

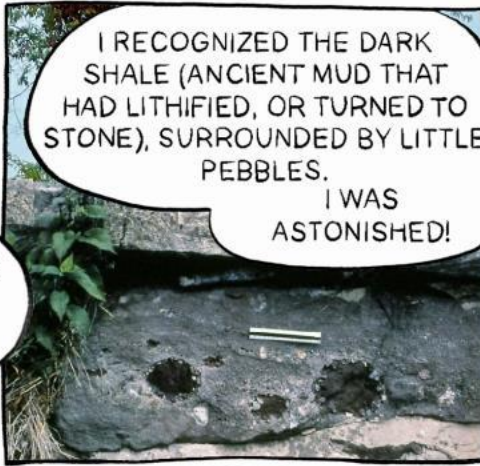
# ARMORED MUD BALLS IN FRANKLIN COUNTY, MASSACHUSETTS

IN 1970, I DISCOVERED  
**LITHIFIED ARMORED MUD BALLS**  
IN THE QUARRIED STONE  
SUPPORTS OF AN OLD BRIDGE  
IN TURNER'S FALLS, MA.

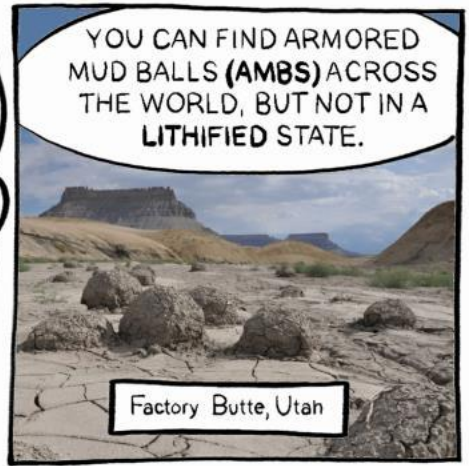


**RICHARD LITTLE**  
Professor Emeritus,  
Greenfield Community College

I RECOGNIZED THE DARK  
SHALE (ANCIENT MUD THAT  
HAD LITHIFIED, OR TURNED TO  
STONE), SURROUNDED BY LITTLE  
PEBBLES.  
I WAS  
ASTONISHED!

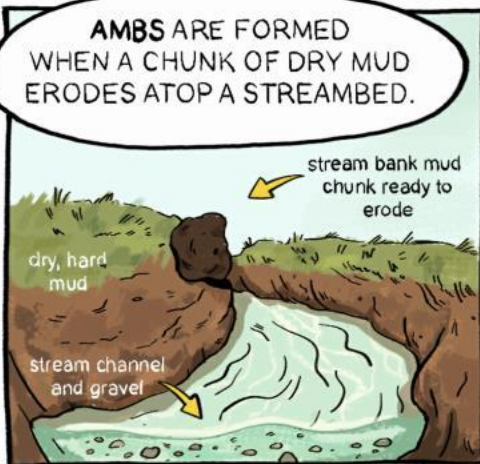


YOU CAN FIND ARMORED  
MUD BALLS (**AMBS**) ACROSS  
THE WORLD, BUT NOT IN A  
**LITHIFIED STATE.**



Factory Butte, Utah

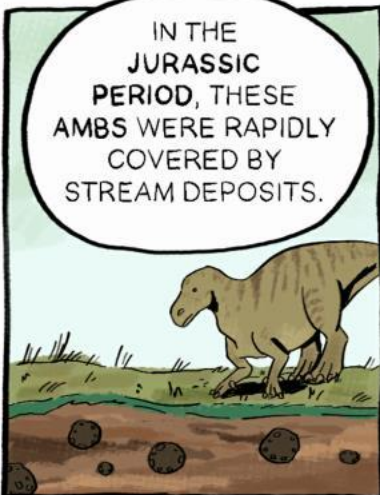
**AMBS** ARE FORMED  
WHEN A CHUNK OF DRY MUD  
ERODES ATOP A STREAMBED.



CHUNKS OF STICKY MUD  
ROLL DOWNSTREAM AND  
PICK UP A COATING OF  
PEBBLES, CALLED "ARMOR"!



IN THE  
**JURASSIC PERIOD**, THESE  
AMBS WERE RAPIDLY  
COVERED BY  
STREAM DEPOSITS.



ANY  
UNCOVERED  
**AMBS** QUICKLY  
FELL APART.



IT TOOK MILLIONS OF  
YEARS FOR THE **AMBS**  
TO LITHIFY AND THERE  
MAY BE MANY HIDDEN  
UNDERGROUND.



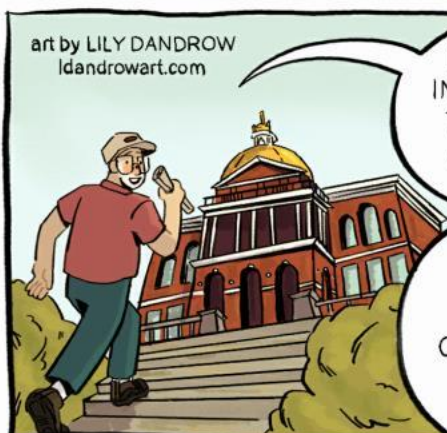
I FOUND THE **AMBS**  
BECAUSE THEY HAD  
BEEN QUARRIED FROM  
A NEARBY HILL AND  
USED TO BUILD THE  
BRIDGE.



FRANKLIN COUNTY IS THE  
ONLY PLACE ON THE PLANET  
TO EASILY SEE LITHIFIED  
ARMORED MUD BALLS.



art by LILY DANDROW  
ldandrowart.com



IN 2025,\* A BILL WILL BE PRESENTED  
IN THE STATE LEGISLATURE TO START  
THE PROCESS OF **AMBS** BECOMING  
AN OFFICIAL STATE "SEDIMENTARY  
STRUCTURE". \*

YOU CAN  
HELP SPREAD  
THE WORD BY  
CONTACTING YOUR  
STATE SENATOR  
AND STATE REP.

edited by  
NICK BERTOZZI  
nickbertozzi.com

Thank  
you!



## FREQUENTLY ASKED QUESTIONS and more information

### ARE THESE THE ONLY LITHIFIED ARMORED MUD BALLS IN THE WORLD?

**Maybe!** These are definitely the *only easily seen* lithified armored mud balls (AMBs) in the world. There are only a handful of other locations where armored mud balls have been seen preserved in rock. They are exposed in remote hillsides from Greenland to Ecuador, hard to find, and probably not seen today due to erosion, soil cover, etc. The [ArmoredMudBalls.rocks](https://armoredmudballs.rocks) web site has more information. Photo (left): AMB from Turners Falls, dime for scale.

### WHY ARE THE FRANKLIN COUNTY AMBs THE BEST IN THE WORLD?

They have the best armor, color, & sizes. The dark mud rock centers contrast with rims of colorful pebbles that adhered from the old stream beds, making them photogenic, easy to see and study. Some other lithified AMBs from ocean environments are sand-armored and the color of the ball matches the surrounding rock, making them hard to see. The great size range of the Franklin County examples, from basketball to golf balls, is *unlike any other location*. Another strange and unique factor is the AMBs place in Geological "Stratigraphy" (study of sedimentary layers). The Franklin County AMBs are found in strata of two different geological time periods, from two different quarries! Most of the AMBs are Jurassic age from the Turners Falls Sandstone but AMBs were also rolling into the Connecticut Valley about 500,000 years *earlier*. These are preserved in Triassic age rock known as the Sugarloaf Arkose. It is *extremely rare* to have AMBs formed and preserved. It is *exceedingly rare* to have AMBs formed repeatedly over geologic time in the same spot on Earth! Look at the geologic story preserved here. After the older AMBs (found in Greenfield and Deerfield), a 100+ foot-thick lava flow (Deerfield Basalt) covered the region, then came a Jurassic lake, and then flooding streams rolled AMBs to the lakeshore to be preserved in the Jurassic Turners Falls Sandstone. **What luck and what an amazing story**



Photo: AMBs in suspension cable anchor, Unity Park, Turners Falls, circa 1970. This rock is now in the GCC Geology Path.

**preserved in rock!!**

### WHY ARE LITHIFIED ARMORED MUD BALLS

#### SO RARE? Look at what has to happen!

**1. Changing lake levels are needed.** Wet climates produce lakes with mud layers. Dry climates (or land uplift) will allow lake mud to harden and be eroded. Flash floods, common in dry climates, erode stream banks and hard mud chunks to fall into the stream, become round, sticky, and roll along picking up pebbles from the stream bed (the "armor" of the ball's rim). **2. Quick burial** is essential as the flood subsides, and then, importantly, **deeper burial** and geologic time for "lithification"—turning to stone.

**3.** Eventually, millions of years later, **land uplift** must happen, followed by just enough erosion to expose hillsides with the rock layers with AMBs. **4.** Next, a **quarry** is needed **at just the right spot** to remove those specific sedimentary layers with the AMBs. **5.** Then, those quarried blocks must be placed so that the round balls might be observed, such as in the former bridge foundation between Turners Falls and Gill (picture above). **6.** Finally, someone has to discover, identify, publicize, and save the rare JAMBs. Prof. Little happened to be the lucky discoverer in 1970 along the Connecticut River in Unity Park, Turners Falls.

### WHY designate JAMBs a MASS. SEDIMENTARY STRUCTURE?

**(1) Extremely RARE**, plus they're in the

*same geologic layers* with our State Dinosaur (Podokesaurus) and State Fossil (dinosaur footprints). **(2) NO COST** to taxpayers! **(3) FREE & ACCESSIBLE** as most are **on STATE LAND** (Greenfield Comm. College & Great Falls Discovery Center (State Park), Turners Falls) or in museums! **(4)** If these unique features are not officially recognized and celebrated, they will likely be forgotten -- a great loss for Massachusetts and the world. We are very fortunate to have these unique-in-the-world sedimentary structures with diverse sizes, quantity, and clarity!

**Save the JAMBs:** celebrate their unique story from the Age of Dinosaurs and preserve them for posterity. Massachusetts' Connecticut River Valley is the *only place in the world* to easily see these rare, fun, and photogenic geologic treasures!

**Notes:** "Sedimentary Structures" are features such as seashells, mud cracks, ripple marks, and, rarely, AMBs that may occur in recently deposited sand & mud. Unlithified AMBs occasionally are found on beaches and riverbanks, such as the Utah examples seen in the cartoon, discovered by Sunderland artist Will Sillin in 2015.



**Credits and thanks.** Graphic artists Nick Bertozzi ([nickbertozzi.com](http://nickbertozzi.com)) and Lily Dandrow ([ldandrowart.com](http://ldandrowart.com)). Will Sillin ([willsillin.com](http://willsillin.com)), Utah AMBs photo. **The best places in the world to see AMBs** are the **Greenfield Community College Geology Path** and the outdoor display at the **Great Falls Discovery Center, Turners Falls**. For more information, see <https://armoredmudballs.rocks>. Questions? Contact Prof. Richard D. Little [RDLittle2000@aol.com](mailto:RDLittle2000@aol.com) / [armoredmudball@gmail.com](mailto:armoredmudball@gmail.com) (413) 527-8536



**Photos:** (l) JAMBs in large boulder at Great Falls Discovery Center, Turners Falls. (r) Greenfield Community College Geology Path. Arrows = 6 JAMB specimens in quarried blocks. (The big white rock is a quartzite boulder.)