



# THE GEOLOGICAL SOCIETY OF MINNESOTA

## News

### Presidents Message

*Volunteer opportunities, field trips, lectures, and public service, since 1938*

2011 is shaping up to be an important year for the GSM. We have some very significant challenges to address and we are working on 2 unique opportunities that don't come around very often.

**The challenges:** As a reminder, we are a public-spirited, non-profit corporation that has been in operation since 1938. Our ongoing mission is to promote public interest and supply educational support in the geological sciences. The GSM's backbone activities are conducted at a high level of scientific relevance, member participation and public access. These include:

- Lecture and lab series
- Field trips
- Newsletter and GSM web site
- Public service activities

We have the committees, infrastructure, experience and board commitment to fund and maintain all the above at our expected high level. Our challenge for 2011 is to maintain the

leadership and member participation needed as many long term contributors relinquish responsibility and move on for various personal reasons.

The GSM currently has 13 charter and ad hoc committees. Until very recently the average tenure of the committee chairs was well over 5 years, and in many cases over 10 years. Of course it is natural for leadership turnover and healthy for an organization to get new members involved. Some recent leadership changes include:

- Darrell Mytty leads the membership committee starting in 2010

*Presidents Message, continued on page 4*

### Kimble Memorial Banquet

**May 2,** "Glacial Geology and Hydrologic Changes from Wetland and Prairie Restorations at the Glacial Ridge National Wildlife Refuge, Northwestern Minnesota", Tim Cowdery, USGS

**At:** Grand City Buffet, 8912 Hwy 7, St Louis Park, MN 55426



Upper photograph: GSM field trip to Minnehaha Falls, July 12, 1942; Lower photograph: GSM field trip, 1937.

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Welcome New Members

- John Beall
- Greg Brick
- Gail Daneker
- Paulette Henderson
- Loraine Jensen
- Ian Keith
- Susan Lighter
- Kaitlin Johnson
- Mike & Judy Martens
- Joe Sixta
- Shelley Steva
- Sylvia Vaala

New State Geologic Map!

Mark Jirsa of the Minnesota Geological Survey along with a team that included Terry Boerboom, Val Chandler, John Mossler, Tony Runkel, and Dale Setterholm have produced a new State Geologic Map. The impressive new map reflects new detailed geologic mapping that has been conducted in recent years over many areas of the state, as well as reprocessed state-wide geophysical data. Congratulations to the team for a remarkable achievement, and a major step forward in our understanding of Minnesota geology!

*An image is provided on page 3.*

GSM News

Officers:

Dick Bottenberg, President  
 Janine Atchison, Vice President  
 Sherry Keeseey, Treasurer  
 Allen Bowles, Secretary

**Board Members:** Darrell Mytty; Alan Smith; Harvey Thorleifson; and Theresa Tweet.

**Editor:** Harvey Thorleifson

The Geological Society of Minnesota is a 501(c)3 nonprofit organization. The purpose of this newsletter is to inform members and friends of activities of the Geological Society of Minnesota.

Send all GSM membership dues, change of address cards, and renewals to:

GSM Membership Chair  
 P.O. Box 390555  
 Edina, MN 55439-0555

Membership dues are: \$10 Full-time students; \$20 Individuals; \$30 Families

GSM News is published four times a year: **February 15, May 15, August 15, and November 15.** GSM News wel-

comes unsolicited Geology and Earth Science related articles and photographs. Deadline for article submission is the first of the month, before the date of publication. Send all material to **Harvey Thorleifson**, [thorleif@umn.edu](mailto:thorleif@umn.edu)

Message from the Editor

Judy Hamilton has finished her term as GSM Newsletter editor, and didn't she do a fine job, as did her predecessors! She had help, and she expresses appreciation to all who did so. Let's all thank Judy for an excellent job! Now, I will take a turn for a short while, but I am only able to do so because I will be working in partnership with Rich Lively of Minnesota Geological Survey. In my experience, it is not unusual for a new Newsletter Editor to give the newsletter a new look. Rich and I hope you like it! Please let us know what you think. Highlights of the page design are scanned photographs from GSM field trips, taken decades ago! We have our customary mix of content in the newsletter, and I want to thank all contributors. Happy reading!

Harvey Thorleifson, [thorleif@umn.edu](mailto:thorleif@umn.edu)

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MINNESOTA GEOLOGICAL SURVEY  
1465 SEASIDE DRIVE

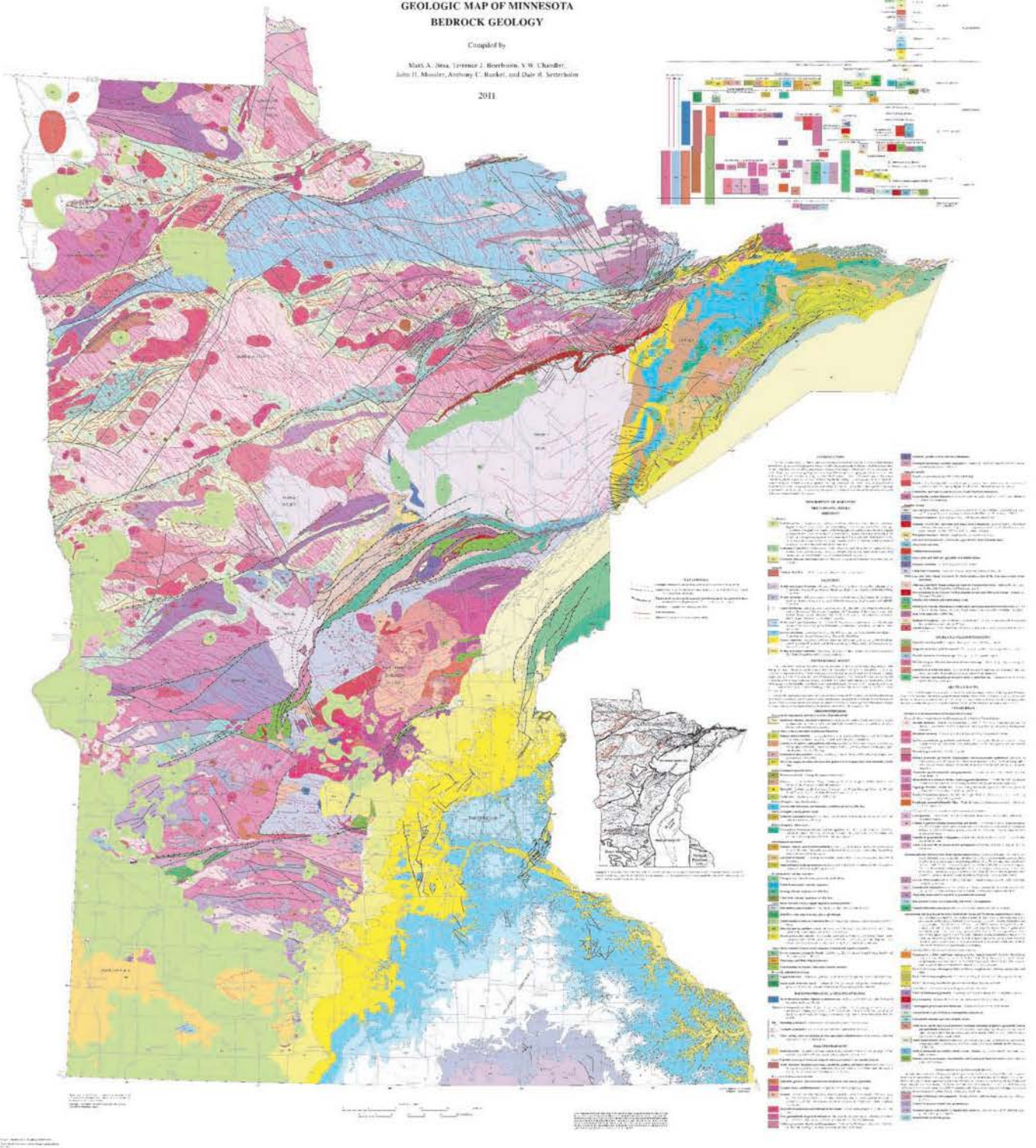
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STATE MAP SERIES 1-31  
MINNRS 10-102

### GEOLOGIC MAP OF MINNESOTA BEDROCK GEOLOGY

Compiled by  
Mark A. Jirsa, Terence J. Breehoorn, V.W. Chandler,  
John H. Mueller, Anthony C. Bunkel, and Dale R. Settleback

2011



Bedrock Geology of Minnesota, Minnesota Geological Survey, 2011

## Upcoming Meetings

### Minnesota Ground Water Association (MGWA)

Spring Conference  
May 4, 2011,  
"Toward Sustainable Water Use in Minnesota"

### Institute of Lake Superior Geology (ILSG),

Ashland WI, May  
18-21, 2011

### Geological Society of America (GSA)

Annual Meeting,  
Minneapolis Convention Center, October 9 – 12, 2011

from the archives



Ruth Benson, Lake Itasca, 1958

*continued from page 1*

- Theresa Tweet is the chair of the Social/Recognition committee starting 2010
- Sherry Keesey took over as Treasurer in 2011
- Allan Bowes became the Board Secretary in 2011
- Joanie Furlong will oversee the State Fair in 2011

We have opportunities for others as the following positions are in transition and need to be filled this year:

Newsletter Editor  
Public Service Committee Chair  
Publicity Committee Chair  
Board Member

The GSM Board is working to fill these positions. If you are asked to help, please say "YES". But don't wait to be asked, if you are interested in helping by joining a committee or by taking on a leadership position go ahead and contact me or any Board member. We have a good thing going and we need your help to keep it going.

**Now for the opportunities:** The Geological Society of America (GSA) has offered the GSM the opportunity to co-sponsor a Geological lecture during the GSA's annual convention in the Twin Cities next October. The Board enthusiastically accepted. The lecture will be at the Minneapolis Convention Center on October 11 and provides a unique opportunity for the GSM to expand public awareness of its presence in the Twin Cities. Steve Erickson and Harvey Thorleifson are working out the details for the agenda and the lecture topic(s). We will need a lot of cookies for this one!

Also, Bill Robbins and Sherry Keesey are working with Sherry's brother, a noted California geologist, to set up a field trip to the San Andreas Fault in the Spring of 2012. This will be a mega field trip that you won't want to miss. Many opportunities for scientific and geologic learning and awareness are being planned.

In summary, 2011 will be an important year of transition for the GSM. Challenges and opportunities abound. The future of the GSM is at stake and we need new members to step up and help run our organization. Please say "YES" when you are asked to help. Thanks and see you in the field.

Dick

## Volunteer Appreciation and Silent Auction

As was the case last year, the 2010 Volunteer Appreciation and Silent Auction was a big success. There was an abundance of good food provided by our GSM members, topped off with a delicious chocolate cake for dessert thanks to Janet Hopper. Master of Ceremonies Dick Bottenberg entertained the group with a Geology fill-in-the-blanks game sheet, stories and jokes, and of course, door prizes. We had donations from the Minnesota Geological Survey, Amateur Geologist, Mountain Press, Cabela's, the Cottage Grove Caribou Coffee, as well as many of our GSM Members. A special thanks to Janine, Dick, David, Janet, Sherry, Lee, Dorothy, Bill and all of those who helped pull the event together.

*Theresa Tweet*

## Upcoming Lectures

**GSM Lecture; Monday, March 7, 2011, 7:30 PM;** Note minor room change from last semester: Room 3-230: The room right next to the room we have had for years at the University of Minnesota, East bank campus Electrical Engineering/Computer Science Bldg, now called Keller Hall, 200 Union St SE, Mpls, 55455

**Chilean and Haitian Earthquakes and Tsunamis** By John P. Craddock, Ph.D., Macalester College

**Bio:** At Macalester, John covers the structural geology, tectonics, and geophysical end of their curriculum in addition to a variety of introductory courses and January field excursions (Costa Rica, Mojave Desert, etc.). This includes Structural and Field Geology (GEOL 255), Geophysics (GEOL 301), Dynamic Earth and Global Change (GEOL 150), and Oceanography (GEOL 100). His research interests include using micro-structural techniques to analyze rock fabrics and interpret geologic structures.

**Abstract:** The IRIS global seismic network was in place in 2004 and recorded, for the first time since the 1964 Alaska earthquake, the global propagation of the Sumatran (Mw=9.3; 250,000 dead) earthquake and ocean-wide tsunami. The Haiti earthquake (Mw=7.0; depth=13 km) of January 12, 2010 was located along the Enriquillo-Plantain fault zone which has ~20 mm of strike-slip displacement each year. The earthquake was preceded in 2008 by three hurricanes which displaced 1,000,000 Haitians, leading to the subsequent seismic devastation (300,000 dead, 316,000 injured) accentuated by 52 aftershocks (Mw >4.5). Coastal Chile experienced a Mw=8.8 subduction earthquake February 27, 2010 generating a small Pacific-wide tsunami. The Chilean earthquake released 560 times more seismic energy than the Haitian earthquake, yet only 521 Chileans died because the Chilean earthquake was deeper and the lengthy fault rupture disseminated the energy in a relatively unpopulated area south of Santiago.

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## A Digital GSM Archive

Many of you will remember working on the GSM Archives in past years. Thank you for all of your efforts! Although some material has apparently been lost over the years, GSM still has an excellent set of archives. Steve Erickson did a superb job as archivist, and recently, a team of GSM people has been working on organizing the material, under the guidance of the President and the Board. Publications from other organizations that are readily available elsewhere have been removed from the archives. The filing system has been tightened up with one thought in mind – if it is worth saving, it is worth scanning. Former GSM President Bently Preece, who now works at the U as an Information Technology Professional, will work in coordination with GSM Board Member and Webmaster Alan Smith to develop a digital filing system on the GSM web site that will allow people to locate the digital GSM documents and photos going back to

the 1930s. The goal is for anyone to be able to search and browse the GSM Archives on the web – that will be interesting! Priority will be placed on Newsletters, followed closely by photographs, correspondence, governance documents such as by-laws, minutes, membership directories, and lists of lectures. Detailed financial records such as cancelled checks and bank statements will be set aside for now, as will clippings and pamphlets. A key goal is to ensure that the scanned legacy documents will be able to merge seamlessly with born-digital materials of the future. Pilot scanning is underway, and we may need to seek financial support to complete the scanning job. But the State may be willing and able to support projects like this, especially if the materials will be used by people such as teachers, students, and community groups. Suggestions are welcome!

Harvey Thorleifson, [thorleif@umn.edu](mailto:thorleif@umn.edu)

## State Geologist's Column: Everything is a Database

Geological surveys consisting of mapping, monitoring, research, and outreach are an essential service provided by geological survey agencies at the federal and state level. These surveys represent authoritative observations and predictions regarding the properties, composition, structure, and origin of sediments and rocks, based on observations and inferences backed by research on material, process, and history. This spatial and temporal accounting is needed to support the progress of research on our home planet, and societal applications related to energy, minerals, water, climate change, waste disposal, construction, and hazards. These information systems need to be planned, to ensure their long-term integrity, take advantage of technological change, and respond to evolving user needs. I am happy to report that we have made much progress on the Minnesota Geological Survey (MGS) information system master plan that was outlined in the Summer 2009 GSM Newsletter. A key step forward over the past year has been a realization that products such as publications, collections, images, and datasets can all best be viewed as databases.

While our priorities at MGS are excellent science, efficient and timely delivery on our obligations, and focusing on the needs of the State, in the form of new mapping and influential research, we concurrently recognize that our databases are tools that facilitate everything that we do. In recent years, we have been working gradually to clarify the list of geological, geophysical, and geochemical databases that we and our partners maintain, so that we can recognize opportunities for enhancements.

Our top priorities with respect to producing new products are County geologic atlases that provide information essential to sustainable management of ground water resources, for applications such as monitoring, water allocation, permitting, remediation, and well construction. These atlases define

aquifer properties and boundaries, as well as the connection of aquifers to the land surface and to surface water resources. They also provide a broad range of information on county geology, mineral resources including construction materials, and natural history.

To better support MGS research and mapping, all formal publications, both 40,000 pages of reports and 600 maps, have been scanned, while Open Files, including 3600 pages and 60 maps, will soon be scanned. These are available as searchable PDF text and maps on the MGS web site. Concurrently, we are making progress on stitching our geological maps together, with the ultimate goal being a single GIS database at two levels of resolution.

With our partners, we maintain several databases of geological data, including geochronology, a geological observations database being built in part following the lead of the Department of Natural Resources (DNR) Aggregate group, geotechnical data, hydrogeological data, images, the karst features database, largely led by the University of Minnesota Geology and Geophysics Department, mineral exploration files maintained by DNR, outcrops, sediment texture and lithology, as well as the immense and immensely important water well database, known as County Well Index (CWI), which is co-managed with the Health Department.

Our geophysical databases are fundamental to everything that we do, especially our aeromagnetic, gravity, and rock properties database. The magnetic database has been completely overhauled, while the gravity and rock properties database are presently being refurbished, thanks to State support. We also have a borehole geophysics index that is fundamental to much of our work, while we plan to work with USGS to update our airborne gamma ray spectrometry database. As reported in the Fall 2010 GSM Newsletter, we have worked with partners to build a new geochemical database, including groundwater geochemical data from the Pollution Control Agency (PCA), soil geochemical data from US Geological Survey (USGS), and till

geochemical data acquired in partnership with industry by MGS.

Our geological collections could not be used without the accompanying metadata that explains what the materials are, and where they came from. We and our partners who maintain collections that we contribute to therefore have databases in varying states of development for all of our geological collections, including drillhole cuttings, the excellent DNR drill core library in Hibbing, MGS field notebooks, the fossil collection maintained by the Geology and Geophysics Department and housed at the Bell Museum, geochemical samples, hand samples, sediment samples, and thin sections.

Our goal is to bring all of these databases up to a common standard, in a readily mappable format, available to users through what are known as Open Geospatial Consortium-compliant web services, which will allow people to subscribe to our regularly updated databases on a live basis, through their GIS or other software, such as a web interface of their choice. Suggestions are welcome!

*Harvey Thorleifson* Ph.D., P.Ge., D.Sc., Director, Minnesota Geological Survey; State Geologist of Minnesota; Vice President, Association of American State Geologists; Professor, Department of Geology and Geophysics; University of Minnesota; 2642 University Ave W, St Paul, MN 55114-1057 USA; Telephone 612-627-4780 ext 224; Fax 612-627-4778; [thorleif@umn.edu](mailto:thorleif@umn.edu)

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### News from the GSM Board

The GSM Board held its December meeting at Sandy and Ed Steffner's house, and as usual we combined work with pleasure as Sandy and Ed hosted a Holiday pot luck gathering afterwards. The food was great and Ed manned the piano with flair.

Each year the December Board meeting is very important as the new Board takes control, as we thank departing Board members, and as we elect officers for the new GSM year. This year we welcomed Sherry Keesey and thanked departing Board members Ly Preece and Paul Jansen for their years of service.

We are happy and fortunate to welcome Sherry Keesey to the GSM Board in her first year of membership. Sherry has a keen interest in Geology and previously has served as Treasurer for a Parent-Teacher Organization in Minnesota. She is working with the Field Trip Committee to possibly set up a field trip to the San Andreas Fault in California to be led by her brother. Sherry volunteered to be the GSM Treasurer.

Ly Preece has served as Vice President, President (2 years) and Secretary for the GSM Board. For all four years Ly has been a key member of the Internet Committee and along with Alan Smith and Harvey Thorleifson re-vamped the GSM website. Ly was also a driving force behind the Geology Town Hall meeting held in April 2008. As it seems with all former GSM Presidents, Ly plans to stay active in the GSM and will continue to provide sage advice and serve on key committees. Thanks for your service Ly!

Paul Jansen was our Treasurer for 1 and ½ years and helped with the first annual Recognition Banquet and Auction, the Marker Committee and many of the field trips. Thank you Paul!

Although the Board and Officers are established for this year we do have one open Board position. Please see any Board member if you are interested. The GSM Board meetings this year will be the 3rd Thursday of February, April, June, August, October and the first Saturday of December. All GSM members are welcome.

## GSM Laboratory

Touring the Submicroscopic World Using Electrons and X-rays

Saturday, February 19, 2011, 10:00 AM to about 12:00 M; Room 100, Olin Rice, Science Center, at Macalester College, 1600 West Grand Av., Saint Paul, MN 55105, (651) 696-6000; Bus: Snelling Av. & Goodrich Av.

**Laboratory Supervisor and Instructor:** Jeff Thole, Macalester College

This GSM lab will be in Room 100, on the lower floor of the Olin Rice Science Center at Macalester.

For this upcoming lab, Jeff Thole is specifically asking for samples that people would want to investigate. Please call Jeff directly (651-696-6426) if you have questions regarding a potential sample. You will need to deliver samples to Jeff prior to the meeting so we can look at them during the lab. They need to be relatively small, preferably about the size of a sugar cube or smaller. We can look at features and/or chemistry of these items. Non-conductive samples should, ideally, be coated using carbon but we can get around that if we don't need to see a good image of it. So be creative, and don't worry about being "wrong".

Jeff Thole's Activities: I teach the laboratory sections of both of our introductory courses (GEOL 150 and 155) and have taught Mineralogy (GEOL 250) on a number of occasions. I came to Macalester after 5 years of doing hydrogeology with two different environmental consulting firms here in the Twin Cities. My other duties include maintaining, running, and user instruction for the instrumentation housed in the Macalester Science Division's Keck Laboratory (see our Department Resources page). I also manage our student work study force, maintain departmental computer facilities, maintain our web content, and do a plethora of other tasks.

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P.O. Box 390555  
Edina MN 55439-0555

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