

**HelmholtzZentrum münchen**  
German Research Center for Environmental Health

**14<sup>th</sup> International Conference on  
Reactive Oxygen and Nitrogen Species in Plants  
July 10 - 12, 2019 | Munich, Germany**



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**Plant Oxygen Group (POG)**



**Society for Free Radical Research Europe (SFRRE)**



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# POG 2019

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# General Information

## Conference Organizer

### HelmholtzZentrum münchen

German Research Center for Environmental Health

Helmholtz Zentrum München  
German Research Center for Environmental Health  
Ingolstädter Landstrasse 1  
85764 Neuherberg, Germany  
[www.helmholtz-muenchen.de](http://www.helmholtz-muenchen.de)

## Conference Venue

Münchner Künstlerhaus  
Lenbachplatz 8 | 80333 Munich, Germany  
[www.kuenstlerhaus-muc.de](http://www.kuenstlerhaus-muc.de)  
Phone +49 (0) 89 59 91 84 0

### WiFi

The Conference Venue offers free WiFi access.  
Please select the network „MKH-Gast“ and enter the password „willkommen“

## Conference Language

The official conference language is English.

## Conference Dinner on Thursday, July 11

Augustinerkeller  
Arnulfstrasse 52 | 80335 Munich, Germany  
[www.augustinerkeller.de](http://www.augustinerkeller.de)  
Phone +49 (0) 89 59 43 93

## Registration Office

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# Conference Program

8:30 – 9:15	<b>Registration</b>	
9:15 – 9:30	Welcome address, opening remarks	
<b>9:30 – 12:45</b>	<b>Session I: Concepts and Directions in Redox Signaling Research</b> <b>Chairs: Ilse Kranner &amp; Karl-Josef Dietz</b>	
9:30 – 10:00	FERROPTOSIS, A METABOLIC DEATH PATHWAY <b>Conrad, Marcus</b>	T 1 p. 13
10:00 – 10:30	CONCEPTS AND DIRECTIONS IN REDOX SIGNALLING IN PLANTS <b>Foyer, Christine</b>	T 2 p. 14
10:30 – 10:45	Discussion	
<b>10:45 – 11:20</b>	<b>Coffee Break</b>	
11:20 – 11:40	THE EVOLUTION OF NITRIC OXIDE SIGNALLING DIVERGES BETWEEN THE ANIMAL AND THE GREEN LINEAGES <b>Astier, Jeremy</b>	T 3 p. 15
11:40 – 12:00	CHLOROPLASTS REQUIRE GLUTATHIONE REDUCTASE TO BALANCE REACTIVE OXYGEN SPECIES AND MAINTAIN EFFICIENT PHOTOSYNTHESIS <b>Müller-Schüssele, Stefanie</b>	T 4 p. 16
12:00 – 12:20	S-NITROSO THIOLS AS ARCHITECTS OF THE HISTONE PTM PATTERN AND DNA-METHYLATION IN <i>ARABIDOPSIS THALIANA</i> <b>Lindermayr, Christian</b>	T 5 p. 17
12:20 – 12:45	<b>Elevator Pitch I - uneven numbers (see page 50)</b>	
<b>12:45 – 14:30</b>	<b>Lunch Break &amp; Poster Session I (uneven numbers)</b>	
<b>14:30 – 17:40</b>	<b>Session II: New Tools for Redox Signaling Research</b> <b>Chairs: Sabine Lüthje &amp; Frank van Breusegem</b>	
14:30 – 15:00	YES TO NO? BIOSENSORS <b>Waldeck-Weiermair, Markus</b>	T 6 p. 18
15:00 – 15:30	THE JANUS FACE OF PLANT HYPOXIA <b>Licausi, Francesco</b>	T 7 p. 19
15:30 – 15:50	THE ROS WAVE: ITS REAL-TIME WHOLE-PLANT DETECTION, FUNCTION AND CHARACTERIZATION <b>Mittler, Ron</b>	T 8 p. 20
<b>15:50 – 16:20</b>	<b>Coffee Break</b>	
16:20 – 16:40	MINING FOR PROTEIN S-SULFENYLATION IN <i>ARABIDOPSIS THALIANA</i> UNCOVERS NEW REDOX-SENSITIVE SITES <b>Messens, Joris</b>	T 9 p. 21
16:40 – 17:00	INTEGRATED PROTEOGENOMIC, QUANTITATIVE REDOX PROTEOMIC AND METABOLOMIC APPROACHES REVEAL SIGNATURES OF SEED DORMANCY CONTROL IN WHEAT <b>Bykova, Natalia</b>	T 10 p. 22
17:00 – 17:20	NEW ANALYTICAL METHOD ENABLING REAL-TIME H <sub>2</sub> O <sub>2</sub> DETECTION IN THYLAKOIDS SHOWS THAT PSI UNIQUELY GENERATES CHLOROPLASTIC H <sub>2</sub> O <sub>2</sub> SIGNAL <b>Fitzpatrick, Duncan</b>	T 11 p. 23
17:20 – 17:40	PITFALLS IN ACCURATE ANALYSIS OF REACTIVE CARBONYL COMPOUNDS FROM BIOLOGICAL SAMPLES <b>Birkemeyer, Claudia</b>	T 12 p. 24
	<b>Plant Oxygen Group Meeting</b>	

<b>9:00 – 12:15</b>	<b>Session III: ROS and redox-active Gases in Development and Plant Physiology</b> <b>Chairs: Elizabeth Vierling &amp; Ismail Turkan</b>	
9:00 – 9:30	NITRIC OXIDE SYNTHASE IN PLANTS: WHERE DO WE STAND? <b>Wendehenne, David</b>	T 13 p. 25
9:30 – 10:00	COORDINATION OF CHLOROPLASTIC AND MITOCHONDRIAL ROS SIGNALING <b>Kangasjärvi, Jaakko</b>	T 14 p. 26
10:00 – 10:20	THE INVOLVEMENT OF MITOCHONDRIAL ELECTRON TRANSPORT CHAIN COMPONENTS IN NITRIC OXIDE METABOLISM IN PLANTS <b>Igamberdiev, Abir</b>	T 15 p. 27
<b>10:20 – 10:50</b>	<b>Coffee Break</b>	
10:50 – 11:10	POLLEN FERTILITY AND THE ROLE OF ROS AND REDOX HOMEOSTASIS IN HEAT STRESS TOLERANCE DURING SEXUAL REPRODUCTION <b>Miller, Gad</b>	T 16 p. 28
11:10 – 11:30	ARABIDOPSIS NITRIC OXIDE (NO) CONTENT IS MODULATED BY THE CHLOROPLAST MEMBRANE K <sup>+</sup> /H <sup>+</sup> ANTIPORTERS, AtKEA1 AND AtKEA2 <b>Corpas, Francisco J</b>	T 17 p. 29
11:30 – 11:50	ERO-MEDIATED THIOL OXIDATION IS ESSENTIAL FOR PLANT ER REDOX HOMEOSTASIS AND ETHYLENE SIGNALLING <b>Meyer, Andreas</b>	T 18 p. 30
11:50 – 12:15	<b>Elevator Pitch II - even numbers (see page 51)</b>	
<b>12:15 – 14:00</b>	<b>Lunch Break &amp; Poster Session II (even numbers)</b>	
<b>14:00 – 17:25</b>	<b>Session IV: Redox-Signaling - Abiotic and Biotic Stress Response I</b> <b>Chairs: Christine Foyer &amp; Jaakko Kangasjärvi</b>	
14:00 – 14:30	ELEVATED TEMPERATURES AND DROUGHT DURING SEED MATURATION AFFECT REDOX SIGNALING <b>Kranner, Ilse</b>	T 19 p. 31
14:30 – 15:00	MEDIATOR AND ELONGATOR SUBUNITS REGULATE H <sub>2</sub> O <sub>2</sub> SIGNALING AND RESPONSES TO OXIDATIVE STRESS <b>Mhamdi, Amna</b>	T 20 p. 32
15:00 – 15:20	SINGLET OXYGEN MEDIATED STRESS RESPONSES ARE GOVERNED BY RNA OXIDATION AND ATTENUATION OF CELLULAR TRANSLATION <b>Koh, Eugene</b>	T 21 p. 33
<b>15:20 – 15:50</b>	<b>Coffee Break</b>	
15:50 – 16:10	FAST REDOX RESPONSE OF IRON-SULFUR GLUTAREDOXIN GRXS17 ACTIVATES ITS HOLDASE ACTIVITY AND PROTECTS PLANTS FROM HEAT STRESS <b>Martins, Laura</b>	T 22 p. 34
16:10 – 16:30	THE MKKK70-MKK4-MPK3 CASCADE AND LORD1 MODULATE ROS-DEPENDENT SERF1 TRANSCRIPTION FACTOR ACTIVITY TO COORDINATE THE INITIAL RESPONSE TO SALT STRESS IN RICE <b>Schmidt, Romy</b>	T 23 p. 35
16:30 – 16:55	HYDROGEN PEROXIDE- AND REDOX-MEDIATED SIGNALLING: WHERE WE ARE NOW OR HISTORY IS BUNK <b>Mullineaux, Philip</b>	T 24 p. 36
<b>16:55 – 17:25</b>	<b>Breakout discussion: New ideas / challenges</b> <b>Moderator: Karl-Josef Dietz</b>	
<b>19:00</b>	<b>Conference dinner at Augustinerkeller</b> Arnulfstrasse 52   80335 Munich	



<b>9:00 – 12:10</b>		
<b>Session V: Redox-Signaling - Abiotic and Biotic Stress Response II</b>		
<b>Chairs: Gary Loake &amp; Francisco J Corpas</b>		
9:00 – 9:30	ADAPTATION TO ENVIRONMENTAL STRESS BY A DYNAMIC CHROMATIN-BASED STRESS MEMORY <b>Bäurle, Isabel</b>	T 25 p. 37
9:30 – 10:00	LSD1, EDS1 AND PAD4 INVOLVEMENT IN ROS REGULATION AND STRESS RESPONSE IN PLANTS <b>Czarnocka, Weronika</b>	T 26 p. 38
10:00 – 10:20	PLANT PATHOGENS HIJACK HOST REDOX INTERMEDIATES TO SUPPRESS IMMUNE SIGNALLING NETWORKS <b>Frungillo, Lucas</b>	T 27 p. 39
<b>10:20 – 10:50</b>		
<b>Coffee Break</b>		
10:50 – 11:10	REACTIVE OXYGEN SPECIES CONTRIBUTE TO THE SYMPTOMLESS, EXTREME RESISTANCE TO POTATO VIRUS X IN TOBACCO <b>Király, Lóránt</b>	T 28 p. 40
11:10 – 11:30	THIOREDOXINS CONTROL SPECIFIC NITRIC OXIDE SIGNALLING BRANCHES IN PLANT IMMUNITY <b>Mata-Pérez, Capilla</b>	T 29 p. 41
11:30 – 11:50	THE RESPONSE OF UNCOUPLING PROTEINS TO BACTERIAL ELICITOR INDUCED OXIDATIVE BURST <b>Szarka, András</b>	T 30 p. 42
11:50 – 12:10	THE 2-HYDROXY CARBOXYLIC ACID ISOLEUCIC ACID MODULATES DEFENSE AND GROWTH IN <i>ARABIDOPSIS THALIANA</i> <b>Bauer, Sibylle</b>	T 31 p. 43
<b>12:10 – 13:15</b>		
<b>Lunch Break</b>		
<b>13:15 – 15:25</b>		
<b>Session VI: Antioxidative Systems and Stress Tolerance</b>		
<b>Chairs: Laura De Gara &amp; Stanislaw Karpinski</b>		
13:15 – 13:40	MITOCHONDRIAL MTERF PROTEINS AND STRESS TOLERANCE <b>Vierling, Elizabeth</b>	T 32 p. 44
13:40 – 14:05	REACTIVE CARBONYL SPECIES (RCS) METABOLISM AND SIGNALING IN GLYCOPHYTIC MODEL <i>ARABIDOPSIS THALIANA</i> AND HALOPHYTIC MODEL <i>EUTREMA PARVULUM</i> <b>Turkan, Ismail</b>	T 33 p. 45
14:05 – 14:25	ALDEHYDE OXIDASE 3 THAT CATALYZES THE LAST STEP OF ABA BIOSYNTHESIS ACTS AS A REACTIVE CARBONYL ALDEHYDES DETOXIFIER <b>Nurbekova, Zhadyrassyn</b>	T 34 p. 46
14:25 – 14:45	FUNCTION AND REGULATION OF THE PLASTID PEROXIREDOXIN II E <b>Dreyer, Anna</b>	T 35 p. 47
14:45 – 15:05	THE MOONLIGHTING FUNCTION OF SUPEROXIDE DISMUTASE DEPENDS ON A NOVEL CLASS OF TRANSCRIPTIONAL CO-ACTIVATORS <b>Schippers, Jos</b>	T 36 p. 48
15:05 – 15:25	<b>Best-Poster-Award sponsored by “Agrisera” and “Antioxidants” and Closing Remarks</b>	

**DEVELOPMENTAL MONITORING OF GLUTATHIONE REDUCTASE ACTIVITY, EXPRESSION, CELL LOCALIZATION AND MOLECULAR VARIABILITY REVEALS ITS RELEVANCE IN THE MAINTENANCE OF REDOX HOMEOSTASIS IN MALE GAMETOPHYTE OF THE OLIVE TREE (*OLEA EUROPAEA* L.)**

E. Lima-Cabello, E. García-Quirós, I.M. Martínez-Beas, J.C. Jimenez-Lopez & J.D. Alché

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Glutathione is a tripeptide of low molecular weight present in most plant cells, determining correct development and physiology throughout its antioxidant character, concomitant with additional roles in Sulphur assimilation, heavy metal detoxification, gene expression, signaling etc. Glutathione can be present in both its oxidized (GSSG) and reduced (GSH) forms, with natural predominance of the later under non-stressing conditions. Glutathione reductase (GR; E.C. 1.8.1.7) represents the major enzyme activity converting GSSG into GSH by using NADPH. The key importance of this enzyme in maintaining redox homeostasis of plant tissues under different conditions has been widely reported. However, our knowledge on the presence, activity, localization and variability of this enzyme in the plant reproductive tissues is rather limited. In the present work we have determined the presence of numerous GR transcripts in the reproductive transcriptome of the olive tree (ReprOlive), which have been deeply analysed by using bioinformatics tools to determine phylogenetic relationships with other plant GR sequences, predict their physic-chemical properties, their potential post-translational modification, putative cell localization, and predicted 3-D structure.

In addition to predictive tools, a broad panel of biochemical analyses has been performed to assess and quantify overall GR activity in the developing anther, the mature olive pollen and the growing pollen tube *in vitro* at different developmental stages. Presence of specific variants of GR has also been assessed by means of *in gel* activity assays. The activity of the enzyme was differentially inhibited in the presence of the GR inhibitors L-carmustinine, 2-AAPA acetylamine and BSO in the reproductive e tissues. Heterologous antibodies from *A. thaliana* were used to identify and quantify the different forms of the protein present in pollen extracts. Moreover, immunocytochemical analyses using the same set of antibodies confirmed cell localization of the enzyme over the bioinformatic prediction. Finally, the expression of the GR forms detected in the reproductive tissues was assessed by q-PCR. The mRNAs corresponding to the enzyme displayed conspicuous changes along development, and in the different tissues analysed, thus providing evidence of the importance of the enzyme in the reproductive process.

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