

PROGRAM - WEDNESDAY, OCTOBER 13TH 2021

- 08:30 - 09:00 Registration and breakfast
09:00 - 09:30 Introductory remarks and welcome

KEYNOTE

- 09:30 - 10:00 Stanley Awramik
Microbialites: A Brief History

SESSION I

- 10:00 - 10:15 Microbial communities in the water column and microbialites from Mexican lakes sampled along an alkalinity gradient
M. Iniesto, D. Moreira, K. Benzerara, E. Muller, P. Bertolino, P. Deschamps, G. Reboul, R. Tavera, and P. López-García

- 10:15 - 10:30 Microbialites history of formation and preservation through multi-isotopic signatures in modern stratified alkaline crater lakes as Precambrian analogs
R. Havas, C. Thomazo, E. Vennin, H. Bert, P. López-García, M. Iniesto, D. Moreira, R. Tavera, E. Muller, and K. Benzerara

- 10:30 - 10:45 Controlling factors in microbialite development and preservation at Dziani Dzaha (Mayotte)
C. Bougeault, E. Vennin, M. Ader, P. Visscher, E. Gaucher, A. Virgogne, and E. Gérard

10:45 - 11:15 Refreshments and coffee Break

- 11:15 - 11:30 Biogeographic distribution of microbialites in Mexico
L.I. Falcón, B. Águilar, A. Yáñez-Montalvo, R. A. Mercado-Juárez, P.M. Valdespino-Castillo, and R.J. Alcántara-Hernández

- 11:30 - 11:45 Integrative analysis of the mineralogical and chemical composition of modern microbialites from ten Mexican lakes: what do we learn about their formation?
N. Zeyen, K. Benzerara, O. Beyssac, D. Daval, E. Muller, C. Thomazo, R.Tavera, P. López-García, D. Moreira, and E. Duprat



11:45 - 12:00 **Biological vs environmental factors ruling microbialite formation down south – Laguna de los Cisnes, Tierra del Fuego, Chile**
C. Pollier, A. Nuñez Guerrero, J. Rabassa, D. Carraro, S. Farsang, C. Thomas, and D. Ariztegui

12:00 - 12:15 **Taphonomy of Cenozoic Stromatolites from Lagoa Vermelha, Brazil**
C. N. Kleim

12:15 - 13:30 **Lunch Break + Visit of the Museum Galleries**

KEYNOTE

13:30 - 14:00 **Alan Decho**
Why have Mats Persisted through Geologic Time? Evidence from Present Day

SESSION 2

14:00 - 14:15 **Spatio-temporal distribution of microbialites in reef systems over the last 30 to 10 ka**
Z. Szilagyi, J. M. Webster, M. A. Patterson, K. Hips, R. Riding, M. Foley, M. Humblet, Y. Yokoyama, L. Liang, E. Gischler, L. Montaggioni, D. F.M. Gherardi, and J. C. Braga

14:15 - 14:30 **Invited Talk: Lighting up the dark - microbial dark matter matters in mats**
B.P. Burns, H.L. Wong, F.I. MacLeod, S.J. Nobs, J. Meltzer, L. Townsley, R.A. White III, and P.T. Visscher

14:30- 14:45 **The dark side of diatoms: diel dynamics of nitrate respiration and oxygen production in illuminated sulfidic sediments and microbial mat.**
E. Merz, G. J. Dick, D. de Beer, G. Lavik, H. K. Marchant, and J. M. Klatt

14:45- 15:15 **Refreshments and coffee Break**



- 15:15 - 15:30 **Elucidation of the diversity, role, and functions of viruses in modern microbialites**
R.A. White III, Q. Murphy, Hon Lun Wong, Brendan Burns, and P.T. Visscher
- 15:30 - 15:45 **Invited Talk: Microbialites and crusts in the Afar (Danakil Depression, Ethiopia): from diagenetic noise to environmental signal**
A. Foubert, D. Jaramillo-Vogel, E. De Boever, H. Negga, J.C. Schaegis, V. Rime, A. Endeshaw, J.C. Braga, D. Birgel, T. Vennemann, B. Atnafu, and T. Kidane
- 15:45 - 16:00 **Preservation and characterization of exopolymeric substances (EPS) in subsurface estuarine sediments**
T. Duteil, R. Bourillot, O. Braissant, B. Gregoire, M. Leloup, A. Henry, B. Birgaud, E. Portier, H. Féliès, I. Svahn, and P. T. Visscher
- 16:00 - 16:30 **Refreshments and coffee Break**
- 16:30 - 16:45 **Microbial ooids: modern examples and fossil analogues**
P. Suarez-Gonzalez, Y. Pei, and J. Reitner
- 16:45 - 17:00 **Ultra-high resolution record of storm events recorded within Cretaceous lacustrine stromatolite**
M. Simonet Roda and J.-H. Lee
- 17:00 - 17:15 **Geobiology and palaeoecology of the Permian-Triassic boundary microbialite (Xiejiacao, South China): implications for two-phase ecologic crises in microbialite ecosystems**
C. M. Su, Z. Q. Chen, X. Wang, and Z. Guo
- 17:15 - 17:30 **Late Anisian microbe-metazoan build-ups in the Germanic Basin – aftermath of the Permian – Triassic crisis**
Y. Pei, J-P. Duda, J. Schönig, C. Luo, and J. Reitner



08:30 - 09:00 **Breakfast**

KEYNOTE

09:00 - 09:30 **Keynote: Russell S. Shapiro**
Alteration of Microbialites

SESSION 3

09:30 - 09:45 **Microbialites micropyrrite: A pristine time capsule of microbial sulfate reduction throughout the geological**
J. Marin-Carbonne, M.-N. Decraene, L. Remusat, R. Havas, V. Pasquier, J. Alléon, S. Bernard, N. Olivier, N. Zeyen, A. Bouton, S. Escrig, E. Vennin, A. Meibom, K. Benzerarra, and C. Thomazo

09:45 - 10:00 **Pyrite formation in modern biofilms: Linking the present to the past**
M. Mansor

10:00 - 10:15 **Multiphase and multiscale characterization of bituminous laminites in Kimmeridgian carbonates from Orbagnoux, France**
S. Thlajeh, K. Lepot, Y. Carpentier, D. Duca, D. Egorov, A. Tewari, A. Riboulleau, N. Tribouvillard, and C. Focsa

10:15 - 10:30 **Generation of sedimentary deformation structures on microbial mats**
L. Maisano, C. Stempels Bautista, L. Ariel Raniolo, and D. G. Cuadrado

10:30 - 10:45 **Eukaryotic Macroalgae from the Tonian Dolores Creek Formation, Yukon Territory, Canada**
K.M. Maloney, G.P. Havlerson, J.D. Schiffbauer, S. Xiao, T.M. Gibson, M.A. Lechte, V.M. Cumming, A.E.G. Millikin, J.G. Murphy, M.W. Wallace, D. Selby, and M. Laflamme

10:45 - 11:00 **Refreshments and coffee Break**

11:00 - 11:15 **Invited Talk: Palaeoarchaeon microbialites: complex communities and palaeoenvironmental indicators**
E. Westall, K. Hickman-Lewis, F. Foucher, B. Cavalazzi, and L. Clodoré



- 11:15 - 11:30 **Invited Talk:** New frontiers in Archaean microbial mat analysis: from biome to atom
K. Hickman-Lewis
- 11:30 - 11:45 **Morphology and potential metabolisms of micro-and macro-bioherms of the Moodies Group (Barberton Greenstone Belt, 3.2 Ga, Eswatini)**
S. Reimann, C. Heubeck, M. Homann, D. J. Janse van Rensburg, and M. Wiedenbeck
- 11:45 - 12:00 **The influence of diagenesis on structures and facies of siliceous sinter deposits from an extinct geyser in El Tatio, Chile**
S. Nabhan, D.T. Wilmeth, K.D. Myers, M. Liesegang, S. Nowak, S. Slagter, S.V. Lalonde, P. Sansjofre, M. Homann, C. Munoz-Saez, K.O. Konhauser, and M.A. van Zuilen

KEYNOTE

- 12:00 - 12:30 **Martin Van Kranendonk**
3.5 billion-year old sulfidized stromatolites from the Dresser Formation, Pilbara Craton, Western Australia
- 12:30 - 14:30 **Lunch Break + Visit of the Museum Galleries / Geological Tour**
- 14:30 - 18:00 **Workshop sessions**

WS1: Creating new microbialites databases: atlases, bibliographies, and beyond

More than a century of microbialite research has produced a staggering quantity of data, including chemical, biological, and geospatial datasets, to name just a few. This session will discuss ongoing and future database initiatives within the microbialite community, and will cover both ancient and modern samples. Actionable goals of the session will primarily focus on 1) identifying facets of microbialite research that require new or updated databases to advance the field, 2) determining the proper collection and organization methods for such datasets, and 3) nominating and/or contacting researchers who are interested in starting the proposed database projects. Related topics will include discussion on previous microbialite databases, current initiatives in fields such as paleontology and biology, and balancing data accessibility with potentially sensitive information. The session will present a unique opportunity to shape the framework of future microbialite research and data collection.

animated by **Karim Benzerara, Dylan Wilmeth, Elodie Muller, Emmanuelle Gérard**

WS2: Building a Microbialite Educational Kit towards a general audience and the youngest

Microbialites are one of the most emblematic examples of the interactions between the biosphere and the geosphere on Earth and fossil stromatolites dated this relationship back to the origin of life near at least 3,5 Ga. The objective of this afternoon is to conceptualize a Microbialite kit that includes various teaching materials (e.g. hand samples, field pictures, thin sections) that can be manipulated by high school students (age 15-18 years) and any educational institution wishing to popularize geobiology and microbialites. With these materials we seek to raise awareness on the fact that strong interactions between the geosphere (rocks, sediments) and the biosphere (organisms, especially microbes) have shaped our planet Earth and are central to our future.

animated by **Camille Thomas, Christophe Thomazo**

WS3: Exhibiting microbialites

On the occasion of M-FED 2021, the Muséum national d'Histoire naturelle offers us the unique opportunity to design the permanent exhibition of microbialites in the Gallery of Paleontology and Compared Anatomy. From the selection of the most representative and significant samples to the elaboration of associated labels, explicative texts and posters shown in 7 display cases, the group will take a significant part in popularizing microbialites and their importance in the evolution of earth systems. All illustrations chosen will be drawn by MNHN artists and graphic art students. This workshop is organized in close collaboration with the person in charge of exhibition and is in the continuity of the current project of renovation of this old historical gallery.

animated by **Marie Béatrice Forel, Pierre Sans-Jofre, Cécile Colin Fromont**



PROGRAM - FRIDAY, OCTOBER 15TH 2021

- 08:30 - 09:00 Breakfast
09:00 - 09:15 Workshop Restitution

SPECIAL DANIEL ARZTEGUI GRANT

- 09:15 - 09:30 Daniel Ariztegui
Microbes and sediments: Amalgamating an environmental tale.

SESSION 4

- 09:30 - 09:45 **Invited Talk:** Modern Microbialites and Microbial Mats in the Volcanoes, Wetlands and Salt Flats of the Central Andes. Prospection, Science, Preservation and Biotechnological Applications
Maria Eugenia Farías
- 09:45 - 10:00 Redox-dependent arsenic biotransformation in a high-altitude hypersaline microbial mat system.
A. Castillejos Sepúlveda, C. F. Kerl, F. A. Vignale, D. R. Speth, M. E. Farías, and J. M. Klatt
- 10:00 - 10:15 Microbialite records of cold systems from Torres del Paine Lakes, Southern Patagonia, Chile.
L. F. Cury, A. Bahniuk, P. Quezada, and M. Calderon
- 10:15 - 10:30 Microorganism Composition Associated to Mineral Precipitation Microbial Mats from Laguna Timone Maar Crater, Pali Aike Volcanic Field National Park, Chilean Patagonia.
C. Henriquez, J. M. Pérez-Donoso, L. Fadel Cury, M. Calderón, G. Athayde, N. Bruna, P. Oyarzún, and A. Bahniuk
- 10:30 - 10:45 Geobiology of novel microbial ecosystems from Salar de Atacama, Chile.
F. A. Vignale, D. Kurth, D. G. Poiré, A. I. Lencina, E. Chihuailaf, N. C. Muñoz-Herrera, F. Novoa, M. Contreras, A. G. Turjanski, M. E. Farías
- 10:45 - 11:15 Refreshments and coffee Break



- 11:15 - 11:30 **Microbialites of Lago Strobel, Santa Cruz, Argentina: Environmental and astrobiological significance.**
E. Rivarola, F. J. Gomez and E. C. Mlewski
- 11:30 - 11:45 **Photoreceptors distribution follows a light gradient in modern stromatolites from Lake Socompa (4,570 m), High-Andes Puna Region**
D.G. Alonso-Reyes, J. M. Irazoqui, A. Amadio, D. Tschoeke, F. Thompson; Maria Eugenia Farias and V.H. Albarracín
- 11:45 - 12:00 **Molecular and isotopic analysis of lipids biomarkers from microbialites and microbial mats from high-altitude hypersaline lakes in La Puna (Argentinian Andes).**
D. Carrizo, L. Sánchez-García, F. Vignale, and M.A. Fariás
- 12:00 - 12:15 **Closing Remarks**
- 12:15 - 14:30 **Lunch Break + Visit of the Museum Galleries / Geological Tour**
- 14:30 - 17:30 **Poster Session & Exhibition of Microbialites**



- 1) **Different cyanobacterial communities share same functions in microbialites**
B. Águila, A. Yáñez-Montalvo, R. A. Mercado-Juárez, I. Becerra-Absalón, G. Montejano, and L. Falcón
- 2) **Microbial mats from extreme environments of Northern Chile**
C. F. Cubillos, D. Moreira, M. Iniesto, P. Aguilar, P. Deschamps, and P. López-García
- 3) **Prokaryotic diversity and biogeochemical characteristics of field living and laboratory cultured stromatolites from the hypersaline Laguna Interna, Salar de Atacama (Chile)**
J.R. Osman, P. Viedma, J. Mendoza, and D. Cotorás
- 4) **Cross-system functional and taxonomic analysis of microbialite communities from different geological regions in Mexico: the central region (volcanic crater-lake Alchichica) and the southeastern karst region (Bacalar lagoon and Cenote Azul sinkhole)**
A. Yanez-Montalvo, B. Águila, R. Mercado, A. Sánchez-Quinto, and L. Falcón
- 5) **Characterization of microbiomes in the modern microbialite ecosystem of Pozo Bravo Lake, Argentina, using 16SrRNA amplicon sequencing**
A. I. Lencina, F. A. Vignale, D. Carrizo, A. Castillejos Sepúlveda, J. M. Klatt, A. G. Turjanski, F. J. Gomez, and M. E. Farías
- 6) **Comparative metagenomics of microbialites from Mexican crater lakes**
A. Gutiérrez-Preciado, M. Iniesto, Y. Zivanovic, D. Moreira, K. Benzerara, P. Bertolino, D. Jezequel, C. Thomazo, R. Tavera, and P. López-García
- 7) **A first metagenomic glimpse of freshwater microbialites in Bacalar lagoon, Mexico**
R. A. Mercado-Juárez, A. Yanez-Montalvo, B. Águila-Salgado, A. Sánchez-Quinto, and L.I. Falcón
- 8) **Endoevaporites or gypsum stromatolites? Metagenome-based study on the carbon precipitation metabolic pathways in the hypersaline lake Laguna Verde (Andean Puna, Northwestern Argentina)**
L.A. Saona, P.G. Villafañe, C. Cónsole Gonella, and M.E. Farías
- 9) **Effect of culture pH on cyanobacterial EPS composition: Implications for carbonate precipitation**
M. Martinho de Brito, I. Bundeleva, F. Marin, A. Wilmotte, E. Vennin, and P. T Visscher
- 10) **Cryptic Sulfur Cycling in a Cyanobacterial Mat**
J. M. Klatt, M. Medina, D. de Beer, W. Ziebis, and G. J. Dick

- 11) **Hydrological cycle and microbial dolomite formation in hypersaline lagoons in Brazil**
C. Areias, M. Sánchez-Róman, C. Fernandes Barbosa, A. P. Soares Cruz, J. A. McKenzie, T. Eglinton, N. Haghipour, D. Ariztegui, and C. Vasconcelos
- 12) **Exploring variations in metal concentrations in modern stromatolites (Lagoa Vermelha, Brasil)**
S. Bruggmann, C. Vasconcelos, J. McKenzie, and M. Sánchez-Román
- 13) **Novel stable isotopes as biomarkers for bio-geochemical metal cycling in microbialites**
S.V. Hohl, and S. Viehmann
- 14) **Evaluation of the sedimentary controls on genesis and evolution of carbonate deposits in the southern Patagonian lake**
L. Cury, G. Marangon, M. Calderón, Quezada, G. Athayde, and A. Bahniuk
- 15) **Microbialite records in the Botijuella Travertine System, Central Andes, Puna region.**
L. F. Cury, T. Stepanenko, G. Alonso, G. B. Athayde, L. da Rocha Santos, F. Varejao, M. E. Farias, and A. Bahniuk
- 16) **The Atacama Desert as an Analogue environment to Rocky Exoplanets**
V. Molina, P. Aguilar, C. Dorador, and J. Tregloan-Reed
- 17) **Oxygenic photosynthesis shapes arsenolipid production and persistence in HAAL**
D. Doherty-Weason, A. Castillejos Sepulveda, F. Schubotz, S. Contreras, M. E. Farias, C. Kerl, D. de Beer, and J. Klatt
- 18) **Arsenic redux: New findings and roles in microbialite formation**
P.T. Visscher, A. Bouton, A. Somogyi, E. Vennin, C. Thomazo, R. Bourillot, A. Pace, B.P. Burns, A.H. Visscher, Z.S. Richardson, and O. Braissant
- 19) **Biominalization evidence in microbialites from crater lake Atexcac, Mexico**
V. Betancourt-García, R. Tavera, K. Benzerara, N. Zeyen, P. López-García, and D. Moreira
- 20) **Geo-biological study of anaerobic microbialites as analogues of Precambrian microbialites**
J. Caumartin, K. Benzerara, E. Muller, P. Lopez-Garcia, R. Havas, C. Thomazo, H. Bert, D. Jezequel, D. Moreira, and R. Tavera



21) **The Role of Cyanobacteria in Calcium Carbonate Precipitation in Fayetteville Green Lake, New York**

Q. Murphy, P.T. Visscher, and R.A. White III

22) **Insight into the metabolisms of phototrophic alphaproteobacteria associated to the stromatolites of Dziani Dzaha, Mayotte**

E. Gérard, Y. Zivanovic, C. Truong, C. Pisapia, K. Benzerara, B. Ménez, and M. Ader

23) **Carbon and oxygen isotopic variations in modern Sardinian stromatolites**

J. Debrie, P. Sans-Jofre, K. Benzerara, and J.P. Saint Martin

24) **Minute cryptoendolithic microbialites indicate bacterial-fungal interaction in a deep-sea volcano, Vesteris Seamount, Greenland Sea**

H. Schmid-Beurmann, M. Ivarsson, W. Bach, and J. Peckmann

25) **Investigating the formation of intracellular ACC inclusions (micropearls) in Chlorodendrophyceae**

I. Segovia-Campos, K. Perron, M. Filella, and D. Ariztegui

26) **Physico-chemical and biological controls on microbialite formation: experimental biomineralization in open system.**

E. Muller, K. Benzerara, J. Caumartin, R. Havas, M. Iniesto, D. Jézéquel, P. López-García, D. Moreira, R. Tavera, C. Thomazo, and E. Vennin

27) **Experimental Fossilization of Stromatolites**

S. Bernard and P. Sansjofre

28) **Geochemical study of stromatolites through geological time: new perspectives from the MNHN Microbialite Collection**

L. Fogret, P. Sansjofre, and S.V. Lalonde

29) **Geochemical heterogeneity in modern and ancient microbialites and their significance for deep time palaeoceanographic interpretations**

D. A. Petrash

30) **Microbialite development and preservation of the Late Quaternary Lahontan lake (USA)**

P. Boussagol, E. Vennin, A. Roche, A. Bouton, C. Kolodka, C. Thomazo, J.F. Buoncristiani, and P.T. Visscher

31) Oncoidal microbialites in non-marine environments in Quaternary carbonate deposits of Central-Brazil.

A. Bahniuk, L. Santos, and A. Rodrigues

32) Microbialites in Rift Lakes: their diversity and significance in the Turkana Depression (Plio-Quaternary, East African Rift System)

M. Schuster, and A. Nutz

33) Late Carboniferous to early Permian microbial deposits of the Massif Central, France: paleoenvironment and paleoclimate implications

M. Mercuzot, E. Vennin, P. Pellenard, S. Steiner, S. Bourquin, G. Gand, L. Beccaletto, and G. Theriez

34) A tale of three Archean microbialite-hosted oxygen oases: comparative trace element systematics from Red Lake, Woman Lake, and Steep Rock Lake.

L.A. Patry, B. Ramsay, D. Wilmeth, M. Afroz, P. Sansjofre, M. Homann, L. Nichol, T. Gobert, R. Riding, P. Fralick, and S.V. Lalonde

35) Carbon isotope data from the Neoproterozoic Campbellrand-Malmani carbonate platform: new insight into carbon fixation pathways at the eve of the Great Oxidation Event

A. Pellerin, R. Havas, P. Sansjofre, N. Olivier, K. Lepot, J. Alleon, J. Marin-Carbonne, P. T. Visscher, and C. Thomazo

36) Carbon and oxygen isotope chemostratigraphy of the Mesoproterozoic stromatolitic carbonate platform at Red Lake, Northwest Ontario, Canada

M. Afroz, P. Fralick, L. Patry, P. Sansjofre, and S.V. Lalonde

37) A Mesoproterozoic oxygen oasis expanded: new trace element and stable isotope data from the 2.8 Ga Mosher Carbonate, Steep Rock Lake, Canada.

D. Wilmeth, P. Fralick, R. Riding, and S. Lalonde

38) Elemental and Isotopic Fingerprints of Mesoproterozoic Phototrophic Metabolisms

S.V. Lalonde, P. Sansjofre, M. Afroz, L. Nichol, M. Homann, D. Wilmeth, L.A. Patry, B. Ramsay, R. Riding, and P. Fralick

39) Microbial mats in the Barberton Greenstone Belt: A testimony of Paleoproterozoic life and habitability on early Earth

M. Homann, C. Heubeck, S.V. Lalonde, P. Sansjofre, M.A. van Zuilen, and S. Reimann

40) Neodymium isotopes in stromatolites: new perspectives on direct dating and reconstructing the source of elements in microbial habitats through deep time

S. Viehmann

