# Nittany Mineralogical Society Bulletin

Nittany Mineralogical Society, Inc., meeting in State College, Pennsylvania
Contact information on back page

*May, 2019* **Visit our web site: www.nittanymineral.org** *Editor (see back page): David C. Glick*

**May 15th meeting:**

## A Quarter-Century of Nittany Mineralogical Society

**organized by**
**David Glick, NMS President**

*Our May meeting will be held Wednesday the 15th in room 116 (the smaller auditorium) Earth & Engineering Sciences Building on the west side of the Penn State campus in State College, PA. Maps are available on our web site.*

*6:45 to 7:45 p.m.: Social hour, refreshments in lobby*
*7:45 to 8:00 p.m.: Announcements, questions, answers*
*about 8:00 p.m.: featured program*

*The event has free admission, free parking, and free refreshments, and is open to all;* ***parents/guardians must provide supervision of minors.*** *Bring your friends and share an interesting evening!*

This presentation has been rescheduled from our snowed-out February meeting. In the February Bulletin I said:

This is it, the twenty-fifth anniversary of our first meeting! I offer my congratulations and deep gratitude to those whose involvement and support have kept the Society such an active organization through those decades. I wasn't involved at the beginning, which makes me even more impressed with those who were. Our program will present a look back at our Society's beginning and its 25-year history; those who have their own stories and remembrances are invited to present them. We recently received materials from the estate of Charlotte Smith which include photographs of early NMS activities, and papers from the earlier Nittany Valley Mineral Club, so we will include some of those.

**Please see the complete illustrated article on pages 3-7 of our *February* issue.**

For many years, we met in the main gallery of Penn State's Mineral Museum. Here, Karen deHaas speaks on "Appraising Gems" in April 2000. *A. Sicree photo*

## MSA Symposium in June

The Mineralogical Society of America will hold a celebratory Centennial Symposium on June 20-21, 2019 in Washington, D.C. Fourteen theme colloquia will offer a vision for exciting new directions in mineralogy, geochemistry, and petrology as MSA begins its second century. Each theme colloquium will include two 20-minute presentations by invited speakers followed by 15 minutes of moderated audience discussion. A once-in-a-century event! See topics, schedule and details: www.minsocam.org/MSA/Centennial/MSA_Centennial_index.html

## On the NMS Schedule

As usual, no meetings are planned for June or July.

Field trips are being planned and will be announced to those who have requested notification.

August 21 meeting: Show and Tell

Sunday, September 8: annual Picnic is planned for late afternoon in Pennsylvania Furnace.

Wednesday December 18: Annual Holiday dinner is planned for our regular third-Wednesday meeting night. This is during Penn State finals week.

**ATTENDING THE MAY MEETING?**
Donations of **a few high quality, labeled door prize specimens** are invited.
Your donated snacks will be welcomed.
Bring a friend!

1997 field trip to Gettysburg (Teeter) Quarry; left to right: Shirley Fonda, Jeanne Dague, Andrew Sicree, 2nd field trip chair Carl Rogers, 1st field trip chair Joe Dague, Mike Sheasley. *Photo courtesy of A. Sicree*

## Proposed Bylaws Changes

by David Glick, NMS President

I was recently reminded that in our Bylaws (available on the web site), Article 10 section 10.3 entitled "Other Business at Regular Meetings" includes the wording "Decisions involving dissolution of the Corporation, financial commitments over $500., actions outside the objectives and purposes of the Corporation as stated in the Articles of Incorporation or these Bylaws, shall require a mail ballot of all eligible members." The $500 limit raises some questions; the Board now manages much more money than 12 years ago when this wording was approved, and as prices increase and possible projects cover a broader range, commitments over $500 could become frequent.

Although these restrictions were probably intended to apply only to decisions proposed by regular members (per wording earlier in that section), an interpretation imposing the restrictions on Board decisions might be possible. Requiring a membership vote may prevent timely action by the Board.

I plan to review the wording of the Bylaws and propose changes to clarify this situation and any other problems which might be found. Any interested members are invited to contact me (see p. 10) in order to participate in review and discussion. The Board of Directors would discuss possible changes, and could put them on the ballot at the Annual Meeting of the Members in October.

## Geo-Sudoku

by David Glick

This puzzle contains the letters EIGNRSUVY ; one row or column spells a method of recording features of the land. As usual, if you've read this issue, you've seen it. Each block of 9 squares, each row, and each column must contain each of the nine letters exactly once. The solution is on page 10.

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# FEDERATION NEWS

Nittany Mineralogical Society, Inc., is a member of EFMLS, the Eastern Federation of Mineralogical and Lapidary Societies, and therefore an affiliate of AFMS, the American Federation of Mineralogical Societies. The **Federations and our Society strongly encourage all members to read the monthly Federation Newsletters, available on their web sites**, which are linked from our web site, www.nittanymineral.org . We present brief summaries here in order to encourage readers to see the entire newsletters. There's a lot there!

The EFMLS Newsletter is now being distributed electronically; a link is available on our web site **www.nittanymineral.org**. A special issue in memory of Carolyn Weinberger, long-time member of the EFMLS leadership, is now on the EFMLS web site (listed as the April-May issue). Everyone is encouraged to read it. The regular May issue is expected in mid-May.

The **AFMS Newsletter** was also edited by Carolyn Weinberger; the new editor is Suzanne Webb, and the April-May issue is now on the web site. The issue begins with "A Tribute to Carolyn Weinberger" by Shirley Leeson which provides some history of Carolyn and husband Steve's extensive involvement with AFMS (separate from EFMLS). Steve has been the "Central Office" of AFMS since 2004. Shirley's article says, "They have been a fixture for so long that AFMS really means Carolyn and Steve. Their work for the AFMS has been monumental and will live on forever." In presenting the 2009 AFMS Recognition Award, Bob Carlson said, "Together, this couple has provided the AFMS with Communication and Organization, without which the AFMS could not exist."

Jim Brace-Thompson, Juniors Program Chair, invites nominations of club members up to age 18 for recognition in *the Rock & Gem Kids* column in *Rock & Gem* magazine. Rockhound of the Year nominations are invited, and awards are announced for All American Clubs and for the Website Contest and Bulletin Editors' Contest. The Conservation and Legislation Committee article provides a summary of the Natural Resources Management Act, and a discussion of how it may affect recreational rockhounding. The ALAA column considers how we can use BLM and Department of the Interior campaigns for recreational use of public lands to our advantage for access to rockhounding sites. The Historian's column discusses the start of mineral clubs from 1928 into the early 1930s, the start of club bulletins and other publications, several Federations in the late 1930s and early 1940s, and the creation of the American Federation in 1946-47. Minutes of the 2019 AFMS Annual Meeting are presented. *-Editor*

# Central Pennsylvania during and following the Pleistocene Ice Age

Dr. Charles E. Miller, Jr.

## Introduction

In Earth's long history, there have been at least five ice ages. Some date back hundreds of millions of years or more. The most recent - the Pleistocene Ice Age - began approximately 2 million years B.P. (before present) and ended about 10,000 years B.P. This ice age is familiar to most of us in Pennsylvania because it directly affected one-third of the state (Figure 1), leaving indelible evidence that we see today.

During the Pleistocene, there were multiple glacial advances into the state. Interglacial periods, with much warmer temperatures, separated each advance. Most geologists believe we are in an interglacial period. Figure 1 shows southern limits of ice sheets in Pennsylvania. Of particular note are the locations of Lock Haven (red ellipse) and Williamsport (red triangle), 32 and 55 miles, respectively, from State College (red star). These two communities are frequently mentioned as being at or near the southernmost glacial advance into central Pennsylvania.

This article describes the general paleoecology and more conspicuous Ice Age features in central Pennsylvania in late- and early post-Pleistocene time. Most of this area was south of the glacial advances and, therefore, unglaciated. Because there are so few glacial deposits (till/moraine/drift) in this part of the state, clues are found in indirect ways.

The last glacial maximum (Late Wisconsin) occurred in Pennsylvania at about 20,000 B.P. (Sevon, et al, 1999). At that time, vegetation distribution in central and eastern United States was approximately as shown in Figure 2 (Flint, 1971). Characteristic vegetation defines, in part, climates because plants adapt to specific ecological conditions. As those conditions shifted northward (glacial retreat) and southward (glacial advance), so did vegetation. This association assists in determining vegetation/climate distributions during the recent Ice Age

Immediately south of the ice sheet at the last glacial maximum was a narrow (50-150 km) tundra belt across north-central Pennsylvania, roughly paralleling the glacial front (Figure 2) (Flint, 1971; Guilday, et al, 1964; Braun, 1989) and extending southward along higher mountains (Flint, 1971; Watts, 1980). That distribution included parts of central Pennsylvania (Figure 2). Today, tundra is restricted to altitudes above the tree line and high latitudes.

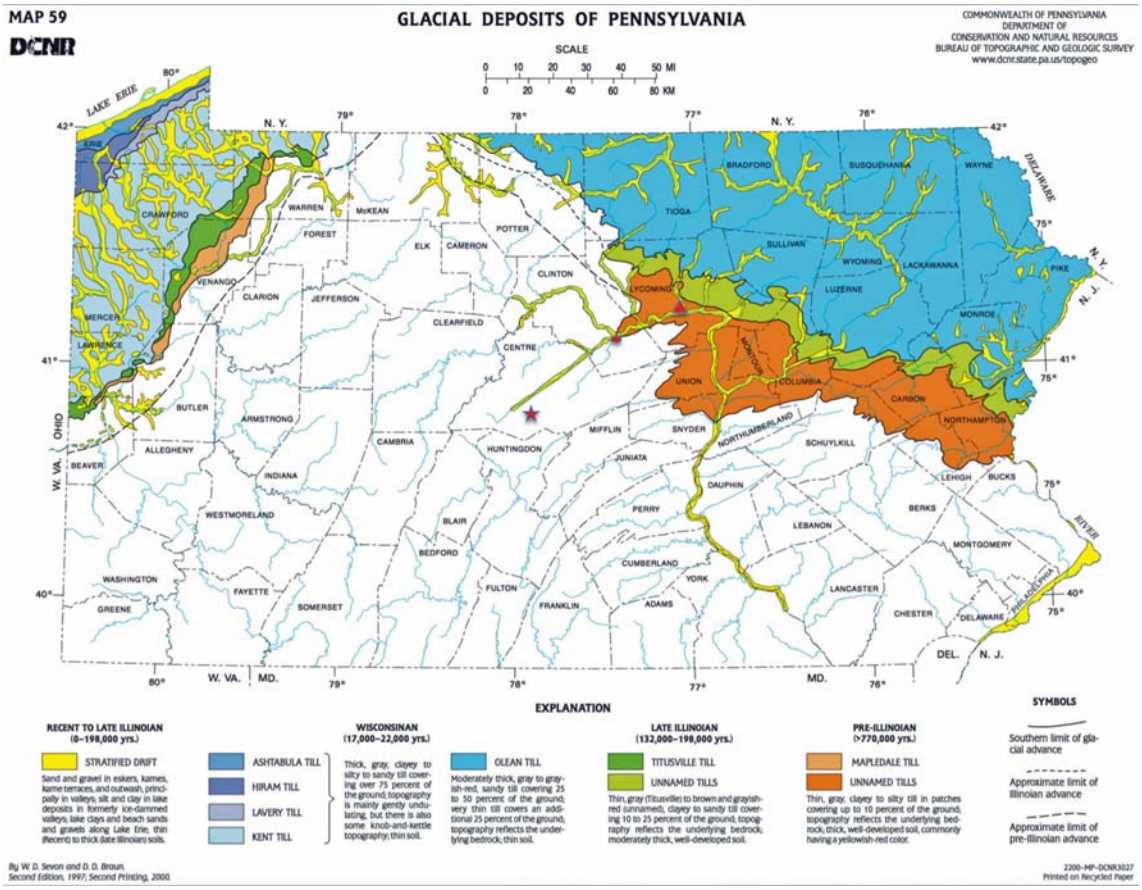


Figure 1: Map showing glacial advances into Pennsylvania during the Pleistocene Epoch. (PA Geol. Survey)

Tundra consists of short shrubs, grasses, mosses, lichens, and limited spruce trees adapted to much lower temperatures. Those temperatures produce permafrost - permanently frozen soil that, today, is restricted to polar areas and elevations above the tree line. Permafrost is due to temperatures low enough to sustain frozen soil year round and can be in any climate having those temperature requirements. Continuous permafrost occurs in places with mean annual air temperatures (MAAT) less than approximately -6° to -8°C. The MAAT for discontinuous

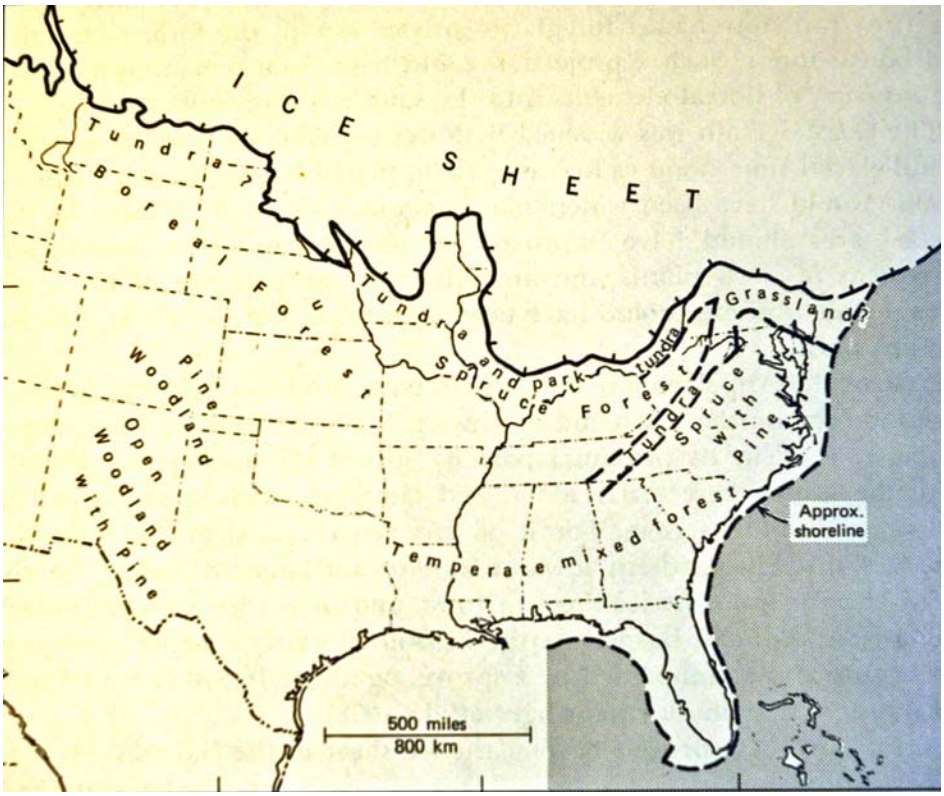


Figure 2: Vegetation distribution in central and eastern United States at the Late-Wisconsin glacial maximum approximately 20,000 B.P. (Flint, 1971).

permafrost is approximately -0.5° to -2°C. In comparison, the MAAT in State College is about 10° C. This means that if continuous permafrost was in central Pennsylvania, since the Pleistocene the MAAT has increased 17° C (30.6° F) (Clark, 1992).

South of the tundra belt (Figure 2), but still in central Pennsylvania, temperatures moderated for spruce and pine to replace grasses and shrubs as the dominant vegetation. This is the taiga or boreal forest, usually relegated to higher latitudes and altitudes. Transition from tundra to taiga was probably not a sharp, well-defined boundary. More likely, in those transition zones, coniferous forest (taiga) had tundra intervals (Figure 3). This is based on palynological (fossil pollen and spores) work at New Paris (Bedford County) (Guilday, et al, 1964) .

**Periglacial features and processes**

Associated with permafrost are periglacial features and/or processes. They are the product of cold temperatures adjacent to glaciers where frost action and intense freeze/thaw cycles exist. Some periglacial processes no longer operate in central Pennsylvania because temperatures are too warm. Others, like frost heaving/ice wedging, still occur but not with the same intensity or pervasiveness as during glacial advances. Landforms associated with permafrost in this part of the state are relics of the Pleistocene.

In central Pennsylvania, boulder fields (scree/felsenmeers) are ubiquitous on mountain slopes and ridges (Figures 4a and 4b). These features are the most widespread and conspicuous Ice Age relics in this part of the state. The boulder fields are periglacial features, largely from frost weathering (frost riving) - water freezing in rock fractures or other discontinuities. When water freezes, it exerts pressures great enough to split rock, creating boulders.

At times, boulders and soil moved imperceptibly down slope due to gelifluction and/or solifluction - periglacial processes involving water-saturated soils resting on frozen (permafrost) and/or unfrozen ground, respectively (Potter, 2014). Freeze and thaw cycles cause down-slope movement, producing lobes - a distinctive feature in much colder climates (Figure 5). Ice-wedge casts (discussed later) are the best indicator of permafrost (Potter, 2014) and their presence in Centre County indicates that continuous Permafrost existed here at that time.

Solifluction features are widespread on nearly allslopes in central and south-central Pennsylvania (Merritts, 2014). However, in these parts of the state, dense forests cover the lobes, making them virtually

Figure 3: Taiga with tundra intervals in northern Canada. Similar conditions prevailed at New Paris (Bedford County) approximately 12,000 B.P. (Guilday, et al, 1964)

Figure 4a: Boulder field near Frankstown, PA. The ice-fractured rock is Silurian Tuscarora Quartzite. Figure 4b: Scree slope of Silurian Tuscarora Quartzite overlooking Bear Meadows, PA. Images by the author.

invisible to the unaided eye. Resolution is gained through Light Detection and Ranging (LiDAR) - a surveying technique using pulsed laser light. Figure 5 shows LiDAR-detected solifluction lobes on the slope of Tussey Mountain at Garner Run (DiBiase, et al, 2017). The lobes indicate permafrost affected this region, and the MAAT during glacial maxima must have been less than 0°C (Merritts, et al, 2014)

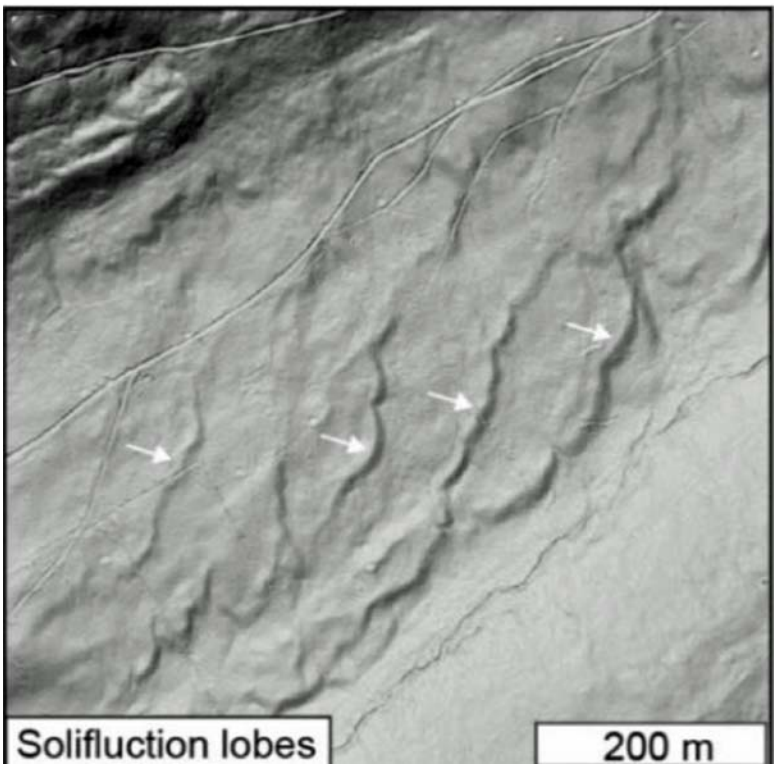


Figure 5: Solifluction lobes on Tussey Mountain at Garner Run. (DiBiase, et al, 2017)

Frost weathering (frost heaving) also produces patterned ground (Figure 6), another periglacial feature. Examples consist of stones, fissures, and vegetation forming polygons, rings, or stripes. These features are due to repeated freezing and thawing. Expanding ice crystals in soil push stones into such patterns. The role of frost action in pushing rocks in soil is appreciated if one considers the plight of farmers in New England. Many parts of those states are covered with glacial deposits. Each year, freeze and thaw cycles bring new rocks to the surface. Farmers regularly remove rocks, placing them in stone fences. In central Pennsylvania, patterned ground is found in Centre County (Hodgson, 1967; Roman DiBiase, personal communication, 2019), Huntingdon County (Troutt, 1971), and Union County (Marsh, 1999). Patterned ground may be more common, here, than realized. However, thick vegetation makes identification difficult.

Ice-wedge casts represent another class of periglacial features in central Pennsylvania. These consist of former ice wedges from when ice developed in open contraction cracks in soil or relatively soft rock, increasing in size with each annual freeze-thaw cycle. After melting, the resulting mold fills with sediment to form a cast of the original ice wedge. Figure 7 is a drawing of an ice-wedge cast near Tusseyville, Centre County (Crowl and Sevon, 1999). Figure 8 shows a soil/ice wedge in a shale pit at Potters Mills, Centre County (Clark, 1992). Ice-wedge casts are conclusive evidence of permafrost (Merritts, et al,

Figure 6: Stone rings patterned ground. (researchgate.net)

2014), indicating a MAAT in this area of -5 to -10°C (Clark, 1992).

Pingos (Figure 9) are large, soil-covered frost mounds, sometimes 30-50 m high and up to 600 m in diameter, associated with periglacial conditions. They are conclusive evidence of permafrost (Merritts, et al, 2014) and form from hydrostatic pressure in or below permafrost, creating closed and open forms. Closed-system pingos form where the mean annual air temperature is about -5°C or lower. Open-system pingos may develop in continuous or discontinuous permafrost. Those in discontinuous permafrost may form in areas where the MAAT is as high as -2° or -1°C (Washburn, 1980). In central Pennsylvania, pingo scars are known from R.B. Winter State Park (Union County) (Marsh, 1987) and Rothrock State Forest (Centre, Huntingdon, and Mifflin Counties) (Kubina, 2014).

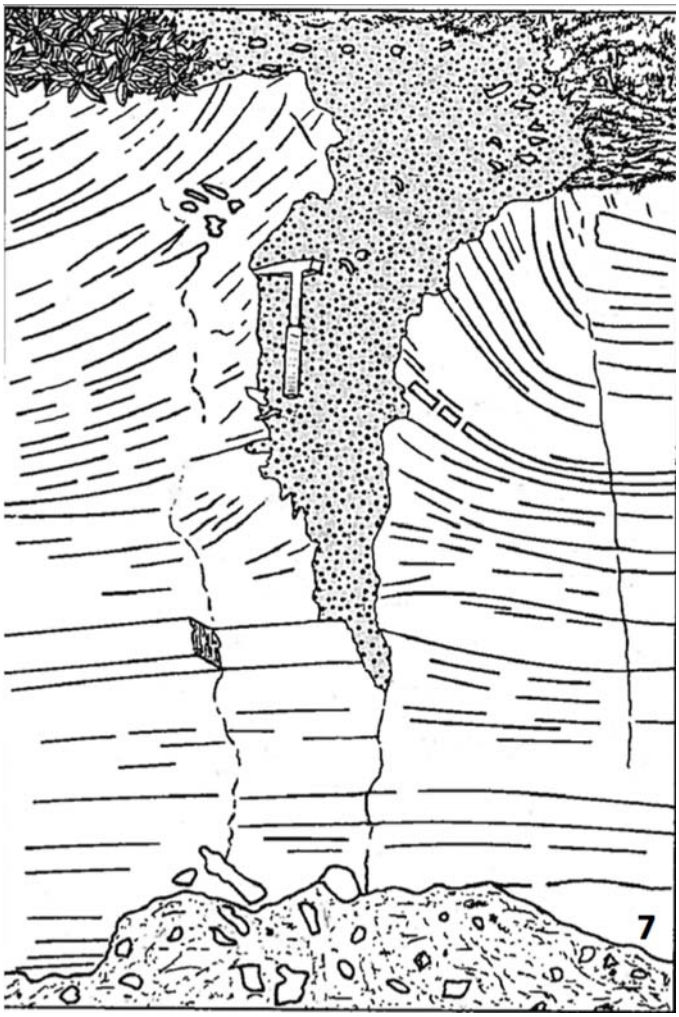


Figure 7: Ice-wedge cast in Ordovician Reedsville Shale near Tusseyville, Centre County, PA. (Crowl and Sevon, 1999).

Loess, as described in this article, is a periglacial eolian (wind-blown), fine-grained, highly sorted soil consisting mostly of silt-sized grains. In central Pennsylvania, loess is reported in Northumberland, Clinton, Dauphin, Juniata, Perry, Snyder, and Union counties (Clark, 1992; Hershey and Pollok, 1995) . One origin of loess begins with rocks grinding under glaciers, producing very fine-grained sediment known as glacial flour. That sediment is transported downstream, clouding the stream with a milky color. The water is said to contain glacial milk. Eventually, the fine-grained sediment is deposited along the sides of streams in

Figure 8: Soil wedge in shale in the Tom Swank (Musser) Shale Pit, Centre County. (Clark, 1992. )

Figure 9: Pingo. (indianapublicmedia.org)

outwash plains. Upon drying out during long cold winters, intense winds often generated near glaciers carry the fine sediment and deposit it as loess.

**Paleontology studies**

Additional insights into central Pennsylvania's environment during the late- and early post-Pleistocene are from paleontology. Plants and animals are linked to particular climates. As climate shifted northward and southward due to glacial retreat and advance, plants and animals followed, staying in the environment to which they were adapted. Some plant and animal species are proxies to a particular climate. Their identification provides a clue to determining the paleoclimate at that time. For example, New Paris (Figure 10) fauna correspond to a present-day geographic distribution in eastern Canada at approximately 50° N. latitude and in central Canada west of Hudson Bay at approximately 57° N. latitude (Guilday, 1964).

In central Pennsylvania, paleontological studies at Frankstown (Blair County); Hosterman's Pit, Oak Hall, and Bear Meadows (Centre County); New Paris (Bedford County); Saltillo (Huntingdon County); Crider's Pond (Franklin County), and Kings Gap Pond (Cumberland County) contribute to interpreting the paleoecology during the referenced time period (Figure 10). Except for Oak Hall and Saltillo, these demonstrate plant and/or animal transitions related to climate change (Figure 10). Paleontological data from all the sites complement previous discussions on much colder conditions in this part of the state.

Over 9300 fossils, representing 71 species of Pleistocene animals (of which 52 are mammals) are reported from a fissure-cave complex at Frankstown. Figure 11 depicts the landscape around the cave when those plants and animals lived about 12,000 years ago. The climate was cold temperate, halfway between the full glacial or "boreal" of several thousand years earlier,

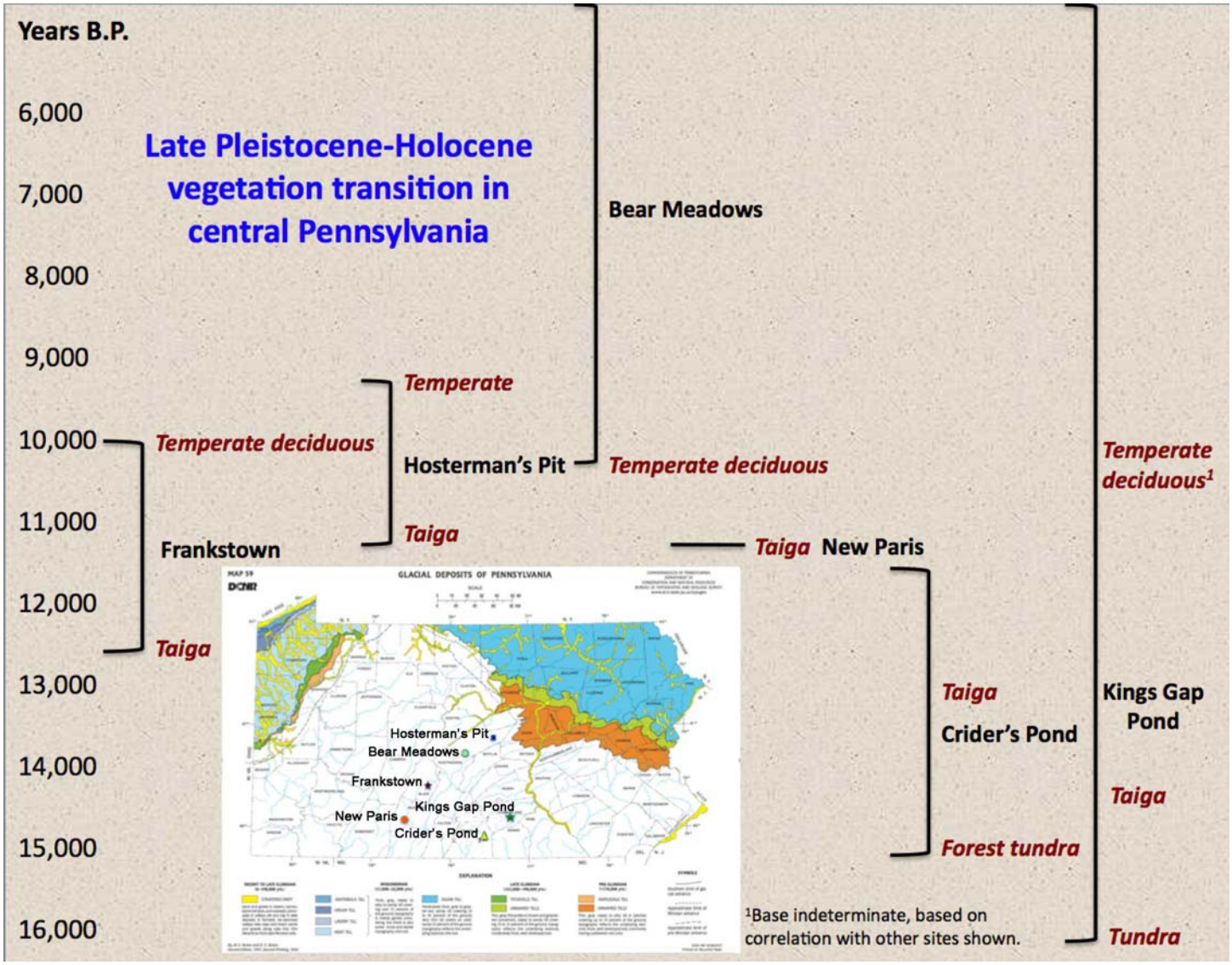


Figure 10: Schematic showing Late Pleistocene-Holocene vegetation transition in central Pennsylvania. Based on palynological data from four sites: Fonda (2013); Guilday (1967); Guilday, et al (1964); and Kovar (1964).

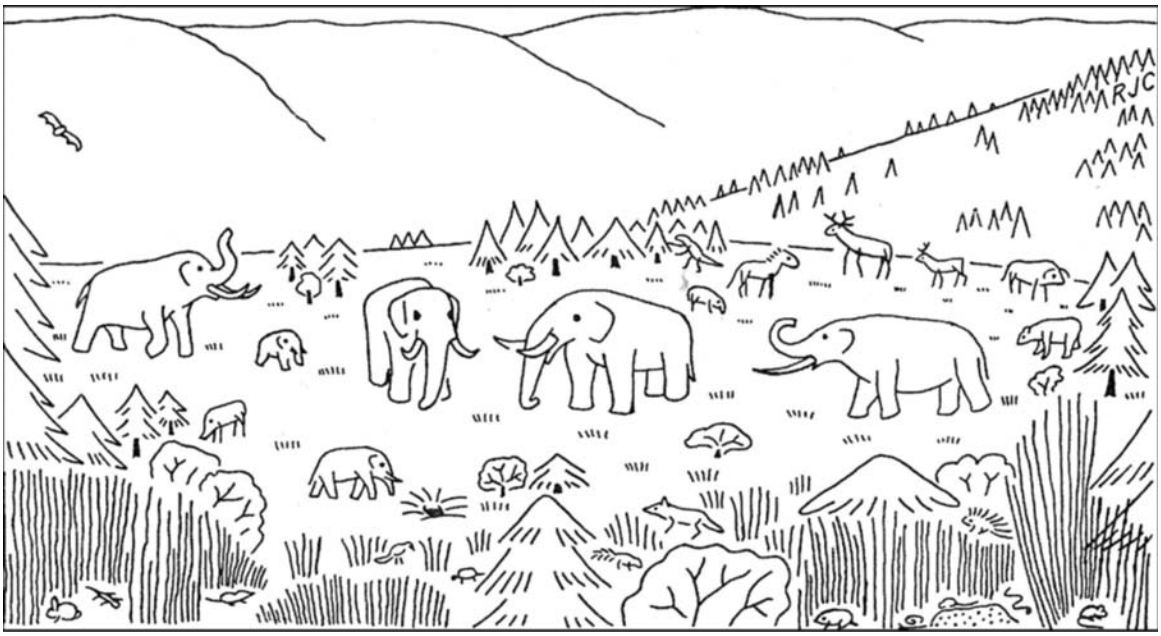


Figure 11: Reconstruction of latest Pleistocene environment, animals, and plants , on top of a hill containing the Frankstown cave (small black hole in front of juvenile mastodon, below and left of center of image. (Cuffey, et al, 1976)

and the mid-temperate of today. Of particular note are fossils of mastodon, caribou, collared lemming, and musk ox.

Intermittently from 1932 to 1963, sinkhole excavations at New Paris yielded over 2700 Pleistocene animals. In 1935 and 1997, remains of a Pleistocene mastodon are described from Saltillo. In the 1960s, paleontological studies at Hosterman's Pit yielded at least 20 animals, representing 13 species, ranging in age from 11,300 BP to 9290 BP. Mastodon, musk ox, and caribou are among the animals excavated. Hosterman's Pit fauna reflect change from a boreal to a temperate mammal fauna over 2-4 thousand years (Figure 10). This implies a rapid climate change of warming temperatures following periglacial conditions of the Pleistocene (Guilday, 1967). Colder temperatures of the preceding tundra and boreal-forest conditions (taiga) are replaced with significantly moderated temperatures. Hosterman's Pit local fauna represent the earliest known date for a Recent fauna in NW North America (Guilday, 1967). More recently, possibly in the late 1990s, a Pleistocene mastodon tooth was found along Spring Creek near Hanson's Oak Hall Quarry.

Of the aforementioned studies, mastodon, caribou, musk ox, and collared lemming are proxies to a colder climate in central Pennsylvania during the Pleistocene. Of these, mastodon generally inhabited areas farther south of the ice front than the others, even as far south as Florida. Mastodon tooth morphology is suited for forest browsing. Close to the ice front where tundra conditions persisted (Figure 2), trees were uncommon. Farther south temperatures moderated and a taiga (boreal forest) developed. This was the setting most suitable to mastodon. In central Pennsylvania, mastodons are known from Frankstown, Saltillo, and Oak Hall. Palynological data suggest these locations were, at that time, in boreal forests (taiga).

Mammoths, the other well-known Pleistocene elephant species, have been found in Pennsylvania. They generally lived along the glacial ice front, with teeth adapted to a harsh grass-grinding diet characteristic of tundra grasses.

Complementing the fauna work are palynological studies at Bear Meadows, Crider's Pond, Frankstown, Kings Gap Pond, and New Paris No. 4 (Figure 10). Pollen identifies plant species and, therefore, the climate in which they grow. Figure 10 is a composite of time intervals for the sites, reflecting climate change through time for central Pennsylvania. In general, there is a warming trend from the late Pleistocene into the Holocene, beginning with tundra, transitioning to taiga, and eventually temperate deciduous vegetation. Of the five sites, tundra is identified only at Kings Gap Pond. Variation in timing of vegetation transitions at individual sites may reflect local factors such as elevation and topographic features that create isolated pockets.

Palynological work at Bear Meadows during the 1950s and 1960s yields data back to 10,320 years ago (Kovar, 1964) (Figure 10). Recently, Penn State began a new initiative at Bear Meadows. As of 10,320 years ago, this part of the state already had a somewhat complex forest cover, having rebounded from the previous colder climate. The palynological record at Crider's Pond ranges from 15,210 to 11,650 years B.P., indicating a transition from forest tundra (Figure 3) to taiga (Figure 10). This transition reflects climate change as temperatures warmed. At Frankstown, between 12,700 to 10,000 years B.P., boreal coniferous forest transitioned into temperate deciduous forest (Figure 10). Kings Gap Pond sedimentation extends from 16,080 years B.P. to the present. Tundra persisted from 16,080 to ~ 14,450 years B.P. That transitioned to taiga, and eventually to temperate deciduous. At New Paris No. 4, pollen studies agree with fauna collected there, identifying boreal forest (taiga) environments at

approximately 11,300 years B.P. The taiga included conifer, fir, white oak, birch, juniper, sedges, lichens and mosses. A boreal forest reflects temperatures warmer than the preceding tundra conditions.

**Conclusion**

During the late Pleistocene approximately 20,000 B.P., tundra 50-150 km wide covered part of central Pennsylvania immediately south of the ice sheet and extended southward along higher mountains. Associated vegetation included grasses, shrubs, mosses, lichens, and limited spruce trees. In general, it was a treeless plain with low biotic diversity. This was the setting of mammoths, musk ox, caribou, and collared lemmings - proxies to a colder climate. Fossils of these mammals have been found in central Pennsylvania. A MAAT of -5 to -10° C produced permafrost. South of the tundra in central Pennsylvania was boreal forest (taiga) of spruce with pine. Here, too, was permafrost. With somewhat moderated temperatures, typical animals of the taiga in this part of the state included mastodon, black bear, deer, elk, porcupine, and voles. Low temperatures associated with these climates, at that time, produced a litany of periglacial features, including ice wedges, pingos, boulder fields, patterned ground, solifluction lobes, and loess

At about 12,700 B.P., taiga forests in central Pennsylvania began transitioning to temperate deciduous in which hardwood deciduous trees (maple, oak, birch, magnolia, sweet gum, beech) dominated. By 10,320 B.P., the State College area already had a complex forest cover as temperatures from the Ice Age continued moderating.

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## Some Upcoming Shows and Meetings

Our web site http://www.nittanymineral.org has links to more complete lists and details on mineral shows and meetings around the country. See www.mineralevents.com for more.

**May 18, 2019:** Earth Science Show & Sale, by The Rock & Mineral Club of Lower Bucks County, PA. Christ United Methodist Ch., 501 Wistar Rd., Fairless Hills PA. Sat. only, 9-3. https://sites.google.com/view/lowerbucksparocks/shows

**May 18-19:** "World of Gems & Minerals" by Berks Mineralogical Soc. Leesport Farmers Market Banquet Hall, 312 Gernant's Church Rd. Leesport, PA 19533. Sat 10-5, Sun. 10-4. Tailgate section Sat. only. https://berksmineralsociety.com/vendor-info/

**June 1, 2019:** Spring Mineralfest by PESA, Macungie Memorial Park, Macungie, PA Sat. Only, 8:30 -3:0). http://www.mineralfest.com/

**June 1-2, 2019:** EFMLS Convention and Orange County Mineral Club Show, Monroe, New York. (EFMLS meeting Friday evening May 31). http://www.amfed.org/efmls/convention.htm

**Sept. 14-15, 2019:** Gem, Mineral & Jewelry Show, by Central Penn. Rock & Mineral Club. Harrisburg Consistory, 2701 North 3rd St., Harrisburg PA. Sat. 10-6, Sun. 10-5. http://www.rockandmineral.org/annual%20show.htm

## NMS BOARD MEETING NOTICE

NMS members are invited to attend Board of Directors meetings, which are generally held at 7:00 p.m. about two weeks prior to the general monthly meeting, although we do not meet every month. **The next date for a full Board meeting has not been set.** Members who would like to attend should contact president David Glick to verify time and place; those who would like to have their discussion item placed on the agenda should contact him at least one week in advance of the meeting.

## Geo-Sudoku Solution

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| I | Y | V | N | G | U | R | E | S |
| **S** | **U** | **R** | **V** | **E** | **Y** | **I** | **N** | **G** |
| N | G | E | R | I | S | U | V | Y |
| R | V | Y | I | S | N | E | G | U |
| G | S | N | U | Y | E | V | I | R |
| E | I | U | G | V | R | S | Y | N |
| Y | E | G | S | R | V | N | U | I |
| U | R | I | E | N | G | Y | S | V |
| V | N | S | Y | U | I | G | R | E |

## INVITE A FRIEND TO JOIN THE SOCIETY

The Nittany Mineralogical Society prides itself on having among the finest line-up of speakers of any earth sciences club in the nation. Everyone is welcome at our meetings. If you'd like to be part of our Society, dues are $20 (regular member), $7 (student rate), $15 (seniors), $30 (family of two or more members, names listed). Those joining in March or later may request pro-rated dues. Your dues are used for programs and speakers, refreshments, educational activities, Bulletins, and mailing expenses. Please fill out a membership form (available at www.nittanymineral.org), make checks payable to "Nittany Mineralogical Society, Inc." and send them in as directed, or bring your dues to the next meeting.

**We want to welcome you!**

### CONTACT INFORMATION

**mailing address:**

Nittany Mineralogical Society, Inc.
c/o S. Bingham, Treasurer
145 Goddard Cir.
Penna. Furnace PA 16865

### SOCIETY OFFICERS

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### OTHER CONTACTS

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The **Bulletin Editor** will welcome your submissions of articles, photos, drawings, cartoons, etc., on minerals, fossils, collecting, lapidary, and club activity topics of interest to the members. Please contact:

David Glick E-mail: xidg@verizon.net
209 Spring Lea Dr. phone: (814) 237-1094 (h)
State College, PA 16801-7226

Newsletter submissions are appreciated by the first Wednesday of the month. Photographs or graphics are encouraged, but please do not embed them in word processor files; send them as separate graphics files (TIF, or good to highest quality JPEG files, about 1050 pixels wide, are preferred). Please provide captions and name of photographer or artist.

**Visit us at www.nittanymineral.org**