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Research Article

Genus *Athyrium* Roth (Athyriaceae: Pteridophyta) from Gujarat State

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Introduction

The lady fern genus *Athyrium* Roth (family Athyriaceae) was originally described in 1800 (1) based on *Athyrium filix-femina* (L.) Roth. The Generic concept in the Athyrioid ferns is always debateable. Many genera viz. *Anisocampium* C. Presl (incl. *Kuniwatsukia* Pic. Serm.), *Cornopteris* Nakai (incl. *Neoathyrium* Ching & Z.R. Wang) and *Pseudocystopteris* Ching & Z.R. Wang were separated earlier from the genus *Athyrium* Roth. However, recently all these representatives are treated under a single genus *Athyrium* (2-6). It is one of the most diversified genera in the world, having ca. 220-230

Abstract

Present study deals with the diversity, distribution and conservation status of the genus *Athyrium* Roth in different climatic regimes of Gujarat state. Five species of *Athyrium* viz., *A. hohenackerianum* T. Moore, *A. falcatum* Bedd., *A. micropterum* Fraser-Jenk., *A. parasnathense* (C.B. Clarke) Ching ex Mehra & Bir and *A. schimperi* subsp. *biserrulatum* (Christ) Fraser-Jenk., were collected from the Gujarat state, of which *A. hohenackerianum* T. Moore is documented earlier. Therefore, occurrence of *A. falcatum*, *A. micropterum*, *A. parasnathense*, and *A. schimperi* subsp. *biserrulatum*, stands as a new distribution records and reported for the first time from Gujarat state. A detailed taxonomic description, photo plates, morphological characters, distribution and comparison of species is provided here for their identification.

Keywords: Gujarat; Athyriaceae; New distribution record; *Athyrium*

Citation

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species (7), of which ca. 50 species and 17 hybrids are reported from India (8). The pteridological studies were carried out by various researchers in the Gujarat (9-16) and a single species (i.e. *A. hohenackerianum* T. Moore) is reported previously from Gujarat state (17).

Since 2013, we initiated the survey for documentation of the pteridophyte diversity in the Gujarat and periodically visiting different parts of the state like wetlands, agricultural fields, hilly regions and plains. Terrestrial ferns growing naturally in shaded, semi-shaded or as a lithophyte on exposed places of rock, on mountain steeps and

river banks. They were collected from different forests of Saurashtra, central and south Gujarat. On critical study and comparison with available literature collected specimens were identified as *Athyrium falcatum* Bedd., *A. parasnathense* (C.B. Clarke) Ching ex Mehra & Bir, *A. micropterum* Fraser-Jenk., and *A. schimperi* subsp. *biserrulatum* (Christ) Fraser-Jenk., belonging to the family Athyriaceae. Perusals of available literature on pteridophyte diversity of Gujarat showed that occurrence of these four ferns were not documented so far in the existing list of the pteridophyte diversity of Gujarat state (12, 17, 18-20). Therefore, a brief description and photograph (Fig. 1-4) of these four taxa are given as follow for their easy identification.

Materials and Methods

Field survey were carried out during the period of 2013-2018 from different forest areas of Gujarat. The collected specimens were pressed using field presser and processed at laboratory. These pressed specimens were poisoned by 4% formalin and affixed on the herbarium sheets by using fevicol glue. Collected specimens were identified with the help of available literature (8, 21-26). Further identity of all species of *Athyrium* were confirmed by comparing with the help of authentic herbarium specimens available in different herbaria, viz. MH, BSI, BLAT and SUK. The voucher specimens were deposited in herbarium of the Department of Botany, The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat (BARO).

Taxonomic treatment

Key to the species

- 1a. Lamina pinnatifid or pinnatisect 2
 1a. Lamina bipinnate or tripinnate 3
 2a. Lamina pinnatifid, lower pinnae suddenly reduced, pinnae auriculate ***A. falcatum***
 2b. Lamina pinnatisect, pinnae gradually reduced, pinnae not auriculate ***A. micropterum***
 3a. Lamina bipinnate, densely scaly stipe and rachis ***A. hohenackerianum***
 3b. Lamina tripinnate, sparsely scaly stipe only .. 4
 4a. Pinnae apex acute, margin crenate ***A. parasnathense***
 4b. Pinnae apex long acuminate, margin dentate ***A. schimperi* subsp. *biserrulatum***

***Athyrium falcatum* Bedd.**, Ferns S. India t. 151. 1863; Mehra, Ferns Mussoorie: 20. 9 1939; Fraser-Jenk., New Sp. Syndr. Indian Pteridol.: 58. 1997; Fraser-Jenkins, Taxon. Revis. Indian Subcontinental Pteridophytes, 601.2008; Fraser-Jenk., D.R. Kandel, S. Pariyar, Ferns Fern-Allies

Nepal 1: 23. 2015. Patil *et al.*, Field Guide Pterid. N. W. Ghats, 81. 2017.

Type: India, Tamil Nadu, Anamallaya (Annamalai).

Asplenium drepanophyllum Baker, in Hooker & Baker, Syn. Fil., ed. 2, 226. 1874.

Athyrium x keralense Manickam & Irudayaraj, Pterid. Fl. W. Ghats, S. India 238. 1992

Description: Plants 20-40 cm height, terrestrial, small-medium sized fern; *rhizome* 1-2 cm long, short, erect, caespitose, scaly; *scales* 2-7 mm long, linear-lanceolate, entire, yellow-brown, acuminate at apex, broad at base, margin entire; *frond* 19-38 cm long, 03-06 cm broad, monomorphic, pinnate-pinnatifid, pale green-green; *stipe* 3-5 cm long, scaly, pale green at young, grooved; *scales* similar to the rhizome scales; *lamina* 16-33 cm long, 03-06 cm broad, dark green-pale green, unipennate-pinnatifid, linear-lanceolate, apex acuminate, glabrous, glossy; *rachis* sparsely scaly, stramineous, flat-round; *pinnae* 3-5 cm long, 1-2 cm broad, 12-25 pairs, subopposite-alternate, dentately lobed, basal lobes auriculate, acute at apex, broad at base; *veins* distinct above and below, forked, reaching to the margin; *sori* 2.5-4 mm long, 0.5-1.5 mm broad, crescent or hook like, indusiate, median; *indusia* 2.5-4 mm long, 0.5-1.5 mm broad, thin membranaceous, yellow-brown, hook like, margin dentate, persistent; *sporangia* 200-600 µm in diameter, numerous, composed of 13-18 annular cells, sub-globose, brown; *spores* 40-60 µm in diameter, monolete, plano-convex in lateral view and elliptic in polar view.

Distribution: **India** (Uttarakhand, Sikkim, Meghalaya, Tripura, Mizoram, Orissa, Parasnath Hills, Madhya Pradesh, Rajasthan, Maharashtra, Kerala), Nepal, Myanmar [Burma]. (Gujarat: Ahwa, Dang, Don, Dharampur, Kaprada, Mahal, Wilson Hills, Junagadh, Karjan dam, Dediapada and Sagai (common throughout Saurashtra, central and south Gujarat).

Phenology: Annual, **Sterile phase:** July-August; **Fertile phase:** August-November

Conservation status: *Athyrium falcatum* is known from central, south and Saurashtra forest areas. This species is luxuriously growing in the Dang, Valsad, Narmada and Junagadh a population of about 100-250 individuals were found and the area of occupancy (AOO) is 250 km². Hence, according to IUCN categories and criteria (27), it is assessed as Least Concerned (LC) species.

Specimen Examined: INDIA, **Gujarat**, Navsari Dt., Vansada, 125 m, 01/12/2014, R.N. Kachhiyapatel & K.S. Rajput, 126 (BARO); the Dang Dt Kudkas, 152 m, 08/02/2015, R.N. Kachhiyapatel & K.S. Rajput, 158 (BARO); Junagadh Dt., Girnar hills, 668 m, 24/09/2017, R.N. Kachhiyapatel & K.S. Rajput, 288 (BARO); **Maharashtra**, Satara Dt, Mahabaleshwar, alt. 1000 m., 13/10/1968, M. R. Almeida, 708 (BLAT); 17/07/1959, P. V. Bole, 1969 (BLAT); 13/08/1966, B.

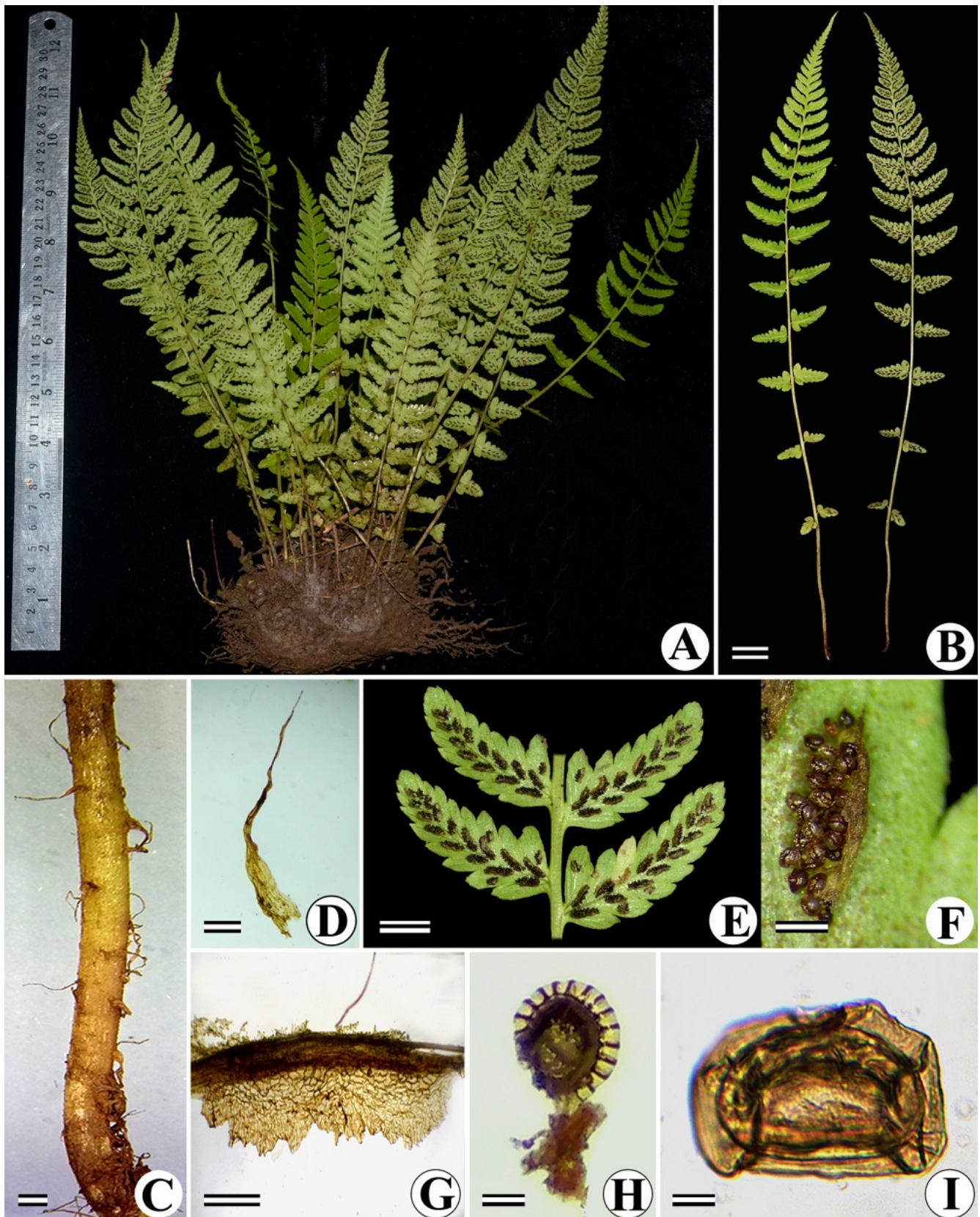


Fig. 1. *Athyrium falcatum*: A: Plant, B: Frond dorsal and ventral view, C: Stipe base showing scales, D: Stipe base scale, E: Parts of pinna showing arrangement of sori, F: Enlarged view of sori showing sporangia and indusium, G: Indusium, H: Sporangium, I: Spore. **Scale bar:** B = 20 mm, C, F = 500 μ m, D = 2 mm, E = 6 mm, G = 300 μ m, H = 100 μ m, I = 10 μ m.

M. Wadawa, 109426 (BLAT); Raigad Dt., Matheran, 20/10/1953, *K. A. Patil* (BLAT).

***Athyrium micropterum* Fraser-Jenk.**, New Sp. *Syndr. Indian Pteridol.* 58. 1997; Fraser-Jenkins, *Taxon.* Revis. Indian Subcontinental

Pteridophytes, 601. 2008; Fraser-Jenk., D.R. Kandel, S. Pariyar, *Ferns Fern-Allies Nepal* 1: 23. 2015.

Type: India, North-West Himalaya, Nainital Dt.

Description: Plants 15-40 cm in height, terrestrial, medium sized fern; *rhizome* 1-2 cm long, short,

erect-suberect, scaly; *scales* 1.5-6 mm long, 1-3 mm broad, yellow-brown, liner-lanceolate, long acuminate apex, broad at base, margin entire; *fronds* 14-38 cm long, 3-6 cm broad, broadly lanceolate, pinnate-pinnatisect, acuminate, herbaceous, green-pale green; *stipe* 3-10 cm long, scaly, pale green-brown, grooved, shorter than lamina; *scales* same as like rhizome scales; *lamina* 11-28 cm long, 3-6 cm broad, pinnate-pinnatisect, broadly lanceolate, apex acute-acuminate, green-pale green, glossy, glabrous, lowest pinnae reduced; *pinnae* 3-6 cm long, 1-3 cm broad, 12-25 pairs, 20-30 pairs, ovate-deltoid or lanceolate, acute-subacute apex, broad at base, margin crenate, sessile to short stalked, subopposite-alternate, deeply incised; *veins* forked, slightly distinct above and below; *sori* 2-4 mm long, 0.4-1.5 mm broad, indusiate, straight-hook like, along the veins, brown, median or sub-median; *indusia* 2-4 mm long, 0.4-1.5 mm broad, thin membranaceous, yellow-brown, straight-hook like, margin wavy or crenate; *sporangia* 200-500 μm in diameter, numerous, covered with 10-17 annular cells, sub-globose, stalked; *spores* 40-60 μm in diameter, monolete, plano-convex-in lateral view and elliptic in polar view.

Distribution: India (Gujarat, Maharashtra). (Gujarat: The Dangs, Narmada, Tapi and Valsad).

Phenology: Annual, **Sterile phase:** July-August; **Fertile phase:** August-November

Ecology and conservation status: *Athyrium micropterum* is known from the Dangs forest areas. This species is luxuriously growing in the south Gujarat, a population of about 80-150 individuals were found and the area of occupancy (AOO) is 250 km². Hence, according to IUCN categories and criteria (27), it is assessed as Least Concerned (LC) species.

Specimen Examined: INDIA, Maharashtra, Satara Dt., Mahabaleshwar, alt 1200 m., 13/10/1968, M. R. Almeida, 711 (BLAT); Karnataka, North Kanara, 25/11/1950, Famandez, 1880 (BLAT); Andhra Pradesh, East Godavari Dt., Valamum, alt. 550 m., 23/12/1993, Mohanan, 170337 (MH); Gujarat, The Dangs Dt., Chinchli, 807 m, 25/08/2017, R.N. Kachhiyapatel & K.S. Rajput, 249 (BARO).

***Athyrium hohenackerianum* T. Moore**, Index Fil. xlix 1857; Bedd., Ferns S. India t. 151. 1863; Bedd., Suppl. Ferns Brit. Ind.: 163. 1892; Manickam and Irudayaraj, Pterid. Fl. W. Ghats, 233 - 234. 1992; Fraser-Jenkins, Taxon. Revis. Indian Subcontinental Pteridophytes, 601.2008. Patil *et al.*, Field Guide Pterid. N. W. Ghats, 80. 2017.

Allantodia hohenackeriana Kunze, Farnkr.2. 63 t. 126. 1850.

Asplenium hohenackerianum Kunze in Bot. Zeitung (Berlin) 7: 771. 1849.

Type: India, Karnataka, Canara.

Description: Plants 10-35 cm in height, terrestrial, medium sized herb; *rhizome* 1-2 cm, sub-erect-erect, densely scaly at apex; *scales* 2-6 mm long, 0.5-2 mm long, linear-lanceolate, concolor, apex acuminate, margin entire; *frond* pinnatifid-bipinnate, elliptic lanceolate; *stipe* 03-10 cm long, densely scaly base, sparsely above; *scales* same as on the rhizome scales; *lamina* 06-23 x 3-6 cm, longer than stipe, pale green-green, elliptic-lanceolate, apex long acuminate, lower pinnae reduced, rachis sparsely scaly; *pinnae* ovate-lanceolate, apex acuminate, base broad, margin serrate, sessile to short stalked, opposite-subopposite; *veins* slightly distinct above and below, forked, reaching to the margin; *sori* 1.5-6 mm long, 0.6-2.5 mm broad, indusiate, straight or J-shaped, along the veins, median or sub-median; *indusia* 1.5-6 mm long, 0.6-2.5 mm broad, straight or J-shaped, thin, membranaceous, brown; *sporangia* 200-500 μm in diameter, numerous, 10-17 annular cells, sub-globose, brown; *spores* 45-65 μm in diameter, monolete, plano-convex to slightly concavo-convex in lateral view and elliptic in polar view.

Distribution: India (Andhra Pradesh, Chhattisgarh, Goa, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu), Sri Lanka. (Gujarat: common throughout Junagadh, Central and South Gujarat)

Phenology: Annuals, **Sterile phase:** June-July; **Fertile phase:** July-November

Ecology and conservation status: *Athyrium hohenackerianum* is known from Saurashtra, central and south Gujarat forest areas. This species is luxuriously growing in the central, Saurashtra and south Gujarat, a population of about 500-600 individuals were found and the area of occupancy (AOO) is 500 km². Hence, according to IUCN categories and criteria (27), it is assessed as Least Concerned (LC) species.

Specimen Examined: INDIA, Maharashtra, Kolhapur Dt., Dajipur, 700 m., S. S. Patil, (SUK); Ratnagiri Dt., Dapoli, 100 m., M. V. Masal, (SUK); Satara Dt., Koynanagar, 800 m., B. V. Jadhav (SUK); Mahabaleshwar, alt. 1200 m, 06/09/1954, P. V. Bole, 1116 (BLAT); Gujarat, Narmada Dt., Sagai, 369 m, 19/09/2014, R.N. Kachhiyapatel & K.S. Rajput, 64 (BARO); The Dangs Dt., Chinchli, 807 m, 25/08/2017, R.N. Kachhiyapatel & K.S. Rajput, 251 (BARO).

***Athyrium parasnathense* (C.B. Clarke) Ching ex Mehra & Bir**, Res. Bull. Panjab Univ., Sci. 15: 141. 1964; Fraser-Jenkins, Taxon. Revis. Indian Subcontinental Pteridophytes., 208-209.2008. Patil *et al.*, Field Guide Pterid. N. W. Ghats, 83. 2017.

Asplenium filix-femina (L.) Bernh. var. *parasnathensis* C.B. Clarke, Tr. Linn. Soc. II, 1: 493, 14 t. 61, C 2 1880.

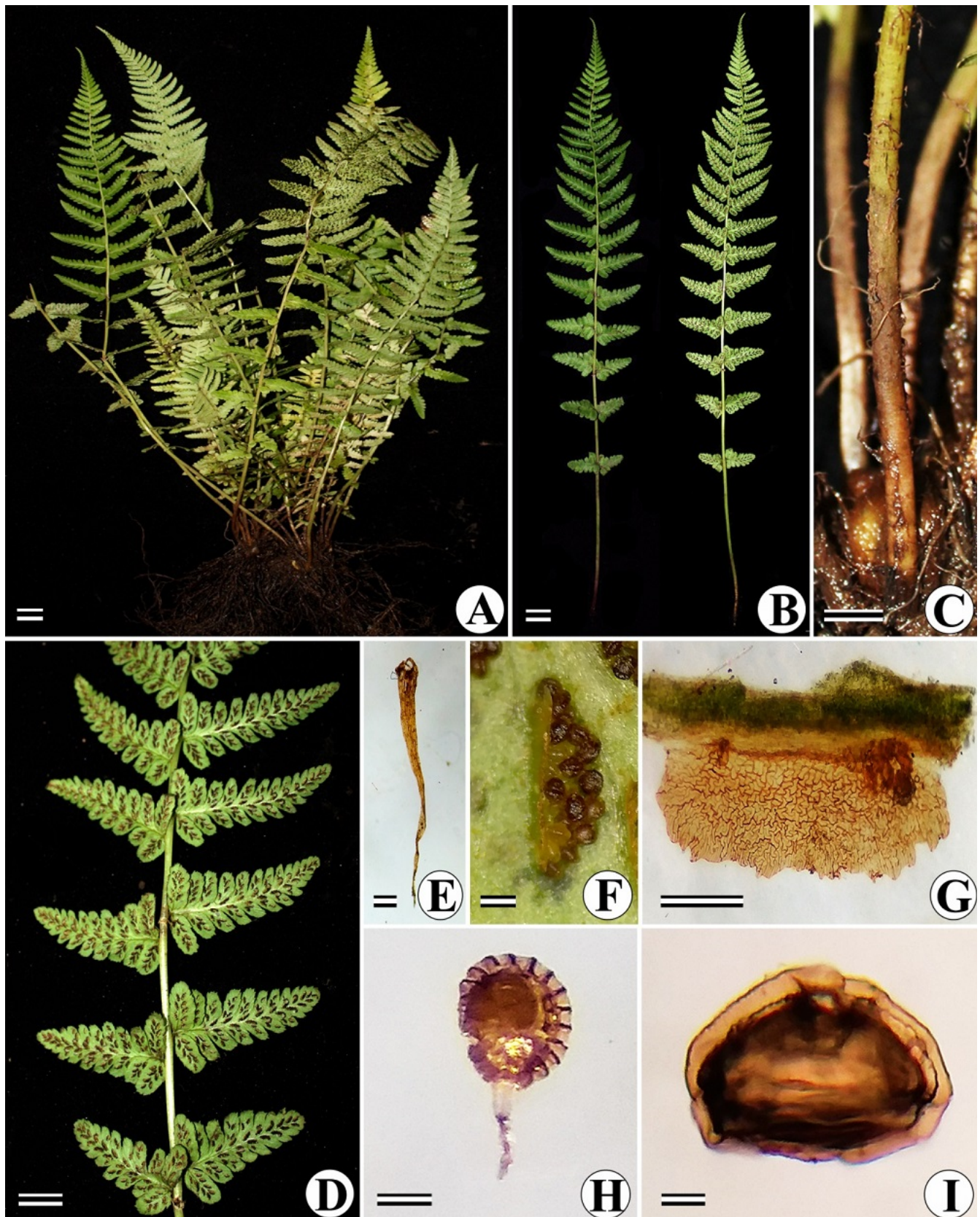


Fig. 2. *Athyrium micropterum*: A: Plant, B: Frond dorsal (left) and ventral (right) view, C: stipe base, D: Pinna, E: Stipe base scale, F: Sori, G: Indusium, H: Sporangium, I: Spore. Scale bar: A, B = 2 cm, C = 5 mm, D = 1 cm, E = 500 μ m, F = 500 μ m, G = 500 μ m, H = 100 μ m, I = 10 μ m.

Athyrium filix-femina (L.) Roth. var. *parasnathensis* (C.B. Clarke) Bedd., Handb. Ferns 16 Brit. India 170. 1883.

Type: India, Parasnath, Chota Nagpore.

Description: Plants 15-45 cm in height, terrestrial, medium sized fern; *rhizome* 1-2 cm, short erect-suberect, caespitose, scaly; *scales* 1-5 mm long, 0.5-2 mm broad, yellow-brown linear-lanceolate, acuminate at apex, broad at base, margin entire; *frond* 14-43 cm long, 3-7 cm broad, herbaceous,

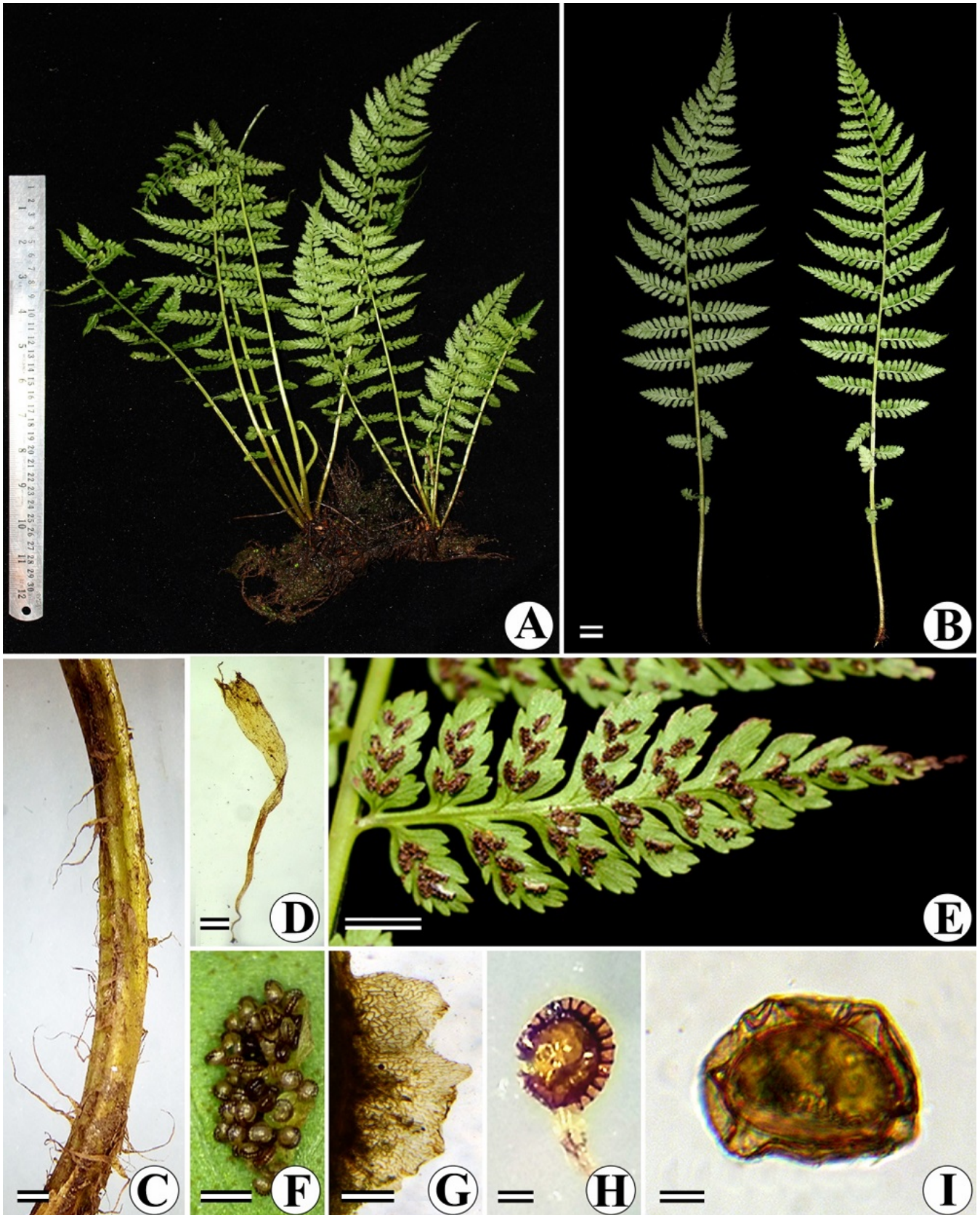


Fig. 3. *Athyrium parasnathense*: A: Plant, B: Frond dorsal (left) and ventral (right) view, C: Stipe base, D: Stipe base scale, E: Pinnae, F: Sori, G: Indusium, H: Sporangium, I: Spore. **Scale bar:** B = 2 cm, C = 2 mm, D = 500 μ m, E = 2.5 mm, F = 500 μ m, G = 200 μ m, H = 100 μ m, I = 10 μ m.

bipinnate-bipinnatifid, broadly lanceolate; *stipe* 3-10 cm long, pale green-brown, grooved, densely scaly at base; scales same as like rhizome scales; *lamina* 11-33 cm long, 3-7 cm broad, broadly lanceolate, apex acuminate, dark green-green, glabrous, glossy; *pinnae* 3-7 cm long, 2-3 cm broad,

15-25 pairs, deltoid-lanceolate, sessile to short stalked, subopposite-alternate, acuminate at apex, broad at base, margin crenate; *veins* forked, slightly distinct above and below; *sori* 1.5-5 mm long, 0.5-2 mm broad, indusiate, linear-hooked, two rows; *indusia* 1.5-5 mm long, 0.5-2 mm broad,

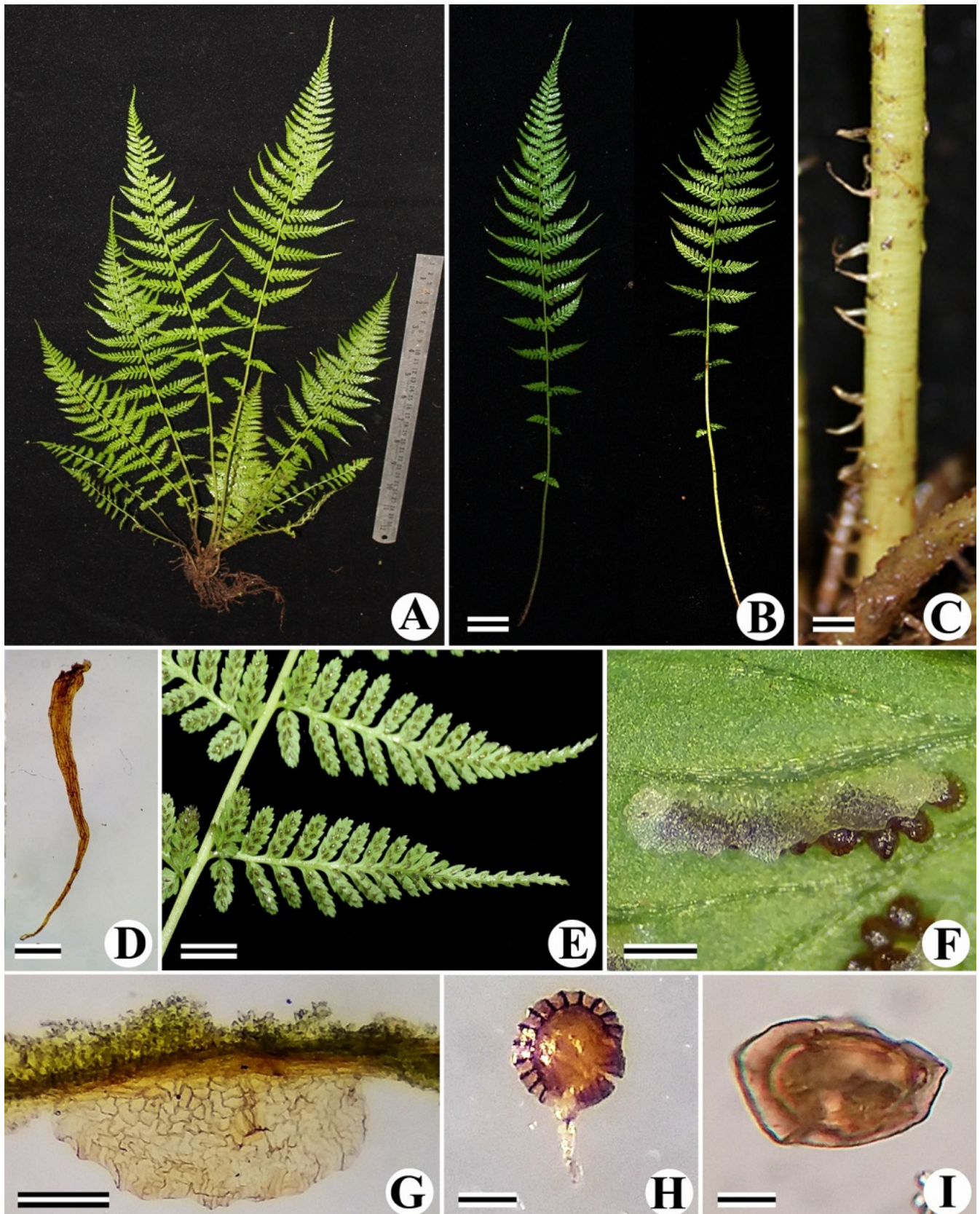


Fig. 4. *Athyrium schimperi*: **A:** Plant, **B:** Frond dorsal (left) and ventral (right) view, **C:** Stipe base, **D:** Stipe base scale, **E:** Pinna, **F:** Sori, **G:** Indusium, **H:** Sporangium, **I:** Spore. **Scale bar:** **B** = 2 cm, **C** = 2 mm, **D** = 1 cm, **E** = 1 cm, **F** = 500 μ m, **G** = 250 μ m, **H** = 125 μ m, **I** = 10 μ m.

thin, membranaceous, linear or hooked, median or sub-median, persistent; *sporangia* 200-600 μ m, composed of 12-18 annular cells, sub-globose; *spores* 45-60 μ m in diameter, monolete, plano-convex to concavo-convex in lateral view and elliptic in polar view.

Distribution: India (Bihar, Gujarat, Karnataka, Maharashtra, Rajasthan, Sikkim, Tamil Nadu, Uttarakhand). (Gujarat: Ahwa, Dang, Don, Dharampur, Girnar, Kaprada, Mahal, Wilson Hills, Karjan dam, Dediapada, Sagai).

Phenology: Annual, **Sterile phase:** July-August; **Fertile phase:** August-November.

Conservation status: *Athyrium parasnathense* is known from Valsad, Narmada, Dang, Shoolpaneswar, Ratanmahal and Junagadh forest areas. This species is luxuriously growing in the Saurashtra, central and south Gujarat, a population of about 100-350 individuals were found and the area of occupancy (AOO) is 250 km². Hence, according to IUCN categories and criteria (27), it is assessed as Least Concerned (LC) species.

Specimen Examined: INDIA, Maharashtra, Satara Dt., Patan, 800 m, 20/08/2013, S. M. Patil & M. M. Dongare, 1067 (SUK); Gujarat, Junagadh Dt., Girnar hills, 667 m, 24/09/2017, R.N. Kachhiyapatel & K.S. Rajput, 290 (BARO); The Dangs Dt, Chinchli, 806 m, 25/08/2017, R.N. Kachhiyapatel & K.S. Rajput, 250 (BARO).

***Athyrium schimperi* subsp. *biserrulatum* (Christ) Fraser-Jenk.,** New Sp. Syndrome Indian Pteridol. 60. 1997.

Type: China, Yunnan.

Asplenium filix-femina var. *polyspora* C.B.Clarke, Trans. Linn. Soc. London, 2 Bot., 1: 493,t. 61, f. 1. 1880.

Athyrium filix-femina var. *polyspora* (C.B.Clarke) Bedd., Handb. Ferns Brit. India 170. 1883.

Athyrium polysporum (C.B.Clarke) Ching ex Mehra & Bir, Amer. Fern J. 50(4): 289. 1960.

Athyrium biserrulatum Christ, Bull. Acad. Int. Géogr. Bot., Mans 17: 135-136. 1907.

Description: Plants 20-45 cm in height, medium sized herb; *rhizome* 1-2 cm long, short creeping-suberect, scaly; *scales* 1-5 mm long, 0.5-2 mm broad, yellow-brown, linear-lanceolate, acuminate at apex, broad at base, margin entire; *frond* 19-43 cm long, 5-10 cm broad, monomorphic, pinnate-bipinnate, ovate-lanceolate, herbaceous, dark green-green; *stipe* 4-10 cm long, shorter than lamina, densely scaly at base, sparsely above, grooved; *scales* same as like rhizome scales; *lamina* 15-33 cm long, 5-10 cm broad, ovate or broadly lanceolate, apex acuminate, lowest pinnae reduced, glabrous, glossy; *pinnae* 3-7 cm long, 1-3 cm broad, 15-25 pairs, ovate to lanceolate, long acuminate apex, cuneate base, margin crenate, short stalk-sessile, subopposite-alternate; *veins* forked, distinct above and below; *sori* 2-4.5 mm long, 0.5-2 mm broad, indusiate, linear or J-shaped, along the veins, median or sub-median; *indusia* 2-4.5 mm long, 0.5-2 mm broad, thin membranaceous, persistent; *sporangia* 200-600 µm in diameter, numerous, composed of 10-18 annular cells, subglobose; *spores* 40-65 µm in diameter, monolet, plano-convex in lateral view and elliptic in polar view.

Distribution: Bhutan, China, India, Myanmar, Nepal, Pakistan, Tibet (Arunachal Pradesh, Gujarat, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, Nagaland, Rajasthan, Sikkim, Uttarakhand, West Bengal). (Gujarat: Dangs).

Phenology: Annual, **Sterile phase:** July-August; **Fertile phase:** August-November

Ecology and conservation status: *Athyrium schimperi* subsp. *biserrulatum*, is known only from the Dangs forest areas. A population of about 10-20 individuals were found and Area of occupancy (AOO) is 5 km². However, other wildlife areas of the state are yet to be explored wholly and we presume that the species might be spread in similar ecological conditions. Thus, more floristic surveys are required to determine and document the full range of distribution of *A. schimperi* subsp. *biserrulatum*. Therefore, according to IUCN (27) criteria, at present this species is considered as data deficient (DD).

Specimen Examined: INDIA, Gujarat, The Dangs Dt., Borigaatha, 381 m, 05/10/2014, R.N. Kachhiyapatel & K.S. Rajput, 81 (BARO).

Discussion

First documented record of pteridophyte from Gujarat state (i.e. *Ceratopteris thalictroides* (L.) Brongn.) goes back to a century ago (9), but studies on this group became neglected thereafter. *A. solenopteris* is reported from Girnar Hills and other forest of the Saurashtra regions (11). Our repeated visits in last 6 years could not relocate the species from Girnar hills. Therefore, it appears that identification of this species might be mistaken for the species *A. parasnathense* (which we collected from Girnar hills). Moreover, the occurrence of *A. solenopteris* in Girnar is erroneous because it is endemic to south India and reported only at high altitude (i.e. above 1500 m) (26). Nevertheless, Girnar hills are considered as one of the tallest hills from the state that has maximum altitude of 1000 m.

In the present study, five species of *Athyrium* viz., *A. hohenackerianum*, *A. falcatum*, *A. micropterum*, *A. parasnathense* and *A. schimperi* subsp. *biserrulatum* were collected. Amongst these *A. falcatum*, *A. micropterum*, *A. parasnathense* and *A. schimperi* subsp. *biserrulatum*, are reporting as new distributional record for Gujarat state. Morphologically, *A. falcatum* and *A. micropterum* are closely related species. However, *A. falcatum* having pinnatifid lamina, suddenly reduced lower pinnae with auriculate pinnule whereas *A. micropterum* is having pinnatisect lamina, gradually reduced lower pinnae with or without auriculate pinnule. Similarly, *A. hohenackerianum*, *A. parasnathense* and *A. schimperi* subsp. *biserrulatum* are closely related species. However, *A. hohenackerianum* is having bipinnate lamina, densely scaly stipe and rachis, whereas *A.*

parasnathense is having bipinnate to tripinnate lamina, sparsely scaly stipe only, pinnae with crenate pinnule and acute-obtuse apex and *A. schimperi* subsp. *biserrulatum* is having tripinnate lamina, sparsely scaly stipe only, pinnae with dentate pinnule and long acuminate apex.

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Authors contribution

RNK and SMP collected the specimens from the field and wrote the initial draft of the manuscript, KSR supervised the project while revision of the manuscript is done by KSR and VMR. All the authors approved the final manuscript.

Competing interest

Authors declare that we have no competing interest.

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