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Hartliella txitongensis (Linderniaceae), a new species from Mozambique

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Summary. *Hartliella txitongensis* Osborne & Eb.Fisch., a species new to science from Niassa Province in Northern Mozambique, is described and illustrated. *Hartliella txitongensis* is the only species of *Hartliella* known from outside the Upper Katanga region of the Democratic Republic of the Congo and the adjacent region of Zambia. The species is provisionally assessed as Critically Endangered under IUCN criterion B and its potential to be a metallophyte is highlighted. A key to the five species of *Hartliella* is provided.

Key Words. Chitonga, metallophyte, Niassa, plant taxonomy, Txitonga.

Introduction

The genus *Hartliella* Eb.Fisch. (Fischer 1992: 204) was erected to accommodate four suffruticose species formerly placed in a broadly defined *Lindernia* All. Species of *Hartliella* are characterised by a capitate inflorescence, almost coriaceous leaves, a woody rhizome, abaxial stamens with a knob-like basal appendage (only weakly pronounced in *H. cupricola* Eb.Fisch.), and aulacospermous seeds. The seeds of Linderniaceae can be divided into three different types: bothrospermous, aulacospermous and non-alveolated. In bothrospermous seeds the surface is sculptured due to the pit-like ingrowth of the inner epidermis of the ovule integument, the endothelium, into the endosperm. This endosperm alveolation results in characteristic rounded pits on the seed surface. By fusion of several endosperm pits, longitudinal furrows are produced that are typical of the aulacospermous seed type. In the non-alveolated seeds, the surface of the endosperm shows 5 – 6 rib-like shallow longitudinal furrows but no deeply impressed pits or ditch-like furrows (Fischer 1992). According to Fischer *et al.* (2013), *Lindernia* s.str. has non-alveolated seeds while the clades with bothrospermous seeds comprise e.g. the genera *Torenia* L. (Linnaeus 1753: 619), and *Craterostigma* Hochst. (Hochstetter 1841: 668) in a broad sense. The clade with aulacospermous seeds consists e.g. of *Crepidorhopalon* Eb.Fisch. (Fischer 1989: 443), *Hartliella*, and *Bampsia* Lisowski & Mielcarek (1983: 377). Up to now, four species of *Hartliella* are known, most of them endemic to Upper Katanga in the Democratic Republic of the Congo with one species, *H. capitata* (Eb.Fisch.) Eb.Fisch. (1992: 211) also occurring in adjacent Zambia. *Hartliella suffruticosa* (Lisowski & Mielcarek) Eb.Fisch. has an elongated stem with 3 – 4 pairs of broadly obovate to almost orbicular leaves and a small, basal pair of cataphylls, the upper leaf pair surrounding a few-flowered, capitate inflorescence. It is found in miombo woodland and savanna on heavy metal-rich soil and is endemic to Upper Katanga. The closely related *H. cupricola* differs from *H. suffruticosa* in having 4 – 6 pairs of lanceolate leaves, a longer calyx-tube and an undivided upper lip of the corolla. The upper leaf pair is distant from the inflorescence. The species is only known from the type locality at Kahumbwe in Upper Katanga (Fischer 1992; Malaisse *et al.* 2016) on copper-rich soil. The two further species have dense capitate inflorescences with a much smaller pair of surrounding leaves. Apart from the cataphylls, there are usually only two pairs of large leaves. The main difference between *H. capitata* and *H. bampsii* (Eb.Fisch.) Eb.Fisch. (1992: 209) lies in the arrangement of these two leaf pairs: in *H. capitata*, the internode is strongly condensed, thus appearing as a rosette or a whorl of four leaves, while in *H. bampsii* the internode is elongated with the upper pair arranged in the middle of the stem. *Hartliella capitata* is found in Upper Katanga with one locality in adjacent Zambia, mainly in miombo woodland on probably metalliferous soil while *H. bampsii* is endemic to Upper Katanga in similar, open woodland habitats. For further differences see Table 1.

During field work in northwest Mozambique in May 2019, the first author, together with Aurélio Banze and Papin Mucaleque, collected a specimen of *Hartliella*, that, at first glance, seemed intermediate between *H. bampsii* and *H. capitata*. Close study revealed that it represents a new species that is described below.

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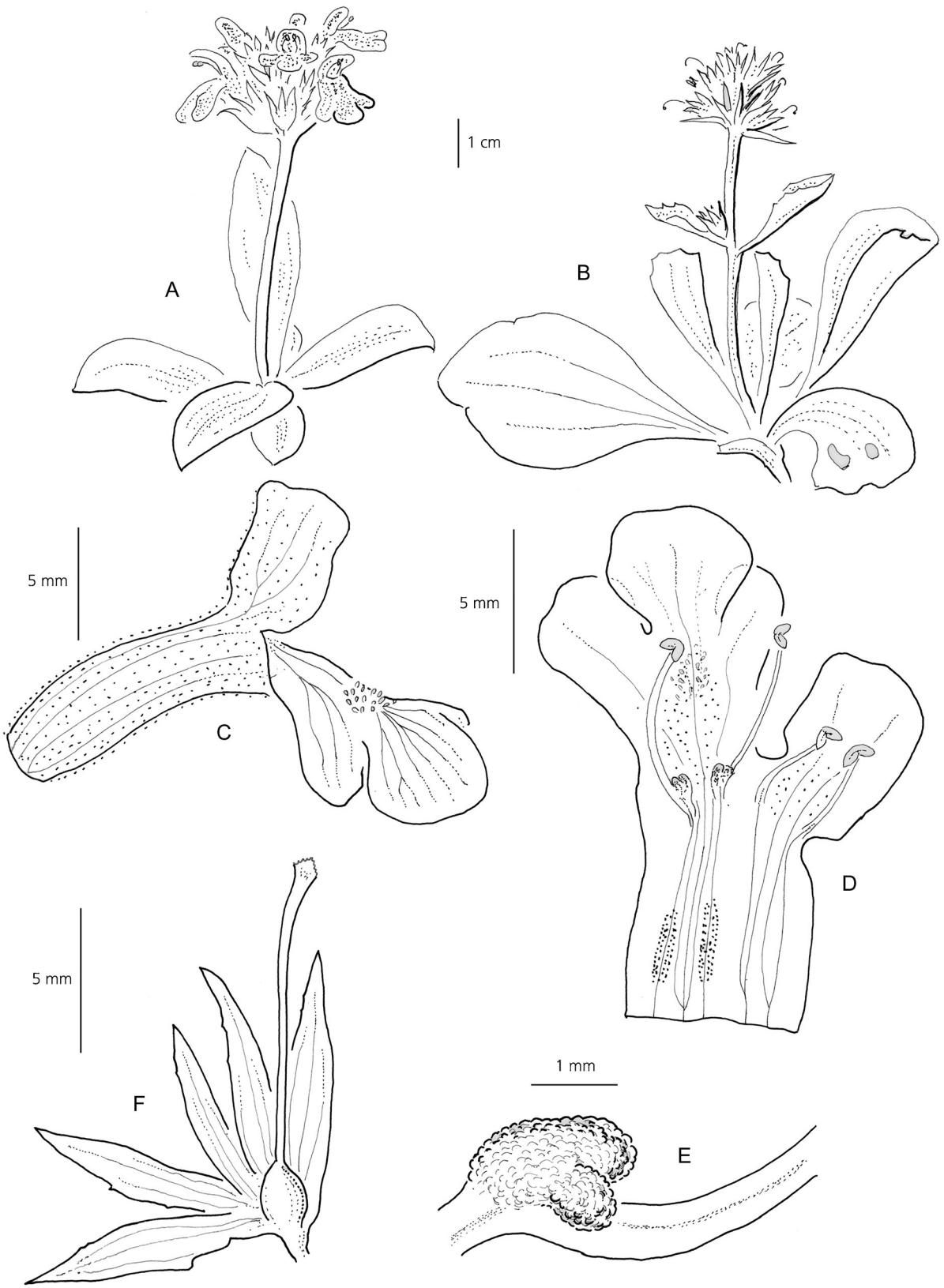


Fig. 1. *Hartliella txitongensis*. A, B habit; C corolla; D corolla dissected; E base of abaxial stamen showing the bilobed appendage; F calyx opened showing ovary with style and stigma. All from *Osborne* JO 1711. DRAWN BY EBERHARD FISCHER.

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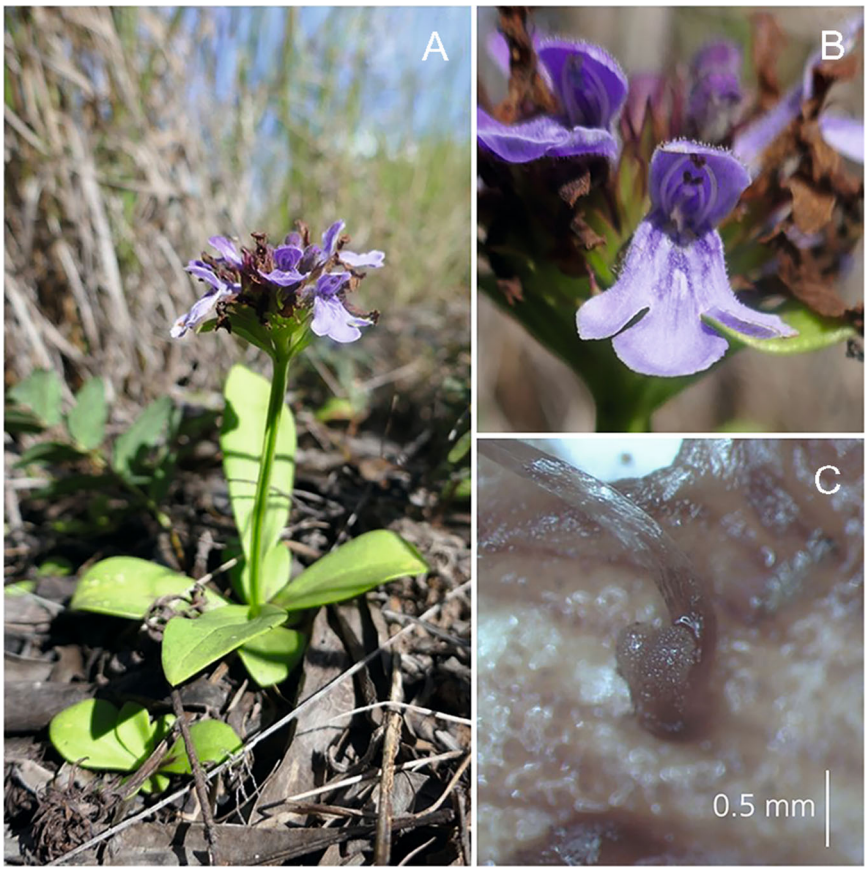


Fig. 2. A *Hartliella txitongensis* growing in the Txitonga Mountains, Niassa Province, Mozambique; **B** flower; **C** bilobed appendage at base of abaxial filament (microscope image of dried and soaked corolla). PHOTOS: J. OSBORNE.

Materials and Methods

Plant material

Dried plant material, consisting of five individual plants of *Hartliella txitongensis*, was studied and imaged in the Herbarium at Kew. Of the five plants, at the time of collection, only one was in flower and the remaining plants were in varying stages of developing fruit. To avoid excessive destructive sampling from the flowering specimen, only two flowers were soaked in water and dissected for examination under a stereo microscope. Fruit and seed measurements were taken from the single most mature fruit found.

Table 1. Character table comparing the five species of *Hartliella*.

	H. suffruticosa	*H. cupricola*	*H. capitata*	*H. bampsii*	*H. txitongensis*
Plant height (cm)	6 – 11	14 – 20	1 – 2	2 – 5	4 – 10
Stems	elongated	elongated	strongly condensed	± elongated	condensed with elongated internode beneath capitulum
Number of leaf pairs	3 – 4	4 – 6	2 (– 4)	2 (– 4)	2 (– 4)
Leaf shape	broadly obovate	lanceolate	variable (broadly obovate to lanceolate)	broadly obovate	obovate to elliptic
Capitulum	few-flowered	few-flowered	dense and multi-flowered	dense and multi-flowered	dense and multi-flowered
Upper lip of corolla	bifid	entire	entire	bifid	entire
Corolla tube length (mm)	6 – 8	6	12	5 – 7	8 – 9
Appendage at base of abaxial filaments	simple globose	simple globose	simple globose	simple globose	bilobed
Distribution	DRC, Upper Katanga	DRC, Upper Katanga	DRC, Upper Katanga; NW Zambia	DRC, Upper Katanga	Mozambique, Niassa

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Maps

The maps were constructed in ArcMap version 10.3 to show the single locality where *Hartliella* is known to occur, and the locations of the Txitonga Mountains and Niassa province in Mozambique. The Txitonga mountains polygon was drawn manually using Google Earth™ imagery of the mountains and based on advice from a local guide and Government Environmental Officer (Fiscal) for the Lupilichi area (R.O. Saide pers. comm. 2019). The Basemap imagery was added from ArcGIS online.

Conservation status

The conservation status of *Hartliella txitongensis* was provisionally assessed using the IUCN categories and criteria (IUCN 2012).

Taxonomic Treatment

Hartliella txitongensis *Osborne & Eb.Fisch.* **sp. nov.** Type: Mozambique: Niassa Province, Txitonga (Chitonga) Mountains, *Osborne* JO 1711 (holotype LMA!; isotypes K! K001346951, LMU!).

http://www.ipni.org/urn:lsid:ipni.org:names:77297515-1

Perennial herb 4 – 10 cm tall, erect, growing from a woody rhizome. *Stems* glabrous, 4-angular and winged along the angles. Leaf pairs 2 (– 4). Leaves closely spaced at base, forming a rosette, sometimes with a more widely spaced internode above providing a pair of cauline leaves. Internodes 0 – 0.2 cm at base, 1.2 – 4 cm above. *Leaves* opposite, sessile, obovate to elliptic, 2 – 7.5 × 1 – 3.5 cm, base attenuate, margin entire or sometimes shallowly toothed towards apex, apex rounded to obtuse, venation palmate with mostly 3 or 5 main veins from the base, both leaf surfaces glabrous and minutely gland-dotted (visible at ×10 in dried material). *Inflorescence* terminal, capitate and many-flowered; bracts subtending the inflorescence lanceolate, up to 16 × 8 mm; bracts subtending individual flowers ranging from foliaceous lanceolate bracts similar to those that subtend the inflorescence to minute linear bracts 2 mm long; all bracts green, becoming dark red in fruit. *Flowers* sessile or shortly pedicellate, pedicels to 1.5 mm long. *Calyx* 10 – 14 mm long, glabrous, funnel-shaped, split to the base abaxially, 5 or 6 lobed, lobes unequal, 5 – 10 × 0.5 – 2 mm, lanceolate, margins entire or minutely serrulate. *Corolla* purple-blue with irregular dark and light markings at base of lower lip, glandular-puberulous, 17 – 18 mm long, tube 8 – 9 mm long, upper lip 5 × 3 mm, rounded at apex, undivided, lower lip 8 – 10 mm long, 3-lobed, lobes 3 mm long, central lobe broadly obovate, 4 mm wide, lateral lobes obovate 2 – 3 mm wide. *Stamens* 4, glabrous, filaments of upper pair 3 mm long, filaments of lower pair 5 mm long with a minute, bilobed appendage at base; anther thecae 0.5 mm long. *Ovary* globose, 1.5 mm, glabrous; style 10 mm long, glabrous; stigma two-lobed, lobes flattened, obtuse and minutely penicillate. *Fruit* a capsule, ovoid, 3 × 5 mm, shortly beaked at apex, beak c. 1 mm long, style persistent. *Seeds* (immature) 0.8 – 1 mm long, flat and oval or irregularly folded. Figs 1 & 2.

RECOGNITION. *Hartliella txitongensis* is similar to *H. bampsii*, but differs in the pairs of stem leaves being closely spaced with a short and condensed internode, thus forming a rosette at base (stem leaves are usually more distant in *H. bampsii* on a ± elongated stem), the leaves being obovate to elliptic, 2 – 7.5 × 1 – 3.5 cm (vs broadly obovate, 4 – 8 × 2.4 – 2.9 cm in *H. bampsii*), the slightly longer corolla tube, 8 – 9 mm long (vs 5 – 7 mm in *H. bampsii*), the undivided upper lip of the corolla (upper lip of corolla bifid in *H. bampsii*) and the bilobed appendage at the base of the abaxial filaments (simple globose in all other *Hartliella* species). It differs from *Hartliella capitata* in the elongated stem below the inflorescence and the shape of the leaves (these being broadly obovate to lanceolate, (3 –) 5 – 7.5 × (1.5 –) 3 – 6 cm in *H. capitata*) and the shorter corolla tube (12 mm long in *H. capitata*). A key to species of *Hartliella* is given below and differences are summarised in Table 1.

DISTRIBUTION. Africa: Mozambique. Known only from the type locality, probably endemic to the Txitonga Mountains. Map 1.

SPECIMENS EXAMINED. MOZAMBIQUE. Niassa Province, Txitonga (Chitonga) Mts, -11.82549, 35.05226, 19 May 2019, *Osborne* JO 1711 (holotype LMA!; isotypes K! K001346951, LMU!).

HABITAT. The vegetation on the foothills and slopes of the Txitonga Mountains is predominantly miombo woodland with narrow strips of moist gallery forest growing along deep stream gullies. At higher elevations, a more open montane savanna and montane grassland occurs.

At the type locality of *Hartliella txitongensis*, at 1515 m elevation, the woodland is open in places, grading into montane savanna grassland with rocky outcrops. The canopy is sparse and low at 3 m high. Woody species include *Uapaca kirkiana* Müll.Arg., *Brachystegia spiciformis* Benth., *Parinari curatellifolia* Planch. ex Benth., *Protea* spp., *Erica mannii* (Hook.f.) Beentje subsp. *pallidiflora* (Engl.) E.G.H.Oliv., *Psorospermum febrifugum* Spach and *Morella pilulifera* (Rendle) Killick. At higher elevations along the mountain ridge the low-growing shrubs *Kotschya strigosa* (Benth.) Dewit & P.A.Duvign and *Cryptosepalum maraviense* Oliv. are common. The montane grassland is mostly short, to c. 50 cm in height and rich in dwarf shrubs, herbs and geophytes. Dry-season fires occur regularly in the montane savannah grassland and the fire frequency is increased by the presence of gold miners (Osborne *et al.* 2019).

Hartliella txitongensis grows in full sun in a red loam soil at the type locality, occurring as scattered individ-

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uals in bare areas of leaf litter between grass clumps and also forming fairly dense patches in places. It appears to be highly localised.

CONSERVATION STATUS. *Hartliella txitongensis* is highly range-restricted, currently known only from the type locality and probably endemic to the Txitonga Mountains of northern Mozambique. This locality is nominally a protected area (Lake Niassa Reserve) but the vegetation of miombo woodland, moist gallery forest, montane savanna and grassland is not effectively protected. The locality is particularly threatened by gold mining, which causes habitat loss locally, broad disruption to the hydrology and environmental damage such as areas with broken rocks, extremely eroded ruptures, sedimented rivers and mercury contamination. The frequency of uncontrolled wildfires is intensified due to the expansion and presence of gold miners which constitute both a current and future threat to the vegetation. However, fire may not be a threat to this species as it grows from a woody rhizome and these resprout after fires, and colonise vegetatively, providing some resilience to recurrent fires (Pausas *et al.* 2018). Since two of the four other species of *Hartliella* are known to occur on metal-rich soils, there is a possibility that *H. txitongensis* is a metallophyte occupying a restricted ecological niche. Using a precautionary approach based on the single known site for this species, the area of occupancy (AOO) is estimated to be less than 10 km^2. With an extent of occurrence (EOO) of less than 100 km^2, an area of occupancy (AOO) estimated to be less than 10 km^2, a single known location and little-known ecological niche, in addition to current threats to the vegetation and an inferred continuing decline in its habitat, this species is provisionally assessed as Critically Endangered under IUCN criterion B: CR B1ab(iii) + 2ab(iii).

The Txitonga mountains have a unique biogeography for Mozambique and therefore a high biodiversity value. The site is to be recognised as an Important Plant Area for Mozambique (Osborne *et al.* in prep). In light of the biodiversity value of this area, conservation measures are urgently needed to protect the flora. Since there is already local management in the area through the Mining Associations, there is potential to put a conservation management plan in place.

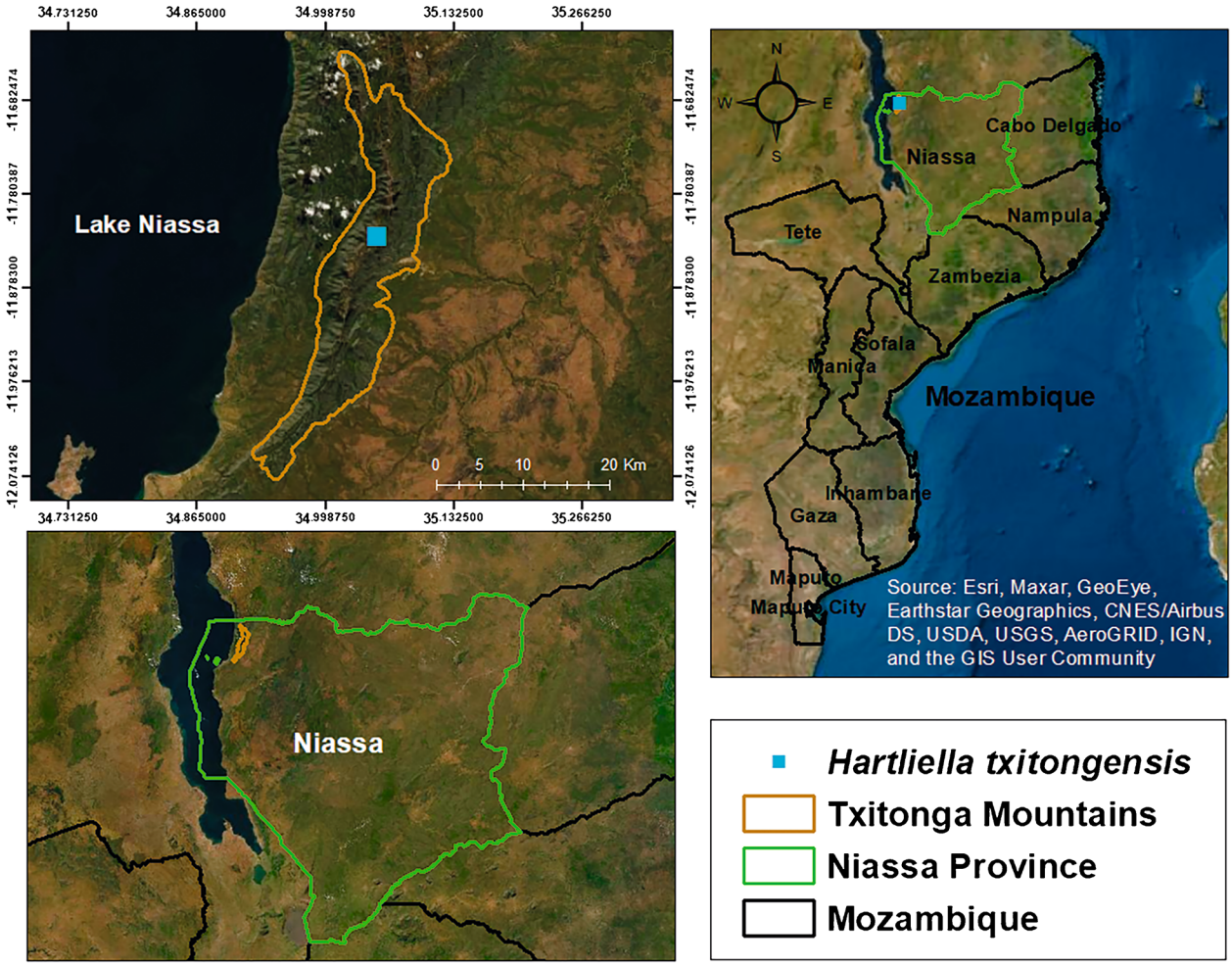
PHENOLOGY. The type was collected in mid-May when most of the population was in fruit (seeds immature). Phenology is estimated as: flowering in April – May, fruiting in May – June. The phenology is similar to that of many other herb taxa recorded during the fieldwork in the Txitonga mountains, flowering and fruiting during the period following the summer rains that occur between November and April (MAE 2005). *Hartliella txitongensis* appears to flower during the early part of the period following the rains.

ETYMOLOGY. Named after the Txitonga (= Chitonga) Mountains in order to highlight the conservation value of the area.

Key to the species of *Hartliella*

1. Stems elongated, plants 6 – 20 cm tall, with 3 – 6 decussate pairs of leaves (excluding cataphylls), inflorescence a few-flowered capitulum ……2
1.' Stems condensed, plants 1 – 10 cm tall, with 2 (– 4) decussate pairs of leaves (excluding cataphylls), inflorescence a dense, multi-flowered capitulum ……3
2. Leaves broadly obovate, 1.5 – 2.5 × 1.2 – 1.6 cm, stem up to 6 – 11 cm tall, with 3 – 4 pairs of leaves, upper leaves surrounding the capitulum usually not considerably smaller than mid-stem leaves, calyx tube 1 mm long, upper lip of corolla bifid, Upper Katanga…… ……**H. suffruticosa**
2.' Leaves lanceolate, 3.5 – 4.2 × 0.7 – 0.95 cm, stem 14 – 20 cm tall, with 4 – 6 pairs of leaves, upper leaves surrounding the capitulum much smaller than mid-stem leaves, calyx tube 8 mm long, upper lip of corolla entire, Upper Katanga ……**H. cupricola**
3. Stem with strongly condensed internodes, plants 1 – 2 cm tall, with the leaves surrounding the dense capitulum like an involucrum, corolla tube 12 mm long, upper lip of corolla entire, Upper Katanga, NW Zambia……**H. capitata**
3.' Stem less condensed, plants 2 – 10 cm tall, with at least one elongated internode below the dense capitulum, corolla tube either 8 – 9 or 5 – 7 mm long, upper lip entire or bifid…. 4
4. Stem leaves forming a rosette at base, corolla tube 8 – 9 mm, upper lip of corolla undivided, appendage at the base of the abaxial filaments bilobed, Mozambique, Niassa ……**H. txitongensis**
4.' Stem leaves not forming a rosette at base, usually more distant on a ± elongated stem, corolla tube 5 – 7 mm long, upper lip of corolla bifid, appendage at the base of the abaxial filaments simple-globose, Upper Katanga ……**H. bampsii**

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Map 1. Distribution of *Hartliella txitongensis* (currently known only from the type locality). MAP BY C. DATIZUA.

Discussion

The study area

Niassa Province in north-west Mozambique is the most sparsely populated province in the country. It borders Tanzania to the north and Malawi and Lake Niassa to the west. Nineteen of Mozambique's endemic plant taxa occur in Niassa Province (10 of these occur only in Niassa) in addition to 21 regional near-endemic taxa (Darbyshire *et al.* 2019) (Table 2). The discovery of additional endemics and near-endemics is highly likely as Niassa Province is under-explored botanically. The province has two protected areas, the huge Niassa National Reserve, also covering part of Cabo Delgado Province, and the Lake Niassa Reserve, a Ramsar site including both Lake Niassa and the adjacent coastal zone (Ramsar 2011). The *Hartliella* species described here was collected during botanical fieldwork to explore the mountains of the Lupilichi area of Lago district (Map 1), within the Lake Niassa Reserve. These mountains, in the northwest of Lago district, extend south from the southern end of the Kipengere Range in Tanzania and form part of the eastern escarpment of the East African rift. They are isolated from the other highland areas in Niassa province — the broad Lichinga plateau area and outlying Mt Mecula and Mt Yao. Mt Txitonga (Chitonga) is the highest peak in the range at c. 1848 m elevation. The mountain range is referred to here as the Txitonga Mountains.

Fieldwork

Fieldwork in the Txitonga Mountains was undertaken as part of the Mozambique Tropical Important Plant Areas (TIPAs) project, a collaboration between the Royal Botanic Gardens, Kew, Mozambique's Agricultural Research Institute (IIAM) and Eduardo Mondlane University, with the aim of identifying and promoting the long-term conservation and sustainable management of Mozambique's most important sites for plant diversity (Darbyshire *et al.* 2019). The Txitonga Mountains were selected as a target site for fieldwork because they are little-known botanically and likely

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Table 2. Summary checklist of Mozambique's endemic and near-endemic vascular plant taxa in Niassa Province. Taxa occurring only in Niassa Province are listed in **bold**. Endemism categories are abbreviated as follows: E = strict-endemic; NE1 = majority of range in Mozambique; NE2 = global range < 10,000 km^2, NE3 = taxon known from five sites or fewer. Under Life form, (a) = annual; (geo) = geophyte; (gram-a) = annual graminoid; (gram-p) = perennial graminoid; (p) = perennial (terrestrial, non-succulent); (s) = succulent. Provinces of Mozambique are abbreviated as follows CD = Cabo Delgado; In = Inhambane; Mc = Manica; Na = Nampula; Ni = Niassa; S = Sofala; Z = Zambezia. (Adapted from Darbyshire *et al.* 2019).

Family	Taxon	Endemism	Life form	Provinces	Other countries
Acanthaceae	*Barleria fulvostellata* C.B.Clarke subsp. *mangochiensis* I.Darbysh.	NE2+3	herb (p), shrub	Ni	Malawi
Acanthaceae	***Barleria torrei* I.Darbysh.**	E	Shrub	Ni	
Acanthaceae	*Barleria vollesenii* I.Darbysh.	NE2+3	herb (p)	Ni	Tanzania
Acanthaceae	*Blepharis torrei* Vollesen	NE2+3	herb (p)	Ni	Tanzania
Acanthaceae	*Justicia attenuifolia* Vollesen	NE1	herb (p)	Ni	Tanzania
Apocynaceae	***Ceropegia cyperifolia* Bruyns**	E	herb (geo)	Ni	
Asphodeleaceae	*Aloe mawii* Christian	NE1	tree (s)	CD, Na, Ni, Z	Malawi, Tanzania
Boraginaceae	***Cordia mandimbana* E.S.Martins**	E	tree	Ni	
Combretaceae	*Combretum andradae* Exell & J.G.García	NE1	shrub, liana	CD, Na, Ni	Tanzania
Crassulaceae	*Kalanchoe elizae* A.Berger	NE1	herb (s)	Na, Ni, Z	Malawi
Dilleniaceae	*Tetracera bussei* Gilg	NE3	shrub	Ni	Tanzania
Euphorbiaceae	*Euphorbia contorta* L.C.Leach	E	shrub (s)	Na, Ni, Z	
Euphorbiaceae	*Euphorbia corniculata* R.A.Dyer	E	shrub (s)	CD, Na, Ni	
Euphorbiaceae	***Euphorbia marrupana* Bruyns**	E	shrub (s)	Ni	
Euphorbiaceae	*Euphorbia mlanjeana* L.C.Leach	NE1+3	shrub (s)	Na, Ni, Z	Malawi
Euphorbiaceae	*Euphorbia ramulosa* L.C.Leach	E	shrub (s)	Na, Ni, Z	
Fabaceae	*Aeschynomene pawekiae* Verdc.	NE2+3	herb (p)	Ni	Malawi
Fabaceae	*Baphia massaiensis* Taub. subsp. *gomesii* (Baker f.) Brummitt	E	shrub, tree	CD, In,Na, Ni	Tanzania?
Fabaceae	*Crotalaria assurgens* Polhill	NE3	herb (p)	Ni	Tanzania
Fabaceae	***Indigofera emarginella* A.Rich. var. *marrupaënsis* Schrire**	E	shrub	Ni	
Fabaceae	*Indigofera nyassica* Gilli var. *brevior* (J.B.Gillett) J.B.Gillett	NE3	herb (a),herb (p)	Ni	Tanzania
Fabaceae	*Indigofera pseudomoniliformis* Schrire	E	shrub	Na, Ni, Z	
Gentianaceae	*Exacum zombense* N.E.Br.	NE1	herb (a)	Mc, Na,Ni, Z	Malawi
Gesneriaceae	*Streptocarpus erubescens* Hilliard & B.L.Burtt	NE2	herb	Ni	Malawi
Iridaceae	***Moraea niassensis* Goldblatt & J.C.Manning**	E	herb (geo)	Ni	
Lamiaceae	***Leucas nyassae* Gürke var. *velutina* (C.H.Wright ex Baker) Sebald**	E	herb (p)	Ni	
Lamiaceae	***Rotheca luembensis* (De Wild.) R.Fern. subsp. *niassensis* (R.Fern.) R.Fern.**	E	herb (p)	Ni	
Lentibulariaceae	*Utricularia podadena* P.Taylor	NE2+3	herb (p)	Ni	Malawi
Lythraceae	***Ammannia ramosissima* (A.Fern. & Diniz) S.A.Graham & Gandhi**	E	herb (a)	Ni	?Malawi
Malvaceae	***Hibiscus torrei* Baker f.**	E	herb (p),shrub	Ni	
Myrtaceae	*Syzygium niassense* Byng & J.E.Burrows	NE1	tree	CD, Na,Ni, S, Z	Tanzania?
Orchidaceae	*Habenaria hirsutissima* Summerh.	E	herb (geo)	Na, Ni	
Orchidaceae	*Habenaria stylites* Rchb.f. & S.Moore subsp. *johnsonii* (Rolfe) Summerh.	NE2+3	herb (geo)	Ni	Tanzania
Poaceae	*Digitaria megasthenes* Goetgh.	E	herb (gram-p)	Ni, Z	
Poaceae	*Eriochloa rovumensis* (Pilg.) Clayton	NE1	herb(gram-a)	Na, Ni, Z	Tanzania
Rubiaceae	*Catunaregam stenocarpa* Bridson	NE1	shrub, tree	CD, Na,Ni, Z	Tanzania
Rubiaceae	*Pavetta gardeniifolia* A.Rich. var. *appendiculata* (De Wild.) Bridson	E	shrub, tree	Ni, Z	
Velloziaceae	*Xerophyta kirkii* (Hemsl.) L.B.Sm. & Ayensu	NE1	shrub, tree	Ni, Z	Malawi
Velloziaceae	*Xerophyta pseudopinifolia* Behnke	NE1	Shrub	Na, Ni, Z	Malawi
Zamiaceae	*Encephalartos turneri* Lavranos & D.L.Goode	E	Cycad	Na, Ni	

to support a distinct biodiversity for Mozambique, closely allied to that of southwest Tanzania.

Fieldwork took place over eight days in May, working from a field camp in the foothills above Tulo Calanda village (Osborne *et al.* 2019). The aims of the fieldwork were to (i) document the vegetation; (ii) record current levels of protection and threats to the vegetation; (iii) document populations of endemic and near endemic target species; (iv) provide a preliminary species inventory. Throughout the fieldwork, plant specimens, with accompanying data and photographs, were collect-

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ed for identification and as a tangible record of occurrence. The specimens were pressed in the field and dried over gas in the field camp. Additional tissue samples were collected into silica gel to facilitate molecular analysis. During the course of the fieldwork 149 plant specimens were collected and specimen identification is ongoing in the herbaria at Kew (K) and IIAM (LMA). In addition to *Hartliella txitongensis*, two other potentially new taxa were collected, a *Streptocarpus* Lindl. (Gesneriaceae) and a *Bothriocline* Oliv. ex Benth. (Asteraceae / Compositae), and further study is underway to confirm their status. It possible that other new taxa may be identified.

Potential to be a metallophyte

Whilst two of the four other species of *Hartliella* are known to occur on metal-rich soils, the soil composition at the type locality of *H. txitongensis* is not yet known. Since there is frequent gold mining in the Txitonga mountains, there is a high likelihood that other metals are present in the soil. Soil analysis and further ecological research at the type locality would be of great interest. If *H. txitongensis* is found to be a metallophyte, there is potential application of the newly described taxon in soil remediation (Ali *et al.* 2013; Awa & Hadibarata 2020).

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Declarations

Conflict of interest. The authors declare that they have no conflict of interest.

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