

Observations on three poorly known aloes from Eritrea *Aloe schoelleri*, *Aloe steudneri* & *Aloe eumassawana*



▲ Kohaito plateau, the type locality of *A. schoelleri*. On the extreme left side you can see the small village of Andal, mentioned by Reynolds in *Aloes of Tropical Africa and Madagascar*.

Of the nine species of *Aloe* known to grow in Eritrea, two are local endemics and six are regional endemics. Several of these species, however, are poorly known, having been rarely observed. In some cases, the flowers have never even been photographed! We have been lucky to make new observations on three poorly known Eritrean aloes: *A. schoelleri*, *A. steudneri* and *A. eumassawana* and would like to share our observations in order to fill in some of the gaps in the taxonomic descriptions and ecology of three of these species. All three are threatened due to habitat destruction caused by agricultural development and/or because of their very restricted area of distribution and small populations.

Aloe schoelleri SCHWEINFURTH (1894)

Aloe schoelleri has a very restricted distribution, being known only from one place in Eritrea, the Kohaito plateau (14°52'N, 39°26'E). This is a

windy, high altitude area (about 2600 m) vegetated primarily with *Becium grandiflorum*, *Juniperus procera*, *Cordia purpurea*, and *Rumex nervosus* as well as three other *Aloe* species: *A. camperi*, *A. elegans* and *A. percrassa*. Apparently, very few people have ever seen this plant in habitat, and the flowers seem never to have been observed until now. In fact, a description of the flowers is missing from the original publication of the species, so we were fortunate to find one plant in bloom. All other plants seen had their inflorescence damaged by humans or livestock.

We observed *A. schoelleri* growing almost exclusively in sandy soil and in rock crevices on the edges of cliffs around the Kohaito plateau. The species is known only from the type collection and the growth form and flowers have never before been documented with illustrations. Young plants are stemless, but mature plants develop a prostrate stem about 8 cm thick by 30 cm long clothed with persistent leaf remains. Plants are solitary or grow in small groups. Rosettes have 25–35 (max 40) leaves that occur in dense rosettes. They are spreading, triangular, 40–52 × 9–14 cm, very

厄立特里亚三种鲜为人知芦荟的观察



1 Kahoito高原，*A. schoeleri*的典型产地。在最左侧，你可以看到Reynolds在《热带非洲和马达加斯加的阿洛克斯》中提到的Andal小村庄。

呀

在厄立特里亚已知生长的九种芦荟中，有两种是当地特有的，六种是区域特有的。然而，其中一些物种鲜为人知，很少被观察到。在某些情况下，这些花甚至从未

拍照！我们很幸运地对三种鲜为人知的厄立特里亚芦荟进行了新的观察：*A. schoeleri*、*A. steudneri*和*A. eumassawana*，并想分享我们的观察结果，以填补其中三种物种在分类学描述和生态学方面的一些空白。由于农业发展造成的栖息地破坏和/或由于其分布区域非常有限和人口稀少，这三种动物都受到了威胁。

舒韦恩弗斯芦荟 (1894)

沙勒芦荟的分布非常有限，仅在厄立特里亚的科海托高原 (14°52' 为人所知N, 39°26'E)。这是一个

多风的高海拔地区 (约2600米) 主要种植有桔梗、杜松、紫藤和神经酸模，以及其他三种芦荟：*A. camperi*，

*A. 秀丽隐杆线虫*和*A. percrassa*。显然，很少有人曾在栖息地见过这种植物，而且这些花似乎直到现在才被观察到。事实上，该物种的原始出版物中缺少对花朵的描述，所以我们很幸运地找到了一株盛开的植物。所有其他植物的花序都被人类或牲畜破坏了。

我们观察到*A. schoeleri*几乎只生长在科海托高原周围悬崖边缘的沙质土壤和岩石裂缝中。该物种仅从类型集中已知，其生长形式和花朵从未有过插图记录。幼苗是无茎的，但成熟植物会发育出约8厘米厚、30厘米长的匍匐茎，上面覆盖着持久的叶子残骸。植物是单生的或成小群生长。莲座有25-35片 (最多40片) 叶子，呈密集的莲座状。它们呈三角形展开，40-52×9-14厘米，非常



The conical, densely flowered racemes of *Aloe schoelleri* bear flowers that, on some individuals, have a greenish central lobe line.

fleshy and gray-green. Under dry conditions, the leaves become slightly canaliculate (meaning they roll up to form a longitudinal groove) towards the tip in dry conditions, but when watered the leaves become tender and green and unfurl. The unspotted leaves have tough, flexible margins that are uniformly dark red (turning a bright, flesh-colored red in well-watered plants) with rather few, small, often blunt, dark red teeth, 5–8 cm apart and 0.5–1 mm long.

These plants produce one or two un-branched inflorescences, initially growing obliquely and then rather abruptly bending upward to grow vertically erect, 50–80 cm high. Each raceme is 30–45 cm long, conical and very densely flowered (with 15 flowers per cm). The flower bracts are ovate to elliptic with an acute apex and well developed, enfolding $\frac{3}{4}$ of the bud's length. They are 18–24 × 8–10 mm, with numerous dark longitudinal lines down the center. The perianth is either a glabrous pale yellow with a greenish central lobe line or a pale pink-orange with a brownish central lobe line (both illustrated here). The flowers are cylindrical trigonous, tapering towards the mouth, 26–32 × 6–8 mm across the ovary, with the outer tepals free for 15 mm. The pedicel is 2–7 (up to 10) mm long. The anthers are exerted (stick out) 12–14 mm, and the stigma is exerted 12–15 mm. The

leaf sap dries to a red-tinged bright brown color.

A. schoelleri flowers from February to April. Until recently we had only been able to observe that the ovary is green, but recent success at seed production allows for the capsule description. It is ovoid, 15–18 mm long and 7–9 mm wide, drying at maturity, and the seeds are approximately 4 × 2 mm and dark brown with paler, narrow wings.

Aloe steudneri SCHWEINFURTH (1894)

This species is a regional endemic found only in Eritrea and Ethiopia^{2,3}, but *Aloe steudneri* seems to have a disjoint distribution within the region. In Eritrea it is reported from only one place: the top of Mt Endertai, part of the larger Mt Saber (15°48'N, 38°47'E), while in northwestern Ethiopia it is known from the Simien Mountains, points separated by about 500 km of ragged and mountainous terrain. Interestingly, although the plant was first collected in the Simien Mountains by Steudner in 1862, the description of the species was based on a plant collected in Eritrea by Professor Penzig in 1891. Also, the first reliable description of the species was based on a plant collected in Eritrea, again by Penzig, and that subsequently flowered at La Mortola (Italy) in 1912¹. Apparently no one has seen the Eritrean



沙勒芦荟的圆锥形、花密的总状花序，花朵裸露，在某些个体上，有一条绿色的中央裂片线。

肉质，灰绿色。在干燥的条件下，叶子在干燥的情况下朝向尖端变得略微小管化（这意味着它们卷起形成纵向凹槽），但当浇水时，叶子会变得柔软、绿色并展开。未被破坏的叶子有坚硬、灵活的边缘，边缘均匀地呈深红色（在水分充足的植物中变成明亮的肉色红色），有相当少的、小的、通常钝的深红色牙齿，相距5-8cm，长0.5-1mm。

这些植物产生一个或两个不分枝的花序，最初倾斜生长，然后突然向上弯曲，垂直直立生长，高50-80厘米。每个总状花序长30-45厘米，圆锥形，花很密（每厘米有15朵花）。花苞片呈卵形至椭圆形，先端锐尖，发育良好，包裹着芽长的 $\frac{1}{2}$ 。它们的尺寸为18-24×8-10毫米，中心有许多深色的纵向线条。花被要么是无毛的淡黄色，中间有绿色的裂片线，要么是淡粉橙色，中间有褐色的裂片线（均如图所示）。花呈圆柱形三角形，向嘴部逐渐变细，子房宽26-32×6-8毫米，外花被片游离15毫米。花梗长2-7毫米（最多10毫米）。花药伸出12-14毫米，柱头伸出12-15毫米

叶汁干燥后呈略带红色的亮棕色。

*A. schoeleri*在2月至4月开花。直到最近，我们还只能观察到子房是绿色的，但最近在种子生产方面的成功允许对蒴果进行描述。它是卵圆形的，长15-18毫米，宽7-9毫米，成熟时干燥，种子约4×2毫米，深棕色，有较淡的窄翅。

施威福芦荟 (1894)

该物种是一种仅在厄立特里亚和埃塞俄比亚发现的区域性特有物种，但芦荟似乎在该地区分布不连贯。在厄立特里亚，只有一个地方有报道：恩德泰山顶，更大的萨贝尔山（15°48'N，38°47'E），而在埃塞俄比亚西北部，它以西米恩山脉而闻名，这些山脉之间相隔约500公里，地形崎岖多山。有趣的是，尽管Steudner于1862年首次在西米恩山脉采集了这种植物，但对该物种的描述是基于Penzig教授于1891年在厄立特里亚采集的一种植物。此外，对该物种的第一个可靠描述是基于彭齐格在厄立特里亚收集的一种植物，该植物随后于1912年在意大利拉莫托拉开花。显然没有人见过厄立特里亚人

Inset: Close up of a leaf of *Aloe steudneri* showing the distinct longitudinal lines, pinkish margins and marginal teeth.

Bottom: Close to the summit of Eritrea's Mt Saber, on the north side, we found the habitat of *Aloe steudneri*. Although the species was first collected in northern Ethiopia in 1862 by Dr Steudner, the species description is based on plants collected here by Prof Penzig between 1891 and 1900.



plants since, and all recent pictures and reports on this species are of the Ethiopian populations. Further investigation will be required to clarify if the Eritrean and Ethiopian populations of *A. steudneri* are indeed the same species or, rather, closely related subspecies.

The altitude range of this plant's habitat is reported to be between 2600–3150 m. However, we have found that the Eritrean population of *A. steudneri* occurs at 2400–2500 m, and in fact all plants were found to grow only at the top of the mountain, on the north side of a very steep slope. The plants seemed to prefer the shade of trees such as *Olea* and *Juniperus* and shared their habitat with an alien species readers of the *Journal* know well: *Opuntia ficus-indica*. We counted only about 80 plants of *A. steudneri*, and interestingly, no juveniles were observed. When we tried to figure out why there were no young plants or spent flower stalks, we discovered that the local farmers were not able to describe the inflorescence, suggesting that this population of *Aloe steudneri* is not flowering. It may be that the opuntia encroachment combined with physical damage to the plants from livestock and other

插图：芦荟叶的特写，显示出明显的纵向线条、粉红色的边缘和边缘齿。

底部：在靠近厄立特里亚萨贝尔山山顶的北侧，我们发现了芦荟的栖息地。尽管该物种于1862年由斯特德纳博士首次在埃塞俄比亚北部采集，但物种描述是基于彭齐格教授在1891年至1900年间在这里采集的植物。



自那以后，所有关于该物种的最新图片和报告都是埃塞俄比亚种群的。需要进一步调查，以澄清厄立特里亚和埃塞俄比亚的*A. steudneri*种群是否确实是同一物种，或者更确切地说，是密切相关的亚种。

据报道，这种植物栖息地的海拔范围在2600–3150米之间。然而，我们发现厄立特里亚的种群*A. steudneri*出现在2400–2500米处，事实上，所有的植物都只生长在山顶，一个非常陡峭的斜坡的北侧。这些植物似乎更喜欢*Olea*和*Juniperus*等树木的阴凉处，并与《华尔街日报》的读者熟知的一种外来物种共享栖息地：仙人掌。我们只统计了大约80株*A. steudneri*植物，有趣的是，没有观察到幼体。当我们试图弄清楚为什么没有幼苗或花茎时，我们发现当地农民无法描述花序，这表明芦荟种群没有开花。这可能是仙人掌的入侵与牲畜和其他动物对植物的物理损伤相结合



Summit of Saber mountain, the type locality of *Aloe steudneri*. The first reliable description of this species is based on a single plant collected here by Penzig. It subsequently flowered in Italy at La Mortola Botanical Garden in 1912. Here, plants are surrounded by an infestation of a common exotic: *Opuntia ficus-indica*.



agricultural activities are posing a concrete threat that may be responsible for decline and possible near-extinction of this species.

Two plants were collected from Mt Saber and brought to Asmara where they did flower, making this description possible. We were able to cross-pollinate them and one plant produced capsules and seeds. Sadly, no germination occurred and those two plants are now dead. Adult plants in habitat

have a decumbent stem about 9 cm thick to 30 cm long clothed in persistent leaf remains. Most plant are solitary rosettes, though occasionally the stem branches to produce clumps of two or three heads. Plants have very numerous leaves, 40–60 × 8–12 cm, which are slightly recurved, spreading, blue or gray-green, and not spotted but with tenuous, alternating, longitudinal lines of a darker, but still pale, shade of green. Leaves have slightly cartilaginous margins that turn white-green to pinkish-red in dry conditions. The margins also support very numerous (11–13 per 10 cm), forward pointing, white-green (pinkish-red in dry conditions) soft marginal teeth, each 1–2 mm long. The leaf sap dries to a yellow-tinged brown.

A. steudneri flowers during March and April. The inflorescence is erect with 1–5 cylindrical, sparsely-flowered racemes that grow 10–40 cm

long and have 2–4 flowers per cm. The bracts are ovate-lanceolate, 10–13 × 5–7 mm, and enfold the base of each flower for half the length of the pedicels. The pedicels are 8–18 mm long and the perianth is glabrous, cylindrical and 36–38 × 7–9 mm. The pink-reddish flowers have a greenish tip

when in bud that becomes yellowish when mature with outer lobes free to base. The seed capsule is ovoid, 25–30 × 12–14 mm and green to blackish-brown when

mature. The seeds are about 3 × 4 mm and blackish brown with whitish wings.

***Aloe eumassawana* CARTER, GILBERT & SEBSEBE (1996)**

A. eumassawana is a local endemic reported to grow at sea level in the coastal area near the port of Massawa⁴ and Hirigigo (15°31'N, 39°26'E), a village 15 km south of the port of Massawa. The description of *A. eumassawana* was based on dry material collected in 1972, and very few people have seen the plant in habitat. In fact, the species seems to have been wrongly reported by Carter, Gilbert and Sebebe⁴ to grow freely on coastal bushland, when, in fact, we found this species only in the graveyard just outside Hirigigo village (probably planted on graves by relatives of



Saber山的顶峰，芦荟的典型产地。对该物种的第一个可靠描述是基于Penzig在这里收集的一种植物。1912年，它在意大利La Mortola植物园开花。在这里，植物被一种常见的外来植物——仙人掌所包围。



从花蕾到授粉后的芦荟花。这可能也是该物种减少和可能濒临灭绝的原因。

从萨贝尔山采集了两株植物，并将其带到阿斯马拉开花，使这种描述成为可能。我们成功地为它们进行了异花授粉

一株植物产生了蒴果和种子。遗憾的是，这两株植物没有发芽，现在已经死亡。栖息地中的成年植物

有一个约9厘米厚至3厘米长的横切茎，上面覆盖着宿存的叶子残骸。大多数植物是坐莲座，尽管偶尔茎枝会产生两三个头的丛。植物有非常多的叶子，40-60×8-12厘米，略微下弯，展开，蓝色或灰绿色，没有斑点，但有细长的、交替的、纵向的深色但仍然苍白的绿色线条。叶子有轻微的软骨边缘，在干燥条件下会变成白绿色到粉红色。边缘还支撑着大量（每10厘米11-13颗）向前指向的白绿色（干燥条件下为粉红色）软边缘牙齿，每颗长1-2毫米。叶汁干后变成略带黄色的棕色。

A. 甜菊在3月和4月开花。花序直立，有1-5个圆柱形、稀疏开花的总状花序，长10-40厘米

蒴果卵圆形，10-13×5-6毫米，每厘米有2-4朵花，每朵花的基部被花梗长度的一半包裹。花梗长8-18毫米，花被无毛，圆柱形，36-38×7-9粉红色的花朵有一个绿色的尖端

芽期，成熟时变黄，外裂片离基。种子蒴果呈卵圆形，大小为25-30×12-14毫米，绿色至黑褐色

成熟。种子约3.4毫米，黑褐色，带白色翅膀

从花蕾到授粉后的芦荟花。
注意发育良好的苞片。



库拉索芦荟，吉尔伯特和塞比（1990）

*A. eumassawana*是一种地方性流行病，据报道在马萨瓦港和希吉戈港附近的沿海地区（15°31'N, 39°26'E），马萨瓦港以南15公里处的一个村庄。对*A. eumassawana*的描述是基于1972年收集的干物质，很少有人在此栖息地见过这种植物。事实上，Carter、Gilbert和Sebsebe似乎错误地报道了该物种在沿海灌木丛中自由生长，而事实上，我们只在Hirgigo村外的墓地发现了该物种（可能是其亲属在坟墓上种植的）



The original description of the *Aloe steudneri* raceme was based on a water color illustration of a plant that flowered at the Cambridge Botanic Garden in 1901. A photo of the flowers has never before been published!

the deceased). The original authors did not visit the area where *A. eumassawuana* was growing but based their description of the species on dry material kept in Kew and from a picture of the plant taken by Mr Hillmann in Hirgigo. Apparently this photo was misleading, because at the edge of the Hirgigo graveyard there are very old graves that have been taken over by the surrounding bush. Simply looking at such a picture, it would be easy to think that the plants grow naturally in the Acacia bushland, and this may explain the mistake of the original authors.

We traveled extensively along the coastal area north and south of Massawa, and we were not able to find any additional populations of *A. eumassawuana*. It seems that this species does not exist naturally outside the graveyard of Hirgigo. Even the other locality mentioned by Reynolds¹, Tumalo (Otumlo, Hetumlo), is a graveyard—the tomb of a holy man, Sidi Hascim El-Morgani. Doubts therefore remain on the real origins of *A.*

eumassawuana and where (or if!) it naturally occurs in Eritrea.

Plants are stemless or nearly so, suckering profusely and forming large clumps. The leaves are relatively few per rosette (13–16), but large. They are shallowly canaliculated (grooved), erect, 40–50 × 8–10 cm, and their tips are slightly incurved. The leaf color is a uniform tender green in the rainy season changing to dull gray-pink when dry. Occasional leaves have a few small, oblong, pale green spots. The leaf margins have whitish, often brown-tipped teeth (5–7 per 10 cm) about 3 mm long. Sap produced from a broken leaf dries to a pale yellow color.



Aloe steudneri flowers from bud to after pollination.



芦荟外消旋体的最初描述是基于1901年在剑桥植物园开花的一种植物的水彩插图。这些花的照片以前从未发表过！

死者)。最初的作者没有访问A. eumassawana生长的地区，而是根据邱园保存的干燥材料和Hillmann先生在Hirigio拍摄的植物照片对该物种进行了描述。显然，这张照片具有误导性，因为在Hirigio墓地的边缘，有一些非常古老的坟墓被周围的灌木丛占据了。简单地看一看这样的照片，很容易认为这些植物是在相思灌木丛中自然生长的，这可能解释了原作者的错误。

我们沿着马萨瓦北部和南部的沿海地区进行了广泛的旅行，但我们没有找到任何addi-民族人口

A. 尤马萨瓦纳。似乎这个物种在Hirigio墓地之外并不自然存在。即使是ReynoldsI提到的另一个地方，图马洛（Otumlo，Hetumlo），也是一个墓地——一个圣人 Sidi Hascim El Morgani 的坟墓。因此，对于A的真正起源仍然存在疑问。

eumassawana以及它在厄立特里亚的自然发生地（或者如果！）。

植物没有茎或几乎没有茎，大量吮吸并形成大块。每个莲座的叶子相对较少（13-16），但很大。它们很浅地小管化（有槽），直立，40-50×8-10厘米，尖端略微弯曲。叶子的颜色在雨季是均匀的嫩绿色，干燥时变成暗灰粉红色。偶尔的叶子有一些小的、长方形的、淡绿色的斑点。叶缘有白色的，通常是棕色的尖端齿（每10厘米5-7个），长约3毫米。碎叶产生的树液干燥后呈淡黄色。

芦荟花从花蕾到授粉后。





◀ *Aloe eumassawana* grows in clumps on old graves just outside the village of Hirgigo. In fact, its only other known habitat is also a graveyard, calling into question the origin of this mysterious plant.

▼ Note the well spaced flowers in this raceme of *Aloe eumassawana*.

All photos by M Dioli.

A. eumassawana flowers in December and January, usually with a single, erect inflorescence, 120–125 cm high, having 1–2 erect branches. The racemes are 15–25 cm long, cylindrically conical and very sparsely flowered (1–2 per cm). The reflexed bracts are 6–7 × 2–4 mm, and the pedicels are 4–7 mm long. The perianth is minutely pubescent (downy), pale scarlet with a pale yellow tip in mature flowers and has a greenish tip when in bud. It is cylindrical-trigonous, curved slightly upwards towards the tip, 25–30 × 7–9 mm, and its outer lobes are free for 9–12 mm. We have not seen the capsule or seed. ❖

ACKNOWLEDGMENTS

The authors wish to thank the University of Asmara and Norwegian Church Aid for practical assistance in making the field trips possible and Mr Gilfrid Powys for his companionship and for sharing his botanical knowledge.

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J芦荟在Hirgigo村外的旧坟墓上成簇生长。事实上，它唯一已知的栖息地也是墓地，这引起了人们的质疑

这种神秘植物的起源。L注意到芦荟总状花序中间隔良好的花朵。

所有照片均由M Dioli拍摄。

A. eumassawana 在12月和1月开花，通常有一个直立的花序，高120-125厘米，有1-2个直立的分枝。总状花序长15-25厘米，圆柱形圆锥形，花非常稀疏（每厘米1-2朵花）。反折苞片长6-7*2-4mm，花梗长4-7mm。花被微短柔毛（绒毛状），淡猩红色，成熟花中有淡黄色的尖端，花蕾时有绿色的尖端。它是圆柱形三角形，向尖端略微向上弯曲，25-30×7-9毫米，其外裂片自由9-12毫米。我们还没有看到蒴果或种子。v

致谢

作者希望感谢阿斯马拉大学和挪威教会援助组织为实地考察提供的实际帮助，以及Gilfrid Powys先生的陪伴和分享他的植物学知识。

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