

10th EAOG Newsletter - Autumn 1999

1. Newsletter Secretary's introduction

Dear members and non-members of EAOG. Here for your delectation is the 10th (I believe) EAOG Newsletter, impregnated with the aroma of Turkish Delight. There are the Minutes of the General Assembly at the EAOG Meeting, and a selection of comments from participants in Istanbul. For the truly observant, and in contrast to previous newsletters, we present here the Minutes of the General Assembly, not the Board Meeting. However, all relevant points covered at the Board Meeting were presented at the General Assembly, so no information is lost to, or concealed from, the membership. Two recipients of the EAOG Travel Award also report here the main conclusions of their stay in the host laboratories.

This newsletter is, like its predecessors, heavy on text and thin on pictures. The reason for this is primarily difficulties in sending embedded images via email (rather than as attachments). Basically, the images disappear from the text. If anyone has any great ideas on how to overcome this, I would be happy to hear from you.

Richard Patience.

2. From the EAOG Chairman

I enjoyed the Istanbul Meeting very much. An excellent conference from a scientific point of view, good food, good wine, old friends etc. For all those who worked hard to make the conference a success, thank you. Well done Namik Yalcin and his team for a job well done!

On a personal note, thanks also to the British Foreign and Commonwealth Service and the World Health Organisation for providing precise and factual information concerning the aftermath of the earthquake. The media is not to be congratulated in this regard.

Several have asked if they might get hold of a copy of the video I showed at the Closing Ceremony (actually intended to be at the Opening Ceremony but c'est la vie). This is now on the EAOG Web Site and can be downloaded.

Best wishes,
Brian Horsfield

3. From the EAOG Secretary

Minutes of the General Assembly Conference Centre, Istanbul, 9th September 1999

About 55 EAOG members attended the General Assembly.

Item 1: Welcome

- The chairman of EAOG, Brian Horsfield, opened the General Assembly at 5:30 p.m. on Thursday, 9th September 1999, and warmly welcomed everyone.

Item 2: International Meetings on Organic Geochemistry

- *20th IMOOG in Nancy, France*

As decided by the Board at the meeting in Aachen in March 1999, the forthcoming IMOOG will be held in Nancy (France) with Patrick Landais being the chairman of the meeting. Provisionally, the meeting will take place from 17th to 21st September 2001, but another check will be made for time overlap with other meetings, especially any international AAPG meeting. Patrick Landais presented a 10 minutes overview with slides showing the conference venue and attractions of Nancy. He also explained the present status of the preparations.

- *21st IMOOG in Krakow, Poland*

As decided by the Board at its meeting in Aachen in April 1999, the IMOOG 2003 will be in Krakow (Poland), possibly close to the timing of Poland's entry into the European Community.

- *International Meetings Organised by Elsevier?*

The Chairman briefly summarised the presentation by Penny Moon, Conference Manager with Elsevier, at the Board meeting. Scepticism regarding such a move to Elsevier as the organiser of our international meetings was expressed by some EAOG members; this mainly concerned the local flavour of the meetings and the financial aspects. The Chairman explained that these issues will be explored very carefully and cautiously. Elsevier may be asked to have a look at the Nancy preparations and explain eventual advantages of their involvement in this particular case.

Item 3: Board Membership

- The Secretary reported that in addition to those suggested by the Board, no additional candidates were nominated by the members of EAOG despite much publicity and extension of the deadline. As agreed among the present Board members by e-mail correspondence before the Istanbul meeting, the General Assembly was asked to approve reduction of Board size by one, election of the new members nominated by the Board and refraining from a ballot by letters in this instance. The approval was unanimous.

- A new Chairman-elect who will replace Horsfield in 2002 will have to be determined by the Board at the next meeting early in 2000 in Nancy either among the Board members then or by nominating an appropriate candidate for the Board elections in 2001.

Item 4: Awards

- Six candidates were nominated for the Pieter Schenck Award. Ultimate selection was achieved by a smooth iteration process via e-mail. As the criterion on the age limit of 35 years is not unambiguously defined, this will have to be done at the next meeting. It will be the duty of the incoming awards officer to prepare this.

- No decision was made on the exchange of members of the Awards Committee. Their terms are not clearly defined. The new awards officer will contact the committee members, find out if they wish to continue and make appropriate suggestions at the next Board meeting.

- The number of applications for travel awards has increased. They comprise diverse origins and destinations. Seven awards were given from January 1998 to July 1999. Three applications had to be rejected for different technical reasons, there are three more inquiries at present. The chairman of the Awards Committee will request any overdue travel reports from the award recipients with copies of the letter to the sending and host organisations. Also, in future the rules for eligibility (particularly time after completion of PhD thesis) will have to be

defined more clearly. The number of travel reports will be restricted to four per year for financial reasons.

- The Board decided to establish a new Distinguished Service Award. The idea was born when the particular difficulties in organising the Istanbul meeting became apparent. The members unanimously decided to give the first Distinguished Service Award to the chairman of the Istanbul IMOOG, Namik Yalcin, with a notion that this is also on behalf of his entire team. This was approved by the General Assembly.

Item 5: Finances

- Membership fees have tripled in the past eight years and developed into a solid income. This makes EAOG a healthy organisation. Income as royalties from the international meetings is less constant and reliable.
- The expenditures are mainly due to the awards. Expenditures on Board meetings are now stable after an increase in recent years following the decision to also reimburse industry employees for their travel costs. Reduction of the size of the Board led to a partial compensation of the increase of expenditures.
- Total assets have recently become stable around 80.000 Euros.
- Ger van Graas and Roger Summons inspected the books during the meeting, because both Kagi and Øygaard, nominated for this duty in Maastricht, did not attend the Istanbul meeting. They declared that bookkeeping had been properly done. The audience released the treasurer from his duties with a round of applause. Jaap Sinninghe Damsté was nominated as auditor to replace Ger van Graas, Roger Summons will stay on.

Item 6: EAOG membership (Rowland)

- The number of members increased to 437 (as of 1st June 1999); this number was later updated to 458 (as of 1st September 1999).

Item 7: Journal

- Elsevier has asked for an increase in subscription fees by 5%. The Board decided not to follow this at the moment, but to await further improved co-operation particularly with respect to the journal. The Board will discuss the need for a reduced student subscription rate (as suggested by Peter Henn) at the next meeting.

Item 8: Newsletter and Web page

- Five newsletters have appeared since September 1996 when Patience became responsible. There was a hiatus between March 1998 and May 1999. There was little response by EAOG members to regular requests for contributions to the newsletters. On the other hand, there was quite an active response to Patience's non-regular communications. He presented some of the response in a most humorous way (with most of the humour being inherent and involuntary by the authors of the messages).
- Telnæs will request direct access to the EAOG web site for announcing small rapid changes. The web page worked very well in the aftermath of the earthquake in Turkey.

Item 9: AOB

- Upon request of one of the members, the chairman explained the procedures for selection of the members of the scientific committee (Suggestions by local organisers, decision by the Board).

The Chairman closed the meeting at 6:30 p.m.

Oldenburg, September 14, 1999.

(Jürgen Rullkötter, Secretary)

4. Impressions of the Istanbul Meeting

"The Istanbul meeting was successful both in terms of organization and presentation quality. Mr Yalcin, Mr Soylu and their staffs are to be congratulated! The lunches were excellent, the Bosphorus cruise memorable, and the conference dinner location was a great choice. One particular organizational aspect that was very well done was the decision to have the hotel invoicing handled from the conference center. This saved a great deal of time during hotel check-out. This approach to handling registration+hotel billing should be adopted at future conferences."

"I thought the Meeting was well organised, the location was wonderful and I would love to return for a holiday with my family!"

"It was an excellent meeting - well organised considering all problems. Compliments to the organising committee, especially the "local branch"! I should however wish that more space had been available for the posters. One day is a very short life for a poster when it has to compete with 100 others."

"I thought the meeting was great, very well executed, despite considerable problems in the lead up. The cruise up the Bosphorous on the way to the conference dinner was truly memorable, as was our coach from the landing jetty to the dinner getting lost in a small hill village 20mins away from the venue (it should have been only a 5min trip)."

"As always, the meeting was a scientific success; lots of ideas flowing and new contacts made. It is also blindingly obvious that our science is being increasingly driven to answer the question 'How does the Earth work?' rather than 'Where is the Oil?' The local committee did an outstanding job and this was all the more impressive given the massive problems they faced with the earthquake, long-term economic uncertainty, political unrest etc. Those of us, probably most of us, who were fortunate enough to have been born in prosperous democracies generally expect our meetings to be held in similar places where life is good and where we don't have to face unpleasant sights or experiences when going about our day-to-day business. So, after another week touring western Turkey, my family and I left the country counting our blessing, far more aware of the social and economic inequalities of this world and far more aware of the adverse impact our environment. The board made a very good decision to hold this meeting in Istanbul and I'd strongly support any initiatives to hold others at venues outside Western Europe."

"Although the scientific programme, the dinner, the city, and many other things were all very memorable, the one ever-lasting memory that I'll never be able to erase is of....Istanbul's taxi drivers! I've taken some pretty gripping taxi rides before - including an eventful one in a hot-wired wreck of a cab reeking of petrol in Venezuela (with a group of other geochemists) in which we almost ran down a pedestrian and nearly collided with another car (in two separate

incidents!) - but I've never been anywhere to compare with Istanbul for the consistent scariness of taxi journeys. Are there any speed limits? - I couldn't tell, but hurtling back into Istanbul at 125km/hour one evening, I didn't think so. On another occasion our driver had a stand up row with the driver of another cab, despite having cut him up (vehicularly speaking, that is). Lane changes are both instinctive and instantaneous, as taxis weave their way through more slowly moving (although still speeding) traffic. Has there ever been a Turkish Formula One motor racing driver? I don't think so, but there surely will be in the future, as Istanbul has a rich resource of nerve and talent in their taxi drivers!"

"I thoroughly enjoyed your little show which greatly enlivened an otherwise predictable (General Assembly - ed) meeting."

5. EAOG Membership Secretary

Update 17.9.99. (NB Figures mentioned below are available on EAOG www site.)

Dear EAOG members,

In my last letter I reported that membership was buoyant. I'm delighted to say that since then, membership has increased still further and as at 1.9.99, EAOG had 458 members (Figure 1). These increases have been accompanied by a steady increase in income from fees, as reported to those who attended the general meeting in Istanbul, and this increased income has allowed EAOG to allocate more travel awards to young EAOG members than ever before.

The distribution of members across various countries (Figure 2) as defined by mailing addresses, shows that we are truly an international Association.

Several of you will be new members who effectively joined EAOG by registering for the Istanbul meeting. I hope you enjoy the benefits of your first year in EAOG and that you will re-enlist at the end of the free enrolment period-as many of your colleagues did after the Maastricht meeting. All the relevant forms for doing so are to be found on the EAOG www site (<http://eaog.ncl.ac.uk/>) and the process is very easy. Forms are submitted direct to Elsevier who will then ensure delivery of the journal *Organic Geochemistry* to you and who will update the membership database for me. Any difficulties you may have can, of course, be raised with me at SRowland@Plymouth.ac.uk.

Best wishes and welcome to EAOG.

Professor Steve Rowland
Professor of Organic Geochemistry
EAOG Membership Officer.

6. Travel Award Reports

A. Xinke Yu
Organic Geochemistry in Basin Analysis Group
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Adelaide, SA 5005, AUSTRALIA

As a recent recipient of a Travel Award, I thank the EAOG very much for their support which enabled me to spend three months (July to September, 1998) working in the Geological Institute at the University of Cologne, Germany. The award covered my return air fare and part of my living expenses while in Cologne.

The purpose of my visit was to undertake experimental and analytical work for an important part of my PhD project, a study of secondary migration and in-reservoir mixing of petroleum hydrocarbons in the Cooper/Eromanga Basin, South Australia. Under the supervision of Professor Detlev Leythaeuser and Dr Lorenz Schwark, I used their novel high-pressure solvent flow-through extraction cell (SFTE: Schwark et al., *Org. Geochem.* 26, 19-31, 1997) to extract 20 core plugs of Permian, Jurassic and Cretaceous reservoir sandstones from the Thurakinna, Garanjanie, Dirkala and Wancoocha fields. I then measured the bulk compositions of all 120 extract fractions by IatroScan-FID. A further 20 sandstone samples were underwent ASE (accelerated solvent extraction). Using MPLC these extracts, 20 selected SFTE samples, and 9 crude oils were separated into their saturated, aromatic and polar fractions. Immediately upon my return to Adelaide, 45 selected aromatic fractions were analysed by GC-MS to determine their maturity (e.g. MPI) and araucariacean biomarker characteristics.

The analytical data I acquired as a result of my work in Cologne are currently being written up as a major part of my PhD thesis. The SFTE yields obtained from these non-marine reservoir and carrier beds were much lower than encountered in previous studies undertaken by the University of Cologne. Another unexpected result was the finding of high concentrations of inorganic salt in the solvent extracts of some core plugs. This has helped me to modify the established model for the distribution of water and petroleum in the pore system of these carrier and/or reservoir beds. It has also provided important new information on the hydrogeology of the study area. Finally, interpretation of the maturity data has led to a better understanding of secondary migration pathways within this part of the southwestern Cooper/Eromanga Basin. In summary, it indicates oil in the major Cooper Basin reservoir was originated not only from contiguous Early Permian source rocks but also from carbonate source rocks of the underlying Warburton Basin. Eromanga-reservoired oil pools include examples of both in situ and mixed (Permian and Jurassic) charges. Basin-margin pinchouts and faulting along anticlinal trends provide migration paths for Cooper and Warburton Basin-derived hydrocarbons into younger horizons in the overlying Eromanga Basin. Here the oils have been variably altered by water washing, as demonstrated by changes to their gasoline-range hydrocarbons.

B. Dr Thierry NADALIG

Max-Planck Institut for Marine Microbiology, Bremen, Germany.

Title: Bacterial degradation of hydrocarbons under anoxic conditions

This work was done in the Max-Planck Institut (MPI) for marine microbiology (Bremen, Germany) in the laboratory of Pr F. Widdel.

(NB The text below is only an extract of the full report, which can be obtained from Joan Grimalt or the author - ed.)

I worked with a pure strain of sulfate-reducing bacteria which was isolated beforehand in the Laboratory of Biological Oceanography (Arcachon, France). I worked also on different projects of the MPI: isolation of pure strains of nitrate-reducing bacteria which degrade aromatic compounds, study of sulfate-reducing processes in sediments enriched with polycyclic aromatic compounds. A publication concerning these works during my post-doctoral position has been submitted to *Applied and Environmental Microbiology* : " Anaerobic, nitrate-depending utilization of hydrocarbons by marine members of the alpha and gamma subclass of *Proteobacteria*", by Zengler K., Llobet-Brossa E., Hang Dinh T., Nadalig T., Richnow H. H., Widdel F.

I would like also to acknowledge the French company Elf-Aquitaine and the EAOG committee for their financial supports (EAOG Travel Scholarship). I also acknowledge Dr N. Raymond, Dr H. Budzinski and Pr J. Grimalt.

INTRODUCTION

Degradation of hydrocarbons by micro-organisms is well known since the beginning of the century (Söhngen, 1913; Wagner, 1914). In the 1980s, development of microbial and analytical methods allowed the study of hydrocarbonoclastic bacteria metabolism (Hopper, 1980; Cerniglia, 1984). Hydrocarbons, with low reactivity, are activated by reaction with molecular oxygen. Degradation of aliphatic hydrocarbons is due to monooxygenase enzymes and degradation of aromatic compounds is activated by monooxygenase or dioxygenases enzymes. Degradation of hydrocarbons under anoxic conditions has been controversial for a long time. In marine coastal ecosystem, sediment is rapidly anoxic. Hydrocarbons which have not been degraded in water column and in oxic area of sediment accumulate in anoxic sediment. Microorganisms involved in the degradation of these hydrocarbons are anaerobic bacteria principally. Denitrifying, sulfate reducing and methanogenic bacteria are the communities capable to degrade hydrocarbons under anoxic conditions.

Degradation of alkanes has been studied for many years but the activation mechanism of alkanes without oxygen has not been elucidated. Two strains of sulfate reducing bacteria have demonstrated the capacity to degrade alkanes from C6 to C18 under strictly anoxic conditions (Aeckersberg et al, 1991; Rueter et al, 1994). Anaerobic degradation of mono-aromatic hydrocarbons, has been observed in communities, enrichments and pure strains with nitrate (Altenschmidt and Fuchs, 1991; Evans et al, 1991), iron (Lovley et al, 1989), or sulfate (Beller et al, 1992; Rabus et al, 1993) as electron acceptors or under methanogenic condition (Edwards and Grbic-Galic, 1994). Degradation of polycyclic aromatic hydrocarbons (PAH) has been observed under denitrifying conditions (Mihelcic and Luthy, 1988; Bregnard et al, 1996), sulfate reduction conditions (Coates et al, 1996; Zhang and Young, 1997) or methanogenic conditions (Genthner et al, 1997). For the moment, no pure strain of anaerobic bacteria capable to degrade PAH has been isolated. Study of bacterial degradation of PAHs is of primary importance for many reasons :

a) hydrocarbons from petroleum discharge may contaminate underground aquifers which are often anoxic. Knowledge of potential and limits of hydrocarbon degradation by micro-organisms under anoxic conditions is a first step before to consider a stimulation of degradation processes.

b) marine sediments may contain hydrocarbons originating from natural or accidental discharge. Concentration of sulfate in sea-water is important (28 mM). So, sulfate-reducing bacteria can contribute to the degradation of hydrocarbons in the anoxic area of marine sediments

c) use of hydrocarbons by sulfate-reducing bacteria is a problem for oil industries. Hydrogen sulfide (H₂S) produced during sulfate-reducing processes is a corrosive compound for pipeline. Knowledge of sulfate-reducing bacteria metabolism can allow to control their activities and the hydrogen sulfide production.

AIMS OF THE STUDY

The aims of this study are to understand phenomena of bacterial degradation of hydrocarbons under anoxic conditions. The first part of this study concerned a pure strain of sulfate-reducing bacteria, named PA2801, isolated in the laboratory of biological oceanography in Arcachon (France). This strain is capable to use hexadecane as sole carbon source. Tests have been performed to study the metabolism of the strain. The second part was the isolation of denitrifying bacteria from enrichment with North-sea sediment and petroleum. The third part was the isolation of sulfate-reducing bacteria capable to degrade PAHs (naphthalene, 1-methylnaphthalene, 2-methylnaphthalene and phenanthrene) from sediments (Guaymas, California Bay, Mexico).

CONCLUSION

The pure strain PA2801 has demonstrated capacities to degrade alkanes from C₁₃ to C₁₈. It seems not capable to degrade aromatic compounds. Enrichment experiment with petroleum under nitrate-reducing conditions has evidenced a degradation of toluene. Degradation of aromatic compounds by nitrate-reducing bacteria seems to require the presence of a methyl-group on the aromatic cycle. Two new bacterial strains capable to oxidize toluene have been isolated. Enrichment experiment with PAHs under sulfate-reducing conditions has demonstrated an increasing of hydrogen sulfide concentrations in the culture media. PAHs are not toxic for sulfate-reducing bacteria. No significant difference has been measured in the sulfide concentrations between control and culture media with PAHs.