



EDITOR'S COMMENT

This is the first newsletter of the COGEOENVIRONMENT Working Group on Medical Geology. It was originally planned to be issued in the first quarter of last year, but was delayed by the Editor's personal affairs. However, things are now back on track and the original schedule of a biannual newsletter should be followed from now on

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REPORT FROM THE WORKSHOP OF THE WORKING GROUP IN UPPSALA 8-12 JUNE 1998

David Elliott

A five day meeting of the Medical Geology Working Group was held in Uppsala from 8th to 12th June 1998. The meeting involved the participation of about 14 working group members from USA, Canada, China, Sri Lanka, Belarus, Zambia, Great Britain, Norway, Poland, and local scientists and a varying number of local doctors, veterinarians, and geoscientists. The meeting started with brief and very interesting presentations from the participants, which were followed by discussions on future activities:

- Future work of the group:
- Regular news letters.
- Internet home page of the group.
- Other information material.
- Publishing of an interdisciplinary book on Medical Geology for a wide audience and decision makers.

Numerous other less formal discussions were held throughout the conference.

Although the conference was ultimately a great success, it was marred by a tragedy on the first day, when one participant, Professor Valentin Lukashev from Belarus, collapsed and died. This was terrible for Professor Lukashev's wife who had accompanied him to Sweden. After deliberation, the participants decided to continue with the conference. Considerable credit is due to Olle Selinus and the others who assisted him in handling the complex arrangements consequent on the death, while continuing to run the conference. An obituary of Professor Lukashev is given below.

The future activities of the group are described below.

Newsletter

A newsletter for the working group and other interested people will be published, initially twice a year. The editor of the newsletter will be Dave Elliott, Canada. The first letter was originally planned for September, 1998, but was delayed by the editor's personal affairs, until the present time.

Internet home page of the group.

The group has an internet home page at <http://hem1.passagen.se/olse2725> an excellent medium for informing group members and others of the ongoing and planned activities. Olle Selinus will update the

pages at least once a month, probably every second week, depending on new material. All members are asked to provide information on links, conferences, etc to the chairman.

Other informational material

Flyers and brochures were discussed, but because of the amount of work involved, it was felt that we should initially for the moment concentrate on the book to be published. However this will be considered at a later time.

Interdisciplinary book on Medical Geology

The major initiative that was decided was the publishing of a book on medical geology: "Introduction to Medical Geology". The intended audience will be junior to senior undergraduates and educated decision-makers. The main objective of the book is to emphasise the importance of geology in health and disease in humans and animals as part of an interdisciplinary approach. The plans for the book are described in more detail, below.

Additional subjects

Information on the activities of the working group should be published in various journals. Olle Selinus will write a suggested text, including a presentation of the results of the workshop and submit it to the homepage. The following journals will be approached: Episodes, Explorer and Journal of Environmental Geology, Earthwise, Explorer; Newsletter of AAPG. Other journals will also be approached. Anyone having published concerning the activities of the working group is asked to send a copy to Olle Selinus, the chairman of the working group.

There were four days of meetings and discussions and a one day field trip to the old town of Falun, 200 kilometres from Uppsala, including a visit to the old mine (about 1000 years old). The remediation activities of mining waste were studied and we also visited the municipality of Falun, studying and discussing the work on metal pollution in the town, interesting subject for the working group. The municipality of Falun concentrates on the bioavailable metals instead of, as is usual, the total contents.

We also visited the Geological Survey of Sweden one afternoon, looking mainly at geochemical activities and work going on radon problems and the effects of Chernobyl in Sweden.

THE CENTRE FOR METAL BIOLOGY IN SWEDEN



Olle Selinus

One of the partners in the working group is the Centre for Metal Biology in Sweden. In recent years there has been an increasing interest among politicians in Sweden in metal related diseases. Therefore the 'Centre for Metal Biology' was established in 1993, on the initiative of Swedish politicians. The members of the Centre are Uppsala University, the Swedish University of Agricultural Sciences, the Geological Survey of Sweden, the National Veterinary Institute, the University Hospital at Uppsala, and the municipality of Uppsala. The Centre was created as a scientific platform with the important tasks of performing research and informing various target groups such as politicians, physicians, veterinarians, teachers and students about the present state of knowledge in the field of heavy metals and the diseases related to them, in humans and animals.

The Centre wants to increase and disseminate knowledge about metal biology through joint action and collaboration with other groups which have different research profiles and outlooks, in order to increase the level of knowledge in the field of metal biology. With a strong background of research on metals in the air, soil, and water as well as on accumulation of these metals in animals and man, it is the intention of the Centre for Metal Biology to study the effect of either a deficiency or excess of metals. It is also the ambition of the centre to find efficient means for reducing or eliminating the load of metals on biological systems. The Centre for Metal Biology, greatly increases the possibilities for co-operation between disciplines.

The metals of which the biology is investigated by the centre are often called trace elements and are found in low concentrations in the body tissues fluids. About 15 of the trace elements, e.g. iron, copper, zinc, and selenium, are assumed to be essential for the proper functioning of mammals. It has also been shown that selenium can give protection against the toxicity of trace elements like cadmium and mercury, which are known only for their toxic properties.

The short and direct route between the universities, and the clinical work in the University Hospital, the faculty of Veterinary Medicine of the Swedish University of Agricultural Sciences, and the authorities, offers a favourable opportunity to rapidly increase our knowledge about health and disease and to efficiently turn the scientific results into practice. In collaboration with business companies the Centre for Metal Biology will work out useful solutions and strategies to make the research results accessible to society and its citizens. Another important aim is to provide appropriate and relevant information for political decision making on environmental and health issues.

Some examples of research projects within the framework of the Centre are:

Development of treatment methods for the overload of metals in man and animals.

Molecular mechanisms for the protective effects of selenium against the toxicity of cadmium and mercury.

Occurrence of heavy metals and trace element support in domestic and wild animals.

Risk assessments concerning metal exposure in the environment and health effects.

Accumulation and occurrence of metals in the pigmented cells of the skin.

Research on Immobilised Metal Affinity Chromatography.

The moose as a sentinel for environmental changes.

Perch as a sentinel for heavy metals and PCB.

Metals in sediments and contaminated soil.

Radon investigations.

Development of laboratory techniques as a tool for metal load diagnostics.

Development of methods to assess the trace element status in the population.

The Director of the centre is Ulf Lindh (also a member of the working group).

Information activities: Elisabeth Carlsson.

PLANNED BOOK ON MEDICAL GEOLOGY

Olle Selinus

It was decided at the workshop in Uppsala to publish an interdisciplinary book on medical geology covering most aspects of this subject. The principal editor will be Olle Selinus. The planned contents are described briefly below of the book.

Title: Introduction to Medical Geology

Audience: Junior to senior undergraduates and educated decision-makers. The book should be very readable and include good graphics and illustrations in colour and it must have a very good visual appearance. Each person contributing to the book should have an interaction with a journalist and a graphics editor will be necessary.

Main objective: To educate on, and emphasise the importance of, geology in health and disease in humans and animals. The text should be laid out so that the message is presented in the introduction, followed by interesting case studies that catch the attention and interest of the reader. The lay-out should be such that a reader can stop reading after the important message has been received and comprehended. Greater detail could then follow for the interested reader.

The planned contents, with the responsible person, are described below.

Introduction (Olle Selinus)

Human and animal life requires various elements (metals, minor and trace elements) the ultimate source of which is the earth. The concept of dose-response relationship, that too little and too much are equally detrimental.

Diseases (Tan Jianan and one other person under discussion)

Deficiency (I, Se, Zn, Mg)

Interactions (Cu/ Mo)

Toxicity (Cd, Hg, Fe - deficiency and toxicity)

Role of essential elements (Ulf Lindh)

Structure of proteins/enzymes (Mn, Cu, Zn)

Catalytic properties (Mn, Cu, Zn)

Differences between animals and plants (B, Mo)

Sources and Pathways (Fiona Fordyce, Robyn Johnston)

Air (Rn)

Water (As, F, Mg)

Food/soil (Cu, Mo)

Environment and Transport (Responsible: Howard Mielke)

Natural environment (F, Se, Pb, Cu-Mo, P)

Disturbed environment (Zn - Poland, Africa, South America)

Transported material

Chernobyl (various)

Traffic (Pb, Zn, V, Ni ...)

Outlook (Dave Elliott)

Organics, asbestos, etc.

Appendices (Responsible: Peter Bobrowsky)

Expanding above concepts.

Increasing complexity and richness of details in above concepts, for example, action levels, health effects (humans and animals), epidemiological features etc.

The suggested schedule for the book was:

15 July 1998 The responsible editors of each chapter contact contributors to their chapters. Deadline for outline of the chapters from each responsible editor. The outlines for each chapter should be sent to Olle Selinus

An extended outline for the book will be produced by the editor and submitted to the working group members. The extended outline will be presented for publishers.

1999 First draft ready.

1999 Second draft ready

MEDICAL GEOLOGY IN NORWAY

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Trondheim, Norway

Medical Geology has a long history in Norway. As one example of endemic diseases the lack of phosphorous in animal nutrition in certain areas of southernmost Norway had already been described in the nineteenth century literature (Låg, 1980). In the early 1940's the lack of copper and cobalt in animal nutrition in Norway has been discussed by a number of authors (unfortunately all in Norwegian - for references see Låg, 1980).

In more recent times the advances of medical geology in Norway are invariably bound to two names: J. Låg and B. Bølviken. Låg, professor emeritus at the Norwegian Agriculture University (NLH) in Ås, was the

chairman of the first geomedical symposium ever held in the Nordic countries in Oslo in May 1978. Papers presented at this conference were collected in a book "Geomedical Aspects in Present and Future Research" (Låg, 1980). Since then many more conferences on this topic have taken place in Norway and there exists a whole series of books with conference proceedings (Låg, 1984, 1987a, 1987b, 1988, 1990a, 1991, 1992, 1994 and 1996), all focussing on selected topics from the broad field that can be defined as "geomedicine". In addition, Låg has edited a book, with contributions from all Scandinavian countries, entitled "Geomedicine" (Låg, 1990b)

All volumes in this series, except one, contain a contribution by B. Bølviken and co-workers. Bølviken was a geochemist (and director) with the Geological Survey of Norway (NGU), who very early in his career took an interest in the connection between regional geochemistry and endemic diseases. Much of his work has been devoted to research into correlation studies between regional geochemistry and regional health statistics. Even after he went on pension some five years ago he still continued to work on this topic (e.g., Bølviken et al., 1997, 1998). Summaries of the geomedical activities at NGU are given by Bølviken et al. (1994) and Bølviken (1998). A list of all publications and open file reports can be obtained from NGU.

An interesting aspect of the earlier work of Låg and Bølviken was the description of naturally occurring heavy metal poisoned soils (e.g. Låg and Bølviken, 1974 and Bølviken and Låg, 1977). An attempt to estimate which species of Pb are most prevalent in the groundwater at one of these sites was published in 1986 (Sæther et al., 1986). In addition to naturally heavy metal poisoned soils, Al-precipitates from natural springs have been recently described in Norway (Sæther and Follestad, in press). Both, Låg and Bølviken have been most interested in natural conditions as possible causes of endemic human and animal diseases. Pollution from industrial sources and car traffic and its medical effects is not a major topic in Norway, which is a very large country (324,219 km²) with very few inhabitants (ca. 4.25 million). There exist, of course local sites which are polluted. An example of a study looking at the contamination of soil and groundwater at an industrial site in Trondheim, concluding that there is no health problem is given in Saether et al. (1997). There are a number of important old mining and smelting districts in the country (e.g. Røros, Kongsberg) that might deserve renewed attention, maybe even under the aspect why the people living there are not all poisoned since long.

A further name that should be mentioned in the connection of medical geology and Norway is that of E. Steinnes. He is another of the regular Norwegian contributors to the series of Låg's books. Steinnes is Professor for Environmental Science at the University of Trondheim and has published a large amount of

studies, that are not necessarily in the field of geomedicine but have a direct importance for geomedical studies as they cover regional element distributions in a multitude of sample media (e.g., Steinnes, 1996; Låg and Steinnes, 1976, 1978; Rühling et al., 1996).

An unusual study looked at the quality of drinking water that supplies 70% of the population of Norway and its relation to the geographical distribution of 25 groups of diseases but failed to give significant

correlation (Flatén, 1991, Flatén and Bølviken, 1991). The data are very interesting in themselves as this was the first time that the chemistry of drinking water was investigated for more than 30 elements and not only for the usual less than 10 elements where drinking water guideline values or action levels are defined.

At about the same time, a Norwegian dentist, Prof. K. Bjorvatn, described high fluoride concentrations in groundwater from southern Norway (Bjorvatn et al., 1992, 1994) which he had found following up some cases of dental fluorosis in Bergen. This observation led to a number of investigations into groundwater quality from bedrock wells, that supply about 13% of the Norwegian population with their drinking water. One of the first observations was that there is a major difference between the chemical composition of water from Quaternary and bedrock groundwater wells, none of the Quaternary wells showing values above the established action level for fluoride in drinking water (1.5 mg/l), while more than 10% of the bedrock wells had higher concentrations (Sæther et al., 1995a). Amounts and sources of fluoride in precipitation over southern Norway was studied by Sæther et al. (1995b). Flatén's approach of looking at all elements that are possible to analyse for was then taken up in a number of studies (Banks et al., 1995, Reimann et al., 1996) where the concentrations of up to 64 elements in bedrock groundwater are reported. A high number (more than 10%) of drinking water wells drilled in bedrock turned out to fail action levels for several chemical elements, the largest problems caused by fluoride and radon. In addition, the study showed that there is a very high natural variation of element concentrations in groundwater - for some elements up to 6 orders of magnitude in just 150 wells from southern Norway. Some elements, known to be highly toxic or carcinogenic (e.g., Be, Th, U), but for which no action levels are set, returned surprisingly high concentrations. Here we can return to Bølviken's old dream of proving correlation between the natural regional variation of chemical elements and human health. If it were possible to establish health statistics for the people drinking water from these bedrock wells, we would with all likelihood be able to learn a lot about the influence of chemical elements on human beings. The Geological Survey of Norway has recently investigated the chemistry of 2000 bedrock wells spread all over Norway (Banks et al., in press a,b). First results are also reported in NGU's yearly report for 1997 (Midtgård et al., 1998).

A former colleague of Bølviken, R.T. Ottesen, was director of the environmental department of the town of Trondheim for the last 6 years. This has resulted in quite a number of interesting geochemical/geomedical studies (most of them reported in Norwegian). For example, Trondheim is the first town in Norway that has carried out a geochemical mapping project of city soils (Ottesen et al., 1995). The data were subsequently used to evaluate the health risk of metals in city soils (Langedahl 1997). In addition, heavy metal and bacterial contents in the sandboxes of kindergartens in Trondheim were investigated (Langedahl and Hellesnes, 1997), a study that showed that very high amounts of heavy metals can leak from pressure impregnated wood used to build the sandboxes into the sand. Very high dust levels in the Trondheim air during winter time and spring are a further topic that has been investigated (Ottesen, 1994).

Activities of the geochemistry section at the Geological Survey of Norway during the last few years have been focussed on environmental geochemistry, leading to the production of an environmental geochemical atlas of the central Barents region (Reimann et al., 1998), where some of the world's largest polluters for SO₂ and metals are located (the Russian nickel industry at Nikel, Zapoljarnij and Monchegorsk). This work is only indirectly connected to medical geology in that it documents metal levels in quite a number of sample media over a very large area. Health studies on the local population that took place at the same time failed, however, to show any relation between pollution and the health of the population (Smith-Sivertsen et al., 1997).

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NORDIC NETWORK FOR MEDICAL GEOGRAPHY

Anders Schærström

The Nordic Network for Medical Geography was created as a medium for contacts between geographers and others in the Nordic-Baltic region who are actively engaged or merely interested in matters concerning geographical aspects of health and disease. It is also meant to serve as a bridge between ourselves and our colleagues in other parts of the world who want to know what is going on here. This time, however, the content of the newsletter is dominated by activities elsewhere.

This article is a abstract of the most recent newsletter of the network.

As usual, an updated and corrected version of the list of members accompanies all newsletters. There have been technical difficulties with some e-mail connections, but they will be removed. Sending the newsletter by conventional mail tends to be costly and time-consuming.

Anders Schærström

Report from Baltimore

The 8th International Symposium in Medical Geography took place in Baltimore, USA, 13-17 July.

Approximately 125 participants, of which the majority came from the three nations that take turns to host the symposium every two years - Canada, UK and the USA, attended the arrangement. All in all, around 20 countries and all continents were represented. (Only six participants from the Nordic region, though).

Around 100 papers were presented under some 20 different session headings, indicating the complexity of medical geography - and making it impossible to account for the full scope, much less the depth, of the symposium. Contributions from the Nordic-Baltic area were few but representing some interesting traits in current research (see below).

Sally Macintyre, sociologist and Editor-in-Chief of *Social Science and Medicine* gave an appreciated introductory lecture on *Unhealthy Places, Unhealthy People: The Role of Place in Inequalities in Health*.

Somewhat surprising, but very adequately, two contributions concerning John Snow and the classical 1848 and 1854 cholera epidemics in London were presented. These papers served as useful reminders of how easily myths and misunderstandings all too frequently are passed on from one generation of scholars to another. A thesis (by Kari McLeod) and another book (by Michael Rip et al.) on this topic can be expected in the near future.

One particularly useful contribution was the paper on *Web Resources for Medical Geography: a Classification of Major Sites*, delivered by Susan M. Macey. The paper, which is included in the proceedings, contains a table of 41 sites (and megasites) characterised by contents. Susan can be reached at the Department of Geography and Planning, Southwest Texas State University, San Marcos TX 78666. E-mail: sm07@swt.edu.

Of certain interest to Europeans was the paper *Widening Inequality of Mortality Between 196 Regions of 15 European Countries in the Early 1990s*. (Mary Shaw et al.) The data presented were obtained from Eurostat. Although the resulting maps displayed distinct differences within countries, the shortcomings of the current Eurostat data were also clearly demonstrated. For example, it is not even possible to present gender-specific mortality data. Hopefully, this is just the first step on the road to comparable mortality and morbidity data across European regions.

A couple of sessions focused on Environment and Health, including papers on *Hypothermia Mortality* (Macey), *the Impact of Climate Change on Mortality Rates in England and Wales* (Bentham), *a Multi-Scale Examinations of Asthma Occurrence and PM10 Levels in Denver* (Marr) and *a Russian Case Study on a Methodology for the Assessment of Critical Ecological Situations* (Malkhazova & Tikunov),

Nine contributions concerned GIS, with a variety of applications, e.g. longitudinal data, population and road density, outdoor air pollution, schistosomiasis in Brasil, primary health care in East Anglia, and - in combination with remote sensing - the spread of Lyme Disease in Baltimore.

Several papers dealt with ageing and health. Two sessions were devoted to health problems of women and children, respectively. Other sessions concerned #health issues in developing countries, disease patterns, mental health and, not least, quantitative and qualitative methods.

In two years from now, the symposium will be arranged in Montreal (See information below.)

Proceedings

Copies of the proceedings may be obtained by sending a check for US\$ 30 to

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The documentation amounts to approximately 500 pages. Observe, however, that unfortunately not all papers are included in the proceedings!

Contributions from the Nordic-Baltic region

Aase, Asbjørn: Spatial Trends in the Rise and Fall of Coronary Heart Disease and Lung Cancer in Norway.

Liljenäs, Ingrid & Strömberg, Magnus: Telemedicine in Northern Sweden: Spatial Outcomes of Different Applications.

Löytönen, Markku & Muukkonen, Mika: Dynamic GIS and Health; Extended Relational Database Models and Longitudinal Data

Sabel, Clive E.; Gatrell, Anthony C; Löytönen, Markku; Maasilta, Paula & Jokelainen, Matti: Modeling Exposure Opportunities: Estimating Relative Risks for Motor Neuron Disease in Finland.

van den Berg, Nanja; von der Ahé, A.Karl-Rainer; Rudolph, Peter & Kramer, Axel: Developing Epidemiological Spatial Information System with ArcView/Avenue

Forthcoming events

A workshop on intelligent environmental and cancer epidemiology is organised on 15 September in Bremen, Germany. More information (in German) can be found at:

<http://www-is.informatik.uni-oldenburg.de/~wieteik/gmds98/>

GIS in Public Health, 3rd National Conference

San Diego

August 17-20 1998

To request registration information contact:

Visions USA, Inc.

404.880-0002 or

visions@internetmci.com

or visit the website:

<http://www.atsdr1.atsdr.cdc.gov:8080/GIS/conference>

First International Health Geographics Conference

October 16-18 1998

The Maritime Institute of Technology

Baltimore, Maryland

For more information:

<http://www.jhsph.edu/ihgc>

9th International Symposium in Medical Geography

Montreal

June 18th-23rd, 2000

Program chair: Professor Jean Pierre Thouez

Department of Geography, University of Montreal

P.O. Box 6128, Station Downtown

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Phone: (514) 343-8054

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E-mail: thouezj@ere.umontreal.ca

Local arrangement: Mrs Effie Samaras

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Courses

M.A. in Health, Space and Society

School of Geography, The University of Manchester

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Contact point

Is someone in the Nordic network working on the association and correlation between environmental factors and excess frequencies of certain diseases? For an exchange of views and ideas, please contact

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IN MEMORIAM: VALENTINE KONSTANTINOVICH LUKASHEV

(25.06.1938 - 08.06.1998)



**Corresponding member of the Belarus Academy of Sciences, Doctor of Sciences,
Head of Department of Geochemistry and Geophysics, Academy of Sciences of
Belarus, Minsk.**

Our good colleague and friend Valentin K. Lukashev died during an international workshop on medical geology at Uppsala, Sweden on June 8, shortly after having given his paper on medical geology research

in Belarus and the former Soviet Union, as member of the International Working Group on Medical Geology.

He was born in St Petersburg/Leningrad, visited school in Moscow and Minsk and graduated from the Belarussian State University in 1961. Since 1961 he worked in the laboratory of geochemical problems, since 1971: Institute of Geochemistry and Geophysics, since 1992: Institute of Geology, Geochemistry and Geophysics. His first thesis is entitled: Paleogeographical conditions of sand dune formation in Belarus, his second thesis: Geochemistry of quaternary lithogenesis. In 1970 he became head of the Department and laboratory of Supergene Geochemistry, in 1986 he advanced to corresponding member of the Belarus Academy of Sciences.

Valentin K. Lukashev was among the pioneers of developing urban geochemistry and ecological geochemical mapping in towns. During the last fifteen years he carried out investigations on thorium as catalyst in geochemical processes, chemical compositions of sapropel used as fertilizers, geological and geochemical aspects of cancer, ecological and geochemical problems of the Chernobyl accident.

Valentin K. Lukashev developed a new method for mineral prospecting using artificial sorbents, for which he received three inventory certificates(patents), including one for a new method of gold prospecting. He presented more than 200 publications and 20 monographs.

A first contact with the international community of geochemists was during the Helsinki conference in 1983 of the Association of Exploration Geochemists. Here he joined within a group of twenty geoscientists from all over the former Soviet Union (including professor Tauson, geochemistry of garnites, and professor Kovalevskii, biogeochemistry).

During one of the first workshops on global geochemical mapping, now global land monitoring, Valentin presented the status of geochemical mapping in the Soviet Union to an international audience. In the following years Valentin presented several papers at international conferences in Sweden, Poland and Germany.

Valentines kind of free communication in a friendly way and his honest personality made him a friend to many colleagues. Some colleagues in Germany tried to improve his situation at the Belarus Academy of Sciences which moved into a disaster after the independence of Belarus. Valentine could follow several invitations to Hannover and Berlin. Here we became aware of his heart problems and consulted some doctors with him.

In Uppsala in June 1998, where he came with his good wife Galina, his heart lost its power and we lost a good and reliable geochemist and friend. We are thankful for his contributions to geochemistry and for his friendship.

Ulrich Siewers

Federal Institute for Geosciences and Natural Resources, Hannover, Germany.

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