Geoscience Canada

Stromato-Mauritania 1988

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Volume 16, Number 2, June 1989

URI: https://id.erudit.org/iderudit/geocan16_2con01

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Publisher(s)

The Geological Association of Canada

ISSN

0315-0941 (print)
1911-4850 (digital)

Explore this journal

Cite this article

Hofmann, H. J. & Pratt, B. R. (1989). Stromato-Mauritania 1988. *Geoscience Canada*, *16*(2), 93–94.

Conference Reports

Stromato-Mauritania 1988

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A highly successful symposium/field excursion for stromatolite specialists took place in the Islamic Republic of Mauritania from 7-18 December 1988. The meeting was held under the auspices of IGCP Project 261 (Stromatolites), led by R.V. Burne of Australia. This project aims to further the understanding of stromatolites with respect to their biological and sedimentological significance, and their use in pre-Cambrian stratigraphy, as well as stromatolite taxonomy.

The Late Proterozoic succession of the Taoudenni Basin in the Adrar area of NW Mauritania (Atar Group) was selected as a most appropriate target for a Project 261 workshop on ancient stromatolites. Here stromatolites of wide morphologic diversity occur as extensive bioherms and biostromes in a mixed carbonate and siliciclastic sequence of 10 formations that make up the 750 m thick Atar Group (900-700 Ma). This group is an accessible, superbly exposed, structurally uncomplicated platform sequence that, together with the underlying siliciclastic Char Group, disconformably overlies the West African craton (Reguibat Shield, stabilized by 2000 Ma). The Atar and its stromatolites have been studied in great detail by the organizers of this workshop ("Stromato-Mauritania 1988"), Janine Bertrand-Sarfati and Alexis Moussine-Pouchkine (U des Sciences et Techniques du Languedoc, Montpellier); they were assisted on this trip by Jean-Jacques Chauvel (U de Rennes) and Jean-Pierre Arrondeau (U de Nice; on loan to Mission Française Coopérative in Mauritania).

For logistical reasons, the excursion was limited to 14 geologists plus 1 hired driver, travelling in four 4-wheel-drive vehicles; three of the French geologists doubled as drivers. Participation was international and represented a broad range of expertise in stromatolite studies: specialists came from Australia (Bob Burne, project leader and video cameraman, Bureau Mineral Resources; Kath Grey, Geological Survey Western Australia), Canada (Hans Hofmann, U Montréal; Brian Pratt, U Toronto), England (Ian Fairchild, U Birmingham), France (the organizers and assistants, plus Joel Casanova, CNRS Luminy), Mauritania (El-Khalil ould Ahmed Khalifa, Institut Supérieur Scientifique), Spain (Miguel Julivert and Isabel Zamarreño; Instituto Jaime Almera, Barcelona), USA (Stan Awramik, U California at Santa Barbara), and West Germany (Josef Paul, U Göttingen). Chinese, Indian, and Soviet representatives were invited but were unfortunately unable to attend. This was a pity, because by far the most active practitioners of Proterozoic stromatolite biostratigraphy are from these countries, and thorough discussions on stromatolite taxonomy with them would have been beneficial.

After various, often convoluted preparatory steps taken by participants in the months (and also minutes) prior to departure (obtaining funds, visa, vaccinations and pills against a host of diseases and minor ailments) the group finally assembled at the Paris international airport on December 7, braving a transport strike and exploding suspicious luggage detonated by airport security staff. The 4¼ hour, non-stop flight to the capital of Mauritania, Nouakchott (= "place of the winds"), provided a glimpse of the stark Saharan landscape and its advancing sands, over which the group would travel two days hence. After somewhat chaotic entry procedures at the airport, the group was lodged in small hotels at the centre of Nouakchott. The following day was mostly taken up with a symposium held in the auditorium of the Ecole Normale Supérieure, so that each one could inform the others of his or her particular interest or approach to stromatolites. With the added audience of several local instructors, J. Bertrand-Sarfati gave a description of the field-trip area, as well as her other Proterozoic stromatolite studies in various parts of the West African craton. I. Fairchild discussed the petrography of the Atar stromatolites and outlined the differences between primary and secondary diagenetic fabrics. K. Grey described her stromatolite work in comparable sequences of Western Australia. H. Hofmann made a strong plea for stromatolite taxonomists to take advantage of microcomputers and employ quantitative methods in characterizing the taxa. B. Pratt contrasted the origin of Proterozoic carbonate sediment with that of the Phanerozoic, and discussed current theories relating to its cyclic accumulation in shallow-water sequences. The role of microorganisms in stromatolite construction was described by S. Awramik, who reminded us of the biological complexity of the mats they form. Moving up the stratigraphic column, J. Paul demonstrated the similarity between Permian stromatolite bioherms of the Zechstein and forms more familiar from the Proterozoic. The occurrence and microstructure of stromatolites in a hypersaline Tertiary sequence in Spain were described by I. Zamarreño, and modern lacustrine forms from African lakes and Kelly Lake in British Columbia were compared by J. Casanova. R. Burne gave an overview of the kinds of stromatolites occurring in modern hypersaline lakes and marine embayments in Australia. (Abstracts of the presentations are be published in the Stromatolite Newsletter.)

After the talks and a late lunch, the group had a chance to see some of the local cultural attractions by visits to the large souk (market) and the Port de Pêche, the beach on the Atlantic, where hundreds of old and young people in colourful dresses awaited the return of the fishing boats (canoes) with the day's catch, and to land them through the surf.

As we were to learn later, this was also the day a DC-7 aircraft from the US Agency for

International Development on a locust-spraying mission was shot down, with the loss of the crew of five, by guerillas about 300 km northeast of the area we were to visit. In the previous year, a group of French hydrologists had driven over a land mine in the same general region and lost their lives. These events reflect the political and great economic difficulties of the region, and serve to remind us of the precarious conditions for doing field work in this area.

On the second day, the group loaded up into the four field vehicles for a very dusty, day-long drive through the desert to the town of Atar, about 500 km and five desultory police checkpoints away. As from the air, the bleak landscape with the encroaching sand dunes over the crumbling highway, sparse vegetation and even sparser habitations is evident all along the way. One had the feeling of sitting at the neck of a gigantic hour-glass sand-clock, with the sand of the Sahara passing by on its way to the Atlantic, measuring centuries and millenia rather than minutes or hours. After arrival in Atar, the group checked into the new and comfortable Atar Hotel, used as a base of operation for the next seven days. Breakfast was taken at the hotel, lunch (fresh baguettes slathered with sardines, and apples and oranges) was on the rocks, dinner was mostly taken at the French Military mission next door to the hotel, but with a couple of forays into the local, camel-based cuisine. The unforeseen access to the bar at the mission also provided an opportunity to partake of liquid refreshments favoured by geologists, but not usually available in Moslem countries.

All-day trips, progressively to stratigraphically higher units within the Atar Group, and ending in the overlying Lower Paleozoic clastics on the last day, provided the scientific highlights of the project; most localities visited were within 25 km of the town of Atar. Discussions each evening at the military mission complemented the experience of the day's splendid exposures in the field. Several copies of a draft version of a manual on how to describe stromatolites, prepared by Kath Grey, were circulated for comment. It is intended to serve as a reference work with suggestions on how to report and interpret data on stromatolites.

Figure 1 Jacutophyton sahariensis, *Atar Group (Unit I-5), at a section near Tod – Tenkharada, north of Atar.*

A detailed, well-illustrated guidebook, with copies of aerial photos of the sections, and reprints of the organizers' recent publications greatly facilitated the process of getting acquainted with the stromatolitic units. The organizers planned the stops in such a way that participants were not rushed, but had ample time to discuss every aspect of the rocks, and to photograph, and sample the sections. Participants were constantly challenged to find interpretations for the unusual and as yet unexplained features observed, such as the petaloid mode of growth of *Jacutophyton sahariensis* (Figure 1), the very pronounced elongation and parallelism exhibited by *Conophyton jacqueti* with lanceolate and dentate plan outlines, broken *Conophyton* columns that look like felled tree trunks, and various enigmatic sedimentary and diagenetic phenomena such as the "vermiculus" problematica that resemble curled-up molar-tooth structure. It was during these fruitful discussions that the breadth of experience exhibited by the workshop group as a whole made itself felt.

The weather was fine most of the time, usually windy, and sometimes dusty. The local populace was curious and friendly. Our friendship with Khalil gave some of us the chance to meet people on a personal level.

The final field day was a tour through the overlying uppermost Proterozoic and Cambro-Ordovician siliciclastic sequence with glaciogenic units, and involved dodging a possible minefield, visiting an historic camel path and movie-set fort, and stone-age cave paintings depicting animals that roamed the Adrar region during wetter climates.

Finally, the night-time departure from Atar added some excitement in one of the vehicles, as it negotiated the switchback track without headlights. Then the Air Afrique flight out of Nouakchott was delayed 18 hours, causing missed connections and hurried changes in travel plans.

Sampling was the one thing in which participants had to exercise restraint. Stringent currency regulations in Mauritania require all foreign money to be declared upon entry as well as exit, with documentation that any difference was changed into ouguyas at the official (and inflated) rate ($1 CDN ≈ 60 UM). The situation precludes the use of credit cards when paying for shipment of samples, and also makes shipping samples extremely expensive: air freight to Montreal is about $10 CDN/kg at this rate; sample trimming was definitely advised, and samples that were shipped air freight took 7 weeks in transit.

Stromato-Mauritania 1988 successfully provided participants with an opportunity to see first-hand, and discuss with other stromatolite specialists, an exceptionally well-preserved and well-studied diversified stromatolite sequence. Friendships were established and joint projects were set in motion. Discussions on taxonomic problems would have benefitted from input from specialists unable to participate. Bob Burne has recorded many candid comments and discussion on videotape, which should make very interesting viewing for both participants and those that could not participate. The organizers deserve our sincere thanks for an outstanding workshop.

Accepted 20 March 1989.