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A PRELIMINARY CENSUS OF HEPATICAE AND ANTHOCEROTAE OF DOON VALLEY

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ABSTRACT

Twenty eight species of liverworts and hornworts have been recorded from Doon valley. Of these, *Fossombronia pusilla* (L.) Dumort. and *Riccia cruciata* Kashyap are new record for western Himalaya. Three species viz. *Monosolenium tenerum* Griff., *Riccia frostii* Austin and *Riccia sorocarpa* Bisch. are new record for Uttarakhand, while 15 species are recorded for the first time from Doon valley.

INTRODUCTION

Situated between the coordinates 30°00' – 30°30'N and 77°30' – 78°45'E, Doon valley covers an area of about 1280 sq km with altitude varying from 250-990 m. The Himalaya in North and the Siwalik ranges in South, river Ganges in the East and Yamuna in the West bound the valley. The climate in the area is relatively moderate, with summer temperature usually ranging between 20.5-34.9°C (occasionally reaching up to 41°C), whereas during winter months it ranges between 5.8-21.9°C (sometimes falling to -1.1°C). The average annual rainfall is approximately 2000-2125 mm and the relative humidity ranges from 77-90 % during monsoon to 30-48 % during summer. Doon valley, as defined here, includes the entire stretch of land bounded on the North by Rajpur, the South by Mohand Pass, the East by Song river and the West by Tons river. Few bryologically interesting localities of the valley are Sahastradhara, Kuwanwala, Mothoronwala, New Forest, Tapkeshwar and Robber's Cave.

There are scanty reports of the liverworts (Hepaticae) and hornworts (Anthocerotae) from Doon valley through the publications of Kashyap (1929), Hattori and Thaithong (1978), Sharma and Srivastava (1993), Srivastava and Dixit (1996) and Singh and Semwal (2000, 2001). However, there are no consolidated record of liverworts and hornworts known so far from this valley. The present study records 28 species of liverworts and hornworts belonging to 20 genera and 14 families from Doon valley. Of these 24 species in 12 families belong to Hepaticae and four species in two families belong to Anthocerotae. Marchantiales with 15 taxa is the largest order in Doon valley followed by

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Jungermanniales with five taxa, whereas Metzgeriales and Anthocerotales are represented by four taxa each. Among the families, Aytoniaceae and Ricciaceae are represented by five species each, whereas the others by one or two species each in the area. The study has resulted into 15 new records for the Doon valley. *Fossombronia pusilla* (L.) Dumort. and *Riccia cruciata* Kashyap are recorded for the first time from Western Himalaya. While, three species viz. *Monosolenium tenerum* Griff., *Riccia frostii* Austin and *Riccia sorocarpa* Bisch. are new records for Uttarakhand.

The families are arranged as per classification of Schuster (1984). All the specimens have been deposited in the Cryptogamic section of the herbarium of Botanical Survey of India, Northern Circle, Dehradun (BSD).

EUMERATIONS

JUNGERMANNIALES

JUNGERMANNIACEAE

1. **Jungermannia glauca** Amakawa in H. Hara, Fl. East. Himalaya : 511. 1966.

Distribution: India [Western Himalaya: Himachal Pradesh, Uttarakhand (Mussorie); Punjab & West Rajasthan: Punjab; Eastern Himalaya: Sikkim], Nepal. (Hattori, 1966; Amakawa, 1966; Váňa, 1972a). New to Doon valley.

Specimen examined: Terrestrial, growing in patches at shaded and sheltered places in pure population or in association with *Lophocolea bidentata*. Sahastradhara, 25. 11. 2001, *S.K. Singh* 99373, 99375, 99377; Tapkeshwar, Garhi Cant, Dehradun, 21. 04. 2002, *S.K. Singh* 99386; 20. 01. 2003, *S.K. Singh* 101294; Mathronwala, 13. 02. 2003, *S.K. Singh* 101359a.

2. **Jungermannia gollanii** Steph., Sp. Hepat. 6: 86. 1917.

Distribution: India [Western Himalaya: Uttarakhand (Dehradun-Mohand Pass, Mussorie)], China. (Stephani, 1917-24; Váňa, 1972b; Piippo, 1990).

Specimen examined: Terrestrial, growing in patches in shaded and sheltered places. Robber's Cave (Guchu pani), 11. 11. 2001, *S.K. Singh* 99355, 99358; Sahastradhara, 25. 11. 2001, *S.K. Singh* 99370; Sahastradhara, 20. 10. 2003, *D.K. Singh* 104479; Robber's Cave (Guchu pani), 09. 03. 2003 *S.K. Singh*, 101366.

GEOCALYCACEAE

3. **Lophocolea bidentata** (L.) Dumort., Recuveil Observ. Jungerm.: 17. 1835. *Jungermannia bidentata* L., Sp. Pl.: 1132. 1753.

Distribution: India [Western Himalaya: Uttarakhand (Bhowali, Mussoorie, Nianital); Eastern Himalaya: Sikkim, West Bengal (Darjeeling); Western Ghats: Tamil Nadu], Nepal, China, Indonesia (?), Europe, America, Australia. (Stephani, 1906; Schuster, 1980; Piippo, 1990; Paton, 1999; Srivastava & Srivastava, 2002). New to Doon valley.

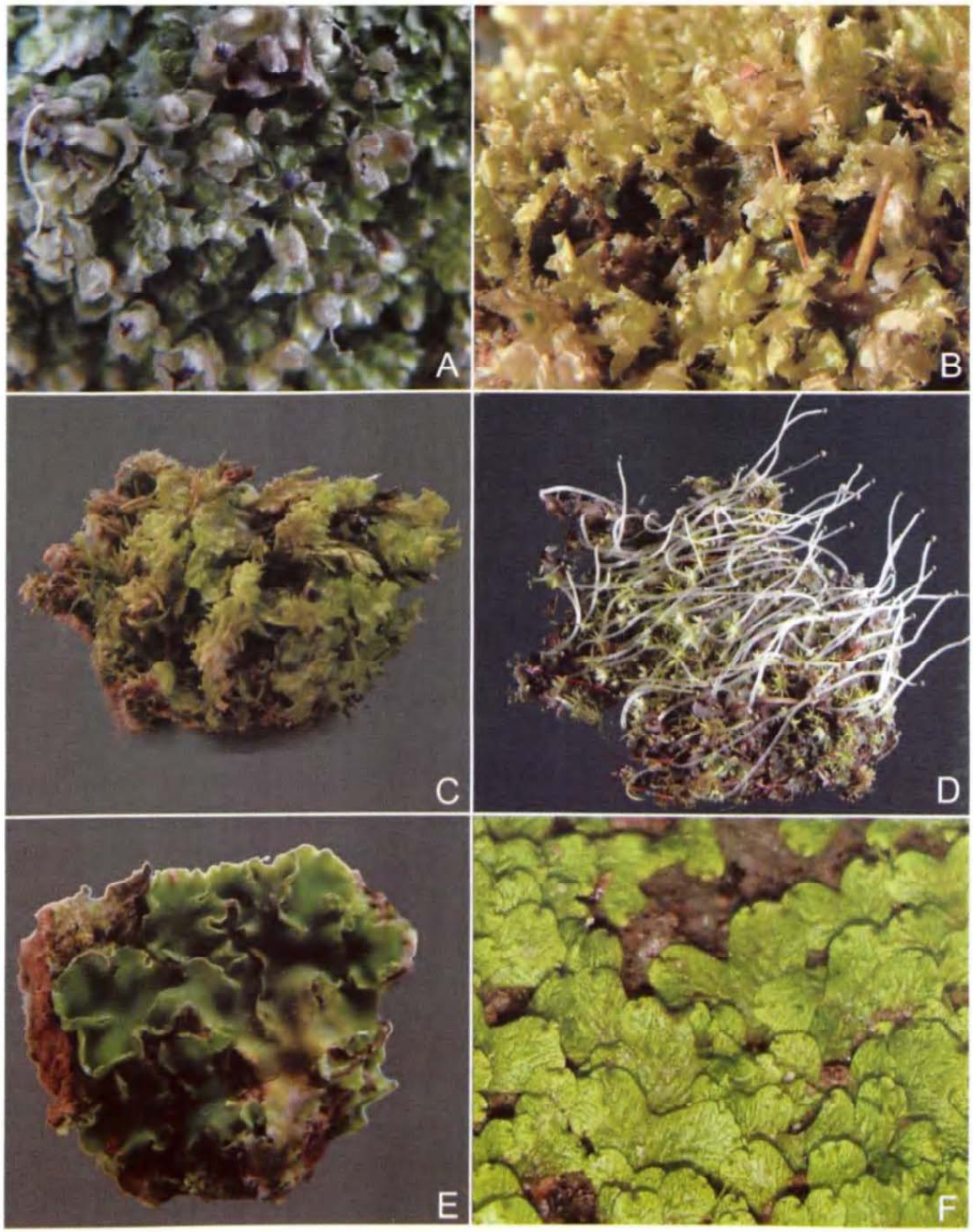


Fig.1. **A.** *Jungermannia gollanii* Steph.; **B.** *Lophocolea bidentata* (L.) Dumort.; **C.** *Fossombronia pusilla* (L.) Dumort.; **D.** *Pellia endiviifolia* (Dicks.) Dumort.; **E.** *Aneura pinguis* (L.) Dumort.; **F.** *Cyathodium cavernarum* Kunze.

Specimen examined: Terrestrial, growing in patches in moist places in association with *Jungermannia glauca.* Mathronwala, 13. 02. 2003, *S.K. Singh* 101359b.

LEJEUNEACEAE

4. Cololejeunea producta (Mitt.) S. Hatt. in H. Hara, Fl. East Himalaya: 533. 1966. *Lejeunea producta* Mitt. in J. Proc. Linn. Soc., Bot. 5: 117. 1861.

Distribution: India [Western Himalaya: Uttarakhand (Valley of flowers); Eastern Himalaya: Sikkim, Bengal], Bhutan. (Hattori, 1966; Long & Grolle, 1990; Asthana & Srivastava, 2003). New to Doon valley.

Specimen examined: Epiphytic, growing on bark of *Mangifera indica.* Mathronwala, 13. 02. 2003, *S.K. Singh* 101360.

5. Lejeunea nepalensis Steph., Sp. Hepat. 5: 780. 1914.

Distribution: India [Western Himalaya: Uttarakhand (Mussorie-Lal Tibba); Eastern Himalaya: Sikkim, West Bengal (Darjeeling), Meghalaya (Shillong, Cherrapunji)], Nepal. (Stephani, 1917; Mizutani, 1971). New to Doon valley.

Specimen examined: Epiphytic, growing on the bark of *Cinnammomum camphora* and *Litchi chinensis.* Kaulagarh (Sitaram temple), Dehradun, 20. 02. 2002, *S.K. Singh* 99385; Kaulagarh (BSI campus), Dehradun, 20. 02. 2002, *S.K. Singh* 99387.

METZGERIALES

FOSSOMBRONIACEAE

6. Fossombronia pusilla (L.) Dumort., Recuveil Observ. Jungerm.: 11. 1835. *Jungermannia pusilla* L., Sp. Pl.: 1136. 1753.

Distribution: India [Western Ghats: Tamil Nadu (Ootacamund)], China, Africa, Europe, America. (Srivastava & Udar, 1975; Schuster, 1992a; Piippo, 1990; Wigginton, 2004).

Specimen examined: Growing terrestrially in moist places. Mathronwala, 13. 02. 2003, *S.K. Singh* 101351; 11. 12. 2003, *S.K.Singh* 104760. New to Western Himalaya.

PELLIACEAE

7. Pellia endiviifolia (Dicks.) Dumort., Recuveil Observ. Jungerm.: 27. 1835. *Jungermannia endiviifolia* Dicks., Fasc. Pl. Crypt. Brit. 4: 19. 1801.

Distribution: India, [Western Himalaya: Jammu & Kashmir, Himachal Pradesh Uttarakhand (Kumaon); Eastern Himalaya: West Bengal (Darjeeling), Sikkim, Assam], Pakistan, Bhutan, China, Africa, Europe, North America. (Long & Grolle, 1990; Schuster, 1992a; Piippo, 1990; Paton, 1999). New to Doon valley.

Specimen examined: Growing terrestrially in moist places along streamside. Sahastradhara, 25. 11. 2001, *S.K. Singh* 99369.

ANEURACEAE

8. Aneura pinguis (L.) Dumort. Comment. Bot.: 115. 1822. *Jungermannia pinguis* L., Sp. Pl.: 1136. 1753.

Distribution: India [Western Himalaya: Himachal Pradesh, Uttarakhand (Sahastradhara, Mussoorie); Eastern Himalaya: West Bengal (Darjeeling); Punjab & West Rajasthan: Punjab; Western Ghats: Maharashtra, Tamil Nadu], Sri Lanka, Bhutan, China, Taiwan, Indonesia, Japan, C.I.S., New Zealand, Australia, Africa, Europe, America. (Mizutani & Hattori, 1957; Srivastava & Udar, 1976; Long & Grolle, 1990; Furuki, 1991; Schuster, 1992a; Piippo, 1990; Paton, 1999).

Specimen examined: Terrestrial, growing in shaded and sheltered places on calcarious soil. Mathronwala, 13. 02. 2003, *S.K. Singh* 101356; Sahastradhara, 11. 12. 2003, *S.K. Singh* 104748, 104749, 104753.

9. Riccardia levieri Schiffn. in Oesterr. Bot. Z. 49: 130. 1899.

Distribution: India [Western Himalaya: Himachal Pradesh, Uttarakhand (Ranikhet); Eastern Himalaya: West Bengal (Darjeeling); Central India: Madhya Pradesh; Western Ghats: Karnataka, Tamil Nadu], Bhutan. (Schiffner, 1899; Srivastava & Udar, 1976).

Specimen examined: Growing terrestrially in moist places. Mathronwala, 13. 02. 2003, *S.K. Singh* 101357. New to Doon valley.

MARCHANTIALES

CYATHODIACEAE

10. Cyathodium cavernarum Kunze in Lehm., Nov. Stirp. Pug. 6: 17. 1834.

Distribution: India [Western Himalaya: Uttarakhand (Dehradun, Mussoorie); Eastern Himalaya: West Bengal (Darjeeling), Meghalaya; Punjab & West Rajasthan: Punjab, Rajasthan; Central India: Gujarat, Madhya Pradesh; Gangetic Plains: Uttar Pradesh; Western Ghats: Maharashtra], China, Myanmar, Indonesia, Africa, Central and South America. (Piippo, 1990; Srivastava & Dixit, 1996; Salazar Allen & Korpelainen, 2006).

Specimen examined: Growing on moist rock surface in shaded places or on old wall surface. Tapkeshwar, Garhi Cant, Dehradun, 26. 09. 2001, *S.K. Singh* 99072; BSI campus, 21. 11. 2002, *S.K. Singh* 99397b; Kaulagarh (BSI campus), Dehradun, 21. 10. 2003, *S.K. Singh* 104480.

AYTONIACAEAE

11. Asterella multiflora (Steph.) Pande & al. ex Kachroo in J. Hattori Bot. Lab. 19: 3. 1958. *Fimbriaria multiflora* Steph., Sp. Hepat. 1: 124. 1899.

Distribution: India [Western Himalaya: Uttarakhand (Dehradun, Mohand); Eastern Himalaya: Assam, West Bengal; Punjab & West Rajasthan: Punjab], Pakistan, Nepal, China. (Kashyap, 1929; Pande & al., 1954; Long, 2006).

Specimen examined: Growing terrestrially on thin layer of soil on moist wall. Kaulagarh (BSI campus), Dehradun, 30. 09. 2002, *S.K. Singh* 101292.

12. Asterella wallichiana (Lehm. & Lindenb.) Pande & al. ex Grolle, Ergebnisse des Forschungs-Unternehmens Nepal Himalaya 1: 262. 1966. *Fimbriaria wallichiana* Lehm. & Lindenb. in Lehm., Nov. Stirp. Pug. 4: 4. 1832.

Distribution: India [Western Himalaya: Himachal Pradesh, Uttarakhand (Pithoragarh, Mussoorie); Eastern Himalaya: West Bengal, Sikkim, Assam; Central India: Madhya Pradesh; Gangetic Plains: Uttar Pradesh; Western Ghats: Maharashtra, Tamil Nadu, Karnataka, Kerala], Pakistan, Nepal, China, Bhutan, Bangladesh, Myanmar, Thailand, Philippines, Indonesia, Japan, Papua New Guinea. (Pande & al., 1954; Udar & Jain, 1983; Long 2006). New to Doon valley.

Specimen examined: Terrestrial, growing in patches over soil in moist places on old walls. Robber's Cave (Guchu pani), 11. 11. 2001, *S.K. Singh* 99354, Sahastradhara, 25. 11. 2001, *S.K. Singh* 99371; Kaulagarh, 17. 12. 2001, *S.K. Singh* 99388.

13. Mannia indica (Steph.) Kachroo in J. Hattori Bot. Lab. 19: 4. 1958. *Grimaldia indica* Steph., Sp. Hepat. 6: 10. 1917-24.

Distribution: India [Western Himalaya: Himachal Pradesh, Uttarakhand (Mussoorie); Punjab & West Rajasthan: Punjab; Gangetic Plains: Uttar Pradesh], Pakistan. (Kashyap, 1929; Udar & Chandra, 1965). New to Doon valley.

Specimen examined: Growing terrestrially in moist and exposed places near a canal. Tapkeshwar, Garhi Cant, Dehradun, 07. 12. 2003, *S.K. Singh* 104713; New Forest (FRI Campus), Dehradun, 05. 02. 2004, *S.K. Singh* 104799.

14. Plagiochasma appendiculatum Lehm. & Lindenb. in Lehm., Nov. Stirp. Pug. 4: 14. 1832.

Distribution: India [Western Himalaya: Himachal Pradesh, Uttarakhand (Dehradun, Garhwal, Nainital); Eastern Himalaya: Sikkim, West Bengal (Darjeeling), Assam; Punjab & West Rajasthan: Punjab, Rajasthan; Gangetic Plains: Uttar Pradesh; Western Ghats: Maharashtra, Tamil Nadu], Pakistan, Afghanistan, Nepal, China, Taiwan, Bangladesh, Myanmar, Philippines, Vietnam, Africa. (Kashyap, 1929; Bischler, 1979; Piippo, 1990; Long & Grolle, 1990).

Specimen examined: Terrestrial, growing in moist and exposed places. Sahastradhara, 25. 11. 2001, *S.K. Singh* 99376; Robber's Cave (Guchu pani), 11. 11. 2001, *S.K. Singh* 99356; Mathronwala, 13. 02. 2003, *S.K. Singh* 101358.

15. Reboulia hemisphaerica (L.) Raddi in Opusc. Sci. 2: 357. 1818. *Marchantia hemisphaerica* L. Sp. Pl.: 1138. 1753.

Distribution: India [Western Himalaya: Jammu & Kashmir, Himachal Pradesh, Uttarakhand (Mussoorie); Eastern Himalaya: West Bengal (Darjeeling), Meghalaya; Punjab & West Rajasthan:

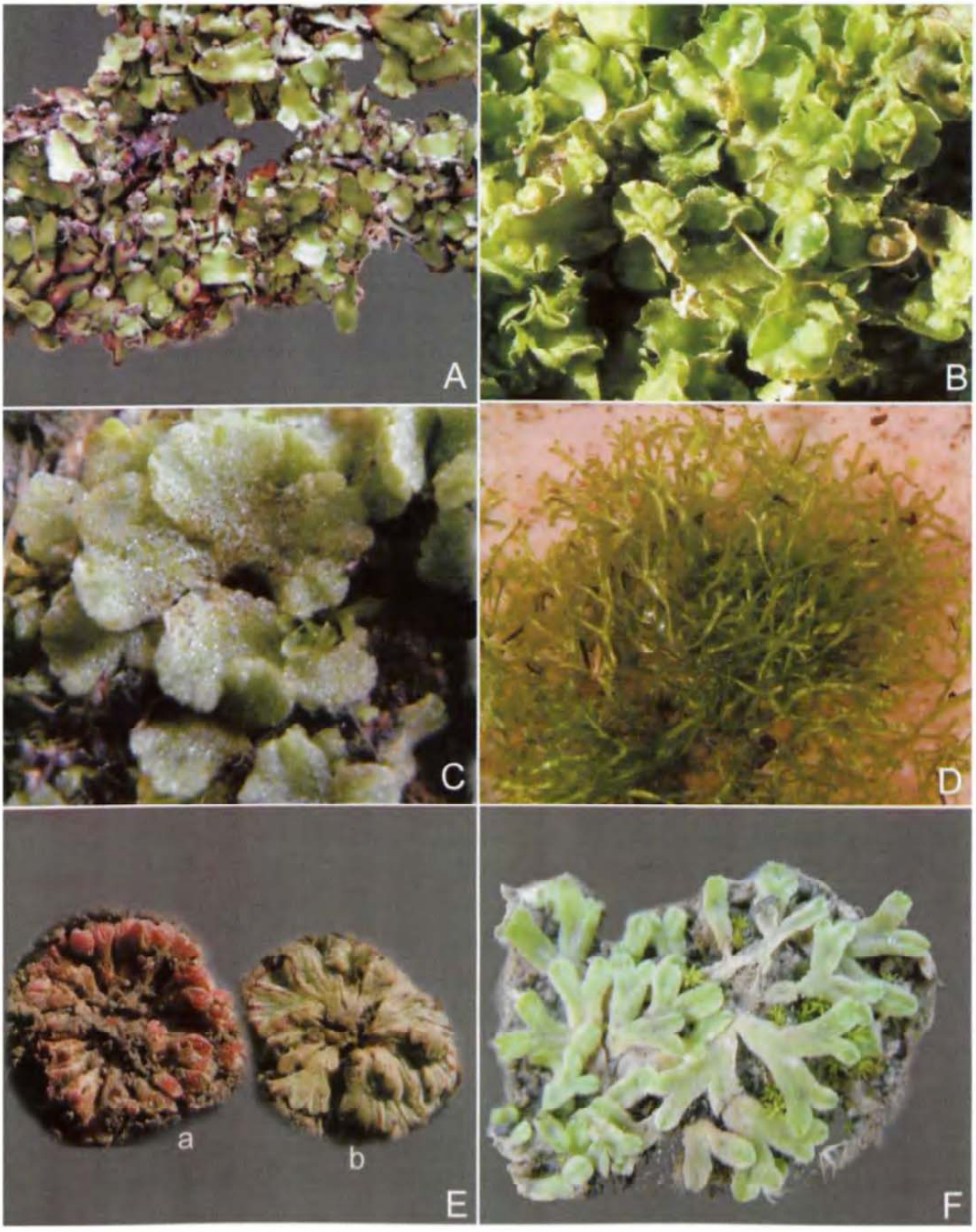


Fig. 2. **A.** *Plagiochasma appendiculatum* Lehm. & Lindenb.; **B.** *Monosolenium tenerum* Griff.; **C.** *Riccia cruciata* Kashyap; **D.** *Riccia fluitans* L.; **E.** *Riccia frostii* Austin (a: male plants; b: female plants); **F.** *Riccia sorocarpa* Bisch.

Rajasthan; Central India: Madhya Pradesh; Gangetic Plains: Uttar Pradesh; Western Ghats: Karnataka, Tamil Nadu], Afganistan, Pakistan, Bhutan, Nepal, China, Indonesia, Asia Minor, Japan, Korea, Bonin, New Zealand, Tahiti, Caucasus Mountains, Australia, Africa, Europe, America. (Kashyap, 1929; Piippo, 1990; Long & Grolle, 1990; Paton, 1999; Schuster, 1992b). New to Doon valley.

Specimen examined: Terrestrial, growing in moist and exposed places. Kaulagarh (BSI campus), Dehradun, 27. 11. 2003, *S.K. Singh* 104487; Sahastradhara, 11. 12. 2003, *S.K. Singh* 104754.

CLEVEACEAE

16. Athalamia pinguis Falc. in Trans. Linn. Soc. London 20: 397. 1851.

Distribution: India [Western Himalaya: Himachal Pradesh, Uttarakhand (Mussoorie, Kumaon); Western Ghats: Tamil Nadu], China. (Kashyap, 1929; Udar & Srivastava, 1965; Kachroo & al., 1977; Piippo, 1990). New to Doon valley.

Specimen examined: Terrestrial, grows in moist places, Sahastradhara, 11. 12. 2003, *S.K. Singh* 104783.

MARCHANTIACEAE

17. Marchantia paleacea Bertol. Opusc. Sci. 1: 242. 1817.

Distribution: India [Western Himalaya: Jammu & Kashmir, Himachal Pradesh, Uttarakhand (Garhwal, Kumaon); Eastern Himalaya: West Bengal (Darjeeling), Sikkim, Assam, Meghalaya; Gangetic Plains: West Bengal; Central India: Madhya Pradesh; Western Ghats: Tamil Nadu], Bhutan, Nepal, China, Pakistan, Japan, Indonesia, Korea, Tahiti, Viti, Samoa, Azores, Hawaii, New Zealand, Africa, Europe, North and South America. (Kashyap, 1929; Bischler, 1989; Piippo, 1990; Long & Grolle, 1990; Yamada & Choe, 1997; Paton, 1999; Schuster, 1992b). New to Doon valley.

Specimen examined: Terrestrial, growing in moist places. Robber's Cave (Guchu pani), 11. 11. 2001, *S.K. Singh* 99357; 25. 11. 2001, *S.K. Singh* 99356; Tapkeshwar, Garhi Cant, Dehradun, 21. 04. 2002, *S.K. Singh* 99384.

18. Marchantia papillata Raddi subsp. **grossibarba** (Steph.) Bisch. in Cryptog. Bryol. Lichénol. 10: 78. 1989 & Bryophyt. Biblioth. 38: 210. 1989. *Marchantia grossibarba* Steph. in Mém. Soc. Sci. Nat. Cherbourg 29: 221. 1894. *M. simlana* Steph., Sp. Hepat. 1:173. 1900; Kashyap, Liverw. W. Himal. 1 : 37.1929.

Distribution: India [Western Himalaya: Jammu & Kashmir, Himachal Pradesh, Uttarakhand (Kumaon); Eastern Himalaya: Sikkim, Assam, Meghalaya; Gangetic Plains: Uttar Pradesh, West Bengal; Punjab & West Rajasthan: Rajasthan; Central India: Madhya Pradesh; Western Ghats: Tamil Nadu], Afghanistan, Pakistan, Nepal, China, Sri Lanka, Bhutan, Bangladesh, Myanmar, Thailand. (Kashyap, 1929; Bischler, 1989; Piippo, 1990; Long & Grolle, 1990). New to Doon valley.

Specimen examined: Terrestrial, growing in moist places on calcareous rock surfaces. Sahastradhara, 25. 11. 2001, *S.K. Singh* 99372; Tapkeshwar, Garhi Cant, Dehradun, 21. 04. 2002, *S.K. Singh* 99383; Mathronwala, along riverside, 13. 02. 2003, *S.K. Singh* 101352.

MONOSOLENIACEAE

19. Monosolenium tenerum Griff., Ic. Pl. Asiat. 2, pl. 75. B. f. l; Not. Pl. Asiat. 2: 341. 1849.

Distribution: India [Western Himalaya: Himachal Pradesh (Sundernagar, Baijnath); Eastern Himalaya: Assam, Manipur], China, Taiwan, Japan, Ryukyu, Hawaii. (Griffith, 1849a,b; Schiffner, 1893; Stephani, 1900; Kashyap, 1923; Hattori, 1952; Inoue, 1966; Yang, 1965; Pippo, 1990; Kapila & Kumar, 1995). New to Uttarakhand.

Specimen examined: Grows terrestrially in moist and shaded places in pure population or in association with *Marchantia papillata* subsp. *grossibarba*. Kaulagarh (Swarna Jayanti Udyan, BSI campus), Dehradun, 21. 10. 2002, *D.K. Singh* 101240; 17. 01. 2003, *S.K: Singh* 101291; 27. 01. 2003, *S.K. Singh* 101297; 16. 02. 2003, *S.K Singh* 101299; 26. 02. 2003, *S.K. Singh* 101300; 10. 03. 2003, *S.K. Singh* 101362; 26.03. 2003, *S.K. Singh* 101377.

RICCIACEAE

20. Riccia cruciata Kashyap in J. Bombay Nat. Hist. Soc. 24: 349. 1916.

Distribution: India [Eastern Himalaya: Sikkim, Assam, Meghalaya; Gangetic Plains: Uttar Pradesh; Punjab & West Rajasthan: Punjab, Rajasthan; Western Ghats: Kerala], Pakistan. (Kashyap, 1929; Sivastava, 1964; Kachroo & al., 1977).

Specimen examined: Terrestrial, growing in moist and sandy soil. Kuwanwala, 13. 02. 2003, *S. K. Singh* 101350; Kuwanwala, 11. 12. 2003, *S. K. Singh* 104757, 104758; Robber's Cave (Guchu pani), 11. 12. 2003, *S. K. Singh* 104739; Mathronwala, 11. 12. 2003, *S. K. Singh* 104779. New to Western Himalaya.

21. Riccia discolor Lehm. & Lindenb. in Lehm., Nov. Stirp. Pug. 4: 1. 1832.

Distribution: India [Western Himalaya: Uttarakhand (Dehradun, Mussoorie, Nainital, Pauri); Eastern Himalaya: Assam, Meghalaya; Gangetic Plains: Uttar Pradesh; Central India: Madhya Pradesh; Punjab & West Rajasthan: Rajasthan; Western Ghats: Karnataka], Pakistan, Nepal, Sri Lanka, Myanmar, Africa. (Pande & Udar, 1957; Srivastava, 1964; Kachroo & al., 1977; Wigginton, 2004).

Specimen examined: Terrestrial, growing in shaded and sheltered places. Kaulagarh (BSI campus), Dehradun, 21. 11. 2002, *S. K. Singh* 99397 a; New Forest (FRI campus), Dehradun, 05. 02. 2004, *S. K. Singh* 104800.

22. Riccia fluitans L. Sp. Pl. 1139. 1753.

Distribution: India [Western Himalaya: Jammu & Kashmir, Uttarakhand (Garhwal, Kumaon); Eastern Himalaya: Sikkim; Western Ghats: Tamil Nadu], Nepal, China, Taiwan, Japan, Korea, Indonesia, Bangladesh, C.I.S., Europe, America. (Srivastava, 1964; Kachroo & al., 1977; Yamada & Choe, 1997; Piippo, 1990; Schuster, 1992b; Schumacker & Váňa, 2000). New to Doon valley.

Specimen examined: Aquatic, growing in flowing water. Kuwanwala, 11. 12. 2003, *S.K. Singh* 104756, 104778.

23. Riccia frostii Austin in Bull. Torrey Bot. Club 6: 17. 1875.

Distribution: India [Western Himalaya: Jammu & Kashmir; Eastern Himalaya: Sikkim, Manipur; Gangetic Plains: Uttar Pradesh, West Bengal; Punjab & West Rajasthan: Rajasthan; Western Ghats: Tamil Nadu, Kerala], Bangladesh, Pakistan, China, Africa, Europe, America. (Srivastava, 1964; Kachroo & al., 1977; Piippo, 1990; Schuster, 1992b; Schumacker & Váňa, 2000). New to Uttarakhand.

Specimen examined: Terrestrial, forming rosettes in moist places in grassland. Mathronwala, 13,02.2003, *S.K. Singh* 101353, 101354.

24. Riccia sorocarpa Bisch., Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 17: 1053.1835.

Distribution: India [Western Himalaya: Jammu & Kashmir (Ratnijhal); Eastern Himalaya: West Bengal (Darjeeling)], Japan, China, Africa, Europe, North America. (Srivastava, 1964; Kachroo & al., 1977; Piippo, 1990; Schuster, 1992b; Paton, 1999). New to Uttarakhand.

Specimen examined: Growing terrestrially in moist and sheltered places in association with *Notothylas kashyapii.* Kaulagarh (BSI campus), Dehradun, 21. 11. 2002, *S.K. Singh* 99398.

ANTHOCEROTALES

ANTHOCEROTACEAE

25. Anthoceros erectus Kashyap in New Phytol. 14: 9. 1915.

Distribution: India [Western Himalaya: Himachal Pradesh, Uttarakhand (Mussoorie, Kumaon, Bhatwari, Heena); Eastern Himalaya: Manipur; Western Ghats: Kerala, Tamil Nadu], endemic. (Kashyap, 1929; Asthana & Srivastava, 1991). New to Doon valley.

Specimen examined: Growing terrestrially in moist and sheltered places. Kuwanwala, 13. 02. 2003, *S.K. Singh* 101349; Mathronwala, 11. 12. 2003, *S.K. Singh* 104762, 104763, 104775.

26. Phaeoceros laevis (L.) Prosk. in Bull. Torrey Bot. Club. 78: 347. 1951. *Anthoceros laevis* L., Sp. Pl.: 1139. 1753.

Distribution: India [Western Himalaya: Himachal Pradesh, Uttarakhand (Mussorie, Pauri); Eastern Himalaya: West Bengal (Darjeeling), Sikkim, Arunachal Pradesh, Meghalaya, Manipur; Western Ghats: Maharashtra, Karnataka, Kerala, Tamil Nadu], Phillipines, China, Taiwan, Japan, Korea, Europe, North America. (Piippo, 1990; Asthana & Srivastava, 1991; Hasegava, 1991; Schuster, 1992b; Paton 1999). New to Doon valley.

Specimen examined: Mathronwala, 13. 02. 2003, *S.K.Singh* 101355; Mathronwala, 11. 12. 2003, *S.K. Singh* 104765, 104772.

NOTOTHYLADACEAE

27. Notothylas kashyapii D.K. Singh in Indian J. Forest. 23: 386. 2000.

Distribution: India [Western Himalaya: Uttarakhand (Dehradun), endemic. (Singh & Semwal, 2000; Singh, 2002).

Specimen examined: Grows terrestrially in garden beds in pure population or in association with *Riccia sorocarpa*. Kaulagarh (BSI campus), Dehradun, 09.1997, *D. K. Singh* 401 (BSD : holotype!); Campus of Van Vigyan Kendra, near Asan barrage, Dehradun, 09.1997, *D. K. Singh* 427; Kaulagarh (BSI campus), Dehradun, 21.11.2002, *S. K. Singh* 39398-b.

28. Notothylas udarii D.K. Singh & R.C. Semwal in Phytotaxonomy 1: 35. 2001.

Distribution: India [Western Himalaya: Uttarakhand (Dehradun); Central India: Gujrat. endemic. (Singh & Semwal, 2001; Singh, 2002; Chowdhary & al., 2006).

Specimen examined: Grows terrestrially in moist ground. Kaulagarh (BSI campus), Dehradun, 10. 1997, *D. K. Singh* 347 (BSD: holotype!); Tapkeshwar, Garhi Cant, Dehradun, 09. 1997, *R. C. Semwal* 383.

Three more species, viz. *Lepidozia breviflora* Mitt. (Lepidoziaceae) from Mohand Pass, *Frullania inflata* Gottsche var. *dioca* S.Hatt. & Thaithong (Frullaniaceae) from Sahastradhara and *Notothylas indica* Kashyap (Notothyladaceae) from Dehradun, reported earlier from the study area, could not be collected during present investigations.

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दून घाटी के हिपैटिकी एवं एंथोसिरोटी की एक प्रारंभिक गणना

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दून घाटी से लिवरवर्ट्स व हार्नवर्ट्स की 28 जातियों को अभिलिखित किया गया है। इनमें से *फॉसम्ब्रोनिया पुसिला* एवं *रक्सिया क्रूसिएटा* को पश्चिम हिमालय क्षेत्र से, *मोनोसोलेनियम टेनेरम, रिक्सिया फ्रास्टाई* व *रिक्सिया सोरोकार्पा* को उत्तराखंड राज्य से तथा 15 अन्य जातियों को दून घाटी से पहली बार अभिलिखत किया गया है।