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THE GENUS *PROLIXANDROMYCES* (LABOULBENIALES) IN THE OLD WORLD

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ABSTRACT

Two new species of *Prolixandromyces* (Laboulbeniales) parasitic on *Rhagovelia* (Heteroptera: Veliidae) are described and illustrated: *Prolixandromyces benjaminii* from the Philippine Islands and *P. lanceolatus* from Africa (Madagascar, Malawi, Nigeria, Sierra Leone, and South Africa) and Asia (Indonesia: Sulawesi, Sumba, Timor; Malaysia: Selangor; and Sri Lanka). In order to accommodate these species the circumscription of *Prolixandromyces* is emended. The new taxa are compared with the one known species from the Old World, *P. triandrus* from Spain, and with the five known New World taxa.

Key words: Heteroptera, Laboulbeniales, new species, parasitic fungi, *Prolixandromyces benjaminii*, *Prolixandromyces lanceolatus*, *Rhagovelia*, *Velia*.

INTRODUCTION

Genus *Prolixandromyces* R.K.Benj. was erected by Benjamin (1970) to accommodate two distinct taxa of Laboulbeniales Engler: *P. veliae* R.K.Benj., and *P. corniculatus* R.K.Benj., both found on species of *Velia* (Heteroptera: Veliidae) from Mexico. Benjamin (1970) recognized a close relationship with a complex of genera constituting what Thaxter (1908) had termed the Stigmatomycetaceae. All included species in this assemblage are characterized by the possession of a simple 3-celled receptacle wherein the basal cell (*I*) forms the foot; the suprabasal cell (*II*) gives rise typically to a single, stalked perithecium; and the terminal cell (*III*) subtends a few- to many-celled antheridial appendage. Benjamin (1970) based the generic separation of *Prolixandromyces* on two distinguishing characteristics, the extremely oblique superposition of cells *I* and *II* of the receptacle, and the very long and sinuate antheridial discharge tubes formed distally on a 3-celled appendage. Later, Benjamin (1981) described three additional species, *P. lingulatus* R.K.Benj., *P. rhinoceralis* R.K.Benj., and *P. tenuis* R.K.Benj., all parasites on species of *Velia*. This paper (Benjamin 1981) also included a key to the five known species, and additional distributional records for the two previously described species. All five species were found on *Velia* from Central America with the known distributions summarized as follows: *P. corniculatus* (Mexico, El Salvador), *P. lingulatus* (Nicaragua), *P. rhinoceralis* (Nicaragua), *P. tenuis* (Costa Rica), and *P. veliae* (Mexico, Nicaragua).

The addition of the three new species added validity to the status of the genus, and Benjamin (1981) noted that the primary distinguishing characteristics, as outlined earlier (Benjamin 1970), remained intact and consistent across all included species. A secondary characteristic, that of a terminal perithecial hornlike projection present in both *P. corniculatus* and *P. veliae*, was not, however, maintained as a generic character as this was absent from specimens of *P. lingulatus*.

The first hint that the geographical distribution of members of this genus might be broader than the known range in Central America came when Rossi (1982) published a photograph of a collection from Sierra Leone, on *Rhagovelia*.

Although he intended to formally describe this fungus (W. Rossi pers. comm.) it was eventually set aside to be included in a proposed future monographic treatment of the genus by Benjamin.

In the meantime, Tavares (1985), in her overview of Laboulbeniales, recognized the five known species of *Prolixandromyces* and placed the genus in her newly erected subtribe Stigmatomycetinae, that now includes more than 40 genera. No mention was made in this work (Tavares 1985) of the published photograph of an undescribed taxon from Sierra Leone. More recently, Santamaria (1988) described a new species, *P. triandrus* Santam., on *Velia caprai* Tamanini from Spain, but again failed to mention the African material. *Prolixandromyces triandrus* represents the first formally described member of this genus from the Old World. According to Santamaria (1988) specimens of *P. triandrus* differ principally from the Central American taxa in: (1) having a sub-apical rather than terminal perithecial outgrowth, (2) having three functional antheridia rather than two, and (3) having four sterile cells in the primary appendage compared to three in the other taxa.

Although for the past 20 years Benjamin continued to study and add to his collections of *Prolixandromyces*, unfortunately, the proposed monographic treatment of the genus did not materialize prior to his death. He did, however, leave a well-organized set of slides and detailed drawings of some of the taxa he had accumulated, totaling some 16 new species. In addition, in his final years he discussed with me, at length, his plans for this work and asked that I undertake to publish this material. The purpose of this initial contribution then is to: (1) describe and illustrate two new species of *Prolixandromyces* from the Old World, (2) compare these with the one known species, *P. triandrus*, from Spain, and with other New World taxa, (3) in the light of these new collections emend the generic description, and (4) extend the known range of *Prolixandromyces* from Central America, Spain, and Sierra Leone to include other African countries, and new records from Asia. The remaining 14 new species accumulated by Benjamin, all from the New World, will be dealt with in a forthcoming contribution.

MATERIALS AND METHODS

The majority of the hosts of the fungi treated in this study were either collected directly in the field by John and/or Dan Polhemus, or obtained indirectly via the collection of John Polhemus. Specimens were preserved in 70–80% ethyl alcohol although some had later been pinned, dried, and placed in museum boxes. All of the latter insects that bore fungi were relaxed prior to removal of the fungal thalli. Infected insects were placed directly into 0.2% saline or a fluid consisting of benzene (5%), ethyl alcohol (45%), water (35%), and ethyl acetate (15%) for a few hours, or overnight, after which they were removed to 70% ethyl alcohol for storage along with a duplicate set of labels. Unsorted insects collected directly into ethyl alcohol were carefully examined with a dissecting microscope and those bearing fungi were segregated and placed, along with appropriate labels, in vials containing fresh 70% ethyl alcohol.

Fungal thalli were mounted in glycerine using previously described methods (Benjamin 1971, 1986, 1993). Initial pencil drawings were prepared by Benjamin using a Leitz Dialux microscope with differential interference contrast (DIC) optics. All observations related to the descriptions, along with the final preparation of illustrations, were carried out by the author using a Nikon E800 research microscope also fitted with DIC optics. Fungal specimens are cited in relation to the collection localities of the corresponding host insects recorded as CL numbers in the field notebooks of John and/or Dan Polhemus.

Specimens of *P. triandrus* for this study were kindly provided by Sergio Santamaria and an infected host bearing the material from Sierra Leone (herein described) was received from Walter Rossi. Terminology and abbreviations used in describing the ascoma (used here for the entire peritheciium-bearing thallus) are mostly those outlined by Tavares (1985) and are explained in the legend of Fig. 1–6. Holotypes of the newly described taxa are deposited in SYRF.

TAXONOMY

PROLIXANDROMYCES R.K.Benj., *Aliso* 7: 174 (1970) emend. A.Weir

Receptacle consisting of three superposed cells bearing distally on one side a free appendage and on the other side a stalked peritheciium. The basal (*I*) and suprabasal (*II*) cells of the receptacle very strongly obliquely superposed, the latter subtending the primary stalk cell (*VI*) of the peritheciium; the upper cell of the receptacle (*III*) subtending the appendage. Appendage consisting of 3–11 superposed cells, the basal two sterile, each of the upper cells bearing a single, simple antheridium, the uppermost cell of the series, in addition producing a terminal antheridium. Antheridia with discharge tubes free and moderately to very elongate. Peritheciium with two stalk cells (*VI*, *VII*), three persistent basal cells (*m*, *n*, and *n'*) and four vertical rows of outer wall cells of four cells each. Ascogenic cell single. Ascospores 1-septate.

Type species: *Prolixandromyces veliae* R.K.Benj.

Benjamin's (1970) description and subsequent treatment (Benjamin 1981) of *Prolixandromyces* indicated an appendage consisting of three superposed cells, the uppermost only bearing two simple antheridia. The later collection and description of *P. triandrus* from Spain (Santamaria 1988)

necessitated recognition of an appendage with four superposed cells and three simple antheridia though no formal emendation to the generic circumscription was made. Here, with the description of two new species, I extend further the range of variation in the structure of the appendage for members of the genus *Prolixandromyces*. Also of note in the two newly described species are the relatively short antheridial discharge tubes ($15\text{--}21 \times 2\text{--}3 \mu\text{m}$) compared to the other known species ($20\text{--}80 \times 2\text{--}3 \mu\text{m}$) of this genus.

On Velia Latreille

1. PROLIXANDROMYCES TRIANDRUS Santam. (*Mycotaxon* 32: 433: Fig. 1–9, 1988).

Ascoma: Erect, nearly straight, slender; pale orange brown and slightly darker orange in the primary appendage and peritheciium. Total length from tip of foot to tip of peritheciium 295–420 μm . *Receptacle*: Relatively short, ca. one sixth total length of thallus, 42–70 μm long from tip of foot to base of appendage; basal cell (*I*) tapered downward to the blackened foot, narrow, $45\text{--}55 \times 10\text{--}13 \mu\text{m}$; suprabasal cell (*II*) and basal cell obliquely superposed; cell *II* slender, 28–35 μm long, and subtending the primary stalk cell (*VI*) of the peritheciium; terminal cell (*III*) triangular in optical section, $25\text{--}33 \times 13\text{--}21 \mu\text{m}$, broadest distally where it subtends the appendage. All three receptacular cells usually in contact with the primary stalk cell (*VI*) of the peritheciium that arises from cell *II*; occasionally, though, cell *I* is reduced and does not come into contact with *VI*. *Appendage*: Free, almost straight 98–105 μm long, composed of four cells that are all separated by strongly oblique septa; basal cell triangular in optical section, superposed above by a parallel-sided cell, both of these two lowermost cells sterile, the uppermost subtending two very long and thin cells that separate the three antheridia; antheridia long and slender, discharge tubes free, elongate, $25\text{--}35 \times 2\text{--}3 \mu\text{m}$. *Peritheciium*: Primary stalk cell (*VI*) longer than broad, $55\text{--}83 \times 15\text{--}25 \mu\text{m}$, with a small constriction near the base; secondary stalk cell (*VII*) shorter, 25–30 μm high, triangular in lateral view; perithecial basal cells (*m*, *n*, and *n'*) comprising 15–22% of total length of perithecial body above stalk cells; body $\pm$ straight, elongate $258\text{--}275 \times 38\text{--}60 \mu\text{m}$ including the basal cells, nearly symmetrical, broadest near the middle and tapered gradually to the perithecial apex; apex distinct with the terminal cell of the posterolateral row of outer wall cells derived from basal cell *m* bearing an elongate subterminal outgrowth with a truncate apex and two downwardly-pointing hook-like expansions.

Specimens examined.—SPAIN: Girona; Catalonia; Riells i Viabrea; 02 Sep 1989; S. Santamaria; on the legs and antennae of *Velia caprai* Tamanini; *RKB* 3520 (designated slides; SYRF). Same collection locality; 11 Aug 1989; S. Santamaria (*SS875A*, *SS875B*); on *V. caprai*; *RKB* 3972 (designated slides; SYRF).

Notes.—The four slides received from S. Santamaria contained 18 mature, 7 immature, and 15 damaged or broken individuals. My measurements of the species differ slightly from those given by Santamaria in the original protologue (Santamaria 1988). Characteristic features of *P. triandrus* separating it from all other known species include the strongly oblique septation of the primary appendage, and the subterminal perithecial outgrowth.

Fig. 1–6. Micrographs of *Prolixandromyces triandrus* (1–3) and *P. benjaminii* (4–6) specimens.—1. *RKB* 3520 [Europe; Spain]: Mature thallus showing relationship of receptacular cells (*I*, *II*, *III*).—2–3. *RKB* 3972 [Europe; Spain]: Mature thalli with characteristic, hooked, subterminal perithecial outgrowth.—4–6. *RKB* 3586 [Philippine Is.; Luzon].—4. Mature thallus with darker perithecium.—5. Mature thallus with paler perithecium and showing relationship of receptacular cells (*I*, *II*, *III*).—6. Detail of antheridial appendage showing nine simple antheridia. (All scale bars = 50 μ m). Key to figure labels: *I*, basal cell of receptacle; *II*, suprabasal cell of receptacle; *III*, terminal cell of receptacle; *VI*, primary stalk cell of perithecium; *VII*, secondary stalk cell of perithecium; *m*, perithecial basal cell derived from cell *VI*, gives rise to one vertical row of wall cells; *n*, one of two perithecial basal cells derived from cell *VII*, gives rise to two vertical rows of wall cells; *n'*, the other perithecial basal cell derived from cell *VII*, gives rise to one vertical row of wall cells; *tr*, trichogyne (also trichogynic remnant); *w*^{1–4}, tiers of outer wall cells, 1 (basal) to 4 (terminal).

Fig. 7–9. *Prolixandromyces lanceolatus*.—7. *RKB 3587* [Indonesia; Sulawesi].—8. *RKB 3588* [Indonesia; Sulawesi].—9. *RKB 3590* [Africa; Madagascar].—7. Mature thallus with darker perithecium.—8. Mature thallus with paler perithecium and six antheridia.—9. Mature thallus with paler perithecium and more typical appendage with four antheridia. (All scale bars = 50 μ m). Key to figure labels as in Fig. 1–6.

On Rhagovelia Mayr

2. *Prolixandromyces benjaminii* A. Weir, sp. nov.

Erectus, fere directus, tenuis, diluto brunneo colore praeter cellulas *VI*, *I* ac *II* hyalinas. Receptaculum breve. Cellula *I* ad basem decrescens, a tenui cellula *II* oblique septo divisa. Cellula *III* trianguli instar, ad basem gradatim decrescens, interno latere cellulis *VI* ac *II* adherente. Appendix directa aut parum arcuata, e 7–11 cellulis gradatim minoribus confecta, quarum duae inferiores steriles, ceterae singulum antheridium ferentes praeter ultimam, alterum antheridium in summo ferentem. Antheridia extra directa, parum elongata ac soluto collo. Cellula *VI* multo longior quam latior, ad basem abrupte contracta. Cellula *VII* multo brevior quam *VI* ac fere triangula. Perithecium directum, elongatum, fere aequale, ad medium latius, ad apicem gradatim extenuatum. Perithecii apex in acutam appendicem desinens e rotundato tumore subtentam. Longitudo a pede usque ad perithecii apicem 260–363 μ m. Longitudo appendicis 108–163 μ m. Perithecium 163–238 $\times$ 40–65 μ m. Parasitus *Rhagoveliae wernerii* Philippinas insulas incolis.

Ascoma: Erect, nearly straight, slender; pale brown to yellow brown except for the apex of the perithecium, the primary stalk cell (*VI*) of the perithecium, and the basal (*I*) and suprabasal (*II*) cells of the receptacle that are all hyaline. Total length from tip of foot to tip of perithecium 260–365 μ m. *Receptacle*: Relatively short, ca. one fifth total length of thallus, 53–70 μ m long from tip of foot to base of appendage; basal cell (*I*) tapered downward to the blackened foot,

outwardly slightly convex distally, 38–58 $\times$ 8–13 μ m; supra-basal cell (*II*) and basal cell obliquely superposed; cell *II* slender, 30–50 μ m long, broadest distally, 8–10 μ m wide where it subtends the primary stalk cell (*VI*) of the perithecium; terminal cell (*III*) triangular in optical section, tapered gradually downward, 25–40 μ m long, broadest distally, 6–13 μ m wide where it subtends the appendage, its distal anterior margin and the lower posterior margin of the primary stalk cell of the perithecium adnate, extending downward along the posterior margin of cell *II* well below the level of the distal end of cell *I*. *Appendage*: Free, almost straight to $\pm$ curved 108–163 μ m long; basal cell longer than broad, 20–28 $\times$ 13–18 μ m, superposed above by an isodiametric cell 13–15 $\times$ 13–15 μ m, both of these two lowermost cells sterile, the uppermost subtending a superposed series of 5–9 successively smaller cells; each of these cells gives rise to an outwardly directed antheridium with the uppermost cell in the series, in addition, bearing a second, terminal antheridium resulting in a total of 6–10 antheridia on the appendage branch; antheridial venters 10–15 $\times$ 8–13 μ m, discharge tubes free, moderately elongate, 15–21 $\times$ 2–3 μ m. *Perithecium*: Primary stalk cell (*VI*) much longer than broad, 45–68 $\times$ 13–20 μ m, strongly and abruptly constricted near the base; secondary stalk cell (*VII*) shorter, 15–25 μ m high, triangular in lateral view; perithecial basal cells (*m*, *n*, and *n'*) comprising ca. 20% of total length of perithecial body above stalk cells; body $\pm$ straight, elongate, 163–238 $\times$ 40–65 μ m including the basal cells, nearly symmetrical,

Fig. 10–19.—Drawings of *Prolixandromyces benjaminii* specimen RKB 3586 [Philippine Is.; Luzon] (10–14), *P. lanceolatus* specimen RKB 3592 [Africa; Madagascar] (15–18), and *P. triandrus* specimen RKB 3520 [Europe; Spain] (19).—10–14. *Prolixandromyces benjaminii*.—10. Mature thallus.—11. Detail of primary appendage.—12. Distal part of perithecium showing arrangement of terminal tier of outer wall cells.—13. Detail showing arrangement of receptacular cells.—14. Immature individual showing arrangement of basal cells and the developing outer wall cells of the perithecium.—15–18. *Prolixandromyces lanceolatus*.—15. Detail of primary appendage.—16. Mature thallus.—17–18. Detail of distal part of perithecium.—19. *P. triandrus*. Detail of distal part of perithecium. (Scale bars. A = 50 μ m, Fig. 10, 16; B = 25 μ m, Fig. 11, 14, 15; C = 10 μ m, Fig. 12, 13; D = 10 μ m, Fig. 17, 18, 19). Key to figure labels as in Fig. 1–6.

broadest near the middle and tapered gradually to the perithecial apex; apex distinct with the terminal cell of the posterolateral row of outer wall cells derived from basal cell *n* bearing a rounded subterminal swelling and a prominent, acuminate, terminal appendage.

Etymology.—Named posthumously for Dr. Richard K. Benjamin, distinguished student of the Laboulbeniales.

Holotype.—PHILIPPINE IS.: LUZON; Laguna Prov., Mount Makiling; Molawin Creek at Mud Spring; 09 Jul 1985; J. T. & D. A. Polhemus (CL 1975); on the antennae and middle legs of *Rhagovelia ?usingerii*; RKB 3586 (designated slide; SYRF).

Isotypes.—Data as for the holotype; RKB 3586 (designated slides; SYRF).

Paratypes.—PHILIPPINE IS.: MINDANAO; Mount Apo; Subulan River, 7000–8000 ft; 21 Sep 1977; C. S. Clagg coll. (leg. J. T. Polhemus, 1973); on the legs of *Rhagovelia wernerii* Hung. & Mats.; RKB 2833 (designated slides; SYRF). PHILIPPINE IS.: MINDANAO; Mount Apo; Galog River, 6000 ft; 13 Nov 1977; C. S. Clagg coll. (leg. J. T. Polhemus, 1973); on the right and left middle legs of *Rhagovelia wernerii*; RKB 2834 (designated slide; SYRF).

Notes.—The collection of *Prolixandromyces benjaminii* included 32 mature, 18 immature, and 21 broken or damaged individuals. The long, flexuous appendage composed of 7–11 cells bearing a series of 6–10 antheridia readily distinguishes *P. benjaminii* from other known species in the genus. All currently known New World taxa (i.e., *P. corniculatus*, *P. lingulatus*, *P. rhinoceralis*, *P. tenuis*, and *P. veliae*) are characterized by possessing a three-celled appendage on which the uppermost cell bears two simple antheridia. *Prolixandromyces triandrus* from Spain differs in having a four-celled appendage with three functional antheridia, and the herein described *P. lanceolatus* is characterized by a five-celled appendage that bears usually four antheridia. The precise structure of the perithecial apex in *P. benjaminii* is also quite different from all other known species of *Prolixandromyces*.

3. *Prolixandromyces lanceolatus* A. Weir, sp. nov.

Fungus erectus, fere directus aut arcuatus, exilis aut plus minusve pinguis, dilute flavus aut brunneus, praeter peritheci apicem, cellulam VI et appendicis superiores cellulas dilutiores. Receptaculum breve. Cellulam I ad basem decrescens, exteriori latere convexo, a tenui cellula II obliquo septo divisa. Cellula III trianguli instar, ad basem gradatim decrescens, interno latere cellulis VI ac II adherente, cellula I tangens. Appendix erecta ac directa, e 4–7 cellulis gradatim minoribus confecta, quarum duae inferiores steriles, ceterae singulum antheridium ferentes, praeter ultimam alterum antheridium in summo ferentem. Antheridia extra directa, parum elongata ac soluto collo. Cellula VI multo longior quam latior, ad basem abrupte contracta. Cellula VII brevior quam VI, fere triangula. Perithecium directum, elongatum, aequale, ellipticum, ad medium latius, ad apicem gradatim extenuatum. Peritheci apex in acutam appendicem desinens e rotundato tumore subtentam. Longitudo a pede usque ad peritheci apicem 300–460 μ m. Longitudo appendices 83–120 μ m. Perithecium 183–283 $\times$ 48–68 μ m. Parasitus complurium Rhagoveliorum in Africa et Asia.

Ascoma: Erect, nearly straight to curved, slender to $\pm$ inflated, pale yellow to brown except for the apex of the perithecium, the primary stalk cell (VI) of the perithecium, and occasionally the uppermost cells of the primary appendage

that may be hyaline. Total length from tip of foot to tip of perithecium 300–460 μ m. *Receptacle*: Relatively short, ca. one fifth total length of thallus, 58–90 μ m long from tip of foot to base of appendage; basal cell (I) tapered downward to the blackened foot, outwardly slightly convex distally, 48–70 $\times$ 10–13 μ m; suprabasal cell (II) and basal cell obliquely superposed; cell II slender 35–60 μ m long, broadest distally, 8–13 μ m wide where it subtends the primary stalk cell (VI) of the perithecium; terminal cell (III) triangular in optical section, tapered evenly downward 23–43 μ m long, broadest distally, 8–15 μ m wide where it subtends the appendage, its distal anterior margin and the lower posterior margin of the primary stalk cell of the perithecium adnate, extending downward along the posterior margin of cell II well below the level of the distal end of cell I. *Appendage*: Free, typically straight and erect, 83–120 μ m long; basal cell longer than broad, 20–35 $\times$ 13–20 μ m, superposed above by a second cell 18–28 $\times$ 13–18 μ m, both of these two lowermost cells sterile, separated from each other by a somewhat oblique septum, the uppermost cell subtending a superposed series of 2–5 (typically 3) successively smaller cells; each of these cells gives rise to an outwardly directed antheridium with the uppermost cell in the series, in addition, bearing a second, terminal antheridium resulting in a total of 3–6 (typically 4) antheridia on the appendage branch; antheridial venters 15–20 $\times$ 6–12 μ m, discharge tubes free, moderately elongate, 15–20 $\times$ 2–3 μ m. *Perithecium*: Primary stalk cell (VI) much longer than broad 40–98 $\times$ 13–20 μ m, strongly and abruptly constricted near the base; secondary stalk cell (VII) shorter, 18–28 μ m high, triangular in lateral view; perithecial basal cells (*m*, *n*, and *n'*) comprising ca. 15–20% of perithecial body above stalk cells; body $\pm$ straight, elongate, 183–283 $\times$ 48–68 μ m including the basal cells, nearly symmetrical and narrowly elliptical, broadest near the middle and tapered gradually to the perithecial apex; apex distinct with the terminal cell of one of the two rows of outer wall cells derived from basal cell *n* bearing a prominent, capitate, terminal protrusion, the other about equal in height to the terminal cell of the row of outer wall cells arising from basal cell *n'*; terminal cell of the row of outer wall cells derived from basal cell *m* shorter and broader than the other three, bearing the large trichogyne scar basally, and a subterminal umbo distally.

Etymology.—*lanceolatus*, referring to the narrowly elliptical perithecial body of this fungus.

Holotype.—Africa: MADAGASCAR: 5 km N of Joffreyville; 16 Nov 1986; J. T. & D. A. Polhemus (CL 2281); on the legs, and the margins and tip of the abdomen of *R. tesari tesari* Hoberlandt; RKB 3590 (designated slide; SYRF).

Isotypes.—Data as for the holotype; RKB 3590 (designated slides; SYRF).

Paratypes.—Africa: NIGERIA: Agege; Lagos; 5 Dec 1948; B. Malkin coll. (leg. J. T. Polhemus, 1973); On the legs of *Rhagovelia maculata* Distant; RKB 2836 (designated slides; SYRF). SIERRA LEONE: Northern Prov.; near Bumbuna; 30 Jan–5 Feb 1980; W. Rossi coll.; on the basal segment of the left antenna of *Rhagovelia infernalis africana* Lundblad or *R. maculata*; RKB 3259 (designated slide; SYRF). Same locality data; on the antennae, legs, and tip of the abdomen of *Rhagovelia* sp.; RKB 3634 (designated slide; SYRF). MADAGASCAR: Tananarive Prov.; 56 km W of Tananarive on Tsiroanomandidy Road, el. 1372 m; 10 Dec 1986; J. T. & D. A.

Polhemus (CL 2303); on the antennae, legs, and tip of the abdomen of *R. faratsihoi* n. sp. (fide J. & D. Polhemus); *RKB 3591* (designated slides; SYRF). Tananarive Prov.; roadside seep and pools 61 km NW of Ankozobe; el. 1387 m; 08 Nov 1986; J. T. & D. A. Polhemus (CL 2272); on the antennae, legs, and the upper surface of the abdomen (especially near the tip) of *R. adriemae-brasili* Poisson; *RKB 3592* (designated slides; SYRF). Diego Suarez Prov.; Montagne d'Ambre Forest Reserve; stream at Petite Cascade; el. 991 m; 15 Nov 1986; J. T. & D. A. Polhemus (CL 2280); on the tibia of the left middle leg of *R. tesari tesari*; *RKB 3593* (designated slide; SYRF). Diego Suarez Prov.; Montagne d'Ambre Forest Reserve; stream at Grande Cascade; el. 671 m; 13 Nov 1986; J. T. & D. A. Polhemus (CL 2278); on the legs of *R. tesari tesari*; *RKB 3595* (designated slides; SYRF). Fianarantosa Prov.; forest streamlet above Namarona River; 6 km W of Ranomafana; el. 930 m; 31 Oct 1986; J. T. & D. A. Polhemus (CL 2248); on the legs of *R. pexa* Hoberlandt; *RKB 3594* (designated slides; SYRF). SOUTH AFRICA: Cape Prov.; Hogback; 20 Feb 1979; J. T. Polhemus (CL 962); on the antennae and legs of *Rhagovelia* sp.; *RKB 3687* (designated slides; SYRF). MALAWI: Zomba; 28 Feb 1979; J. T. Polhemus (CL 984); on the antennae and legs of *Rhagovelia* sp.; *RKB 3688* (designated slide; SYRF). Asia: SRI LANKA: Uva Prov., Monaragala; 2 Jul 1970; P. B. Karunaratne coll. (leg. J. T. Polhemus, 1973); on the legs of *Rhagovelia ceylonica* Lundblad; *RKB 2835* (designated slides; SYRF). Northern Prov., Anuradhapura; Vauniya; 07 Mar 1964; K. L. A. Perera coll.; on the margin of the left hemelytron of *Rhagovelia ceylonica*; *RKB 3126* (designated slide; SYRF). INDONESIA: SULAWESI: Sulawesi Utara Prov.; Dumoga-Bone National Park; 4 Sep 1985; J. T. & D. A. Polhemus (CL 2100); on the antennae and legs of *R. celebensis* J. & D. Polhemus; *RKB 3587* (designated slides; SYRF). Sulawesi Utara Prov.; tributary of Tumpah River; Dumoga-Bone National Park; el. 235 m; 5 Sep 1985; J. T. & D. A. Polhemus (CL 2101); on the antennae and legs of *R. wallacei* J. & D. Polhemus; *RKB 3588* (designated slides; SYRF). INDONESIA: TIMOR: Nusa Tenggara Timur Prov.; spring and stream at Oe Hala; 10 km N of Soe; el. 685 m; 11 Sep 1991; D. A. & J. T. Polhemus (CL 2593); on the legs and antennae of *Rhagovelia* sp.; *RKB 3814* (designated slides; SYRF). Nusa Tenggara Timur Prov.; spring and stream at Oe Noah near Polen; 23 km NE of Soe; el. 840 m; 12 Sep 1991; D. A. & J. T. Polhemus (CL 2594); on the legs and antennae of *Rhagovelia* sp.; *RKB 3815* (designated slides; SYRF). INDONESIA: SUMBA: Nusa Tenggara Timur Prov.; Kambahapang River; 59 km SW of Waingapu; el. 530 m; 14 Sep 1991; D. A. & J. T. Polhemus (CL 2599); on the legs of *Rhagovelia* sp. (nov. sp. in ms., fide D. & J. Polhemus); *RKB 3816* (designated slide; SYRF). Nusa Tenggara Timur Prov.; Mataiyang Spring and outflow stream at Lewa Paku; el. 500 m; 14 Sep 1991; D. A. & J. T. Polhemus (CL 2598); on the legs, antennae, and tip of abdomen of *Rhagovelia* sp.; *RKB 3817* (designated slides; SYRF). MALAYSIA: SELANGOR: Templer Park N of Kuala Lumpur; small stream; 17 Aug 1985; J. T. & D. A. Polhemus (CL 2070); on the antennae, legs, and tip of the abdomen of *R. sumatrensis* Lundblad; *RKB 3589* (designated slide; SYRF).

Notes.—The collection of *Prolixandromyces lanceolatus* included 418 mature, 190 immature, and 29 broken or damaged individuals. Most of the thalli examined, including the holotype material, have an antheridial appendage formed from 5 cells, the upper 3 of which are fertile, forming 4 antheridia. Exceptions to this arrangement include: (1) thalli typified by an appendage formed from 6 (rarely 7) cells and bearing 5 (rarely 6) antheridia from Madagascar (*RKB 3594*, *3595* in part), Sri Lanka (*RKB 2835*, *3126*), Sulawesi (*RKB 3588* in part), and Sumba (*RKB 3817* in part), and (2) thalli typified by an appendage with 4 cells and 3 antheridia from South Africa (*RKB 3687*). Because these variations in number of appendage cells and antheridia occur throughout the geographical range and, in some cases, have even been found

on the same host insect as the more typical form, I have followed Benjamin (unpubl. notes) in choosing not to separate these taxonomically. In terms of appendage characteristics, *P. lanceolatus*, the most wide-ranging species of this genus currently known, differs from the known New World taxa (*P. corniculatus*, *P. lingulatus*, *P. rhinoceralis*, *P. tenuis*, and *P. veliae*) in always producing an appendage with more than 3 cells and more than 2 simple antheridia. *Prolixandromyces lanceolatus* differs from *P. benjaminii* in forming a generally shorter (83–120 μ m versus 108–163 μ m) appendage branch composed of fewer cells (4–7 typically 5 versus 7–11 typically 10) and producing fewer antheridia (3–6 typically 4 versus 6–10 typically 9), and also in lacking the subterminal swelling that characterizes the perithecial apex of *P. benjaminii*. With the exception of the material from South Africa, thalli of *P. lanceolatus* differ from the only other known species, *P. triandrus* from Spain, in possessing an appendage composed of more than 4 cells and bearing more than 3 antheridia. Although the South African material produces the same number of appendage cells and antheridia it differs principally in lacking the strongly oblique septa separating all appendage cells in *P. triandrus*. Moreover, all material (including South African) of *P. lanceolatus* differs from *P. triandrus* in lacking the distinctive subapical perithecial outgrowth so characteristic of the latter.

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