Liverworts of Turkey and their position in South-West Asia

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Liverworts of Turkey and their position in South-West Asia

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ABSTRACT

GÖKLER, I. & M. ÖZTÜRK (1991). Liverworts of Turkey and their position in South-West Asia. *Candollea* 46: 359-366. In English, English and German abstracts.

In this study, the liverworts existing in Turkey are listed according to the grid square system and *Asterella lindenbergiana* (Corda ex Nees) H. Arn. is reported for the first time from here. A taxonomical and ecological comparison of the Turkish liverwort flora with that of South-West Asian countries is given.

ZUSAMMENFASSUNG

GÖKLER, I. & M. ÖZTÜRK (1991). Lebermoose aus der Turkei und ihrer Lage in Südwest Asien-Länder. *Candollea* 46: 359-366. Auf English, mit englischer und deutscher Zusammenfassung.

In dieser Arbeit sind die Lebermoose nach dem Quadratsystem gelistet und darunter is *Asterella lindenbergiana* (Corda ex Nees) H. Arn. für die Türkei neu erfunden. Ausserdem sind diese Pflanzen mit den Floren der Südwest Asien-Länder nach ihrer taxonomischen und ökologischen Hinsicht verglichen.

The latest list of Turkish liverworts has been published by CETIN (1988), based on the publication of HENDERSON & PRENTICE (1969). Although it represents a general potential of this group in Turkey, however, many gaps are visible in it. As such, current studies were undertaken so as to put forth the present situation in the light of work done by us (GÖKLER & al., 1984; GÖKLER, 1986, 1989; GÖKLER & ÖZTÜRK, 1986, 1987, 1989; ÖZTÜRK & GÖKLER, 1988; SECMEN & al., 1989) and the papers published by other workers (HENDERSON, 1961; WALTHER, 1967, 1970; HENDERSON & PRENTICE, 1969; VANA, 1974; CRUNDWELL & NYHOLM, 1979; DÜLL, 1983; GROLLE, 1983; BISCHLER & JOVET-AST, 1986; CETIN, 1988, 1989a, 1989b; EL-OQLAH & al., 1988).

List of taxa

In all 145 species are seen to show a distribution in Turkey. Out of these 1 species has been recorded newly. This is given as follows:

Asterella lindenbergiana

Aydin: Bozdoğan, Ziyaretli village alongside the stream, West, 500 m, 16.4.1986 (37°39', 28°19'E). EGE herbarium No. 8710 *(Gökler 705/115).*

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The other species are listed below according to GROLLE (1983). The distributional areas reported before are given with the species according to the grid square system and new sites have been added to it which are designated by an asterisk (*). The distributional areas of the species, reported for the first time in the list of CETIN (1988) and EL-OQLAH & al. (1988) are not given in the list, because no such record could be traced.

ANTHOCEROPSIDA, ANTHOCEROTALES

Anthocerotaceae Dum.
- *Anthoceros punctatus* L. 1, 4, 6, 11, *12
- *Phaeoceros bulbiculosus* (Brotero) Prosk. 6
- *Phaeoceros laevis* (L.) Prosk. 1, 4, 6, 11, 12

MARCHANTIOPSIDA, SPHAEROCARPALES

Riellaceae Ebgler
- *Riella helicophylla* (Bory & Mont.) Mont. ..... —

Sphaerocarpaceae (Dum.) Heeg
- *Sphaerocarpos michelii* Bellardi 6, 11
- *Sphaerocarpos texanus* Aust. 11

MARCHANTIALES

Targioniaceae Dum.
- *Targionia hypohylla* L. 2, 6, 11, *12, 13
- *Targionia lorbeeriana* K. Müll. 6, 11

Aytoniaceae Cavers
- *Plagiochasma rupestre* (R. & G. Forst.) Steph. 6, 11, *12
- *Reboulia hemisphaerica* (L.) Raddi 4, 6, 7, 8, 11, 12, 13
- *Mannia androgyna* (L.) Evans 12
- *Mannia fragrans* (Balbis) Frye & Clark ..... —
- *Asterella gracilis* (F. Web.) Underw. 1
- *Asterella lindenbergiana* (Corda ex Nees) H. Arn. *11

Conocephalaceae K. Müll. ex Grolle
- *Conocephalum conicum* (L.) Underw. 1, 2, 3, 4, 5, 6, 8, 11, 12

Lunulariaceae Klinggr.
- *Lunularia cruciata* (L.) Lindb. 1, 2, 3, 4, 6, 9, 11, 12

Cleveaceae Cavers
- *Clevea rousseliana* (Mont.) Leit. 8, 12
- *Athalamia hyalina* (Sommerf.) Hatt. 1
- *Athalamia spathysii* (Lindenb.) Hatt. ..... —

Marchantiaceae (Bisch.) Lindley
- *Marchantia alpestris* (Nees) Burgeff 1, 6, 9
- *Marchantia paleacea* Bertol. 4, 12
- *Marchantia polymorpha* L. 1, 2, 4, 5, 6, 8, 9, *11, 12, 13, 15

Corsiniaceae Engler
- *Corsinia coriandrina* (Spreng.) Lindb. 6, 11, 12

Oxymitraceae K. Müll. ex Grolle
- *Oxymitra paleacea* Bisch. ex Lindenb. 6, 11, 12

Ricciaceae Reichenb.
Ricciocarpos natans (L.) Corda 2
Riccia bicarinata Lindb. 6, 11, 12
Riccia bifurca Hoffm. 8
Riccia ciliata Hoffm. 6, 11
Riccia ciliifera Link ex Lindenb. 1, 6
Riccia crystallina L. emend. Raddi 6
Riccia frostii Aust. 3, 15
Riccia gluca L. 11
Riccia gougetiana Durieu & Mont. 6, 11
Riccia lamellosa Raddi ..... —
Riccia macrocarpa Levier 6, 11
Riccia michelii Raddi 11. 12
Riccia nigrella DC. 6, 11
Riccia papillosa Moris ..... —
Riccia rhenana Lorbeer 6
Riccia sorocarpa Bisch. 6, 11, 12
Riccia trabutiana Steph. ..... —

METZGERIALES

Metgeriaceae Klinggr.
Metzgeria conjugata Lindb. 3, 4, *6, 13
Metzgeria furcata (L.) Dum. 1, 2, 3, 4, 6, *11, 12, 13
Apometzgeria pubescens (Schrank) Kuwah. 4

Aneuraceae Klinggr.
Aneura pinguis (L.) Dum. 12
Riccardia chamedryfolia (With.) Grolle 6
Riccardia multifida (L.) S. Gray 4, 9
Riccardia palmata (Hedw.) Carruth. 2, 4

Pelliaceae Klinggr.
Pellia endiviifolia (Dicks.) Dum. 1, 2, 3, 4, 6, 7, 9, 11, 12
Pellia epiphylla (L.) corda 2, 4, *11
Pellia neesiana (Gott.) Limpr. 4, 6

Blasiaceae Klinggr.
Blasia pusilla L. 4

Codoniaceae Klinggr.
Fossombronia angulosa (Dicks.) Raddi 2, 4, 6, 11
Fossombronia caespitiformis De Not. ex Rabenh. 6, 11
Fossombronia pusilla (L.) Nees 4, 6, 11, *12
Petalophyllum ralfsii (Wils.) Nees & Gott. 6, 11, 12

JUNGERMANNIALES

Lophoziaceae (Joerg.) Vanden Berghen
Barbilophozia attenuata (Mart.) Loeske 4
Barbilophozia barbata (Schmid. ex Schreb.) Loeske 4, 6
Barbilophozia hatcheri (Evans) Loeske 1, 2, 6
Lophozia badensis (Gott.) Schiffn. ..... —
Lophozia bicrenata (Schmid. ex Hoffm.) Dum. 1
Lophozia collaris (Nees) Dum. 4
Lophozia excisa (Dicks.) Dum. 6

Lophozia incisa (Schrad.) Dum. 4
Lophozia longidens (Lindb.) Macoun 4
Lophozia longiflora (Nees) Schiffn. 2, 4
Lophozia sudetica (Nees ex Hüb.) Grolle 4
Lophozia turbinata (Raddi) Steph. 6, 11, 12
Lophozia ventricosa (Dicks.) Dum. 1, 4
Gymnocolea acutiloba (Schiffn.) K. Müll. 4
Gymnocolea inflata (Huds.) Dum. ..... —
Tritomaria exsecta (Schrad.) Loeske 4
Tritomaria exsectiformis (Breidl.) Loeske 1
Tritomaria quinquedentata (Huds.) Buch 4

Jungermanniaceae Reichenb.
Jamesoniella autumnalis (DC.) Steph. 4
Mylia taylori (Hook.) S. Gray 2
Jungermannia atrovirens Dum. 4, *11, *12
Jungermannia caucasica Vana 4
Jungermannia gracillima Sm. 2, 4, 6
Jungermannia handelii (Schiffn.) Amak. 4
Jungermannia hyalina Lyell 4
Jungermannia lignicola (Schiffn.) Grolle 4
Jungermannia obovata Nees 4
Jungermannia sphaerocarpa Hook. 1, 4
Jungermannia subtilissima Schiffn.) Grolle 3, 4
Nardia compressa (Hook.) S. Gray 4

Gymnomitriaceae Klinggr.
Marsupella emarginata (Ehrh.) Dum. 4
Marsupella funckii (Web. & Mohr) Dum. 4
Gymnomitrion concinnatum (Lightf.) Corda 4

Arnelliaceae Nakai
Southbya nigrella (De Not.) Henriques 6, 11, 12
Southbya tophacea (Spruce) Spruce 6, 11, 12
Gonylanthus ericetorum (Raddi) Nees 11

Plagiochilaceae (Joerg.) K. Müll.
Plagiochila asplenioides (L. emend. Tayl.) Dum. 2, 4, 5
Plagiochila porelloides (Torey ex Nees) Lindenb. 2, 3, 4, *6, *11

Geocalycaceae Klinggr.
Lophocolea bidentata (L.) Dum. 1, 2, 3, 4, 6
Lophocolea heterophylla (Schrad.) Dum. 2, 3, 4, 6
Lophocolea minor Nees 1, 2, 3, 4
Chiloscyphus pallescens (Ehrh. ex Hoffm.) Dum. *4, 6
Chiloscyphus polyanthos (L.) Corda 1, 2, 4, 5, 6

Scapaniaceae Migula
Diplophyllum albicans (L.) Dum. 4
Diplophyllum taxifolium (Wahlenb.) Dum. 4
Scapania aequiloba (Schwaegr.) Dum. 2, 4
Scapania aspera M. & H. Bern. 4
Scapania compacta (A. Roth) Dum. 1, 6
Scapania curta (Mart.) Dum. 4
Scapania irrigua (Nees) Nees 1, 4
Scapania nemorea (L.) Grolle 2, 3, 4
Scapania umbrosa (Schrad.) Dum. 4

Scapania undulata (L.) Dum. 1, 4, 6, *11
Scapania verrucosa Hegg 3, 4

Cephaloziellaceae Douin
Cephaloziella baumgartneri Schiffn. 6, 11
Cephaloziella divaricata (Sm.) Schiffn. 4, 6, 11
Cephaloziella hampeana (Nees) Schiffn. 11
Cephaloziella stellulifera (Tayl. ex Spruce) Schiffn. 6, 11

Cephaloziaceae Migula
Cephalozia bicuspidata (L.) Dum. 1, 2, 4
Cephalozia catenulata (Hüb.) Lindb. 4
Cephalozia pleniceps (Aust.) Lindb. 1
Nowellia curvifolia (Dicks.) Mitt. 4
Cladopodiella fluitans (Nees) Buch 1, *6

Antheliaceae Schust.
Anthelia julacea (L.) Dum. 4

Lepidoziaceae Limpr.
Lepidozia reptans (L.) Dum. 4
Bazzania tricrenata (Wahlenb.) Lindb. 2, 4
Bazzania trilobata (L.) S. Gray 4

Calypogeiaceae (K. Müll.) H. Arn.
Calypogeia arguta Nees & Mont. 4, *6
Calypogeia azurea Stotler & Crotz 4
Calypogeia fissa (L.) Raddi 1, 4, 6
Calypogeia sphagnicola (H. Arn. & J. Perss.) Warnst. & Loeske 1

Pseudolepicoleaceae Fulf. & J. Tayl.
Blepharostoma tricophyllum (L.) Dum. 2, 4

Radulaceae (Dum.) K. Müll.
Radula complanata (L.) Dum. 1, 2, 4, 6, *11
Radula lindenbergiana Gott. & Hartm. 2, *3, 4

Porellaceae Cavers
Porella arboris-vitae (With.) Grolle 2, *6, *11
Porella baueri (Schiffn.) C. Jens. 6, *11
Porella cordaeana (Hüb.) Moore 1, 2, 6, 7, 13
Porella obtusata (Tayl.) Trev. 3, 6
Porella pinnata L. 12
Porella platyphylla (L.) Pfeiff. 1, 2, 3, 4, 5, 6, 7, 11, 12, 13

Frullaniaceae Lorch
Frullania dilatata (L.) Dum. 1, 2, 3, 4, 5, 6, 11, 12
Frullania jackii Gott. 4
Frullania tamarisci (L.) Dum. 1,2, 3, 4, 6, 13

Jubulaceae Klinggr.
Jubula hutchinsiae (Hook.) Dum. 3, 4

Lejeuneaceae Cas.-Gil
Lejeunea cavifolia (Ehrh.) Lindb. 3, 4, 6, 11
Lejeunea lamacerina (Steph.) Schiffn. *3, 6
Lejeunea patens Lindb. 4
Cololejeunea calcarea (Libert.) Schiffn. 2
Cololejeunea rosettiana (Mass.) Schiffn. 2

A perusal of the list given above shows that, the maximum number of liverworts is distributed in the grid square 4 which lies alongside the Black Sea coast, in the Euro-Siberian phytogeographical region and experiences a heavy rainfall with mild winters. This is followed by the grid square 6, with 62 species covering the states of Izmir, Manisa, Balikesir; and lying in the Mediterranean phytogeographical region. The grid square 11 and 1 including Aydin, Denizli, Muğla and Marmara region show 46 and 32 species respectively. In our opinion a poor record from the grid squares in the great Irano-Turanian phytogeographical region is due to the lack of work done in this region.

Out of a total of 35 families of liverworts in Turkey (Tab. 1) Lophoziaceae with 18 species from 4 genera tops the list followed by Ricciaceae with 17 species from 2 genera, Jungermanniaceae with 12 species from 4 genera, Scapaniaceae with 11 species from 2 genera, Aytoniaceae with 6 species from 4 genera and Porellaceae 6 species from 1 genus. At present the minimum number of species (1) is found in the families like Riellaceae, Conocephalaceae, Lunulariaceae, Corsiniaceae, Oxymitraceae, Blasiaceae, Antheliaceae, Pseudolepicoleaceae and Jubulaceae.

The variations in the edaphic, microclimatological and microtopographical conditions play a great role in the distribution as well as the survival of liverworts. This can be clearly seen from the records reported from the countries and islands in the region surrounding Turkey. A comparison of the liverworts of island of Crete and West Anatolia (A1, B6, C11 grid squares) shows that, as against 66 species reported from the former area (DÜLL, 1979) latter embodies 82 species. Out of these 49 species are common between the two and 33 are found only in the West Anatolian part of Turkey. Out of the species reported from the Crete although 17 are not found in West Anatolia but 9 are reported from other parts of Turkey. Eight species recorded from Crete have not been reported from Turkey. In particular the species like *Barbilophozia barbata, B. hatcheri, Lophozia bicrenata, L. excisa, L. turbinata, L. ventricosa* and *Tritomaria exsectiformis* belonging Lophoziaceae distributed in West Anatolia are not found in Crete at all. Out of 82 liverworts recorded from Western part of Turkey, 3 belong to Anthocerotales, 2 to Sphaerocarpales, 24 to Marchantiales, 11 to Metzgeriales and 42 to Jungermanniales. In Crete Jungermanniales is represented by 25 species followed by Marchantiales with 24 species, Metzgeriales with 11 species, Anthocerotales with 3 species and Sphaerocarpales with 3 species.

A comparison of the number of species with other South-West Asian countries (FREY, 1986; BISCHLER & JOVET-AST, 1986) reveals that, Turkey stands first with 145 species belonging to 57 genera followed by Iran with 56 species from 32 genera, Israel with 36 species from 19 genera, Lebanon-Syria-Jordan triangle with 20 species from 14 genera, Arabian Peninsula with 15 species from 7 genera and Iraq with 7 species from 6 genera.

Out of these Jordan with a representation from only Marchantiales and Metzgeriales gives an interesting example for comparison with Turkey. Former has 12 species of liverworts as against 145 species in the latter. Eleven species are common between the two countries. Two species of *Riccia* namely *R. lamellosa* and *R. trabutiana* recorded by EL-OQLAH & al. (1988) to our knowledge have not been reported before in other lists of Turkish species.

The speciation is seen to be maximum in the Caucasian-Euxine-Hyrcanian (CEH) region covering North Anatolia too, wherefrom 300 species are reported to have got originated (BISCHLER & JOVET-AST, 1986). This ratio is quite poor in the Mediterranean belt and its environs. For example Turkish Mediterranean part has only 61 species, Lebanon 46, Israel 41, Cyprus 34, Arabian Peninsula 23, South Iran 19 and Egypt 13 species of hepatics.

The North Anatolian part of Turkey is dominated by the taxa from Jungermanniales whereas other parts are dominated by Marchantiales taxa. This can be attributed to a heavy rainfall and mild winters in this region as compared to East, West, South and Central Anatolian parts of Turkey. We believe that, Turkish liverwort flora will get enriched only through detailed studies in the East Black Sea coast (Euro-Siberian part) followed by Irano-Turanian and Mediterranean phytogeographical regions of the country.

	Genera	*Species*
1. Lophoziaceae	4	18
2. Ricciaceae	2	17
3. Jungermanniaceae	4	12
4. Scapaniaceae	2	11
5. Aytoniaceae	4	6
6. Porellaceae	1	6
7. Cephaloziaceae	3	5
8. Geocalycaceae	2	5
9. Lejeuneaceae	2	5
10. Aneuraceae	2	4
11. Codoniaceae	2	4
12. Cephaloziellaceae	1	4
13. Calypogeiaceae	1	4
14. Anthocerotaceae	2	3
15. Cleveaceae	2	3
16. Metzgeriaceae	2	3
17. Gymnomitriaceae	2	3
18. Arnelliaceae	2	3
19. Lepidoziaceae	2	3
20. Marchantiaceae	1	3
21. Pelliaceae	1	3
22. Frullaniaceae	1	3
23. Sphaerocarpaceae	1	2
24. Targioniaceae	1	2
25. Plagiochilaceae	1	2
26. Radulaceae	1	2
27. Riellaceae	1	1
28. Conocephalaceae	1	1
29. Lunulariaceae	1	1
30. Corsiniaceae	1	1
31. Oxymitraceae	1	1
32. Blasiaceae	1	1
33. Antheliaceae	1	1
34. Pseudolepicoleaceae	1	1
35. Jubulaceae	1	1

Table 1. — List of the families according to the number of genera and species.

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