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# Nota Científica / Short Communication

# *Kielmeyera aureovinosa* (Calophyllaceae) – a new species from the Atlantic Rainforest in highlands of Rio de Janeiro state

Kielmeyera aureovinosa *(Calophyllaceae) - uma nova espécie da Mata Atlântica na região serrana do estado do Rio de Janeiro*

*Mario Gomes*[1]

**Abstract**

*Kielmeyera aureovinosa* M. Gomes is a tree of the Atlantic Rainforest, endemic to the highlands of Rio de Janeiro state, occurring in riverine forest. The new species is distinguished in the genus by having a wine colored stem with metallic luster, peeling, with golden bands: it differs from other species of *Kielmeyera* section *Callodendron* by having leaves with sparse resinous corpuscles and flowers with ciliate margined sepals and petals. This paper provides a description of the species, illustrations and digital images; morphological and palynological features of *Kielmeyera* section *Callodendron* species are discussed and compared.

**Key words**: Calophyllaceae, *Kielmeyera aureovinosa*, Atlantic Rainforest, riverine forest, Rio de Janeiro state.

**Resumo**

*Kielmeyera aureovinosa* M.Gomes é uma árvore da Mata Atlântica, endêmica da região serrana do estado do Rio de Janeiro, ocorrente em matas ciliares. A nova espécie é distinta das demais no gênero por ter caule de coloração vinoso-metálica, desfolhante, com faixas e nuances dourados; diferencia-se das demais espécies de *Kielmeyera* seção *Callodendron* por possuir folhas com corpúsculos resiníferos esparsos e flores com sépalas e pétalas de margens ciliadas. Este trabalho fornece descrição da espécie, estado de conservação, ilustrações esquemáticas e imagens digitais; características morfológicas e palinológicas das espécies de *Kielmeyera* seção *Callodendron* são discutidas e apresentadas em tabelas para comparação.

**Palavras-chave**: Calophyllaceae, *Kielmeyera aureovinosa*, Mata Atlântica, mata ciliar, estado do Rio de Janeiro.

## Introduction

The taxonomic history of *Kielmeyera* has been recorded by constant changes in various super and infrageneric categories from inception to the present day. Certain features like alternate leaves, resinous corpuscles and capsular fruits with winged seeds are some of the main reasons that authors have proposed many changes (*e.g*. Martius 1825; Cambessedes 1828; Pohl 1830; Bentham 1862; Wawra 1886; Szyszylowicz 1895; Engler 1895; Maguire 1972).

Pollen morphology analysis reveals that among the Clusiaceae, *Kielmeyera* is the only genus with pollen grains gathered in tetrads and polyads. This base would support the tendency to exclude it or place it at the beginning of the evolutionary line of the family. A few species with pollen in monads could be linked to other genera (Barth 1980).

With the advent of phylogenetic analysis based on information obtained by DNA sequencing of the angiosperms, there follows a vast output of works that are defining, revalidating, rearranging and creating names for all levels of taxonomy. Some points, however, have been shown as conflicting, for example, changes in the scope of the order Malpighiales, and more precisely in the delimitation of families of the clusioid clade, to which families that contain this genus have been linked. These changes result primarily from advances in analytical techniques (*eg*, Savolainen *et al*. 2000; Davis & Wurdack 2004).

What most likely has impaired the establishment of boundaries and interrelationships

[1] Extracta Moléculas Naturais S.A., Av. Carlos Chagas Filho 791, Cidade Universitária, 21941-904, Rio de Janeiro, RJ, Brasil. mario@extracta.com.br

of the families that comprise the clusioid clade is the following: the age of the group, which includes fossil records dating back about 90 million years BP; and the fact that its members appear to display accelerated rates of molecular evolution (Wurdack & Davis 2009).

It seems that a more profound treatment of the phylogenetic relationships of *Kielmeyera* is related to the advancement of this research. The genus was first placed together with the Clusiaceae (APG 1998), and then confirmed as belonging to the subfamily *Kielmeyeroideae* and tribe *Calophylleae* (Gustafsson *et al*. 2002; Notis 2004). The two subfamilies of Clusiaceae, determined on the basis of morphological features, indicate, in molecular analysis, a polyphyletic family. In order to resolve issues related to ancestry, it was decided to elevate the *status* of subfamily *Kielmeyeroideae*, revalidating family Calophyllaceae, composed of fourteen genera (Wurdack & Davis 2009).

In a thorough analysis of the clusioid clade, Ruhfel *et al*. (2011) confirm Calophyllaceae as a monophyletic family and recognize two tribes, *Calophylleae* that holds *Kielmeyera* in a subclade related to alternate-leaved genera *Caraipa*, *Mahurea* and *Neotatea* together with *Haplocathra* with opposite leaves, all with winged seeds, native to the New World.

A revision of *Kielmeyera*, presented as a thesis by Saddi (1982, *apud* Saddi 1983, 1989), created major taxonomic publications on the genus, among which can be highlighted: 1) a review of supra-specific hierarchies, which recognizes two subgenera and expands the number of sections to eleven; it also creates some series, and describes new species and varieties (Saddi 1983); 2) a detailed analysis of the external morphology of the 47 species, now known of *Kielmeyera*, most described by the author himself, ordering them in sections, linking them to biogeographic aspects, separately describing, illustrating and using graphs and tables for comparison of organs and further characterization of taxa (Saddi 1989).

The systematization of *Kielmeyera* in the above articles is the main source of this work and enabled the recognition and characterization of the new species and provided data for their identification with the species that make up the section *Callodendron* and showed their distinction within the group.

## Results and Discussion

***Kielmeyera aureovinosa*** M. Gomes, *sp. nov*. *Typus*: BRAZIL. RIO DE JANEIRO: São José do Vale do Rio Preto, próximo ao Rio Preto, 22°10'14''S, 42°53'05''W, 612 m, 5.I.2011, fl., *M. Gomes 1053* (*holotypus* RFA!; *isotypi* RB!, UEC!). Fig. 1

Kielmeyera aureovinosa *M. Gomes, sp. nov.; forma, dimensione, textura foliorum cum* K. excelsa *optime comgruens, sed differt corpusculis flavis resiniferis; differt ceterum speciebus generi cauli cum cortice deciduo colore vinoso-metallico, fasciis transversalibus auratis et radicibus cum epidermide caduca colore sulphureo; ab omnibus speciebus sectionis (Sect. Callodendron) corpusculis resiniferis sparsis, sepalis petalisque ciliatis marginibus differt.*

Tree 6–10 m alt.; resin sparse, thick, yellow. Taproot underground system, robust lateral roots, bark papery, sulfurous yellow, peeling, dbh 12–25 cm, stem and side branches developed vinous with metallic luster, with gold cross bands, peeling spiralling in papery transverse membranes; young branches glabrous, slender, gray, striated, rounded-triangular cylindrical. Leaves glabrous, petiole slender, striate, canaliculated, 2–4 cm long, blade obovate to elliptical, 8.5–18.5 × 4–7 cm, coriaceous, base acute or cuneate, sometimes slightly asymmetric, apex rounded obtuse, sometimes apiculate, rarely acute or emarginate; midrib slender, sunken on adaxial surface and prominent on abaxial surface; secondary veins 15–22 on either side, prominent on both sides; inter-secondary veins subparallel and double crosslinked, evident on both faces; marginal rib c. 0.05 cm wide, orange (*in sicco*); resinous corpuscles in the form of dashes and dots, yellow (*in sicco*), sparse, distributed near the margin, secondary veins subparallel. Inflorescence in corymbiform thyrses sparsely flowered, branches glabrous, striated; rachis robust, angular, 3.5–9.5 cm long, lateral branches articulated, ending with 2–3 flowers; basal branches with 2–7.5 cm long, apical 1–1.5 cm long, pedicels 1–1.5 cm long. Flowers white, hermaphrodite and staminate; buds ovoid; sepals slightly unequal among themselves, ovate orlong-ovate, concave, margin ciliate, apex acute or rounded, 0.35–0.5 × 0.55–0.7 cm; petals oblong-obovate, concave, margin ciliate, apex truncate or rounded, slightly asymmetrical, 1.5–2.3 × 1–1.5 cm; stamens with hairless filaments, thin,

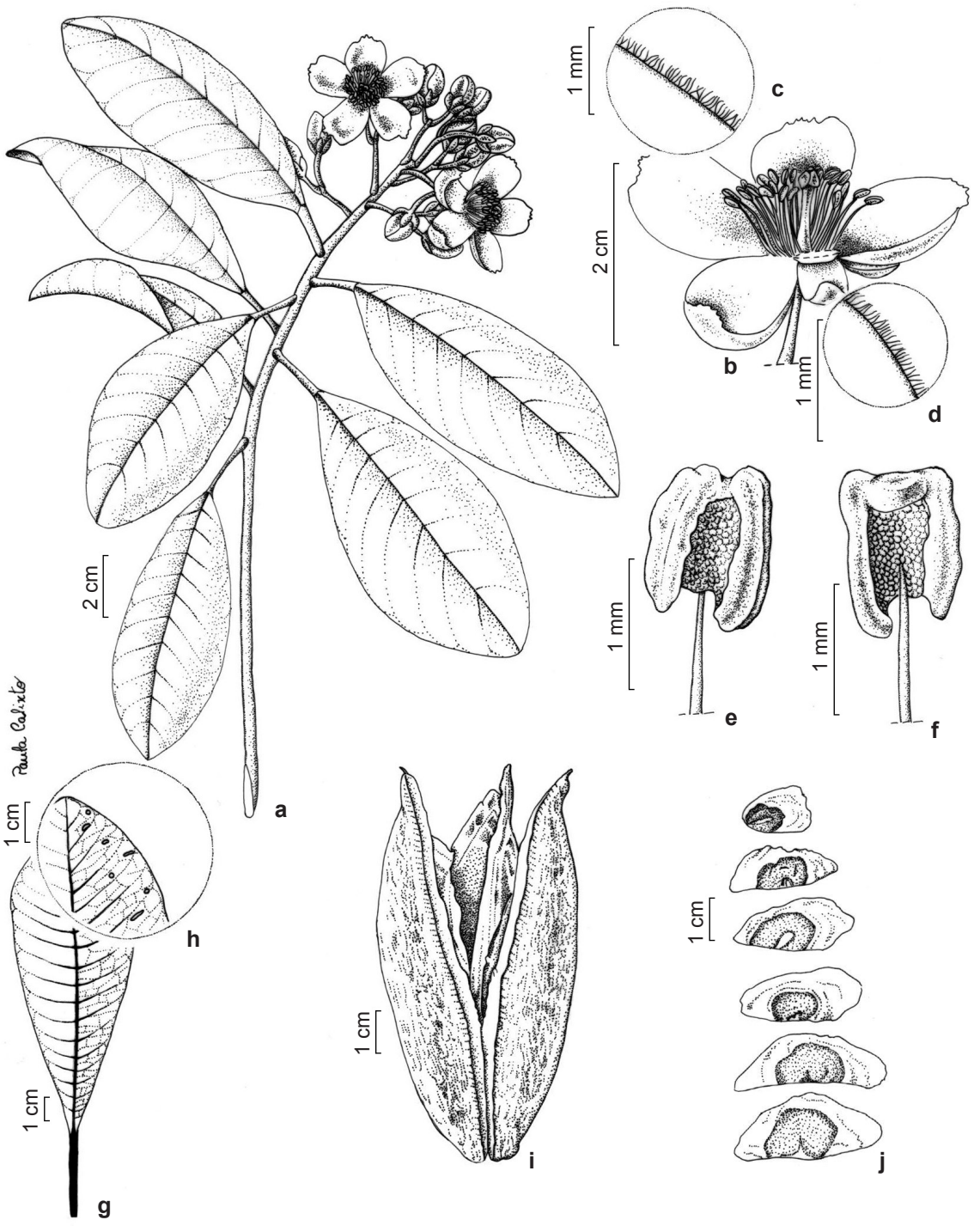


**Figure 1** – a-j. *Kielmeyera aureovinosa* M. Gomes – a. branch; b. flower; c. petal margin; d. sepal margin; e. anther front view; f. dorsal view of anther; g. leave; h. resinous corpuscles; i. fruit; j. seeds.

**Table 1** – Ocorrence of intervenial leaf-structures (section *Callodendron*)

| | Resinous Corpuscles | | |
|---|---|---|---|
| **Species** | **Color** | **Form** | **Density** |
| *K. aureovinosa*** | yellow | dash/dot | sparse |
| *K. decipiens** | yellow | dash/dot | abundant |
| *K. excelsa** | red | dash (dot) | abundant |
| *K. gracilis** | yellow | streak (dash/dot) | abundant |
| *K. insignis** | yellow | streak (dash/dot) | abundant |
| *K. rizziniana** | yellow | dash/dot (streak) | abundant |

(*Saddi 1989; **this work)

**Table 2** – Sepal and petal margins (section *Callodendron*)

| **Species** | **Sepals** | **Petals** |
|---|---|---|
| *K. aureovinosa*** | ciliate | ciliate |
| *K. decipiens** | non-ciliate | non-ciliate |
| *K. excelsa** | non-ciliate | non-ciliate |
| *K. gracilis** | non-ciliate | non-ciliate |
| *K. insignis** | non-ciliate | non-ciliate |
| *K. rizziniana** | non-ciliate | non-ciliate |

(*Saddi 1989; **this work)

compressed, anthers quadrangular, base lobed asymmetric, 0.1–0.15 cm long, dorsi-apical gland globuloidal; gynoecium glabrous, ovary striated, c. 0.5 cm long, style c. 0.6 cm long, stigma capitate-trilobate, c. 0.1 cm long. Fruit a woody septifragal capsule, elongated ellipsoid, 8–12 cm long, immature with rounded lobes, 1.2–2 cm wide, epicarp peeling, base narrow-truncate, apex emarginate, apiculate; dehiscent with carpels curvred, epicarp rough, inner undulate; central column slender, trine, falsely winged due to traces of placentas; seeds oblong, discoid, hemispherical, falciform, often asymmetrical, wings hyaline, 1–4.4 × 0.7–1.6 cm, embryo orbicular, eccentric, 0.4–1.8 × 0.3–1.1 cm.

**Examined material**: BRAZIL. RIO DE JANEIRO: São José do Vale do Rio Preto, próximo ao Rio Preto, 22°10'24''S, 42°53'06''W, 662 m, 29.XII.2009, fl., *M. Gomes 1008* (RFA); 19.V.2010, fr., *M. Gomes 1030* (RFA); 22°10'14''S, 42°53'05''W, 612 m, 13.VIII.2010, fr., *M. Gomes 1038* (RFA, RB, UEC).

*Kielmeyera aureovinosa* M. Gomes is endemic in Rio de Janeiro state. It occurs in a restricted area of the highlands, in São José do Rio Preto, inhabiting the Atlantic Rainforest in riverine formations, between 600–700 m.

The epithet *aureovinosa* refers to the most striking feature of this taxon, which is the vinous color with golden glow of the defoliant parts of the stem.

The taxon is distributed in a restricted area that is not within any conservation unit and where agricultural activities take place. Thus the species can be classified in the category Vulnerable (VU), according to the IUCN criteria (IUCN Standards and Petitions Subcommittee 2010).

The new species belongs to section *Callodendron*, linking to other taxa of the group as a tree, having distinctly petiolate leaves, flowers with sepals subequal not scarious margined, erect anthers oblong-rectangular, dorsifixed, with reduced dorsi-apical glands (Fig. 1e, f) and stigma capitate-trilobed (Fig. 1d). The species are from the Atlantic Rainforest, with distribution near the coast of the states of Rio de Janeiro and São Paulo. This section, in which only the type species *K. excelsa* (Saddi 1983) was originally included, was later expanded with *K. rizziniana*, *K. gracillis*, *K. insignis* and *K. decipiens* (Saddi 1984, 1989).

*Kielmeyera aureovinosa* is distinguished from other species of the genus by presenting stem peeling vinous-metallic colored with golden hues and transverse bands (Fig. 2d) and roots with skin peeling and sulfurous yellow (Fig. 2a) – characteristics that remain in dried material. The leaves are similar to *K. excelsa*, in form and consistency, differing by presenting yellow resinous corpuscles. It differs from all species of the section *Callodendron* in having these corpuscles sparsely distributed (Tab. 1; Fig. 2c) and having flowers with sepals and petals ciliate margins (Fig. 1c, d; Tab. 2).

The species of section *Callodendron* do not have a xylopodium, so there is no annual regeneration. The underground system is usually a slender taproot with lateral roots (e.g. *K. rizziniana* and *K. excelsa*). In *K. aureovinosa* roots exhibit sulfur yellow epidermal peeling (Fig. 2a). The side branches are robust, growing subparallel to the soil, near the surface.

*Kielmeyera aureovinosa* has characteristics that make it distinct from other species of the genus, with individuals preserved in a stretch of

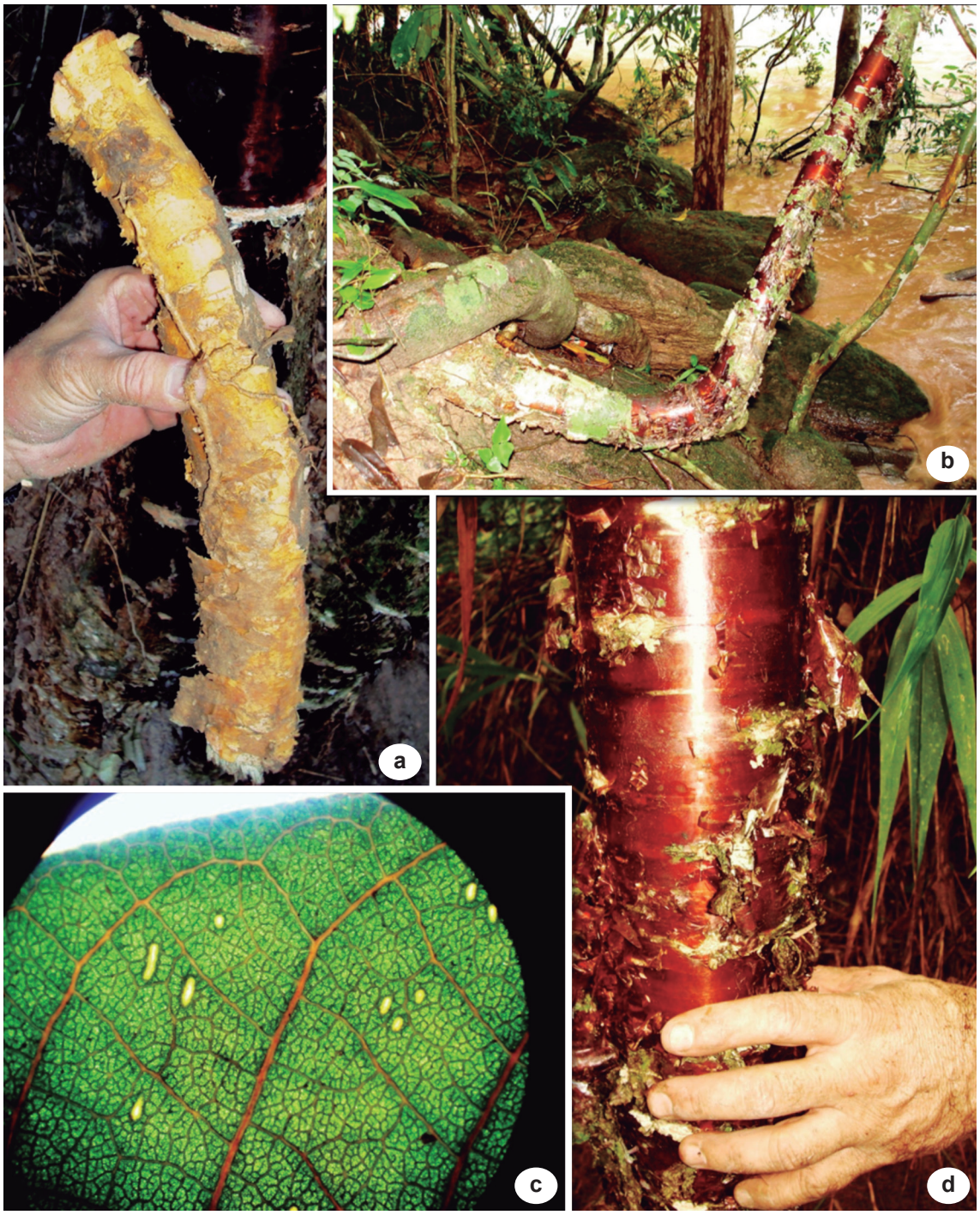


**Figure 2** – a-d. *Kielmeyera aureovinosa* M.Gomes – a. root segment; b. young plant; c. leave with resinous corpuscles; d. stem.

riverine forest near the Rio Preto (Fig. 2b), on private property in the montane region of Rio de Janeiro state, Atlantic Rain Forest area, in São José do Vale do Rio Preto.

Palinology provides important data for the characterization of this taxon. In preliminary analysis, it was observed that pollen grains of *K. aureovinosa* are monads, 3-colpate with sexine perforated (V. Esteves, *comm. pers.*). According to the pollen morphology of the genus (Barth 1980), of the 46 species studied – including seven indeterminate – only *K. excelsa*, *K. appariciana* and *K. rufotomentosa*, belonged to the group of monads, which, according to the ornamentation and structure of the exine, were framed in the types: roof psilate or punctured, the first; and microreticulate, the following two. The vast majority of species of the genus has tetrads or polyads.

For the genus, the pollen of *K. aureovinosa*, also occur in a ratio of rare species, is also a type that had been reported in only a single taxon. It is awaiting further analisys of their morphology.

Table 3 shows the pollen groups and types of pollen from closely related species, according to the terminology of Barth (*l.c.*). In addition to *K. aureovinosa*, *K. insignis* was examined to complete this list of species of section *Callodendron*.

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**Table 3** – Pollen structure (section *Callodendron*) according Barth (1980)

| Species | Pollen Group | Type (ornamentation and structure of exine) |
|---|---|---|
| *K. aureovinosa*** | monads | perforated roof |
| *K. decipiens** | tetrads | reticulate surface |
| *K. excelsa** | monads | perforated or psilate roof |
| *K. gracilis** | tetrads | reticulate surface |
| *K. insignis*** | tetrads | reticulate surface |
| *K. rizziniana** | tetrads | reticulate surface |

(*Barth 1980; **Vânia Esteves *pers. comm*)

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