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Ethesia tanquana (Ornithogaloideae, Hyacinthaceae), a new species from the Tanqua Karoo (South Africa), with notes on *E. haalenbergensis*

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Abstract

Martínez-Azorín, M. & Crespo, M.B. 2012. *Ethesia tanquana* (Ornithogaloideae, Hyacinthaceae), a new species from the Tanqua Karoo (South Africa), with notes on *E. haalenbergensis*. *Anales Jard. Bot. Madrid* 69(2): 201-208.

As a part of a taxonomic revision of *Ethesia* Raf., a new species, *E. tanquana* Mart.-Azorín & M.B.Crespo, is described from the Tanqua Karoo in South Africa. This new species is at first sight similar to *E. haalenbergensis* (U.Müll.-Doblies & D.Müll.-Doblies) Mart.-Azorín, M.B.Crespo & Juan and also *E. xanthochlora* (Baker) Mart.-Azorín, M.B.Crespo & Juan, but it differs in floral and vegetative characters as well as in its ecology and isolated distribution. A complete description, data on biology, habitat, and distribution of the new species are presented. An identification key for *Ethesia* and new data on the rare Namibian *E. haalenbergensis* are also given.

Key words: *Ethesia xanthochlora*, distribution, ecology, habitat, taxonomy, Tankwa Karoo.

Resumen

Martínez-Azorín, M. & Crespo, M.B. 2012. *Ethesia tanquana* (Ornithogaloideae, Hyacinthaceae), una nueva especie de Tanqua Karoo (Sudáfrica), con notas sobre *E. haalenbergensis*. *Anales Jard. Bot. Madrid* 69(2): 201-208 (en inglés).

En el marco de la revisión taxonómica de *Ethesia* Raf., se describe una nueva especie, *E. tanquana* Mart.-Azorín & M.B.Crespo, del Tanqua Karoo en Sudáfrica. Esta nueva especie se asemeja a primera vista a *E. haalenbergensis* (U.Müll.-Doblies & D.Müll.-Doblies) Mart.-Azorín, M.B.Crespo & Juan y *E. xanthochlora* (Baker) Mart.-Azorín, M.B.Crespo & Juan, pero difiere por sus caracteres florales y vegetativos así como por su peculiar ecología y distribución aislada. Además, se presenta una descripción completa para la nueva especie, junto a información sobre su biología, hábitat, y distribución. Finalmente, se presenta una clave de identificación para *Ethesia* y nuevos datos sobre el raro endemismo namibiano *E. haalenbergensis*.

Palabras clave: *Ethesia xanthochlora*, distribución, ecología, hábitat, taxonomía, Tankwa Karoo.

INTRODUCTION

Family Hyacinthaceae includes about 700-900 species of bulbous plants that are mainly distributed throughout Europe, Africa and SW Asia, with a single small genus in South America (Speta, 1998; APG II, 2002). Four monophyletic subfamilies are accepted within Hyacinthaceae: Hyacinthoideae, Ornithogaloideae, Urgineoideae and Oziroëoideae (Pfosser & Speta, 1999; Manning & al., 2004). Alternatively, Hyacinthaceae has been treated as subfamily Scilloideae of the Asparagaceae, and the subfamilies above are then treated as tribes Hyacintheae, Ornithogaleae, Oziroëeae and Urgineeae (e.g. APG III, 2009; Chase & al., 2009).

Ornithogaloideae are distributed through Europe, SW Asia and Africa. In recent decades a number of morphological and phylogenetic studies were made on the group, focusing on circumscriptions of the genera. As a consequence, at least three very different taxonomic arrangements at generic level have been proposed for the Ornithogaloideae by Speta (1998) and Manning & al. (2004, 2009), all based exclusively on plastid DNA regions. The latest comprehensive study of the subfamily, including for the first time nuclear DNA regions, accepts 19 independent genera (Martínez-Azorín & al., 2011). These genera are based on monophyletic clades supported by a clear syndrome of morphological characters and distinct biogeographic patterns (cf. Martínez-Azorín & al., 2011), thus making this treatment highly consistent.

The genus *Ethesia* Raf. was described by Rafinesque (1837) to include a single species, *E. prasina* (Ker Gawl.) Raf. It was characterized as follows: '649. *Ethesia* Raf. (Nymph) diff. ad *Loncomelos*, filamentis equalis basi ovatis dilatatis, stylo elongato striato, stigma capitat. pubescens. - Type *E. prasina* Raf. Ornithog. prasinum Edw. b. reg. 158. fol. glaucis canalicul. apice tortilis, scapo racemoso, fl. viridescens. South Africa.' Therefore, *Ethesia* was related to *Loncomelos* Raf., the latter including the species traditionally placed in *Ornithogalum* subg. *Beryllis* (Salisb.) Baker (≡*Beryllis* Salisb.). Following the recent comprehensive studies in the Ornithogaloideae (cf. Martínez-Azorín & al., 2011), *Loncomelos* is a genus with ca. 20 species endemic to the Mediterranean basin, whereas *Ethesia* comprises four species, *E. haalenbergensis* (U. Müll.-Doblies & D. Müll.-Doblies) Mart.-Azorín, M.B. Crespo & Juan, *E. polyphlebia* (Baker) Mart.-Azorín, M.B. Crespo & Juan, *E. prasina* (Ker Gawl.) Raf., and *E. xanthochlora* (Baker) Mart.-Azorín, M.B. Crespo & Juan, all occurring in southern Africa. Both genera can be clearly differentiated by morphological features, and the phylogenetic analyses show that *Ethesia* and *Loncomelos* constitute two distant monophyletic clades within the tribe Ornithogaleae (Martínez-Azorín & al., 2011).

Ethesia was overlooked by modern taxonomic revisions in the Ornithogaloideae (Leighton, 1945; Obermeyer, 1978; Müller-Doblies & Müller-Doblies, 1996), and its four currently accepted species were placed in the morphologically heterogeneous *Ornithogalum* subg. *Urophyllon* (Salisb) Baker. The concept of this subgenus has proved to be artificial, with a mixture of taxa of the tribes Ornithogaleae and Albuceae (cf. Manning & al., 2009; Martínez-Azorín & al., 2011). Manning & al. (2009), in their latest phylogenetic study on the Ornithogaloideae, again overlooked *Ethesia* and

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placed *O. prasinum* Ker Gawl., the type of that genus, in their new *Albuca* subg. *Namibiogalum* (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Goldblatt. As discussed by Martínez-Azorín & al. (2011), the inclusion of *O. prasinum* in *A.* subg. *Namibiogalum* (= *Battandiera* Maire *sensu* Martínez-Azorín & al., 2011) is not consistent with the morphological data. Furthermore, other apparently related species, such as *O. haalenbergense* U.Müll.-Doblies & D.Müll.-Doblies and *O. xanthochlorum* Baker, were placed in *O.* sect. *Xanthochlora* (U.Müll.-Doblies & D.Müll.-Doblies) J.C.Manning & Goldblatt (= *Ethesia* Raf. *sensu* Martínez-Azorín & al., 2011) in their phylogenetic analyses by Manning & al. (2009). However, Manning & Goldblatt (2011) subsequently transferred *O. prasinum* to their widely circumscribed and morphologically heterogeneous *Ornithogalum*, a solution that implicitly corroborates the previous results by Martínez-Azorín & al. (2011). Manning & Goldblatt's treatment was supported by the cytological data presented in Goldblatt & Manning (2011). *Ethesia* has the unique chromosome number $2n = 16$ ($x = 8$), that it shares only with its sister clade *Galtonia* Decne.

The latest revision of *Ornithogalum* in southern Africa (cf. Müller-Doblies & Müller-Doblies, 1996) accepted *O. xanthochlorum*, *O. prasinum* and *O. polyphlebium* as independent species. These authors also described a new related species, *O. haalenbergense* that is endemic to a small area in the surroundings of Haalenberg in SW Namibia. This species is closely related to *E. prasina*, but it differs in the colour of the tepals and the number and morphology of the leaves. It is remarkable that no complete morphological description of this new species was presented, and no holotype or isotypes appear to have been deposited in the herbaria cited in the protologue ('holotypus: WIND; isotypi: B, BTU, K, PRE') since its description in 1996. As a consequence, a clear understanding of the taxonomic status of *E. haalenbergensis* is still lacking.

It is the aim of this paper to enhance our knowledge of the taxonomy of *Ethesia*. The study of living populations and herbarium collections of *Ethesia* from southern Africa reveals the existence of clear morphological differences that allow the description of a new species, *Ethesia tanquana* Mart.-Azorín & M.B.Crespo. This taxon appears to be closely related to *E. xanthochlora* and *E. haalenbergensis* from SW Namibia and Namaqualand. Data on morphology, biology, habitat, and distribution of *E. tanquana* and the rare and poorly known *E. haalenbergensis* are provided, together with a tentative key for the identification of *Ethesia* species.

MATERIAL AND METHODS

Morphological studies were mainly undertaken on living material from natural populations, usually within a few hours after collection, as described in detail by Martínez-Azorín & al. (2007, 2010) for other related groups of Ornithogaloideae. These data were complemented with studies of dried material conserved in the herbaria BOL, BNRH, GRA, J, K, KEI, KMG, NBG, NH, NU, PEU, PRE, PUC, UFH, and WIND (acronyms according to Thiers, 2012). Authors of the cited taxa follow the IPNI (2012).

Fig. 1. *Ethesia xanthochlora* in habitat SW of Garies, South Africa (*M. Martínez-Azorín, A. Martínez-Soler & R. McKenzie* MMA743 GRA).

RESULTS AND DISCUSSION

Species of *Ethesia* are characterized by tepals ovate-oblong, free, all spreading, greenish, with branched outer nerves, sometimes with white margins; staminal filaments showy, pure white, and also spreading; capsule obcordate or widely globose and truncate to retuse at the apex, about equal or wider than long (cf. Martínez-Azorín & al., 2011). From a phylogenetic point of view, *Ethesia* is monophyletic and considered sister to the *Galtonia* clade (including *O. saundersiae* Baker) (cf. Martínez-Azorín & al., 2011). *Galtonia* is easily differentiated from *Ethesia* by the large leaves sheathing the stem; racemose inflorescence, with flowers nodding; tepals fused into a campanulate tube for about half of their length; filaments cylindrical, adnate, and included; and capsule oblong-cylindrical and acute, usually longer than wide. Only *G. saundersiae* (Baker) Mart.-Azorín, M.B. Crespo & Juan shows a disruptive flower structure in the genus, it having the tepals almost free and spreading, and the ovary globose and shining black. Further studies, including molecular data, are needed to elucidate its final taxonomic position. *Galtonia* and *Ethesia* show different biogeographic patterns since species of the former genus occur

in summer-rainfall, high-altitude regions of the Drakensberg, Low Drakensberg, Southern Berg and Natal Midlands (South Africa and Lesotho), whereas *Ethesia* species occur in winter-rainfall, sub-arid regions in western and central South Africa and southern Namibia.

Four species are currently accepted in *Ethesia* (cf. Martínez-Azorín & al., 2011). Among them, *E. xanthochlora* is probably the most well-known species of the genus, perhaps because of its large size and abundance in Namaqualand, NW South Africa (Fig. 1). This species was described in *Ornithogalum* by Baker (1897) based on a Harry Bolus collection from 'Western region: Little Namaqualand; Kaus Mountain, 2500 ft., Bolus 6598!'. The original description includes the following characters: '… raceme dense, 6-8 in. long; pedicels stout, erecto-patent, lower 1-1¼ in. long, … perianth yellowish-green, ½ in. long …'. In summary, this species is characterized by the long and narrow, dense, inflorescence with short and stout pedicels, and flowers with uniformly yellow-green tepals. A similar concept was followed by Leighton (1945) 'Inflorescence many flowered, dense … pedicels 2-3 cm long … perianth green …'. Later Obermeyer (1966) illustrated this species in *Flowering Plants of Africa*. The description and figure showed plants with a long and cylindrical inflorescence with pedicels short and stout, all of similar length, and greenish flowers. The specimen figured was collected by A. Amelia Obermeyer 'about 21 miles north of Springbok near the road to Steinkopf, not far from the type locality'. She gave interesting distribution data on this species, saying that it 'has been collected fairly often in the Namaqualand area, while a few records come from Calvinia and Ceres'. A few years later, Obermeyer (1978) characterized the same species again as having 'Inflorescence … with a long, dense, many flowered, cylindrical raceme … pedicels arcuate, lengthening and hardening in fruit, up to 30 mm long … Perianth green …'. She also cited a list of herbarium collections distributed from the Richtersveld in the north to near Ceres in the south.

Müller-Doblies & Müller-Doblies (1996), in their revision of *Ornithogalum* in southern Africa accepted *O. xanthochlorum*, though with no new morphological data, and only citing Obermeyer s distributional information. Moreover, these authors described a new species *O. haalenbergense*, here accepted as *E. haalenbergensis*, which was known from a single locality in the surroundings of Haalenberg in SW Namibia. It was considered to be related to *O. prasinum*, but it differs by the tepals green with a white marginal region and the 2-3 narrowly oblong and decumbent leaves. No complete morphological description of *E. haalenbergensis* has been published to date and no types are available in any southern African or European herbaria.

Based on our fieldwork in South Africa and the revision of the main herbaria in that country, we present data supporting the description of a new species, *E. tanquana*, for populations growing in the Tanqua Karoo (also known as Tankwa Karoo), South Africa. It shows clear affinities to both *E. xanthochlora* (with which it has been usually misidentified) and *E. haalenbergensis*, though reproductive and vegetative characters allow easy separation from the latter. Since *E. xanthochlora* is a well-known species for which extensive information is available, complete morphological descriptions as well as data on biology, habitat, and distribution are included (see below) only for *E. tanquana* and the rare and poorly known *E. haalenbergensis*.

Ethesia tanquana Mart.-Azorín & M.B.Crespo, **sp. nov.** (Figs. 2, 3, 4)

Holotype: South Africa, Western Cape, Tanqua Karoo, 6.1 km from main road on turn off to Middelpos, 452 m, 32°39'06"S, 19°45'25"E, 3-IX-2011, *M. Martínez-Azorín, A. Martínez-Soler & R. McKenzie* MMA815 (GRA).

Species ad E. xanthochloram *et* E. haalenbergensem *certe affinis sed eis facile distinguitur foliis per anthesim plenam pro parte maxima emarcidis, et pedicellis fructiferis longioribus bracteas suas semper superantibus. A priore etiam differt tepalis olivaceis late albo-marginatis, nervis atratis pulchre ornatis; filamentis staminalibus angustioribus (ad* 2.5 mm *latis); stylis brevioribus (ad* 6 mm *longis). A posteriore valde discrepat foliis magis numerosis et generaliter majoribus; pedunculo inflorescentiae gracilliore (ad* 0.3 cm *lato); bracteis herbaceis, angustioribus, breve albo-marginatis; floribus in omnibus partibus majoribus.*

Habitat in apricis siccis, solo arenoso parum lapidoso, in regione Tanqua Karoo dicta, ex Africa meridionali.

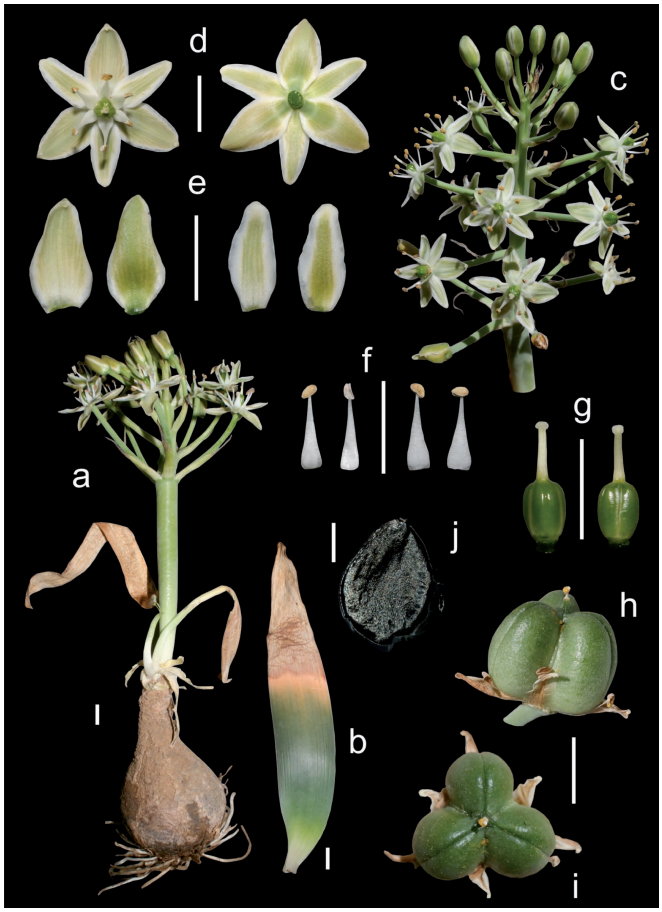

Fig. 2. *Ethesia tanquana* Mart.-Azorín & M.B. Crespo: **a,** plant; **b,** leaf; **c,** inflorescence; **d,** flower, frontal view (left) and dorsal view (right); **e,** tepals, outer (left) and inner (right); **f,** stamen, outer (left) and inner (right); **g,** gynoecium, lateral views; **h,** capsule, lateral view; **i,** capsule, apical view; **j,** seed. Scale bars: a-i = 1 cm; j = 2 mm.

Deciduous bulbous plant. Flowering scapes (10)15-28(37) cm high. Bulb hypogeal, ovoid, 4-9 × 2.5-6 cm, with a flat, small, basal plate, and dark leathery outer tunics. Leaves 5-11, in a basal rosette, not sheathing the stem, completely or mostly withered in full anthesis, lanceolate-oblong, lorate, flat, curved outwards and downwards, (8)11-18(25) × 0.8-4.5 cm, somewhat fleshy, glabrous, green, entire with a narrow hyaline margin. Inflorescence with (7)15-28(35) flowers, in a short, conical raceme, (3.5)5-16 × (2.5)3-6(8) cm, ca. 1-2 times longer than wide; peduncle erect, stout, terete, green, 6-15(20) × 0.7-1.2 cm; flower pedicels erect-patent, (1.8)2.4-4.3(4.8) × 0.2-0.3 cm; fruit pedicels lengthening and hardening, (3)3.2-4.4(5) × 0.2-0.3 cm, ascending, slightly arcuate, forming an obtuse callus above; bracts narrow-triangular, slightly clasping pedicles, 1.8-3.5 × 0.8-1 cm, usually not overtopping the flowers, at least in the basal portion of the inflorescence shorter than fruiting pedicels, greenish-yellow with a membranous translucent margin, persistent, drying out slowly and becoming brown from the tip downwards. Flowers sweet-scented; tepals fleshy, pale grey-green with white margin, with distinct darker green venation, and branched lateral veins; outers ovate, 13-14 × 6-8 mm, with a slightly cucullate, white, papillate apex; inners narrowly ovate-lanceolate, 12-13 × 5-6 mm. Filaments all similar, ovate-lanceolate or narrowly triangular, acuminate, thick, fleshy, white, 8-9.5 × 2-2.5 mm, all spreading not enclosing the ovary; anthers small, 2-2.5 × 1-1.2 mm after dehiscence. Ovary oblong, turbinate, trigonous, 6-6.5 × 3.5-4 mm, green, with septal nectaries in the apical portion of the carpel sutures, which produce abundant nectar; ovules biseriate; style thickened, white, 5.5-6 × 1 mm, as long as the ovary, erect or somewhat curved; stigma shortly 3-lobed, somewhat capitate, with conspicuous papillate lobes. Capsule broadly globose-oblong, truncate, retuse at the apex, as wide or wider than long, 13-15 × 15-19 mm, trilobate in section, surrounded by the persistent perianth; seeds flattened, semidiscoid to irregularly discoid, 5-7.5 × 4-6 mm; testa shining black, with a very shallow undulate cell pattern.

Etymology. Named after its confined distribution to the Tanqua Karoo in South Africa (*tanquana* = from Tanqua Karoo).

Chromosome number. $2n = 16$ (cf. Goldblatt & Manning, 2011; as *O. xanthochlorum* = *Snijman 2227* NBG).

Flowering time. August-October, fruits appear in late September-November.

Habitat. Flats with dry open karroid shrubby vegetation (Succulent Karoo Biome), over clayey soils on shale mudstones or red-brown sandy and slightly stony soils derived from shale arenites.

Distribution and biogeography. It is confined to the Tanqua Karoo in the inland areas of SW South Africa, from south of Calvinia to north of Ceres (Fig. 5). This region comprises the lowlands located south west of the Hantam-Roggeveld Centre (HRC) of plant endemism (Van Wyk & Smith, 2001), and includes the vegetation units Tanqua Karoo and Koedoesberge-Moordenaars Karoo in the Rainshadow Valley Karoo bioregion (Mucina & Rutherford, 2006). Other taxa, such as *Babiana tanquana* J.C.Manning & Goldblatt, *Moraea tanquana* Goldblatt & J.C.Manning, *Octopoma tanquanum* Klak, *Lampranthus tanquanus* H.E.K.Hartmann, *Euphorbia gentilis* subsp. *tanquana* L.C.Leach, or *Tanquana* H.E.K.Hartmann & Liede, are also found in the same geographic area, thus emphasizing the fact that the Tanqua Karoo is a remarkable biogeographical unit in terms of endemicity.

Diagnostic characters and relationships. *Ethesia tanquana* is easily identified by the tepals olive-green with a broad white margin and dark nerves, the bracts up to ¾ the length of fruiting pedicels, and the leaves mostly withered at the full anthesis. *Ethesia xanthochlora* can be related to *E. tanquana* on the basis of its robust habit, with stout inflorescence peduncle and flower pedicels, but it differs in its uniformly green-yellowish tepals, the cylindrical narrow inflorescence with bracts longer than pedicels in fruit (Table 1). On the other hand, *E. haalenbergensis* shares with *E. tanquana* the tepals green with a white margin, but differs in its smaller flowers and inflorescence, with only 2-3 leaves per flowering stem, among other characters (Table 1). It is also notable that despite its floral similarities with *E. haalenbergensis*, *E. tanquana* occurs in continental

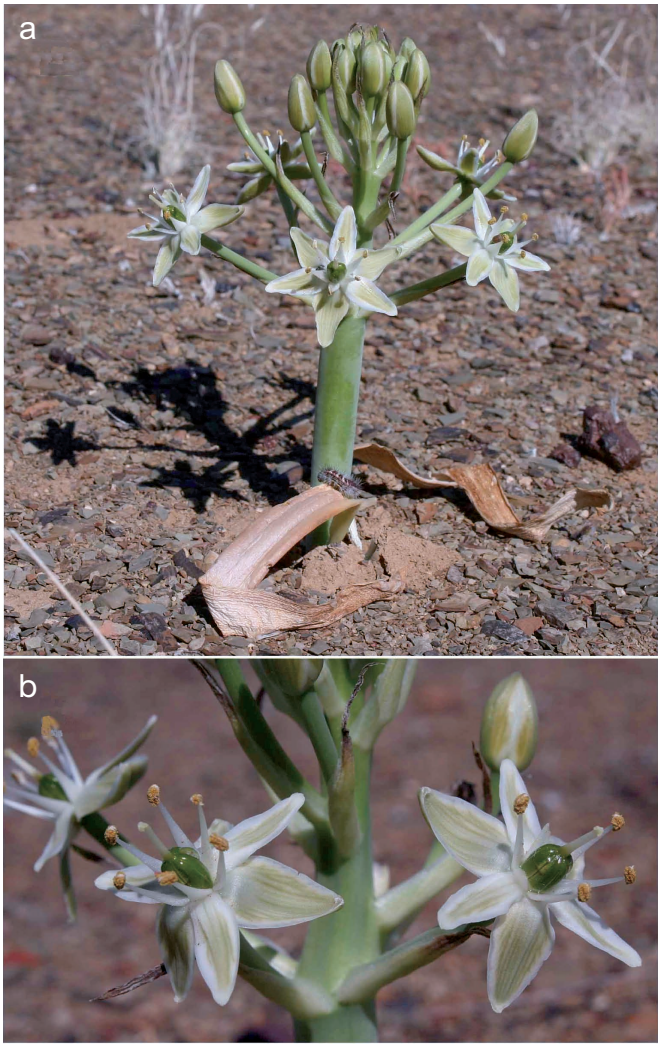

Fig. 3. *Ethesia tanquana* in the type locality: **a,** general view; **b,** details of flowers (with evident nectar drops produced by the septal nectaries) [corresponding to the holotype: *M. Martínez-Azorín, A. Martínez-Soler & R. McKenzie* MMA815 GRA].

Fig. 4. Infrutescence of *Ethesia tanquana* showing the long pedicels with shorter bracts [corresponding to the holotype: *M. Martínez-Azorín, A. Martínez-Soler & R. McKenzie* MMA815 GRA]. Scale in mm.

areas to the south of the main populations of *E. xanthochlora*, whereas *E. haalenbergensis* is found in coastal regions further north of the *E. xanthochlora* populations (Fig. 5).

Observations. Herbarium materials of the new species have usually been misidentified as *O. xanthochlorum* (= *E. xanthochlora*). The first known collections were made by R.H. Compton in Gansfontein, in Tanqua Karoo, in 1935 (*Compton* 5991 NBG). The most recent flora of the Roggeveld and the Tanqua Karoo (cf. Van der Merwe & Van Rooyen, 2010) includes a photograph of this species, although again as *O. xanthochlorum*.

Additional specimens studied

SOUTH AFRICA: **Northern Cape**: (3119DC) Tankwa Karoo, Kalkgat Oos, next to road, 31º51'18"S, 19º34'29"E, 7-IX-2004, 452 m, *H. Rösch* 239 (KMG, NBG); (3219BB) Tankwa Karoo, along Roodewerf road, 32º00'14"S, 19º52'14"E, 18-IX-2006, 543 m, *H. Rösch* 564 (KMG, NBG); (3219BC) Wupertal, Elands Vlei, lower Tanqua, *Marloth* 10465 (cf. Obermeyer, 1978). **Western Cape**: (3219DA) Tanqua Karoo, farm De Mond, just E of Doorn River, 6-X-2008, *D.A. Snijman* 2227 (NBG); (3219DA) Calvinia CP, Tanqua Karoo, Gansfontein, 26-VIII-1935, 1500 feet, *Compton* 5991 (NBG); (3219DA) Tanqua Karoo, 3.8 km from main road on turn off to Middelpos, 32º39'44"S, 19º44'21"E, 3-IX-2011, 469 m, *M. Martínez-Azorín, A. Martínez-Soler & R. McKenzie* MMA818 (GRA); (3219DB) Farm Grootkapelsfontein, 8 km along road to Middelpos from Ceres/Calvinia turn off, 31-VIII-1982, 450 m, *D.A. Snijman* 612 (NBG); (3219DD) between Ceres and Sutherland, in the Tanqua Karoo, near Bizansgat, 24-IX-1987, *M. Viviers & J. Vlok* 338 (NBG); (3219DD) on road to Sutherland, just before turn off to Onder-Wadrif, north of river crossing, 1-X-1974, *K. Hiemstra* 586 (NBG); (3319BC) Worcester, Karoopoort, *Hafström & Acocks* 231 (cf. Obermeyer, 1978).

Ethesia haalenbergensis (U.Müll.-Doblies & D.Müll.-Doblies) Mart.-Azorín, M.B.Crespo & Juan in Ann. Bot. (Oxford) 107(1): 28. 2011. ≡ *Ornithogalum haalenbergense* U.Müll.-Doblies & D.Müll.-Doblies in Feddes Repert. 107(5-6): 492. 1996.

Holotype: Namibia (2615DA, Lüderitz): Haalenberg, N of the road, ca. 600 m, 25-VII-1988, *Müller-Doblies* 88040e (allegedly at WIND). Isotypes: B, BTU, K, PRE.

Ornithogalo prasino *affine, sed differt foliis solum* 2-3, *planis, humo appressis, anguste oblongis.*

Deciduous bulbous plant. Flowering scapes 5-6.5 cm high. Bulb hypogeal, ovoid, 4-7 × 2-3 cm, with a flat, small, basal plate, and brown leathery outer tunics. Leaves 2-3, in a basal rosette, not sheathing the stem, coetaneous with flowers, narrowly-oblong, lorate, flat, curved outwards and downwards, 7-12 × 0.4-1.2 cm, somewhat fleshy, glabrous, glaucous green, entire with a narrow hyaline margin. Inflorescence with (9)11-20(22) flowers, in a short, conical raceme, 2-3.5 × 2.8-3.2 cm, about as long as wide; peduncle erect, terete, green, 2.3-5.2 × 0.2-0.3 cm; flower pedicels erect-patent, 0.6-1.4(1.6) × 0.1 cm; fruit pedicels 0.7-1.7 × 0.1 cm; bracts mostly white-membranous, broad-ovate and widely clasping the pedicels, 0.8-1.5 × 0.6-0.7 cm, about as long as fruiting pedicels. Flowers erect-patent; tepals fleshy, pale olive-green with white margin, with distinct darker green venation, and branched lateral veins; outers ovate, 7-9 × 4-6 mm, with a slightly cucullate, white, papillate apex; inners narrowly ovate-lanceolate, 7-8 × 3-4 mm. Filaments all similar, ovate-lanceolate or narrowly triangular, acuminate, thick, fleshy, white, 4.5-6.5 × 1.5-2.2 mm, all spreading not enclosing the ovary; anthers small, ca. 2 × 1 mm after dehiscence. Ovary oblong, turbinate, trigonous, ca. 3.5 × 2.5 mm, green, with septal nectaries in the apical portion of the carpel sutures; ovules biseriate; style white, ca. 3 × 0.5 mm, about as long as the ovary, erect; stigma shortly 3-lobed, somewhat capitate, with conspicuous papillate lobes. Capsule

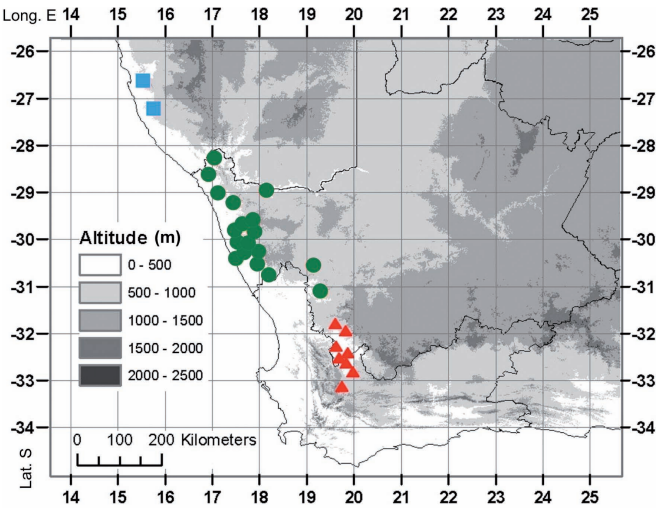

Fig. 5. Known distribution of *Ethesia haalenbergensis* (squares), *E. xanthochlora* (circles) and *E. tanquana* (triangles) in SW Africa.

broadly globose-oblong, truncate, retuse at the apex, as wide or wider than long, 7-10 × 10-14 mm, trilobate in section, surrounded by the persistent perianth; seeds flattened, semidiscoid to irregularly discoid, black, shiny (Fig. 6).

Etymology. Named after the type locality near Haalenberg (*haalenbergensis* = from Haalenberg) in SW Namibia.

Chromosome number. Unknown.

Flowering time. July-September (January), fruits appear in late September-October.

Habitat. Deep sandy soils on flats and rocky outcrops of the Succulent Karoo Biome.

Distribution. Endemic to the coastal regions of SW Namibia, from Haalenberg near Lüderitz in the north, to Klinghardtsberge Mts. in the south (Fig. 5).

Diagnostic characters and relationships. This species is easily identified by the presence of 2-3 lorate and spreading leaves, the short, subglobose inflorescence, the widely ovate-lanceolate and white-membranous bracts and the tepals olive-green with white margins. It appears to be akin to *E. tanquana* on the basis of flower morphology, but strongly differs by leaf number, and size of inflorescence, flowers and pedicels (Table 1).

Observations. First collected in the surroundings of Haalenberg by M.K. Dinter in 1929 (*Dinter* 6612 B, BTU-b), and labelled as '*Albuca diphylla* ined.'(cf. Müller-Doblies & Müller-Doblies, 1996). This species was illustrated as '*Ornithogalum prasinum*' by Mannheimer & al. (2008), whilst the photographs by C. Mannheimer do indeed correspond to *E. haalenbergensis* that by T. Greyling shows *E. prasina*.

No type specimens of *E. haalenbergensis* have been found in WIND, PRE and K, which together with the very poor description in the protologue, made a priori understanding of this species difficult. However, the photograph in the protologue shows features that undoubtedly match the materials studied here (Fig. 6) from sites south to the type locality, which supports the placement of this species in *Ethesia* as proposed by Martínez-Azorín & al. (2011). This situation raises a question that should be addressed by botanical nomenclature authorities, with regard to a requirement for a time limitation for the deposition of types after description of new taxa.

Additional specimens studied

NAMIBIA: **Lüderitz**: (2615CB) Haalenberg, 30-VIII-1929 cofl., *Dinter* 6612 (B, BTU-b; as *Albuca diphylla* ined.); Haalenberg, quarry 2 km N of the road at 3 km WSW of Haalenberg, deep sand and rocky slopes, ca. 600 m, 31-VII-1988, *Müller-Doblies* 88047c (BTU, WIND), in bud; 2715BD (Bogenfels): Karas, dune entering outskirts of Klinghardts from the south east, 27°15'47"S, 15°46'48"E, 21-IX-2003, 615 m, *C.A. Mannheimer* 2443 (WIND!); 2715BD (Bogenfels): Sperrgebiet, hills on northern side of Klinghardt mountains, 27°15'47"S, 15°46'45"E, 13-VIII-2011, 644 m, *L. Smook* 11370 (WIND!);

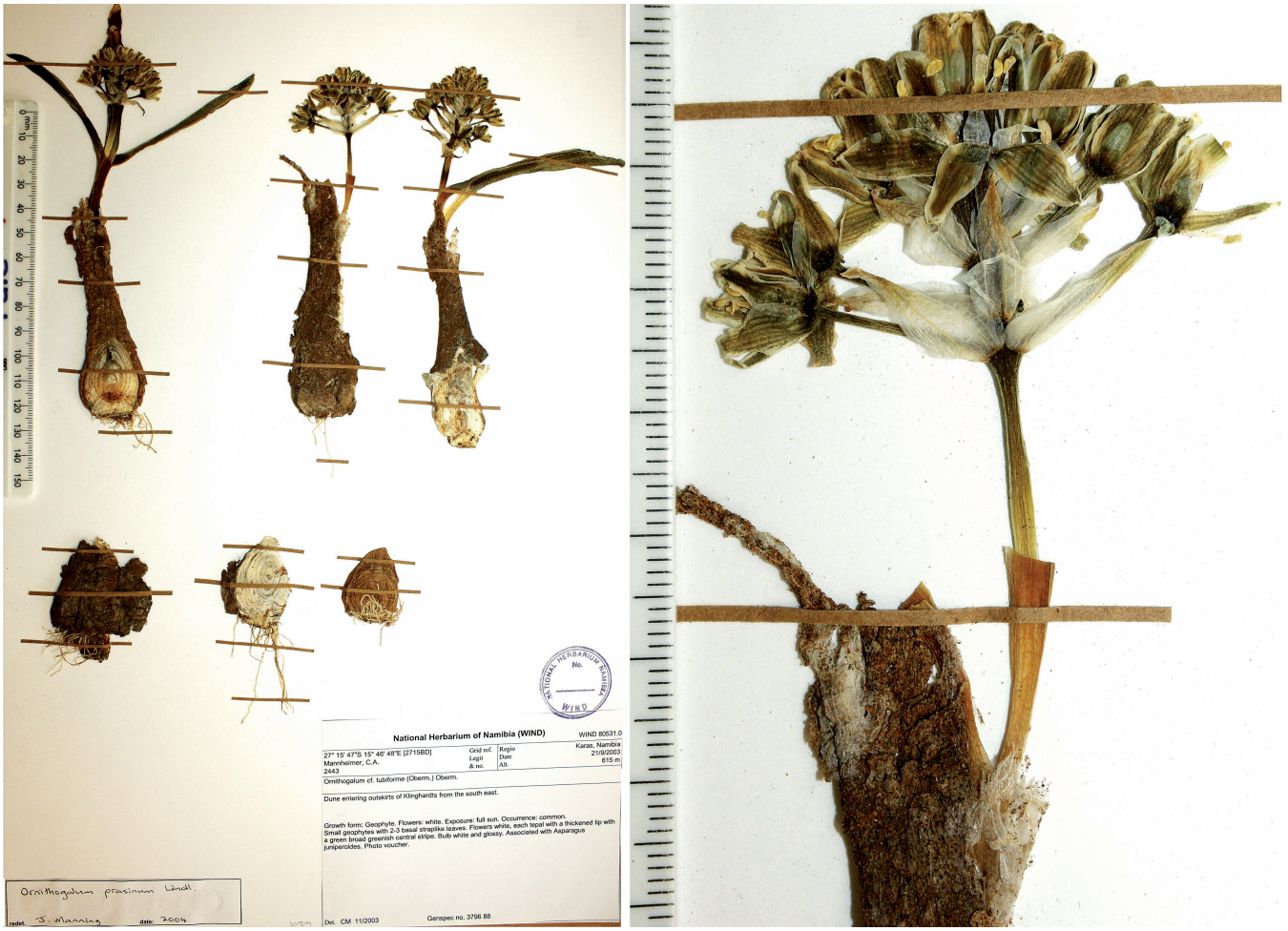

Fig. 6. *Ethesia haalenbergensis* (*Mannheimer* 2443, WIND). Scales in mm.

Table 1. Main diagnostic characters of *Ethesia xanthochlora*, *E. tanquana* and *E. haalenbergensis*.

	E. xanthochlora	***E. tanquana***	***E. haalenbergensis***
Plant	40-70 cm	(10)15-28(37) cm	5-6.5 cm
Bulb	7-12 × 4-10 cm	4-9 × 2.5-6 cm	4-7 × 2-3 cm
Leaves	(7)9-12(15) mostly coetaneous with the flowers	5-11 completely or mostly withered in full flower	2-3 coetaneous with flowers
	(15)20-37(46) × (1.5)2.4-5(5.6) cm	(8)11-18(25) × 0.8-4.5 cm	7-12 × 0.4-1.2 cm
Inflorescence	(20)25-58(65) flowers (8)10-26 × 3-4.5(5.5) cm peduncle (10)13-45 × 1-1.7 cm flower pedicels (0.8)1.2-2.8(3) × 0.3-0.4 cm	(7)15-28(35) flowers (3.5)5-16 × (2.5)3-6(8) cm peduncle 6-15(20) × 0.7-1.2 cm flower pedicels (1.8)2.4-4.3(4.8) × 0.2-0.3 cm	(9)11-20(22) flowers 2-3.5 × 2.8-3.2 cm 2.3-5.2 × 0.2-0.3 cm flower pedicels 0.6-1.4(1.6) × 0.1 cm
	fruit pedicels (1.3)1.5-3(3.5) × 0.4-0.5 cm	fruit pedicels (3)3.2-4.4(5) × 0.2-0.3 cm	fruit pedicels 0.7-1.7 × 0.1 cm
Bracts	(1.8)2.5-5.8(7) × 0.6-1.4 cm exceeding pedicels, flowers and fruits	1.8-3.5 × 0.8-1 cm usually shorter than pedicels in full flower and shorter than pedicels in fruit	0.8-1.5 × 0.6-0.7 cm about as long as pedicels in fruit
	greenish becoming brown when withered	greenish becoming brown when withered	mostly white-membranous when withered
	narrow-triangular, slightly clasping pedicles	narrow-triangular, slightly clasping pedicles	broad-ovate and widely clasping pedicels
Tepals	uniformly pale yellow-green, with almost indistinct venation in fresh material	pale olive-green with white margin, with distinct darker green venation, and branched lateral veins	pale olive-green with white margin, with distinct darker green venation, and branched lateral veins
	outers 12-18 × 6-9 mm inners 12-16 × 5-6.5 mm	outers 13-14 × 6-8 mm inners 12-13 × 5-6 mm	outers 7-9 × 4-6 mm inners 7-8 × 3-4 mm
Filaments	8-12 × 2.5-4.2 mm	8-9.5 × 2-2.5 mm	4.5-6.5 × 1.5-2.2 mm
Ovary	6-7 × 4-4.5 mm	6-6.5 × 3.5-4 mm	ca. 3.5 × 2.5 mm
Style	7-8 × 1 mm	5.5-6 × 1 mm	ca. 3 × 0.5 mm
Capsule	12-15 × 14-15 mm	13-15 × 15-19 mm	7-10 × 10-14 mm
Seeds	5-6 × 2-3 mm	5-7.5 × 4-6 mm	—
Flowering time	August-September	August-October	July-September (January)

2715BD (Bogenfels): along road in sandy-rubble, armoured flats, 1 km due S of spot, 630 m, 21-VII-1986, *van Berkel* 562 (NBG!); 2715BD (Bogenfels): sandy-rubble armoured flats 1 km due S of spot ht 703 ca. 2.5 km NE of Schwartzkuppen, 17-VIII-1986, 603 m, *van Berkel* 565 (NBG!).

KEY TO THE SPECIES OF *ETHESIA*

1. Tepals uniformly greenish-yellowish 2
1. Tepals green with white margins 4
2. Plant large, up to 70 cm, with very stout peduncles and pedicels; inflorescence narrow and long, cylindrical, with all pedicels of similar length; bracts as long as or longer than pedicels; leaves (15)24-50(56) mm broad ..... ***E. xanthochlora***
2. Plant smaller, up to 30 cm, with thin peduncles and pedicels; inflorescence widely racemose or conical; bracts much shorter than pedicels; leaves 1.5-18(50) mm broad 3
3. Leaves not twisted, 10-18(50) mm broad; tepal length 10-12 mm; style 4.5-5 mm long ..... ***E. prasina***
3. Leaves twisted, 1.5-7(8) mm broad; tepal length 7-9(10) mm; style 3.3-4.5 mm long ..... ***E. polyphlebia***
4. Leaves 2-3, up to 1.2 cm broad, coetaneous with flowers; inflorescence 2-3.5 cm long; tepals 7-9 mm long; bracts about as long as the pedicels in fruit, mostly white-membranous, broadly ovate, widely clasping the pedicels ..... ***E. haalenbergensis***
4. Leaves 5-11, up to 4.5 cm broad, mostly withered at the anthesis; inflorescence (3.5)5-16 cm long; tepals 12-14 mm long; bracts shorter than the pedicels in fruit, greenish becoming brown when withered, narrowly triangular, slightly clasping pedicels ..... ***E. tanquana***

Additional specimens studied

Ethesia xanthochlora. SOUTH AFRICA. **Northern Cape:** (2816BD) Head of Helskloof, Hottentotsparadyskloof, 28-VIII-1977, 700 m, *Thompson & A. Le Roux* 149 (NBG); (2816BD) Oranjemund, Richtersveld, Kuboos, *Lavranos* 10842 (cf. Obermeyer, 1978); (2817AC) Vioolsdrift: Richtersveld, Khubus, kloof at Khubus, 28º26'01"S, 16º59'56"E, 30-IX-2010, 236 m, *M. Martínez-Azorín, M.B. Crespo & A. Martínez-Soler* 403 (GRA); (2917AA) Lekkersing, *Marloth* 12284 (cf. Obermeyer, 1978); (2917BA) Springbok, foot of Anenous Pass, 29º15'18"S, 17º30'20"E, 11-IX-2000, 525 m, *P. Goldblatt, J.C. Manning & V. Savolainen* 11491 (NBG); (2917BB) near Henkries, between Steinkopf and the Orange River, *Phillips* 1632 (cf. Obermeyer, 1978); (2917CD) Namaqualand, Komaggas, 9-IX-1950, *W.F. Barker* 6733 (NBG); (2917DA) Namaqualand, Spektakel Camp, 9-IX-1950, *W.F. Barker* 6732 (NBG); (2917DB) Okiep, *Kitto sub Marloth* 6586 (cf. Obermeyer, 1978); (2917DB) Springbok: south of Springbok, on N7, 29º45'08"S, 17º50'49"E, 27-IX-2010, 849 m, *M. Martínez-Azorín, M.B. Crespo & A. Martínez-Soler* MMA330 (GRA); (2917DB) Springbok: north of Springbok, ca. 5 km east of turn off to Nababeep, 29º36'30"S, 17º51'50"E, 28-IX-2010, 988 m, *M. Martínez-Azorín, M.B. Crespo & A. Martínez-Soler* 358 (GRA); (2917DD) Vogelklipp, in collibus, 17-IX-1897, 2600 feet, *Schlechter* 11311 (B100168482, B100168483, GRA, K000365555) as '*Albuca bracteata* Schltr. nom. nud.'; (3017BA) Bokskloof, Kookfontein farm, 10 km NE of Soebatsfontein, 400 m, 02-IX-1986, *C. Hilton-Taylor* 1398 (NBG); (3017BA) Namaqualand, near Soebatsfontein, 3-IX-1980, *A. Le Roux* 2788 (NBG); (3017BA) near Soebatsfontein, *Lewis* 1422 (cf. Obermeyer, 1978); (3017BA) Namaqualand, 8 m north of Soebatsfontein, 27-VIII-1957, 600 feet, *J.P.H. Acoks* 19457 (K); (3017BB) Kamieskroon, *Thorne sub* SAM 48848 (cf. Obermeyer, 1978);

(3017DB) Hondeklipbaai: farm Brakfontein, on road to Hondeklipbaai from N7, 334 m, sandy soil, 30º34'35"S, 17º53'35"E, 30/08/2011, *M. Martínez-Azorín, A. Martínez-Soler & R. McKenzie* MMA740 (GRA); (3017DB) Hondeklipbaai: private reserve, 11 km from turn off to Kotzerus from Garies-Hondeklipbaai road, 30º40'53"S, 17º49'34"E, 30-VIII-2011, 208 m, *M. Martínez-Azorín, A. Martínez-Soler & R. McKenzie* MMA741 (GRA); (3017DB) Namaqualand, Springbok, banks of Groen Rivier, S of Garies, 5-IX-1961, *O.S. Hardy* 550 (K); (3017DB) banks of Groen Rivier, south of Garies, 750 feet, 28-VIII-1975, *E.G.H. Oliver* 5945 (K); (3017DB) Hondeklipbaai, 6 km to Kotzesrust off Garies-Hondeklipbaai road, 3-IX-1976, *C. Boucher* 3155 (NBG); (3017DB) near Garies, *Gill sub SAM* 54334 (cf. Obermeyer, 1978); (3017DD) Hondeklip Bay: 20 km from turn off to Kotzerus from Garies-Hondeklipbay road, 30º39'30"S, 18º00'26"E, 30-VIII-2011, 181 m, *M. Martínez-Azorín, A. Martínez-Soler & R. McKenzie* MMA743 (GRA); (3018CA) Loerkop, 3 miles NE of Garies, 14-VIII-1967, *Van Breda* 4055 (K); (3019AC) Richtersveld, Jakhalsputs, IX-1953, *Hall sub NBG* 766-53 (NBG); (3119AB) Calvinia, NE of Nieuwoudtville, Koringhuis, turn out on Loriesfontein road, 13-IX-1961, *W.F. Barker* 9488 (NBG); Vanrhynsdorp dist., Niewerust 7-IX-1945, *W.F. Barker* 3725 (NBG); Kamiesberg, Giftberg and Olifants river mountains, Stinkfontein, 10-IX-1911, *H.H.W. Pearson* 6727 (K); Little Namaqualand, Wallekraal, 30-VIII-1935, *R.H. Compton* 5992 (NBG); 1840, *Drége* 8709 (K).

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