12th EAOG Newsletter - Autumn 2000

Newsletter Secretary's bit

Time for a new instalment of our biannual newsletter, which is rapidly becoming as popular and eagerly awaited as the next "Harry Potter" book[1]. It's just a shame I don't get the same remuneration as J.K. Rowling.

This time we have a column from the Chairman, in which he informs us that, *inter alia*, we have a new Chairman-elect. Apart from that we have the EAOG version of "Lonely Planet"[2], otherwise known as the Travel Award reports.

On a very sad note, we regret the passing of Prof. M. Teichmüller, who died earlier this year, and we include an obituary here.

Richard Patience.

Chairman's Column

The last several months have been extremely busy for me primarily because I am in the process of switching jobs from Forschungszentrum Jülich (KFA) to Geoforschungszentrum Potsdam, and I thank the EAOG Public Relations Officer (a.*k.a. Newsletter Secretary - ed.*) for his subtle blend of gentle prodding and undisguised threats that finally got me to write my contribution.

First, it is my great pleasure to inform you that Richard Patience was unanimously voted to the office of Chairman-Elect by the EAOG Board in April. What this means is that Richard will take over from me in September 2002, and that the 20th International Meeting on Organic Geochemistry in Nancy will be my last as Chairman. For the record, the EAOG Articles state that the term of office of the EAOG Chairman is six years, thereby ensuring continuity in the longer term. The articles also state that a Chairman-Elect shall be named two years ahead of the Chairman's impending departure, thus Richard's election this year. I think it is to his credit that Richard, before accepting the nomination, suggested we consider that the last two EAOG Chairman were also British (Geoff Eglinton was my predecessor), and that perhaps it was time for a change of nationality at "the top". However, because personal qualities rather than nationality are of paramount importance, the matter was quickly settled and the Board voted unanimously in his favour. Once again, congratulations to Richard Patience.

The 20th International Meeting on Organic Geochemistry will take place in Nancy, 10-14 September 2001. Let me remind you that extended abstracts must be in by December 1, 2000. Patrick Landais and his local committee have a fine programme lined up, both scientifically and social, so don't let the deadline pass you by!

Talking of IMOG conferences, I was most gratified to have been invited to Turkey in June this year to receive a certificate and plaque by Namik Yalcin on behalf of the Istanbul Conference Organising Committee to acknowledge EAOG's close co-operation in making the 19th

1 Excellent children's books also enjoyed by
2 Excellent travel books and TV

International Meeting on Organic Geochemistry happen. You will remember that only three weeks before the scheduled start a devastating earthquake struck northern Turkey, and it was touch and go as to whether we should run the meeting. The citation reads "Despite the devastating Marmara earthquake of 17. August 1999 the 19th International Meeting on Organic Geochemistry (IMOG) was successfully held in Istanbul on 6-10 September 1999. Tübitak-Marmara Research Centre (MRC) acknowledges the great personal effort and support of the president of the European Association of Organic Geochemists (EAOG) Prof. Dr. Brian Horsfield to the Organisation Committee of the 19th IMOG."

I want to use this opportunity to express my thanks to Namik Yalcin for this kind gesture. The photo shows the occasion, and, yes, Dietrich Welte was there too.

Brian Horsfield.

EAOG Travel Awards

New awards:
Two applications for Travel Awards were approved by the committee in March 2000. These are:
1. Jeremy R. Marlow, University of Newcastle, budget US$ 2000
2. Manuel Algarra Gonzáles, Universidad de Malaga, budget US$ 3500

Reports from completed awards:

1. Cláudio Pires Florencio, University of São Paulo, BRAZIL

TITLE: GEOCHEMICAL ORGANIC MARKERS OF THE PARIPUEIRA EVAPORITIC INTERVAL, SERGIPE / ALAGOAS SEDIMENTARY BASIN, NORTHEAST BRAZIL.

Host laboratory: Prof. Juan José Pueyo, Faculty of Geology, University of Barcelona, SPAIN

Introduction

The Paripueira evaporites are Aptian in age and are spread across several areas of Alagoas State, NE Brazil. They are composed of alternations of halite and black organic shales. These evaporites represent the first marine transgression under restricted conditions in the basin. The results obtained in the research will be of great importance to the overall project.

Essential objectives

-To analyse the organic content of halites and shales in the evaporite layers.
-To determine the isotopic composition of the organic matter and carbonates.
-To evaluate the importance, contribution and variation of continental vs marine organic matter, as well as the characteristic of organic matter in the saline environments.
-To understand the paleoenvironmental conditions of the evaporite basin in the context of the initial stages of the South Atlantic Ocean generation.
-To compare marine evaporites from a rift environment with evaporites in other geodynamic contexts.

Realizations

The analyses took place at the laboratories of the University of Barcelona (Faculty of Geology), in March, April and May, 2000.
The following work was done:
- Extraction, fractionation and analysis by GC-MS of organic fractions of shales and halites in the evaporite layers.
- Determination of the isotopic composition of the organic extracts and carbonates.
- Elemental analysis for quantitative determination of C, N, H and S.
- Identification of the main local anoxic events represented by the high TOC contents distributed along the stratigraphic column.

2. Ivana Tonsa, Laboratory for Geochemistry and Cosmochemistry, University of Nis, Nis, Yugoslavia

Host laboratory: Instituto de Ciencias de la Tierra (ICT), Facultad de Ciencias (Universidad Central de Venezuela, Caracas, Venezuela).

Introduction

In general, marine carbonate/siliceous rocks are the source of large quantities of immature, non-biodegraded heavy petroleum deposits that occur as liquids/semisolids in porous/fractured media. These non-biodegraded asphaltic petroleums (rich in vanadium: V) found, for example, in the northwestern Venezuela (the La Luna Formation) are considered to be the products of oil-prone, V-rich (immature) source kerogen of marine origin.

The origin of V associated with the asphaltenes in asphaltic petroleums of marine origin, in general, is one of the intriguing problems of petroleum geochemistry since its origin is undoubtedly closely related to the origin of the immature source kerogen itself and the associated asphaltic petroleum. In fact, V bound in the asphaltene matrix may have originated into two ways: a) through incorporation into the humic progenitors (humics) of the immature source kerogen during the diagenesis of the original bio-organic material in the early sediment from interstitial seawater and b) through incorporation into humics and diagenesis of the (endemic) V compounds of the original bio-organic material. Although there is no general agreement on the issue, majority opinion seems to incline toward a non-endemic origin of V associated with the immature source kerogen structure. A few earlier researchers expressed the view that V in a geo-organic accumulation (including the source kerogen) was derived from the biological precursors. In most cases, the V incorporation into the immature source kerogen is essentially due to abiotic, diagenetic reactions of initial humic substances with the associated seawater (inorganic) V. Thus, it is not unreasonable to suggest that the La Luna immature source kerogen abundant in V (or, at least, those parts of its macromolecular skeletons which are highly enriched with V) are relics of initial marine humic substances which were also enriched with V. However, the relative V abundances in the La Luna source kerogen and related petroleum asphaltenes obviously require an additional source of V enrichment beside common seawater.

Apart from artificial short-lived radioactive nuclides, V consists of a mixture of two stable naturally occurring V isotopes, ^{50}V and ^{51}V, whose relative abundances in geochemically undifferentiated carbonaceous material come close to 0.250 % and 99.750 %, respectively (with a corresponding isotopic ratio $^{50}V/^{51}V = 2.50 \times 10^{-3}$). The various geochemical considerations suggest that V of petroleum asphaltenes arising from non-endemic source should have a $^{50}V/^{51}V$ ratio similar to that of an inorganic source. V of petroleum asphaltene arising directly from biological material (endemic source) should have a $^{50}V/^{51}V$ isotopic ratio larger than the inorganic source due to kinetic/equilibrium effects during biological processing. Implicit in such an approach is that the ultimate inorganic source of the endemic/non endemic V was primarily seawater enriched more or less with this metal. In view of this, our research efforts are focused on the V contents and isotopic compositions of V in asphaltenes of asphalt petroleums of Venezuela and their source kerogens of the La Luna Formation. In addition, I intend to analyze isotopically V of the source kerogens from the Apon/Querecual Formations (Venezuela). The object of this study is gaining some further insight into the general biogeochemistry of V during the source kerogen-/asphaltene-forming processes. Interest is particularly centred on the possible direct biological source of V.

Whilst considerable attention has been paid to the isotopic composition of the various forms of non-metals (especially carbon) in petroleum, less regard has been given to the metals. Previously we noted that the V isotopic compositions of petroleum asphaltenes differed by as much as 2 % to 5 % from inorganic source ($VOSO_4 \cdot 5H_2O$, Merck)**.** The preliminary results of this isotopic analysis of V within the petroleum asphaltene fractions of La Luna Formation are included in our paper titled "The vanadium isotopic constitution of petroleum asphaltenes: La Luna Formation (Venezuela)" which is going to be published in J. Inorg. Biochem.

The possibility that such a difference arose from a different preference for the V isotopes of the original living organisms (whose buried remnants contributed to formation of the source

kerogen) warrants extension of our previous study to V of the asphaltenes isolated from asphaltic petroleums from the La Luna Formation containing enhanced concentrations of V (≥ 3000 ppm).

Work programme

The work consisted of fractionation of: twenty three samples of asphaltic petroleums (the La Luna Formation: the DM locations); nineteen source rocks samples of the QM locations (the La Luna Formation); twenty source rocks samples of the ARQ locations (the Querecual Formation) and fifty source rocks samples of the POZO 33F-1X locations (the La Luna/Apon Formations). This procedure includes extractions of asphaltic and non-asphaltic components of bitumen and isolation of kerogen, as well as inorganic fractions: carbonate/oxide and clay/silicate.

Organic fractions of selected samples were or will be examined by various geochemical techniques (vanadium isotopic analysis, elemental analysis, Mossbauer spectroscopy, nuclear magnetic resonance for liquid/solid state, X-/Q- band electron spin resonance, Fourier transform infrared, X-ray diffraction, gel permeation chromatography, electron microscopy and electron microprobe). Similar approach is applied for the inorganic fractions. It is worth mentioning here that within the vanadium isotopic study we closely collaborate with Professor Bill White (Department of Geological Sciences, Cornell University, Ithaca, USA).

Obituary

On 12th September 2000, Marlies Teichmüller died at the age of 85 in Krefeld, Germany. Born in Herne, Germany, in 1914 as Marie-Luise ("Marlies") Barbara Köster, she studied geography and mathematics in Freiburg, and later geography and geology in Berlin. There, the young Dr. E. Stach introduced her to the then new field of coal petrography which remained her area of study for the rest of her life. During her first stay in the United States from summer 1937 until spring 1938 she worked at Clark University in Worcester, Massachusetts and later at the U.S. Bureau of Mines in Pittsburg, where she met Dr. R. Thiessen, one of the "fathers" of coal petrology. She started working on her doctoral thesis in Pittsburg, where she was introduced to the methods of transmitted light microscopy for examining coals. She finished her thesis on "The fine structure of American coals in polished sections and thin sections – a comparison of microscopic methodologies" at Berlin university in 1939, one year after her marriage to Rolf Teichmüller. Until 1945, Marlies Teichmüller worked at the Reichsamt für Kohlenforschung (Geological Survey of Germany) where she became head of the laboratory for coal petrology. After World War II, she moved to Bonn with her husband for a short period of time. In 1947 she joined the Geological Survey of North-Rhine

Westphalia where she worked until her retirement in 1979. The Survey was initially located in Bochum and moved later to its present location in Krefeld, close to the Dutch border. More details on her career at the Survey and on her numerous awards can be found in the extended "Portrait of Marlies and Rolf Teichmüller" published by Kasig (1992).

Marlies Teichmüller's contributions to coal petrology are numerous and of the highest quality. She was one of the principal authors of "Stach's Textbook of Coal Petrology" published in 1975 and 1982, which became the most widely used reference for this discipline at that time. In total, she published about 200 scientific papers, often on new subjects. Strongly influenced by her husband, who was a structural geologist, she opened her mind to new disciplines beyond coal petrology. She worked closely with Prof. P. Frey from Basel University (Switzerland) on the very low grade metamorphism of the external parts of the Central Alps and thus made most spectacular contributions to our understanding of thrust movements in Europe's highest mountain range. Another example of her contributions to geology is the coalification map of the Carboniferous surface in Northern Germany. Although now slightly modified, this map became a powerful and widely applied tool in gas exploration in the North German basin. Of great value were her other studies on coalification in central Europe, e.g. in the Upper Rhine Valley and in the coal-producing districts of the Ruhr, Saar, and Aachen areas, respectively.

In addition, Dr. Teichmüller made invaluable contributions to the field of organic geochemistry, co-operating closely with colleagues from different subdisciplines and from different countries. As early as 1969 she published with Dr. U. Colombo, Italy, the results of isotopic studies on coalbed methane from German coal mines, for which she obtained maturity assessments. Another example of this international co-operation was her joint publication in 1983 with Dr. B. Durand of IFP, France, on a comparison of studies of rank with Rock Eval pyrolysis results. The corresponding correlations were later widely applied. The same holds true for the correlations of vitrinite reflectance with maturity parameters based on aromatic hydrocarbons (methylphenanthrenes) which she published with Dr. M. Radke and other members of the Institute of Petroleum and Organic Geochemistry at KFA Jülich, Germany. Her interdisciplinary approach to scientific problems is also exemplified by her work on correlations between illite crystallinity and smectite/illite transformations with petrographic maturity parameters which she performed with clay mineralogists in the nineteen-seventies.

At about this time, Marlies Teichmüller published her first papers on the organic petrographic characteristics of oil shales and petroleum source rocks using the technique of fluorescence microscopy and fluorescence spectroscopy. Thus, she became one of the first coal petrologists to extend the discipline to organic petrology. Due to her contributions to petroleum source rock studies and organic geochemistry, she was invited to present aspects of her research at the biannual Organic Geochemistry Conference in 1985. Her state-of-the-art article was published in the conference proceedings (1986) and contains, besides nice photomicrographs of oil shales, a table with photographs of other organic petrologists. She could easily compile such a table, because both Teichmüllers loved to take photographs of their guests, both at home and in her office, as many of us can remember.

Marlies Teichmüller did not only contribute as an outstanding scientist to geosciences. Together with her husband, she also created the "R. & M. Teichmüller Stiftung", a foundation that supports young scientists working on fundamental aspects of geosciences. Marlies Teichmüller was always open-minded and enjoyed scientific discussions with young

colleagues. She remained an active member of the scientific community after her retirement. Until 1997 those who met her were impressed by the eagerness and discipline she dedicated to her work on the new textbook "Organic Petrology", together with Geoff Taylor and co-authors. Marlies Teichmüller was a dignified person, friendly but not overly outgoing; kind and supportive in a quiet and reserved way; a woman of integrity and endurance. Besides that, she was undoubtedly among the most creative and best known organic petrologists world-wide. Her passing is a great loss to the community of geologists.

Kasig, W. (1992): Portrait of Marlies and Rolf Teichmüller. Translation into English and editing by N. Tamberg and P.C. Lyons, International Journal of Coal Geology, 21, 99-112.

Teichmüller, M. (1986): Organic petrology of source rocks, history and state of the art. Organic Geochemistry, 10, 581-599.