CHANG, YU-LUNG Studies in the spore morphology of *Loxogramme* Presl. *Acta Bot. Sin.* 11 (1) : 26-37. 1963.

CHING, R. C. AND WU SU-KING, Flora of Xiangica, Vol.1. Pteridophyta ed. by Wa Cheng-Yita. Science Press. China. 6-350. 1983.

COPELAND, E. B. The genus *Loxogramme*. *Phillip. Journ. Sci. Bot.* 11(1): 43-47, 1916.

DIXIT, R.D. D. HAJRA AND B. D. KAR. *Loxogramme remote frondigera* (Hayata) C. Chr. a new record for India and China. *Bull. Bot. Surv. India. 18: 222, f. 1-3. 1979.*

DIXIT, R.D. A. Census of the Indian Pteridophytes. Botanical Survey of India, Howrah. 1984.

HOOKER, W. J. and R.K. GREVILLE, Icones Filicum, Vol. 1, London, 1831.

NAYAR, B. K. AND S. Kaur. Companion to Beddome's Handbook Today & Tomorrow's Publication. New Delhi. 1974.

OHASHI, H. Pteridophyta in H. Hara. Flora of Eastern Himalayas, 3rd report, *Bull. Univ. Mus. Univ. Tokyo*, No. 8, 166-205. 1975.

PANIGRAHI, G. Pteridophytes of Eastern India: Enumeration of the species collected and their nomenclature. *Bull. Bot. Surv. India* 2: 303-314. 1960.

PRICE, G.M. Three new combinations in *Loxogramme*. *Amer. Fern Jour.* 80(1): 3-8, 1990.

SINGH. AND G. PANIGRAHI Notes on two species of *Loxogramme* Presl. (Pteridophyta) in the Eastern Himalayas. *Bull. Bot. Surv. India* 27(1-4) : 252-254, f. 1-7, 1985.

SLEDGE, W.A. The Polypodiaceae and Grammitidaceae of Ceylon. *Bull. Brit. Mus. (N.H.) Bot.* 2(6): 133-158. 1960.

TAGAWA, M. *Loxogramme* of Japan *Acta Phytotax. Geo. Bot.* 13: 118- 129. 1943.

—— Pteridophyta in H. Hara's Flora of Eastern Himalayas. *Univ. Tokyo* 494 - 495. 1966.

—— Flora of Eastern Himalayas, 2nd report, *Bull. Univ. Mus. Univ. Tokyo* No. 2 : 218. 1971.

PROPER DISTRIBUTION AND CORRECT IDENTITY OF *LOXOGRAMME INVOLUTA* (D. DON) PRESL. IN INDIA

Beddome (1892) recognized the occurrence of only three species of *Loxogramme* Presl., from British India, Ceylon and the Malay Peninsula, of which only *L. lanceolata* (Sw.) Presl., and *L involuta* (D. Don) Presl., reported from the Indian region. Scrutiny of the specimens revealed that a majority of specimens with larger fronds are identified as *L. involuta* in Central National Herbarium (CAL.). Among specimens with larger fronds, recently Price (1984) made a new combination as *Loxogramme cuspidata* (Zenker) Price from South India. But, the specimens of *L. cuspidata* (Zenker) Price from South India were wrongly identified as *L. involuta* (D. Don) Presl., in Indian Herbaria. Critical examination of *L. involuta* (D. Don) Presl., from Calcutta Herbarium and the Herbaria of Regional Circles, Botanical Survey of India; National Botanical Research Institute, Lucknow; Forest Research Institute, Dehradun; together with protologue, available literature and cibachrome photographs of type material from Kew Herbarium revealed that *L. involuta* (D. Don) Presl., is a mixture of number of species which were wrongly identified in all Indian Herbaria. Price (1990) described a new species of *Loxogramme* from Sikkim Himalayas as *L. porcata* Dixit and Das (1994) reported that the specimens from North-West Himalayas are entirely different from the previously identified *L. involuta*. Detail study of true *L. involuta* (D. Don) Presl., authors found that it does not occur in North-West Himalayas. Species segregated from *L. involuta* complex from Western Himalayas and described as *L. mussooriana* Dixit and Das. A number of new taxa and new records of species segregated from *L. involuta* complex *viz.* *L. carinata* Price, *L. wallichiana* (Hook.) Price, *L. ensiformis* Ching, *L. manipuriana* Das and Dixit. Our studies on *L. involuta* (D. Don) Presl. conclude that it is not an abundant species in India as recorded in the past; but confined only to Eastern India and can be easily distinguished from

all other species of *Loxogramme* Presl., as shown in the key. By the following diagnostic characters i.e. presence of ovate-lanceolate scales, lamina broadest in the middle, coriaceous in the texture, lamina becomes deep brown in colour and on drying margins strongly involute, costa brownish-violet, sori starts from the lower half of lamina, and starts near the costa to well within the margins.

In view of the prevailing confusion regarding taxonomy and distribution of *L. involuta* (D. Don) Presl., it is considered appropriate to provide the correct nomenclature, detailed description, specimen examined, distribution and key to all the species of (confused taxa to facilitate easy identification) *L. involuta* complex in India.

KEY TO THE SPECIES

1a. Fronds smaller, 1.5-25 cm × .6-1.8 cm:

1b. Fronds larger, 25-90 cm × 1-6 cm:

2a. Stipes long :

3a. Stipes purplish black at base lamina with long acuminate apex ...*L. remotefrondigera*

4a. Stipes 3-4 cm long, lamina 32-40 cm long ...*L. cuspidata*

4b. Stipes 5-6 cm long, lamina 47-55 cm long ... *L. duclouxii*

3b. Stipe not coloured, lamina acute to acuminate at apex ...*L. salicifolia*

2b. Stipes very short or absent :

5a. Lamina 25-54 cm long, sori confined upper 3/4 or more of lamina :

6a. Lamina lanceolate to linear-lanceolate :

7a. Lamina thick, costa raised, scales ovate to linear-lanceolate :

8a. Leaf margin not cartilaginus but involute ...*L. involuta*

8b. Leaf margins cartilaginous not involute ...*L. porcata*

7b. Lamina thin, costa not raised, scales broadly ovate- lanceolate ...*L. mussoorjana*

5b. Lamina 34-90 cm long, sori confined upper 1/2 or less of lamina:

6b. Lamina oblanceolate ...*L. carianta*

9a. Fronds 25-45 cm long, scales narrowly ovate-lanceolate ...*L. wallichjana*

9b. Fronds 20-25 cm long, scales broadly ovate-lanceolate ...*L. ensiformis*

Loxogramme involuta (D. Don) Presl. Tent. Pterid. 215.1836; Bedd. Ferns South India 17, t. 50. 1863; Handb. Ferns Brit. India 393, t. 228. 1883; Dixit, Census Indian Pterido. 33. 1984. *Grammitis lanceolata* D. Don, Fl. Nepal. 14. 1825. *Gymnogramme involuta* Hook. Sp. Fil. 5. 155. 1864; Clarke, Trans Linn. Soc. Lond. 11. Bot. 1. 570. 1880.

Rhizome thick, creeping clothed with bunch of thick roots and dark-brown to black, clathrate, ovate-lanceolate scales. Fronds 2-8 mm apart; lamina elliptic-lanceolate to lanceolate, 20-35 cm × 2.0-3.5 mm thick in texture, broadest in the middle, apex acuminate, margins involute at maturity, brown on drying midrib raised on the lower half. Sori oblique 4.0-4.6 cm long, 2-3 mm apart, very close to midrib than the margins; spores monolete 75- 80 × 45-50 μm verrucoid.

Specimens examined : (Only selected specimens are cited) INDIA: Manipur 2000 m, 18-3-1984, *Ghosh* 16546 (CAL). Meghalaya, 28-6-1956; *Deka* 3622 (ASSAM, CAL) Sikkim; Gangtok 19-5-1961. *Mazumdar* 87(CAL), Darjeeling Jalapahar, 12-5-1976; *Sikdar* 4610(CAL), Kalimpong 1800 m, 7-6-1983; *Ghosh* 57665(CAL), Naga hills 1-3-1982. *H. Collect* 71. (CAL).

Type cibachrome photograph examined: Nepal, East Nepal, *Wall.* CAL. 1820(K).

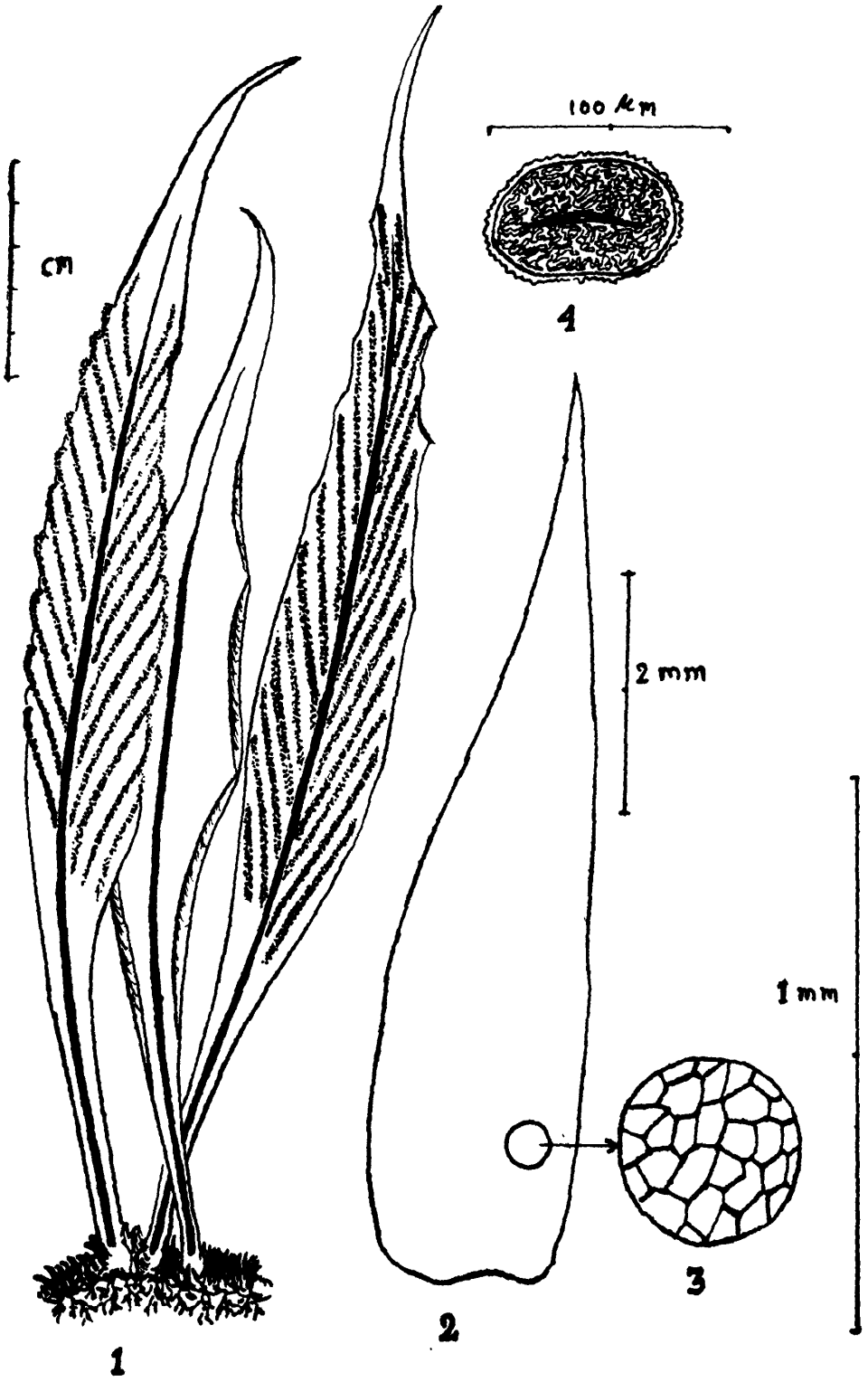
Distribution : India: Meghalaya, West Bengal, Sikkim, Manipur, Nagaland, Assam; Nepal.

ACKNOWLEDGEMENTS

Grateful thanks are due to Dr. P.K. Hajra, Director, Botanical Survey of India, Calcutta for encouragement. Our thanks are also due to the Regional Botanist, Botanical Survey of India, Royal Botanic Gardens, Kew, England, for sending type photographs.

SILPI DAS AND R.D. DIXIT

Botanical Survey of India, Howrah and Allahabad



Figs. 1-4: *Loxogramme involuta* (D.Don) Presl. 1. Habit; 2. Camera lucida sketches of rhizoid scales; 3. Camera lucida sketches of cells of scales; 4. Camera lucida sketches of proximal part of spores.

REFERENCES

BEDDOME, R.H. The Ferns of Southern India. Madras, 1863-1864, Reprinted Edition, New Delhi, 1970. 1883. A Handbook to the Ferns of British India, Ceylon and the Malay Peninsula. Thacker Spink & Co. Calcutta. 1863-'64.

——— Supplement to the Ferns of British India and the Ceylon and Malay Peninsula. Thacker Spink & Co. Calcutta. 1892.

DIXIT, R.D. A Census of the Indian Pteridophytes. Botanical Survey of India, Howrah; 1984.

——, DIPALI HAZRA AND B.D.KAR. *Loxogramme remote frondigera* (Hayata) C. Chr., a new record of India and China. *Bull.Bot.Surv.India* 18(1-4): 222, 1976 (released in 1979).

—— AND SILPI DAS. *Loxogramme mussooriana* Dixit and Das, a new species of Fern from India. *Indian Fern Journal* 11: 1994.

—— Two species of *Loxogramme* Presl.-new to India. *Ibid.* 11:1994.

—— *Loxogramme cuspidata* (Zenk.) Price-a little known endemic Fern from South India with conservation strategy, *Bull.Bot.Surv.Ind.* 35(1-4) : 1993.

PRICE, M.G. Three new combinations in *Loxogramme*. *Amer. Fern J.* 74.(2) : 61, 1984.

—— Four new Asian *Loxogramme*. *Ibid.* 80(1): 4-8. 1990.

LOXOGRAMME CUSPIDATA (ZENK.) PRICE - A LITTLE KNOWN ENDEMIC FERN FROM SOUTH INDIA

In the course of revisionary studies of the family Loxogrammaceae Ching ex Pic. Ser. in India, the authors came across a new combination Loxogramme cuspidata (Zenk.) Price, the type of which came from Ootacammand, Nilgiris, South India, led the authors to request for type material and correspondence with Dr. M. G. Price of Michigan University, U.S.A. The receipt of Cibachrome photograph of type material from Kew and requisite literature with suggestions from Dr. Price, Michigan University, U.S.A. (Personal communication, April, 1993) confirmed our views that South Indian material identified as *L. involuta* D. Don actually represents *L. cuspidata* (Zenk.) Price hither to taxonomically little known species from South India. In the absence of detailed description, proper illustration etc., as well as endemic status of taxon, it is found appropriate to provide the above details for this little known species.

Loxogramme cuspidata (Zenk.) Price in Amer. Fern Journ. 74 : 61, 1984; *Grammitis cuspidata* Zenk. Plantae 1 : t. 2. 1835. *Loxogramme involuta auct. non* Zenk.; Bedd., Handb. Ferns Brit. India 393. 1883; Dixit, Cons. Indian Pterid. 33. 1984 (p. p.).

Rhizome thick, 3-4 mm in diameter, long creeping, clothed with clathrate, dark brown, dense adpressed, ovate-lanceolate scales and bunch of roots, stipes 3-4 cm long, base black at least abaxially. Fronds large, simple, lamina pale-green, paperaceous 32-40 × 2-3 cm, broadest above the middle, apex cuspidate, margins smooth; midrib slightly raised on the lower side. Sori above the middle part of lamina, oblique, 2.5 - 3.0 cm long, *ca* 2 mm thick, 3-5 mm apart, very close to the midrib and 4-5 mm away from the margins. Spores pale yellow, monolete, 110-120 × 50 - 60 µm.

Distribution : South India - (Karnataka, Kerala, Tamil Nadu), endemic.

Specimens examined : All at CAL. SOUTH INDIA, 1858, *Beddome* 46; *Herb. Wight* 3170; *V. Narayanswamy party s. n.* TAMIL NADU Nilgiri : Ootacamund, 15.8.1878, *G. King* 2430; Kodaikanal, 21.4.1883, *Levinge* 24309; Nilgiri 5.1883, *Gamble* 11480; Santaveri : Bababoodu hills, 4000 ft. 19.10.1908. *Meebold* 7885; Nilgiri Glennargan Forest, Pykara, 17.6.1981, *Vajravelu* 77711 (MH, CAL); Coimbatore Bellagi Shola, 5000 ft., 25.8.1905, *Fischer* 209; Naduvattam 29.8.1970, *B. D. Sharma* 35905 (MH) KERALA Devicolam Tran, 12.1910, *Meebold s.n.*