

P. T. K. MOHAN\* & S. M. JORAPUR\*: **Cytotaxonomical studies of the genus *Luisia* Gaud. (Orchidaceae) from South India**

P. T. K. モハン\*・S. M. ジョラプール\*: 南インドの  
ボウラン属の細胞分類学的研究

Genus *Luisia* Gaud. belongs to the subtribe Sarcanthinae of the tribe Epidendreae. It is a native of India comprising of about 25 species distributed through south east Asia to Japan. Hooker (1890) reported 13 species from India. Cooke (1908) reported 2 species viz., *Luisia teretifolia* Gaud. and *Luisia tenuifolia* Bl. as occurring in his 'Flora of Presidency of Bombay'. Gamble (1928) also reported the above 2 species in his 'Flora of Presidency of Madras'. But, Blatter & McCann (1932), while revising the flora of Bombay Presidency, made a report of 6 species viz., *L. teretifolia* Gaud., *L. tenuifolia* Bl., *L. pseudotenuifolia* Blatt. & McC., *L. truncata* Blatt. & McC., *L. evangelinae* Blatt. & McC., *L. macrantha* Blatt. & McC. as belonging to this genus. Santapau & Kapadia (1966), however, working on the same locality, described only 3 species. Further, on the basis of their critical observations on the fresh material, the authors reduced the six species of Blatter & McCann into three, namely, *L. teretifolia* Gaud. *L. tenuifolia* Bl. var. *evangelinae* (Blatt. & McC.) Sant. & Kap., *L. macrantha* Blatt. & McC.

In order to elucidate the taxonomic status of the species described by Blatter & McCann (1932) and Santapau & Kapadia (1966), the present morphological and cytological work is envisaged.

The chromosome number reports in the species of this genus have been made by Midzuno (1940), Pancho (1965), Chatterjee (1968), Mehra & Vij (1970), Arora (1971), Mehra & Kashyap (1973) and Kulkarni & Jorapur (1979).

**Material and method** Material for the present investigation was collected from various localities of south western parts of India. *L. teretifolia* Gaud. has been collected from Mercara (Coorg Dist.), *L. tenuifolia* Bl. var. *evangelinae* (Blatt. & McC.) Sant. & Kap. from Anmod (Belgaum Dist.), *L. macrantha* Blatt. & McC. from Yellapur and Haliyal (North Kanara Dist.).

\* Orchid Laboratory, Department of Botany, Karnatak University, Dharwad-580 003, India.

Tjio & Levan (1950) oxyquinoline aceto-olcein technique was adopted for chromosome study. The temporary preparations were photographed, and sketches were made with camera-lucida at the table level.

**Morphological and taxonomic considerations** While classifying the species in the genus *Luisia* Gaud. into six species, Blatter & McCann (1932) separated *L. teretifolia* Gaud. and *L. truncata* Blatt. & McC. on the basis of leaf and petal characters. According to them, the petals are linear and obtuse in the former and strap-shaped and truncate in the latter. These observations were made by them from the descriptions given by Miss E. Bell and from the manuscript notes of Mr. T.R. Bell. Further, *L. pseudotenuifolia* Blatt. & McC. and *L. evangelinae* Blatt. & McC. were treated as separate and distinct species on the basis of differences in the leaf and sepal morphology.

On the other hand, Santapau & Kapadia (1966), who have made a careful examination of the fresh material, opined that *L. truncata* Blatt. & McC. is identical with *L. teretifolia* Gaud. Further, *L. pseudotenuifolia* Blatt. & McC. and *L. evangelinae* Blatt. & McC. have also been considered as identical as their morphology is quite similar, except for a few minor morphological differences in the leaf and sepal characters. Later, on the basis of the observations on floral characters they have treated *L. evangelinae* Blatt. & McC. as a variety of *L.*

Tab. 1. Morphological characters of the three species of *Luisia* Gaud.

Taxon	Hypochile		Epichile		Sinus	Leaf
	Side lobes	Venation	Surface	Apex		
<i>L. tenuifolia</i> var. <i>evangelinae</i>	small	promin- ently 3-nerved	somewhat raised	mucronulate, with 2 diverging lobules	narrow	caudate at apex jointed to the leaf
<i>L. macrantha</i>	small round, ear-like, 2 lobules	nerves not prominent	clearly raised	broadened with 2 wide orbicular lobules	broad	apex with a short conical apiculum on the outer side
<i>L. teretifolia</i>	completely reduced	venation obscure	somewhat deflexed	rhomboid, obtuse, slightly 3-lobed	absent	open rounded

*tenuifolia* Bl. as the morphological differences are apparent between them. However, *L. macrantha* Blatt. & McC. has been maintained as a distinct species on the basis of its having large flowers and inflorescence.

In the present taxonomic investigation, however, the primary importance is given to the epichile and hypochile structures of the lip and the secondary importance is given to the other vegetative characters (Tab. 1).

#### Cytological considerations

*L. tenuifolia* Bl. var. *evangelinae* (Blatt. & McC.) Sant. & Kap. (Fig. 1: 1 and 1a)

The somatic chromosome number in this species is  $2n=38$ . The karyotype of this species mainly consists of medium-sized chromosomes. Of the 19 pairs, 17 have median and 2 have submedian centromeres. The size gradience of the chromosomes is gradual. The longest chromosome in the complement measures  $3.64 \mu\text{m}$  and the smallest  $1.68 \mu\text{m}$ . The total chromatin length is  $50.12 \mu\text{m}$ . Karyotype formula:  $KM=2n=38, 28M(m)+2M(sm)+6S(m)+2S(sm)$ .

*L. macrantha* Blatt. & McC. (Fig. 1: 2 and 2a)

The diploid chromosome number in this species is also  $2n=38$ . Out of the 19 pairs, twelve are medium-sized chromosomes and 7 are short ones. Two pairs of medium-sized median chromosomes have 'Sats' on their short arms. The longest chromosome in the complement measures  $3.92 \mu\text{m}$  and the smallest  $1.40 \mu\text{m}$ . The absolute chromosome length is  $45.30 \mu\text{m}$ . Karyotype formula:  $K=2n=38, 12M(m)+12M(sm)+8S(m)+6S(sm)$ .

*L. teretifolia* Gaud. (Fig. 1: 3 and 3a)

The somatic chromosome count made in this species is  $2n=38$ . There are 10 pairs of medium-sized and 9 pairs of short chromosomes. The karyotype comprises of eight pairs of median and eleven pairs of submedian chromosomes. Pair nos. 1, 3 and 5 have 'Sats' on their short arms. The chromosome length varies from the longest being  $3.64 \mu\text{m}$  to the smallest  $1.40 \mu\text{m}$ . The total chromatin length is  $42.34 \mu\text{m}$ . Karyotype formula:  $K=2n=38, 10M(m)+10M(sm)+6S(m)+12S(sm)$ .

**Discussion** Arora (1971) reports  $n=20$  for *L. trichorhiza* Bl. and *L. brachystachys* Bl. However,  $n=19$  has been reported by Mehra & Vij (1970) and Mehra & Kashyap (1973) in *L. inconspicua* Hook. f. and *L. trichorhiza* Bl. respectively. Pancho (1965), Chatterjee (1968), Mehra & Vij (1970) and Kulkarni & Jorapur (1979) have reported  $2n=38$ . Besides this, a different number as  $2n=40$

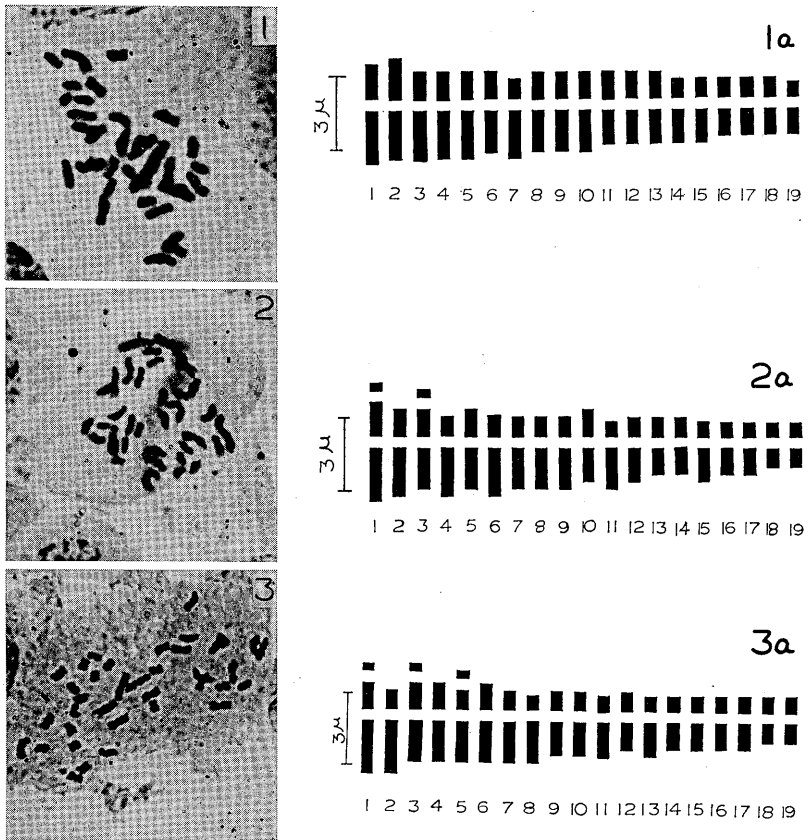


Fig. 1. Karyotypes of the three species of *Luisia*. Microphotographs of the somatic metaphase plate and their idiograms respectively. 1 & 1a: *L. tenuifolia* var. *evangelianae*. 2 & 2a: *L. macrantha*. 3 & 3a: *L. teretifolia*.

is also given by Midzuno (1940). However, the diploid chromosome number as recorded in the present investigation for all the three species studied is also  $2n=38$ . Though the  $2n$  number is the same in all the three species investigated presently, their chromosome morphology varies from species to species. For example, the presence of more number of median chromosomes and absence of 'Sats' has resulted in a mostly symmetrical karyotype in *L. tenuifolia* var. *evangelianae* (Blatt. & McC.) Sant. & Kap. (Fig. 1: 1a). In *L. macrantha* Blatt. & McC., on the other hand, a comparative advancement in the karyotype can be

observed. Here, only 10 pairs of median chromosomes are present as against 17 in the former species (Fig. 1: 2a). Another point of interest is the presence of 2 pairs of 'Sat' chromosomes in the complement. Lastly, the karyotype of *L. teretifolia* Gaud. seems to be comparatively asymmetrical as a consequence of more number of submedian chromosomes, presence of 'Sat' chromosomes and an increase in the number of short chromosomes (Fig. 1: 3a) as compared with the former two species. The size of the chromosome is also observed to diminish from *L. tenuifolia* var. *evangelinae* through *L. macrantha* to *L. teretifolia*.

Thus, the present karyomorphological studies have minimized the earlier confusion regarding the two species of Cooke (1908), six species of Blatter & McCann (1932) and three of Santapau & Kapadia (1966) in delimiting the species.

### References

- Arora, C.M. 1971. IOPB chromosome number reports. *Taxon* 20(5/6): 785-797.  
 Blatter, E. & C. McCann 1932. Revision of the flora of the Bombay Presidency 17: 491-494.  
 Chatterji, A.K. 1968. Orchid cytology in India. *Cyto. and Gene.* 3: 32-40.  
 Cooke, T. 1906. The flora of Presidency of the Bombay 3: 205-206.  
 Gamble, J.S. 1928. The flora of Presidency of Madras 3: 1005-1006.  
 Hooker, J.D. 1890. The flora of British India 6: 22-25.  
 Kulkarai, H.D. & S.M. Jorapur 1979. IOPB chromosome number reports. *Taxon* 20(4): 391-408.  
 Mehra, P.N. & S.P. Vij 1970. IOPB chromosome number reports. *Taxon* 20: 785-797.  
 Mehra, P.N. & S.P. Kashyap 1978. IOPB chromosome number reports *Taxon* 27(2/3): 225-231.  
 Midzuno, P. 1940. Chromosome number reports. The Orchids—a scientific survey. Ed. Withner, C.L. Ronald Press, New York.  
 Pancho, J. 1965. Index to plant chromosome number, 1965. Santapau, H. & Z. Kapadia 1966. The Orchids of Bombay. Government of India Press, Calcutta, 212-218.  
 Tjio, J.H. & A. Levan 1950. The use of oxyquinoline in chromosome analysis. *Ann. Estac. Exp. Aula. Die.* 2: 21-64.

\* \* \* \*

南インドに産するボウラン属は Blatter & McCann (1932) は 6 種とし, Santapau & Kapadia (1966) は 3 種としている。生品による観察と染色体を調べた結果, 3 種とする Santapau 等の調査の正しいことを明らかにした。