



## *Notoscyphus grollei* sp. nov. in Bitterfeld amber rather than the extant *Notoscyphus lutescens* (Lehm. & Lindenb.) Mitt.

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### Abstract

A Paleogene fossil of a leafy liverwort that had earlier been assigned to the extant species *Notoscyphus lutescens* is described as *Notoscyphus grollei*, sp. nov. It differs from all other *Notoscyphus* taxa by mammillose-papillose leaf cells.

**Key words:** Cenozoic, fossil, Jungermanniales, Jungermanniopsida, liverwort, Notoscyphaceae

### Introduction

Bitterfeld amber originates from the open brown coal pit Goitzsche near the city of Bitterfeld in central Germany. The amber is Paleogene in age, and its minimum age should be regarded as 24 million years (Knuth *et al.* 2002, Blumenstengel 2004). Seventeen species of leafy liverworts have been recognized from Bitterfeld amber (Grolle & Meister 2004), among them the extant *Notoscyphus lutescens* (Lehmann et Lindenb. in Lehmann 1832: 16) Mitten (1871: 407). Grolle (1988) established the presence of *Notoscyphus lutescens* in the Paleogene of Bitterfeld based on a single liverwort inclusion consisting of a fragment of a sterile gametophyte. He assigned it to *N. lutescens* “sensu amplo” because he could not find any morphological differences between the fossil and extant plants.

Based on a reinvestigation of the Bitterfeld amber inclusion of *Notoscyphus* Mitten (1871: 407), we propose to treat it as an extinct rather than an extant species. We substantiate our proposal by pointing to differences in the mammilosity of the leaf cells of extant *N. lutescens* and the fossil.

### Materials and Methods

Amber piece BHU-Palaeo no. SB.M.10.4 was cut out of a larger piece of amber and contains a single branched shoot of a leafy liverwort that was assigned to the extant species *Notoscyphus lutescens* (s.l.) by Grolle (1988). At the time of our reinvestigation, the amber platelet was enclosed in Canada balsam, with two cover slips glued to its surface.

For investigation, the specimen was covered with a drop of water and another cover slip. Then, the liverwort inclusion was analyzed using a Leica M50 dissection microscope and a Carl Zeiss AxioScope A1 compound microscope, the latter equipped with a Canon 60D digital camera. Incident and transmitted light were used simultaneously. The images provided in Figure 1 are digitally stacked photomicrographic composites of up to 93 individual focal planes obtained by using the software package HeliconFocus 6.0.

The taxonomic treatment of the fossil was based on a screening of the literature on fossil and extinct liverworts, and on comparison to herbarium material housed at the Botanische Staatssammlung München (M). Herbarium specimens were moistened, placed on a microscope slide and covered with a cover slip. The digital images in Figure 1 were produced using the same method as for the fossil.