●	●				●			●	●			
46	<i>Fossombronia wondraczekii</i> (Corda) Lindb. [12]														◆	
47	<i>Frullania dilatata</i> (L.) Dumort. [13]	●	●	●	●	●	●					●	●	●		
48	<i>Frullania fragilifolia</i> (Taylor) Gottsche, Lindenb. et Nees														●	
49	<i>Frullania jackii</i> Gottsche [14]				●											
50	<i>Frullania tamarisci</i> (L.) Dumort. [15]	●	●	●	●				●				●	●		
51	<i>Gongylanthus ericetorum</i> (Raddi) Nees											●	●			
52	<i>Gymnocolea inflata</i> (Huds.) Dumort. [16]				●							●				
53	<i>Gymnomitrium concinatum</i> (Lightf.) Corda [17]				●											
54	<i>Harpanthus scutatus</i> (F. Weber et D. Mohr) Spruce				●											
55	<i>Jamesoniella autumnalis</i> (DC.) Steph.				●											
56	<i>Jubula hutchinsiae</i> (Hook.) Dumort. subsp. <i>javanica</i> (Steph.) Verd. [18]		●	●	●											
57	<i>Jungermannia atrovirens</i> Dumort.	●	●		●				■			●	●			
58	<i>Jungermannia caucasica</i> Váňa				●											
59	<i>Jungermannia gracillima</i> Sm.		●		●				●			●				
60	<i>Jungermannia handelii</i> (Schiffn.) Amakawa				●											
61	<i>Jungermannia hyalina</i> Lyell	●	●		●							●				
62	<i>Jungermannia leiantha</i> Grolle				●											
63	<i>Jungermannia lignicola</i> (Schiffn.) Grolle [19]				●											
64	<i>Jungermannia obovata</i> Nees [20]				●											

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		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
131	<i>Riccia crozalsii</i> Levier	●										●				
132	<i>Riccia crystallina</i> L. emend. Raddi						●									
133	<i>Riccia fluitans</i> L.											●				
134	<i>Riccia frostii</i> Austin			●								●				●
135	<i>Riccia glauca</i> L. var. <i>glauca</i>						■					●	●			
136	<i>Riccia glauca</i> var. <i>ciliaris</i> Warnst. [40]											●				
137	<i>Riccia gougetiana</i> var. <i>armatissima</i> Levier ex Müll. Frib. [39]											●				
138	<i>Riccia gougetiana</i> Durieu et Mont. var. <i>gougetiana</i>							●				●				
139	<i>Riccia lamellosa</i> Raddi [39]															
140	<i>Riccia macrocarpa</i> Levier							●				●				
141	<i>Riccia michelii</i> Raddi											●	●			
142	<i>Riccia nigrella</i> DC.	●						●				●	■			
143	<i>Riccia papillosa</i> Moris [21]															
144	<i>Riccia rhenana</i> Lorb. ex Müll. Frib.							●								
145	<i>Riccia sorocarpa</i> Bisch.					●	●					●	●			
146	<i>Riccia trabutiana</i> Steph. [41]															
147	<i>Ricciocarpos natans</i> (L.) Corda		●													
148	<i>Riella helicophylla</i> (Bory et Mont.) Mont. [21]															
149	<i>Scapania aequiloba</i> (Schwägr.) Dumort.		●		●											
150	<i>Scapania aspera</i> Bernet et M. Bernet		●	●	●											
151	<i>Scapania compacta</i> (Roth) Dumort.	●					●									
152	<i>Scapania curta</i> (Mart.) Dumort.				●											
153	<i>Scapania irrigua</i> (Nees) Nees	●	●		●											
154	<i>Scapania paludosa</i> (Müll. Frib.) Müll. Frib.				●											
155	<i>Scapania nemorea</i> (L.) Grolle [42]		●	●	●											
156	<i>Scapania subalpina</i> (Nees ex Lindenb.) Dumort.				●											
157	<i>Scapania umbrosa</i> (Schrad.) Dumort.				●											
158	<i>Scapania undulata</i> (L.) Dumort. [43]	●	●		●		●					●				
159	<i>Scapania verrucosa</i> Heeg		●	●	●											
160	<i>Southbya nigrella</i> (De Not.) Henriq.							●				●	●			
161	<i>Southbya tophacea</i> (Spruce) Spruce		●					●				●	●			
162	<i>Sphaerocarpos michelii</i> Bellardi							●				●				
163	<i>Sphaerocarpos texanus</i> Austin						■					●	●			

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164	<i>Targionia hypophylla</i> L.	●	●				●	●				●	●	●		
165	<i>Targionia lorbeeriana</i> Müll. Frib.						●					●				
166	<i>Telaranea europaea</i> Engel et Merr.				●											
167	<i>Tritomaria exsecta</i> (Schmidel ex Schrad.) Loeske				●											
168	<i>Tritomaria exsectiformis</i> (Breidl.) Loeske	●														
169	<i>Tritomaria quinquedentata</i> (Huds.) H. Buch		●		●											
Anthocerotae																
170	<i>Anthoceros punctatus</i> L.	●	●	●	●		●					●	●			
171	<i>Phaeoceros laevis</i> (L.) Prosk	●			●		●					●	●			
172	<i>Phymatoceros bulbiculosus</i> (Brot.) Stotler, W.T. Doyle et Crand.-Stotl. [44]						●									
Total Taxa Numbers for Individual Grid-Square:		58	67	35	108	17	70	17	6	5	-	66	4	11	-	2

- 5- Syn: *Calypogeia trichomanis* auct. pro parte non (L.) Corda.
- 6- This species has been recorded from Turkey by Kürschner (2001) without details of locality.
- 7- This species has been recorded from Turkey by Crundwell & Nyholm (1979) without details of locality. Afterwards, Papp & Sabovljevic (2003) reported this species from grid-square A1.
- 8- Syn: *Chiloscyphus polyanthos* (L.) Corda var. *pallescens* (Ehrh. ex Hoffm.) C. Hartm.
- 9- Syn: *Chiloscyphus rivularis* (Schrad.) Hazsl., *Chiloscyphus polyanthos* (L.) Corda var. *rivularis* (Schrad.) Gottsche, Lindb. et Nees.
- 10- Syn: *F. caespitiformis* De Not. ex Rabenh. var. *husnotii* (Corb.) Corb.
- 11- The species *Fossombronia foveolata* Lindb. has been reported by Smith (1990) from Turkey without locality data.
- 12- The species *Fossombronia wondraczekii* (Corda) Lindb. is newly recorded for Turkey.
- 13- Syn: *Frullania dilatata* (L.) Dumort. var. *microphylla* Nees.
- 14- Syn: *Frullania davurica* Hampe subsp. *jackii* (Gottsche) S. Hatt.
- 15- Syn: *Frullania tamarisci* (L.) Dumort. var. *atrovirens* Carrington.
- 16- Syn: *Gymnocollea acutiloba* (Schiffn.) Müll. Frib., *Gymnocollea inflata* var. *acutiloba* (Schiffn.) S.W. Arnell.
- 17- incl. *Gymnomitrium concinnatum* (Lightf.) Corda var. *intermedium* Limpr., reported from Turkey by Schiffner (1909).
- 18- Syn: *Jubula javanica* Steph., *Jubula hutchinsiae* (Hook.) Dumort. var. *sullivantii*
- 19- Endemic species to Turkey.
- 20- Syn: *Plectocolea obovata* (Nees) Mitt.

- 21- This species has been reported by Çetin (1988) from Turkey without collection data and locality.
- 22- Syn: *Lophozia bantriensis* (Hook.) Steph.
- 23- Syn: *Lophozia collaris* (Nees) Dumort.
- 24- Syn: *Lophozia turbinata* (Raddi) Steph.
- 25- Syn: *Lophocolea cuspidata* (Nees) Limpr.
- 26- According to Bischler-Causse & Boisselier-Dubayle (1991); *M. polymorpha* L. subsp. *polymorpha* (approximately *M. aquatica* (Nees) Burgeff, *M. polymorpha* L. subsp. *aquatica* (Nees) Gams 1957, *nom. inval.*: Art. 32.2).
- 27- According to Bischler-Causse & Boisselier-Dubayle (1991); *M. polymorpha* L. subsp. *montivagans* Bischl. & Boisselier (approximately *M. alpestris* (Nees) Burgeff, *M. polymorpha* L. subsp. *alpestris* (Nees) Gams 1957, *nom. inval.*: Art. 32.2).
- 28- This taxon was reported by Ros *et al.* (2007) from Turkey without collection data and locality.
- 29- Syn: *Marsupella aquatica* (Lindenb.) Schiffn., *Marsupella emarginata* subsp. *aquatica* (Lindenb.) Meyl., *Marsupella emarginata* var. *aquatica* (Lindenb.) Dumort.
- 30- incl. *Marsupella funckii* (F. Weber et D. Mohr) Dumort. var. *major* (Nees) Boulay.
- 31- Syn: *Metzgeria furcata* (L.) Dumort. var. *ulvula* (Nees) Gottsche *et al.*
- 32- Syn: *Lejeunea ulicina* (Taylor) Gottsche *et al.*
- 33- Syn: *Oxymitra paleacea* (Bisch.) ex. Lindenb.
- 34- This species has been recorded from Turkey by Bischler (2004) without details of locality. Afterwards the report was rejected by Ros *et al.* (2007).
- 35- According to Boisselier-Dubayle *et al.* (1998) an allopolyploid taxon (parents: *Porella cordaeana* x *Porella platyphylla*).
- 36- Syn: *Porella thuja auct., non* (Dicks.) Lindb.
- 37- Syn: *Jungermannia pulcherrima* Weber.
- 38- The species *Preissia quadrata* (Scop.) Nees [*Chomiocarpon quadratus* (Scop.) Ldbg.] has been recorded from grid-square B9 of Turkey by Schiffner (1913). Afterwards, Crundwell & Nyholm (1979) reported that the species was a misidentification of *Reboulia hemisphaerica* (L.) Raddi.
- 39- This species has been recorded by Jovet-Ast (1986) from Turkey without collection data and locality.
- 40- Syn: *Riccia glauca* L. var. *subinermis* (Lindb.) Warnst.
- 41- This taxon has been reported by El-Oqlah *et al.* (1988) from Turkey without collection data and locality.
- 42- incl. *Scapania nemorosa* (L.) Grolle var. *fallaciosa* Schiffn. reported from Turkey by Schiffner (1909).
- 43- incl. *Scapania undulata* (L.) Dumort. var. *dentata* (Dumort.) McArdle, reported from Turkey by Walther (1967).
- 44- Syn: *Phaeoceros bulbiculosus* (Brot.) Prosk.

Fossombronina wondraczekii (Corda) Lindb. new to the liverwort flora of Turkey. *F. wondraczekii* is widespread in Europe and has been observed in Austria, Belgium, Britain, Bulgaria, Czech Republic, Slovakia, Denmark, Finland, France, Germany, Greece, Ireland, Switzerland, The Netherlands, Spain, Hungary, Iceland, Italy, Croatia, Portugal, Norway, Poland, Romania, Northern part of European Russia, Central part of European Russia, Corsica, Sicily, Sweden, Balears, Crete, Belarus, Ukraine, Estonia, Latvia, Lithuania), S.W. Asia, N. Africa, N. America, S.E. Australia (Smith, 1990; Paton, 1999; Schumacker & Váňa,

2000). We observed *F. wondraczekii* near Antalya, new to the Turkish liverwort flora:

C12 grid-square adopted by Henderson (1961), Antalya; Kemer, Çıralı road, 2-3. km, on soil near road; 196 m altitude; 36° 25.705' N 30° 26.033' E, West, 20.03.2006; Özenoğlu C12/037-47., leg. Özenoğlu Kiremit (personal herbarium protect in Adnan Menderes University). The specimen was collected on soil, associated with *Lunularia cruciata* (L.) Dumort. ex Lindb. The dominant trees in the area were *Pinus brutia* Ten., *Pinus nigra* Arn., *Cedrus libani* A. Richard, *Abies cilicica* (Ant. et Kotschy) Carr., *Quercus coccifera* L.

DISCUSSION

The present study summarizes recent knowledge on the distribution of liverworts and hornworts in Turkey. A total number of 166 species and four infraspecific taxa (three hornworts, 169 liverworts) is recongized. The liverwort, *Fossombronia wondraczekii* (Corda) Lindb. is added to the liverwort flora of Turkey. In addition, 13 species are newly recorded for several grid squares (2 species for A4; 2 species for A5; 4 species for B6; 4 species for B7 and one species for C12) of Turkey.

According to current knowledge, gride square A4 (108) has the highest number of liverworts in Turkey. Gride square A4 comprises the Black Sea coast in the Euro-Siberian phytogeographical region and experiences a heavy rainfall with mild winters. Grid square, B6 (lying in the Mediterranean phytogeographical region) has 70 taxa; A2 grid squares 67 taxa, and C11 66 taxa. In our opinion, a poor record from the grid squares in the great Irano-Turanian phytogeographical region is due to the lack of liverwort studies in this region.

Our list reflects current work on the liverwort and hornwort flora of Turkey. However, we are sure that the liverwort flora is still incompletely known. We believe that the Turkish liverwort and hornwort flora can be enriched through detailed investigations of localities with ecological conditions suitable for the growth of these plants.

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