



N°2, DECEMBER 2016

NEWSLETTER



EUROCAROTEN

EUROPEAN NETWORK TO ADVANCE CAROTENOID RESEARCH AND APPLICATIONS IN AGRO-FOOD AND HEALTH

WELCOME

We are pleased to welcome you to the second issue of the EUROCAROTEN newsletter.

In this issue you can get useful information about Short Term Scientific Missions (STSMs), and read about the personal experience of a STSM applicant. It can be of great help!

We also invite you to read about our carotenoid of the month, lutein, and get to know Dr. Torsten Bohn (Leader in WG 3) on our EUROCAROTEN Interview.

And don't forget the SAVE THE DATE for our next EUROCAROTEN meeting.

You can find more information about EUROCAROTEN COST Action on its COST website http://www.cost.eu/COST_Actions/ca/CA15136 and on our website www.eurocaroten.eu.

*Yours sincerely,
Joana Corte-Real
Paula Mapelli-Brahm
Kristina Kljak*



Subscription to the newsletter e-mailing is available via the EUROCAROTEN website (www.eurocaroten.eu). For further information, please contact us via our e-mail info@eurocaroten.eu. You can also send us your comments and proposals.

FINISHED STSMs AND FUTURE EVENTS

Page 2

Finished STSMs

Future Events

13th and 14th February 2017

EUROCAROTEN Conference and WG & MC Meetings

9th to 14th July 2017

18th International Symposium on Carotenoids

FINISHED STSM – EXPERIENCE REPORT

Page 3

Hendrik Pollman - Development of a genome-scale model for *X. dendrorhous*

“[...] it appeared exciting to develop a genome-scale model which would use all that data for the reconstruction of the metabolic network. That model could then predict genetic manipulations as well as optimized media conditions to increase carotenoid yield.”

EUROCAROTEN INTERVIEW

Page 4

Talking with: Torsten Bohn

“This COST action will surely broaden our horizon regarding carotenoids, and will constitute an important starting point for many future inter-and cross disciplinary collaborations [...]”

CAROTENOIDS IN OUR DAILY LIFE

Page 5

Lutein and Vision

“Amazingly, recent work (from our research group) has shown that lutein, zeaxanthin and meso-zeaxanthin supplementation enhances visual function in people free of retinal disease.”

Lutein and Maize

“Also various fruits and grains have been determined to be important sources of lutein, whereby especially maize contains large amounts (up to 32 µg/g).”

THINK TANK INFORMATION

Page 6

Short Term Scientific Missions (STSMs)

STSMs are exchange visits which allow researchers to visit certain institutions or organisations in another COST country, or Near Neighbour and International Partner Country included in this Action.

WORKING GROUPS NEWS

Page 7

Working Group 1

With the recent advances in Synthetic Biology and genome editing, the opportunities have now arisen to advance our rudimentary pathway modification further and develop prototypes that can be used to show the technical, production and economic feasibility of novel sources of carotenoids.



FINISHED STSMs AND FUTURE EVENTS

SAVE THE DATE

13th & 14th February 2017
2nd EUROCAROTEN Conference
&
WG and MC Meetings
SKOPJE | FYR MACEDONIA



FINISHED STSMs

DEVELOPMENT OF A GENOME-SCALE MODEL FOR *X. dendrorhous*

Grant Holder

Hendrik Pollman,
Institute for Molecular Bioscience, J.W. Goethe
University, Germany

Period

31st May to 24th June 2016

Host Institution

Technical University of Denmark, Denmark

CAROTENOID ANALYSIS AND IDENTIFICATION BY COUPLING HPLC WITH MS

Grant Holder

Dr. Jürgen Breitenbach,
Institute for Molecular Bioscience, J.W. Goethe
University, Germany

Period

2nd September to 19th September 2016

Host Institution

Royal Holloway University of London, United Kingdom

IN VITRO INVESTIGATIONS OF BIOLOGICAL ACTIVITIES OF DIFFERENT CAROTENOID-RICH FOOD

Grant Holder

Dr. Sanja Vlajsavljevic,
Department of Chemistry, Biochemistry and
Environmental Protection, University of Novi Sad, Serbia

Period

5th September to 15th October 2016

Host Institution

Department of Life Sciences, University of Trieste, Italy

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FUTURE EVENTS

2ND EUROCAROTEN CONFERENCE & WG AND MC MEETINGS

13-14 February 2017 | Skopje, FYR Macedonia

MORE DETAILS TO FOLLOW SOON

THE 18TH INTERNATIONAL SYMPOSIUM ON CAROTENOIDS

9-14 July 2017 | Lucerne, Switzerland

www.icslucerne2017.org



FINISHED STSMs EXPERIENCE REPORT

HENDRIK POLLMAN

DEVELOPMENT OF A GENOME-SCALE MODEL FOR *Xanthophyllomyces dendrorhous*

Affiliation Institute for Molecular Bioscience, J.W.
Goethe University, Germany

Position PhD Student

Host Institution Dr. Nikolaus Sonnenschein, Novo Nordisk
Foundation Center for Biosustainability,
Technical University of Denmark

E-mail: pollmann@bio.uni-frankfurt.de



During my PhD project, in which I am generating new *X. dendrorhous* strains by means of metabolic engineering, it became more and more clear that for further improvement of the carotenoid yield a comprehensive understanding of carotenogenesis and its interconnection within the metabolic network is important.

Conveniently, the genome of *X. dendrorhous* was sequenced recently and combined with several analyses of metabolism and physiology from literature it appeared exciting to develop a genome-scale model which would use all that data for the reconstruction of the metabolic network. That model could then predict genetic manipulations as well as optimized media conditions to increase carotenoid yield.

After I submitted my application, I received an immediate response from the STSM coordinator Lourdes and after three weeks my request was approved. Although my mission started only one and a half month after the action's official start, the whole application process ran smoothly and according to plan.

Once in Denmark, I was impressed by Center for Biosustainability's internationality [...]. Also, the technical equipment was state-of-the-art. Right from the beginning the cooperation with the group members was very pleasant and productive, since I always felt welcome and well supported. The following weeks I worked together

with a master student on generating a draft model based on the genome sequence. Although my proposed work plan was a little bit too optimistic the model development made a big leap forward, since the draft model is nearly completed.

On the weekends, I took the opportunity to explore the cities and countryside of the Copenhagen region. I went along the windy north coast to Helsingør, sat at the beautiful Lake Esrum and marveled at the impressive chalk cliffs of Stevns Klint. Those trekking trips were the perfect change to my scientific work and helped to regenerate from a busy week. Travelling by bus and train was very pleasant and nothing compared to the public transport in the Frankfurt region. Also, the Danes I met were all very friendly and spoke very good English, what made communicating easy.

Looking back on that great experience, I can only say that I really enjoyed my mission and highly appreciated the support from EUROCAROTEN. My work and the started cooperation were of great benefit to my PhD, which I'm going to finish soon. It was priceless to meet eye to eye, work together and learn from each other for several weeks, instead of just communicate electronically.

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EUROCAROTEN INTERVIEW

TALKING WITH:

Torsten Bohn

Affiliation	Department of Population Health, Luxembourg Institute of Health
Position	Principal Investigator Nutrition
Country	Luxembourg
Area of Interest	Bioavailability, Metabolism, Phytochemicals, Micronutrients, Inflammation, Digestion

Link to other interviews and networks:

http://www.cost.eu/COST_Actions/Ia/FA1403
<https://www6.inra.fr/cost-positive>
<https://www.facebook.com/ASN-Carotenoids-and-Retinoids-Interactive-Group-1661121230832065/info/?tab=overview>



Please tell us a bit about your lab and what you work on?

Within the Department of Population Health [...] one major focus is to obtain new data and insights regarding the intake of micronutrients and phytochemicals and their relation to health, especially chronic diseases. Personally, a main area of interest rests on polyphenols and carotenoids. For this purpose, both clinical human intervention trials and other epidemiological investigations [...] are carried out together with our Clinical and Epidemiological Investigation Centre. In addition, [...] we have been employing cellular models [...] to study aspects of bioavailability such as cellular uptake, but also to develop models of intestinal inflammation [...]. This is typically coupled with *in vitro* models of digestion [...].

Which area of carotenoids research do you find most interesting?

I am intrigued by factors influencing bioavailability. These can range from food matrix and dietary factors, but also include host factors such as digestive enzymes required to achieve carotenoid solubilisation, and also transport and further metabolism of carotenoids. However, I am also very much interested in the way in which carotenoids act on the human body – direct antioxidant effects, or via altering intracellular signaling cascades and gene expression.

As a STSM hosting lab, what type of collaborative projects would you envision?

I envision “symbiotic” collaborations in which we offer our expertise and training capabilities to the visiting scientists and also have the chance to learn from them.

In your eyes, how can the EUROCAROTEN COST Action contribute to carotenoid research?

[...] First of all, scientific exchange and inter-disciplinarily are important. [...] for creating new ideas and approaches in tackling carotenoid associated research questions. An additional approach is via highlighting the state-of-the-art and pointing out gaps, such as in reviews and position papers. Also the possibility to organize conferences in the framework of EUROCAROTEN should be used. This COST action will surely broaden our horizon regarding carotenoids, and will constitute an important starting point for many future inter- and cross disciplinary collaborations [...].

Read more @ www.facebook.com/eurocaroten

CAROTENOIDS IN OUR DAILY LIFE

CAROTENOID OF THE MONTH

Name: Lutein

Chemical Formula: $C_{40}H_{56}O_2$

Molecular Weight: 569 g/mol



LUTEIN AND VISION

[...] Lutein, zeaxanthin and meso-zeaxanthin, accumulate in the macula, where they are collectively referred to as macular pigment (MP).[...] Evidence suggests that lutein along with zeaxanthin and meso-zeaxanthin protect our eyes via their antioxidant properties [...] and filtering of harmful blue light. [...]

As we age, the risk of eye diseases such as age-related macular degeneration (AMD) and cataract increases. [...] MP has been shown to enhance visual function in diseased and non-diseased eyes and reduces the risk of visual loss in, and progression of, AMD. [...] Amazingly, recent work (from our research group) has shown that lutein, zeaxanthin and meso-zeaxanthin supplementation enhances visual function in people free of retinal disease. [...]

In most cases, we do not consume enough lutein naturally from our diets [...]. Therefore, lutein has been incorporated into nutritional supplements, fortified foods, or beverages [...].

Further investigation has found that these carotenoids correlate positively with MP levels and actual measures of cognitive function (i.e. positive news for everybody!). [...]. In summary, lutein and its sister carotenoids are important for both eye and brain health and we need to try and increase the consumption of these nutrients from an early age.

Text by Rachel Moran
PhD Candidate at Waterford Institute of Technology,
Ireland.
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LUTEIN AND MAIZE

Lutein is a naturally occurring yellow pigment that fulfils a crucial role in plants by protecting the photosynthetic apparatus against any damage caused by an excess of light. Therefore, this carotenoid is highly abundant in leafy green vegetables such as spinach, green lettuce, celery, and broccoli.

[...] Also various fruits and grains have been determined to be important sources of lutein, whereby especially maize contains large amounts (up to 32 $\mu\text{g/g}$).

Accordingly, inclusion of lutein-rich foods in the diet is desired as this carotenoid is assigned with health-promoting properties. Indeed, lutein fulfils an important role in eye health as well as it exhibits anti-inflammatory and antioxidant effects. In this context, nutrient modification or supplementation is considered an attractive strategy to achieve the daily recommended intake level of 10 mg for eye health.

Text by Lieven Van Meulebroek
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THINK TANK

STSM INFORMATION

SHORT TERM SCIENTIFIC MISSIONS (STSMs)

STSMs are exchange visits which allow researchers to visit certain institutions or organisations in another COST country, or Near Neighbour and International Partner Country included in this Action. The aim of STSMs is fostering collaborations, developing or learning new techniques, and sharing infrastructure that may not be available in other participants' institutions or laboratories. More details about regulations related to STSM are available in the COST Vademecum (<http://www.cost.eu/participate>).

STSMs should specifically contribute to the scientific objectives of the EUROCAROTEN. To be eligible for a STSM grant the applicant must be engaged in a research program as a PhD student or postdoctoral fellow, or be employed by an Institution which has within its remit a clear association with performing scientific research. Within EUROCAROTEN, STSMs preference will be given to Early Career Investigators (ECIs), and geographical and gender balance issues will be taken into consideration, as well.

Applicants from COST Inclusiveness Target Countries (Bosnia-Herzegovina, Bulgaria, Cyprus, Czech Republic, Estonia, Croatia, Hungary, Lithuania, Latvia,

Luxembourg, Malta, Montenegro, Poland, Portugal, Romania, Slovenia, Slovakia, the Former Yugoslav Republic of Macedonia, Republic of Serbia and Turkey) are especially welcome. Nevertheless, applications from all countries will be equally considered and the quality will always be the decisive parameter.

When preparing potential STSM for application, these duration rules need to be followed:

- a minimum duration of 5 days,
- a maximum duration of 90 days,
- to be carried out in their entirety within a single grant period and within the Action's lifetime.

Exceptions can be made for ECIs wishing to stay for 91-180 days.

The applicants can contact the STSM Coordinator and Vice-Coordinator for further information concerning the application process:

STSM Coordinator:

Dr. Lourdes Gómez Gómez
(marialourdes.gomez@uclm.es)

STSM Vice-Coordinator:

Prof. Vladimir Kren (kren@biomed.cas.cz)



OF EARLY CAREER INVESTIGATORS AND
OTHER YOUNG RESEARCHERS

Representatives for 1st year:

Joana Corte-Real (joana.corte-real@lih.lu)

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Joana Corte-Real

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WORKING GROUP NEWS

WG 1 PRODUCTION: DEVELOPING RESOURCES AND BIOSYNTHETIC PATHWAYS

With the recent advances in Synthetic Biology and genome editing, the opportunities have now arisen to advance our rudimentary pathway modification further and develop prototypes that can be used to show the technical, production and economic feasibility of novel sources of carotenoids. Within WG 1 we hope to build on the national and European investments that have been made to date in the field and with the resources available scope the potential of the area and highlight future activities that could provide real benefits to European consumers and industries. At the initial meeting, key areas that need addressing were defined: central repository of information, sharing of analytical procedures and standards, incorporation of new Synthetic Biology approaches, interaction with industrial

members and governmental bodies and introduction of new technologies into the field. It is hope through a number of key network meetings, whereby high profile success stories coupled with industrial and stakeholder interaction we can really begin to ascertain what is needed in these areas and what can be addressed with the resources available. The training missions available within the network have already started to show that through the exchange of early career researchers, practical data can be generated in these areas.

Leader: Paul Fraser (P.Fraser@rhul.ac.uk)

Vice Leader: Pauline Snoeijs-Leijonmalm (Pauline.snoeijs-leijonmalm@su.se)

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Torsten Bohn for his contribution to our EUROCAROTEN Interview.

Paul Fraser and **Pauline Snoeijs-Leijonmalm**, in WG 1 description.

All the STSMs applicants who have so kindly given their testimonies.

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