

## Gymnocalycium mesopotamicum sp. nov.

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During a collecting and study trip made by the Royal Botanic Gardens Kew with the collaboration of the Instituto Darwinion, those taking part found a species of *Gymnocalycium* in the region known as 'Mesopotamia' (prov. Corrientes). It proved to be an unknown species with very interesting features: one is that its seeds and flowers appear to be intermediate between two very distinct series, *Quehliana* F. Buxb. and *Uruguayensis* F. Buxb.† Another is that some specimens seem to be male and others female; studying this problem leads to the conclusion that it is a case of a subdioecious, or polygamous species, i.e. that the separation of the sexes in these plants is partial but not complete.



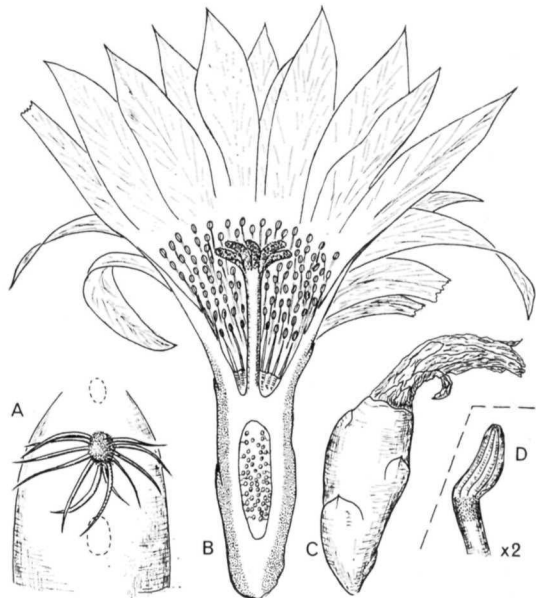
*G. mesopotamicum*, Cutler & Lonsdale 126-552, flowering in cultivation, July 1979 (photo: Kiesling)

\*Member of the Carrera del Investigador of the Consejo Nacional de Investigaciones Cientificas y Tecnicas, Republic of Argentina. Work carried out at the Royal Botanic Gardens, Kew, during the tenure of a CONICET scholarship for study abroad. Translated by D. R. Hunt.

†Published as series *Uruguayense* F. Buxb. Corrected in accordance with ICBN Arts 21.2 and 32.4.—D. R. HUNT

**Gymnocalycium mesopotamicum** Kiesling, **species nova**; *G. denudato* (Link & Otto) Pfeiffer affinis, sed corpore minore, aculeis brevioribus et gracilioribus subpectinatis, tubo florali intus rubro, seminibus cum iis serie Quehlianorum congruentibus.

Simplex, globosa, 4 cm. diametro, 1.2-2.3 cm. alta, obscuro-viridis; costae 7-9, rectae, rotundatae; aculei omnes laterales margine areolae insertae 9-12, 2-9 mm. longae, flexuosae, rufescentes, adpresso-arcuatae, plerumque 2-4 deorsum spectantes. Flores infundibuliformes, 6-7 cm. longi, 6-7 cm. diametro; receptaculum obconicum pallido-viride; squamae spathulatae, olivaceae vel subfuscae; phylla perigonii interioria angusto-lanceolata, nivea, basi rubra vel rosea; filamenta 8-13 mm. longa, alba basi rosea; antherae flavae; stylus cylindricus, 2.2 cm. longus; stigma 0.5-0.6 cm. longum c. 8-lobulatum, cremeum, ovarium obconico-fusiforme. Fructus clavatus 2-3 cm. longus, 7-8 mm. diametro, viridis, parce squamosus. Semina truncato-globosa, c. 1.7 mm. diametro, tuberculata, nigra, hilo magno basali. Typus: Argentina, prov. Corrientes, Mercedes, Nov. 1978, Cutler & Lonsdale 126-552 (K, holo.; SI, iso.).



**A**, part of rib with one areole and position of two others; **B**, half-flower of holotype plant (stippled area of receptacle is green); **C**, fruit with remains of perianth; **D**, style-apex and stigma of paratype plant (stippled area at base of stigma showed rapid necrosis). All natural size except D ( $\times 2$ ).



*G. mesopotamicum*, holotype plant prior to removal of apical half for preservation

(photo: Svanderlik)

**DESCRIPTION.** *Stem* solitary, globose, 1.2–2.3 cm. high and c. 4 cm. diam., epidermis dark green, apex umbilicate, the depression 0.5 cm. deep and 1 cm. diam. with pronounced tubercles. *Ribs* c. 7–9, broad, low, obtuse, 1.5 cm. broad at the base; *tubercles* not very prominent, separated by shallow transverse grooves. *Areoles* c. 5 to each rib, oval, large, 3 mm. long and 1 mm. broad, with abundant yellowish-white wool (grey when adult), somewhat sunken, sited on the upper part of the tubercles. *Spines* 9–12, the smallest only 2–3 mm. long, the longer 9 mm. long, setaceous, flexible, adpressed, arching over the body, subpectinate, arising at the edges of the areoles, reddish brown when young, later greyish white or somewhat pinkish. *Flowers* arising at the adaxial side of areoles bordering the umbilicus, 6–7 cm. long, 2 cm. max. diam. when closed, 5.5 cm. long, 6.5 cm. diam. when open; *receptacle* obconic, 3 cm. long, 0.5 cm. diam. at base and 1 cm. diam. above, light opaque green, fleshy, the wall c. 1 mm. thick; *scales* c. 10, prominent, broad, obtuse, the lower smaller, 2–5 mm. long, 4–5 mm. broad, mucronate, pinkish green; *outer perianth-segments* spatulate 1–3 cm. long, 6–7 mm. broad, mucronate, somewhat fleshy, pinkish green to pinkish white; *inner perianth-segments* lanceolate, 3.1–3.3 cm. long, 6 mm. broad, white, tinged pink near the tip and reddish at the base with pinkish green mid-stripe, *innermost perianth-segments* narrowly lanceolate, very acute, 3 cm. long, 4–5 mm. broad, pure white; *tube* 1.8 cm. long, pale red within *nectar chamber* at base of tube, cylindric, 1 mm. long, 2–3 mm. diam.; *filaments* erect, 8–13 mm. long, white with pinkish base; *anthers* small, 1 mm. long, 0.5 mm. broad, yellow, curving over the style; *pollen* abundant, yellow, globose, tricolpate, with low fertility, tectum perforate-spinulate; *ovary* obconic-fusiform, truncate, 13 mm. long, 3.5–4 mm. diam., with numerous small white ovules;

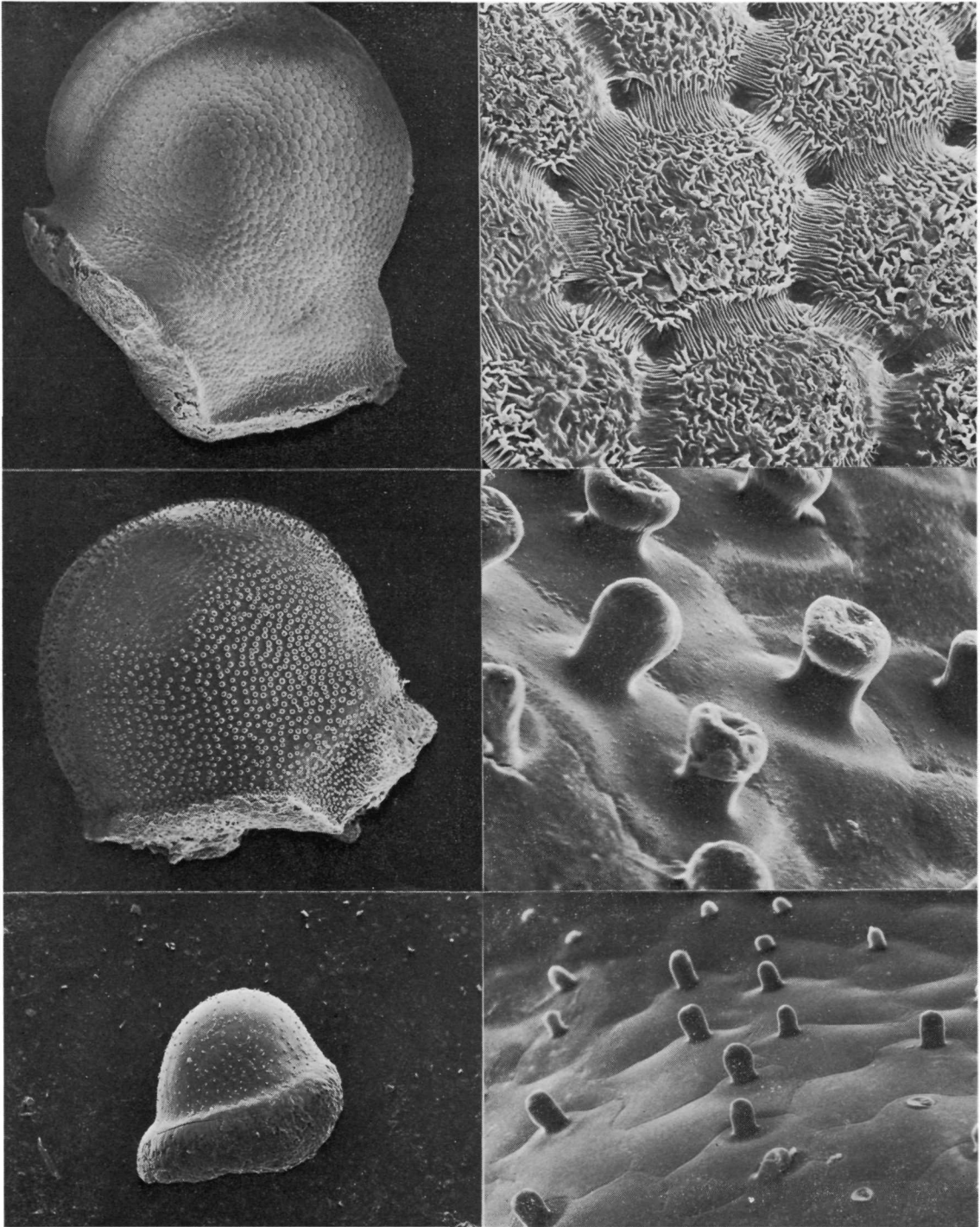
*style* cylindric, 1.8 cm. long, 1 mm. diam. creamy white; *stigma* white; papillose, with some 8 radiating sub-cylindric lobes c. 5–6 mm. long and 1 mm. diam. *Fruit* clavate, 2–3 cm. long, 7–8 mm. diam., dull green, with the dried perianth persistent, brown; *scales* few about 6, similar in shape to those of the flower, greenish at the base, pale pink above. *Seeds* globose-truncate, 1.7–1.8 mm. diam., with large convex hilum c. 1.8 mm. long and 1.2 mm. broad, oval, curved; *testa* black with the cells superficially smooth and slightly convex, but each one with an eccentric cylindric or more often capitate projection 0.025 mm. high and 0.015 mm. diam. at the base. *Chromosome no.*  $2n=22$  (observed at mitosis in ovary-wall cells, M. A. T. Johnson, unpubl. data).

N.B. All the measurements are taken from living specimens. In drying there would be appreciable shrinking.

I consider this species to be intermediate between series I. *Uruguayensia* F. Buxb. (subg. *Gymnotalycium* in Schütz's scheme) and series VIII *Quchliana* F. Buxb. (subg. *Trichoseminum* Schütz), as may be seen from the table.

**Sexuality.** The holotype plant on which the foregoing description is based produced perfect flowers with both male and female organs well-developed, but with very low pollen-fertility; of 820 grains examined, 54.4% were normal, 40% were empty and 5.4% were of approximately double the normal size and with several





Top, *Gymnocalycium leeanum* (series *Uruguayensia*), seed (left,  $\times 32$ ) and part of testa (right,  $\times 480$ ); centre, *G. mesopotamicum* seed (left,  $\times 32$ ) and part of testa (right,  $\times 720$ ); bottom, *G. ragonessii* (series *Quehliana*), seed (left,  $\times 32$ ) and part of testa (right,  $\times 460$ ) Photographed with a Jeol 535 scanning electron microscope at 18kV at either  $30^\circ$  or  $0^\circ$  tilt.

	Series <b>Uruguayensia</b>	<b>G. mesopotamicum</b>	Series <b>Quehliana</b>
Distribution	S. Brazil, Uruguay, NE. Argentina	NE. Argentina	W. and cent. Argentina
Habitat	Mesophytic	Mesophytic	Xerophytic
Stems	Globose	Globose	Globose-applanate, obconic
Colour	Green	Green	Purplish, glaucous or dull green
Ribs	Rounded, with or without humps	Rounded, without humps	Applanate, with humps
Spines	Flexible to rigid, few to many (3-20)	Flexible (12-14)	Rigid, few (1-7)
Flowers	White to yellow	White, tube red within	White, tube red within
Seeds	Black, 2-3 mm. diam., globose, rugose	Black, 1.7 mm. diam., globose, smooth, with papillae	Brown, 1 mm. diam., campanulate, smooth, with papillae
Polygamous	Yes	Yes	No

Comparison of *G. mesopotamicum* sp. nov., with series *Uruguayensia* and *Quehliana*.

nuclei (3-5). The observations were made by staining the grains with Cotton-blue Lactophenol.

A second specimen, *Cutler & Lonsdale* 126-552A (K, SI, paratypes), showed the following differences: *style* somewhat longer, 2.2 cm., curved in S-shape and showing rapid necrosis at the base of the stigma; *stigma-lobes* connivent at the edges, not separating. *Pollen* with high fertility, about 100%; polar diameter (45-)50(-56) $\mu$ m, equatorial diameter (49-)56(-60) $\mu$ m (mean and extremes from 20 measurements).

All this, I believe, indicates that the species is polygamous, since the specimens studied have flowers with the organs of one or other sex semi-atrophied. This condition is rare but known in the Cactaceae. In *Gymnocalycium* it has been recorded in *G. artigas* Hert. and *G. lecanum* (Hook.) B. & R., both from Uruguay, and in *G. bruchii* (Speg.) Hosseus, from Cordoba.

*Phenology*. The specimens studied flower in England repeatedly between June (which is when the best flowering occurs) and October. The flowers open for between two and four days from about 12 noon to 3 p.m.

#### Acknowledgements

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Svanderlik for the colour photograph, and to Miss M. A. T. Johnson for the chromosome data and help with the pollen-study. I am also grateful for the comments of Mr. G. J. Swales and the loan of his unpublished thesis on this genus. My wife Angeles has helped with SEM and light-microscope preparations and with the pollen study.

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*Dr. Kiesling has now returned to Argentina with his wife and son after his year's study visit to England. On the way home he called at the New York Botanical Garden and attended the IOS Congress in Mexico. It was a very great pleasure to have them with us and we hope they will come again.*