

**NOTE**

**Examination of type specimens for *Colliculoamphora reichardtiana* (Grunow) Williams and Reid, with a description of a new species, *Colliculoamphora johnwrightii* nov. sp.**

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**Abstract**

In the original description of the diatom genus *Colliculoamphora*, the type species of *Colliculoamphora reichardtiana* (Grunow) Williams and Reid (= *Amphora reichardtiana* Grunow) was mistakenly said to be as from Honduras. Inspection of relevant specimens and manuscript material of *Amphora reichardtiana* in Grunow's collection (held in W) has permitted a re-evaluation of the species. Type material has been identified and, after examination, a new species, *Colliculoamphora johnwrightii*, is separated from *Colliculoamphora reichardtiana*.

**Keywords:**— *Colliculoamphora*, type material, new species.

## Introduction

The genus *Colliculoamphora* Williams & Reid was originally described for two species, the living marine species, *Amphora reichardtiana* Grunow, and the extinct fossil species *Eunotia reedii* Schrader, the former designated as the type of the genus (Williams & Reid 2006). Subsequently a further nine species were added, eight by Williams & Reid (2009) and one by Lobban (2015).

In the original description of *Colliculoamphora*, it was noted that the type species of *A. reichardtiana* was ‘originally described from “*Sargassum* von Honduras” (Grunow, 1867: 25)...’ (Williams & Reid 2006: 148). This is not the case. Those locality details were derived from a mistaken assumption based on the title of Grunow’s paper in which the species description appeared: ‘Diatomeen auf *Sargassum* von Honduras, gesammelt von Lindig’ (Grunow 1867). In Grunow’s text for the original description of *A. reichardtiana* the Adriatic Ocean was indicated as the source of the specimens (‘...neue Amphora-Arten des adriatischen Meeres...’, Grunow 1867: 25, reproduced here as Figure 1). There was no figure with Grunow’s original description but three illustrations of *A. reichardtiana* published some years later in Schmidt’s *Atlas Diatomaceen-kunde* (Schmidt 1876: pl. 39, figs 33—35) were based on specimens from Campeche Bay, Mexico and ‘Sansego’ (fig. 33 = ‘Camp. Bai’; fig. 34 = ‘Sansego’; fig. 35 = ‘Camp. Bai, viell. äusserste Altersverkümmerng derselben?’). Schmidt’s figures are reproduced here as Figures 13 and 18; Grunow’s annotated copies of those figures are reproduced here as Figures 14 and 19. The latter are taken from Grunow’s ‘Bilder-Sammlung’ sheet no. W-1901/3239; the ‘Bilder-Sammlung’ is Grunow’s image collection, which includes drawings, micrographs, printed pictures etc. ‘Sansego’ is Italian for Sušak, an island in the Adriatic Sea near Croatia. Thus the actual type locality for *A. reichardtiana* is ‘Sansego’ (Sušak) and figure 34 in Schmidt’s *Atlas* is the only published example of a specimen prior to the present paper.

## Type Material

Inspection of relevant specimens and manuscript material of *A. reichardtiana* in Grunow’s collection (held in Vienna [W]) has permitted a re-evaluation of the species. I begin with a consideration of Grunow’s ‘Bilder-Sammlung’ (image collection) for *A. reichardtiana* collected together on sheet no. W-1901/3240. There are nine drawings, two micrographs and a hand-written description in Latin. The drawings are grouped together in three sets:

1. A set of seven illustrations depicting six specimens in valve view and one, possibly, in girdle view (reproduced in Figure 2). The four drawings illustrated in the upper part of the sheet are all based on specimens from Grunow sample W 869, identified as from Porto Zubzamki, Sušak Island, Gulf of Kvarner, [Jugoslavia] Croatia, leg. Reichardt (Figure 2). Of the three remaining images in this set, the two micrographs are possibly from Lesina (Figure 2a) and possibly from Campeche Bay (although this text is difficult interpret, Figure 2c), and the drawing between these two is from sample W 1556 (Campeche Bay, Mexico) (Figure 2b).
2. A drawing of a single specimen, in valve view, taken from sample W 1696 (Campeche Bay, Mexico) (Figure 20).
3. A set of three drawings of specimens in valve view, all from sample W 869 (see above) (Figure 7).

Material of interest with respect to the type of *A. reichardtiana* is thus Grunow's sample W 869, from Porto Zubzamki, Sušak Island, Croatia. Three slides of this material were examined from Grunow's collection: W 869, W 869b and W 869c, and all should be considered syntypes (following Ross 1963: 73, see below and McNeill et al. 2012: Article 9.5). There are also two packets containing Grunow's sample W 869 in the herbarium, one labelled *Amphora reichardtiana* (Figure 3, Grunow number W-1901/3867), the other labelled *Mastogloia braunii* var. *lata*, a *nomen nudum* (or maybe more accurately a *nomen herbariorum* as that name has never appeared in the literature, only on a herbarium label) (Figure 4, Grunow 'Bilder-Sammlung' sheet no. W-1901/4935). Each packet includes a glass slide, locality details (Porto Zubzamki, Sušak Island, Gulf of Kvarner, [Jugoslavia] Croatia) and a rough drawing of a valve of *A. reichardtiana* (Figures 5 and 6). Examination of this material yielded numerous specimens of *A. reichardtiana* of which Figures 8—12 are a selection (Figure 11 is from W 869, Figures 9 and 12 are from W 869b and Figures 8 and 10 are from W 869c; Figure 13 is the published image reproduced from Schmidt 1876: pl. 39, with fig. 34, the specimen from 'Sansego', enclosed in a black box; Figure 14 is Grunow's annotated version of the same figure, on 'Bilder-Sammlung' sheet no. W-1901/3239). Unfortunately, raw material from Sušak Island is unavailable for electron microscopy.

Sample W 869 also happens to be the type of *Schizostauron fimbriatum* Grun. (= *Achnanthes fimbriata* (Grunow) Ross), which was discussed in detail by Ross (1963: 68)). In Grunow's later article, translated into English (and with additional notes from Frederick Kitton), he did not write further about *A. reichardtiana* (Grunow 1877: 181) but did discuss

other species from the Adriatic near Croatia (“Adriatic Sea near Lussin piccolo (leg. Dr. Reichardt)”), thus a note is required concerning the micrograph that may be from ‘Lesina’ (Figure 2a). Lesina is another name for Hvar, a Croatian Island in the Adriatic Sea and could, therefore, be type material, but no specimens were ever published from this locality. In addition, Ross examined the type of *Schizostauron reichardtiana* Grun. and identified Grunow’s W 864a as its type, from ‘Mali Lošinj Island, Gulf of Kvarner [Croatia]’ (Ross 1963: 71), ‘formerly known as Lussin Piccolo’ (Ross 1963: 67, Grunow 1877: 181). It is unlikely that the name ‘Lesina’ on the micrograph in Figure 2a refers to ‘Lussin Piccolo’, yet it remains interesting that *A. reichardtiana* was found along that Croatian coast of the Adriatic.

Grunow’s 1867 description was sufficient to allow subsequent identification and the three drawings of *A. reichardtiana* published sometime later in Schmidt’s *Atlas* (Schmidt 1876: pl. 39, figs 33—35, see Figures 2 and 3) complement the text. Grunow’s description from 1867, presumably based only on the Sušak Island specimens, is as follows:

‘Die andere “Amphora Reichardtiana m.” ist ganz ohne Anologen [Analogen], nicht complex, mit breit-linearen, an den Enden abgerundeten, schwach gebogenen Schalen, welche bisweilen an den Enden bogig aufwärts gekrümmt sind und den dicken, kurzen Formen der Eunotia monodon täuschend ähnlich sehen. Die Mittellinie fällt mit dem untern Rande zusammen und zeigt längliche End- und Mittelknoten. Radiale punctirte [punctierte] Querstreifen 30—40 in 0,001”. Sie ist bis auf den Mittelknoten kaum von Eunotia zu unterscheiden’ (Grunow 1867: 25).

The unpublished Latin description (reproduced as part of Figure 2) is as follows:

‘Amphora parva eunotiaeformis, a latere pri –mario oblonga, ad polas truncato rotundata medio constricta valvis lineari oblongis, leviter arcuatis, dorso subconvexo, ventre concavo, polis rotundatis; linea longitudinali nodulis ventrali et nodulis terminalibus instructa omnino cum latere inferiori valvae coincidente, striis punctatis (33-39 in 0.001) radiantibus’.

Both make direct comparisons to the genus *Eunotia* Ehrenberg and describe the shape of the valves. Comparison of specimens from Sušak Island (Figs 8—14) with those from Campeche Bay (Figs 15—21), even with just the light microscope, indicates clear differences between the two and hence it would be more accurate to consider these specimens as belonging to two separate species (in Schmidt’s *Atlas* the specimens in figures 33 and 35 demonstrate size variation, not structural variation, as can be seen from the actual specimens). As Grunow’s protologue includes reference only to specimens from Sušak Island, it is only

these that should be referred to as *A. reichardtiana*. As material from Campeche Bay is widely available and the description of *A. reichardtiana* given in Williams & Reid (2006) was based entirely on those specimens, that description and the accompanying published images should refer to a new species of *Colliculoamphora*; this is described below.

### **Taxonomic Descriptions**

*Colliculoamphora reichardtiana* (Grunow) Williams & Reid (2006: 153, *excl. figs and decsr.*) (Figs 1—14)

*Basionym.* *Amphora reichardtiana* Grunow 1867, Monthly Microscopical Journal 18, p. 25.

#### *Description*

Valves linear, asymmetrical about the apical plane (17–30  $\mu\text{m}$  in length, 7–10  $\mu\text{m}$  in breadth) with a pronounced curving of the poles towards the ventral margin; striae uniseriate, regularly spaced at valve margins and perimeter of valve face (10–15 in 10  $\mu\text{m}$ , slightly denser towards the apices). Raphe slit visible at each pole and along the margin, deflected towards ventral side of valve, extending from valve face towards mantle edge, terminating at mantle with small central nodule.

#### *Lectotype*

W 869c, **lectotype, designated here** (=Figures 8 and 10, specimen length 25  $\mu\text{m}$ ).

#### *Type locality*

Porto Zubzamki, Sušak Island, Croatia.

#### *Distribution*

This species is known only from the type locality and possibly from Hvar, Croatia. Although the specimens illustrated and described as *C. reichardtiana* in Williams & Reid (2006: 153) are now not considered to be that species, the combination remains valid but the description is redundant as it refers to the new species described below.

*Colliculoamphora johnwrightii* sp. nov. (Figs 15—21)

#### *Description*

Valves linear, asymmetrical about the apical plane (20–52  $\mu\text{m}$  in length, 10–13  $\mu\text{m}$  in breadth), striae uniseriate, regularly spaced at valve margins and perimeter of valve face, becoming scattered and irregular towards valve centre (10–15 in 10  $\mu\text{m}$ , slightly denser towards the apices). Raphe slit present at each pole, deflected towards ventral side of valve, extending from valve face towards mantle edge, terminating on mantle with small central nodule. Raphe with helictoglossa, rimportulae absent, sternum present, ill-defined in external view, internally more obvious, occurring centrally along mid-point of valve. Girdle bands narrow, with two rows of simple pores, regularly spaced (c. 30–34 per 10  $\mu\text{m}$ ), total probably three, all open, shallow and lack any notable structure.

### *Holotype*

BM 12890, Cleve & Möller, *Diatoms*, no 150, **holotype, designated here**; BM 12913, 12914, Cleve & Möller, *Diatoms*, nos 151-2, isotypes). Cleve & Möller note that *A. reichardtiana* is ‘rare’ (Cleve & Möller 1878: 5; images in Williams & Reid 2006: Figs 11—16 are from BM 12890, Cleve & Möller, *Diatoms*, no. 150, and in Figures 15—17) but in the raw material held at BM many specimens were found, including specimens with girdle bands (Williams & Reid 2006: Figs 17-29).

### *Type locality*

Campeche Bay, Mexico.

Other examined material came from Pensacola, Florida, USA (BM 31004, BM 92544-6) and Colon, Panama (BM 53343, 54162).

### *Etymology*

Named after John Wright, primarily in honour of his popular book on taxonomy (Wright, J. 2015. *The Naming of the Shrew*, Bloomsbury) but also for enduring a whole day of talks on Willi Hennig and cladistics at the Linnean Society in 2013 (Williams 2013) and for another book of which I have made enormous use (Wright, J. 2013. *Booze. River Cottage Handbook* no. 12, Bloomsbury)<sup>1</sup>.

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<sup>1</sup> He is also a mycologist – but we all make mistakes.

*Distribution*

As stated before, this species is tropical, sub-tropical, distributed around South and Central America but commonly in Mexico (Krayesky et al. 2009).

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Anton Igersheim, curator of the diatom collection in W, was immensely helpful both during my stay at Vienna and after. Charlie Jarvis (NHM) and Anton Igersheim helped decipher Grunow's Latin text and Harald Schneider (NHM) translated Grunow's German description. As ever, Pat Kociolek offered numerous helpful comments on a draft of this ms., and the suggestions made by two referees were most valuable.

## Disclosure statement

No potential conflict of interest was reported by the author.

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## Figure Legends

### (Figures made with Adobe Photoshop CS6)

Figures 1—14: *Colliculoamphora reichardtiana*

Figure 1: Text of Grunow's original description of *Amphora reichardtiana* ('...neue Amphora-Arten des adraitischen Meeres...', Grunow (1867: 25).

Figure 2: Illustrations from Grunow's 'Bilder-Sammlung' (image collection) for *A. reichardtiana* collected together on sheet no. W-1901/3240. Figure 2a: Seven illustrations depicting six specimens in valve view and one, possibly, in girdle view, from Grunow sample W 869, identified as from Porto Zubzamki, Sušak Island, Gulf of Kvarner, [Jugoslavia] Croatia, leg. Reichardt. Figure 2b: Micrograph possibly from Lesina; Figure 2c: Drawing from sample W 1556, Campeche Bay, Mexico; Figure 2d: Micrograph possibly from Campeche Bay.

Figure 3: Grunow's sample W 869 labelled *Amphora reichardtiana*, Bilder-Sammlung W-1901/3867

Figure 4: Grunow's sample W 869 labelled '*Mastogloia braunii* var. *lata*', Bilder-Sammlung W-1901/4935.

Figure 5: Drawing of a valve of *Colliculoamphora reichardtiana* accompanying Grunow's Bilder-Sammlung W-1901/3867.

Figure 6: Drawing of a valve of *Colliculoamphora reichardtiana* accompanying Grunow's Bilder-Sammlung W-1901/4935.

Figure 7: Set of three drawings of specimens in valve view, all from Bilder-Sammlung for *Colliculoamphora reichardtiana*, W-1901/3240.

Figures 8 and 10: *Colliculoamphora reichardtiana*, W 869c; specimen length 25 µm.

Figure 11: *Colliculoamphora reichardtiana*, W 869; specimen length 22 µm.

Figures 9 and 12: *Colliculoamphora reichardtiana*, W 869b; specimen length 25 µm.

Figure 13: *Colliculoamphora reichardtiana*, reproduced from Schmidt (1876: pl. 39, with fig. 34, from 'Sansego'), enclosed in a black box.

Figure 14: Grunow's annotated version of figure 34, from Bilder-Sammlung W-1901/3239.

Figures 15—21: *Colliculoamphora johnwrightii* sp. nov.

Figs 15—17: *Colliculoamphora johnwrightii* sp. nov., Campeche Bay, BM 12890, Cleve & Möller, *Diatoms*, no 150, lectotype, specimens of length 30—35 µm.

Figures 18—19: reproduced from Schmidt (1876: pl. 39, with fig. 33 and 35, enclosed in black boxes) and Grunow's annotated copy, from Grunow's 'Bilder-Sammlung' sheet no. W-1901/3239.

Figure 20: Drawing from sample W 1696, Campeche Bay, Mexico.

Figure 21: Detail of drawing from sample W 1556, Campeche Bay, Mexico (detail from Figure 2c).