The remarkable story of *Grimmia ochyriana* Muñoz

Grimmia ochyriana was first described in 1998, but controversy has existed surrounding its possible synonymy with *G. mexicana* and, more recently, *G. atrata*. **Henk Greven** recounts its history and his own experience of these species in Nepal and Mexico.

In May 1964, the Swiss bryologist M. Zimmermann travelled to Nepal for an expedition to the Mount Everest base camp. About 10 km south of this camp he collected mosses from a moraine of the Khumbu valley near the hamlet of Lobuche (alt. 5,100 m). The material was deposited in the Geneva herbarium (G.). In the same year, the Japanese bryologist A. Noguchi revised the mosses collected during previous Swiss Himalayan expeditions in 1952 and 1954. The curator of G. also sent Noguchi the 1964 material and, based on Zimmermann 301, he described a new species, *Grimmia subdonniana* (Noguchi, 1964). In 1998, the Spanish bryologist Jesus Muñoz revised the *G. subdonniana* material and concluded that this was identical to *G. fuscolutea* Hook. However, intermingled with a paratype of *G. subdonniana* (Zimmermann 558), Muñoz found a small quantity of sporulating material of an undescribed species that he published as *G. ochyriana*, named after the Polish bryologist Ryszard Ochyra (Muñoz, 1998).

In continuation of my work on European Grimmias (Greven, 1995), I planned an expedition to the Mexican volcanoes. I asked a member of the Dutch Bryological and Lichenological Society, who once lived in Mexico, to be my travel companion, and in November 1997 we departed for Mexico. We visited Nevado de Toluca, Iztaccíhuatl, Popocatépetl and Pico de Orizaba (Fig. 1). Popocatépetl was only partly accessible because the volcano was very active and several times a day large clouds of smoke arose from the crater. On the slopes of the volcanoes we found *G. austrofunalis* Müll. Hal., *G. bernoullii* Müll. Hal., *G. donniana* Sm., *G. torquata* Hornsch. and *Coscinodon cribrosus* (Hedw.) Spruce, all new to the Mexican bryoflora (Sharp *et al.*, 1994). However, of greater significance was the occurrence, between 3,870 and 4,600 m, of an undescribed species, that was subsequently published as *G. mexicana* (Greven, 1999). However, the editor of *The Bryologist* initially sent the manuscript to Muñoz as referee, who reported

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◁ Fig. 1. (a) Orizaba – at 5,699 m, the highest peak in Mexico and the location where *G. mexicana* (b, c) was found (H.C. Greven, Puebla, Pico de Orizaba, Piedra Grande, sunny, south-facing andesite rock, alt. 3,870 m, leg. H.C. Greven, 4 December 1997). *Henk Greven*

▷ Fig. 2. (a) Khumbu valley, Nepal, the location where the author collected *G. ochyriana* Muñoz (b. c) (moraine between Pheriche and Lobuche, east-facing slanting rock, alt. 4,270 m, leg. H.C. Greven, 11 February 2000. *Henk Greven*

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that he had described *G. mexicana* earlier, as *G. ochyriana*, and that he therefore could not support publication. Thereupon, I requested the holotype of *G. ochyriana* from G. and found that although there were similarities, there were also distinct morphological differences, overlooked by Muñoz, presumably because of the small amount of material available mixed with *G. fusco-lutea*. I contacted the editor, presented the results of my study and the manuscript was accepted and published unchanged. Muñoz did not agree with this decision and shortly after this he published a revision of Latin American Grimmias, in which *G. mexicana* was apparently treated as *G. ochyriana* (Muñoz, 1999). Since the characters of *G. mexicana* from the Mexican volcano samples deviated from his protologue of *G. ochyriana*, he adapted the description to include the characters of *G. mexicana* and prepared new drawings from a sample of *G. mexicana* collected by Dale Vitt from a Mexican volcano (Vitt 7488, ALTA). As a result of the above-mentioned amendments, the Mexican bryologist C.M. Delgadillo asked G. for the type material of *G. ochyriana*. After his study and comparison with *G. mexicana*, he came to the same conclusion as myself, and subsequently published his opinion that *G. mexicana* differs in various characters from *G. ochyriana* (Delgadillo, 2000).

To collect information on the occurrence and ecology of *G. ochyriana*, I decided to visit the locality where *G. ochyriana* was collected, and in February 2000 I travelled, accompanied by my son, to Nepal for a journey through the Khumbu valley from Lukla up to the Mount Everest base camp. After a rough hike, following

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our Nepalese guide over frequently frozen and snow-covered tracks, we reached Namche Bazar, the capital of the Sherpas, from where we saw Mount Everest for the first time. After 4 days we reached Pheriche (alt. 4,270 m), the beginning of the moraine that stretches up to Mount Everest base camp. Here, we found richly sporulating mats of *G. ochyriana* on top of boulders. It appeared that *G. ochyriana* was a rather commonly occurring species in the moraine between Pheriche and Lobuche (Fig. 2). Since I had studied the occurrence and ecology of *G. mexicana* previously in Mexico, and now that of *G. ochyriana* in the Himalayas, it was clear to me that these two plants were indeed different species. The results of the journey through the Khumbu valley were published (Greven, 2002).

However, the remarkable story of *G. ochyriana* does not end here. In 2001, the Swiss bryologist Eva Maier began a revision of the genus *Grimmia* in the Himalayas, principally based upon 360 samples collected by the Scottish bryologist David Long during nine expeditions between 1979 and 1997 in Bhutan, Nepal, Sikkim and adjacent China (Maier, 2002). In her paper, Maier considered *G. ochyriana* to be synonymous with *G. atrata* Miel. ex Hornsch., based on similarity of leaf shape, costal architecture, uniseriate prolongation of a paradental cell row at the peristome insertion, and in particular the shape of the annulus cells. The last two characters were based on the work of Lantzius-Beninga (1844, 1850), who published ideas on the taxonomic value of the peristome and annulus. However, the leaf shape of these two species is

clearly dissimilar, and in spite of the similarities noted above, there are distinct ecological and other morphological differences (Table 1, Fig. 3) that lead me to the conclusion that these two taxa are not synonymous.

▽ Fig. 3. Top row: *G. atrata* Miel. ex Hornsch. (India, east Sikkim, Tsongo Lake, alt. 3780 m, leg. H.C. Greven, 11 March 2002). Bottom row: *G. ochyriana* Muñoz (Nepal, Khumbu valley, Pheriche, alt. 4270 m, leg. H.C. Greven, 11 February 2000). *Henk Greven*.

In her study, Maier combined European material with Himalayan material. For the description of *G. atrata*, she used plants from Austria, France and Norway in addition to Himalayan specimens. Although Long had collected *G. ochyriana*, Maier regarded it as synonymous with *G. atrata* and as a result of this, her drawings are a mixture of *G. atrata* from Europe (her habit drawing was reproduced from Maier & Geissler 1995), Hochstettler,

Table 1. Differences between *G. atrata* and *G. ochyriana*

Character	*G. atrata*	*G. ochyriana*
Habitat	Heavy-metal-bearing rock	Non-heavy-metal-bearing rock
Stem	Central strand absent	Central strand present
Leaves	Erect when moist	Spreading when moist
Leaf apex	Obtuse	Acuminate
Basal marginal cells	Rectangular, hyaline	Quadrate, brownish
Perichaetial leaves	Similar to upper leaves	Enlarged
Seta	4–6 mm	2–3 mm
Capsule	Exserted, cylindrical, dark brown	Immersed, ovate-ellipsoid, yellowish

A.E. Sauter and samples of *G. ochyriana* from the Himalayas (Long 20936, 22611 and 16861).

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