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FLORAL VARIABILITY IN SELECTED SPECIES OF THE GENUS *COELOGYNE* LINDL., ORCHIDACEAE

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Abstract. Correlations of the lip characters in the *Coelogyne* flower proved a synchronised development of this organ. The lip is a very interspecifically variable organ. A numerical taxonomy approach permitted to select in an ordination space some extreme species, based on a description of lip morphology, *Coelogyne salmonicolor versus C. fuliginosa* and *C. quinquelamellata versus C. nitida*. A hybrid *C. lawrenceana* × *mooreana* appeared to be close to its paternal species.

Key words: *Coelogyne*, lip morphometrics, interspecific variability

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Introduction

Orchids of the genus *Coelogyne* Lindl. are distributed in South East Asia, including East India, and on some Pacific Islands. They occupy epiphytic and rarely rocky ecological niches (Yonzone *et al.* 2012). Over 200 species are included in the genus. Main centers of the *Coelogyne* diversity are Borneo, Sumatra and the Himalayas (Gravendeel 2000). Nine sections have been recognized in the genus. Some sectional delimitations are based on morphological data, others on the recently obtained molecular data. The combination of both types of information seems to be the most reasonable in taxonomic and phylogenetic approach. However, shape of the lip base used in the traditional morphological taxonomy is less suitable in a phylogenetic approach (Gravendeel 2000). Shape of the lip is an important factor in pollination biology, therefore it cannot be neglected in the consideration of the speciation process. Endress (1994) recognized orchid flower structures as principal evolutionary factors in the family. This is especially important in the self-incompatible *Coelogyne* species (Cheng *et al.* 2009). Therefore, the purpose of the study determines which traits ought to be taken into account.

Material and methods

The morphology of the lip was analysed on herbarium specimens obtained from the private collection of Jerzy Błaszczyk. Analyses were done for the following species (symbols used in the text are in brackets): *Coelogyne bilamellata* Lindl. (b), *C. celebensis* J.J. Sm. (ce), *C. chloroptera* Rchb. f. (ch), *C. corymbosa* Lindl. (co), *C. cristata* Lindl. (cr), *C. fimbriata* Lindl. (fi), *C. flaccida* Lindl. (fl), *C. fuliginosa* Lodd. ex Hook. (fg), *C. fuscences* Lindl. (fus), *C. intermedia* Hort. (i), *C. lawrenceana* Rolfe (l), *C. lawrenceana* Rolfe × *mooreana* Rolfe (lm), *C. marmorata* Rchb. f. (m), *C. nitida* (Wall. ex D. Don) Lindl. (n), *C. parishii* Hook. f. (p), *C. quinquelamellata* Ames (q), *C. rumphii* Lindl. (r), *C. salmonicolor* Rchb. f. (sa), *C. speciosa* (Blume) Lindl. (sp), *C. tomentosa* Lindl. (t), *C. usitana* Roeth et O. Gruss (u), *C. virescens* Rolfe (v) and *C. xyrekes* Ridl. (x). Several specimens from the same species are numbered. Twelve characters of the lip were studied, as follows: length, width, shape (length/width), number of lobes, hairiness, presence of callus, presence of epichil callus, lobe indentation depth, ratio: lip length/lobe indentation, lobe length and ratio: lobe length/indentation lobe. For the numerical taxonomy of the studied material, the coefficients of Pearson's correlation were calculated and a matrix of average taxonomic distances was used

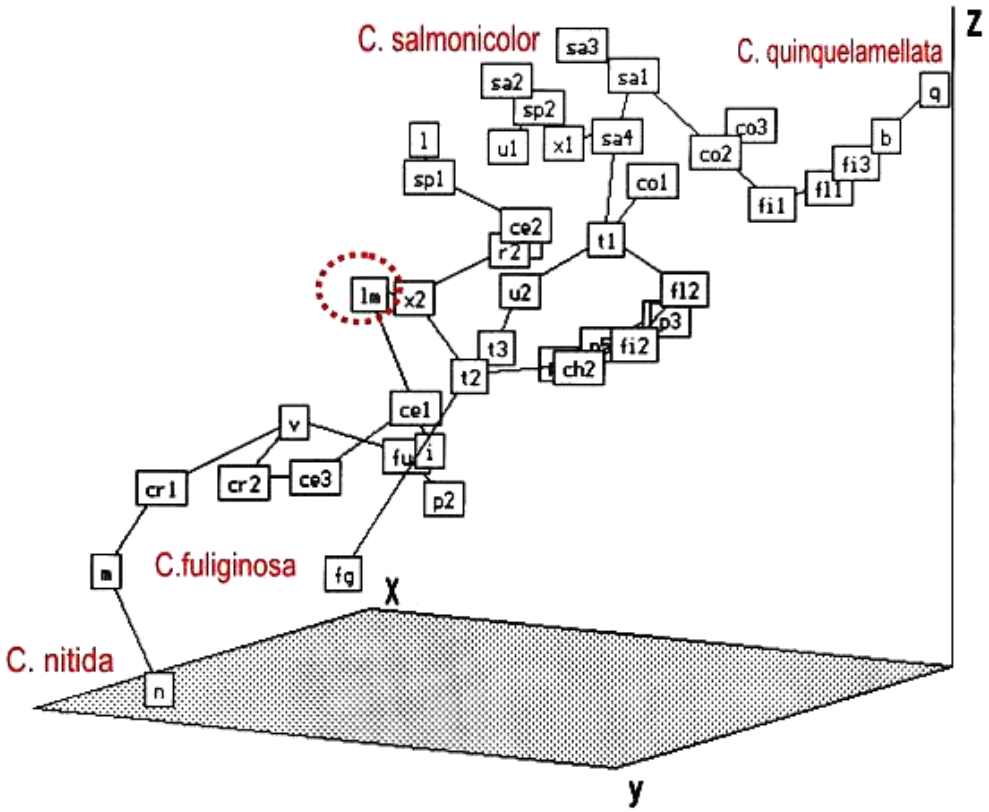

Fig. 1. A minimum spanning tree of the genus *Coelogyne* species. OTUs (species) are scattered in a non-metric multidimensional scaling ordination space. OTUs were described by morphology (traits and some ratios) of the lip.

in the non-metric multidimensional scaling method according to ROHLF (1994), to put OTUs into an ordination space.

Results and discussion

From the morphogenetic point of view, correlations between ratios (shapes) and their initial characters are most interesting. The shape of lip is determined more by its width variation (r = -0.45**). The correlations of the initial character with two other ratios prove that relationships between longitudinal growth of lip lateral lobes and a central part of lip (r = 0.90***) create the main variation of the organ. The highest coefficients of correlation between dimensions of lip and its lateral lobes prove that the development of the lip as a whole is synchronised (SZKUDLAREK 2010).

In an ordination space (Fig. 1) the following species are distinguished from the set as extreme OTUs: *Coelogyne salmonicolor*, section *Speciosae* Pfitzer et Kraenzlin; *C. quinquelamellata*, section *Longifoliae* Pfitzer et Kraenzlin; *C. fuliginosa*, section *Fuliginosae* Pfitzer et Kraenzlin; and *C. nitida*, section *Ocellatae* Pfitzer et Kraenzlin. An OTU of hybrid origin, *C. lawrenceana* × *mooreana*, is located in the centre of the diagram and is close to a paternal species (l). Members of other section are intermediate in relation to extreme OTUs. *C. salmonicolor* (the highest value of *z*-axis) *versus C. fuliginosa* (low value of *z*-axis) express difference in the development of lateral lobes and this creates a different shape of lips. The species from section *Speciosae*, located

in the ordination space at the highest values of *z*-axis, have a lip with the complex structure.

The study of the lip morphology is highly justified, because this organ is very differentiated. Thus, the morphological basis is created for the various Hymenoptera or Diptera pollination behaviour. The lip is also evolutionarily very plastic (Endress 1994).

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