
Supplemental Notes on New World *Xyris* (Xyridaceae)

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ABSTRACT. Of South American *Xyris* sent to the author for determination by the Missouri Botanical Garden and The New York Botanical Garden, six appear to be new species: three (*X. boliviana*, *X. guillenii*, and *X. subasperula*, sent from MO) are recent collections from eastern Bolivia; two (*X. amorimii* and *X. ferreirae*, sent from NY) are Brazilian, from Bahia and Amazonas, respectively. A sixth (*X. gongylospica*) was collected from the Guayana Highlands of Bolívar, Venezuela. All are described and illustrated, and their relationships are discussed.

Of the South American *Xyris* recently sent to me for determination from the Missouri Botanical Garden and The New York Botanical Garden, five are distinct when one applies existing treatments (Kral, 1988, 1994; Maguire & Smith, 1964; Smith & Downs, 1968) to them. These, and yet another that I found during a trip to the Guayana Highlands of Edo. Bolívar, Venezuela, are presented below. The kindness of curators at the above-mentioned institutions, together with that of the original collectors of the Brazilian and Venezuelan material, is hereby gratefully acknowledged.

1. *Xyris amorimii* Kral, sp. nov. TYPE: Brazil. Bahia: Mun. Morro do Chapeau, Estrada p/o Morro da Torre de transmissão, ca. de 10 km a partir da Sede do Municipio, ca. 1100 msm, campo rupestre, 22 Fevereiro 1993, A. M. A. Amorim, A. M. V. de Carvalho, J. G. Jardim & J. R. da Silva 1048 (holotype, CEPEC; isotypes, NY, VDB). Figure 1.

Habitu et spica *X. minarum* Seubert et affinibus similis, praecipue differt sed basibus foliorum minus dilatatis, bracteis (dum similiter scariosis) et sepalis lateralis distaliter fimbriatis, trichomatibus elongatis, pallidis, crispatis.

Perennial, caespitose, smooth, 5–7 dm high. Roots slender, fibrous. Stems short. Principal foliage leaves in narrow fans, 16–26 dm long, longer than the scape sheaths; sheaths entire, carinate, thin, prominently costate, shining, brown to pale red-brown or stramineous, about as long as the blades, distally papillose, at base gradually dilat-

ing, uleaf gradually narrowed, eligulate or short-liguled, flattened, narrowly linear, 1–2 mm wide, olivaceous, prominently few-nerved, minutely papillose; apices gradually narrowed, narrowly acute, slightly thickened; margins thin, entire. Scape sheaths red-brown toward base, toward apex open with elongate blades. Scapes straight, slightly twisted, terete, ca. 0.5 mm thick, at apex few-costate, minutely papillate, olivaceous. Spikes multiflorous, turbinate at anthesis, broadly ovoid afterward, 0.7–1 cm long; bracts erect to ascending, subequal, loosely spirally imbricate, broadly oblong to narrowly ovate, 5.5–6.5 mm long, thin, pale brown, papillate, scarious, the margins toward apex densely white-villous, the dorsal areas prominent, pale green, punctate. Sterile bracts few, with continuous, narrow dorsal areas; fertile bracts emarginate, the dorsal areas narrowly triangular, up to 4 mm long. Lateral sepals free, equilateral, lanceolate, curved, ca. 5 mm long; keel narrow, firm, papillate from base to tip; margins scarious, white-villous toward apex. Petal blades obovate, ca. 4 mm long, acute, undulate-margined, yellow. Staminodia bibrachiate, the branches densely long-penicillate. Anthers oblong, ca. 1.5 mm long, deeply emarginate and sagittate; filaments 0.5–0.7 mm long. Capsule ellipsoid, ca. 3 mm long; placenta central. Seeds numerous, ellipsoid to ovoid, ca. 0.4 mm long, finely spirally multiribbed, translucent.

Distribution. Known only from the type collection.

This species is distinctive both in foliage and inflorescence, but it is difficult to determine its alliances. In habit and spike it resembles *Xyris minarum* Seubert and related taxa, yet its leaf bases are less dilated; its spike bracts, while similarly scarious, are fringed distally with long, pale, crisped hairs, a character likewise found on its lateral sepals. These two latter features are unique in that complex.

2. *Xyris boliviana* Kral, sp. nov. TYPE: Bolivia. Santa Cruz: Velasco Parque Nacional Noel Kempff M., pampa inundada, orilla Rio Itenez, 13°32'37"S, 61°01'37"W, 200 m, 1 June 1994, E. Gutierrez, R. Quevedo & F. Mamani 1345 (holotype, USZ; isotypes, MO, VDB). Figure 2.

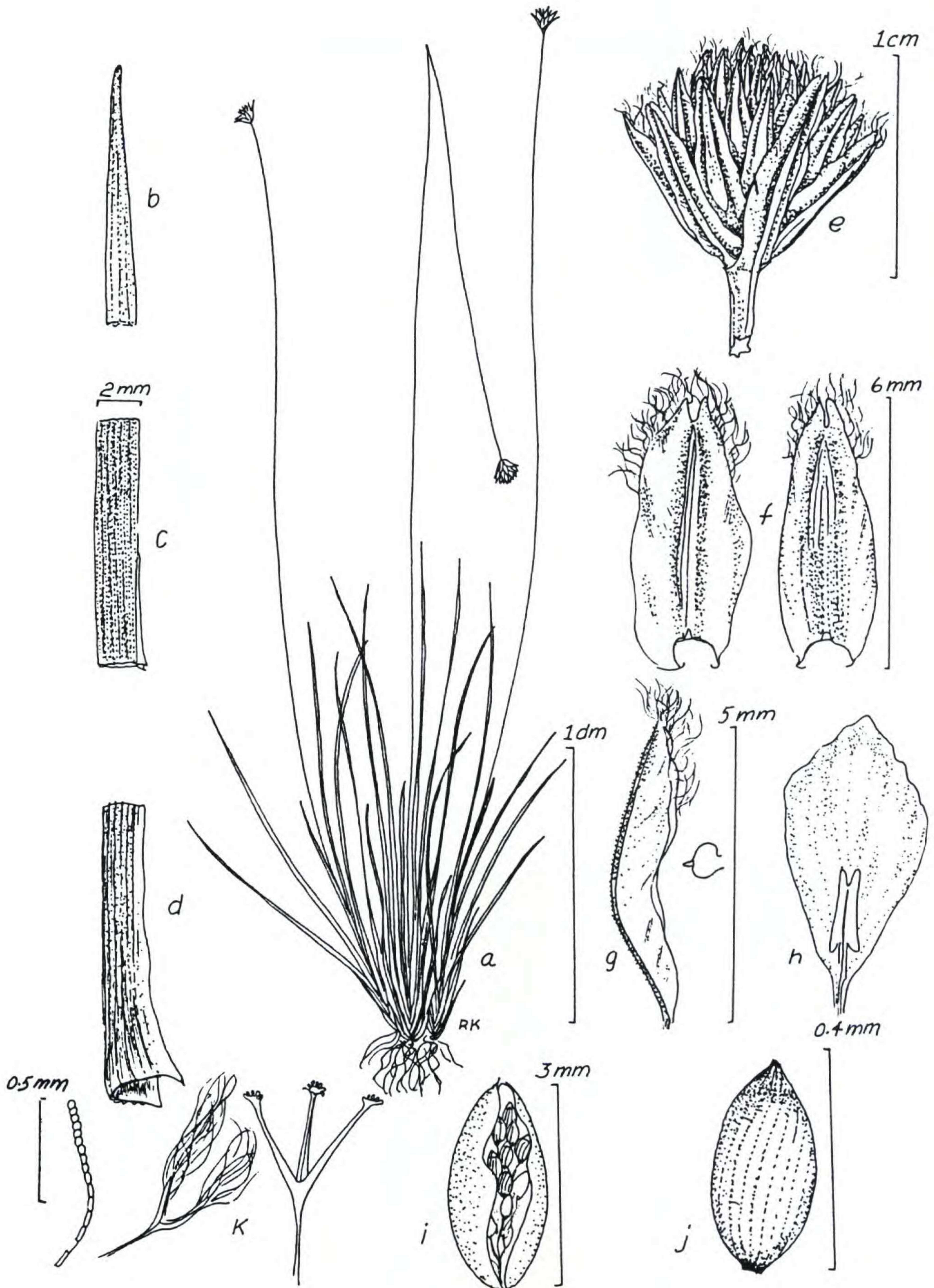


Figure 1. *Xyris amorimii* Kral (Amorim et al. 1048). —a. Habit sketch. —b. Leaf apex. —c. Leaf blade, midsector. —d. Leaf base. —e. Spike. —f. Sterile bract (left); fertile bract (right). —g. Lateral sepal. —h. Petal, stamen. —i. Capsule. —j. Seed. —k. Staminodial beard hair, enlarged (left); staminode (middle); stylar apex (right).

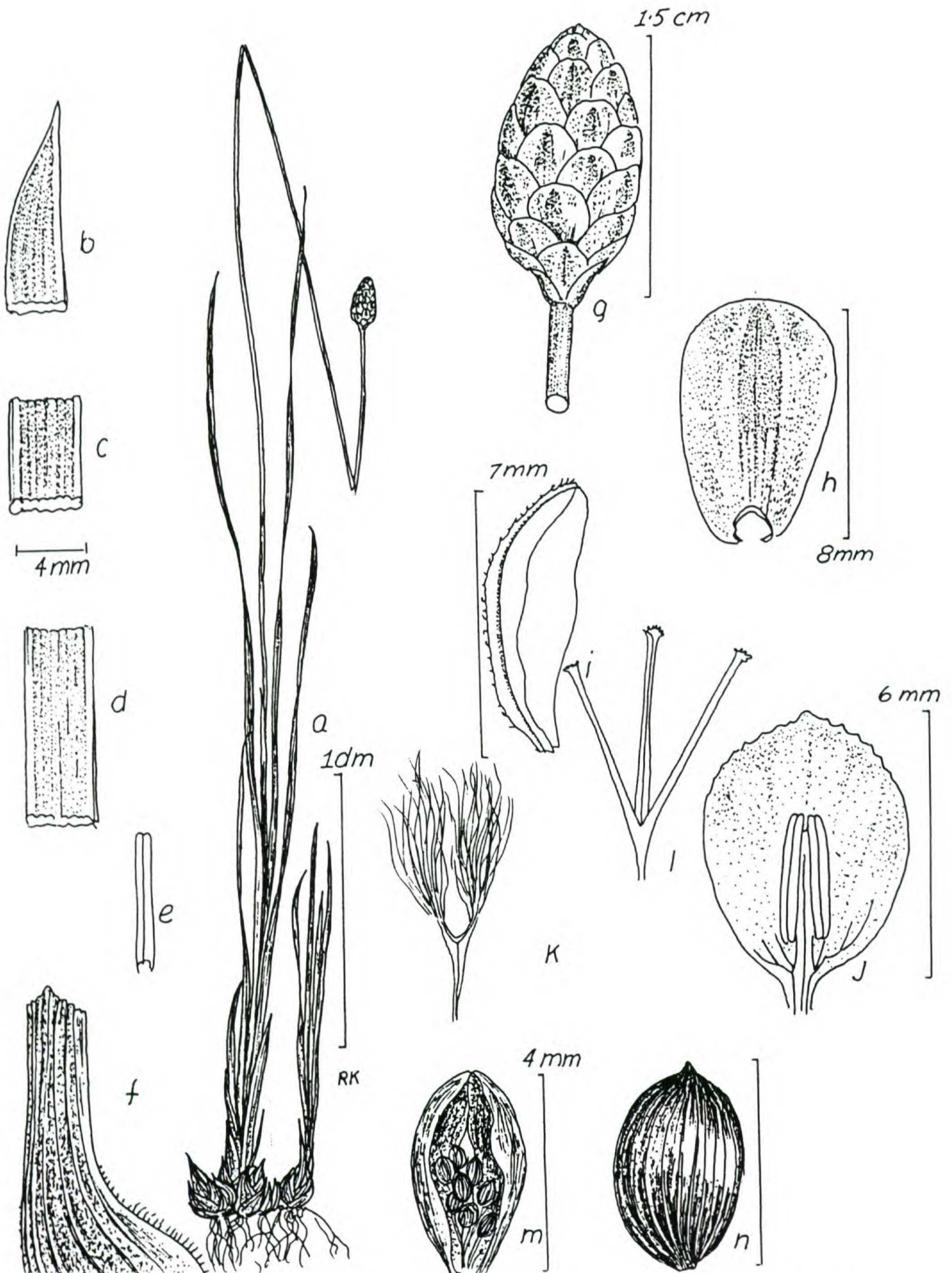


Figure 2. *Xyris boliviana* Kral (Gutierrez et al. 1345). —a. Habit sketch. —b. Leaf apex. —c. Leaf blade, midsector. —d. Leaf blade-sheath junction. —e. Leaf blade edge, abaxial side. —f. Leaf base. —g. Spike. —h. Fertile bract. —i. Lateral sepal. —j. Petal blade, stamen. —k. Staminode. —l. Stylar apex. —m. Capsule. —n. Seed.

Fortasse *X. nilssonii* Malme affinis sed valde rhizomatosis, plus robustis, basibus plus atratioribus, vaginis soriorum cilatis, spicis grandioribus, bracteis fertilibus integris, sepalis lateralibus valde inaequilateralis, obtusioribus.

Robust perennial herbs 7–10 dm tall, strongly rhizomatous and bulbous-based, the bulbs ovoid, thick-scaled, at ends of short, scaly, ascending or horizontal rhizomes. Principal leaves stiff, subdistichous (the lower ones transitional to bulb scales and mostly sheath), erect to slightly ascending, twisted, 30–50 cm long, longer than the scape sheaths; sheaths (and bulb scales) ecarinate, scabridulous, ciliate or ciliolate at dilated base, sordidly purple-brown, multicostate, abruptly dilated below, then gradually narrowed into blade, eligulate; blades compressed, linear, slightly twisted, 3–4 times longer than sheaths, longitudinally distinctly few-nerved, the tips asymmetrically subulate; margins thickened, entire, commonly with median sulcus. Scape sheaths firm, twisted, shorter than leaves. Scapes straight or flexuous, twisted, terete toward apex, ca. 1 mm thick, finely striate. Spikes broadly to narrowly ovoid, 1.2–2 mm long, short-attenuate, blunt or obtuse, several-flowered, the sterile bracts several, the lowermost pair oblong-lanceolate, ca. 5 mm long, blunt with linear dorsal areas, the inner ones broader, gradually longer, grading evenly into the fertile; fertile bracts broadly obovate, 8–8.5 mm long, ecarinate, broadly convex, broadly rounded, entire becoming erose, the dorsal areas elliptic, greenish brown, with indistinct median costae. Lateral sepals free, strongly inequilateral, broadly spatulate, 7–7.5 mm long; carinal keel broad, irregularly ciliolate. Petal blades broadly obovate to suborbicular, 6 mm long, yellow, dentate. Staminodia bibrachiate, the branches densely long-penicillate. Anthers curved-oblong, 2–2.5 mm long, emarginate and deeply sagittate, the filaments stout, ca. 0.5–1 mm long. Capsule obovoid, ca. 3.5–4 mm long, the placentation basal. Seeds numerous on long funicles, broadly ellipsoid, apiculate, 0.4–0.5 mm long, shiny, deep brown, longitudinally distinctly multicostate.

Distribution. Thus far known only from wet savanna at low elevation (200 m), Santa Cruz Province, Bolivia.

In existing treatments for *Xyris* of South America this species appears to stand apart, perhaps the nearest to it being *X. nilssonii* Malme, a species that extends from the western planalto of Brazil westward into Bolivia. However, that species, while bulbous-based, definitely lacks the stout scaly rhizomes that connect the larger, more nerved, bulbs of *X. boliviana*. *Xyris boliviana* is more robust,

darker-based. Its leaves in venation and margin are similar, but the sheath bases are ciliate rather than entire, lacking the lustrous dark brown borders of *X. nilssonii*. The spikes of *X. boliviana* are similar in being attenuate-based, but are larger with more and broader fertile bracts, which are entire (rather than scarious-lacerate) and with less distinct narrower dorsal areas. The broadly spatulate lateral sepals are very inequilateral, rather than equilateral, are blunt rather than acute, and the seeds are slightly shorter, darker, more lustrous, and broader.

In habit *Xyris boliviana* has some resemblance to *X. asperula* Martius, but that species is in an entirely different complex, since it has no dorsal areas, lacks attenuate spike base, and has longer lateral sepals.

Since we have few records of xyrids from this particular part of Bolivia, and since the plant has been collected now from two different localities within the Parque Nacional, it is quite likely that further records of it will become available as the region becomes better known botanically.

Paratype. BOLIVIA. **Santa Cruz:** Velasco Parque Nacional Noel Kempff M., pampa inundada, 13°33'3"S, 61°03'31"W, 200 m, 30 May 1994, E. Gutierrez, R. Quevedo & F. Mamani 1285 (MO, Museo Noel Kempff Mercado, VDB).

3. *Xyris ferreirae* Kral, sp. nov. TYPE: Brazil. Amazonas: Mun. Humaita, BR 230, Rod. Transamazonica a 94 km de Humaita, Reserva Indigena dos Tenharim, 6°55'S, 62°15'W, campina aberta, solo arenoso branco, 15 Abr. 1985, C. A. Cid Ferreira 5466 (holotype, INPA; isotypes, NY, VDB). Figure 3.

Habitu, folia, et apicis bracteorum *X. hymenachne* Martius similis, sed vaginis foliorum cilatis, plus atratioris, laminis foliorum submarginale incrassatis, dense rufociliolatis.

Perennial, caespitose, 3–8 dm long, the stems short, the bases thickened, the roots slender-fibrous. Principal leaves narrowly linear, 15–25 cm long, distichous, in narrow fans, longer than the scape sheaths; blades level to slightly twisted, 2–3 mm broad, flattened, multinerved, smooth, red-brown, submarginally with a strong, raised band, the apex abruptly asymmetrically narrowed to a short-subulate tip, the margin thin, rusty, densely ciliolate; leaf sheaths dilated, carinate, multicostate and ciliate at base, abruptly then gradually narrowed upward to converge with blade, there eligulate. Scapes slender, erect, slightly twisted, flexuous, subterete, longitudinally with several low ribs, with 1 strong rusty-ciliolate costa (rarely another). Spikes broadly ellipsoid, 6–9 mm long, several-

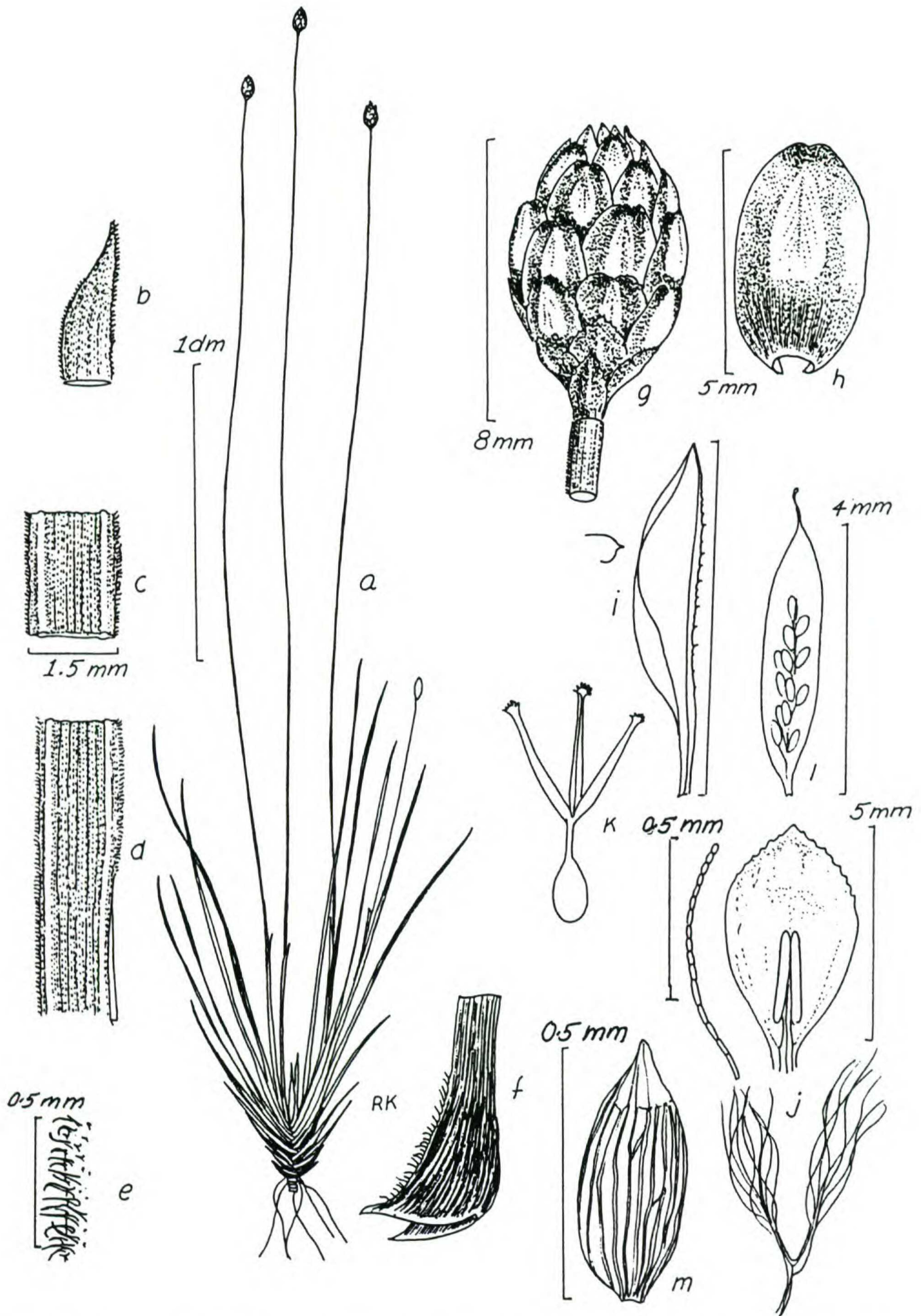


Figure 3. *Xyris ferreirae* Kral (*Cid Ferreira 5466*). —a. Habit sketch. —b. Leaf apex. —c. Leaf blade, midsector. —d. Leaf blade-sheath junction. —e. Leaf blade edge, magnified. —f. Leaf base. —g. Spike. —h. Fertile bract. —i. Lateral sepal. —j. Staminodial beard hair, enlarged (left); petal blade, stamen (right); staminode (below). —k. Stylar apex. —l. Capsule outline, showing placentation. —m. Seed.

bracted, the bracts spirally imbricate, convex, ecarinate, pale brown with darker tip and base, with scarious, paler, entire borders, aging lacerate; sterile bracts several, ovate, subcarinate, 1.5–4.5 mm long with narrowly elliptic dorsal areas; fertile bracts obovate to broadly elliptic, ca. 5 mm long, obtuse or shallowly emarginate, the inner ones oblong; dorsal areas elliptic or narrowly ovate, venulose. Lateral sepals free, inequilateral, narrowly elliptic, ca. 5 mm long, acute; keel narrow, firm, straight, sparsely and remotely ciliate. Petal blades elliptic, ca. 5 mm long, yellow, apically serrulate. Anthers lance-oblong, ca. 1.5 mm long, emarginate and deeply sagittate, on flattened, shorter filaments. Capsules cylindrical, ca. 4 mm long; placentation central. Seeds narrowly ovoid, 0.5 mm long, with pale-conic apiculus, brownish, translucent, irregularly several-costate longitudinally.

Distribution. Thus far known only from white sand savanna and adjacent gallery woodland, municipalites of Humaita and Manicore, Amazonas, Brazil.

In leaf and general habit this novelty bears some resemblance to the widespread savanna species *Xyris hymenachne* Martius, resembling it also somewhat in the pale, friable bract borders. However, this plant has distinct dorsal areas, its dark leaf sheath bases are ciliate, and its leaf blades are submarginally thickened, bordered by a narrow, rusty and rusty-ciliate edge, all features that compel one to place the species elsewhere in the genus.

Paratype. BRAZIL. Amazonas: Mun. de Manicore, BR 230, 150 km ao L de Humaita e 18 km ao S pela Rod. do Estanho, 8°10'S, 61°45'W, Mata de beira de estrada, solo arg., 15 Abr. 1985, C. A. Cid Ferreira 5506 (INPA, NY, VDB!).

4. *Xyris gongylospica* Kral, sp. nov. TYPE: Venezuela. Bolívar: Mun. Gran Sabana, Sierra de Lema, SE headwaters of Rio Carrao, 1050 m, 5°54'N, 61°42'W, seeps along stream in riparian scrub, 22 Jan. 1993, R. Kral 81888 with O. Huber & Anna Weitzmann (holotype, VEN; isotypes, GH, K, MO, MYF, NY, SMU, US, VDB). Figure 4.

X. thysanolepis Maguire & Lyman B. Smith primo aspectu maxime simile, sed paginis foliorum et scaporum omnino scabridulis aut rugulosis, scapis teretibus et grosse multicostatis, spicis latioribus, attenuatis, sepalis lateralis valde inaequilateris, obtusioribus.

Caespitose perennial 5–7 dm high, the roots slender, fibrous, the stems short or up to 5 cm long. Principal leaves in fans, 15–30 cm long, longer than the scape sheaths; sheaths carinate, long-cil-

iate, thin, papillose to rugulose, pale red or tan, dilated at base, gradually narrowing upward to blades, eligulate; blades 3–4 times shorter than sheaths, narrowly linear-gladiate, plane, 3–6 mm wide, dull green, transversely undulately tuberculate-rugose; apices gradually, then abruptly narrowed, incurved-acute, slightly thickened; margins thin, densely and coarsely brown-ciliate. Scape sheaths red-brown toward base, angulate, multicostate, distally open, carinate, short-bladed. Scape apically terete, ca. 1–1.2 mm thick, coarsely multicostate, densely scaberulous to papillose, dull green. Spikes multiflorous, subglobose, ca. 1 cm long, attenuate; bracts erect, loosely spirally imbricate, thin, convex, ecarinate, without dorsal area, deep red-brown, broadly rounded with narrow, scarious, pale, erose borders; sterile bracts several, obovate, the lower pair obovate, ca. 3 mm long; fertile bracts broadly obovate, ca. 5 mm long. Lateral sepals free to slightly connate, strongly inequilateral, spatulate, ca. 5 mm long, obtuse, slightly curved, the keel wide, from base to tip irregularly brownish ciliate. Petal blades obovate, 4.5–5 mm long, yellow, broadly acute, undulate. Staminodia bibrachiate, the branches densely long-penicillate. Anthers oblong, ca. 2 mm long, deeply emarginate and sagittate; filaments ca. 1 mm long. Capsules narrowly obovoid, 3 mm long; placentation central. Seeds numerous, cylindrical-ellipsoid, ca. 1 mm long, longitudinally spirally multiribbed, translucent.

Distribution. Thus far known only from the type locality.

In the most recent published treatment of *Xyris* for the area (Kral, 1988) this would belong to the complex containing *X. thysanolepis* Maguire & Lyman B. Smith, for which we now have several localities within the Guayana Highlands. However, this differs from such plants by having completely scabridulous and rugulose leaf and scape surfaces, by its terete and coarsely multicostate scapes, and by its mostly broader spike outline. Also, it differs in the spike base, which is attenuate and made up of many more sterile bracts, as well as in its lateral sepals, which are strongly inequilateral and blunter.

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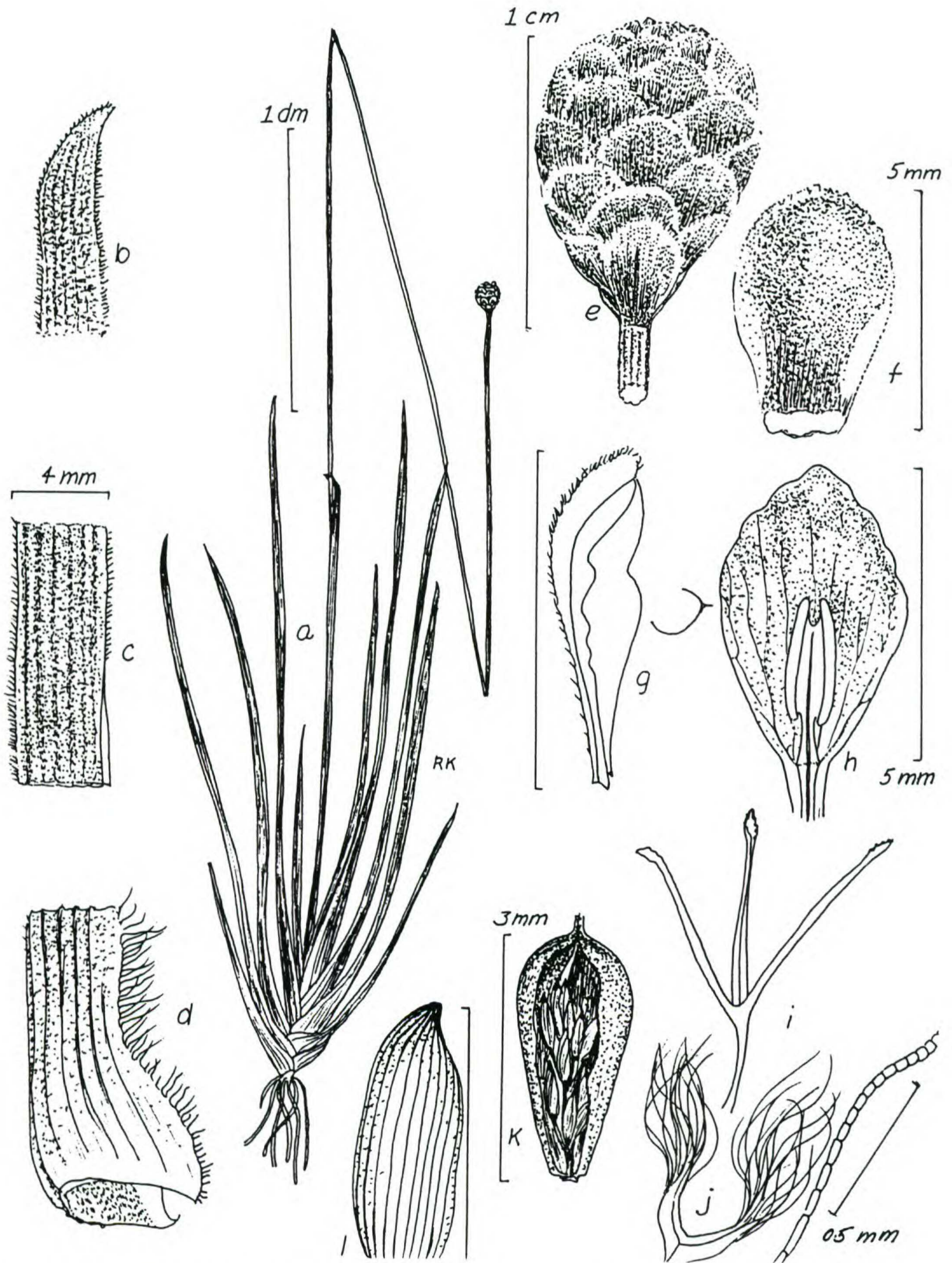


Figure 4. *Xyris gongylospica* Kral (Kral et al. 81888). —a. Habit sketch. —b. Leaf apex. —c. Leaf blade-sheath junction. —d. Leaf base. —e. Spike. —f. Fertile bract. —g. Lateral sepal. —h. Petal blade, stamen. —i. Stylar apex. —j. Staminode (left); beard hair, enlarged. —k. Capsule. —l. Seed.

below the tepuis, and to the latter for his willingness to show us the country.

5. *Xyris guillenii* Kral, sp. nov. TYPE: Bolivia. Velasco: Parque Nacional Noel Kempff M., pampa grande de Bella Vista, pampa termiteria anegado temporalmente, suelos franco arcillosos, 13°42'10"S, 61°31'1"W, 180 m, *R. Guillen et al.* 3904 (holotype, USZ; isotypes, MO, VDB). Figure 5.

X. lacerata Pohl ex Seubert valde similis, sed circumferentiis spicarum latioribus, sepalis lateralis valde inaequilateris, spathulatis.

Plants perennial, short-stemmed, bulbous-based, with slender roots. Outer (lower) leaves scale-like, contracted, broadly ovate, 0.5–2 cm long, subulate-acuminate, strongly costate, papillate. Principal leaves suberect, 10–23 cm long, strongly flexuous and twisted, longer than the scape sheaths; blades at base a little involute, 2–2.5 mm wide, upward convolute, then conduplicate, subterete, ca. 1 mm thick, shallowly multicostate, at tip triquetrous-subulate; sheath toward base rounded, longitudinally costate, pale brown, undulate-rugulose, long-ciliate, upward abruptly then gradually converging to blades, eligulate. Scape sheaths twisted, open at apex, short-bladed. Scapes linear, erect, strongly twisted and flexuous, terete, with many low costae, ca. 1.5 mm thick, punctate, smooth. Spikes broadly obovoid to broadly ellipsoid, hemispheric or subglobose, attenuate-based, 1–1.5 cm long, multibracteate, the lower (sterile) bracts many, orbiculate to broadly ovate or reniform, 2–5 mm long, shorter than the fertile and grading into them, with broadly triangulate dorsal areas. Fertile bracts broadly ovate, becoming (upspike) oblong, 6–7 mm long, with elliptic to oblong dorsal areas. Lateral sepals free, strongly inequilateral, spathulate, 5–6 mm long, with elliptic to oblong dorsal areas. Lateral sepals free, strongly inequilateral, spathulate, 5–6 mm long, obtuse, strongly incurved, ciliolate. Petal blades elliptic, ca. 5 mm long, yellow. Staminodia bibrachiate, branches elongate, long-penicillate. Anthers lanceolate, ca. 2 mm long, tetralocular, deeply sagittate and retuse, the filaments flattened, shorter. Capsule cylindrical-ellipsoid, ca. 4.5 mm long, placentation central. Seeds cylindro-ellipsoid to ellipsoid, 0.5–0.6 mm long, bi-apiculate, translucent, reddish brown, strongly 12–14-costate, transversely striolate.

This novelty, named after its collector and known only from the type, bears strong resemblances to *Xyris lacerata* Pohl ex Seubert, perhaps sufficient to be considered conspecific. Differences mostly

have to do with sepal character (in *X. guillenii* the sepals are very inequilateral and spathulate, while in *X. lacerata* they are but slightly so and are elliptic-oblong), and spike size and shape. In fact, the latter features are what draw one's attention first. My own material, consisting of two plants and five spikes, shows a surprising range, with two of the five being double (as in *X. bicephala*), this feature not included in the above description on the distinct possibility of it being anomalous. The other three spikes show a range from hemisphaeroid to subglobose. At the least, however, these plants make an example that would stand out in the field in contrast to nearby *X. lacerata*.

6. *Xyris subasperula* Kral, sp. nov. TYPE: Bolivia. Velasco: Parque Nac. Noel Kempff M., Campamento "Laja," sobre senda de Geobol, a 15 km al SE de Los Fierros sobre rocas areniscas, en medio de campo humedo, 14°33'S, 60°45'W, 750 m, 21 July 1995, *T. J. Killeen, J. Blalce & C. Graham* 7480 (holotype, USZ; isotypes, MO, VDB). Figure 6.

Habitu, indumentis foliorum et scaporum, et basi plantarum, *X. asperula* Martius valde affinis sed spicis attenuatis, bracteis sterilibus multo numerosis, multo parvis, gradatis, seminibus multo numerosis, distincte brevioribus.

Plants perennial, 6–10 dm high, solitary or caespitose, the bases bulbous, dark brown. Roots slender-fibrous. Stems short. Leaves ensiform-linear, 17–55 cm long, twisted, erect to slightly spreading, longer than the scape sheaths; blades flattened, 3–5 times longer than the sheaths, 2.5–4 mm wide, olivaceous (in the dry specimen), transversely undulate-rugose, longitudinally multinerved, nerves low; apices gradually then abruptly narrowed, tip subulate; margins narrow, densely retrorsely scabrociliate or scabrid; sheaths ecarinate, at base papillose, abruptly dilated, long-ciliate, upward gradually narrowed, transversely undulate-rugose, gradually converging to blade, eligulate. Scape sheaths twisted, low-costate, similar to leaf in color and blade apex. Scapes linear, terete, toward apex 1–1.4 mm thick, shallowly multicostate, scabrid. Spikes many-flowered, ellipsoid to cylindrical, 1.5–2.5 cm long, obtuse, short-attenuate, the bracts spirally imbricate, firm, ecarinate, brownish, entire, without distinct dorsal areas; sterile bracts broadly ovate to suborbiculate, 4–5.5 mm long, shorter than the fertile and grading into them; fertile bracts broadly obovate (the inner oblong), 6–8.5 mm long. Lateral sepals free, slightly inequilateral, narrowly elliptic, 7–8.5 mm long; carinal keel antrorsely ciliolate from middle to apex. Petal blades, stamens,

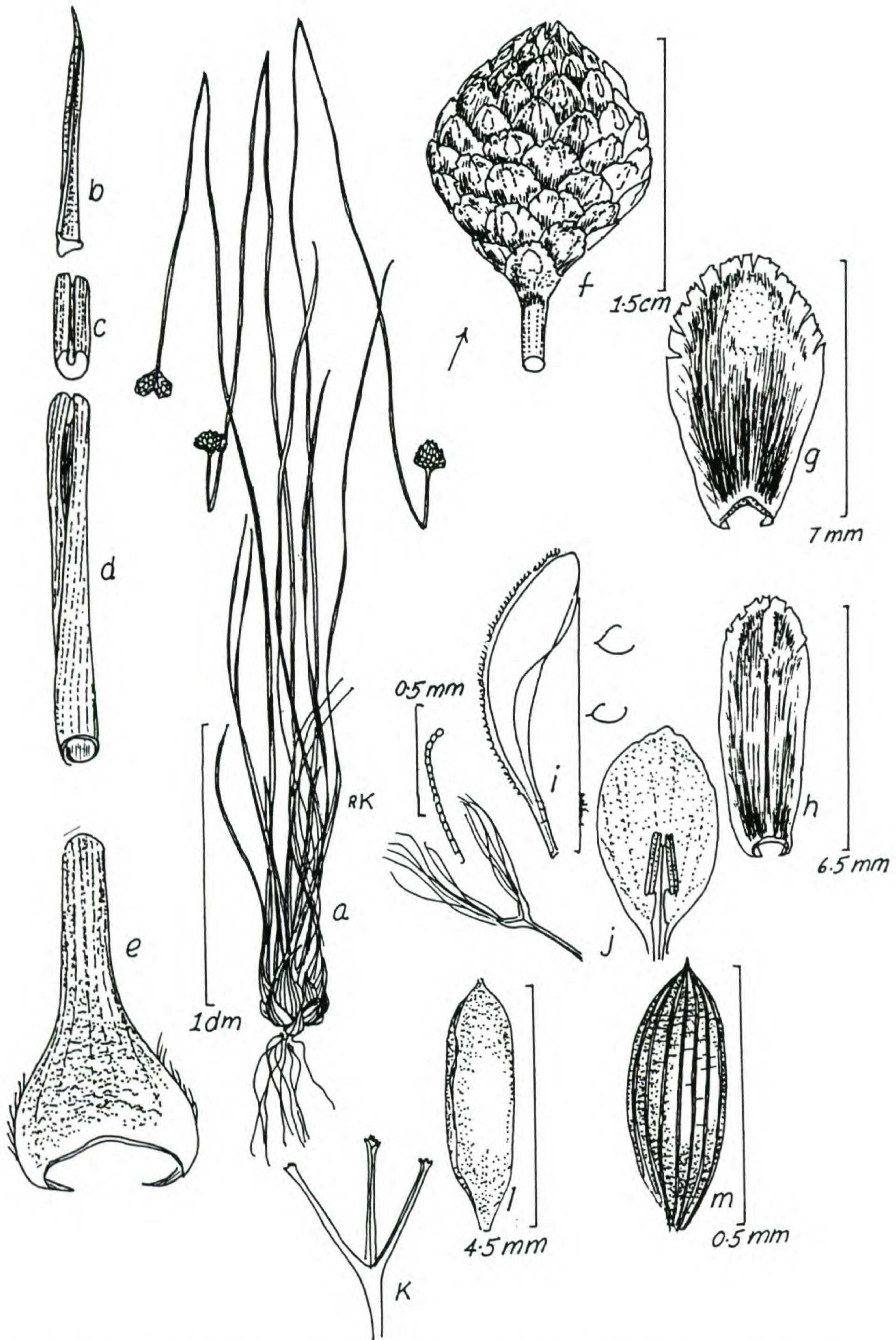


Figure 5. *Xyris guillenii* Kral (Guillen et al. 3904). —a. Habit sketch. —b. Leaf apex. —c. Leaf blade sector. —d. Leaf sheath apex. —e. Leaf base. —f. Spike. —g. Fertile bract (from base of spike). —h. Fertile bract (from near spike apex). —i. Lateral sepal. —j. Staminode and enlarged beard hair (left); petal blade, stamen (right). —k. Stylar apex. —l. Capsule. —m. Seed.

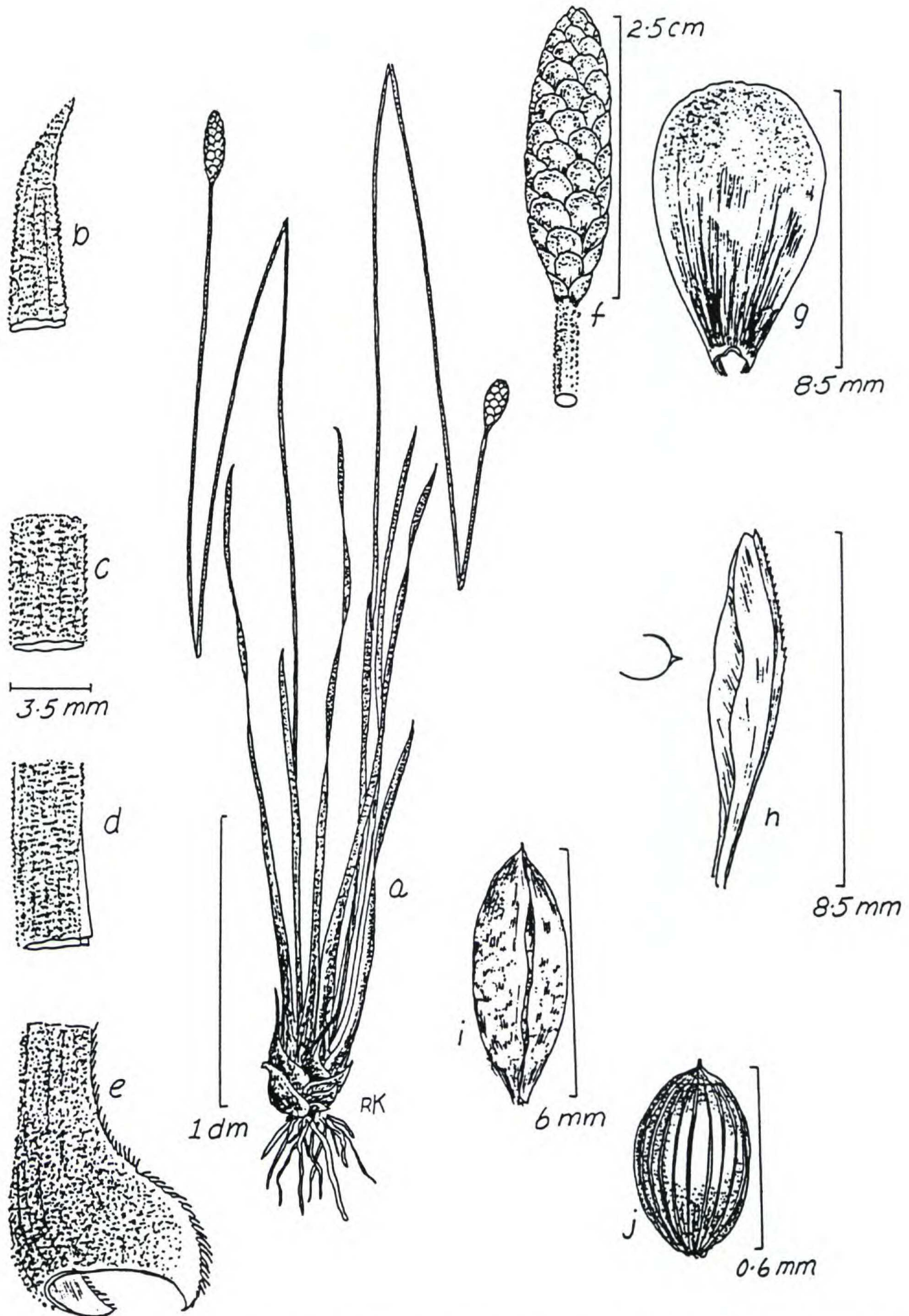


Figure 6. *Xyris subasperula* Kral (Killeen et al. 7480). —a. Habit sketch. —b. Leaf apex. —c. Sector of leaf midblade. —d. Leaf sheath-blade junction. —e. Leaf base. —f. Spike. —g. Fertile bract. —h. Lateral sepal. —i. Capsule. —j. Seed.

and staminodia not seen. Capsule narrowly ellipsoid, ca. 6 mm long; placentation free-central. Seeds numerous, broadly ovoid to broadly ellipsoid, 0.45–5 mm long, apiculate, translucent, red-brown, finely longitudinally multiribbed.

This species, in general habit (scabrous to scabridulous leaves and scapes, bulbous base, etc.), bears strong resemblance to the widespread Brazilian *Xyris asperula* Martius, but differs in its attenuate (rather than rounded) spike base, its more numerous, smaller, gradate sterile spike bracts, and its distinctly smaller seeds.

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