

Study on leaf venation of four *Nervilia* (Orchidaceae) from the state of Karnataka, India

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Abstract

In this article we discuss the leaf veining of four *Nervilia* found in Karnataka, India: *Nervilia concolor*, *Nervilia infundibulifolia*, *Nervilia plicata* and *Nervilia simplex*. The campylodrome or brochidodrome primary veins of species of this genus are accompanied by many diverse secondary, and tertiary veins. They are discussed here and accompanied by illustrations. A determination key, based on leaf venation, is also proposed.

Résumé

Dans cet article nous discutons de la nervation des feuilles de quatre *Nervilia* trouvés au Karnataka, en Inde : *Nervilia concolor*, *Nervilia infundiulifolia*, *Nervilia plicata* et *Nervilia simplex*. Les nervures primaires campylodromes ou brochidodromes des espèces de ce genre sont accompagnées de nombreuses nervations secondaires et tertiaires diverses. Elles sont ici discutées et accompagnés d'illustrations. Une clé de détermination, basée sur la nervation foliaire, est également proposée.

Keywords: Geophyte plants, terrestrial orchids, venations campylodromous and brochidodromous, Western Ghats of India.

Mots clés : Ghâts occidentaux de l'Inde, nervures campylodromes et brochidodromes, orchidées terrestres, plantes géophytes.

Introduction

The etymology of *Nervilia* Commerson ex Gaudichaud (1829: t. 35) is derived from latin word 'nervus' meaning 'veins' in reference to the prominent leaf veins in the of species of the genus (ANBG, 2023). *Nervilia* records 83 species across the world from the subtropical and tropical regions of Africa, Asia, Australia, and Oceania (POWO, 2023). In India there are 15 species of *Nervilia* recorded by Singh *et al.*, 2019. According to various authors, notably Sanjappa & Sringshwara (2019) and Lakshminarasimhan *et al.* (2019) 5 or 6 species of *Nervilia* are recorded in the flora of Karnataka. The study was carried out on the vegetative parts, in particular the leaves, of four species that we were able to observe in the Karnataka state and found in evergreen, semi-evergreen and moist-deciduous forest floor: *N. concolor* (Blume, 1825: 416) Schlechter (1911: 404) on the road to Jambotikankumbi, Belgaum; *N. infundibulifolia* Blatter & McCann (1932: 725) in the Anshi National Park, Dandeli, Uttara kannada; *N. plicata* (Andrews, 1803: 321) Schlechter (1911: 403) in the Khanapur forest range, Belgaum and *N. simplex* (Sprengel, 1826: 736) Schlechter (1911: 401) on the Alnavar road, Dharwad. A recent study on the anatomical characteristics of the leaves of *Nervilia* from Karnataka was carried out by Soumya & Krishnaswamy (2021) however, these last two authors did not discuss the venation of the leaves. They are detailed here.

Materials and method

Specimens collected were identified using the floras in particular from Rao (1998) and Rao & Sridhar (2007). *Nervilia* arise above the ground during first monsoon season i.e. in the months of May-June. During May-June they produce inflorescence scape with beautiful flowers and for few days (fig. 1), after pollination they produce a capsule. Single leaf arise from the tuber. The four leaf samples were collected at maturity during field surveys from June to July 2022.

The collected and dried leaves were kept in sodium hypochlorite for 24 hours to degrade the leaf tissues other than the venations and veinlets (Amanda *et al.*, 1999). After that, the leaves have been meticulously studied under stereo-microscope with the help of light at the ventral side. The leaves were drawn using Rotring pen with various sizes as per primary, secondary and tertiary veins.

Results

The *Nervilia* leaf has various shape, structure with different venations. The primary veins of *Nervilia* species are campylodromous or brochidodromous, secondary veins are paralleldromous and semicraspedodromous (Radford *et al.*, 1974; Amanda *et al.*, 1999). The various primary, secondary and tertiary venations are presented in Table 1.

Table1: Venation pattern of the four *Nervilia* of Karnataka studied

	primary veins	secondary veins	tertiary veins
<i>N. concolor</i> (fig. 2.1)	brochidodromous	paralleldromous	alternate percurrent
<i>N. infundibulifolia</i> (fig. 2.2)	campylodromous	semicraspedodromous	mixed opposite with alternate
<i>N. plicata</i> (fig. 2.3)	campylodromous	semicraspedodromous	mixed opposite or alternate
<i>N. simplex</i> (fig. 2.4)	campylodromous	semicraspedodromous	alternate percurrent

Key using the leaf-venation of the four *Nervilia* studied

1. Brochidodromous primary nervations with more than 13 veins, secondary veins paralleldromous *N. concolor*
- 1a. Campylodromous primary nervations with up to 13 veins, secondary veins semicraspedodromous 2
2. Primary nervations very distant from each other with usually 5 secondary veins in the middle *N. infundibulifolia*
- 2a. Primary nervations very close to each other with usually 1-3 secondary veins in the middle 3

3. Primary nervations up to 13, tertiary nervations are mixed opposite or alternate*N. plicata*
- 3a. Primary nervations up to 9, tertiary nervations are alternate percurrent*N. simplex*

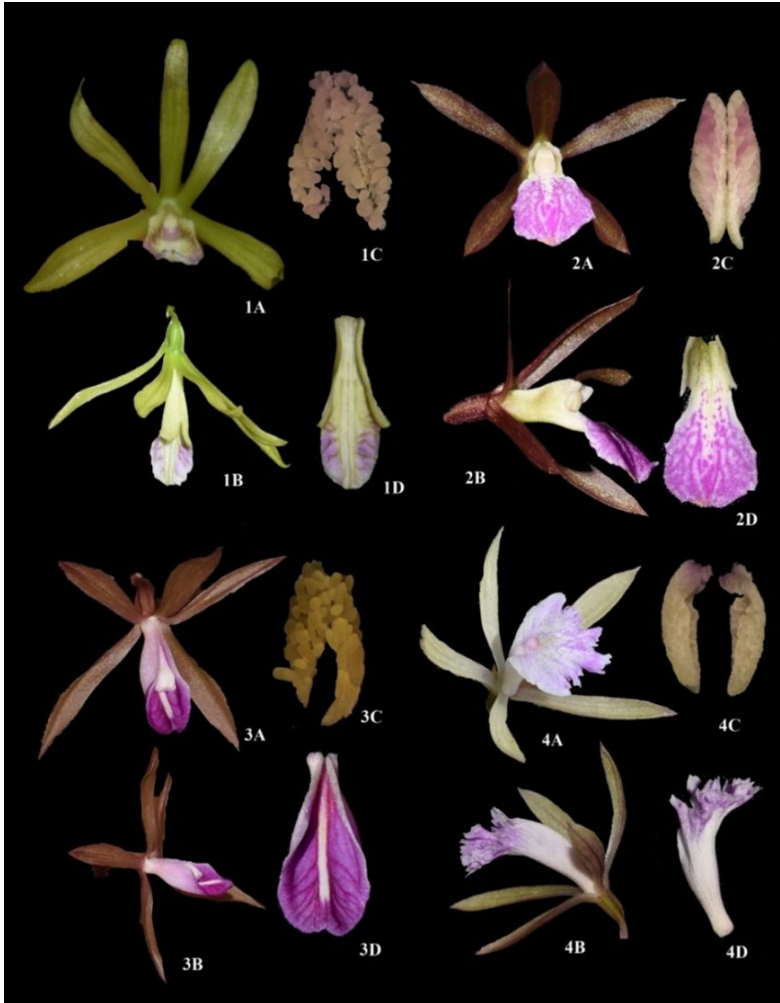


Figure 1: 1. *Nervilia concolor*, 2. *Nervilia infundibulifolia*, 3. *Nervilia plicata*. 4. *Nervilia simplex* 1A- front view of flower – 1B-top view of flower – 1C-pollinarium – 1D-lip; 2A-front view of flower – 2B-side view of flower – 2C-pollinarium – 2D-lip; 3A-front view of flower – 3B-side view of flower – 3C-pollinarium – 3D-lip; 4A-front view of flower – 4B-side view of flower – 4C-pollinarium – 4D-lip.

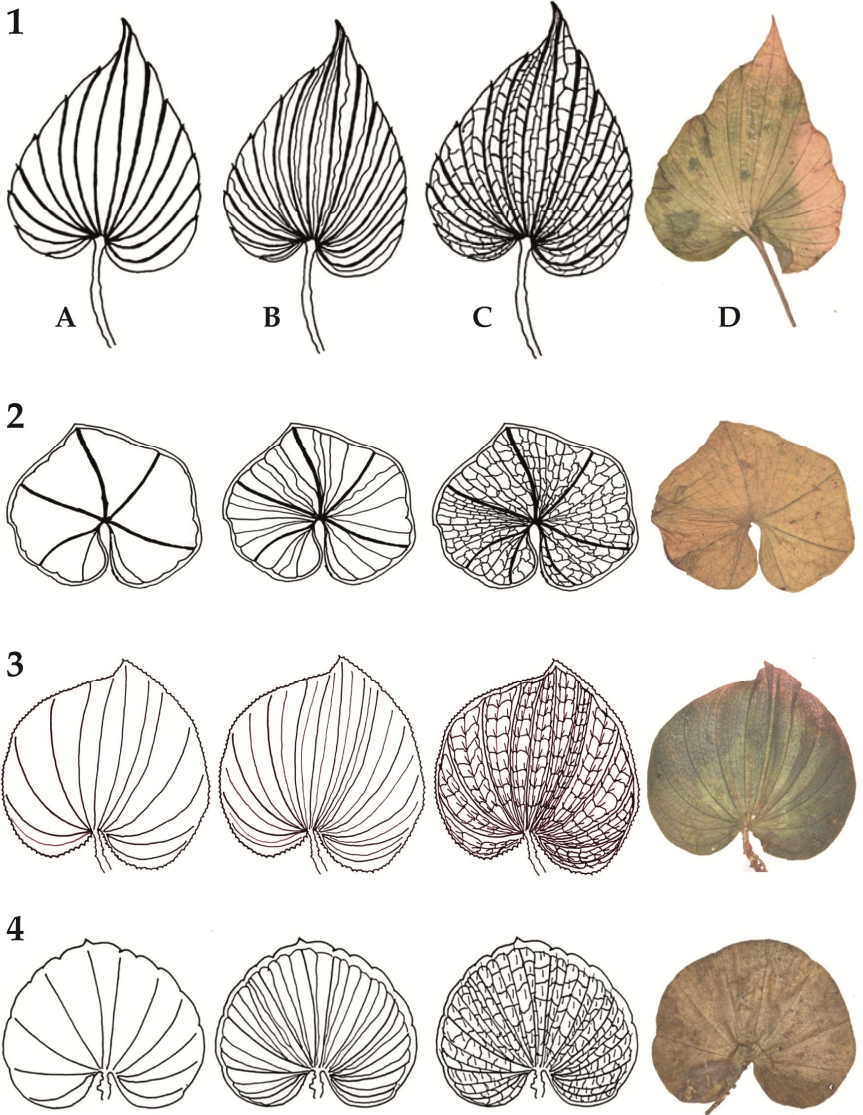


Figure 2: 1. *Nervilia concolor*, 2. *Nervilia infundibulifolia*, 3. *Nervilia plicata*, 4. *Nervilia simplex*. A- primary veins – B-primary and secondary veins – C-primary, secondary and tertiary veins – D-dried leaf specimen.

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