A NEW SPECIES OF *CITRULLUS* (BENINCASEAE) FROM THE NAMIB DESERT, NAMIBIA

Citrullus rehmii *De Winter* sp. nov., *C. lanato* (Thunb.) Matsumura & Nakai affinis, a quo floribus minoribus, seminibus minoribus atrobrunneis et fructibus atroviridibus subtiliter salmoneo-maculosis differt. A *C. ecirrhoso* Cogn. et *C. colocynthidi* (L.) Schrad. habitu annuo non perenne, atque superficie fructuum subtiliter maculosa differt.

TYPE.—Namibia, near Ugab River on road from Uis to Welwitschia [Khorixas], near small 'Inselberge' of red granite on sandy flats, 28.3.1963, *De Winter & Hardy 8127* (PRE, holo.; K, NBG, WIND, iso.).

Monoecious, creeping, herbaceous annual producing procumbent stems radiating from a central taproot. Mature vegetative parts coarsely scabrid with bristly hairs; young parts densely covered with a mixture of bristly , bulbous-based, glasslike, sharp-pointed, septate hairs and yellowish, blunt, glandular hairs with a somewhat granular appearance; bulbous bases of bristles increase in size as vegetative parts mature, becoming opaque and white and the glandular hairs largely disappear. *Stems* simple or branched, 0,3–2 m long, sparsely to densely bristly, rough to the touch. *Leaves* petiolate; petioles sparsely bristly, (10–)30(–70) mm long; leaf blade triangular-cordate to broadly cordate in outline, (50–)60(–120) × (30–)50 (–60) mm, deeply dissected into 3–5 lobes, each lobe strongly undulate and sinuous on the margin or deeply lobed, usually very densely covered with bulbous-based hairs on the lower surface, upper surface glabrous except for bristles on the veins, on and near the leaf margin. *Tendrils* very slender, one at each node, bifurcate or rarely simple, branches strongly coiled. *Flowers* solitary, axillary, yellow, pedicellate. *Male flowers* articulated to the peduncle at the base of the receptacle; receptacle semi-hyaline, 2–3 mm deep. *Calyx lobes* firm, green, linear, 2–3 mm long, bristly on the outside. *Corolla* shallowly saucer-shaped 17–20 mm in diameter when open, lobes

7–8 mm long, ovate to broadly ovate; with 5–7 strong, parallel main veins interconnected by a network of secondary veins; main veins protruding on the lower surface and bristly; margins and lower surface sparsely covered with multicellular, blunt, shortly stalked, glandular hairs. *Stamens* 3, filaments ± 2 mm long; adaxially bearded at the base; anther-thecae conduplicate. *Ovary* totally absent. *Female flowers* with the receptacle tube ± 1 mm long. *Calyx* lobes 5, linear, firm, green, inserted on the receptacle, 2,5–3,0 mm long, like the receptacle covered with glassy, septate, bristly, sharp-pointed hairs. *Corolla* lobes 5, demarcated from the receptacle by a distinct rim linking the bases of the calyx lobes, lobes ovate to broadly ovate, ± 6 mm long, apex and margins densely covered with glandular hairs. *Staminodes* 3 or 4, opposite the calyx lobes, reduced to triangular, often fleshy scales, bearded at the base with hyaline septate bristles and crowned by a sterile reduced anther. *Ovary* inferior, subglobose, densely villous with slender, hyaline, septate hairs up to 2 mm long; with 3 parietal placentae and numerous ovules. *Fruit* globose, (80–)100(–120) mm in diameter, surface deep green, finely mottled with irregular salmon-pink to orange-pink spots, glabrous except for persistent, sparsely scattered, hyaline, septate hairs; pulp white, very bitter. *Seeds* straw-coloured to dark chestnut-brown, flattened, broadly obovate in outline, ± 6,0 × ± 4,5 mm.

NAMIBIA.—2014 (Khorixas): near Ugab River mouth on road from Uis to Khorixas [Welwitschia] (–DD), *De Winter & Hardy 8127* (PRE, holo.); between Uis and Khorixas (–BD), *Toelken & Hardy 838* (K, PRE, WIND). 2114 (Uis): Brandberg (–BA), *Giess 3712* (PRE, WIND); 112 km NE of Henties Bay, direction Uis (–BC), *Chadwick 62* (K, NBG, PRE). 2115 (Karibib): Klein Spitskoppe (–CC), *Giess 8791* (WIND). 2819 (Warmbad): flats just east of Karasburg (–BB), *Oliver & Steenkamp 6255* (PRE).

Specific epithet

This species is named in honour of Prof. Sigmund Rehm who, jointly with Dr P.R. Enslin, undertook intensive studies of the chemistry and genetics of the South African Cucurbitaceae including the genus *Citrullus*.

Distribution and ecology

Except for one record from east of Karasburg in the arid south of Namibia, all collections of *C. rehmii* were made in the Namib Desert from Khorixas [Welwitschia] in the north to a little south of Klein Spitskoppe. A photograph taken by P. Steenkamp at Sesriem on the Namib Desert edge, in 1976, on which fruits of *C. rehmii*, *C. ecirrhosus* and *C. lanatus* are grouped together, seems to indicate that all three species are found at this locality. However, no records of any of the species from Sesriem are known to me, so that this assumption could not be verified. The record from Karasburg seems somewhat doubtful and needs checking. *Citrullus ecirrhosus*, the second desert species in southern Africa, is found in the Namib Desert from north of the Brandberg to Kuboos in the Richtersveld of the northern Cape. It is therefore possible that the range of the two species may prove to be very similar. *C. rehmii* apparently inhabits mainly the gravelly to sandy-gravelly flats, avoiding the areas with deeper sand.

Relationships

Little is known about the relationships of *C. rehmii* with the three other species of *Citrullus*. It has been successfully hybridized with the wild form of *C. lanatus* as well as with the bitter form of the watermelon cultivar 'Hawkesbury', also classified as *C. lanatus*, by Rehm & Neethling (Unpublished Project Report 1967). Ellis in 1968 successfully hybridized *C. rehmii* with sweet tsamma *C. lanatus* as well as *C. ecirrhosus* and *C. colocynthis*. The F1 hybrids of all crosses are fertile and strongly intermediate in character, particularly in as far as the mottling of the fruits is concerned. The degree of sterility in the F2 progeny was not tested (R.P. Ellis unpublished). Rehm & Neethling, however, found that the F2 progeny of the crosses *C. lanatus* × *colocynthis* and *C. lanatus* × *ecirrhosus* showed a high degree of sterility. The F2 progeny of the crosses of *C. colocynthis* × *ecirrhosus* proved to be fertile. Because of lack of flowering material no crosses with *C. rehmii* were made by Rehm & Neethling. These unpublished experiments show that *C. lanatus* is related to *C. ecirhosus* and *C. colocynthis* but clearly specifically distinct, on morphological as well as genetical grounds.

C. ecirrhosus and *C. colocynthis* are morphologically somewhat similar but easily distinguished on the size and mottling of the fruits, the presence or absence of tendrils and the disjunct distribution.

As a matter of convenience the latter two species should, on basis of morphological and phytogeographical differences, be retained as separate species, in spite of their genetic compatibility.

As soon as material becomes available, crosses between *C. rehmii* and the other species will be undertaken to establish the degree of fertility of the progeny in the F2. On morphological grounds it is predicted that *C. rehmii* will prove to be genetically more closely related to *C. ecirrhosus* and *C. colocynthis* than to *C. lanatus*.

The fruits of all *Citrullus* species contain various quantities of cucurbitacin E, an oxygenated tetracyclic triterpene. *C. rehmii* contains cucurbitacin E and traces of cucurbitacin B and I (Enslin & Rehm 1958). The chemistry of the bitter principles contributes little to the elaboration of relationships. The relationship with *C. lanatus* is put forward mainly on the evidence of the annual habit, low cucurbitacin E content and the presence of tendrils. The leaf characters are similar in general features to those of *C. ecirrhosus* and *C. colocynthis* and taken in isolation, would favour a closer relationship with *C. ecirrhosus*. C. rehmii differs from all the other species by the characteristic salmon-pink mottling on a dark green background, of the rind of the fruit.

Uses

The fruits of hybrids made by R.P. Ellis at the Botanical Research Institute in 1967 were investigated by Enslin. The cross between *C. lanatus* cultivar 'Hawkesbury-bitter' ×

C. rehmii yielded 200 mg/100 g glycoside, which in turn yielded 91 mg/100 g cucurbitacin E. This was considerably higher than the yield of hybrids of the non-bitter wild form of *C. lanatus* × *rehmii* as well as that of *C. colocynthis* × *C. rehmii*. Cucurbitacin E was used by Enslin to synthesize alternative steroid hormones (P.R. Enslin pers. comm. 1967).

REFERENCE

ENSLIN, P.R. & REHM, S. 1958. The distribution and biogenesis of the cucurbitacins in relation to the taxonomy of the Cucurbitaceae. *Proceedings of the Linnean Society of London* 169,3: 230–238.

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