



Discussion

Comment on “Determination of carotenoid as the purple pigment in *Gorgonia ventalina* sclerites using Raman spectroscopy” [Leverette et al., Spectrochim. Acta A, 69 (2008) 1058–1061]

Emmanuel Fritsch^a, Stefanos Karampelas^{a,b,*}

^a Université de Nantes, Nantes Atlantique Universités, CNRS, Institut des Matériaux Jean Rouxel (IMN), 2 rue de la Houssinière, UMR6502, BP32229, F-44322 Nantes Cedex 3, France

^b Department of Geology, Laboratory of Mineralogy–Petrology–Economic Geology, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece

ARTICLE INFO

Article history:

Received 15 January 2008

Accepted 7 May 2008

We read with interest the article entitled: “Determination of carotenoid as the purple pigment in *Gorgonia ventalina* sclerites using Raman spectroscopy”. Indeed, Raman spectroscopy is very useful to determinate the chemical nature of the pigment present in these sclerites. This approach parallels to the works we recently published, on the origin of color of freshwater cultured pearls using Raman scattering [1,2]. We actually mentioned the possibility of extending the type of study we did on freshwater cultured pearls to corals among others. In these articles we demonstrate that signal, which looks like those identified by Leverette and colleagues as due to carotenoid in *Gorgonia ventalina*, are actually due to mixtures of polyenes. Polyenes (or polyacetylenes) are organic compounds that contain several sequences of alternating double and single carbon–carbon bonds, the polyenic chain. Polyenic molecules can have various substitutions on their terminal ends. The polyenes contained in the freshwater cultured pearls are short polymers containing from 6 to 14 acetylene motives. Carotenoid pigments are also polyenic molecules, having also various substitutions on their terminal ends, but they additionally have four methyl (CH₃) groups attached to their polyenic chain. Using Raman spectroscopy, the fact that some corals are not colored by carotenoids was first indicated at 1986 [3]. In this publication was shown also that a carotenoid which gives a peak (ν_1) at about 1500 cm⁻¹—due to the double carbon–carbon (C=C) bond stretching mode of a given polyenic chain—gives a peak (ν_2) at about 1150 cm⁻¹—due to the

simple carbon–carbon (C–C) bond stretching mode coupled with C–H in-plane bending modes. A polyenic molecule with the same chain length, thus peak at about 1500 cm⁻¹, is giving a peak at about 1120 cm⁻¹. The 30 cm⁻¹ shift of ν_2 band is because of lack of methyl groups attached in their polyenic chain in the lateral molecule. Fig. 5 of the commented article seems to confirm these results. The peak at about 1015 cm⁻¹ present in the Raman spectra of *Gorgonia ventalina* sclerites may can be attributed to the deformation-activated CH=CH wagging mode [4].

The presence of more than one pigment in the sclerites of *Gorgonia ventalina* can be shown in Fig. 4a, as correctly stated by the authors, in the slight yellow part of the clear sclerites. In order to see if the purple color is also because of more than one pigment, we propose to authors of the article to take Raman spectra using different excitation wavelengths without changing the point of measurement. Because of the Raman resonant phenomena, which this kind of molecules presents, it will be observed the possible variations in the position, shape and relative intensities of the two most intense bands under different excitation wavelengths. We think that this way the chemical structure and the synthesis of pigments during the formation of sclerites can be better understood and the disease state of these organisms can be better determined.

References

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DOI of original article: [10.1016/j.saa.2007.07.018](https://doi.org/10.1016/j.saa.2007.07.018).

* Corresponding author at: Department of Geology, Laboratory of Mineralogy–Petrology–Economic Geology, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece. Tel.: +30 2310 998142; fax: +30 2310 998147.

E-mail address: steka@physics.auth.gr (S. Karampelas).