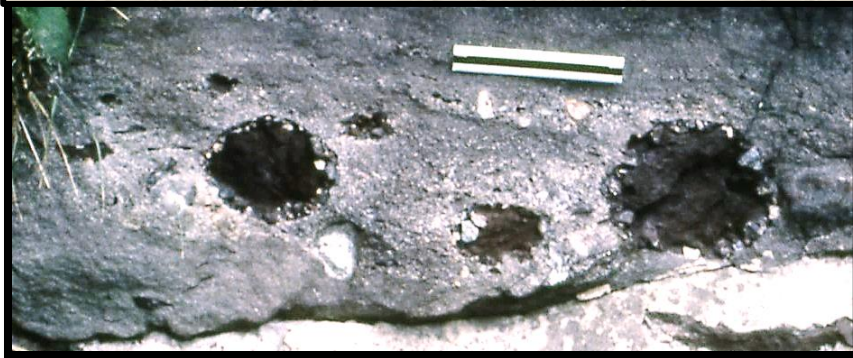


“SAVE THE RARE & UNIQUE MASSACHUSETTS ARMORED MUD BALLS” PROJECT



Quarried block, Jurassic age Turners Falls Sandstone, now located at the Greenfield Community College Geology Path. 6 inch ruler for scale.

PROJECT GOAL: Promote the rare Massachusetts Jurassic age armored mud balls (AMBs) to become a State “Sedimentary Structure”. * This official State Symbol designation would preserve, protect, educate the public, and celebrate these unique geologic features. (They are more important compared to other State Symbols such as the Corn Muffin and Boston Cream Donut!)

**[“Sedimentary structures” are features preserved during deposition of sediment, such as fossils, mud cracks, ripple marks, and rarely, armored mud balls.]*

WHAT ARE ARMORED MUD BALLS? Hard mud pieces fall into a stream, get tumbled, rounded, and coated (“armored”) with streambed pebbles. Quick burial and lithification (hardened to rock) preserves these delicate “sedimentary structures,” much rarer than dinosaur fossils. Eventually, over geologic time, erosion of the enclosing rock may reveal them for discovery.

WHERE CAN YOU FIND THEM? The formation, preservation, and discovery of lithified armored mud balls is so rare that only a handful of examples have been found. Except for our Massachusetts examples, all are in remote areas and perhaps not currently visible due to weathering, erosion, or soil cover. The Massachusetts lithified AMBs illustrate a variety of sizes, from golf ball to basketball and have distinct pebble armor. They have been found in 200 million-year-old sedimentary rock (late Triassic – early Jurassic) near the Connecticut River in Turners Falls, Deerfield, and Greenfield. Quarried blocks from a now-dismantled bridge foundation in Turners Falls, preserve excellent AMBs now displayed along the Greenfield Community College Geology Path. Specimens have also been contributed to local colleges and museums.

WHY ARE ARMORED MUD BALLS IMPORTANT? These are unique specimens! There are no locations in the world where lithified AMBs can be easily seen and sampled except for the Massachusetts examples and these display a variety of sizes plus distinctive pebble armor. Many examples are in quarried blocks so AMBs are quite visible within the stream-deposited conglomerate rock. The amusingly named “armored mud balls” preserves rare, interesting events from the Connecticut River Valley’s “Age of Dinosaurs” which excites students, the public, as well as geologists. Everyone smiles when they see and learn about AMBs!

HOW CAN THEY BE SAVED? Designate them official Massachusetts “Sedimentary Structures”! Otherwise, they will be neglected and their significance forgotten. That will be a loss to science as well as to Massachusetts.

WHO IS ORGANIZING THIS EFFORT? Prof. Richard D. Little, Greenfield Community College, discovered these rare features & documented them in a Journal of Geology article (1982). His volunteer preservation efforts are supported and assisted by many geologists, lay people, conservation / education organizations and Franklin County towns. Over a thousand people have viewed the AMB video ** or visited the web site and hundreds have signed the petition (see web site).

MORE INFORMATION: <https://ArmoredMudBalls.rocks>

** 6 minute video <https://youtu.be/OIJEXvJ8Esw>

RDLittle2000@aol.com (413) 527-8536

6 Grandview Ln, Easthampton MA 01027 <https://EarthView.rocks>

Thanks for reading. Consider helping with publicity expenses! (Prof. Little works for free.)

Donate: <https://www.gofundme.com/save-the-armored-mud-balls>



PAGES 2 – 13:

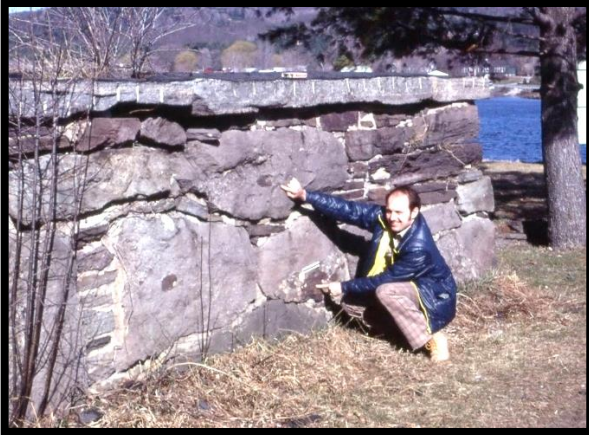
(A) History, Origin & Importance of Armored Mud Balls

(B) Photos of all lithified Armored Mud Balls from around the world

(C) Photos of many non-lithified Armored Mud Balls

(D) More information

(A1) HISTORY OF FINDING ARMORED MUD BALLS IN MASSACHUSETTS *(Statement of RD Little, 2021)*



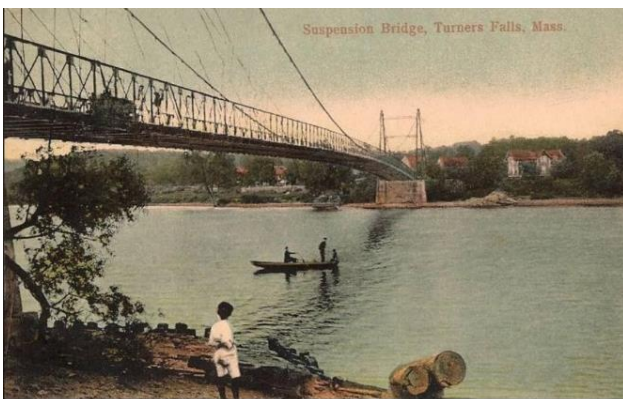
"I was a new hire at Greenfield Community College, preparing for classes and exploring this new area. I went to Unity Park in Turners Falls along the banks of the Connecticut River. Unity Park is the site of a suspension bridge, now dismantled, that connected Gill to Turners Falls (1878 – 1942). In the suspension cable anchors, a few feet from where I parked, were these intriguing round features (see picture below). I had found armored mud balls! Below is that "genesis rock" of armored mud balls. It was right by the parking lot in the suspension cable anchor, adjacent to the Connecticut River. The ruler is 6 inches. The cable anchor is now dismantled and many of the quarried stones with armored mud balls are in the Geology Path at GCC with a few remaining at

the bridge site in Unity Park. A postcard view of the old suspension bridge is pictured below.

After several years of bringing students here as part of GCC field trips, further research revealed that no one had ever noted them in the geological (or any other) literature. I prepared a paper that was published in the Journal of Geology (1982). Being the discoverer was quite a surprise since many 19th century geologists traveled over this bridge to nearby dinosaur footprint quarry sites in Gill. I am quite sure that they would have stopped to view these obvious and interesting sedimentary features, but nobody wrote about them. Maybe they were too busy thinking about dinosaur discoveries."

In order to protect these unique geological oddities, the Unity Park rocks of scientific interest were moved to Greenfield Community College in the 1980s where they became part of our outdoor geology collection. A few quarried blocks remain at Unity Park, including one having armored mud balls.

Photo top: *The author (mid 1970's) at the old Red Bridge's west suspension cable anchor, pointing to armored mud balls. Both this anchor and the other a few feet to the east, were dismantled in the 1970's and the armored mud ball specimen blocks were transported to be preserved at Greenfield Community College or placed nearby at Unity Park.*



Postcard: The "Old Red Bridge" (now dismantled), view looking south from Gill toward Turners Falls, present location of Unity Park.

(A2) THE ORIGIN AND IMPORTANCE OF ARMORED MUD

BALLS.

Photo: Armored Mud Ball, Greenfield Community College Geology Path. The center of this 3 inch ball is sandy mud, now fine-grained sandstone rock. Pebble armor is the circumference. The surrounding rock is Turners Falls Sandstone from the Jurassic Period (200 million years old), a sandy conglomerate rock from stream deposition. This quarried block was removed from the Turners Falls "Old Red Bridge" foundation.



Armored mud balls are very rare geologic sedimentary structures. (Sedimentary structures are geologic features created during or shortly after sediment layers are deposited. Some examples: ripples, mud cracks, fossils, and very rarely, armored mud balls.) These early Mesozoic Era (Triassic and Jurassic Periods) examples in Massachusetts were deposited in a rift valley, similar to today's Death Valley, formed as Pangea split. Valley lakes swelled and shrank due to climate changes, an essential part of the creation story.

To Form Armored Mud Balls Five things are needed, in this order: (1) Lake bed with **mud deposition**, perhaps due to a wetter climate which causes expanded lakes, followed by falling lake levels perhaps due to a drier climate. (2) **Stream erosion** of now-exposed, dry and hard lake bed mud produces angular mud chunks that drop into the flowing water. (3) **Stream flow** rolls the angular mud chunks downstream and they become round, soft and sticky on the outside, picking up stream sand and pebbles along the way. That coating is the "armor". (4) **Quick burial** is essential before drying disintegrates the fragile balls. (5) Many quickly buried armored mud balls might be subsequently eroded by the nearby stream and destroyed, so **deep burial** and eventual **lithification** (turned to stone by mineralized groundwater) along with the surrounding rock, is important for geologic permanence. *Please note the explanatory diagrams at the end of this article.*

To Find Armored Mud Balls Once lithified, turned to stone, the armored mud balls and their surrounding sedimentary rock must be revealed at the earth's surface. Geologic time and the right amount of uplift and erosion are needed to expose the 200 million year old sandstone rock containing the Massachusetts armored mud balls so that they might be observed. If our State was a desert, it would be much easier to find exposed bedrock. However, in our humid climate, rock exposures are actually very limited due to soil and vegetation cover. The lithified armored mud balls of Massachusetts are sometimes seen in rock exposed in the Connecticut River bed, but most are from quarries. One quarry, now covered by buildings, is in the downtown area of Turners Falls and the other is in northeast Deerfield's "Cheapside Quarry." The Route 2A Greenfield Stop and Shop Supermarket site reveals several armored mud balls both in the blasted rock face at the rear plus the exposed glacier-smoothed and scratched rock adjacent to the parking lot. Finally, once the rare lithified armored mud balls are exposed, someone must find, recognize and record them.

As you can see, this is a complicated series of events and as a result, lithified armored mud balls are extremely rare.

See the following section for pictures of lithified and non-lithified armored mud balls from other locations.

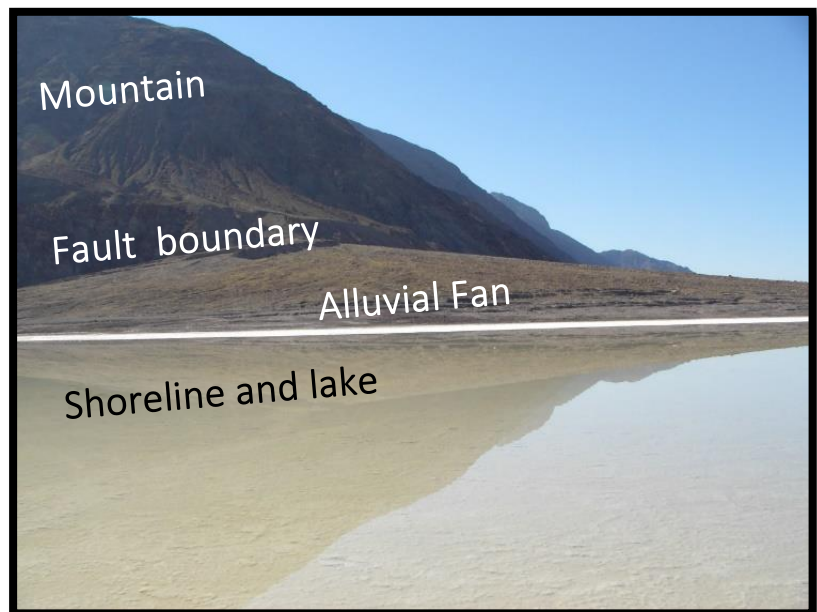
It is fortunate that most Franklin County specimens are revealed in quarried blocks since they can be moved and displayed. Sometimes pieces are small enough to be cabinet specimens and occasionally a piece may fit on a lab rock saw and be dissected so that a number of specimens can be produced from one rock. **In the whole world, the only source for samples of lithified armored mud balls is Franklin County** and most of these rare

specimens (about 20) have been donated to local colleges and museums. Besides the quarried blocks with armored mud balls, a few others are found in bedrock, but these balls are firmly part of the well-cemented Mesozoic Era sandstone and they can not be removed.

The best place for you to find Massachusetts lithified armored mud balls is along the GCC Geology Path (in the Outdoor Learning Lab, adjacent to Parking Lot F, south end of the Main Building). Plus, see the display case by the Geology Lab (room N 350). Other places: the now-dismantled “Red Suspension Bridge” site in Unity Park, Turners Falls and the Beneski Museum, Amherst College. You can find directions to Franklin County’s armored mud balls sites in Richard Little’s (2020) “Exploring Franklin County” book. You can also discover many other geological and scenic “gems” proving that this is the best place in the world to study geology. (see www.EarthView.rocks for order information or search Amazon or check with your local bookstore.)

(A3) MASSACHUSETTS LITHIFIED ARMORED MUD BALL ORIGINS

The mid-Mesozoic Era (late Triassic through early Jurassic time, about 200 million years ago) in the Connecticut River Valley region of Massachusetts was a rift valley landscape created as the Pangea supercontinent split. It looked like Death Valley (photo). Streams flowed from mountains onto and across gently sloping gravelly deposits of alluvial fans which led downslope to muddy / sandy layers of temporary lakes or meandering rivers. Sometimes, during wet intervals, the lakes expanded and extended over alluvial fan edges, leaving mud deposits on the alluvial fan gravel. This will become the raw material for the armored mud balls.



Badwater, Death Valley, April 2005. photo by RDL

Later, with drier climate conditions (or perhaps uplift of the valley floor), the lakes shrank and exposed the mud layers left on the alluvial fans which then dried and hardened. When it rained, streams eroded and hard mud chunks rolled downstream becoming round, soft and sticky around their margins ensnaring pebbles from the stream bed to form the armor. Then, the fragile balls were deposited and covered with sediment that protected them from drying and cracking. Next, if these sediments remain buried, lithification will eventually occur (due to seeping mineral-rich groundwater) and the sediment, along with the armored mud balls, will become “rock.” Two hundred million years will elapse before they will next see the light of day.

In Turners Falls, that “light of day” was sometime before 1878 as the Connecticut River’s “Old Red Bridge” between Turners Falls and Gill was being built. Local sandstone was quarried and the pieces became part of the bridge’s suspension cable anchors. In about 1970 Prof. Little discovered them and the rest is “history”.

(B) LOCATIONS AND PICTURES OF LITHIFIED ARMORED MUD BALLS

Pictures are worth a thousand words. Below is the world's best compilation of lithified armored mud ball photos. The lithified armored mud ball photos are then followed by examples of unlithified ones. Enjoy.



LITHIFIED ARMORED MUD BALLS.

In Franklin County lithified armored mud balls have only been found in three locations: (1) Turners Falls, in the lower Jurassic Turners Falls Sandstone Formation. These include the ones from the "Old Red Suspension Bridge" cable

anchors in Unity Park plus the Conn. Riverbed exposures. (2) There are armored mud balls in the upper Triassic Sugarloaf Arkose, seen at Stop and Shop parking lot, High Street (Rte. 2 -A), Greenfield. Finally, (3) the upper Triassic Falls River Beds at the "Cheapside Quarry" in northeast Deerfield, River Road (private property). Lithified armored mud balls have not been found in any other sedimentary rock outcrops in Massachusetts, Connecticut, or other eastern North American sites having similar Mesozoic rift valley deposits.

The rock above is in the GCC Geology Path and has the best grouping of armored mud balls. The large one to right is at this quarried block's edge and therefore you can see two dimensions of this round basketball sized piece. Spectacular!

The rock to the right, now in the GCC Geo Path is the same one pictured previously (with the 6 inch ruler) in the suspension bridge anchor, Unity Park, Turners Falls.





This rock (left) from the Cheapside Quarry, River Road, NE Deerfield, has a dozen or more large armored mud balls with sand armor. Lichen spots cover much of this surface.

The Geology Path at Greenfield Community College. The armored mud ball specimens are in the first grouping on the left. The prominent “egg” is an esker-tumbled (glacier-tunnel river) quartzite. There is a Geo Path Guide in a box on site and also on the GCC Science Department web site.

You can find out more about Franklin County’s excellent geology in Richard Little’s new (2020) book: *Exploring Franklin County*. See the Publications Order Form page www.EarthView.rocks or visit Amazon or your local bookstore.



THIS IS THE BEST AND PERHAPS ONLY COMPILATION OF (NON-MASSACHUSETTS) LITHIFIED ARMORED MUD BALL PHOTOS .

Lithified armored mud balls from the Eocene Cathedral Bluffs Member in SW Wyoming/NW Colorado, a thick succession of fluvial/alluvial sediments that form picturesque vistas in that area.

dynamic-earth.blogspot.com/.../armored-mudballs.html

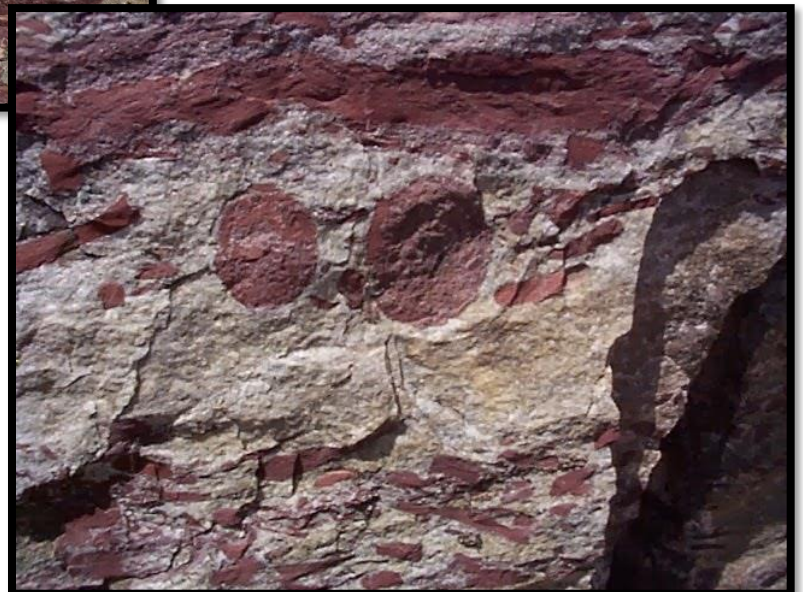


RDL COMMENTS: Certainly, these are interesting but not too exciting when you compare to the Massachusetts AMBs. The armor seems to be entirely sand sized.



Left and below: Going To The Sun Road, Glacier National Park. These late Precambrian sediments show a beautiful combo of AMBs. Grinnell Formation.

Photos by Richard Gibson



RDL COMMENTS:

These AMBs may have a sand armor, but it is not obvious. These are by far the oldest known...600 million years old.



On no, a missing armored mud ball! Where did it go?

Friday Field Foto #41 (FEBRUARY 8, 2008): Armored mudball (eroded out) Eocene Grès d'Annot Formation of southeastern France, "[Clastic Detritus](#)" web site, Prof. Brian Romans, Virginia Tech.

RDL COMMENTS: It would be super to have this one intact! The bedrock appears to be poorly consolidated, so the mud center can easily be lost. See below for another (probably nearby) AMB location in France.

Photo right. "Notes" Figure 2, p. 674 by Daniel J. Stanley, "Large Mudstone-Nucleus Sandstone Spheroids in Submarine Channel Deposits" (1963) Location: Contes, France.

(thanks to Jamie Hizzett, Univ. of Southampton, UK, for this and below reference)

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NOTES

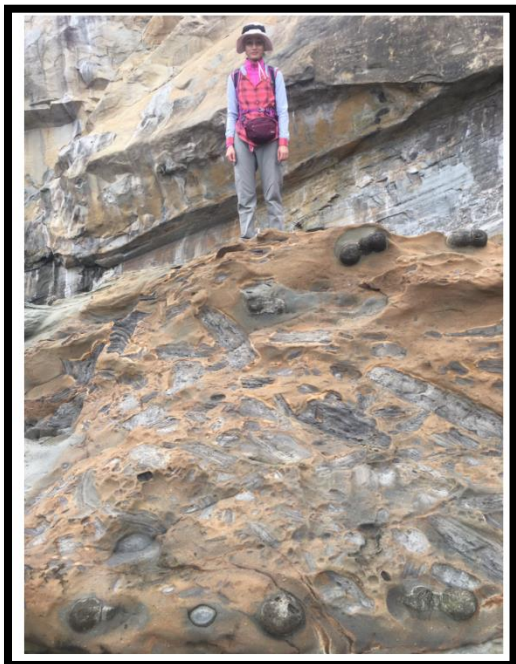
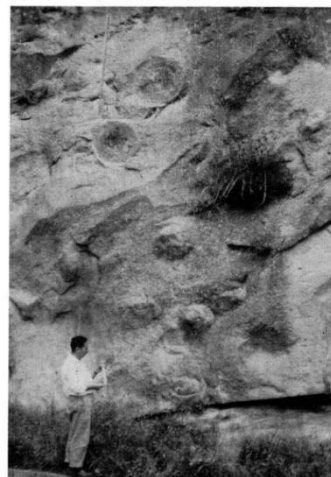


Photo left.
"Eureka
Cove, Coos
Bay, Oregon"

RDL COMMENTS: Great pictures, but sand armor seems to be all that is recorded in these two locations. It is quite possible that these location would be difficult if not impossible to find today. The Oregon picture is from Twitter and not a geologic publication. Exact location not noted.

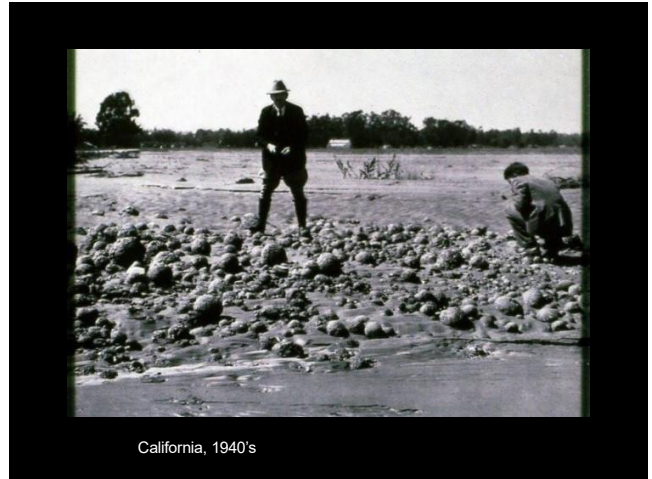
Attention Web Surfers: If you find other images of lithified armored mud balls, please let me know and I will add to this collection.

(C) UNLITHIFIED ARMORED MUD BALLS

ARMORED MUD BALLS¹
THEIR ORIGIN, PROPERTIES, AND ROLE
IN SEDIMENTATION²

HUGH STEVENS BELL
Soil Conservation Service Cooperative Laboratory
California Institute of Technology

Journal of Geology, January – February 1940. In this issue, Hugh Bell first used the term “armored mud ball”.



Now, this is amazing: I (RDL) FOUND AN ARMORED MUD BALL! Just south of Carlsbad Caverns is a little known national park: Guadalupe Mountains. Along the visitor center nature trail was this stream-bank armored mud ball from a flood 8 months before. I could not locate any others, although there were some suspicious sediment piles which may have been another one or two that had disintegrated. The white rocks are limestone.



Guadalupe Mts. Nat. Park, W. Texas, March 2015 (from flood of September, 2014)



Will Sillin, 2015, Factory Butte, Utah

Left photo.

Sunderland, MA, artist Will Sillin often takes photo trips out west to capture images for future painting ideas and inspiration. Look what he found on this 2015 hike at Factory Butte, Utah. These armored mud balls are about one foot in diameter.

Right photo. Prof. Callan Bentley, No. Virginia Comm. College, captured this armored mud ball in the clay-rich badlands at “Devils Coulee”, Warner, Alberta, Canada

Callan says “At [Devil’s Coulee](#) in Alberta, there are dinosaur bones and Western Interior Seaway clamshell fossils — *yawn*.

What really got me excited, though, were the armored mud balls! 8 AUGUST 2012 [Armored mud balls - Mountain Beltway - AGU Blogosphere](#)



Right photo.

W.J. Fritz, S. Harrison “Giant armored mud boulder from the 1982 Mount St. Helens mudflows” *Journal of Sedimentary Geology*, 53 (1983), pp. 131-133

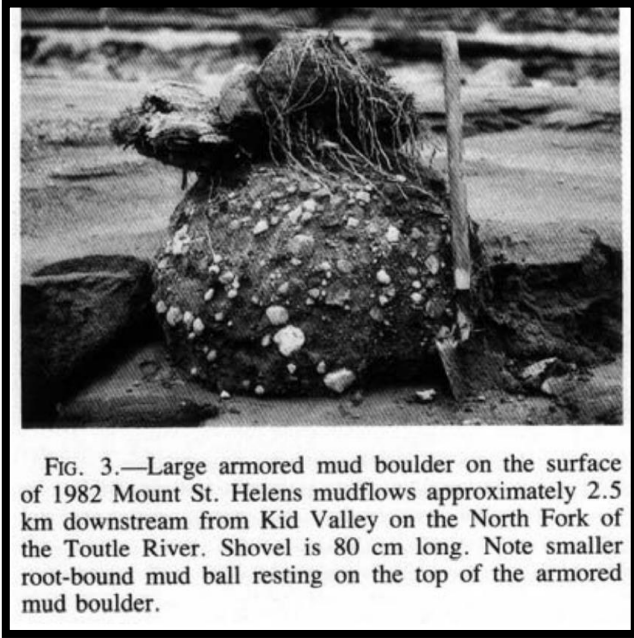


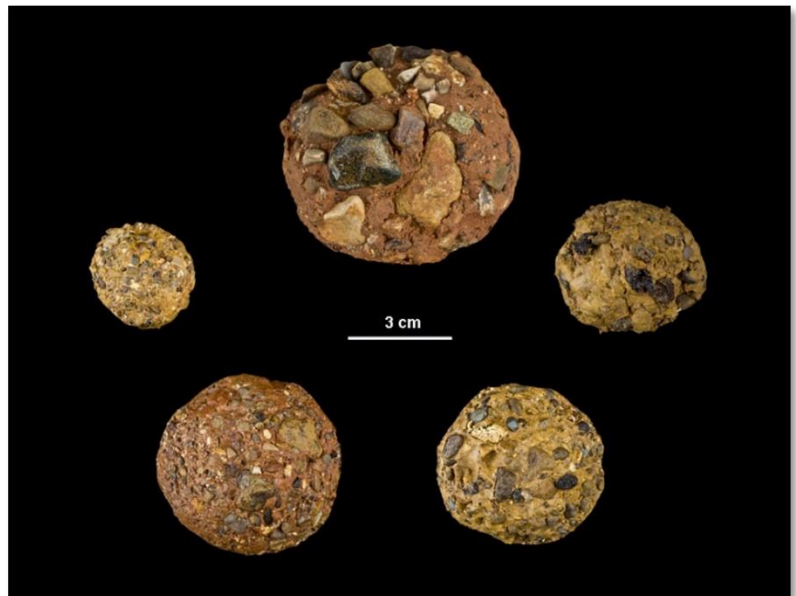
FIG. 3.—Large armored mud boulder on the surface of 1982 Mount St. Helens mudflows approximately 2.5 km downstream from Kid Valley on the North Fork of the Toutle River. Shovel is 80 cm long. Note smaller root-bound mud ball resting on the top of the armored mud boulder.



This photo (left) was taken during shore zone mapping in Alaska's arctic.

Read more: <http://www.groundtruthtrekking.org/photo/armored-mud-ball/#ixzz6fuWmkEiq>

The black armor pebbles are coal.



Photo, right.

Armored mud balls collected in Monroe County, Indiana. Photo by John M. Day and Barbara T. Hill, 2008 They formed after a torrential rainstorm.



Photo, left. Armored Mud Balls

Roosevelt National Park, North Dakota. Erosion of clay-rich badlands.

Nat. Park Photo.

Photo below, A 'swarm' of mudballs – and a sure indication of high erosion activity [10 June 2012]



EAST YORKSHIRE, UK,
COASTAL EROSION -
MUDBALLS
(urbanrim.org.uk)

(D) And finally, "more information".....read how AMBs led to a dinosaur bone discovery!

The following is a section copied from Prof. Little's *Exploring Franklin County* book (2020). It gives more information about our local specimens and where to find them.

Did you know that Armored Mud Balls (AMBs) led to the discovery of the only dinosaur bone in the Mesozoic Deerfield Basin? This is a commentary by the author.

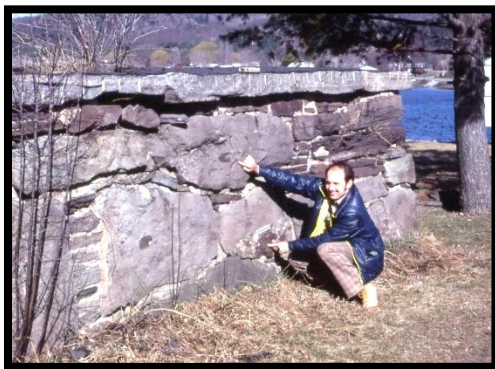
In the late 1980's I was showing the AMBs in quarried blocks at the dismantled bridge site in Turners Falls' Unity Park to geologists Phil Huber and Nick McDonald. Phil said, "forget the armored mud balls, look at this dino bone." Near the edge of the several ton arkose stone was an odd colored "pebble" which I had given no thought or study. That "pebble" was just part of the conglomerate deposit to me. But, as you will see, it was a significant find! It was , indeed, a dinosaur bone.

If it weren't for the armored mud balls, this bone would have probably never been discovered! Who knows where a rolling ball of Mesozoic mud will next advance the study and understanding of our magnificent Franklin County geology? After its discovery, this bone, luckily near the edge of the quarried block, was sawed out and further studied. Where it currently rests is a bit of a mystery. The sawed rock with bone was sent to a vertebrate paleontologist in Canada, and seems to not be labeled, catalogued, or displayed (Ed Gregory research, email, 5.16.2019).

However, it has been referenced in the geological literature: "Stratigraphy and Paleoecology of the Deerfield Rift Basin (Triassic-Jurassic, Newark Supergroup), Massachusetts, by Paul E. Olsen, Lamont-Doherty Geological Observatory of Columbia University, Palisades, NY 10964, Nicholas G. McDonald, Dept. of Earth and Environmental Sciences, Wesleyan University, Middletown, CT 06459, plus Phillip Huber and Bruce Cornet, *In* Guidebook for Field Trips in the Connecticut Valley Region of Mass. and Adjacent States (vol.

2), 84th Annual Meeting, New England Intercollegiate Geological Conference, Amherst, MA October 9 – 11, 1992, p 488 – 535. (The bold print below is my edit.)

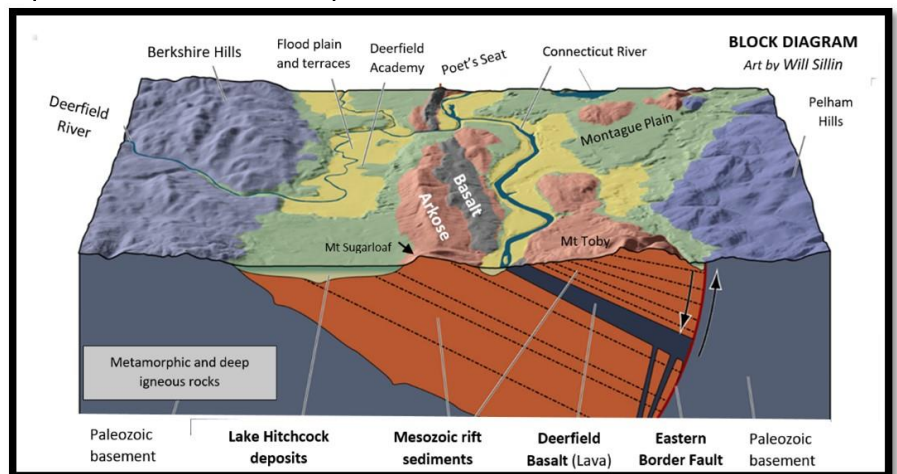
*"The osseous remains of probable tetrapods in the Deerfield basin are represented by two bone fragments: one from the Sugarloaf Arkose; the other from the Turners Falls Sandstone. The Sugarloaf specimen was discovered by Solon Wiley in Greenfield in ?1875 and presented to Professor O.C. Marsh of Yale, where it was catalogued as YPM 6281. Lull (1953) and Galton (1976) regarded this bone fragment as presumably dinosaurian without additional comment or description. We regard its identification as dinosaurian as very suspect. **The second specimen was discovered (by PH and NGM) in a large, transported block of pebbly sandstone in Turners Falls. The specimen is a blue-weathered, hollow bone fragment about 2.5 cm in diameter, exposed in oblique section. It extends into the matrix an unknown distance. The bone is quite thin ~0.5 cm. Thin, hollow bones are a shared derived character of theropod dinosaurs. We conclude that this fragment may be a portion of the distal end of a long bone of a medium sized theropod, and as such it is the first record of a theropod bone from the Deerfield basin.** (my emphasis) The block of pebbly sandstone contains clasts up to 10 cm in diameter and excellent armored mud balls (see Little, 1982). **The block came from the abutments of the "Red Suspension Bridge", which formerly spanned the Connecticut River upstream of the Turners Falls-Gill dam (observed by Richard Little, pers. comm., 1992). According to Ms. Therrisa Rice (of Turners Falls) the original stratigraphic origin of the block is from an abandoned quarry (presently occupied by buildings) on the west side of Main St. in the Village of Turners Falls.**" (p. 498)*



The author (mid 1970's) at the Turners Falls Unity Park site of the "Old Red Bridge's" suspension cable anchor, pointing to armored mud balls. This anchor along with its neighbor a few feet to the east, was dismantled in the 1970's and the armored mud ball specimen blocks were transported to Greenfield Community College or placed nearby at Unity Park.

Diagram of Deerfield Basin Structure. The rift valley sedimentary layers have been tilted by the Eastern Border Fault as Pangea continued to separate. The Deerfield Basalt is the black band. The armored mud balls are found in the sedimentary layers directly below and above the basalt. (art by Will Sillin)

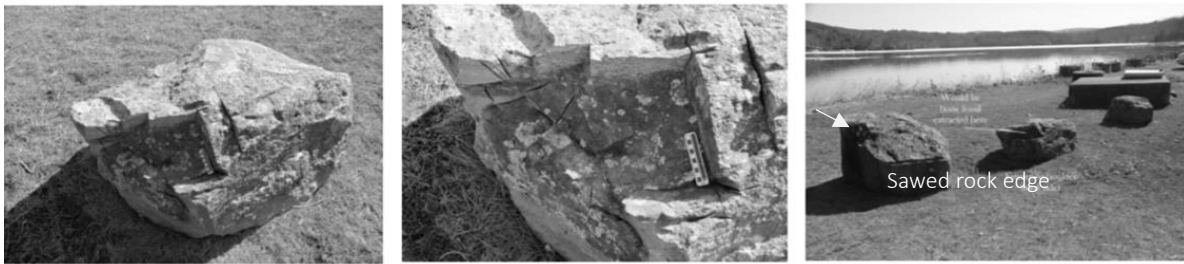
I always chuckle how armored mud balls have become such a fun way to interest people in geological history. I am a lucky guy, being the first person to discover them in the Connecticut Valley in the fall of 1969 after moving here from Southern California to begin my teaching career at Greenfield Community College. Several years later I discovered how rare these specimens were and wrote a paper that was published by the Journal of Geology (1982). Connecticut Valley armored mud balls have only been found in Turners Falls, northeast Deerfield, and Greenfield. A small geographic area. They are separated by a thickness about 1000 feet of rock, with the Deerfield Basalt lava in between. **So, some rolled into the valley before volcanic eruptions spread lava flows across the rift valley and some rolled into the old valley after.** There is perhaps a half million years of time represented in this history.



Even though there are massive amounts of Jurassic red sandstones exposed in Connecticut and in similar Eastern North American rift valleys of this era, no armored mud balls have ever been found although there are many mud pieces, a few of which are round, but not armored.

Why are armored mud balls only here in the Mesozoic Deerfield Basin? The Deerfield Basin must have had just the right conditions that were hard to duplicate. There had to be mud deposits (old lake beds) just the right distance upstream, up on the alluvial fans. Then, just the right amount of stream erosion and transport for lake bottom mud chunks to become round and armored with pebbles. Burial had to occur quickly before drying crumbled them to dust. This part of Franklin County for hundreds of thousands of early Mesozoic years was the “sweet spot” for armored mud ball formation and preservation! Is it possible that dinosaurs came from far and wide to smile at these rolling balls of mud and leave their footprints impressed along the old riverbanks?

Where can you go to see armored mud balls? Greenfield Community College has a Geology Path (S. side of Main Building, by parking lot F) which displays specimens from Turners Falls and Deerfield. Stop and Shop in Greenfield. Unity Park in Turners Falls has several of the old quarried blocks right by the river (picture below). There are a few harder-to-see AMBs in the old bridge foundations across the river in Gill and along the at least one outcrop on a side street in Turners Fall.



Photos by Ed Gregory. You can see the cut where the rock saw has removed the dinosaur bone. While many of the armored mud ball specimens were removed to Greenfield Community College, several rocks from the dismantled suspension cable anchors remain at the site in Unity Park along the Connecticut River.

‘Armored mudballs’ found in Turners Falls

By AARON COOKE
Recorder Staff

TURNERS FALLS — The old Red Bridge abutment on the east side of the Connecticut River is a geologist’s conversation piece.

In the sandstone blocks of the abutment of the former suspension bridge are “armored mudballs,” a geological rarity millions of years old, according to Richard Little, a geologist at Greenfield Community College for 10 years. He said there are only four other places in the world where the phenomenon has been said to bedrock.

Armored mudballs are usually formed in floods when a chip of clay bank falls to a river, gathering pebbles around it as it travels downstream. After the mudball is deposited on shore, they dry and crumble into dust.

Sometimes, however, an armored shell is buried in fine sand which keeps the configuration intact in the rock.

The mudballs in the Red Bridge abutment, which is located in an area known for dinosaur tracks, are the only ones the geologist has found in the Connecticut River Valley.

Little, 36, of Greenfield, theorizes that 200 million years ago some mudballs were preserved when they were rapidly covered by a layer of silt in one of the many rivers crisscrossing the Connecticut River Valley at the time.

The mudballs are noticeable in the sandstone blocks in the abutments, appearing as dark brown circles ringed with pebbles against the tan background of the rock.

The geologist isn’t sure of the location of the quarry from which the blocks were taken to construct the bridge abutment.

This summer, he intends to undertake more research on the mudballs as part of a state-funded project to order geological features in the Pioneer Valley. Little was one of five G.C.C. professors selected to work on research projects in line of pay for tracking summer courses.

How did he ever come across the armored mudballs in the first place?

Geologists are always getting around,” he says.

GREENFIELD RECORDER

188th Year—No. 149 24 Pages Greenfield, Massachusetts Monday, June 23, 1980 25 Cents 4 Days \$1.15 Month \$3.45 6 Months \$17.95

Saturday, June 23, 1980: The day when Armored Mud Balls made a banner headline! (It must have been a slow news day.)

And another long-forgotten event from

shortly after: Northampton Station WHMP’s disc jockeys made a humorous song from a Beach Boys hit, substituting “Turners Falls Mud Balls” for “California Girls”. Groovy.

-----This is the end -----