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REUNION ISLAND, WEST INDIAN OCEAN: AN ACTIVE VOLCANO AS AN UNUSUAL SAMPLING SITE FOR MARINE-ASSOCIATED FUNGI

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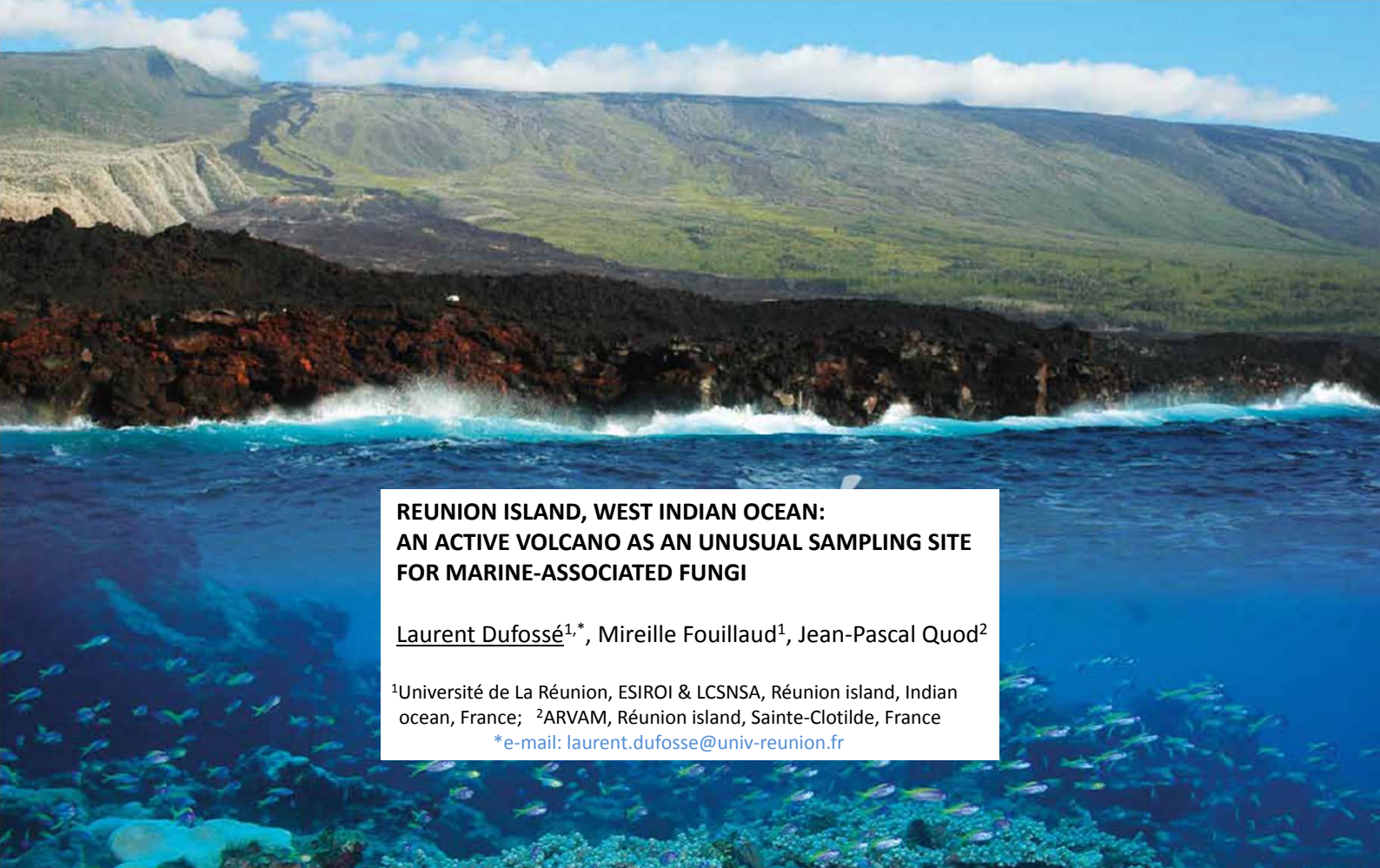
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**REUNION ISLAND, WEST INDIAN OCEAN:
AN ACTIVE VOLCANO AS AN UNUSUAL SAMPLING SITE
FOR MARINE-ASSOCIATED FUNGI**

Laurent Dufossé^{1,*}, Mireille Fouillaud¹, Jean-Pascal Quod²

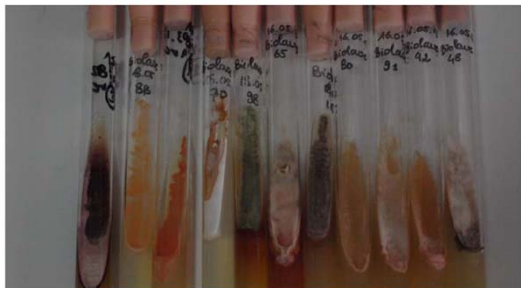
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Marine ecosystems in active volcanic areas are regularly subject to natural hazards such as being covered by incandescent lava flows, acoustic phenomena caused by microseisms, temporary changes in physicochemical conditions of water bodies and exceptional elevations of temperature. The Piton de la Fournaise (Reunion Island) is one of the most active effusive volcanoes in the world with 27 eruptions between 1998 and 2007 and a mean frequency, over a century, of an eruptive phase every 9 months. It provides a natural laboratory to study the colonization of a blank substrate. Therefore, a project called BIOLAVE was launched in 2010 in order to study species and habitat diversity on the coastal marine area of the volcano, including the first taxonomic inventory for the southeast side of the Island [1]. One hundred fungal isolates were obtained from 1977 lava flow (-25m depth), 2004 lava flow (-70m) and free water (-70m) as preliminary sampling. Density of propagules was estimated as follows: 0.085/g free water (-70m), 20/g 2004 lava (-70m) and 80/g 1977 lava (-25m) (MEA, PDA and Sabouraud media). These isolates should now be identified using phenotypic characteristics and molecular biology.

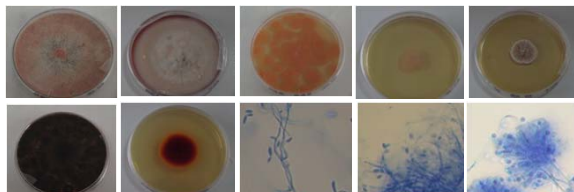
Genus / species from Free water -70m	Similarity with Accession number (GenBank)	Genus / species from Hard lava flow 1977 (-25 m)	Similarity with Accession number (GenBank)
<i>Aspergillus sydowii</i>	KC253961.1	<i>Penicillium citrinum</i>	EU030332.1
<i>Cladosporium cladosporoides</i>	JF949719.1	<i>Penicillium viticola</i>	AB606414.1
<i>Hortaea werneckii</i>	JN997372.1	<i>Epicoccum sorghi</i>	KC106717.1
<i>Myrothecium atroviride</i>	AJ302002.1	<i>Fusarium equiseti</i> (A)	JQ936153.1
<i>Nectria haematococca</i> (A)	XM_003053163.1	<i>Fusarium equiseti</i> (B)	JF311925.1
<i>Periconia</i> sp.	HQ608027.1	<i>Nectria haematococca</i> (B)	XM_003053163.1
<i>Peyronellaea glomerata</i>	JQ936163.1		
<i>Rhodospiridium paludigenum</i>	AF444493.1		



First study on metabolites
(pigmented anthraquinones) [2, 3, 4]
Extrolites available for other studies
(open scientific collaboration with labs)



Growth of marine-derived fungi collected near Lava flow on PDA



Myrothecium atroviride (PDA) *Epicoccum sorghi* *Nectria haematococca* (A) *Nectria haematococca* (B) *Aspergillus sydowii*



Myrothecium atroviride (Sabouraud)

References:

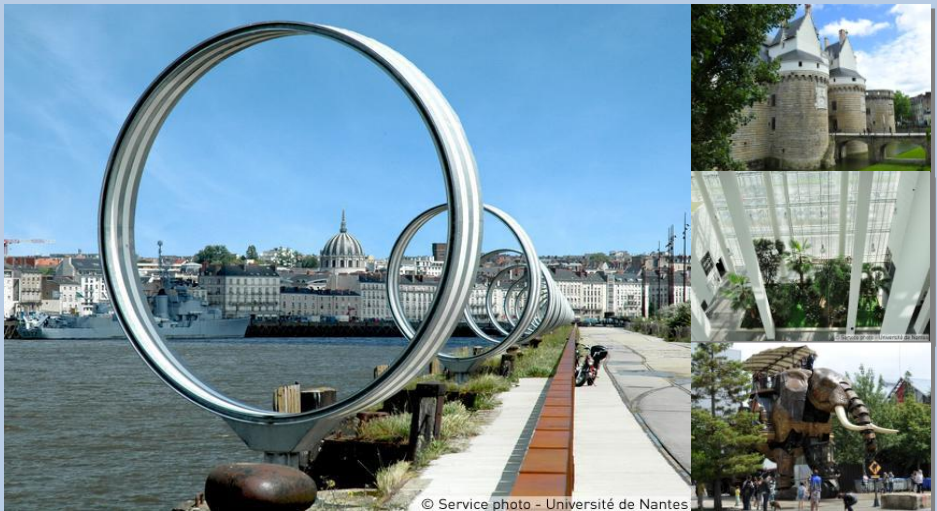
[1] Bollard S. et al., *Cah. Biol. Mar.*, **2013**, 54, 491-497
 [2] *Natural hydroxyanthraquinoid pigments as potent food grade colorants: an overview.* Caro Y., Anamale L., Fouillaud M., Laurent P., Petit T., Dufossé L. *Natural products and Bioprospecting*, **2012**, 2(5), 174-193.
 [3] *Filamentous fungi are large-scale producers of pigments and colorants for the food industry.* Dufossé L., Fouillaud M., Caro Y., Mapari S.A.S., Sutthiwong N. *Current Opinion in Biotechnology*, **2014**, 26, 56-61.
 [4] *Anthraquinones, the Dr Jekyll and Mr Hyde of the food pigment family.* Dufossé L. *Food Research International*, **2014**, 65, 132-136.



1st International Conference of the Marine Fungal Natural Products Consortium

Joint with

the 14th International Marine and Freshwater Mycology Symposium



July 22-24th 2015, Faculty of Pharmacy, Nantes, France
University of Nantes & Ifremer





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Program



1st International Conference of the
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University of Nantes - Faculty of Pharmacy

Tuesday 21st July 2015

From 6:00 pm - Participants registration / Opening cocktail

Wednesday 22nd July 2015

From 8:30 am - Participants registration

09:00-09:20 - Conference opening - Welcome speech

First session

Marine fungal biodiversity I

Chair: Dr. Ka-Lai Pang

09:20-10:10 - Inaugural lecture - Pr. E. B. Gareth Jones – “Gaps in documenting marine fungal biodiversity and their industrial application”

10:10-10:30 - Dr. Marlis Reich – “The many faces of marine fungal communities – Combining information on marine fungal community structure”

10:30-10:45 - *Coffee break*

Second session

Marine fungal biodiversity II

Chair: Pr. E. B. Gareth Jones / Pr. Peter Proksch

10:45-11:05 - Dr. Ka-Lai Pang – “Fungal community associated with *Pterocliadiella capillacea* in northern Taiwan”

11:05-11:25 - Dr. Teppo Rämä – “Diversity and biodiscovery of arctic marine fungi”

11:25-11:45 - Dr. Mohammed Rizman bin Idid – “Revealing antimicrobial potential of selected marine derived endophytic fungi from *Vitex rotundifolia* and *Ipomoea pes-caprae*”

11:45-12:05 - **Flash communications** (5 min/poster)

Dr. Amaria Matallah-Boutiba - *“Fungal isolates from western algerian marine environment”*

Ms. Marion Navarri - *“Antimicrobial activities of deep-sea marine fungi”*

Dr. Elodie Blanchet - *“Intra- and interspecific communication of bacterial and fungal endophytic communities of Posidonia oceanica”*

Pr. Lan Liu - *“Isolation, identification and cytotoxic activity analysis of symbiotic filamentous fungus from Himerometra magnipinna”*

12:05-13:45 – *Lunch*

Third session

Adaptation / chemical response of marine fungi

Chair: Pr. Soizic Prado

13:45-14:35 - Invited lecture - **Pr. Peter Proksch** – *“Co-cultivation - A powerful tool for enhancing the chemical diversity of fungi”*

14:35-14:55 - **Ms. Marine Vallet** – *“Diversity, metabolome and ecological role of endophytic fungi associated with brown algae”*

14:55-15:15 - **Dr. David Overy** – *“Affects of osmotic stress upon secondary metabolism in Aspergillus aculeatus”*

15:15-16:45 - *Coffee break / Poster session / exhibition*

Fourth session

Richness of marine fungi from unique environments

Chair: Dr. Gaëtan Burgaud

16:45-17:35 - Invited lecture - **Pr. Bin-Gui Wang** – *“Enhancing chemical diversity of secondary metabolites produced by marine-derived endophytic fungi from chinese sea waters”*

17:35-17:55 - **Dr. Vanessa Rédou** – *“Marine fungi from deep seafloor sediments: species richness and adaptation”*

17:55-18:15 - **Dr. Zhu-Hua Luo** – *“Fungal diversity and abundance in a hydrothermal vent site at the Mid-Atlantic Ridge of the South Atlantic Ocean”*

Thursday 23rd July 2015

From 8:30 am - Participants registration

First session

Marine fungi, a bioresource of growing interest I

Chair: Pr. Russel G. Kerr

09:00-09:50 - Invited lecture - **Pr. Johannes Imhoff** – “*Marine Fungi - still an underrepresented source of marine natural products*”

09:50-10:10 - **Pr. Laurent Dufossé** – “*Anthraquinones from marine-derived fungi, challengers for natural colors in industrial fields?*”

10:10-10:30 - **Ms. Camila Dias** – “*Lipids from marine-derived fungi as source of bioactive compounds*”

10:30-10:45 - *Coffee break*

Second session

Metabolomics applied to marine fungal extracts

Chair: Pr. Bin-Gui Wang / Dr. Rainer Ebel

10:45-11:05 - **Dr. Samuel Bertrand** – “*Aggressive LC-MS/MS data annotation: application to extract prioritisation*”

11:05-11:25 - **Ms. Alyssa Grunwald** – “*Characterization of tetramic acid containing compounds from *Tolyposcladium* species isolated from Canada's Arctic*”

11:25-11:45 - Shimadzu sponsor communication

11:45-12:05 - Flash communications (5 min/poster)

Ms. Sahar Daoud - “*Identification of potential bioactive compounds against breast cancer cells from the metabolic profiles of marine-derived *Penicillium* strains*”

Dr. Henrik Harms - “*Epipolythiodiketopiperazines from the marine-derived fungus *Dichotomomyces cejpii* with NF- κ B inhibitory potential*”

Mr. Peter Hufendiek - “*Epipyrones from the marine-derived fungus *Epicoccum nigrum* Link inhibit the proteases Cathepsin K and S*”

Mr. Jan Schrör - “*Secondary metabolites of the fungus *Stemphylium globuliferum* and their biological activity*”

12:05-13:45 – *Lunch*

Third session

Marine fungi, a bioresource of growing interest II

Chair: Pr. Rob J. Capon

13:45-14:35 - Invited lecture – **Dr. Rainer Ebel** – “*Induction of secondary metabolites by/ in marine-derived fungi*”

14:35-14:55 - **Dr. Olivier Grovel** – “*Combining dereplication and semi-synthesis to reveal marine-sourced fungal chemodiversity*”

14:55-15:15 - **Ms. Anne-Isaline van Bohemen** – “*Marine-derived fungi, a new source for bio-control agents: antifungal activity of peptaibols and of a peptaibol-producing strain, Trichoderma atroviride*”

15:15-16:45 - *Coffee break* / **Poster session** / **exhibition**

16:45-18:15 - Round table / Marine Fungal Natural Products Consortium discussion

Chair: Pr. Russell G. Kerr / Pr. E.B. Gareth Jones

20:00 - *Gala dinner*

Friday 24th July 2015

First session

From ecology, physiology to innovative products from marine fungi

Chair: Pr. Gabriele König / Pr. Johannes Imhoff

09:20-09:40 - **Ms. Aiko Hayashi** – “*Australian dust storm associated with extensive Aspergillus sydowii fungal “bloom” in coastal waters*”

09:40-10:00 - **Dr. Giovanna Cristina Varese** – “*Phylogenetic diversity and chemical profiling of algicolous marine fungi active against multidrug resistant bacteria*”

10:00-10:20 – **Pr. Rob J. Capon** – “*Polyketides from marine mollusc-associated fungi*”

10:20-10:35 - *Coffee break*

Second session

Metabolites of marine-derived fungi

Chair: Dr. Catherine Roullier

10:35-11:25 - Invited lecture - **Pr. Gabriele M. König** – “*Marine-derived fungal metabolites – focussing on structural diversity, biosynthesis and bioactivity*”

11:25-12:00 – Awards

12:00-12:15 – Conclusion

13:30-18:00 - *Social event*



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POSTERS

(& flash communications)

Reunion Island, West Indian Ocean: an active volcano as an unusual sampling site for marine-associated fungi

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Marine ecosystems in active volcanic areas are regularly subject to natural hazards such as being covered by incandescent lava flows, acoustic phenomena caused by microseisms, temporary changes in physicochemical conditions of water bodies and exceptional elevations of temperature. The Piton de la Fournaise (Reunion Island) is one of the most active effusive volcanoes in the world with 27 eruptions between 1998 and 2007 and a mean frequency, over a century, of an eruptive phase every 9 months. It provides a natural laboratory to study the colonization of a blank substrate. Therefore, a project called BIOLAVE was launched in 2010 in order to study species and habitat diversity on the coastal marine area of the volcano, including the first taxonomic inventory for the southeast side of the Island [1].

One hundred fungal isolates were obtained from 1977 lava flow (-25m depth), 2004 lava flow (-70m) and free water (-70m) as preliminary sampling. Density of propagules was as follows: 0.085/g free water (-70m), 20/g 2004 lava (-70m) and 80/g 1977 lava (-25m) (MEA, PDA and Sabouraud media). These isolates should now be identified using phenotypic characteristics and molecular biology.



[1] Bollard *et al.*, *Cah Biol Mar*, **2013**, 54, 491.



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Phuong	Nam Ngoc	Po-08
Poirier	Laurence	Po-08
Poli	Anna	OC-17, Po-05
Pouchus	Yves-François	OC-10, OC-14, OC-15, Po-06*, Po-08, Po-10*, Po-12
Prado	Soizic	OC-5, Po-03*
Prigione	Valeria	Po-05
Proksch	Peter	IL-2
Quod	Jean-Pascal	Po-02
Rämä	Teppo	OC-3
Rateb	Mostafa E	OC-6, IL-5
Rédou	Vanessa	OC-7
Reich	Marlis	OC-1
Renaux	Yann	OC-15
Richardson	Anthony J.	OC-16
Rizman-Idid	Mohammed	OC-4
Robiou du Pont	Thibaut	Po-12
Roullier	Catherine	OC-6, OC-11, OC-14, Po-10
Ruiz	Nicolas	OC-10, OC-15, Po-06*, Po-08
Schrör	Jan	Po-17*, IL-6
Shang	Zhuo	OC-6
Silva	Ricardo	OC-14
Slotwinski	Anita	OC-16
Stien	Didier	Po-03*
Strittmatter	Martina	OC-5
Tedesco	Pietro	OC-17
Tomasi	Sophie	Po-21, Po-22
Vallet	Marine	OC-5
van Bohemen	Anne-Isaline	OC-15, Po-08
Vansteelandt	Marieke	OC-14, Po-18
Varese	Giovanna Cristina	OC-17, Po-05

Last name	First name	
Venkatachalam	Mekala	OC-9, Po-01
Vignaud	Laetitia	Po-20
Wakefield	Jennifer	IL-5
Wang	Bingui	IL-3
Weiß	Michael	OC-1
Whittock	Lucy	OC-16
Wielgosz-Collin	Gaëtane	OC-10
Wolfender	Jean-Luc	Po-19
Xu	Wei	OC-8
Xu	J.	Po-04*
Yilmaz	Pelin	OC-1
Zalouk-Vergnoux	Aurore	OC-15, Po-08
Zwick	Vincent	Po-19

* *Flash communications*