



Carotenoid News

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FROM THE EDITOR

"Festina lente" (Make haste slowly)

The favorite maxim of the Roman emperor Augustus contains valuable advice for scientists of the XXI century. We are so overwhelmed by a deluge of information and electronic mail, that we scarcely find time for research and writing publications, which should be our main pursuits. Instead, an inordinate effort is spent on preparation of grant proposals to secure funds for research, and on fancy presentations, using the latest software tools. We are expected to be masters of all trades — computer experts, artists, printers, business managers, and secretaries. The lack of time and concentration becomes increasingly obvious when plain oversight produces errors in publications, which are not corrected by our equally busy coauthors and reviewers. Quantity is replacing quality, because the latter may only be achieved by thoughtful investigation, fearless discussion, long quiet hours in laboratory, careful poring over manuscripts and literature. Can we afford doing many things at the same time (multi-tasking), without falling victim to adult attention deficit disorder?

In order to concentrate the best minds on important issues in carotenoid research, we invite you to participate in CARIG EB 2003 Conference on April 12 in California. The endless summer of San Diego will provide a perfect background for unhurried discussion of our most pressing research problems.

Maria S. Sapuntzakis (Chicago, IL)

UPCOMING EVENTS

April 1-2, 2003

International Ceres Forum, Washington, D. C. Examining the Health Benefits of Lycopene from Tomatoes. Contact: Conference Register, Outreach Program Services, 810 University City Blvd, Suite D, Virginia Tech, m/c 0272, Blacksburg, VA 24061, **website:** www.canted.vt.edu/ssl/lycopene/index.lasso

April 11-15, 2003

Experimental Biology 2003, San Diego, CA. Contact: EB 2003, c/o FASEB Office of Scientific Meetings, 9650 Rockville Pike, Bethesda, MD 20814-3998, **tel:** 301-530-7010, **fax:** 301-530-7014, **website:** www.faseb.org/meetings/eb2003 **E-mail:** eb@faseb.org [see CARIG Conference program and other highlights below]

May 21-24, 2003

Diet and Optimum Health, Portland, Oregon. Prevention and treatment of human diseases by vitamins, micronutrients and phytochemicals. Role of oxidative stress and antioxidants in health and disease. Conference organized by Linus Pauling Institute, and co-sponsored by Oxygen Club of California. Contact: Linus Pauling Institute, Oregon State University, 571 Weniger Hall, Corvallis, OR 97331-6512, **tel:** 541-737-5075, **fax:** 541-737-5077, **website:** <http://lpi.orst.edu>

June 26-27, 2003

Free Radicals: The Pros and Cons of Antioxidants, Bethesda, MD. Contact: Harold Seifried at NIH, **tel** 301-496-8573, **E-mail:** seifriedh@mail.nih.gov or Susie Warner, **E-mail:** swarner@scgcorp.com, **tel:** 301-670-4990, **website:** www3.cancer.gov/prevention/frpcq2003

June 30-July 2, 2003

5th International Food Data Conference, Washington, DC. Fostering Quality Science in Food Composition Databases. Contact Jean Pennington (jp157d@nih.gov) or Jim Harnly (hernly@bhnrc.usda.gov), **website:** www.nal.usda.gov/fnic/foodcomp/conf

September 2-5, 2003

International Antioxidant Methods Workshop, Chicago, IL. Contact: John W. Finley, Kraft Foods, 801 Waukegan Rd, Glenview IL 60025, **tel:** 847-646-7321, **fax:** 847-646-3301, **E-mail:** jfinley@kraft.com or Keith Singletary, Director of Functional Foods for Health Program, University of Illinois, 1302 W Pennsylvania Ave, 101 Agricultural Bioprocess Lab, Urbana, IL 61801, **tel:** 217-333-6364, **fax:** 217-333-7386, **E-mail:** kws@uiuc.edu

October 6-24, 2003

Food Comp 2003, Wageningen, the Netherlands. 6th International Graduate Course on Production and Use of Food Composition Data in Nutrition. Contact: Ms. L.A. Duym-Brookman, Secretariat Food Comp 2003, Division of Human Nutrition, Wageningen University, P.O. Box 8129, 6700 EV Wageningen, The Netherlands, **tel:** +31-317-48-3054/48-2589, **fax:** +31-317-48-3342, **E-mail:** lous.duym@wur.nl, **website:** www.wau.nl/vlag/foodcomp.htm

November 8-12, 2003

5th International Symposium on Natural Colorants for Foods, Confectionery, Beverages, Cosmetics. San Diego, CA. Contact Peter C. Hereld, Whitney Center, Suite 341, 200 Leeder Hill Drive, Hamden, CT 06517, **tel/fax:** 203-281-6766

HIGHLIGHTS OF EXPERIMENTAL BIOLOGY 2003

CARIG Travel Awards

CARIG will award \$500 for travel to the Experimental Biology 2003 meeting. Each applicant should be first author on an abstract submitted to EB 2003. Awards will be based on the merit of the abstract and on financial need. Students, staff, and scientists beginning their careers are eligible to apply. Please send a copy of your abstract (on the EB 2003 form) and a letter explaining the need for financial aid by March 14 to Dale A. Cooper, Ph.D., the Procter & Gamble Company, Miami Valley Laboratories, 11810 East Miami River Road, Cincinnati, OH 45252, **fax:** 513-627-0597, **E-mail:** cooper.da@pg.com

VARIG / CARIG Social at Experimental Biology

The annual VARIG / CARIG Social will be held at Experimental Biology, 6:30 - 8:30 pm in the Marriott Hotel Green Room, on Friday, April 11. Please note the change of day, from Saturday to Friday. The Nutrition Society is planning a cruise as a special social function for Saturday evening, and we did not wish to compete with that function. We look forward to seeing you on Friday evening.

Carotenoid Research Interactive Group (CARIG) Conference

12:30-4:30 pm, Saturday, April 12, 2003
San Diego Marriott Hotel & Marina, Ballroom A
Co-Chairs: Dale A. Cooper, The Procter & Gamble Co.
Cheryl L. Rock, University of California-San Diego
Wendy S. White, Iowa State University
(No registration fee)

James A. Olson Memorial Perspectives on Carotenoids Lecture: Dietary and transcriptional regulation of β -carotene 15,15'-monooxygenase. *T. Michael Redmond*

Marginal zinc deficiency decreases intestinal retinol and β -carotene absorption. Is the decrease attributable to a defect in luminal phosphatidyl choline hydrolysis? *Sung I. Koo*
Lutein and atherosclerosis. *James H. Dwyer*
Use of plant biotechnology to develop oil seeds high in provitamin A carotenoids for human nutrition. *Christine K. Shewmaker*
Carotenoids — An Industrial Perspective. *Richard Cotter*

Carotenoids MiniSymposium at Experimental Biology

The Carotenoids Minisymposium will be held on Sunday from 8 am to 10 am. The poster session will also be held on Sunday. The Vitamin A oral session will take place on Monday afternoon at 3 pm; the vitamin A posters will be presented on Saturday.

RECENT / FORTHCOMING PUBLICATIONS

Proceedings of the 13th International Carotenoid Symposium. *Pure Appl. Chem.* Vol. 74, No. 8, 1369-1469 (2002)

Proceedings of the International Symposium on the Role of Tomato Products and Carotenoids in Disease Prevention. April 10, 2001, New York, NY. *Exp. Biol. Med.* 227 (10), November 2002.

Dietary Reference Intakes For Vitamin A, Vitamin K, As, B, Cr, Cu, I, Fe, Mn, Mo, Ni, Si, V and Zn. National Academic Press, Washington, DC, 2002. Appendix C contains revised tables of dietary intake data from NHANES III, 1988-94, for α -carotene, β -cryptoxanthin, lycopene, β -carotene, lutein with zeaxanthin, retinol and total vitamin A. To order: **tel:** 1-888-624-8422, **fax:** 202-334-2451, **website:** www.nap.edu

SIGHT AND LIFE Newsletter 4/2002, publication of the Task Force SIGHT AND LIFE, PO Box 2116, 4002 Basel, Switzerland, **tel:** 41-61-688-7494; **fax:** 41-61-688-1910, **website:** www.sightandlife.org.
A very informative article by Delia B. Rodriguez-Amaya. "Brazil: a bounty of carotenoid sources."

Alphabetical Listing of Recent Publications

This list of citations includes many missed in earlier issues. Prepared by Dr. Harold Furr, Craft Technologies, Inc.

Albrecht, M., Steiger, S. & Sandmann, G. (2001) Expression of a ketolase gene mediates the synthesis of canthaxanthin in *Synechococcus* leading to tolerance against photoinhibition, pigment degradation and UV-B sensitivity of photosynthesis. *Photochem. Photobiol.* 73: 551-555.
Aleman, T. S., Duncan, J. L., Bieber, M. L., de Castro, E., Marks, D. A., Gardner, L. M., Steinberg, J. D., Cideciyan, A. V., Maguire, M. G. & Jacobson, S. G. (2001) Macular pigment and lutein supplementation in retinitis pigmentosa and Usher syndrome. *Invest. Ophthalmol. Vis. Sci.* 42: 1873-1881.
Ambrosini, G. L. (2001) Does drinking carrot juice affect cancer of the prostate? *Med. J. Aust.* 175: 53-54.
Antolovich, M., Prenzler, P. D., Patsalides, E., McDonald, S. & Robards, K. (2002) Methods for testing antioxidant activity. *Analyst* 127: 183-198.
Arab, L., Steck-Scott, S. & Fleishauer, A. T. (2002) Lycopene and the lung. *Exp. Biol. Med.* 227: 894-899.
Arellano, J. B., Borrego, C. M., Martinez-Planells, A. & Garcia-Gil, L. J. (2001) Effect of carotenoid deficiency on cells and chlorosomes of *Chlorobium phaeobacteroides*. *Arch. Microbiol.* 175: 226-233.
Arora, A., Willhite, C. A. & Liebler, D. C. (2001) Interactions of β -carotene and cigarette smoke in human bronchial epithelial cells. *Carcinogenesis* 22: 1173-1178.
Ben-Dor, A., Nahum, A., Danilenko, M., Giat, Y., Stahl, W., Martin, H. D., Emmerich, T., Noy, N., Levy, J. & Sharoni, Y. (2001) Effects of acyclo-retinoic acid and lycopene on activation of the retinoic acid receptor and proliferation of mammary cancer cells. *Arch. Biochem. Biophys.* 391: 295-302.
Beutner, S., Bloedorn, B., Frixel, S., Hernandez Blanco, I., Hoffmann, T., Martin, H. D., Mayer, B., Noack, P., Ruck, C., Schmidt, M., Schulke, I., Sell, S., Ernst, H., Haremza, S., Seybold, G., Sies, H., Stahl, W. & Walsh, R. (2001) Quantitative assessment of antioxidant properties of natural colorants and phytochemicals: carotenoids, flavonoids, phenols and indigoids. The role of β -carotene in antioxidant functions. *J. Sci. Food Agric.* 81: 559-568.
Bhosale, P. & Gadre, R. V. (2001) Optimization of carotenoid production from hyper-producing *Rhodotorula glutinis* mutant 32 by a factorial approach. *Let. Appl. Microbiol.* 33: 12-16.
Bhosale, P. B. & Gadre, R. V. (2001) Production of β -carotene by a mutant of *Rhodotorula glutinis*. *Appl. Microbiol. Biotechnol.* 55: 423-427.

Biesalski, H. K. & Obermueller-Jevic, U. C. (2001) UV light, β -carotene and human skin—beneficial and potentially harmful effects. *Arch. Biochem. Biophys.* 389: 1-6.
Blount, J. D., Surai, P. F., Nager, R. G., Houston, D. C., Moller, A. P., Trewby, M. L. & Kennedy, M. W. (2002) Carotenoids and egg quality in the lesser blackbacked gull *Larus fuscus*: a supplemental feeding study of maternal effects. *Proc. R. Soc. Lond. B. Biol. Sci.* 269: 29-36.
Boelsma, E., Hendriks, H. F. & Roza, L. (2001) Nutritional skin care: health effects of micronutrients and fatty acids. *Am. J. Clin. Nutr.* 73: 853-864.
Boelsma, E., Van de Vijver, L. P., Goldbohm, R. A., Klopping-Ketelaars, I. A., Hendriks, H. F. & Roza, L. (2003) Human skin condition and its associations with nutrient concentrations in serum and diet. *Am. J. Clin. Nutr.* 77: 348-355.
Boileau, T. W., Clinton, S. K., Zariwreh, S., Monaco, M. H., Donovan, S. M. & Erdman, J. W., Jr. (2001) Testosterone and food restriction modulate hepatic lycopene isomer concentrations in male F344 rats. *J. Nutr.* 131: 1746-1752.
Boileau, T. W., Boileau, A. C. & Erdman, J. W., Jr. (2002) Bioavailability of all-trans and cis-isomers of lycopene. *Exp. Biol. Med.* 227: 914-919.
Borisovets, E. E., Zadorozhny, P. A., Kalinina, M. V., Lepskaya, N. V. & Yakush, E. V. (2002) Changes of major carotenoids in gonads of sea urchins (*Strongylocentrotus intermedius* and *S. nudus*) at maturation. *Comp. Biochem. Physiol. B. Biochem. Mol. Biol.* 132: 779-790.
Boronowsky, U., Wenk, S., Schneider, D., Jager, C. & Rogner, M. (2001) Isolation of membrane protein subunits in their native state: evidence for selective binding of chlorophyll and carotenoid to the b(6) subunit of the cytochrome b(6) complex. *Biochim. Biophys. Acta* 1506: 55-66.
Bowen, P., Chen, L., Stacewicz-Sapuntzakis, M., Duncan, C., Sharifi, R., Ghosh, L., Kim, H.-S., Christov-Tzelkov, K. & van Breemen, R. (2002) Tomato sauce supplementation and prostate cancer: Lycopene accumulation and modulation of biomarkers of carcinogenesis. *Exp. Biol. Med.* 227: 886-893.
Breithaupt, D. E., Bamedi, A. & Wirt, U. (2002) Carotenol fatty acid esters easy substrates for digestive enzymes? *Comp. Biochem. Physiol. B. Biochem. Mol. Biol.* 132: 721-728.
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Bukhov, N. G., Kopecky, J., Pfundel, E. E., Klughammer, C. & Heber, U. (2001) A few molecules of zeaxanthin per reaction centre of photosystem II permit effective thermal dissipation of light energy in photosystem II of a poikilohydric moss *Planta* 212: 739-748.
Burke, M., Edge, R., Land, E. J., McGarvey, D. J. & Truscott, T. G. (2001) One-electron reduction potentials of dietary carotenoid radical cations in aqueous micellar environments. *FEBS Lett.* 500: 132-136.
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Buzzini, P. (2001) Batch and fed-batch carotenoid production by *Rhodotorula glutinis*-*Debaryomyces castellii* co-cultures in corn syrup. *J. Appl. Microbiol.* 90: 843-847.
Caffari, S., Croce, R., Breton, J. & Bassi, R. (2001) The major antenna complex of photosystem II has a xanthophyll binding site not involved in light harvesting. *J. Biol. Chem.* 276: 35924-35933.
Cameri, M., Furlattini, L., Mangia, A., Musc, M., Anklam, E., Theobald, A. & von Holst, C. (2001) Supercritical fluid extraction for liquid chromatographic determination of carotenoids in *Spirulina Pacifica* algae: a chemometric approach. *J. Chromatogr. A* 912: 61-71.
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Davidson, F. J. (2001) Does drinking carrot juice affect cancer of the prostate? *Med. J. Aust.* 175: 51-52.
Deming, D. M., Baker, D. H. & Erdman, J. W., Jr. (2002) The relative vitamin A value of 9-cis β -carotene is less and that of 13-cis β -carotene may be greater than the accepted 50% that of all-trans β -carotene in gerbils. *J. Nutr.* 132: 2709-2712.
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- carotenoid interactions. *J.Lipid Res.* 43: 1086-1095.
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TECHNICAL NOTE

Lighting for Carotenoid Laboratories

Every carotenoid and vitamin A laboratory has its own preferred lighting: some use red lights, some use gold fluorescent lights, some use dim lights, and some work in near-darkness. *De gustibus non est disputandum*. We are currently using a different alternative: UV filters over conventional fluorescent tubes. These products were designed for use in museums, where it is essential to provide a nearly natural lighting spectrum for displays, but it is necessary to protect precious artifacts from UV damage. These filters are available as flat plastic sheets (which fit in a standard fluorescent ceiling fixture, 24 inches x 48 inches) or as tubes, either hard plastic or soft plastic (which fit over individual fluorescent tubes). Manufacturers/retailers claim that most UV radiation below 400 nm, or all UV below 380 nm is removed. These UV filters are estimated to have an effective life of 5-15 years, depending in part on light intensity (Northeast Document Conservation Center, www.nedcc.org/plam3/leaf24.htm). We are currently using such UV filters at Craft Technologies lab personnel likes them because they do not alter the quality or quantity of visible light noticeably. We have not made a careful study of the UV efficaciousness of these filters, but can only report anecdotally that we have seen no problems. (These filters were evaluated in the research laboratories at NIST several years ago.)

Such filters do not make a totally safe environment for our beloved carotenoids, but they can provide a more pleasant life for both carotenoids and chemists.

Below is the list of some suppliers:

Dalton & Associates, www.fluorescentlightfilters.com

tel: 201-945-8077

Ergomart.com, tel: 888-420-3200 www.ergomart.com

Natural-light Inspired Concepts Corp. tel: 909-735-6285

<http://www.natural-light.net>

University Products, www.archivalsuppliers.com

tel: 800-628-1912

Neal Craft and Harold Furr, Craft Technologies

ANNOUNCEMENTS

International Carotenoid Society

In the recently held electronic elections for offices in the International Carotenoid Society, the following individuals were elected: President-elect: Richard Cogdell; new Councilors: Robert Russell, Hideki Hashimoto, Wieslaw Gruszecki, Frederick Khachik Helmut Sies. They will join Susan Mayne, John Bertram, Andrew Young, Hans-Dieter Martin and Tom Moore, who will serve another 3-year term continuing as councilors. Harry Frank is now the President of the Society, with George Britton assuming the title of Immediate Past President. Also, the Council has appointed Frederick Khachik as Treasurer, and Andrew Young as Secretary (a.j.young@livjm.ac.uk).

Dates have now been set for the 5th Gordon Conference on Carotenoids. It will be held at the Ventura Beach Marriott, Ventura California, January 4-9, 2004. Harry A. Frank will act as Chair and John Landrum as Vice Chair. Details of the speaker programme will be available for download from the Gordon Research Conferences web site (www.grc.uri.edu) in the next couple of months. Note that

registration for the meeting is not yet possible but will take place later this year (via the GRC). A further e-mail will be sent when additional details become available.

What knowledge base is required for the effective planning of clinical trials for phytochemicals?

Chairs: Myron Gross and Elizabeth Jeffery

Guest Chair: Howard Hodis

Friday, April 11, 2003, 12:30-4:00 pm

San Diego Convention Center, Room 6C

This workshop will discuss the basic scientific information needed for successful planning and implementation of a clinical trial for whole foods or dietary bioactive components, understanding that the concepts used to develop drug trials may not always hold for trials of functional foods and dietary supplements. The workshop will provide an overview of the status of specific diet and phytochemical studies in the areas of cardiovascular disease, cancer and Alzheimer's disease. It will identify and discuss development of the types of scientific information necessary for the implementation of clinical trials in these areas. Specific issues in each major area of background information will be discussed in working groups and panel discussions. A summary document will be prepared for publication, using the findings from the presentations and discussions. While preregistration is not required, if you would like to be a part of a specific discussion group, you may write to Dr. Jeffery (ejeffery@uiuc.edu).

Plant Phenolics and Human Health Research Interest Group

6th Annual Scientific Conference and Meeting

Monday, April 14, 2003, 8:00 a.m. to 10:30 a.m.

San Diego Convention Center, Room 1A

Experimental Biology 2003

(No registration fee for PhenHRIG)

Chairpersons: *Myron Gross* (University of Minnesota)

Phyllis Bowen (University of Illinois at Chicago)

8:00 a.m. Welcome to PhenHRIG & Introduction to Phenolics and Health. *Myron D. Gross*

I. Keynote Address

8:05 a.m. Perspectives in Flavonoid Research. *Helmut Sies*

II. Epidemiology and Related Biological Actions of Citrus Flavonoids

8:45 a.m. Dietary Flavonoids and Cancer Risk: evidence from human population studies. *Marian L. Neuhouwer*

9:10 a.m. The Biological Actions of Naringenin. *David Edwards*

III. Bioavailability and Mechanisms of Action

9:35 a.m. Bioavailability of Dietary d-Limonene. *Iman Hakim*

10:00 a.m. The Effect of Flavonoids on Cellular Signaling Pathways. *Tony Kong*

10:25 a.m. Closing Comments

For more information, contact Dr. Myron Gross at gross@epi.umn.edu or 612-624-5417. PhenHRIG webpage: www.hnrc.tufts.edu/departments/labs/phenhrig.html

Internet Addresses for Carotenoid Researchers

1. USDA Nutrient Database for Standard Reference (SR13) is a major source of food composition data for epidemiologists and nutritionists. Carotenoid Food Database contains best available estimates of carotenoid content in foods, also used in NDS-R: www.nal.usda.gov/fnic/foodcomp/data/index.html

2. This list is intended to be an open forum for carotenoid researchers from around the world to discuss recent developments in this field: CARIG.Forum@lists.unh.edu. To subscribe, send e-mail to: listproc@lists.unh.edu. In the body of the message write: subscribe CARIG Forum, your name.

3. International Carotenoid Society Webpage:

www.carotenoidsociety.org Anyone wishing to join the society and be listed in the web directory, please contact Harry A. Frank at harry.frank@uconn.edu

4. Newsletter of CaroteNature GmbH, offering carotenoids standards, analysis, custom synthesis and consultancy. **E-mail:** info@carotenature.com, **website:** www.carotenature.com

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Canthaxanthin	Lycopene
Chlorophyll a	Myxoxanthophyll
Chlorophyll b	Neoxanthin
Chlorophyll c2 & c3	Peridinin
Chlorophyllide a	Phaeophytin a
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DHI is an independent self-governing institute for water and environment affiliated to the Danish Academy of Technical Sciences (ATV). The objective of the Institute is to build competence and promote technological development in areas of relevance to the water environment.



Who We Are

Craft Technologies is a contract research laboratory founded in 1994. We specialize in micronutrient and phytochemical analysis. Our 10,000 ft² laboratory is located in North Carolina approximately 50 miles east of Raleigh.

Analytical Services

We provide a range of analytical services, specializing in carotenoids, fat-soluble vitamins and phytochemicals. Offering analyses utilizing HPLC, GC, and EIA from a variety of sample matrices including: serum/plasma, urine, tissue, dried blood spot, nutraceuticals, food additives, food products, and animal feed.

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