

Studies on the ketocarotenoid pigments in the sea urchin gonads of *Stomopneustes variolaris* from the Mandapam Coast of Gulf of Mannar

R.Saravanan*, Amir Kumar Samal, Ravi K. Avadhanula, I.Syed sadiq and A. K. Abdul Nazar
ICAR-Mandapam Regional Centre of CMFRI, Mandapam – 623 520, Tamil Nadu, India

*stingray_mr@yahoo.com



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Introduction

Sea urchin gonads of *Stomopneustes variolaris* is a delicacy in many parts of the world. The bright yellow orange colour of the gonad derives from the carotenoids pigments and an important organoleptic criterion for its quality. The major carotenoids naturally found in sea urchins are β -carotene, α -carotene, β -echinenone, zeaxanthin, canthaxanthin, lutein, astaxanthin, diatoxanthin, fucoxanthin and alloxanthin. As astaxanthin and canthaxanthin are major antioxidant and pigment molecules of aquaculture importance, in the present study the level of these two pigments were quantitatively assessed.

Methods

Sea urchin *S.variolaris* was collected along the Mandapam coast following the lunar phase during pre-monsoon period and they were subjected to the pigment analysis. The quantitative acetone extracts of the gonads of *S. variolaris* (n=10) were prepared by addition of known amount of the internal standard trans- β -apo-8'-carotenal and subsequently were quantitatively analysed through a Shimadzu high performance liquid chromatography system (HPLC) consisting of a phenomenex® SecurityGuard™ C18 HPLC guard cartridge, a phenomenex® Luna 5 μ m C18 column of 250mm length and 4.6 mm internal diameter integrated to a Shimadzu HPLC system.

Results

The chromatographic analyses of the returned no quantifiable astaxanthin (t_R = 13.60 min) and canthaxanthin (t_R =16.82 min) peaks. Nevertheless, presence of at least eight different carotenoid pigment molecules, other than astaxanthin and canthaxanthin, in the extracts was confirmed by additional chromatographic peaks at retention times (t_{RS}) of 14.25 min, 14.80 min, 15.52 min, 15.81 min, 16.33 min, 24.53 min, 27.76 min and 27.97 min which had their absorption spectra typical of carotenoid pigments. Hence, although the gonads of *S. variolaris* did not contain quantifiable amount of ketocarotenoids astaxanthin and canthaxanthin, it contained many other carotenoid pigment molecules having potential functional significance for the species.

Conclusion

Sea urchins can not synthesize carotenoids *de novo* and obtain from the natural diets in the wild. In the present study gonads of *S.variolaris* did not contain two ketocarotenoid pigments *viz.*, Astaxanthin and Canthaxanthin; but however there were other eight pigment peaks observed. This study gives an idea of the quantifiable carotenoid naturally available in the gonads of sea urchin *S.variolaris*, which is consumed by the fishermen population of Gulf of Mannar, Kanniyakumari and Karwar. This work provide the baseline information on the carotenoid pigments, which is responsible for the colour of the gonad, an attribute very much important in deciding its quality for consumption. The edible sea urchin of different species are in culture in many countries around the world. This work gives scope to future work in assessing the various carotenoid pigments available in Indian sea urchin species along the vast coastal waters of India, which is a first step towards the long term goal of developing a candidate species of sea urchin for echiniculture activities.



Figure.1 Gonads of sea urchin *S. variolaris*

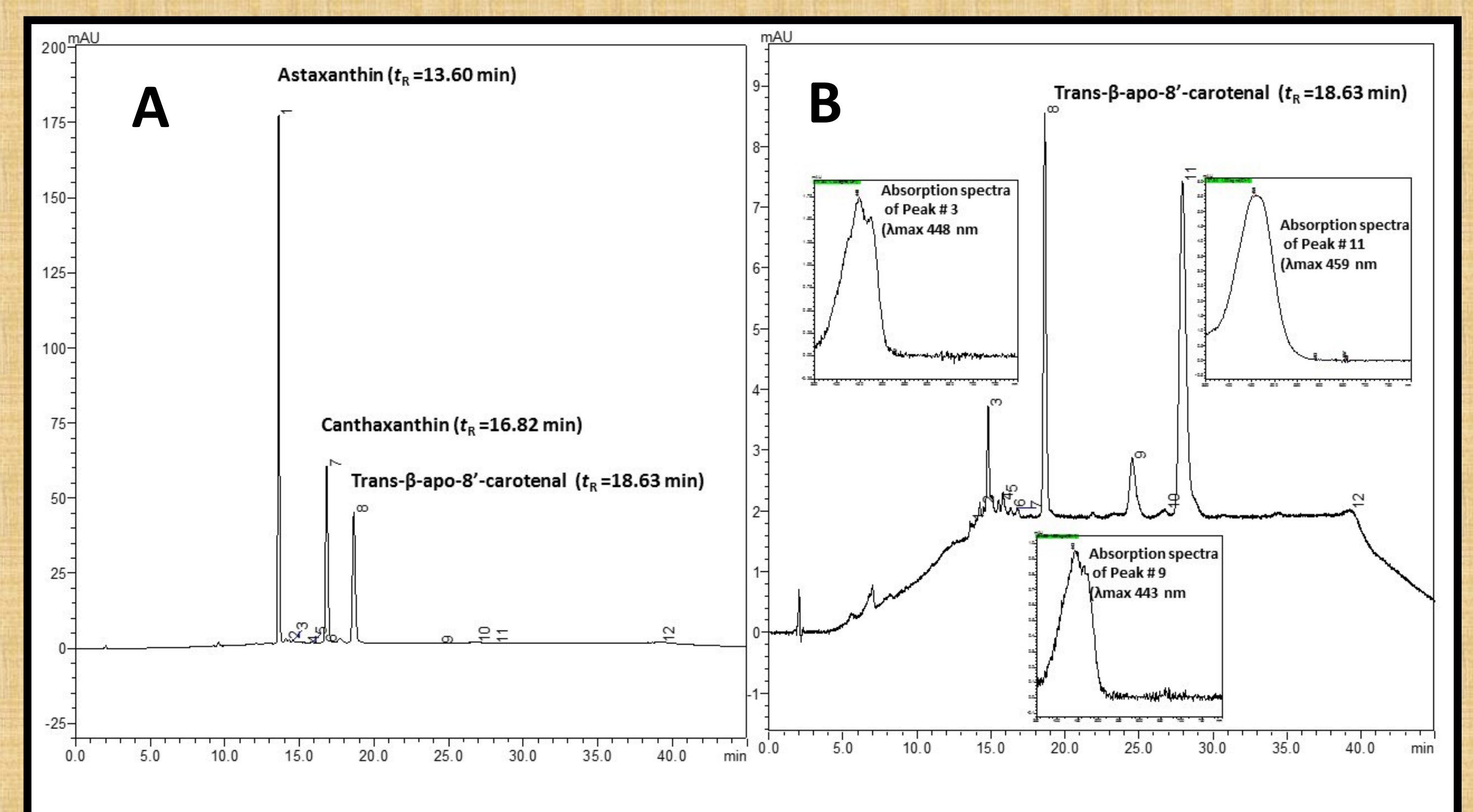


Figure 2: A: Chromatogram of standards of astaxanthin (peak # 1), canthaxanthin (peak #7) and Trans- β -apo-8'-carotenal (internal standard; peak # 8). B: Chromatogram of *S. variolaris* gonadal extract revealing the absence of astaxanthin and canthaxanthin but the presence of other carotenoid molecules (e.g. peak # 3, 9 and 11 with their characteristics absorption spectra (inserts) having only a strong Soret band around 450 nm).

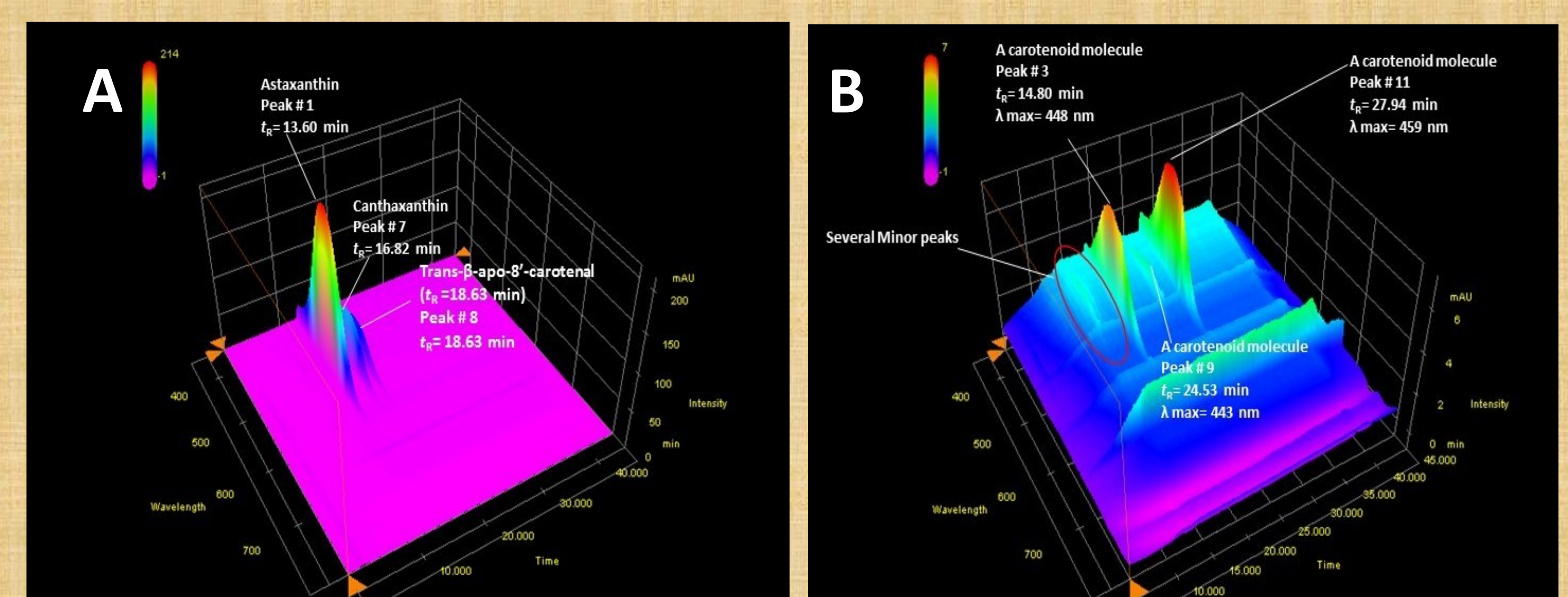


Figure 3: 3D Chromatogram of pigment standards (A) and *S. variolaris* gonad extract (B)