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Five new species of *Pachygenium* (Schltr.) Szlach., R. González & Rutk. (Spirantheae, Cyclopogoninae, Orchidaceae) from Brazil

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Abstract: Five new species of *Pachygenium* (Schltr.) Szlach., R. González & Rutk. (Spirantheae, Cyclopogoninae, Orchidaceae) from Brazil are described and illustrated. Their taxonomic position is briefly discussed. The genus is compared with *Pelexia* Poit. *ex* Rich., and the taxonomic status of both genera is discussed.

Key words: taxonomy, Orchidaceae, Spirantheae, Cyclopogoninae, *Pachygenium*, *Pelexia*, Neotropics, South America

1. Introduction

The species today classified within the genus *Pachygenium* (Schltr.) Szlach., R. González & Rutk. (Spirantheae, Cyclopogoninae, Orchidaceae) were included in the heterogeneous genus *Pelexia* Poit. *ex* Rich. until 2001, when Szlachetko and others elevated its section *Pachygenium* to the rank of genus. The 5 sections of *Pelexia* recognized by Schlechter (1920) were *Potosia, Cogniauxiocharis, Eupelexia, Centropelexia* and *Pachygenium*. Both *Pelexia* and *Pachygenium* (together with 8 other genera) belong to the subtribe Cyclopogoninae described by Szlachetko (1995).

Pachygenium differs from *Pelexia* s. str. in numerous features. Leaves of *Pachygenium* are gathered in the lower part of the stem but do not form a rosette as in *Pelexia* s. str. Their narrow leaf blade transforms gradually into an indistinct petiole, whereas in *Pelexia* s. str. the petioles are very narrow and the leaf blade is wide, ovate to elliptic, much broader than the petiole. The spur of *Pachygenium* is sac-like, swollen, and usually reaches the middle of the ovary, whereas the spur of *Pelexia* s. str. is narrowly cylindrical, acute to subacute, often of the same length or even longer than the ovary and pedicel. The lateral sepals of *Pachygenium* are sac-like at the base, a feature lacking in *Pelexia* s. str. The lip base of *Pachygenium* is strongly S-curved, making the auricles perpendicular to the ovary axis and arching the lip claw. The lip base and auricles in *Pelexia* s.str. are parallel to the ovary. The genera also differ in gynostemium structure. In *Pachygenium* the stigma apex is truncate, a massive rostellum is ribbon-like with a narrow base, and the viscidium is usually very solid and transversely elliptic; rostellum is truncate after removal of the pollinarium. In contrast, representatives of *Pelexia* s. str. have an obtuse to rounded stigma apex, rostellum is thin and delicate, and its remnant is acute. The viscidium is small and delicate.

Pachygenium is an exclusively South American taxon and embraces about 40 species described so far (Rutkowski *et al*. 2008), occurring in Columbia, Ecuador, Brazil, Paraguay, Peru, Bolivia, and Argentina. In this paper we describe 5 new *Pachygenium* species from Brazil.

2. Material and methods

A standard procedure of preparation of herbarium material was applied. The analyzed vegetative characters of individual plants included: stem (height, shape, presence of glandular hairs), leaves (number, size, shape), cauline bracts (number, shape, size), inflorescence (size, density), floral bracts (size, shape, presence of glandular hairs), and flowers taken from the middle part of the inflorescence (presence of glandular hairs, size of the pedicel and ovary, line of adnation between

lateral sepals and the ovary, size and shape of the spur, size and shape of sepals, petals and lip). Particular parts of each examined flower were boiled, dissected, measured and drawn under a binocular microscope. The results were analyzed and compared with the type material, diagnoses, and original illustrations. Every studied herbarium specimen was photographed or digitalized using a scanner. The database of the studied material is available in the first author's archives.

The material for the studies was loaned from or examined in 5 European herbaria (BR, HBG, P, UPS, Z). The acronyms of herbaria are adopted from *Index Herbariorum* (Holmgren *et al*. 1990). The abbreviations of titles follow those in BPH (Lawrence *et al*. 1968), BPH/S (Bridson & Smith 1991), TL2 (Stafleu & Cowan 1976-1988) and TL2/S (Stafleu & Mennega 1992), while author abbreviations follow Brummitt and Powell (1992).

3. Results

While preparing the revision of the Neotropical subtribe Cyclopogoninae Szlach. (Spirantheae, Orchidaceae) we found 5 new species of *Pachygenium* from Brazil. They are described below:

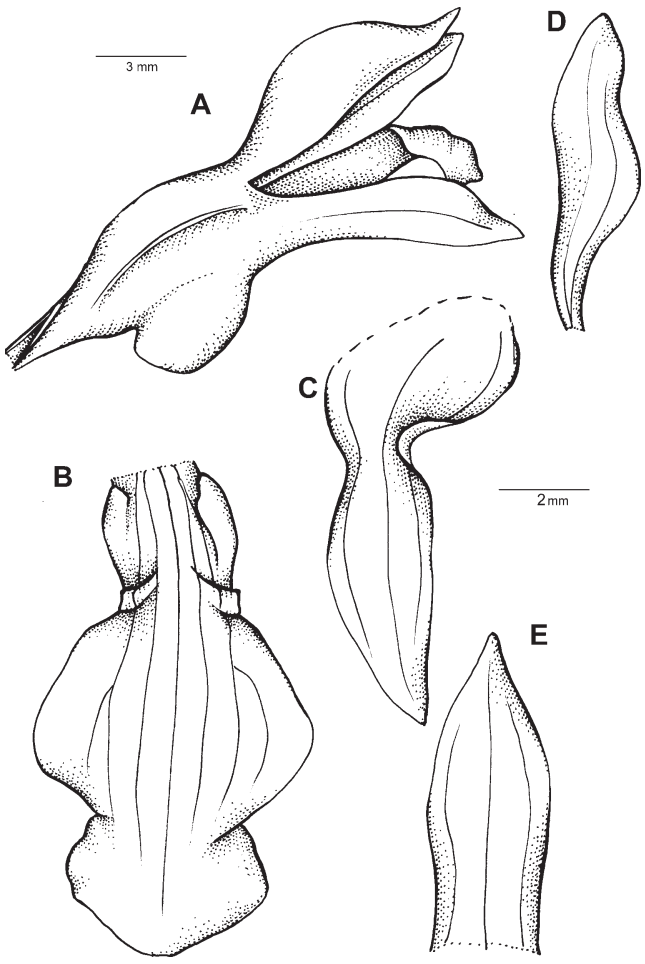

Fig. 1. *Pachygenium konsikianum* Mytnik, Rutk. & Szlach. Explanations: A – flower, B – lip, C – lateral sepal, D – petal, E – dorsal sepal (drawn by J. Mytnik-Ejsmont from type material)

Pachygenium (Schltr.) Szlach., R. González & Rutk. Polish Bot. J. 46(1): 3 (2001).
GENERITYPE: *Pachygenium oestriferum* (Rchb.f. & Warm.) Szlach., R. González & Rutk. [= *Spiranthes oesrtifera* Rchb.f. & Warm.]

Pachygenium konsikianum
Mytnik, Rutk. & Szlach. *sp. nov.* (Fig. 1)
TYPE: Brazil. Santa Catharina. In Abhangen des Campo de Capivare, serra Geral. Jan 1891. *Ule 1905* (Holotype: HBG).
Species haec Pachygenio itatiayae (Schltr.) Szlach., R.González & Rutk. *arte similis est, sed calcari ad ovarium parallelo et epichilo angustiore differt.*

Stem up to 25 cm high, erect, stout, slightly glandular in basal part, densely glandular near apex. Leaves 3, gathered in basal rosette; petiole ca. 1 cm long, narrow; blade up to 8.5 cm long and 25 mm wide, lanceolate, acute. Cauline bracts 3, acute, herbaceous, thin, adnate to stem above petiole, longer than internodes, reaching up to inflorescence base, glandular in basal part. Inflorescence 9 cm long, ca. 30-flowered, multilateral, dense. Flowers pedicellate, densely glandular. Line of adnation between lateral sepals and ovary visible. Spur sac-like, 3 mm in diameter. Floral bracts lanceolate, acute, thin, herbaceous, sparsely glandular in basal half. Pedicel 3 mm long, twisted. Ovary 7.6 mm long. Dorsal sepal 10 mm long, 4 mm wide, elliptic-lanceolate, acute, 3-nerved, concave in basal half. Lateral sepals 8.5 mm long, 2.8 mm wide, fused with ovary in basal one-third, free part ovate-lanceolate, acute, 3-nerved. Petals 10 mm long, 2 mm wide, falcate-spatulate, truncate, 2-nerved. Lip thin, constricted near column; claw short and broad, lip auricles fused with claw margins, fleshy, 3.2 mm long; hypochile 5.5 mm long, 6.8 mm wide, ovaterhomboid, widest in middle; epichile 2.5 mm long and 4 mm wide, twice as wide as long, transversely elliptic, obtuse to rounded at apex, fleshy. Gynostemium 5.5 mm long, erect, massive. Rostellum 2.8 mm long. Anther 3 mm long. Viscidium 1 mm long.
REPRESENTATIVE SPECIMENS – Brazil. Santa Catharina. In Abhangen des Campo de Capivare, serra Geral. Jan 1891. *Ule 1905* (HBG!).
DISTRIBUTION – Brazil.
ETYMOLOGY – Dedicated to Zygfryd Konsik, an Australian-Polish orchid enthusiast.
NOTES – *P. konsikianum* is closely related to *P. itatiayae* (Schltr.) Szlach., R.González & Rutk.. Both species have a rhomboid hypochile, widest in the middle, but the epichile of *P. konsikianum* is transversely elliptic, narrower than the hypochile, whereas the epichile of *P. itatiayae* is cordate, often as wide as the hypochile. These species differ in spur direction, as it is directed forward in *P. itatiayae* but parallel to the ovary in *P. konsikianum*.

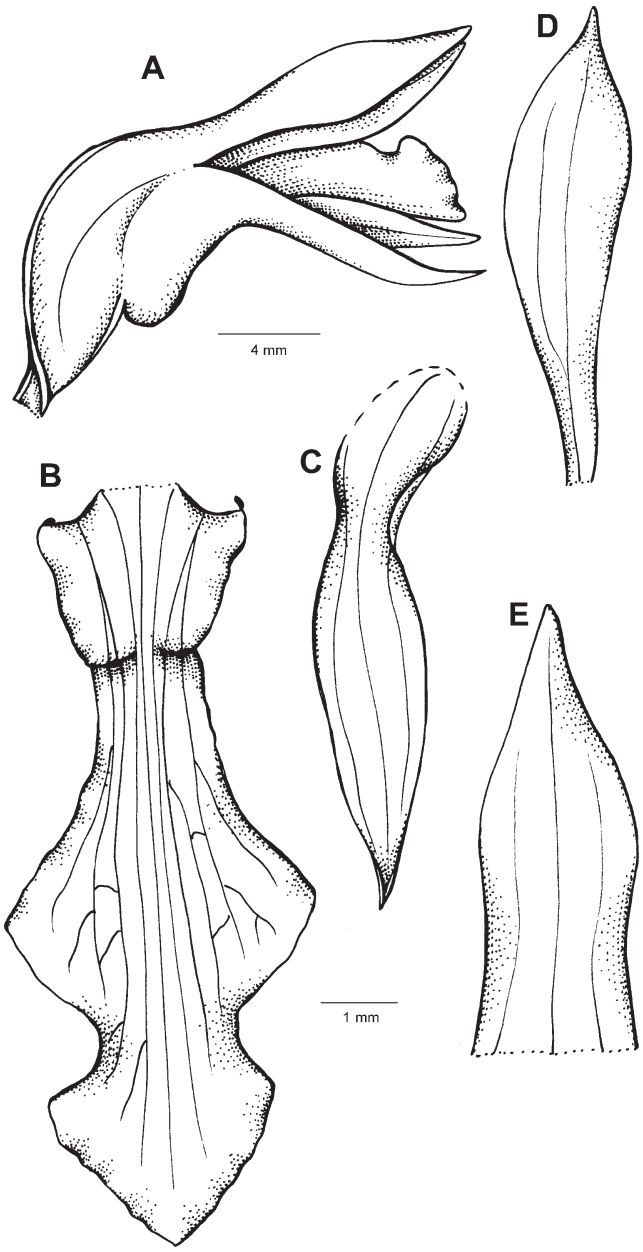

Fig. 2. *Pachygenium geralium* Mytnik, Rutk. & Szlach.
Explanations: A – flower, B – lip, C – lateral sepal, D – petal, E – dorsal sepal (drawn by J. Mytnik-Ejsmont from type material)

Pachygenium geralium Mytnik, Rutk. & Szlach. *sp. nov.* (Fig. 2)

TYPE: Brazil. Santa Catharina. An Abhangen des Campo du Campivare. Serra Geral. Jan. 1891. *Ule 1905b* (Holotype: HBG)

Species haec Pachygenio bonariense (Cogn.) Szlach., R. González & Rutk. *similis est, sed labelli base et auriculis differt. In* Pachygenium geralium, *labellum basi truncatum est et auriculae minutis appendicibus instructae sunt.*

Stem 32-33 cm high, erect, rather delicate, glandular just below inflorescence. Leaves not seen during flowering time. Cauline bracts 9-14, acute, herbaceous, thin, adnate to stem, longer than internodes, reaching up to inflorescence base, glabrous. Inflorescence 8.0-8.3 cm long, 15-25-flowered, multilateral, lax to dense. Flowers pedicellate, densely glandular. Line of adnation between lateral sepals and ovary visible. Spur sac-like, 2 mm in diameter. Floral bracts up to 21 mm long, lanceolate, acute, thin, herbaceous, densely glandular on margins. Pedicel 2 mm long, twisted, glabrous. Ovary 8-9 mm long, densely glandular. Dorsal sepal 9 mm long, 4 mm wide, elliptic-lanceolate, acute, 3-nerved, concave in basal half. Lateral sepals 12.5-14.5 mm long, 1.6-2.3 mm wide, fused with ovary in basal one-third, free part lanceolate, acuminate, with enrolled margins at apices, 3-nerved. Petals 9 mm long, 2.3 mm wide, obovate, apiculate, 2-nerved. Lip thin, divided into hypochile, isthmus and epichile, connate firmly with column; claw very short, lip auricles outspread, set preaxially, triangular, acute to acuminate, thin, with small projections at auricle apices, 1.2-2.2 mm wide each; hypochile 7.7-8.0 mm long, 2.8-4.0 mm wide, slightly constricted below auricles, ribbon-like below auricles, but ovate-rhomboid to orbicular in apical half; isthmus ribbon-like, 1.7 mm long, 2.5-2.8 mm wide; epichile 2.9-3.0 mm long, 3.3-3.7 mm wide, triangular to sagittate, acute at apex, fleshy. Rostellum 2.1 mm long. Viscidium 0.7 mm long. Anther 3.2 mm long.

REPRESENTATIVE SPECIMENS – Brazil. Santa Catharina. An Abhangen des Campo du Campivare. Serra Geral. Jan. 1891. *Ule 1905 b* (HBG!). *Sine loco*. 1894-95. *Glaziou s.n.* (BR!).

DISTRIBUTION – Brazil.

ETYMOLOGY – The name refers to Serra Geral, the mountain range in southern Brazil, where the plant was collected.

NOTES – The species is easily distinguishable from other members of the genus by unique lip structure. The hypochile is ribbon-like below the auricles, then ovate-rhomboid to orbicular in apical half, auricles furnished with very small appendices at the apices. The epichile is triangular to sagittate, acute at the apex. There are no callosities in the disc. Spur of *P. geralium* is sac-like, shorter than the ovary, adjoined to it.

Pachygenium popowianum Mytnik, Rutk. & Szlach. *sp. nov.* (Fig. 3)

TYPE: Brazil. Parana. In Campo Paludoso. Apr. 1916. *Dusen 18150* (Holotype: Z)

Species haec Pachygenio ventricoso (Cogn.) Szlach., R.González & Rutk. *similis est, sed constrictione inter hypo- et epichilum obscura, nervis apice ecallosis et auriculis parvis basi com transversales spissescentes differt.*

Stem 89 cm high, erect, stout, slightly glandular just below inflorescence, more densely glandular towards apex. Leaves 3, on basal part of stem, petiolate; petiole up to 9 cm long; blade 11.5-21.5 cm long and 24-42 mm wide, lanceolate, acute. Cauline bracts 6, acute, herbaceous, thin, adnate to stem, glabrous. Inflorescence

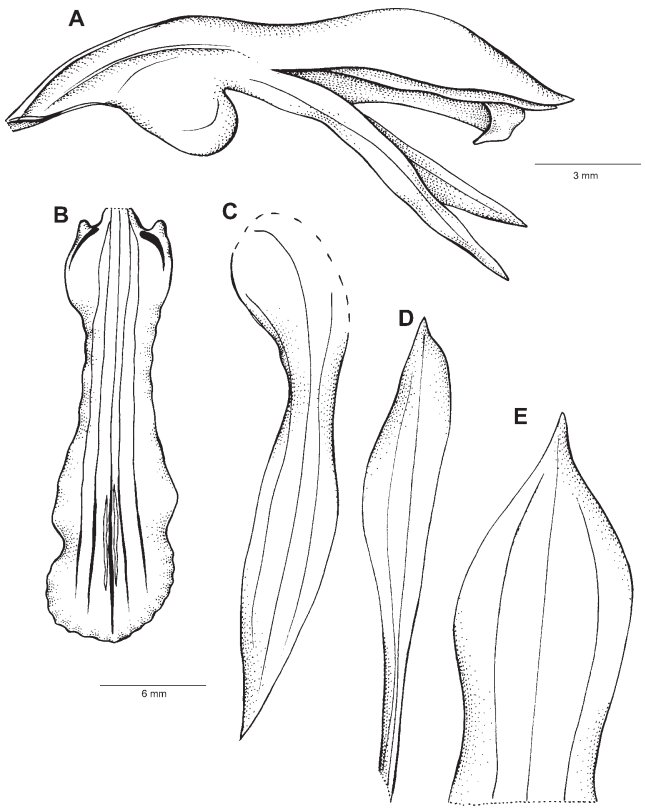

Fig. 3. *Pachygenium popowianum* Mytnik, Rutk. & Szlach.
Explanations: A – flower, B – lip, C – lateral sepal, D – petal, E – dorsal sepal (drawn by J. Mytnik-Ejsmont from type material)

10.5 cm long, 22-25-flowered, multilateral, dense. Flowers pedicellate, densely glandular. Line of adnation between lateral sepals and ovary visible. Spur sac-like, 4-5 mm in diameter. Ovary 14 mm long, densely glandular. Dorsal sepal 18 mm long, 6 mm wide, elliptic-lanceolate, apiculate, 3-nerved, concave in basal half. Lateral sepals 22 mm long, 3.2 mm wide, fused with ovary in concave basal one-third, free part 14 mm long, lanceolate, acuminate, 3-nerved. Petals 18 mm long, 3 mm wide, oblong-spatulate, acuminate, 2-nerved. Lip thin, divided by a slight constriction near apex into hypochile and epichile, connate firmly with column; claw short; lip auricles small, with 2 linear dark and fleshy calli; hypochile 15 mm long, 5.2 mm wide, narrowly spatulate, widest at apex, sometimes with thin, oblong, wing-like calli along mid-nerve in apical half of lip; epichile 5.5-6 mm long, 5.1-5.5 mm wide, orbicular to transversely oblong, often as long as wide, endings of nerves thickened, darker than other lip parts.

Representative specimens – Brazil. Parana. In Campo Paludoso. Apr. 1916. *Dusen 18150* (Z!).

Distribution – Brazil.

Etymology – Dedicated to Neboisha Popow, an orchid grower from Germany.

Notes – *Pachygenium popowianum* is related to *P. ventricosum* (Cogn.) Szlach., R.González & Rutk. but differs from the latter species in lip structure. The lip of *P. popowianum* is obscurely divided into the hypochile and epichile; endings of nerves are thickened and darker than the rest of the lip. Lip auricles are small and furnished with oblong darker fleshy thickenings.

Pachygenium chironianum Mytnik, Rutk. & Szlach. *sp. nov.* (Fig. 4)

Type: Brazil. Minas Gerais. Cidade de Caldas, Serra de Cidade. 11 May 1874. *Regnell I. 421* (Holotyp: UPS). *Species haec* Pachygenio oestrifero (Rchb.f. & Warm.) Szlach., R.González & Rutk. *similis est, sed labelli forma differt: hypochilum oblongo-triangulare et apice truncatum est, auriculae parvae et margine incrassatae sunt, labellum ecallosum est.*

Stem 41 cm high, erect, stout, slightly glandular just below inflorescence and more densely glandular towards apex. Leaf 1, at stem base, petiolate; petiole 70 cm long, narrow; blade 13.5 cm long and 2 cm wide, lanceolate, acute. Cauline bracts 6, acute, herbaceous, thin, adnate to stem, longer than internodes, reaching up to inflorescence base, glabrous. Inflorescence short, 6 cm long, ca. 15-flowered, multilateral, dense. Flowers pedicellate, densely glandular, forming with inflorescence axis an angle of ca. 60°. Line of adnation between lateral sepals and ovary visible. Spur sac-like, 4.5 mm in diameter. Floral bracts 35 mm long, lanceolate, acute,

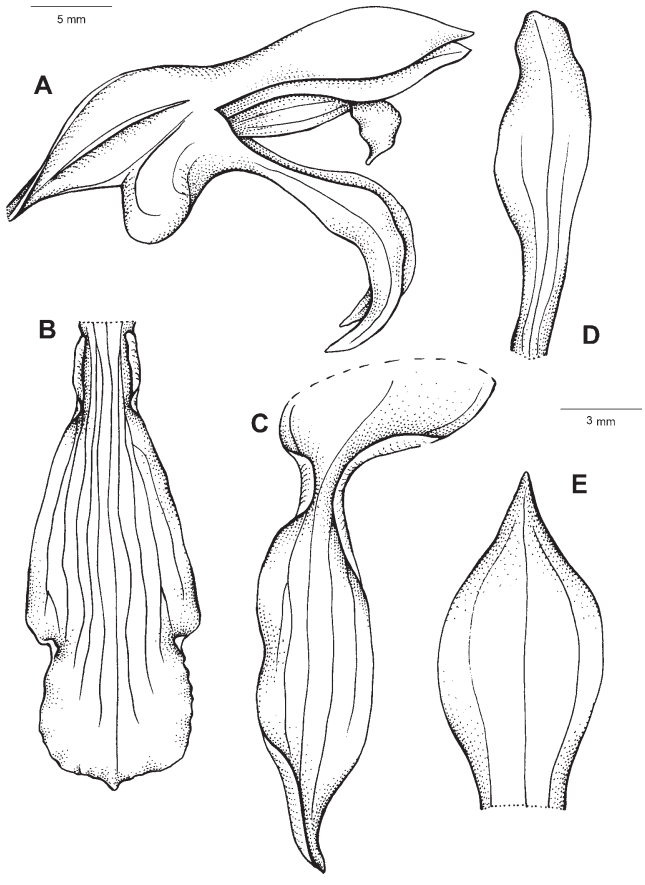

Fig. 4. *Pachygenium chironianum* Mytnik, Rutk. & Szlach.
Explanations: A – flower, B – lip, C – lateral sepal, D – petal, E – dorsal sepal (drawn by J. Mytnik-Ejsmont from type material)

thin, herbaceous, rather densely glandular outwards. Pedicel twisted. Ovary 14 mm long, densely glandular. Dorsal sepal 13 mm long, 5.6 mm wide, elliptic-lanceolate, acute, 5-nerved, concave in basal half. Lateral sepals 15 mm long, 3.6 mm wide, fused with ovary in concave basal one-third, free part ovate-lanceolate, subacute, with enrolled margins, 5-nerved. Petals 13 mm long, 3 mm wide, falcate-spatulate, acute, 3-nerved, glandular outside. Lip thin, obscurely divided into hypochile and epichile, connate firmly with column, slightly fleshy in lower half, narrowest at base, widest at apex of hypochile; claw short and broad, lip auricles fused to claw margins, narrow, glabrous; hypochile 12 mm long, 7 mm wide, ovate-triangular, widest at apex, sometimes with 2 small calli protruding in truncate apex of hypochile, just near margins; epichile 6 mm wide and long, subquadrate to suborbicular, slightly mucronate at apex, fleshy. Gynostemium 9 mm long, erect, massive. Column foot 8 mm long, anther 5 mm long. Viscidium 1 mm long. Rostellum 2.2 mm long, broad in basal part.

Representative specimens – Brazil. Minas Gerais. Cidade de Caldas, Serra de Cidade. 11 May 1874. *Regnell I. 421* (UPS!).

Distribution – Brazil.

Etymology – Dedicated to Dr. Guy Chiron, French orchidologist and editor of the journal *Richardiana*.

Notes – *Pachygenium chironianum* is easily distinguishable by lip structure and swollen spur, which is perpendicular to the ovary. The hypochile is ovate-triangular, widest at the apex, the narrowest at the base and gradually widened up to a truncate apex. The epichile is slightly narrower than the hypochile, subquadrate to suborbicular, slightly mucronate at the apex.

Pachygenium sagittatum Mytnik, Rutk. & Szlach. *sp. nov*. (Fig. 5)

Type: Brazil. *Sine loco*. *Glaziou 5484* (Holotype: P).

Species haec Pachygenio bonariense (Lindl.) Szlach., R.González & Rutk. *arte similis est, sed labello paulatim dilatato sine constrictione nec callo et epichilo hypochilo latiore differt*.

Stem 38-47 cm high, erect, stout, glandular just below inflorescence, denser towards apex. Leaves 3, on basal part of stem; blade 11-19 cm long and 20 mm wide, lanceolate, acute. Cauline bracts 4-5, acute, herbaceous, thin, adnate to stem, longer than internodes, glandular at base. Inflorescence 9-20 cm long, ca. 20-flowered, multilateral, dense, oblong-ovate. Flowers pedicellate, densely glandular, form with inflorescence axis an angle of 45°-60°. Line of adnation between lateral sepals and ovary not visible. Spur sac-like, oblong-ovate, 3-4 mm in diameter, free apex 1.5-4.5 mm long. Floral bracts 22-24 mm long, lanceolate, acute, thin, herbaceous.

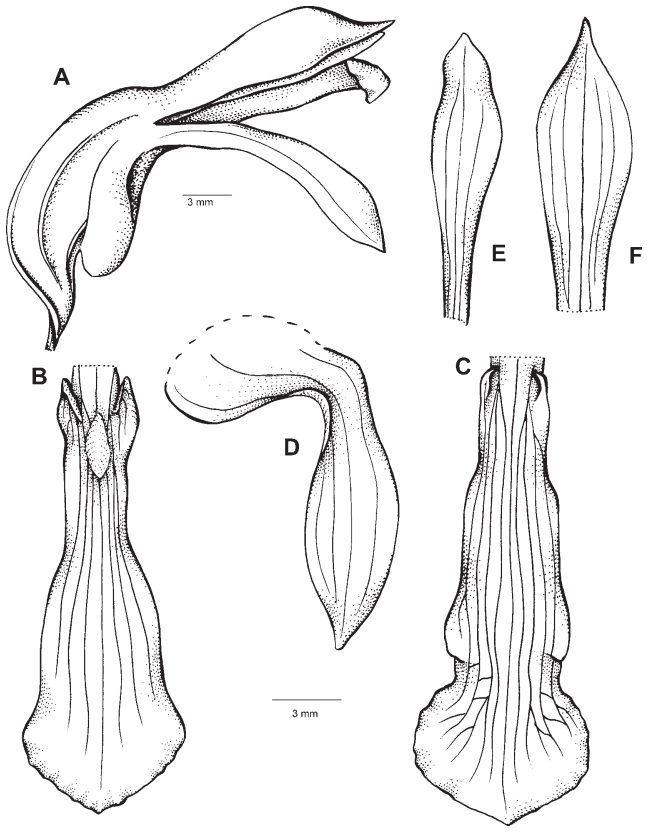

Fig. 5. *Pachygenium sagittatum* Mytnik, Rutk. & Szlach. Explanations: A – flower, B, C – lip, D – lateral sepal, E – petal, F – dorsal sepal (drawn by J. Mytnik-Ejsmont from type material)

Pedicel 3 mm long, twisted. Ovary 13-14 mm long, densely glandular. Dorsal sepal 14-18 mm long, 4.0-4.5 mm wide, elliptic-lanceolate, subacute, 5-nerved, concave in basal half. Lateral sepals 18.5-23.0 mm long, 2.9-3.2 mm wide, fused with ovary in concave basal one-third, free part ovate-lanceolate, subacute, 5-nerved. Petals 11.5-15.5 mm long, 2.0-2.5 mm wide, spatulate, acute, 3-nerved. Lip up to 20 mm long, thin, very obscurely divided into hypochile and epichile; claw short and broad, auricles digitate, 0.8-1.8 mm long; hypochile 13.5 mm long, 5.5 mm wide, narrowly spatulate, widest at apex, with round fleshy callus between auricles; epichile 6.2 mm wide and 6.2-7.2 mm long, wider than hypochile, transversely elliptic, rounded to obtuse at apex. Gynostemium 9 mm long, erect, massive. Anther 4 mm long. Rostellum ca. 2 mm long. Viscidium 0.8 mm long.

Representative specimens – Brazil. *Sine loco*. *Glaziou 5484* (P!).

Distribution – Brazil.

Etymology – The name refers to lip shape.

Notes – *Pachygenium sagittatum* is characterized by the spur parallel to the ovary, free in the apical part. The lip is oblong, very obscurely divided into the hypochile and epichile, narrowest at the base, then gradually widened towards the apex, furnished with

digitate auricles at the lip base. There is a small ovate thickening between the auricles. The epichile is wider than long, transversely elliptic, rounded to obtuse at the apex.

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References

Bridson G. D. R. & Smith E. R. (eds.). 1991. B-P-H/S: Botanico-Periodicum-Huntianum- Supplementum, Hunt Institute for Botanical Documentation, Carnegie Mellon University, Pittsburgh, Pennsylvania.

Brummitt R. K. & Powell C. E. (eds.). 1992. Authors of Plant Names: A list of authors of scientific names of plants, with recommended standard forms of their names,including abbreviations. Royal Botanic Gardens, Kew, England.

Holmgren P. K., Holmgren N. H. & Barnett L. C. (eds). 1990. Index Herbariorum. Part 1: The Herbaria of the World. Regnum Vegetabile 120, 693 pp. New York Botanical Garden, Bronx, New York.

Lawrence G H. M., Buchheim A. F. G., Daniels G. S. & Dolezal H. (eds.). 1968. Botanico-Periodicum-Huntianum, Hunt Botanical Library, Pittsburgh.

Rutkowski P., Szlachetko D. L. & Górniak M. 2008. Phylogeny and taxonomy of the subtribes Spiranthinae, Stenorrhynchidinae and Cyclopogoninae (Spirantheae, Orchidaceae) in Central and South America. 345 pp. Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk.

Schlechter R. 1920. Versuch einer systematischen Neuordnung der Spiranthinae. Beih. Bot. Centralbl. 37(2): 317-454.

Stafleu F. A. & Cowan R. S. (1976-1988). Taxonomic Literature: A Selective Guide to Botanical Publications and Collections with Dates, Commentaries and Types. 7 vols, ed. 2. Regnum Vegetabile [series], vols. 94, 98, 105, 110, 112, 115-116. Bohn, Scheltema and Holkema, Utrecht, The Netherlands.

Stafleu F. A. & Mennega E. A. 1992. Taxonomic Literature: A Selective Guide to Botanical Publications and Collections with Dates, Commentaries and Types. Supplement. Regnum Vegetabile [series], vols. 125, 130, 132, 134-135, 137. Koeltz Scientific Books, Königstein, Germany.

Szlachetko D. L. 1995. Systema Orchidalium. Fragm. Florist. Geobot, Suppl. 3: 1-137.

Szlachetko D. L., González R. & Rutkowski P. 2001. *Pachygenium* Szlach., R. González & Rutk., a new genus of the subtribe Cyclopogoninae (Orchidaceae). Polish Bot. J. 46(1): 3-6.