

Softly does it! Cracking lobster shell crustacyanin protein crystal structures.

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The coloration of the lobster shell, famously known from its colour change on cooking, derives from a complicated mix of astaxanthin carotenoid molecules and several proteins in complex. Crystals of various components have been known for many years but the breakthrough in structure determination came from use of softer X-rays of wavelength 2 Å targeting the increase in the sulphur anomalous scattering and the xenon LI absorption edge. One structure of the gene group of proteins was thus solved and refined at 1.4 Å [1] and this could be used for molecular replacement crystal structure solution of the beta-crustacyanin dimer complex at 3.2 Å resolution [2]. The molecular tuning parameters causing the 100nm bathochromic shift of the b-crustacyanin were thus identified and have stimulated further research in theoretical [3] and carotenoid chemistry and crystallography [4]. There are wider biological implications too, including the colours of rare lobsters, where site-specific amino acid changes could be a cause. Public interest has been especially strong not least because 'the' question: *Why does a lobster change colour on cooking?* is known to nearly everyone. Interactions with newspapers, radio and TV people, and finally science writers and children assigned this as a homework task, have been illuminating, rewarding and at times downright humorous! The alpha-crustacyanin 320kDa complex of eight b -crustacyanins beckons us on [5].

- (1) Cianci et al 2001 Acta Cryst D57, 1219-1229.
- (2) Cianci et al 2002 PNAS USA 99, 9795-9800.
- (3) Durbeej and Eriksson 2006 PCCP, 8, 4053-4071.
- (4) M Helliwell et al Acta Cryst B in press.
- (5) Chayen et al 2003 Acta Cryst D59, 2072-2082.