

## Two new species of *Camarops* (Boliniaceae, Ascomycotina) and a key to Argentinean species

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Four species of *Camarops* growing on *Podocarpus parlatorei* were collected in Argentina. Two of them, *C. sacciformis* and *C. podocarpi*, are undescribed species and the other two (*C. pugillus* and *C. lutea*) are new records for Argentina. A dichotomous key to the six species so far known from Argentina is provided.

Keywords: *Camarops*, *Podocarpus*, Argentina, systematics.

The genus *Camarops* P. Karst. (Boliniaceae Rick) presently includes fourteen species (Kirk & al., 2001), which have been described and reported by Shear (1938, 1940), Nannfeldt (1972), Hilber & Hilber (1980), Rogers (1981), Lundqvist (1987), Rogers & Samuels (1987), Samuels & Rogers (1987), and Vasilyeva (1988, 1997). A key to the *Camarops* species in the Americas was provided by San Martín & Lavin (1997).

It is still unclear to which family the genus *Camarops* belongs (Eriksson & Hawksworth, 1993). Barr (1990) and Rogers (1994) included it in the family Boliniaceae in the Xylariales. Recent molecular studies by Andersson & al. (1995), however, have indicated that *Camarops* (Boliniaceae) is closely related to sordariaceous genera, such as *Chaetomium* Kunze, *Neurospora* Shear & B.O. Dodge and *Sordaria* Ces. & De Not., but not to xylariaceous genera, such as *Obolarina* Pouzar and *Xylaria* Hill ex Schrank. Andersson & al. (1995) therefore, included the family Boliniaceae in the Sordariales. Subsequently Cannon (in Kirk & al., 2001) erected the new order Boliniales to accommodate the two families Boliniaceae Rick and Catabotrydaceae Petr. ex M.E. Barr.

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In Argentina, only specimens of *Camarops polyspermum* (Mont.) J. H. Mill. (Mercuri, 1972) and *Camarops rostratus* A. I. Romero & Samuels (Romero & Samuels, 1991) had so far been collected from wood in plantations of cultivated trees in the Buenos Aires province. During a long term survey of micromycetes on bark and wood of *Podocarpus parlatoresi* Pilg. in the provinces of Tucumán and Catamarca, four additional species of *Camarops* were found. Two are considered to be new and the other two are new records for Argentina. These four species are described in this paper.

### Materials and methods

All collections were found on fallen branches of *Podocarpus parlatoresi* Pilg. collected in the forests of Sierra de Medina and Taficillo (Tucumán) and Las Juntas (Catamarca), Argentina, specifically in “The Yungas Phytogeographic Province” or “Tucumano-Bolivian Forest” (Cabrera, 1971; Hueck, 1978). Specimens were deposited in LIL. Ninety-eight specimens, including type materials, were examined from BAFC, BPI, IMI, NY, PRM, S and UPS (herbarium abbreviations follow Holmgren & al., 1990).

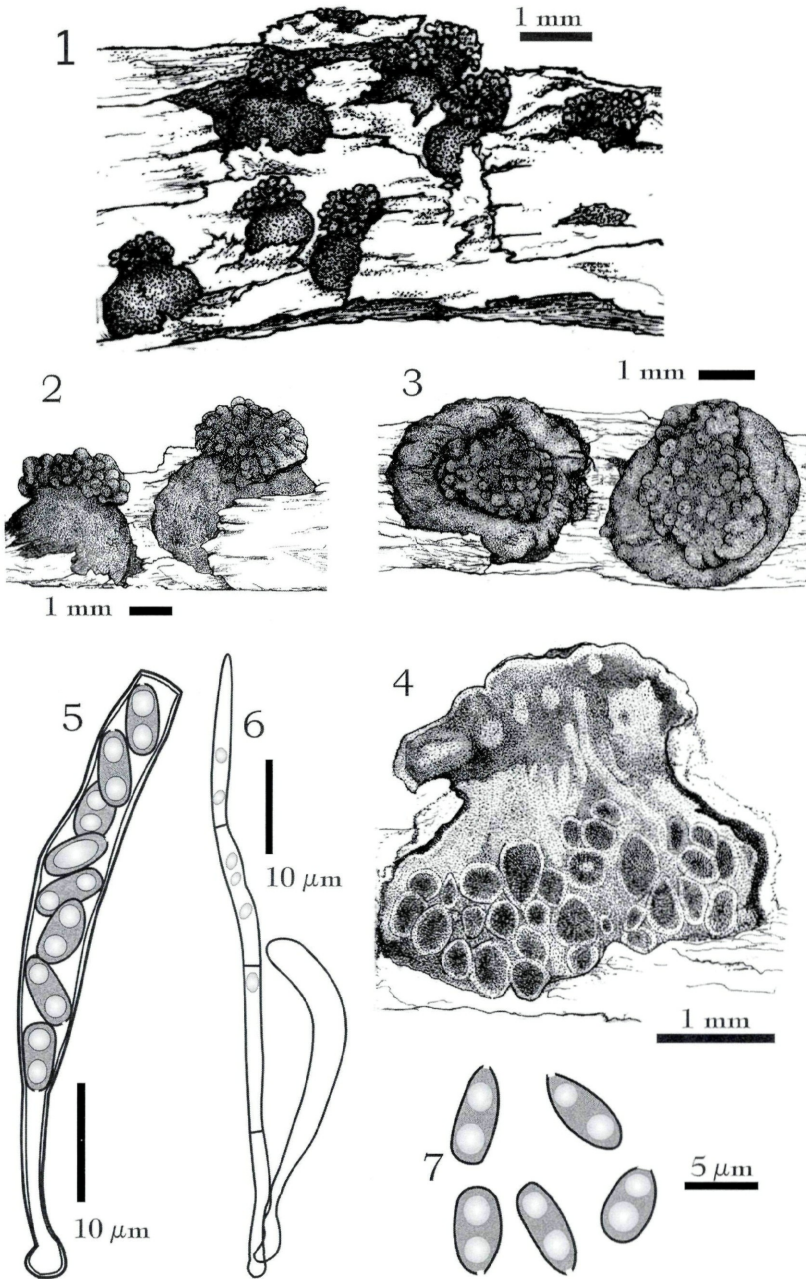
Observations and measurements were made on fresh material squash-mounted in distilled water, 5% KOH and phloxine for optical microscopy (OM) and in Melzer’s reagent for the amyloid reaction (IK). Material mounted in calcofluor (Romero & Minter 1988) was examined by Epifluorescence (EF) microscopy to observe apical rings in the asci and septa in paraphyses. Drawings were made with a camera lucida.

Cultures were initiated from ascospores that had been extruded from perithecia in a cirrus by touching one cirrus with the sterilized tip of a needle to pick up ascospores; the ascospores were then placed on potato dextrose agar (PDA) in 9 cm diam Petri dishes (media according to Kirk & al., 2001). Petri plates were incubated under laboratory conditions at approximately 12 hr fluorescent light per day at 25 °C.

### Results and discussion

***Camarops sacciformis*** Catania & A. I. Romero, **sp. nov.** – Figs. 1–7; 17–19; 44–46.

Ab aliis speciebus huius generis differt ob uniforme stroma, nigrum, sub peridermide in ligno, in duo partibus subapicali constrictione divisum. Pars apicalis robustis collis praedita, 1-5 mm diametro; pars basalis subglobosa, 1.5–7 mm diametro. Argentina. Holotypus LIL.



Figs. 1-7. *Camarops sacciformis* (holotype). - 1. General aspect. - 2. Stromata in lateral view. - 3. Stromata in apical view. - 4. Stroma in longitudinal section. - 5. Ascus. - 6. Young ascus and paraphyses. - 7. Ascospores.

**Etymology.** – “sacciformis” refers to the shape of the stroma, which suggests a small cloth sack that was used to hold coins in the previous centuries in England.

**Anamorph.** – Unknown.

**Teleomorph.** –

**Stromal morphology.** – Stromata black, urn or sac-like, with a distinct subapical constriction, subepidermal in wood, appearing circular or elliptical to irregular in top view, 2.5–6 mm high, surface plane but with (10–)20–42(–50) conspicuous perithecial papillae, separating into two parts; the apical part 1–5 mm diam, the basal part 1.5–7 mm diam.

**Stromal anatomy.** – Ectostroma 2.5–6.0  $\mu\text{m}$  wide, erumpent through the bark and pierced by ostiolar canals of perithecia, cells 4.0–10.5  $\mu\text{m}$  diam forming *textura angularis*, cells at the surface darkly pigmented, internal cells light brown; microscopic crystals forming among the perithecial necks. – Endostroma subepidermal in wood, brown, of hyphae 2.5–3  $\mu\text{m}$  diam forming *textura intricata*, mixed with fragments of wood. Wood below stromata stained light yellow, a black line within the wood delimiting each stroma. – Perithecia polystichous, venter subglobose to ovoid, 273–468  $\mu\text{m}$  diam, perithecial wall 18–28  $\mu\text{m}$  wide, of *textura angularis*; necks elongate, reaching the surface of the stroma; ostiolar canal periphysate. – Asci cylindrical, stipitate, 42–55  $\times$  (4–)4.5–5.5 (–6.5)  $\mu\text{m}$ , with 8 ascospores obliquely arranged in uniseriate manner, thin-walled, truncate at apex, with an inconspicuous apical ring, appearing as a bright point in EF. – Ascospores cylindrical to ellipsoidal, light brown, flattened, (5–)6–7(–8)  $\times$  2.5–3.5  $\mu\text{m}$ , unicellular, biguttulate, smooth, with one conspicuous basal germ pore. – Paraphyses exceeding the asci length by 30–50  $\mu\text{m}$ , 2.0–2.5  $\mu\text{m}$  wide, guttulate, filiform, thin-walled, unbranched or branched near the base, abundant.

**Habitat and distribution.** – subepidermal in wood of fallen branch of *Podocarpus parlatoarei* Pilg.; known only from the type collection.

**Holotype.** – ARGENTINA: Tucumán: Dpto. Tafí Viejo, Parque Biológico Sierra de San Javier, Cumbres de Taficillo, Las Mentas, in woods of *P. parlatoarei*, on fallen branch, 3. 7. 1998, Catania 1620 (LIL).

Several attempts to germinate ascospores were unsuccessful.

The sharp constriction that separates the stroma into two parts distinguishes *Camarops sacciformis* from all other species of the genus. Its stromal shape suggests a sack with coins that was given to

employees in England in previous centuries when they were released from their employment (hence the English expression “to give the sack”). The apical part is marked by rounded outgrowths of the ectostroma. *Camarops sacciformis* resembles *C. lutea* (Alb. & Schw. : Fr.) Nannf., *C. rostratus* A. I. Romero & Samuels and *C. pugillus* (Schw. : Fr.) Shear in having polystichous perithecia but differs in its peculiar stromal shape.

***Camarops podocarp*** Catania & A. I. Romero **sp. nov.** – Figs. 8–16; 25–26; 40–43.

A *Camarops tubulina* differt ob fusiforme stroma superficie conicis papillis praedita et stromatibus et peritheciis minoribus compositum. Argentina. Holotypus LIL.

**Etymology.** – referring to the host

**Anamorph.** – Unknown.

**Teleomorph.** –

**Stromal morphology.** – Stromata black, pulvinate, elongate with acute ends with long axis parallel to fibers of wood, immersed in wood, erumpent, surface plane-convex, (2.5–)4–16(–22) × (1–)1.5–4 mm long, 1.0–2.0 mm high; margins of some stromata covered by wood; surface slightly marked by small papillae, papillae conic when wet, with conspicuous ostioles, with irregular distribution.

**Stromal anatomy.** – Ectostroma 100–350 µm wide, forming a black carbonaceous layer at both sides of the papillae, cells 6–12 µm diam forming *textura angularis*. – Endostroma greyish, hyphae 2–3 µm diam forming *textura intricata*, abundant microscopic crystals among the perithecial necks. Scanty wood tissue among the perithecial venters. – Perithecia polystichous; venter subglobose to ovoid or cylindrical, variable in shape by mutual pressure, 450–900 × 225–450 µm, with more or less 3 perithecial wall layers, 8–60 venters in longitudinal section, perithecial wall 25–37.5 µm wide of *textura angularis*; ostiolar canal periphysate. – Asci cylindrical, long stipitate, (50–)56–68 × (4–)4.5–5(–6) µm, with 8 ascospores obliquely arranged in uniseriate manner, thin-walled, truncate at apex; apical ring inconspicuous, Γ, appearing as a bright point in EF. – Ascospores cylindrical to ellipsoidal, light brown, (5.5–)6.0–6.5 × (2.5–)3–3.5 µm, unicellular, smooth, biguttulate, with one conspicuous germ pore at basal end. – Paraphyses exceeding the asci by 10–15 µm, 2.0–2.5 µm wide, with few septa, guttulate, filiform, thin-walled, unbranched or with few branches at the base, abundant.

Habitat and distribution. – in decorticated wood of fallen branches of *Podocarpus parlatorei* Pilg., known only from the type locality.

Material examined. – ARGENTINA: Catamarca: Dpto. Ambato, Las Juntas, cruzando el río Las Juntas, on woods of *P. parlatorei*, 24. 5. 2000, *Catania 1618* (HOLOTYPE LIL); second collection, same collecting data, *Catania 1619* (LIL).

Material of *C. tubulina* examined. – CANADA: Ontario: York Co., Nashville, on *Fagus grandifolia*, 17. 10. 1949, *R.F. Cain*, IMI 208319, NY. CZECH REPUBLIC: Carpatorossia, in silvis mixtis virgineis (*Abies alba*, *Picea excelsa*, *Fagus sylvatica* etc.) in valle rivi Berlevaš prope vicum Trebusány, alt. 800–1000 m.s.m., 08.1937, *A. Pilát*, rev. M. Svrček 1969 (PRM 488648). CZECH REPUBLIC: BOHEMIA MERIDIONALIS, Novohradské hory, in silva virginea “Žofinský prales”, on *Picea abies*, 18. 10. 1967, *Z. Pouzar*, PRM 646760 and PRM 647008; *ibid.*, 09. 10. 1968, *Z. Pouzar et J. Kubička*, PRM 661454; *ibid.*, ad truncum iacentem *Abietis albae*, 09. 10. 1968, *Z. Pouzar*, PRM 661453; *Piceae abietis*, 28. 09. 1967, *Z. Pouzar*, PRM 628921. POLAND: sylva virginea Białowieza ap. Hajnówka, “Park narodowy”, quadratum no. 399; ad truncum iacentem *Piceae abietis*, 26. 08. 1973, *Z. Pouzar* (UPS). SLOVAKIA: silva virginea mixta Dobrossky prales, Cierny Balog. distr. B. Bystrica, montes Slovenské Rudohorie (Carpati occident.), *Piceae abies*, 30. 08. 1961, *F. Kotlaba & Z. Pouzar* (PRM 615711, UPS). SWEDEN: ÖG. Omberg, Storpissam, on *Pycnoporellus fulgens*, 16. 02. 2000, Max Koschatzky, S; Södermanland: Grödinge, Norga, ca 150 m SV om Åtorp, 11. 07. 1998, G. Odelvik & R. Karls, S; among others. USA: Hamilton County: Raquete Lake, Long Point, on well rotted wood, 06. 09. 1986, G.J. Samuels & K. F. Rodrigues, NY).

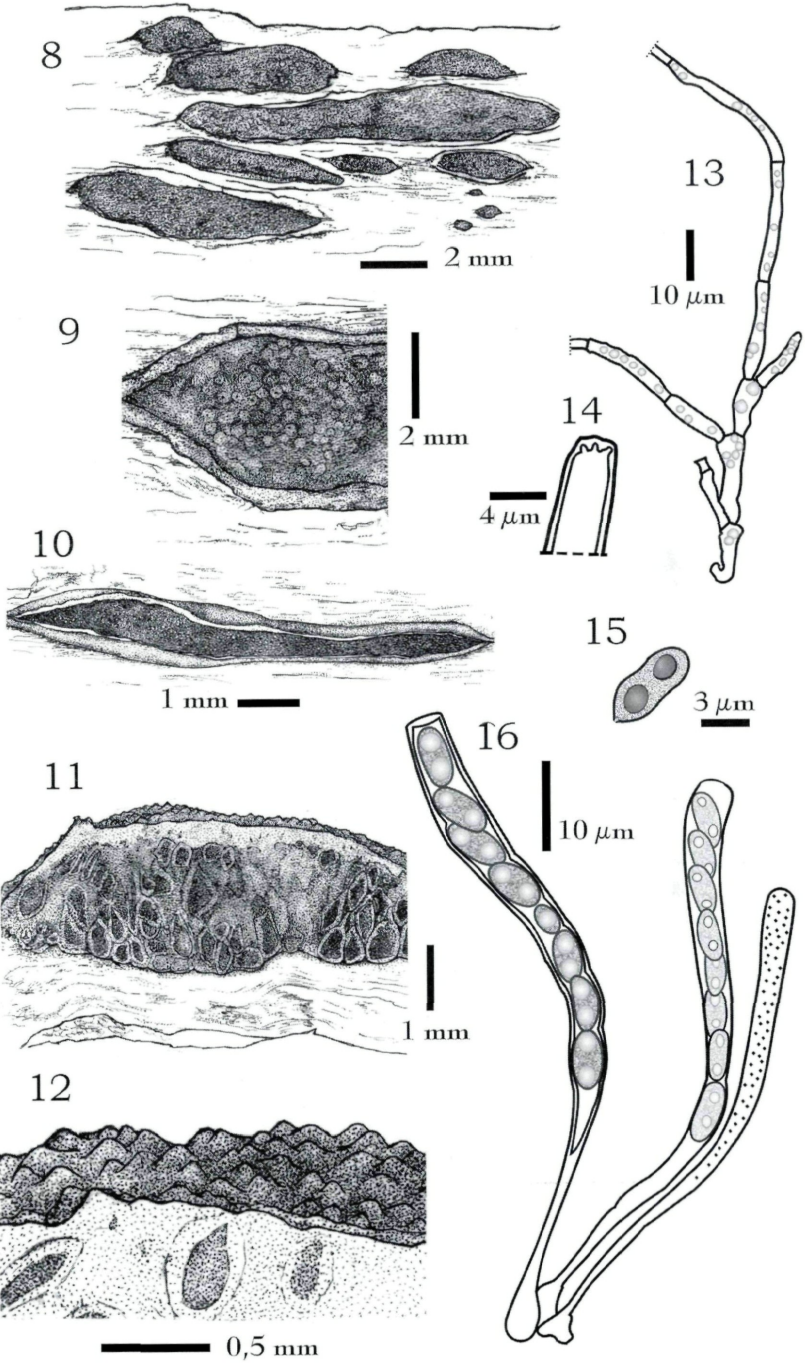
Several attempts to germinate ascospores were unsuccessful.

*Camarops podocarp*i resembles *C. polyspermum* (Mont.) J. H. Miller, *C. ustulinoides* (P. Henn.) Nannf. and *C. tubulina* (Alb. & Schw.: Fr.) Shear because of the pulvinate stromata. *C. polyspermum* and *C. ustulinoides*, however, have monostichous perithecia.

Our fungus differs from *C. tubulina* because of its fusiform stromata, with a surface only with conical papillae, smaller stromata and perithecia. Perithecia of *C. tubulina* are described as bottle-shaped by some authors (Hilber & Hilber, 1980, Table 2:). Although the holotype of *C. tubulina* was not examined, several collections of this species were studied. The ascospore morphology of *C. podocarp*i falls within the range of variation of that of *C. tubulina*, but this character is quite variable in the latter (ovoid, biscuit or almond-like, often canoe-like to cylindrical). In addition, the surface of the stroma of *C. tubulina* is remarkably wrinkled and tuberculate, as observed in some of the herbarium material of *C. tubulina* studied

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Figs. 8–16. *Camarops podocarp*i (Holotypus). – 8. General aspect. – 9. Stromata in apical view. – 10. One stroma showing its fusiform shape. – 11. Stroma in longitudinal section. – 12. Stroma in longitudinal section showing conical papillae in lateral view. – 13. Paraphyses. – 14. Apex of a young ascus. – 15. Ascospore. – 16. Asci in three different stages of maturation.



(CZECH REPUBLIC: BOHEMIA MERIDIONALIS, Novohradské hory, in silva virginea "Žofinsky prales", on *Picea abies*, 18. 10. 1967, Z. Pouzar, PRM 646760 and PRM 647008; *ibid.*, 09. 10. 1968, Z. Pouzar et J. Kubcka, PRM 661454; *ibid.*, ad truncum iacentem *Abietis albae*, 09. 10. 1968, Z. Pouzar, PRM 661453; *Piceae abietis*, 28. 09. 1967, Z. Pouzar, PRM 628921) as well as based on the description by Hilber & Hilber (1980), while in *C. podocarp*i the surface is hardly marked with conical papillae when wet and with small craters when dry.

*C. podocarp*i could be also compared with *C. plana* Pouzar. As it was pointed out by Pouzar (1986) *C. plana* differs from *C. ohensis* (Ellis & Everh.) Nannf. and *C. tubulina* by a very flat stroma which externally gives the impression of a resupinate basidiomycete. Similarly *C. podocarp*i can be distinguished from *C. plana* because of the pulvinate stroma formed by *C. podocarp*i. In addition, *C. plana* was collected on Angiospermae and *C. podocarp*i on Gymnospermae.

***Camarops pugillus*** (Schw. : Fr.) Shear, Mycologia 32: 549. 1940. Figs. 20–24; 29–33; 50–51.

*Sphaeria pugillus* Schw.: Fr., Syst. Mycol., 2: 383. 1823.

Descriptions and illustrations. – Nannfeldt (1972), Lundqvist (1987).

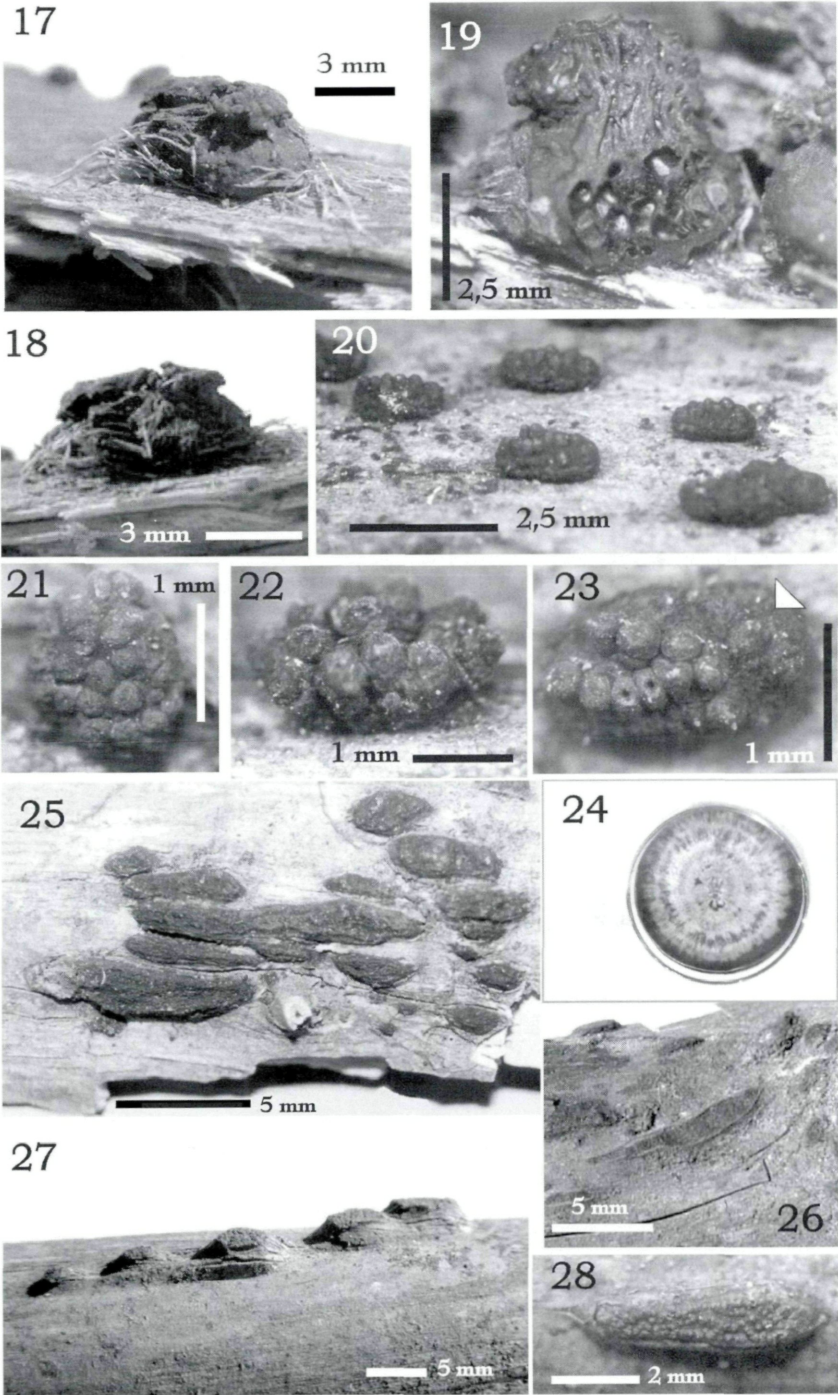
Anamorph. – Unknown.

Teleomorph. – Stromata deeply sunken in wood, erumpent as a disc with 2–15(–25) cylindrical protuberances, with a central ostium; disc sometimes absent, then with only slightly divergent, finger-like, more prominent and longer, 0.5–1.0 mm high cylindrical protuberances reaching the surface. – Perithecia polystichous, 200–475(–700) × 125–400 μm, venters totally immersed in wood. Abundant xylem elements among the perithecial necks in the stromatic disc. – Asci cylindrical, 42.5–55.0 × 4.5–5.0 μm, apical ring inconspicuous, I-, with EF seen as a bright spot. – Ascospores cylindrical to ellipsoidal, 5.5–6.0 × 2.5–3.0 μm, biguttulate, with one conspicuous basal germ pore, light brown. – Paraphyses exceeding the asci by 50–70 μm, 2.0–2.5 μm, wide, guttulate, filiform, thin-walled, unbranched, abundant.

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Figs. 17–28. *Camarops sacciformis*. – 17–18. General aspect. – 19. Stoma in longitudinal section. – 20–24. *Camarops pugillus*. – 20. General aspect. – 21. Stroma in apical view. – 22. Stroma without disc. – 23. Stroma with disc (arrowhead), in apical view. – 24. Colony on PDA, 4 weeks. – 25–26. *Camarops podocarp*i. General aspect. 27–28. *Camarops lutea*. – 27. General aspect. – 28. Detail of ostiolar papillae.





Colony on PDA covering the 9 cm diam Petri dish in 4 weeks at 25 °C. At first white, creamy, appressed arachnoid, later developing concentric zones, with alternating greenish yellow to dark green with greyish white rings; margin even. Reverse at first bright yellow, later black, zonate with greenish yellow rings. Mycelium composed by 1.5–2 µm diam light brown, thin-walled, septate hyphae; some hyphae swollen (onion shaped) at the septa as described by Hilber & Hilber (1980) for other species. No conidia were observed.

**Habitat.** – on decorticated wood of *Podocarpus parlatorei* Pilg.

**Distribution.** – Argentina (Tucumán). North America (Shear, 1940). Europe (Slovakia, Sweden and Austria) and Russia (Vasilyeva, 1997). Czech Republic and France (data from examined material mentioned below).

**Material examined.** – ARGENTINA: Tucumán: Dpto. Burruyacu, Sierra de Medina, ruta provincial 310, a 31 Km. desde Villa padre Monti, Aguas Negras, Finca Mansilla, in woods of *P. parlatorei* Pilg., 1600 m a.s.l., 23. 08. 2000, *Catania 1621* (LIL, culture BAFC 1128); second collection, same collecting information, *Catania 1622* (LIL); same collecting locality, 19. 11. 1999, *Catania 1746* (LIL); Dpto. Tafí Viejo, Parque Biológico Sierra de San Javier, Cumbres de Taficillo, Las Mentas, in woods of *P. parlatorei*, on fallen branch, 29.02.2000, *Catania 1804* (LIL).

**Specimens of *C. pugillus* studied.** – USA: Virginia: Arlington Cemetery, on *Liriodendron?*, 27. 03. 1927, C. L. Shear 5593 (BPI 619142 and UPS); Tennessee: Indian Gap Road, on *Rhododendron*, 18. 08. 1939, C.L. Shear 4239, BPI 619586; New York: Schroon Lake, on *Acer*, 04. 08. 1927, C.L. Shear, BPI 619584. CZECH REPUBLIC: Bohemia: sylvia “Setalická bazantnice” ap. Satalice prope Praha; ad truncum emortuum semiiacentem Fraxini excelsioris, 05. 09. 1996, Z. Pouzar, PRM 889200. FRANCE: Bois Bastard de Pau 64, on *Quercus*, 24. 10. 1998, F. Candoussau & G. J. Samuels, S. SLOVAKIA: sylvia “Šur” prope Jur ori Bratislave, ad truncum iacentem *Alni glutinosae*, 18. 10. 1985, Z. Pouzar, PRM 872310. SWEDEN: Uppland: Sollentuna par. 800m. NNW of Hägerstalund, on rotten log, 03. 05. 1984, Nils Lundqvist, S.

**Specimens of *C. rostratus* studied.** – ARGENTINA: Buenos Aires: San Pedro, Gobernador Castro, on wood of *Eucalyptus viminalis*, 02.1982, Romero 9/22-4, HOLOTYPE of *Camarops rostratus* BAFC 32012; Isotype BPI.)

The Argentine collections agree with descriptions provided by Shear (1940) and Nannfeldt (1972) for *Camarops pugillus*, although stromatic discs were not mentioned by the last author. These collections were also compared with *C. rostratus* A. I. Romero & Samuels. The stroma in *Camarops pugillus* is almost completely immersed in the wood, only a stromatic disc is sometimes seen on the surface. No stromatic disc is formed in *C. rostratus*, which has larger ascospores [6.0–7.0(–9) × 3–4 µm] than *C. pugillus*. In addition, in *C. pugillus* no amorphous material is formed among the perithecial necks and the

wood below the stromata is stained yellow; this feature was reported also by Shear (1940: 549). From the study of the Argentine collections and those from other countries it appears that *C. pugillus* is a polymorphic species.

Vasilyeva (1997: 6) transferred *Sphaeria pugillus* Schw. : Fr. to a new genus *Camaropella* Lar. N. Vassiljeva. She also suggested that *C. rostratus* could be placed in this new genus. We prefer, however, to maintain both species in *Camarops* on the basis of the strikingly uniform microscopic features common to these two species and other species of *Camarops*. We thus agree with Nannfeldt's concept (1972) "members of *Camarops* are very homogeneous in all fundamental (taxonomically and phylogenetically) important characters and that the specific differences concern only more "superficial" feature such as size, shape and position of stromata and perithecia . . ."

A culture was obtained from a small portion of the stroma but only sterile mycelium was observed in cultures. Callan and Rogers (1989) pointed out that several *Camarops* species have been previously cultured and no anamorph has been associated with cultures of any of them. Multispore isolates obtained from *Camarops lutea* by Petrini (1986), on the other hand, formed the teleomorph in culture.

***Camarops lutea*** (Alb. & Schw.: Fr) Nannf., Svensk Bot. Tidskr. 66: 363. 1972. Figs. 27-28; 34-39; 47-49.

Basionym, synonyms and description. – Nannfeldt (1972).

Anamorph. – Unknown.

Teleomorph. Stromata erumpent, pulvinate truncate, formed within the wood, 1–5(–13) × 0.5–2.5(–4.0) mm, surface dotted by hemispherical, irregularly spaced, conspicuous, farinaceous ostiolar papillae. – Perithecia polystichous, 200–600 × 200–400 µm, microscopic crystals observed among the perithecial necks; xylem elements abundant in the stroma. – Asci cylindrical, 56–88 × 5–6 µm, apical ring inconspicuous, I-, seen as a bright spot with EF. – Ascospores ellipsoidal, 6.0–6.5 × 2.5–3.0 µm, with one conspicuous basal germ pore, brown. – Paraphyses 60–85 × 2.0–2.5 µm, septate, guttulate, filiform, thin-walled, unbranched, abundant.

Habitat. – on decorticated wood of *Podocarpus parlatoresi*.

Distribution. – Argentina (Tucumán). Europe and North America (Nannfeldt, 1972; Petrini, 1986).

Material examined. – ARGENTINA: Tucumán: Dpto. Burruyacu, Sierra de Medina, ruta provincial 310, at 31 km from Villa padre Monti, Aguas Negras, Finca Mansilla, in woods of *P. parlatorei* Pilg., 1600 m a.s.l., 23. 08. 2000, *Catania* 1623, LIL; Dpto. Tafí Viejo, Parque Biológico Sierra de San Javier, Cumbres de Taficillo, Las Mentas, on woods of *P. parlatorei*, 1500–1600 m a.s.l., 24. 05. 1999, *Catania* 1659, LIL; *ibid.*, 20. 08. 1999, *Catania* 1711 and 1718, LIL; *ibid.*, 29. 02. 2000, *Catania* 1803, 1805, 1806 and 1808, LIL. S. ENGLAND: Surrey, Box Hill, on *Buxus sempervirens*, 21. 09. 1930, *C. L. Shear & E. M. Mason*, det. as *C. tubulina*, BPI 619129, UPS and NY; *ibid.*, Box Hill, on *Buxus sempervirens*, 07. 1930, *E. W. Mason*, S; among others; Yorkshire, Forge Valley, on *Sambucus*, 15. 04. 1955, *C. Booth*, IMI 59902; Norfolk, Wheatfen Broad, on *Corylus*, 08.1961, *C. Booth*, IMI 89266; among others. FRANCE: Bambous d’Ossearain 64, on *Phyllostachys* sp., 23. 08. 1992, *J. P. Chaumeton*, BPI 1112765. SLOVAKIA: sylvia Sur ap. Jur pr: Bratislava, in Alneto glut. ad ramum iacentem *Alni glutinosae*. 18. 10. 1979, *Z. Pouzar*, PRM 838402, among others).

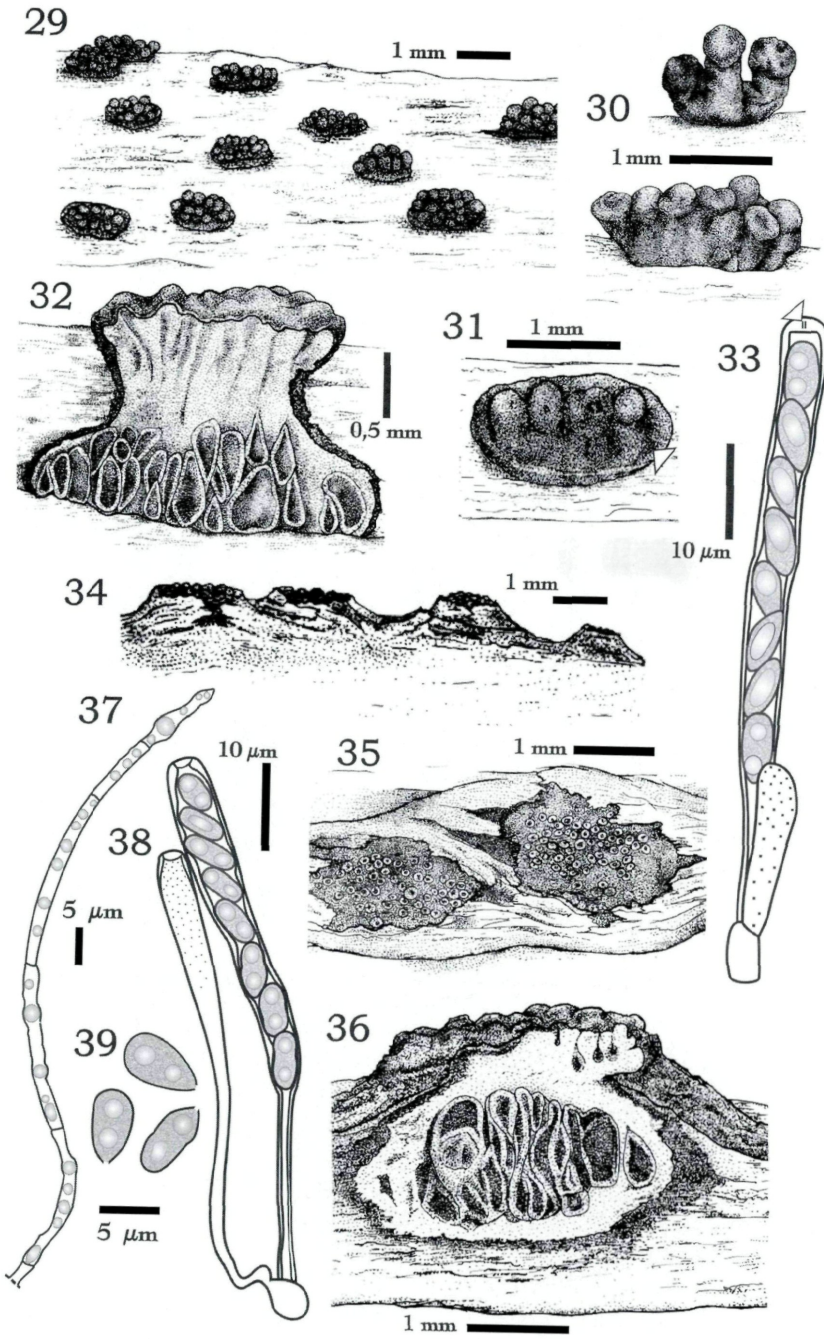
Our material agrees well with the description by Nannfeldt (1972) of *C. lutea*. The bright yellow color of the inner stroma was observed neither in our material nor in the herbarium material examined by Nannfeldt (1972), who mentioned that *Camarops lutea* is only known from Europe. One collection from the United States examined during this work (USA: New York: Warren County, Charles Lathrop Pack Demonstration Forest, New York State College of Forestry, 5 miles north of Warrensburg, on rotten log, 11. 09. 1982, R. P. Korf & students (CTR 82-54), NY) was identified as *C. lutea* by Petrini (1986). We agree with Petrini’s identification. In consequence the geographic distribution of this species can be extended to include North America and South America. This is the first record of *C. lutea* from Argentina.

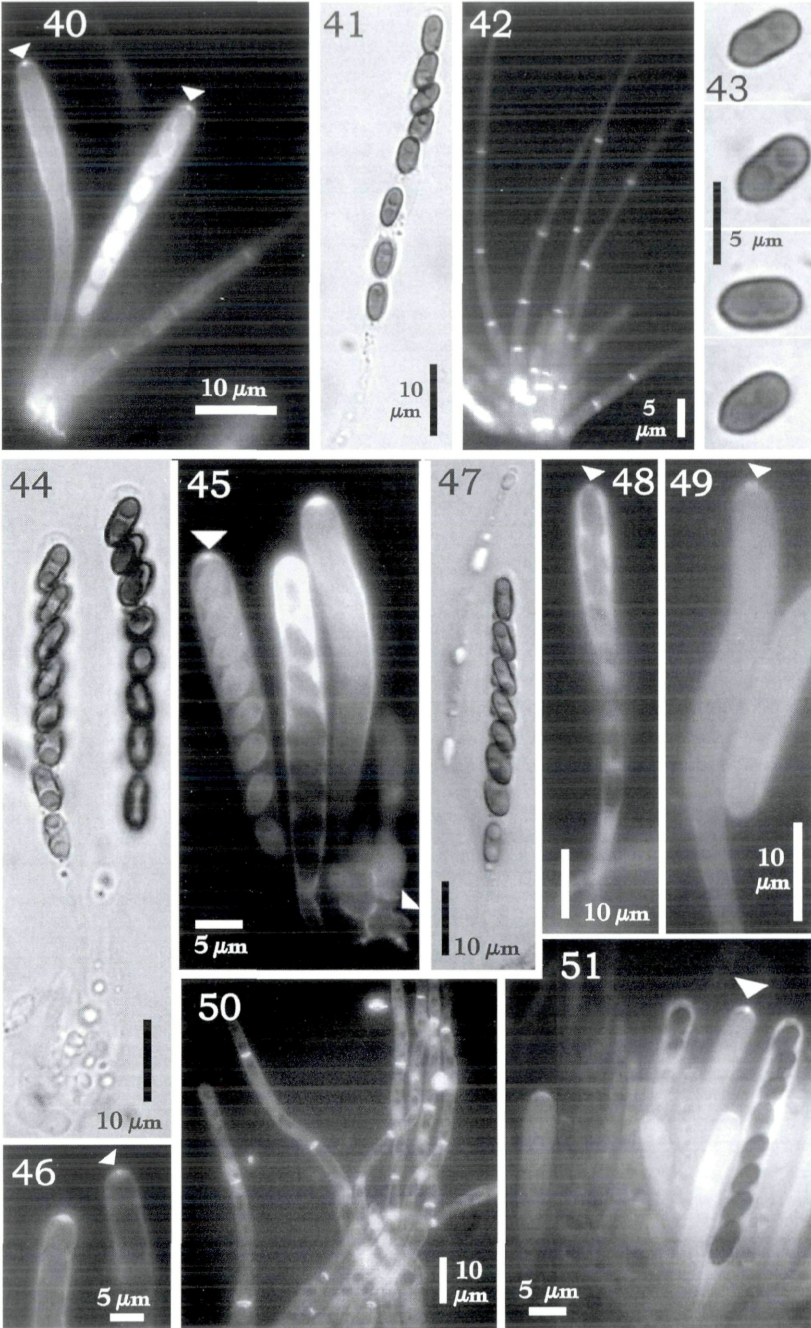
Key to the known Argentineans *Camarops* species

- 1 Perithecia monostichous, tubular . . . . . *C. polyspermum*
- 1\* Perithecia polystichous . . . . . 2
  
- 2 Perithecial necks reaching the surface of the substratum as thick protuberances . . . . . 3
- 2\* Perithecial necks completely immersed in the stroma, not emerging as protuberances . . . . . 4

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Figs. 29–39. *Camarops pugillus*. – 29. General aspect. – 30. Cylindrical protuberances reaching the surface, having slightly divergent finger-like shapes, without stromatic disc. – 31. Stromatic disc (arrowhead). – 32. Stroma in longitudinal section. – 33. Ascus; note the inconspicuous I– ring, (arrowhead). 34–39. *Camarops lutea*. – 34. General aspect. – 35. Stoma in apical view. – 36. Stroma in longitudinal section. – 37. Paraphyses. – 38. Asci in two different stages of maturation. – 39. Ascospores.





- 3 Stroma partially immersed in rotten wood, elongate in apical view. Ascospores  $6-7(-9) \times 3-4 \mu\text{m}$  . . . . . *C. rostratus*
- 3\* Stroma entirely immersed in rotten wood, circular in apical view. Ascospores  $5.5-6.0 \times 2.5-3.0 \mu\text{m}$  . . . . . *C. pugillus*
  
- 4 Stroma urn- or sack-shaped, strongly constricted, divided into two parts, apical part smaller than the basal one, globose to subglobose. . . . . *C. sacciformis*
- 4\* Stroma pulvinate, not divided into two parts. . . . . 5
  
- 5 Stroma truncate, circular to elongate, with abrupt margin, surface flat to slightly concave, dotted by hemispheric, conspicuous, ostiolar papillae . . . . . *C. lutea*
- 5\* Stroma not abruptly truncate, fusiform, elongate, margin of some stromata covered by wood, surface plane-convex, marked by small conical ostiolar papillae . . . . . *C. podocarp*

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Figs. 40–51. *Camarops podocarp*. – 40. Asci and paraphyses with EF. – 41. Ascus with OM. – 42. Paraphyses with EF, note the septa. – 43. Ascospores. 44–46. – *Camarops sacciformis*. – 44. Asci with OM. – 45. Asci with EF, note bright point at the apex and bright basal septa of croziers (arrowheads). – 46. Apex of two asci. 47–49. – *Camarops lutea*. – 47. Ascus and paraphyses with OM. – 48–49. Ascus with EF. 50–51. *Camarops pugillus*. – 50. Paraphyses with EF (note the septa). – 51. Asci with EF. (arrowheads show inconspicuous apical ring as a bright spot with EF for all figures).

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