

RESEARCH ARTICLE

DIVERSITY, DISTRIBUTION AND CONSERVATION PERSPECTIVES OF
PTERIDOPHYTES IN KORBA DISTRICT, CHHATTISGARH, INDIASwapnil Anand¹, Dinesh Kumar Singh², Ankita Verma¹, Ruchi Mani¹, Rupendra Kumar Yadav¹, Vaishali Bhartiya¹ and Deepak Kumar Gond^{1*}¹Department of Botany, Chaudhary Mahadeo Prasad Degree College, Prayagraj-211002, Uttar Pradesh, India²Freelancer botanist, Prakriti Farms, Korba-495677, Chhattisgarh, IndiaEmail: botanydeepakgond@gmail.com

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Abstract: Pteridophytes are important components of forest ecosystems, contributing significantly to biodiversity and ecological stability. Despite its extensive forest cover and favourable climatic conditions, the pteridophytic flora of the Korba district, Chhattisgarh, Central India, remains unexplored. The present study aimed to document the pteridophyte diversity of the district, provide taxonomic descriptions, assess population status and highlight conservation needs. Extensive field surveys were conducted across the Korba district from 2024 to 2026. Specimens were collected in both vegetative and reproductive stages and processed using standard herbarium techniques. Taxonomic identification was carried out using regional floras and relevant taxonomic literature. A comprehensive review of available literature revealed no previous systematic account of the pteridophytes of the Korba district. The study recorded 30 species belonging to 21 genera and 13 families, all representing new distributional records for the district. These findings provide a baseline for future taxonomic, ecological, and conservation research on pteridophytes in Central India.

Keywords: Chhattisgarh, Conservation, Korba district, New record, Pteridophytes

INTRODUCTION

Lycophytes (clubmosses, spikemosses, and quillworts) and monilophytes (ferns and horsetails) represent the earliest lineages of vascular plants to successfully colonize terrestrial habitats (Ranker & Haufler, 2008). Collectively, they are called pteridophytes and represent the second most species-rich group of vascular plants, with an estimated diversity of nearly 12,000 species across the globe (Ranker & Haufler, 2008; PPG I, 2016).

India possesses a rich and diverse pteridophytic flora owing to its remarkable topographic diversity, wide range of climatic conditions, and unique geographical position at the confluence of several phytogeographical regions. These factors have facilitated the migration, establishment, and diversification of pteridophyte species belonging to different floristic elements across the country. Consequently, pteridophytes constitute one of the most significant groups of vascular cryptogams in the Indian flora, ranking second only to angiosperms in terms of species diversity among vascular plants. India harbours approximately 1300 species of lycophytes and ferns distributed across a wide range of habitats (Dixit, 1984; Chandra, 2000; Fraser-Jenkins et al., 2017). Although the Himalayan region, the Western Ghats, and northeastern India are well

known for their rich pteridophytic diversity, central India has received comparatively less floristic attention.

Chhattisgarh possesses diverse landscapes comprising forests, plateaus, hills, rivers, streams, waterfalls, and wetlands. These varied habitats create favourable ecological conditions that support a rich diversity of pteridophytes. The geographical position and physiographic situation of the Korba district of Chhattisgarh comprises tropical, sub-tropical, and cool climatic regions along with low or high plateaus and many perennial rivers, streams, ponds, puddles, and falls. These factors are responsible for the formation and maintenance of ideal places for growth and survival of a variety of pteridophytic species. The vegetation of the district is predominantly dry deciduous, although moist deciduous patches occur in areas receiving higher rainfall and at higher elevations. The region supports lush green forests with rich floristic diversity. The principal natural forest tree associates are *Acacia*, *Adina*, *Aegle*, *Albizia*, *Azadirachta*, *Bauhinia*, *Bombax*, *Boswellia*, *Buchanania*, *Butea*, *Cassia*, *Cordia*, *Dalbergia*, *Diospyros*, *Ficus*, *Hardwickia*, *Holarrhena*, *Madhuca*, *Mangifera*, *Phyllanthus*, *Shorea*, *Tamarindus*, *Tectona*, etc. The open forest lands are largely dominated by different species of grasses. A large number of plants with high medicinal values

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are also found growing naturally in the forest. These plant communities play an important role in maintaining habitat diversity and ecological stability. Geology plays a significant role with regard to the composition of the forest in the district. The two distinct geological formations, the Vindhyan and Gondwana systems, comprise two different compositions of forest. The Vindhyan system consists of dry mixed forest scattered on the drier southern and western parts of hills and slopes in the northern region, reverine tracts in the southern region of the district. The Gondwana System, having hilly, moist part that receives more precipitation or comprising humid conditions, is situated in the central and southern parts of the district. Consequently, this region supports predominantly moist deciduous forests with comparatively richer floristic diversity. The prevailing climatic conditions, together with its varied topography and vegetation, provide favourable habitats for a rich diversity of pteridophytes. A comprehensive review of the available literature on the pteridophytes of Central India, including the works of Tiwari (1964); Panigrahi & Dixit (1966); Verma et al. (1982); Beddome (1883); Dixit (1984, 1989); Bir (1987); Panigrahi & Murti (1989); Panigrahi & Murti (1999) and Dixit & Singh (2005) reveal that no comprehensive floristic account of pteridophytes of Korba district has been reported.

Therefore, an attempt has been made to briefly describe different taxa along with their population status and conservation strategies. The findings, which include 30 taxa belonging to 21 genera of 13 families, are being reported for the first time from the Korba district.

MATERIALS AND METHODS

Study Area

The Korba district lies between 22° 01' and 23° 01' N latitude and 82° 08' to 83° 09' E longitude. The climate of the region is predominantly tropical, characterised by hot summers and a humid monsoonal regime with four distinct seasons. The seasons were summer (March-June), monsoon (July-September), post-monsoon (late September-October), and winter (November-February). The district experiences a mean annual temperature of approximately 25.45°C, with average maximum and minimum temperatures of 39.4°C and 18.5°C, respectively. The district receives most of its precipitation during the southwest monsoon season. The average rainfall is approximately 1400-1600 mm. The landscape comprises plateaus, hills, forests, perennial rivers, streams, waterfalls, ponds, and wetlands, providing diverse habitats that are suitable for pteridophyte growth. The natural vegetation is predominantly tropical dry deciduous and moist deciduous forests.

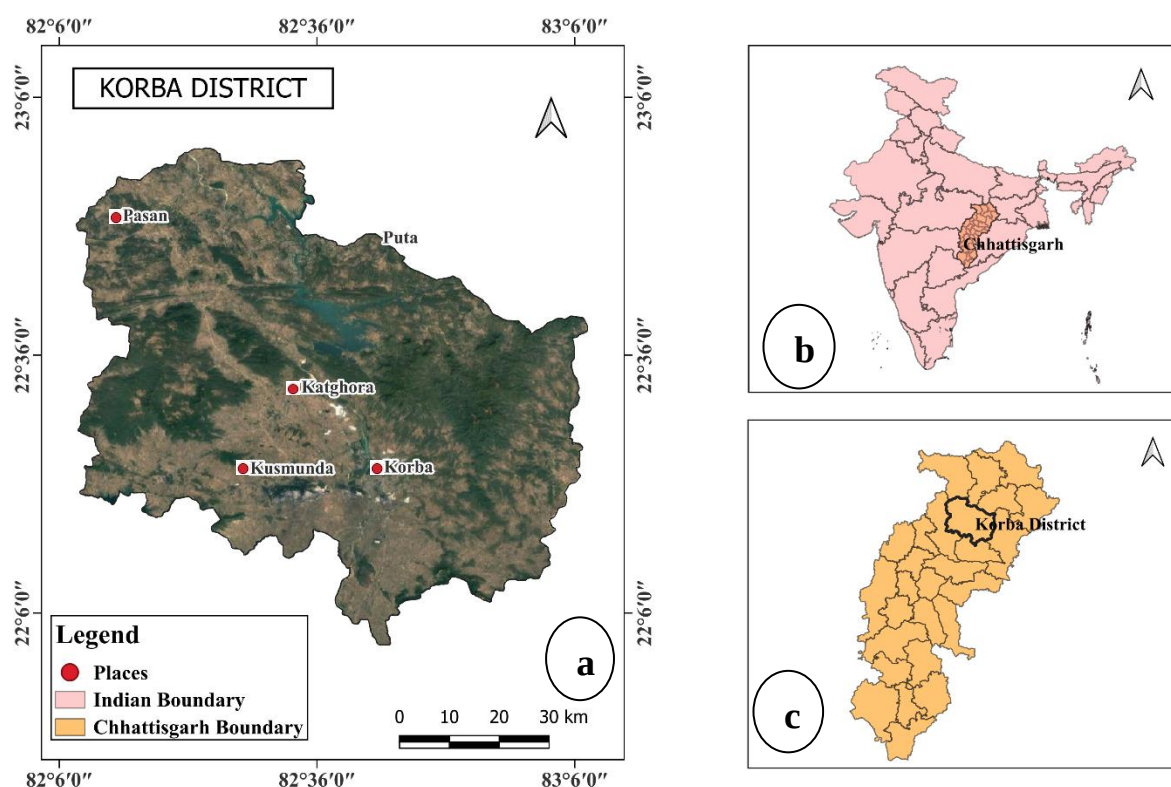


Figure 1. (a) Map of Korba district showing major places; (b) Map of India; (c) Map of Chhattisgarh state.

Field surveys and specimen collection

Extensive field surveys were conducted from 2024 to 2026 to ensure comprehensive sampling of the pteridophytic flora of the study area. Specimens were collected from different habitat types, including forest floors, rocky slopes, stream banks, grasslands and hill slopes. Attempts were made to collect complete and representative specimens exhibiting all essential taxonomic characters, including the entire plant with rhizomes or roots, stipe, fertile and sterile fronds, and well-developed sori wherever available. For each collection, field observations including collection number, locality, habitat, altitude, date of collection and collector's name were recorded.

Herbarium preparation

The collected specimens were processed following standard herbarium techniques. The specimens were cleaned, pressed, dried, poisoned and mounted on herbarium sheets. Voucher specimens were labelled with complete field information and accession numbers before being deposited in the herbarium of Chaudhary Mahadeo Prasad (CMP) Degree College, Prayagraj for future reference.

Identification and nomenclature

Identification of the specimens was carried out using standard taxonomic literature, regional and national floras (Panigrahi & Murti, 1989; Verma et al., 1993; Dixit & Singh, 2005), and authentic herbarium specimens. The nomenclature and author citations were verified using the International Plant Names Index (IPNI), Plants of the World Online (POWO), and the Pteridophyte Phylogeny Group I (PPG I, 2016) classification. The families follow the classification proposed by PPG I (2016).

Data analysis

The occurrence and distribution of each taxon were documented based on the field observations. Population status was assessed qualitatively according to the frequency of occurrence observed during field visits and was categorised as common, abundant, frequent, or rare. Habitat preferences and ecological notes were recorded for all species.

Literature consulted

Identification and verification of taxa were carried out with the help of published floras and taxonomic literature, including Tiwari (1964); Panigrahi & Dixit (1966); Basihya & Rao (1982); Beddome (1883); Bir (1987); Dixit (1984, 1989); Panigrahi and Murti (1989, 1999); Khullar et al. (1993); Dixit & Singh (2005); Saini et al. (2010); Fraser-Jenkins et al. (2017), and other relevant publications.

RESULTS

Taxonomic enumerations:

Adiantum L. (Pteridaceae)

1. *Adiantum capillus-veneris* L., Sp. Pl. 2: 1096. 1753; *Adiantum capillus-veneris* var. *trifidum* (Willd. ex Bolle) Milde, Fil. Eur. Atlant.: 30. 1867;

Tiwari in J. Indian. Bot. Soc. 43(3): 435. 1964; Khular et al., Ferns of Nainital 56. 1991. (Fig.3. L)

Fronds ovate tri-quadri-pinnate, pinnules delicate, membranous, glabrous, obliquely broad, cuneate to rhomboid, tapering into a rather long, slender petiolate, lamina 12-25 cm long, 5-15 cm broad, the superior margin deeply and irregularly inciso-lobate; lobes obtuse or truncate soriferous (sterile one sub-inciso dentate) sori as broad as the lobes, oblong or sub-reniform, stipes and slender rachis everywhere ebeneous, glossy and quite glabrous.

Ecology & Population Data: Crevices of moist rocks along river banks; Rare.

Specimen examined: India, Chhattisgarh: Korba district, Bundeli road, 08.09.2024, S. Anand, 410; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

2. *Adiantum incisum* Forssk., Fl. Aegypt.-Arab.: 187. 1775; *Adiantum capillus-gorgonis* Webb, Niger Fl.: 192. 1849; Tiwari in J. Indian. Bot. Soc. 43(3): 435. 1964; Khular et al., Ferns of Nainital 58. 1991.

Fronds linear, oblong, elongated, attenuated, often rooting at the apex and the base of pinnae; pinnae nearly sessile, lamina 18-30 cm long, alternate, rather thick membranaceous, dimidiate oblong, the upper base truncated and parallel with the rachis, the upper margin more or less deeply lobed, the lobes often bifid, soriferous, villous in every part, with rufous hairs or more or less glabrous, veins generally prominent, involucre nearly orbicular or subquadrate, hairy or glabrous, stipes generally short, stout as well as the rachis more or less clothed with fulvous chaffy hairs.

Ecology & Population Data: In shady and moist rocky places; Frequent.

Specimen examined: India, Chhattisgarh: Korba district, Rajgamar road, 09.09.2024, S. Anand, 415; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

3. *Adiantum philippense* subsp. *philippense* (L.) Fraser-Jenk., Candollea 63(2): 344. 2008; *Adiantum philippense* L., Sp. Pl. 2: 1094. 1753; Tiwari in J. Indian. Bot. Soc. 43(3): 435. 1964; Khular et al., Ferns of Nainital 58. 1991.

Frond oblong pinnate, pinnae alternate, rather long-petiolate, membranaceous oblong-lunate, dimidiate below, upper margin lobed, truncate at the base, uppermost pinnae cuneate, sori linear, approximate, and often confluent, stipes and rachis ebeneous glabrous, the latter often extended beyond the pinnae and proliferous.

Ecology & Population Data: In moist situations at low mountain tracts; Common.

Specimen examined: India, Chhattisgarh: Korba district, Rajgamar road, 09.09.2024, S. Anand, 484; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

Azolla Lam. (Salviniaceae)

1. ***Azolla pinnata*** R.Br., Prodr. Fl. Nov. Holl. 167. 1810; *Rhizosperma pinnata* (R.Br.) Meyen, Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 19 (Suppl. 1): 449. 1836; Verma, et al., Flora of M.P. 100. 1993.

Plant triangular, small floating, horizontal. Stem very short. Root born singly or in groups, unbranched. Leaves imbricating, trapezoidal; maculate, bearing a few pointed trichomes on ventral sides. Megasporengium warty, no collar, 2 tiers of floats (3 above, 6 below) and a terminal, flagellated crown. Leaves often turning reddish in winter and in hot summer, with a cavity near the base, containing *Anabaena*, floating on ponds, paddy fields, and irrigation ditches.

Ecology & Population Data: In ponds, paddy fields, irrigation ditches; Common.

Specimen examined: India, Chhattisgarh: Korba district, Pasarkhet, 10.03.2025, S. Anand, 508; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

***Blechnum* L. (Aspleniaceae)**

1. ***Blechnum orientale*** L., Sp. Pl. 2: 1077. 1753; *Asplenium orientale* (L.) Bernh., J. Bot. (Schrader) 1801(1): 17. 1802; Tiwari in J. Ind. Bot. Soc. 43(3): 446. 1964. (Fig.3. M)

Rhizome erect and thick. Fertile and sterile fronds present, 30-160 cm or more long, 7-52 cm or more broad. Stipe long, purplish; scales narrow, entire, brown. Lamina oblong to lanceolate, pinnate; pinnae slightly lanceolate, 4-19 mm broad, 4-21 cm long, sessile or adnate, margins entire; costae and rachis brown, smooth or with uneven hairs and slender brownish scales. Sori on both sides of costa.

Ecology & Population Data: Growing on slopes and forest edges, Abundant.

Specimen examined: India, Chhattisgarh: Korba district, Lemru road, 12.03.2025, S. Anand, 515; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

***Ceratopteris Brongniari* (Pteridaceae)**

1. ***Ceratopteris thalictroides*** (L.) Brongn., Bull. Sci. Soc. Philom. Paris 1821: 186. 1821; *Acrostichum thalictroides* L., Sp. Pl. 2: 1070. 1753; Dixit, Cens. Indian Pterid. 84. 1984. (Fig. 2. H).

Stipes somewhat quadrangular, thick, inflated, filled with air-space. Fronds bipinnate, the fertile ones erect, 15-30 cm high, with linear, acute segments, 1.5-2.5 cm long; the margins revolute and covering the fructification their whole length. Barren fronds shorter and more spreading, the segments cuneate with 2-3 oblong or lanceolate lobes, of a soft semi-succulent texture.

Ecology & Population Data: In muddy places along 'nalas', ponds; Rare.

Specimen examined: India, Chhattisgarh: Korba district, Lemru road, 10.09.2024, S. Anand, 451; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

***Dicranopteris* Bernh. (Gleicheniaceae)**

1. ***Dicranopteris linearis*** (Burm.f.) Underw., Bull. Torrey Bot. Club 34: 250. 1907; *Gleichenia linearis* (Burm.f.) C.B. Clarke, Trans. Linn. Soc. London, Bot. 1: 428. 1880; Verma, et al., Flora of M.P. 52. 1993. (Fig.2. G).

Rhizome long-creeping, slender, bearing hairs and distantly spaced stipes, growing apex covered with red-brown hairs. Stalks shining, erect, varying much in length, brown to purplish-brown; pseudodichotomously branched, ultimate branches in equal pairs; leafy. Sori near to costae of the segments on the acroscopic branch of a vein, each with 10-15 sporangia.

Ecology & Population Data: In shady and moist places, with little humus or in rocky alluvial soil; Abundant.

Specimen examined: India, Chhattisgarh: Korba district, Bundeli, 11.03.2025, S. Anand, 520; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

***Diplazium* Sw. (Aspleniaceae)**

1. ***Diplazium esculentum*** (Retz.) Sw., J. Bot. (Schrader) 1801(2): 312. 1803; *Hemionitis esculenta* Retz., *Observ. Bot.* 6: 38. 1791. Verma, et al., Flora of M.P. 91. 1993.

Stipe stout, blackish at base; laminae changing in form with age; young fronds are pinnate with broad pinnate, later fronds are bipinnate with narrower pinnules, large fronds may be tripinnatifid; pinnae petiolate, pinnules sub-sessile; apex of lamina pinnatifid, upper third pinnate and lower section bipinnate.

Ecology & Population Data: In shady and moist places, Frequent.

Specimen examined: India, Chhattisgarh: Korba district, Pasarkhet, 11.03.2025, S. Anand, 523; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

***Dryopteris* Adans. (Polypodiaceae)**

1. ***Dryopteris cochleata*** (D. Don) C. Chr., Index Filic. 258. 1905; *Nephrodium cochleatum* D. Don, Prodr. Fl. Nepal. 6. 1825; Verma, et al., Flora of M.P. 93. 1993.

Rhizome short, stout and suberect. Stipe tufted scaly at least at base, fronds pinnate to decompound, usually with a pinnatifid apex, venation free, simple or forked. Sori rounded, 4-5 on each side of costule nearly covering the lobe, inducia large, round or reniform, attached at the sinus, usually persistent.

Ecology & Population Data: In moist localities in Sal forests; Frequent.

Specimen examined: India, Chhattisgarh: Korba district, Dhaurabhata, 22.03.2026, S. Anand, 546; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

***Equisetum* L. (Equisetaceae)**

1. ***Equisetum arvense*** L., Sp. Pl. 2: 1061. 1753; *Equisetum campestre* Schlecht. ex F. Weber & D. Mohr, *Bot. Taschenb.* 1807; Saini, et al.

Biodiversity of aquatic and semi-aquatic plants of Uttar Pradesh, 403. 2010.

Stem with 2-3 branches per node or unbranched, 1-7 mm in diameter. Sheath longer, lower sheath brown and upper ones green; teeth 3-9 mm long, Strobili apiculate.

Ecology & Population Data: Along riverbanks; Frequent.

Specimen examined: India, Chhattisgarh: Korba district, Devpahri road, 22.03.2026, S. Anand, 542; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

2. ***Equisetum ramosissimum*** Desf. var. ***huegelii*** (Milde) Christenh. & Husby, Bot. J. Linn. Soc. 189(4): 343. 2019; *Equisetum huegelii* Milde, Verh. Zool.-Bot. Ges. Wien 11: 439. 1861; Dixit, Cens. Indian Pterid. 19. 1984. (Fig.2. E).

Rush like perennial plant with a creeping rhizome. Stem green, grooved, jointed, 30 cm to 1 m tall, with 1-4 branches per node; stomata in double lines in the grooves; sheath green, cylindrical, 4-12 mm long, teeth thin, brown to white, drying and deciduous. Strobili terminal on main stem, apiculate; sporangia born on the back of stalked sporangiophores. Spores rounded, green with 4 elaters. Gametophyte green, lobed.

Ecology & Population Data: Growing along streams and paths; Abundant.

Specimen examined: India, Chhattisgarh: Korba district, Bundeli, 10.03.2025, S. Anand, 532; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

***Hemionitis* L. (Pteridaceae)**

1. ***Hemionitis tenuifolia*** (Burm.f.) Christenh., Global Fl. 4: 22. 2018; *Cheilanthes tenuifolia* (Burm.f.) Sw., Syn. Fil.: 129, 332. 1806. (Fig.3. O)

Rhizome short, creeping, bearing scales. Fronds distant, stipes 5-20 cm, scaly at base, naked above, purple-black; lamina 10-45 x 5-15 cm, lanceolate, glabrous; segments of the primary and secondary divisions the largest, pinnatifid, segments of various shapes, margins crenate. Sori marginal, confluent; indusia elongated, denticulate, wrinkled.

Ecology & Population Data: Along roadside and in rock crevices; Abundant.

Specimen examined: India, Chhattisgarh: Korba district, Lemru road, 08.09.2024, S. Anand, 548; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

***Lindsaea* Dryand. ex Sm. (Lindsaeaceae)**

1. ***Lindsaea ensifolia*** Sw., J. Bot. (Schrader) 1800(2): 77. 1801; *Schizoloma ensifolia* (Sw.) J. Sm. In Hook. J. Bot. 3: 414: 1841; Fraser-Jenk., Rev. Indian Pterid. 2008; PPG I, J. Syst. Evol. 54: 563-603. 2016. (Fig.3. K)

Rhizome short-creeping, scales reddish brown. Fronds close, pinnate, stipes 10-25 cm, dark brown; ascending, evenly narrowed from the base to apex, sub-acute to acuminate, dark green to olivaceous-green when dry; margins entire, forming 2-3 series of

areoles. Sori continuous, indusium entire, strongly reflexed and concealed at maturity.

Ecology & Population Data: In open areas and forest undergrowth; Frequent.

Specimen examined: India, Chhattisgarh: Korba district, Devpahri road, 23.03.2026, S. Anand, 576; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

***Lycopodiella* Holub (Lycopodiaceae)**

1. ***Lycopodiella cernua*** (L.) Pic.Serm., Webbia 23: 166. 1968. *Lycopodium cernuum* L., Sp. Pl. 2: 1103. 1753, Baishya and Rao, Ferns and Ferns-allies of Meghalaya State, India 21. 1982. (Fig.2. D).

Main stem stout, erect, much branched when growing in thickets or among tall grasses; weak and prostrate when growing on exposed hillside. Leaves spirally arranged, narrowly linear, 2-5 mm long, incurved, entire. Strobili solitary at the end of short branches, oblong, 4-9 mm long, sessile; sporophylls ovoid, pale yellowish, irregularly serrate, ciliate at the margins.

Ecology & Population Data: On hillsides in exposed moist places; Rare.

Specimen examined: India, Chhattisgarh: Korba district, Dhaurabhata, 22.03.2026, S. Anand, 579; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

***Lygodium* Swartz (Schizaeaceae)**

1. ***Lygodium flexuosum*** (L.) Sw.; J. Bot. (Schrader) 1800(2): 106. 1801. *Ophioglossum flexuosum* L., Sp. Pl. 2: 1063. 1753. Khullar et al, Ferns of Nainital 54. 1991. (Fig. 1.i). Syn. *L. japonicum* (Thbg.) Sw. (Fig.2. I)

Stem climbing, slender, glabrous or pubescent, fronds bipinnate, glabrous or slightly hairy, pairs of fronds stipitate-pinnate with the pinnules again pinnate or variously lobed or sub-palmate; segments short, serrulate, the fertile ones much contracted, terminal segment linear-lanceolate, serrulate, lamina 15-30 cm broad. Sori occupying the whole of the undersurface or protruding from the margin.

Ecology & Population Data: In forest under moist situations along river banks; Rare.

Specimen examined: India, Chhattisgarh: Korba district, Lemru road, 30.06.2026, S. Anand, 597; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

2. ***Lygodium microphyllum*** (Cav.) R.Br., Prodr. Fl. Nov. Holl. 162. 1810 Dixit, Cens. Indian Pterid. 60. 1984, Syn. *L. scandens* Sw.

Rachis twining, glabrous, bearing very short primary branches, 2-4 mm long, dormant bud covered with stiff brown hairs; secondary branches opposite, 4-10 cm long; sterile pinnules 2-3 cm long, about 1 cm broad, ovate, often slightly lobed at the base, glabrous, crenulate, articulate at base, when deciduous, leaving the petiole on the secondary branches; upper pinnules fertile. Sporangia born in 2-rows on the finger-like projecting lobes, covered with scale-like indusia.

Ecology & Population Data: In the moist areas along sloppy hills; Rare.

Specimen examined: India, Chhattisgarh: Korba district, Lemru road, 30.06.2026, S. Anand, 609; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

Marsilea L. (Marsileaceae)

1. **Marsilea minuta** L., Mant. Pl. Altera: 308. 1771. *Marsilea tetraphylla* Thunb., Fl. Jap.: 340. 1784. Verma, et al., Flora of M.P. 70. 1993. (Fig. 3. P) A creeping aquatic herb, Rhizome slender, branched, creeping on or just below the surface of the soil, growing tip hairy. Leaves borne on the nodes and arranged alternately in two rows, one on each side of the median line, variable in size, lamina divided into 4 small, usually equal pinnae, petiole long. Sporocarp 0.3cm long, ellipsoid.

Ecology & Population Data: In small ditches, ponds and other reservoirs along road-sides; Common.

Specimen examined: India, Chhattisgarh: Korba district, Pasarkhet, 11.03.2025, S. Anand, 513; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

Odontosoria (C.Presl.) Fée (Lindsaeaceae)

1. **Odontosoria chinensis** (L.) J.Sm., Bot. Voy. Herald: 430. 1857. *Trichomanes chinense* L., Sp. Pl. 2: 1099. 1753; Verma, et al., Flora of M.P. 44.1993. (Fig. 2. F).

Rhizome short creeping to semierect, densely covered with paleae. Paleae hair-like, 1-celled broad, ferruginous. Fronds bi-or tripinnate, lanceolate, up to 7-50x3-15 cm, glabrous; pinnae much dissected, rather dichotomously forked in to 4-8 pinnules; pinnules rhomboidal, each again forked in to 2-4 lobes, lobes subulate. Sori marginal, rather submarginal inside the marginal flaps, terminal on free veinlets. Indusium attached at base and sides, opens outward. Annulus 18-celled. Spores bean-shaped with one longitudinal dark slit, light brown, hyaline.

Ecology & Population Data: Growing on hill slope; Abundant.

Specimen examined: India, Chhattisgarh: Korba district, Lemru road, 09.09.2024, S. Anand, 498; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

Ophioglossum L. (Ophioglossaceae)

1. **Ophioglossum reticulatum** L., Sp. Pl. 2: 1063. 1753; *Ophioglossum vulgatum* var. *reticulatum* (L.) D.C.Eaton, Mem. Amer. Acad. Arts, n.s., 8: 218. 1861; Khullar et al., Ferns of Nainital 49. 1991.

Stem subterranean with adventitious roots and tuberous, cylindrical rhizome and every year produce an aerial complex consisting of a long stipe bearing a single sterile chordate-ovate, acute or obtuse fronds or laminar portion, and a long fertile spike (contracted frond), fronds 3-5 x 2.5 cm, simple with reticulate venation.

Ecology & Population Data: In Sal Forest under moist situations along streams where organic matter is rich; Frequent.

Specimen examined: India, Chhattisgarh: Korba district, Lemru road, 22.03.2026, S. Anand, 560; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

2. **Ophioglossum vulgatum** L., Sp. Pl. 2: 1062. 1753.; *Ophioglossum ovatum* Sw. ex Opiz, Kratos 1(4): 12. 1819, nom. illeg. superfl.; Khullar et al., Ferns of Nainital 50. 1991. (Fig. 2. B)

Rhizome fibrous. Common stalk 6.5-7.5 cm long, blade sterile, nearly orbicular or broadly ovate, cordate at base, rounded at apex about 3.5 cm long and 3 cm wide, areolae with included veinlets. Fertile segment arising from near base of sterile blade. Spores roughly reticulate.

Ecology & Population Data: In moist area of sal forests, marshy localities; Rare.

Specimen examined: India, Chhattisgarh: Korba district, Lemru road, 22.03.2026, S. Anand, 578; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

Psilotum Sw. (Psilotaceae)

1. **Psilotum nudum** (L.) P.Beauv., Prodr. Aethéogam.: 112. 1805; *Lycopodium nudum* L., Sp. Pl. 2: 1100. 1753. Verma, et al., Flora of M.P. 44. 1993. (Fig. 2. A)

Rhizome bearing rhizoid. Aerial stem 10-30 cm long, simple below, repeatedly dichotomously branched above, erect or pendent. Leaves small awl shaped, 1-2mm long, scale like, scattered, veinlets, lacking midrib. Sporangia 3-lobed, born on adaxial side in the axil of minute. Leaves eusporangiate, homosporous; spores bilateral.

Ecology & Population Data: In crevices of moist rocks; Rare.

Specimen examined: India, Chhattisgarh: Korba district, Lemru road, 11.03.2025, S. Anand, 535; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

Pteris L. (Pteridaceae)

1. **Pteris biaurita** L., Sp. Pl. 2: 1076. 1753; *Pteris flavicaulis* Hayat, J. Coll. Sci. Imp. Univ. Tokyo, 30(1): 443-444, 1911; R. D. Dixit, Census Indian Pterid., 69. 1984; Khullar, III. Fern Fl. West Himalaya, 1:260. t.92. 1994.

Rhizome short, erect, scaly. Scales long, bicolorous, linear, apex acuminate. Stipes long, 25-55 cm long, glabrous above. Lamina pinnate, 30-60 cm long, 15-20 cm wide, herbaceous, green, lanceolate. Rachis, costa and costule glabrous. Sori linear, marginal, extending from sinus, not reaching apices, continuous, indusiate. Indusium 0.5-1 cm long, 0.1 cm wide, transparent, membranaceous, persistent, curls out at maturity. Sporangia round, globose, 15-17-celled annulus.

Ecology & Population Data: Along streams and forest edges; Rare.

Specimen examined: India, Chhattisgarh: Korba district, Lemru road, 10.09.2024, S. Anand, 437; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

2. ***Pteris cretica*** L., Mant. Pl. 13. 1767; *Pteris nervosa* Thunb., Fl. Japan. 332. 1784; Moony in Indian For. Rec. 3(7): 248. 1942; R. D. Dixit, Census Indian Pterid., 69. 1984; Khullar, III. Fern Fl. West Himalaya, 1:260. t.93. 1994.

Rhizome short, creeping, densely covered with scales; scales 0.3-0.5 cm long, brown, linear, lanceolate, acuminate, margin smooth. Stipes 25-40 cm long, yellow, glabrous above, scaly at base. Fronds dimorphic. Lamina 15-25 cm long, fertile lamina longer than sterile ones; lamina shorter than stipe. Sori at the margin of fertile pinnae except at base and apex, linear, indusiate. Indusium 0.5-1 mm broad. Sporangia with 16-celled annulus, stalked.

Ecology & Population Data: In open places and forest edges; Abundant.

Specimen examined: India, Chhattisgarh: Korba district, Bundeli road, 11.03.2025, S. Anand, 525; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

3. ***Pteris multifida*** Poir., Encycl. (Lamarck) 5: 714. 1804; *Pteris serrulata* L.f., Suppl. Pl.: 445. 1782, nom. illeg.; Singh J. Forestry 82. 1989. (Fig. 2. J)

Rhizome short, creeping, thick, scaly. Scales small up to 2.5 mm long, entire, apex acute. Fronds dimorphic, thin, fertile fronds 25-32 cm in height; sterile fronds 13-20 cm in height, green, ovate. Pinnae 2-3 pairs, pinnate, opposite, lanceolate, green, terminal pinnae larger than lateral pinnae, terminal pinnae 15.0-16.0 cm long, and 0.6-0.8 cm broad; lateral pinnae 6.0- 9.0 cm long and 0.4-0.5 cm broad; margin wavy, apex acute, serrate, glabrous, thin, papyraceous, pinna decurrent to form a winged rachis; lower pinnae multifid; venation free, forking, numerous. Sori brown along the margin. Indusium white. Sporangium globose, 220-240 µm long; stalk 250-300 µm, 2-celled. Annulus 17-18-celled, Spores brown 40-45 µm, trilete-tetrahedron.

Ecology & Population Data: In moist and shady places; Frequent.

Specimen examined: India, Chhattisgarh: Korba district, Dhengurdih, 09.09.2024, S. Anand, 506; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

4. ***Pteris vittata*** L., Sp. Pl. 2: 1074. 1753; *Pycnodoria vittata* (L.) Small, Ferns Florida: 89. 1932; Khullar et. al., Ferns of Nainital 80. 1991.

The plant is generally 30-60 cm in height. Rhizome is erect, sub erect or short creeping, depending on age, unbranched, densely scaly at apex; scales lanceolate, entire, acuminate. Stipes bent at base, grooved above, densely scaly towards the base, sparsely upwards. Fronds simple, pinnate, gradually narrowing towards the base, terminated by a larger pinna than the lateral ones. Pinnae opposite or sub

opposite, sessile, ascending, lanceolate with acute apex. Margin of soriferous pinna entire and finely serrulate, veins forked, continuous along of the margin from above the base.

Ecology & Population Data: Along 'nalas' in the crevices of walls and rocks; Common.

Specimen examined: India, Chhattisgarh: Korba district, Rajgamar road, 08.09.2024, S. Anand, 493; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

***Salvinia* Ség. (Salviniaceae)**

1. ***Salvinia natans*** (L.) All., Fl. Pedem. 2: 289. 1785; *Salvinia vulgaris* Rupr., Distr. Crypt. Vasc. Ross.: 27. 1845; Saini et al., Biodiversity of aquatic and semi-aquatic plants of Uttar Pradesh: 411. 2010.

A small floating herb, stem horizontal, roots absent. Leaves of two types; floating green leaves in pairs, oval-oblong, 10-15 mm long, midrib distinct, the upper surface covered with papillae, the under-surface covered with straight, multicellular hairs, with 4 free hairs on tips of each papilla; submerged leaves finely dissected, root like. Sporocarps borne in cluster on a branch of the root like leaf, globular or ovoid, covered with brown multicellular hair, some containing megasporangia, and other microsporangia.

Ecology & Population Data: Floating in stagnant water in ponds, ditches and paddy fields; Frequent. Vegetative reproduction rapid by fragmentation.

Specimen examined: India, Chhattisgarh: Korba district, Kerakachhar, 23.03.2026, S. Anand, 564; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

***Selaginella* P.Beauv. (Selaginellaceae)**

1. ***Selaginella ciliaris*** (Retz.) Spring, Bull. Acad. Roy. Sci. Bruxelles 10: 231. 1843; *Lycopodium ciliare* Retz., Observ. Bot. 5: 32. 1789; Dixit, Cens. Indian Pterid. 12. 1984.

Main stems creeping, 3-10 cm long, stramineous, glabrous, angular, rooting at intervals but mostly near base. Leaves dimorphic; lateral leaves unequal sided, ovate lanceolate, ciliate, acute or obtuse at apex, pointing outwards; median leaves nearly equal sided, ovate with prominent midrib, ciliate, cuspidate at apex, pointing upwards; axillary leaves equal sided, ovate, acute at apex, ciliate at base. Strobili terminal, 5-10 mm long; sporophylls dimorphic, those of the upper side unequal sided, lanceolate, ciliate, acuminate at apex; those of the lower side, ovate, keeled, acuminate at apex, the margins with long conspicuous cilia.

Ecology & Population Data: Growing on exposed rocks; Abundant.

Specimen examined: India, Chhattisgarh: Korba district, Lemru road, 30.06.2026, S. Anand, 410; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

***Tectaria* Cav. (Polypodiaceae)**

1. ***Tectaria coadunata*** (J.Sm.) C.Chr., Contr. U.S. Natl. Herb. 26: 331. 1931; *Sagenia coadunata* J.Sm.,

J. Bot. (Hooker) 4: 184. 1841; Dixit, Cens. Indian Pterid. 142. 1984. (Fig.2. C).

Rhizome short creeping, stout. Stipes about 20 cm long, not winged, with lanceolate, puberulent, brown scales at base; fronds ovate-deltoid, bipinnatifid, with 1-3 pairs of free lateral pinnae below the pinnatifid apical portion; texture thin; stipes and rachis stramineous, covered with small ctenitis hairs, the costae veins on both surfaces and margins also bearing ctenitis hairs; veins anastomosing with included veinlets; veins along the costa forming one row of costal arches. Sori usually borne on the end of included veinlets, sometimes on a plexus of veinlets; indusia thin, brown, reniform, puberulent.

Ecology & Population Data: In forests at low lands; Rare.

Specimen examined: India, Chhattisgarh: Korba district, Labed, 30.06.2026, S. Anand, 620; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

***Thelypteris* Schmidel (Aspleniaceae)**

1. ***Thelypteris dentata*** (Forssk.) E.P.St.John, Amer. Fern J. 26(2): 44. 1936; *Christella dentata* (Forssk.) Brownsey & Jermy, Brit. Fern Gaz. 10: 338. 1973. (Fig.3. N)

Rhizome suberect, short, scaly; scales upto 1 cm long, margin entire. Stipe 12-20 cm long, brownish, scaly and hairy. Lamina unipennate, 40-55 cm long, lanceolate, hairy, apex acuminate; pinnae 15-20 pairs, subopposite to alternate, lanceolate. Rachis hairy. Venation veins pinnate, alternate, parallel, reaching margin. Sori small, brown, round, in two rows. Indusium reniform brown, shortly hairy.

Ecology & Population Data: On stream banks; Rare.

Specimen examined: India, Chhattisgarh: Korba district, Rajgamar road, 30.06.2026, S. Anand, 624; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

2. ***Thelypteris prolifera*** (Retz.) C.F.Reed, Phytologia 17: 306. 1968; *Hemionitis prolifera* Retz., Observ. Bot. 6: 38. 1791; Verma, et al., Flora of M.P. 80. 1993.

Rhizome creeping, scaly; scales ovate- subtriangular, hairy on margins. Stipes 30-60 cm long fronds pinnate, 1-2 mm apart, buds producing long secondary fronds, common in the axil of the pinnae; laminae of two kinds, one with a stalked terminal pinnae, the other growing indefinitely with small, lateral pinnae; pinnae almost sessile except for the terminal one, the lower distant, up to 20 cm long and 2 cm wide, the upper more closely placed and smaller, 4-9 cm long, 1-1.5 cm wide, truncate to cordate at base, acuminate at apex, texture thin but firm, usually glabrous, veinlets 7-8 pairs, close, 4-6 pairs, uniting alternately to form an intermediate

excurrent vein. Sori oblong, or elongate, along conjugated veinlets, ex-indusiate, but with capitate, orange paraphyses.

Ecology & Population Data: In shady wet places along ditches in lowlands, common.

Specimen examined: India, Chhattisgarh: Korba district, Labed, 30.06.2026, S. Anand, 617; deposited in the herbarium, Botany department, C.M.P. College, Prayagraj.

CONCLUSION

The present study provides the first systematic documentation of pteridophyte flora from the Korba district, Chhattisgarh. A total of 30 species belonging to 21 genera and 13 families were recorded from the study area. The most species-rich family was Pteridaceae (9 species), followed by Aspleniaceae (4), while Salviniaceae, Polypodiaceae, Equisetaceae, Lindsaeaceae, Schizaeaceae, and Ophioglossaceae were each represented by two species. The rest of the families were represented by single genus and single species in each family. The result highlights that most of the species are categorized as Least Concern (LC), and several remain Not Evaluated (NE). Notably, *Psilotum nudum* is listed as Critically Endangered (CR), highlighting the conservation significance of the district and the need for the targeted protection of its habitats. The district has diverse physiographic features ranging from Vindhyan dry mixed to Gondwana moist deciduous forests, along with perennial rivers that provide the ideal microhabitats for the survival and proliferation of pteridophytes. However, increasing anthropogenic disturbances, including habitat degradation and forest alteration, pose significant threats to these species by reducing the availability of suitable habitats.

This study addresses a significant gap in the floristic knowledge of central India, a region that has historically received considerably less attention than the Himalayas, Western Ghats and Northeast India. The findings presented here provide a valuable baseline for future ecological, taxonomic, biogeographical, and conservation studies. Furthermore, the documentation of both common and threatened taxa underscores the importance of long-term ecological monitoring, habitat protection, and conservation planning to ensure the persistence of this ancient lineage of vascular plants. Overall, the findings establish Korba district as a significant repository of pteridophytic diversity and emphasize its significance for future research and biodiversity conservation initiatives.

Table 1. Pteridophytes recorded from the Korba district in Chhattisgarh

S.N.	Botanical Name	Common Name	Family	IUCN Status	Habitat
1	<i>Adiantum capillus-veneris</i> L.	Southern maidenhair	Pteridaceae	LC	Crevices of moist rocks along river banks
2	<i>Adiantum incisum</i> Forssk.	Northern maidenhair	Pteridaceae	NE	In shady and moist rocky places
3	<i>Adiantum philippense</i> subsp. <i>Philippense</i>	Black maidenhair	Pteridaceae	NE	In moist situation at low mountain tracts
4	<i>Azolla pinnata</i> R. Br.	Mosquito fern	Salvinaceae	LC	In ponds, paddy fields, irrigation ditches
5	<i>Blechnum orientale</i> L.	Centipede fern	Aspleniaceae	NE	On open slopes and forest edges
6	<i>Ceratopteris thalictroides</i> (L.) Brongn.	Water sprite	Pteridaceae	LC	In muddy places along 'nalas', ponds
7	<i>Dicranopteris linearis</i> (Burm.f.) Underw.	False staghorn fern	Gleicheniaceae	LC	In shady and moist places, with little humus or in rocky alluvial soil
8	<i>Diplazium esculentum</i> (Retz.) Sw.	Vegetable fern	Aspleniaceae	LC	In shady and moist places
9	<i>Dryopteris cochleata</i> (D.Don) C.Chr.	Indian male fern	Polypodiaceae	NE	In moist localities in Sal forests
10	<i>Equisetum arvense</i> L.	Horsetail	Equisetaceae	LC	Along river-banks
11	<i>Equisetum ramosissimum</i> var. <i>huegelii</i> (Milde) Christenh. & Husby	Branched horsetail	Equisetaceae	LC	Growing along streams and paths
12	<i>Hemionitis tenuifolia</i> (Burm.f.) Christenh.	Poison fern	Pteridaceae	LC	Along roadside and in rock crevices
13	<i>Lindsaea ensifolia</i> Sw.	Graceful necklace fern	Lindsaeaceae	LC	In open areas
14	<i>Lycopodiella cernua</i> (L.) Pic.Serm.	Staghorn clubmoss	Lycopodiaceae	LC	On hillsides on exposed moist places
15	<i>Lygodium flexuosum</i> (L.) Sw.	Maidenhair creeper	Schizaeaceae	NE	In forest under moist situations along river banks
16	<i>Lygodium microphyllum</i> (Cav.) R.Br.	Old World climbing fern	Schizaeaceae	LC	In the moist areas along sloppy hills
17	<i>Marsilea minuta</i> L.	Water clover	Marsileaceae	LC	In small ditches, ponds and other reservoir along road-sides
18	<i>Odontosoria chinensis</i> (L.) J.Sm.	Lace fern	Lindsaeaceae	NE	Growing on hill slope

19	<i>Ophioglossum reticulatum</i> L.	Netted Adder's tongue	Ophioglossaceae	LC	In Sal Forest under moist situation along streams where organic matter is rich
20	<i>Ophioglossum vulgatum</i> L.	Adder's tongue	Ophioglossaceae	LC	In moist area of sal forests, marshy localities
21	<i>Psilotum nudum</i> (L.) P.Beauv.	Whisk fern	Psilotaceae	CR	In crevices of moist rocks
22	<i>Pteris biaurita</i> L.	Thinleaf brake	Pteridaceae	NE	Along streams and forest edges
23	<i>Pteris biaurita</i> L.	Cretan brake	Pteridaceae	NE	In open places and forest edges
24	<i>Pteris multifida</i> Poir.	Spider fern	Pteridaceae	NE	In moist and shady place
25	<i>Pteris vittata</i> L.	Chinese brake fern	Pteridaceae	LC	Along 'nalas' in the crevices of walls and rocks
26	<i>Salvinia natans</i> (L.) All.	Floating fern	Salviniaceae	LC	Floating in stagnant water in ponds, ditches and paddy fields
27	<i>Selaginella ciliaris</i> (Retz.) Spring	Fringed spikemoss	Selaginellaceae	NE	Growing on exposed rocks
28	<i>Tectaria coadunata</i> (J.Sm.) C.Chr.	Halberd fern	Polypodiaceae	NE	In forests at low lands
29	<i>Thelypteris dentata</i> (Forssk.)E.P.St. John	Downy maiden fern	Aspleniaceae	LC	On stream bank
30	<i>Thelypteris prolifera</i> (Retz.) C.F.Reed	Riverine scrambler	Aspleniaceae	NE	In shady wet places along ditches in low lands





Figure 2. Representation of some species collected during the field study. (A) *Psilotum nudum* (L.) P.Beauv.; (B) *Ophioglossum vulgatum* L.; (C) *Tectaria coadunata* (J.Sm.) C.Chr.; (D) *Lycopodiella cernua* (L.) Pic.Serm.; (E) *Equisetum ramosissimum* var. *huegelii* (Milde) Christenh. & Husby; (F) *Odontosoria chinensis* (L.) J.Sm.; (G) *Dicranopteris linearis* (Burm.f.) Underw.; (H) *Ceratopteris thalictroides* (L.) Brongn.; (I) *Lygodium flexuosum* (L.) Sw.; (J) *Pteris multifida* Poir



Figure 3. Representation of some species collected during the field study. (K) *Lindsaea ensifolia* Sw.; (L) *Adiantum capillus-veneris* L.; (M) *Blechnum orientale* L.; (N) *Thelypteris dentata* (Forssk.) E.P.St.John; (O) *Hemionitis tenuifolia* (Burm.f.) Christenh.; (P) *Marsilea minuta* L.

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