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The transfer of *Gelidiella trinitatensis* W.R.TAYLOR (Gelidiales, Rhodophyta) to *Parviphycus*

With 4 Figures

Keywords: Carribean, *Gelidiellae trinitatensis*, marine algae, *Parviphycus trinitatensis*

Abstract

Evidence is presented to support the transfer of the red algal species *Gelidiella trinitatensis* W. R. TAYLOR (Gelidiales) to the segregate genus *Parviphycus* SANTEL. The very small stature of this alga, the arrangement of tetrasporangia in distinct chevron rows, the organization as seen in transverse section, and the apical organization indicate its correct taxonomic placement is within the genus *Parviphycus*. This species, originally described from Trinidad in the southern Caribbean Sea, is now known to be widely occurring throughout the Caribbean. It has also been reported from Central and South America.

Introduction

Gelidiella was established by FELDMANN & HAMEL (1934) as a new name to replace the illegitimate generic name *Echinocaulon* KÜTZING (1843), which was a later homonym. The type species was *Gelidiella acerosa* (FORSSK.) FELDMANN & HAMEL, a species with a worldwide tropical distribution and of economic value because of its high agar content (GANZON-FORTES 1994). Over the years many species have been added to *Gelidiella*. Two categories of species were recognized within the genus, these two groups being separated by differences in their apical organization and in the manner in which tetrasporangia were arranged (RICO et al. 2002; SANTELICES 2002). The apical divisions in *Gelidiella*, as seen in *G. acerosa*, show a decussate pattern, the cell

divisions of the subapical and subsequent cells in the axial filament occurring at right angles to each other (SANTELICES 2002). Thus, the central axial filament is discernible only a short distance below the branch apex (MELO 1992). On the other hand, the apical divisions in *Parviphycus*, as observed in *P. adnatus* and *P. tenuissimus*, show a lateral pattern. The axial cell cuts off 2–4 periaxial cells, which cut off further cells laterally (RICO et al. 2002). So the arrangement is more distichous than decussate (SANTELICES 2002). Some species, including the generitype of *Gelidiella*, produce tetrasporangia in a compact and random pattern in fertile axes, whereas other species produced tetrasporangia in cylindrical stichidia with the sporangia formed in regular transverse rows. The former group was called the “*acerosa*-type”, and the latter group was called the “*pannosa*-type” (GANZON-FORTES 1994). This distinction was pointed out by many authors (GUIRY & WOMERSLEY 1992; KRAFT & ABBOTT 1998; SANTELICES 2002). In a detailed study of *G. acerosa* and several other species then assigned to *Gelidiella*, SANTELICES (2004) presented arguments to recognize the segregate genus *Parviphycus*, with *P. adnatus* (E.Y. DAWSON) SANTEL. designated the generitype. Three additional species were transferred by SANTELICES (2004) to his new genus: *P. antipae* [“*antipae*”] (CELAN) SANTEL., *P. tenuissimus* (FELDMANN & HAMEL) SANTEL., and *P. womersleyanus* (KRAFT & I.A. ABBOTT) SANTEL. Subse-

quently, AFONSO-CARRILLO et al. (2007) transferred *Gelidiella setacea* (FELDMANN) FELDMANN & HAMEL into *Parviphycus*, and the new species *P. felicinii* was described by PERRONE & DELLE FOGLIE (2006). *Gelidiella* and *Parviphycus* are the only two genera now assigned to the Gelidiellaceae (FAN 1961; PERRONE et al. 2006). *Gelidiella trinitatensis* W.R.TAYLOR (TAYLOR 1943) remains an incompletely studied species. The small stature of the plants in this species and the production of the sporangia in distinct chevrons were features that led HUISMAN et al. (2009) to suggest that *G. trinitatensis* had affinities with *Parviphycus*. But because they had not seen authentic material, they refrained from making a transfer.

Materials and methods

The Holotype of *Gelidiella trinitatensis* was first deposited in the personal herbarium of W. R. TAYLOR (TAYLOR 1943). That herbarium is now incorporated in the University of Michigan Herbarium (MICH), Ann Arbor. The holotype of *G. trinitatensis* was examined in this study. Whole mounts were prepared, and cross-sections were made using a single-edge razor blade and mounted on glass slides

for examination under a standard Zeiss research compound microscope. An EPSON Scan Ver. 1.28A (Seiko Epson Corp.) was used to capture an image of the holotype. Line-drawings of portions of the holotype were prepared using a camera-lucida mounted on the microscope. The software program Adobe Photoshop CS3 Version 10.0 was then used to prepare the art-work. Author abbreviations of taxa are in accordance with BRUMMITT & POWELL (1992): http://www.ipni.org/ipni/query_author.html. Herbarium abbreviations are according to the on-line Index Herbariorum: <http://sciweb.nybg.org/science2/IndexHerbariorum.asp>.

Results

Observations were made on the holotype, which consist of two small matted clusters of branched terete axes (Fig. 1). Axes are decumbent and give rise to erect axes that are sparingly and irregularly branched (Fig. 2). Vegetative axes are terete, 52–80(–100) μm in diameter, ending in a single transversely dividing apical cell (Fig. 3a–c). The lateral pattern of division of the axial filament was of the *Parviphycus* type rather than the decussate pattern of *Gelidiella*. Cross-sections of erect axes show

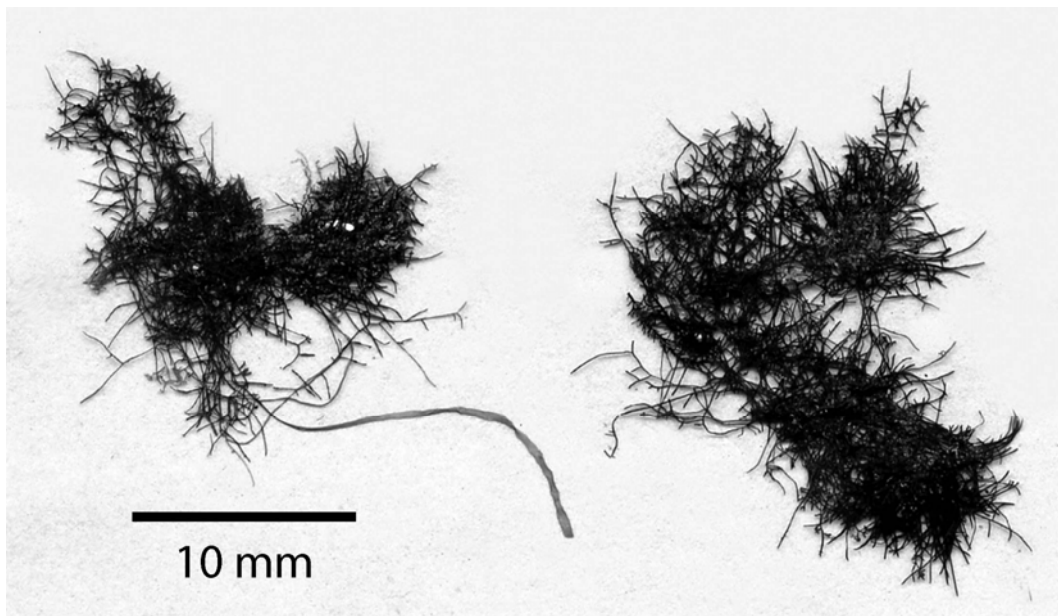


Fig. 1
Parviphycus trinitatensis. Holotype of *Gelidiella trinitatensis* in MICH.

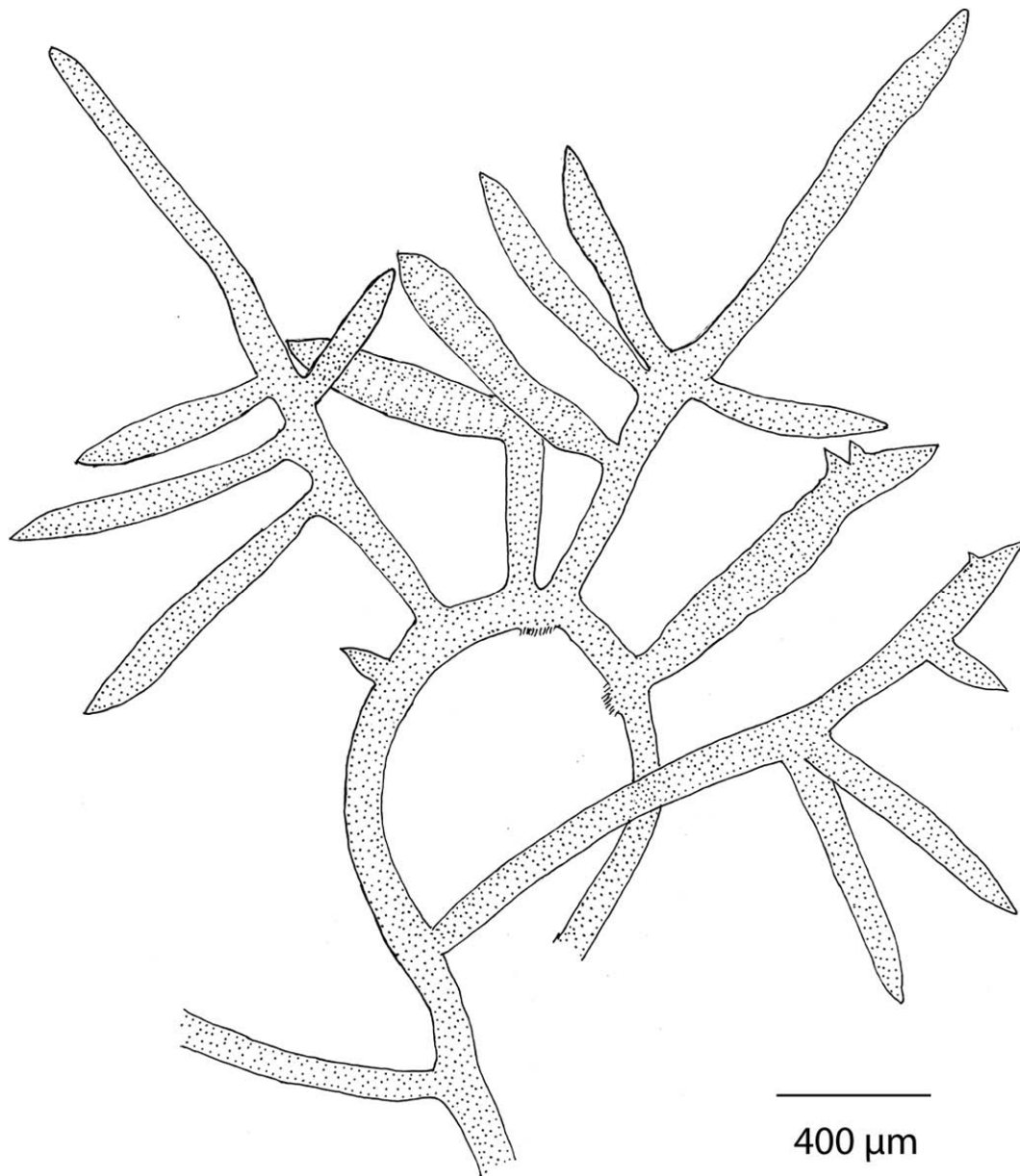


Fig. 2
Parviphycus trinitatensis. Habit

an absence of narrow rhizines (Fig. 3d). Tetrasporangial stichidial portions of axes are compressed to flattened, 98–162 μm in width and 325–715 μm in length (Fig. 4a, b). Usually only the distalmost portions of a stichidium still retain sporangia, the rest of the stichidium

having shed the spores. Stichidia range from simple to bearing lateral secondary stichidia, thus pinnately branched. Tetrasporangia are arranged in chevrons, thus, the V-formation as described by TAYLOR (1943). The mature tetrasporangia are 22–25 μm in diameter and

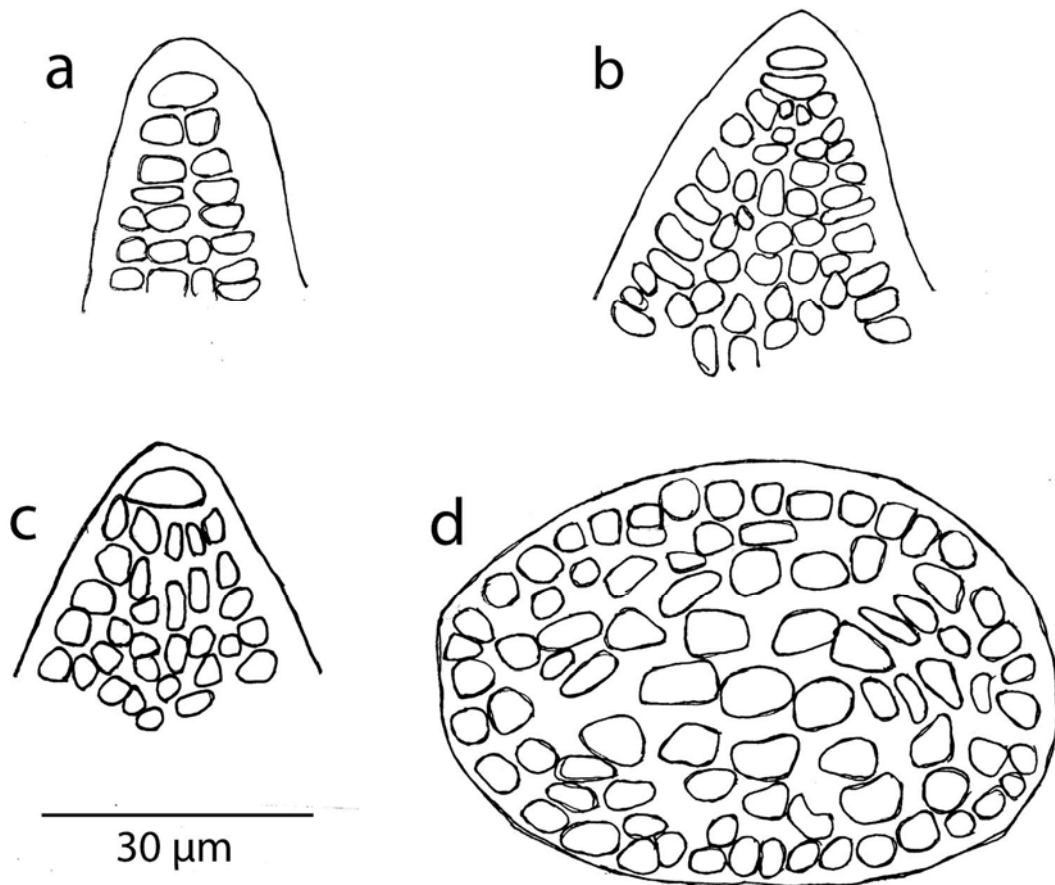


Fig. 3
Parviphycus trinitatensis

a–c — camera-lucida drawings of apices; d — camera-lucida drawing of cross-section of axes

show irregular patterns of division, sometimes appearing cruciform and other times appearing to be tetrahedral.

Discussion and conclusions

When TAYLOR (1943) described *Gelidella trinitatensis*, he provided only a single figure, which was of the habit. TAYLOR described the plant as being minute and creeping, giving rise to erect portions usually only 2–10 (rarely to 15) mm in height and segments to 100 μm in diameter. He observed tetrasporangia to be produced in simple or pinnate to subpalmate branchlets and stressed the feature

that the tetrasporangia originated in obvious V-shaped rows near the apices. These rows later become obscured. The spores are released from the base of the stichidium as maturation of sporangia proceeds distally. The feature that TAYLOR (1943) regarded as distinguishing his new species from *Gelidium crinale* was the very regular arrangement of the tetrasporangia in “V-shaped rows” and the fact that these fertile branchlets “appeared stichidium-like”. The features seen in the holotype of *G. trinitatensis*, including the apical pattern of division, are the characteristics of the segregate genus *Parviphycus* as stated by SANTELICES (2004). Therefore, the following transfer is proposed:

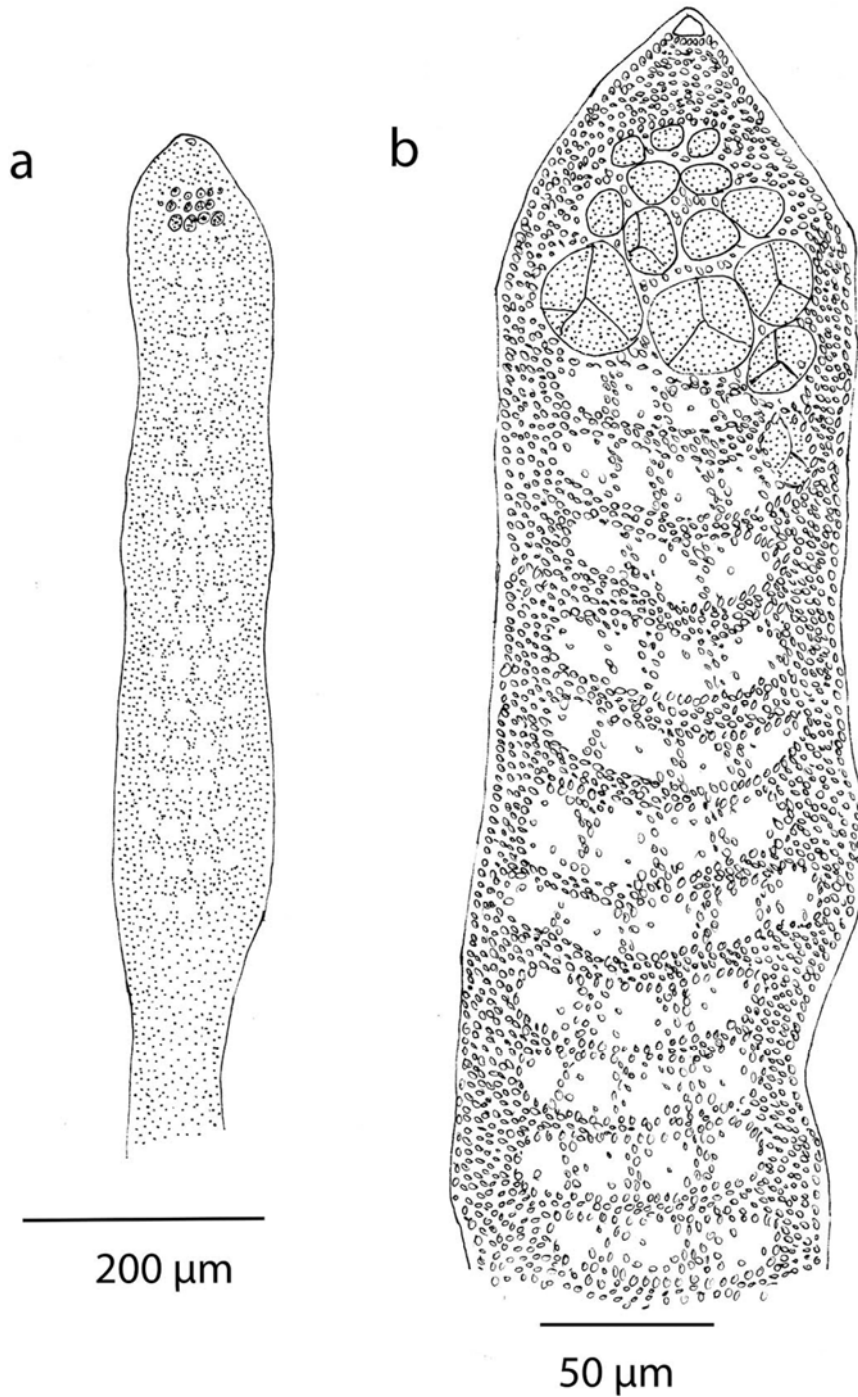


Fig. 4
Parviphycus trinitatensis

a, b — camera-lucida drawings of tetrasporangial stichidia, from which spores have mostly been already shed

Parviphycus trinitatensis (W.R.TAYLOR)

M.J.WYNNE comb. nov.

Basionym: *Gelidiella trinitatensis* W.R.TAYLOR, Pap. Mich. Acad. Sci., Arts & Lett. 28: 150, pl. I, fig. 1. (1943).

TAYLOR (1943) described *Gelidiella trinitatensis* with a type locality of Manzanilla Point, Trinidad, West Indies. The type material was collected by ROLAND THAXTER and had been earlier identified by TAYLOR (1929) as *Gelidium crinale* (TURNER) GAILLON. Subsequently, *G. trinitatensis* has been reported from the States of São Paulo (JOLY 1965) and Rio de Janeiro, Brazil (BRASILEIRO et al. 2009), Costa Rica (TAYLOR 1960), Grand Cayman Island (TAYLOR 1969), Quintana Roo and Vera Cruz, Mexico (GARZA BARRIENTOS 1976; MENDOZA-GONZÁLEZ & MATEO-CID, 1985, 1992; ORTEGA et al. 2001), Venezuela (GANESAN 1990), Belize (LITTLER & LITTLER 1997), Cuba (CABRERA et al. 2004; SUÁREZ 2005), Pacific Panama (LITTLER & LITTLER 2009), and generally throughout the Greater and Lesser Antilles, the Caribbean, and the Gulf of Mexico (LITTLER & LITTLER 2000).

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