

Origin and evolution of *Dorlodotia* (Rugosa)

Julien DENAYER & Edouard POTY

Service de Paléontologie animale et humaine, Département de Géologie, Université de Liège, BAT. B18,
Allée du Six-Aout, B-4000 Liège, Belgium. julien.denayer@ulg.ac.be

Dorlodotia is a fasciculate coral common in the Viséan of Belgium, France, England, Donetz, South China and Japan. More than 30 species have been reported, mainly from Asia, but were often misidentified and/or misnamed (*Thysanophyllum*, *Thysanophylloides*, *Pseudodorlodotia*, *Kwangsiphyllum*, *Lithostrotionella*, etc., see POTY 2007). *Dorlodotia briarti* SALÉE (1920), the type species, shows the typical characters of the genus (reviewed by POTY 1975, 1981, 2007) and exposes the high variability of the species, concerning the length of the septa, the development of the dissepiments, the thickening of the skeletal elements and the shape of the columella. Unfortunately, Salée's lectotype and unpublished material from the type locality of *D. briarti* are thought to be unusual and non representative by having well developed minor septa. Although, less than 5% of the thousand colonies of *D. briarti* checked for this study show well developed minor septa!

Dorlodotia appears in Western Europe during the Uppermost Tournaisian "Avins event" (RC4 β 1 rugose coral biozone of POTY et al. 2006). It does not originate from *Siphonodendron*, *Axophyllum* nor *Lonsdaleia* as stated by different authors, but probably evolved from a solitary caninoid coral which have budded and developed a weak columella from a long counter septum (POTY 2007). For example, *Caninia cornucopiae* from Tournai (Late Tournaisian) shows such a columella, associated with short or not developed minor septa and rare lonsdaleoid dissepiments that remind the *Dorlodotia briarti* corallite. *Corphalia*, was first described by POTY (1975) from the Belgian Early Viséan as protocorallite of *Dorlodotia* that does not bud. Since the paper of POTY, *Corphalia* sp. (very close to small *Caninia* with long counter septum) was found in the Latest Tournaisian and thus could seriously be considered as the original taxa giving birth to *Dorlodotia*.

Several Chinese *Dorlodotia* differ from species of the *D. briarti* group by the absence of a columella and the various development of lonsdaleoid dissepiments. These two features also remind the Asian genus *Kwangsiphyllum*. Both could have evolved from another caninoid solitary coral (small *Siphonophyllia*? or *Caninia*?) and gave birth to a lateral branch of the *Dorlodotia* genus, in which the acolumellate *D. pseudovermiculare* could also be placed.

North American "*Dorlodotia*" are different from European and Asian ones in many important characters: (1) moderately to well developed minor septa, (2) very long major septa except if they are interrupted by lonsdaleoid dissepiment, (3) lonsdaleoid dissepiments absent or very irregularly developed, (4) discontinuous weak columella (SANDO & BAMBER 1985), (5) inner row of dissepiments not thickened. Because of these differences, North American "*Dorlodotia*" are clearly separated from European and Asian *Dorlodotia* and should thus be excluded from the genus (contrarily to FEDOROWSKI & BAMBER 2007). They probably are homeomorphic to the latter, the same way North American "*Siphonodendron*" are homeomorphic to European and Asian ones (Poty 2010).

Sub-cerioid and cerioid trends have been figured within fasciculate *Dorlodotia* in Europe and Asia, but there are very sparse data establishing links between *Dorlodotia* and cerioid *Dorlodotia*-related taxa. Recent discoveries in Northwest Turkey (DENAYER, in press) have brought new precisions to the evolution of *Dorlodotia*. A new species, *D. euxinensis* (DENAYER, in press) is thought to evolve from *D. briarti* as the result of an increase in size and complexity (hypermorphosis process). During the Middle Viséan this "giant" *Dorlodotia* gave rise to a cerioid form described in a new genus, *Ceriodotia* (DENAYER, in press). *Ceriodotia bartinensis* evolved from *D. euxinensis* with a delay in the separation of the daughter corallite from its parent (neotenic process) and thus to the appearance of the cerioid trend. *Ceriodotia bartinensis* then evolved into *C. petalaxoides* (DENAYER, in press) by a decrease in size and complexity leading to the loss of mature stages in the new species in comparison with its ancestor (progenetic process).

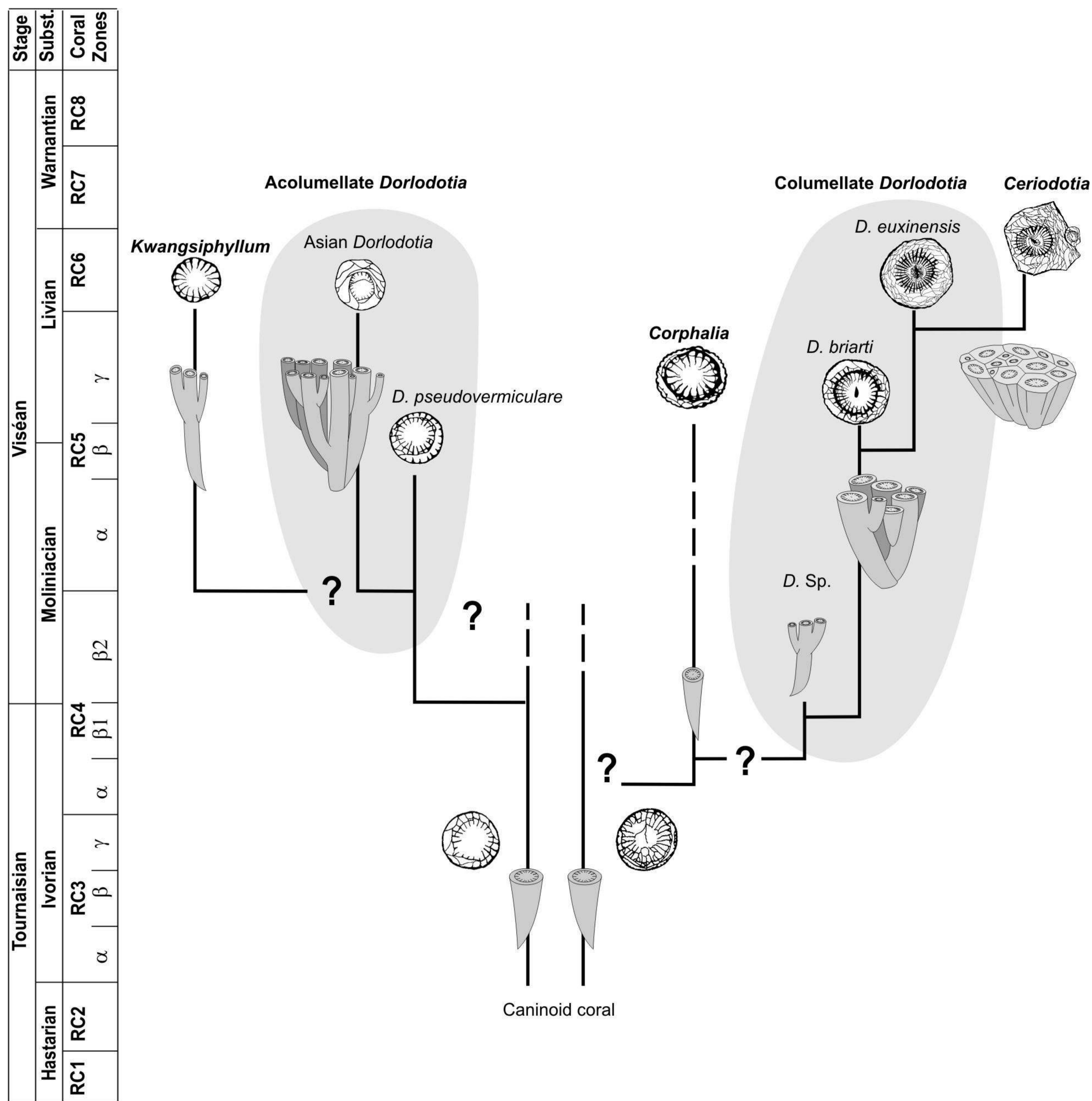


Fig. 1: stratigraphic distribution and proposed phyletic lineage for *Dorlodotia* and related genera. Tournaisian small solitary corals (*Corphalia*?, *Caninia*?) are thought to give rise to fasciculate genera by budding during the Latest Tournaisian. One group gave rise to acolumellate *Dorlodotia* (*D. pseudovermiculare* and Asian species) and questionably to *Kwangsiphyllum*. Another group seems to have evolved into columellate *Dorlodotia* (*D. briarti* and close species). The latter pursued a cerioid trend during the Middle Viséan (Livian), giving rise to *Ceriodotia*. Coral zones and substages after POTY et al. (2006).

The lineage *Dorlodotia*/*Ceriodotia* shows an evolution comparable to the lineage *Siphonodendron*/*Lithostrotion* and *Lonsdaleia*/*Actinocyathus* in which fasciculate forms give rise to cerioid ones. EASTON (1973) compared the cerioid genus *Petalaxis* to *Dorlodotia*. However, *Dorlodotia* is not thought to be the direct ancestor of *Petalaxis*, but part of Viséan "*Acrocyathus*", being considered as *Ceriodotia* could constitute the root of Upper Carboniferous cerioid taxa.

In comparison with the phyletic lineage cited above, the next "step" of the evolution of *Dorlodotia* should be the loss of the outer wall and the increase of integration of the corallites as stated by POTY (2010). Until now, neither astreoid nor aphroid forms have been identified as "*Dorlodotia*-like" but it constitutes an interesting topic for future research!

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