History of Connecticut Mines and Their Minerals

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Orange County Mineralogical Society

09 July 2021

Mineralization – Western Connecticut

1) Volcanic- and shallow intrusive systems

2) Intermediate depth hydrothermal systems

3) Deep magmatic systems

4) Intermediate- to deep metamorphic systems

Mineralization – Western Connecticut

1) Volcanic- and shallow intrusive systems

Bristol Copper Mine, Newgate Prison, New Britain

2) Intermediate depth hydrothermal systems

Thomaston Dam, Cobalt Arsenopyrite, Lane's Mine, Long Hill Mine

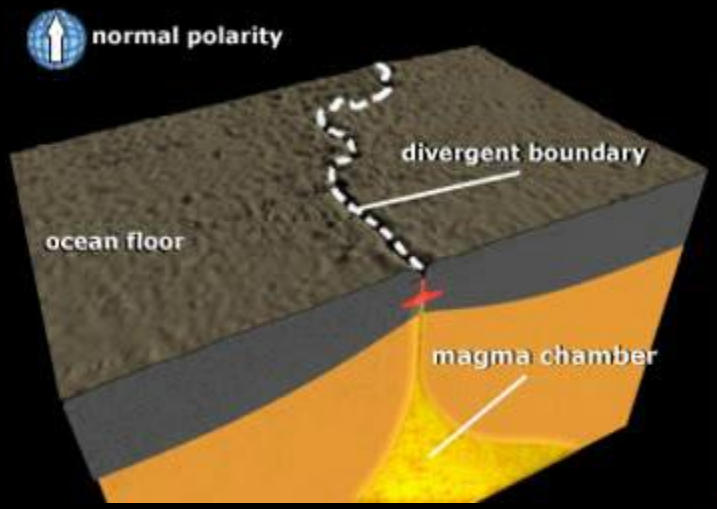
3) Deep magmatic systems

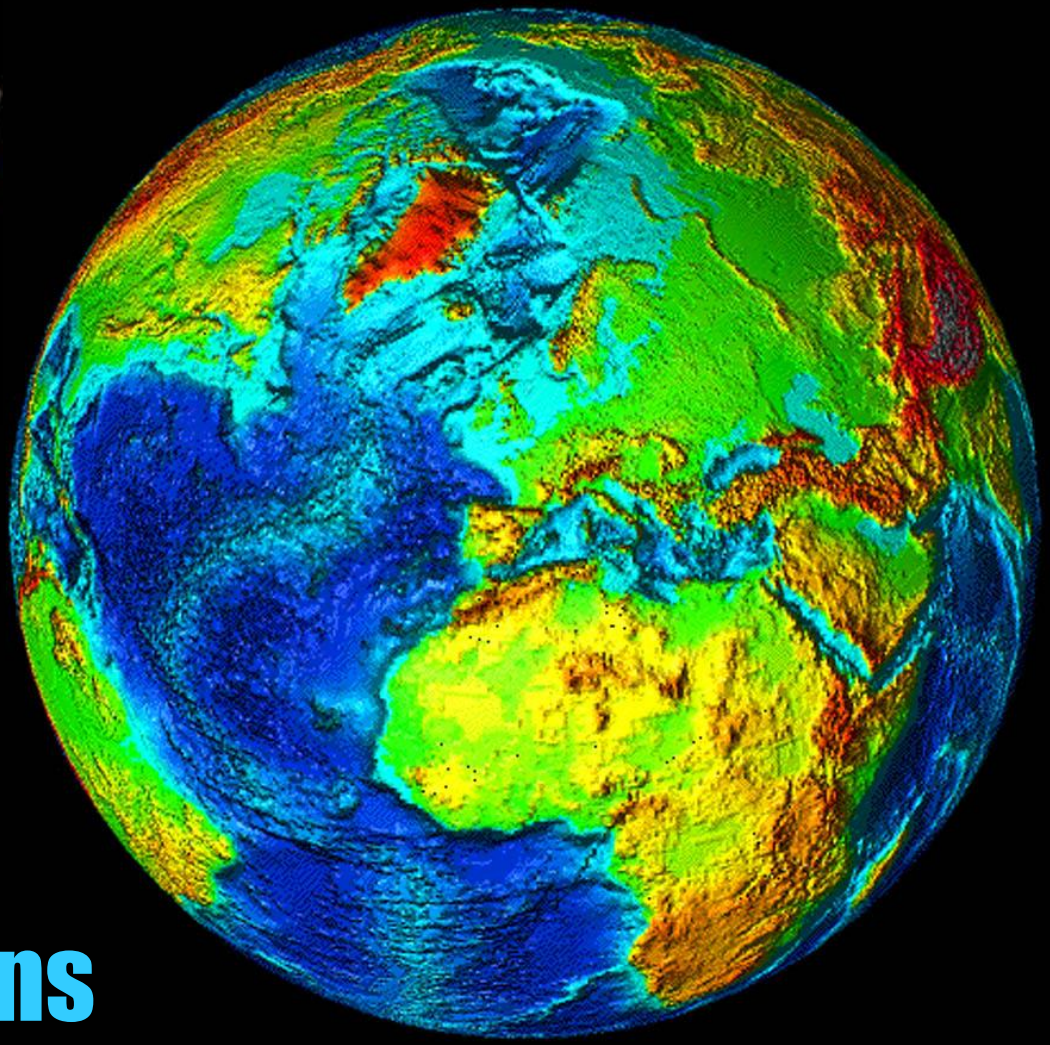
Hodges, Mt. Prospect, Branchville, Merryall, Southbury, Middletown District

4) Intermediate- to deep metamorphic systems

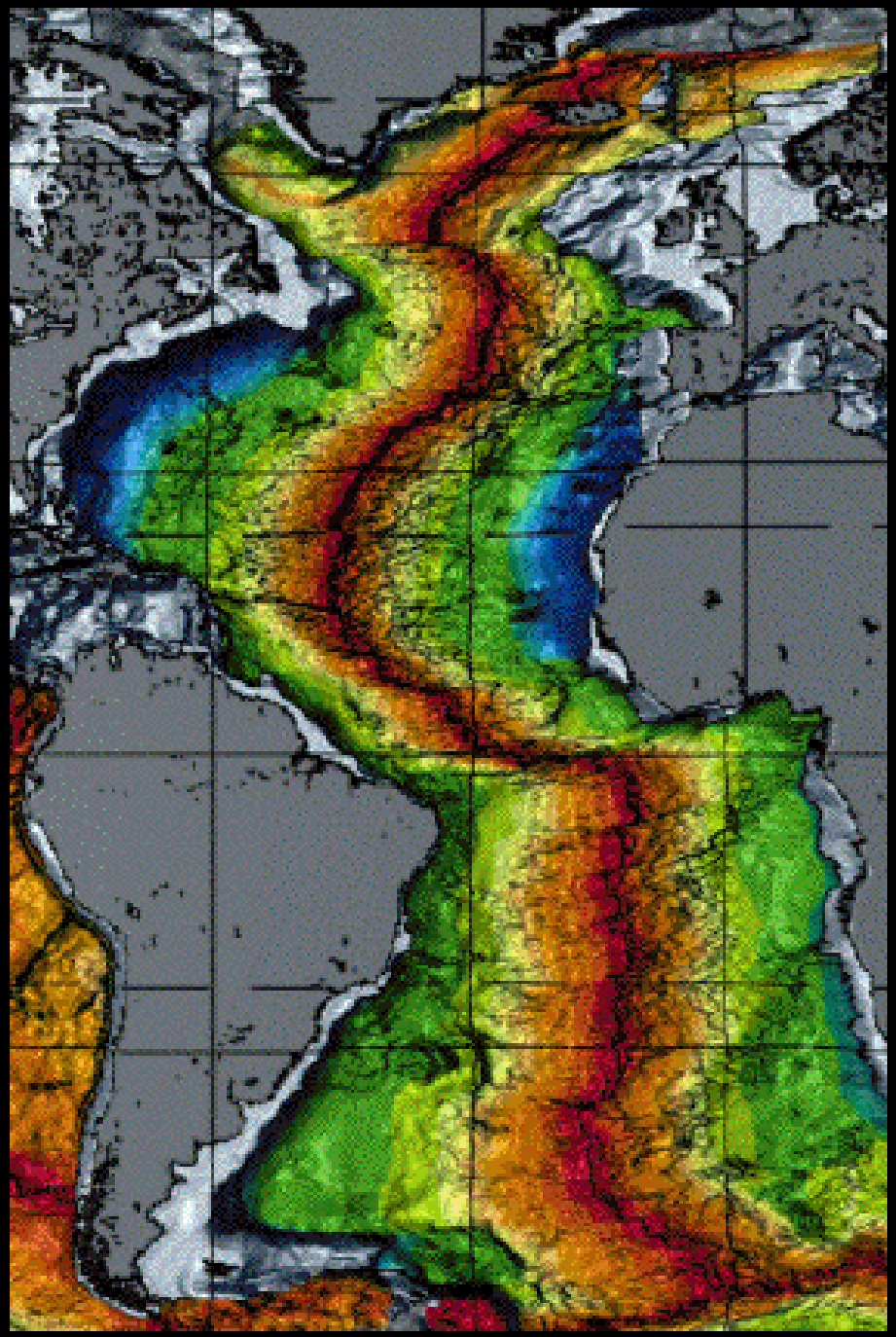
Salisbury District, Roxbury, West Torrington, West Redding

Remember CM, You're Nothing Without Me!
Now He's Going to Talk Way Too Long About Mineral Environments



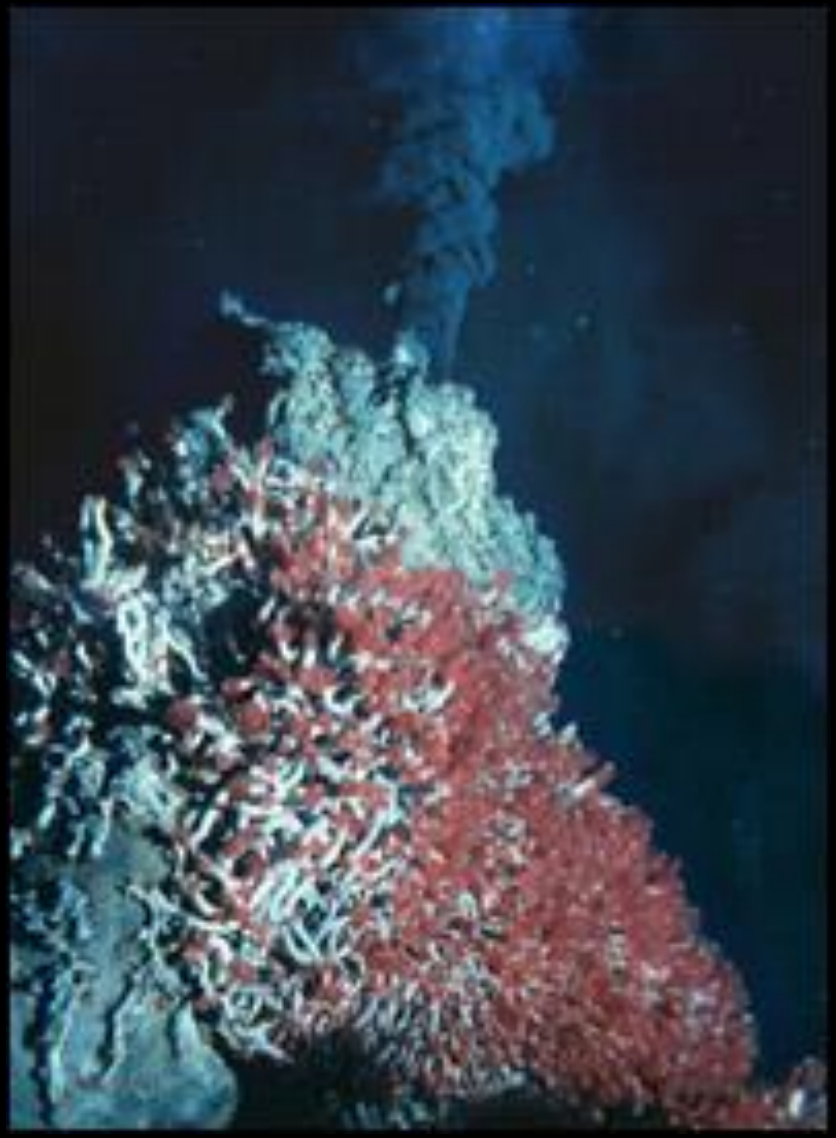


Open Ocean Divergent Margins



Ocean Floor Environment

Black Smokers



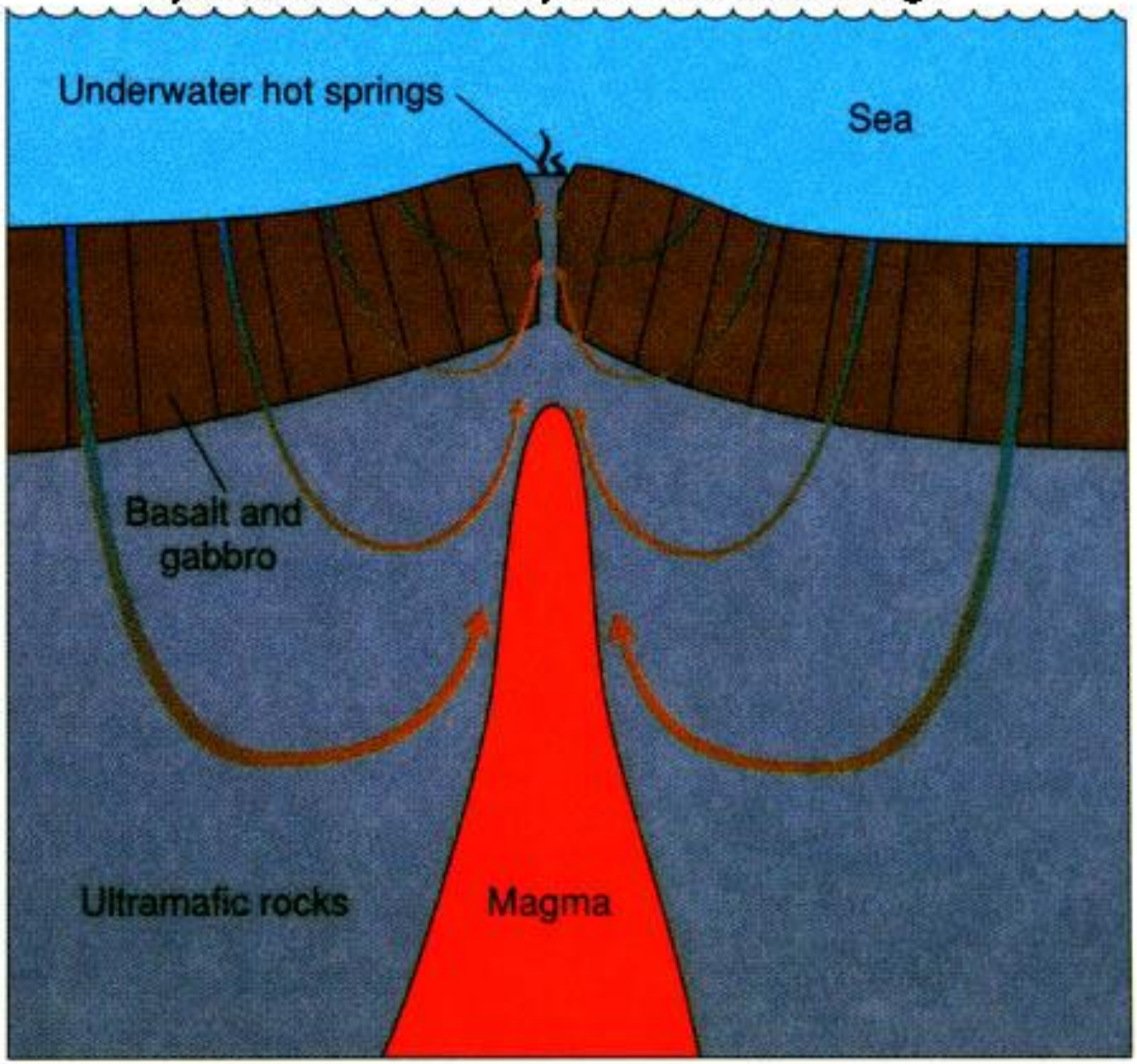
East Pacific Rift, 13N

Pillow Talk

Pillow Lavas
McBride Avenue
Paterson, NJ

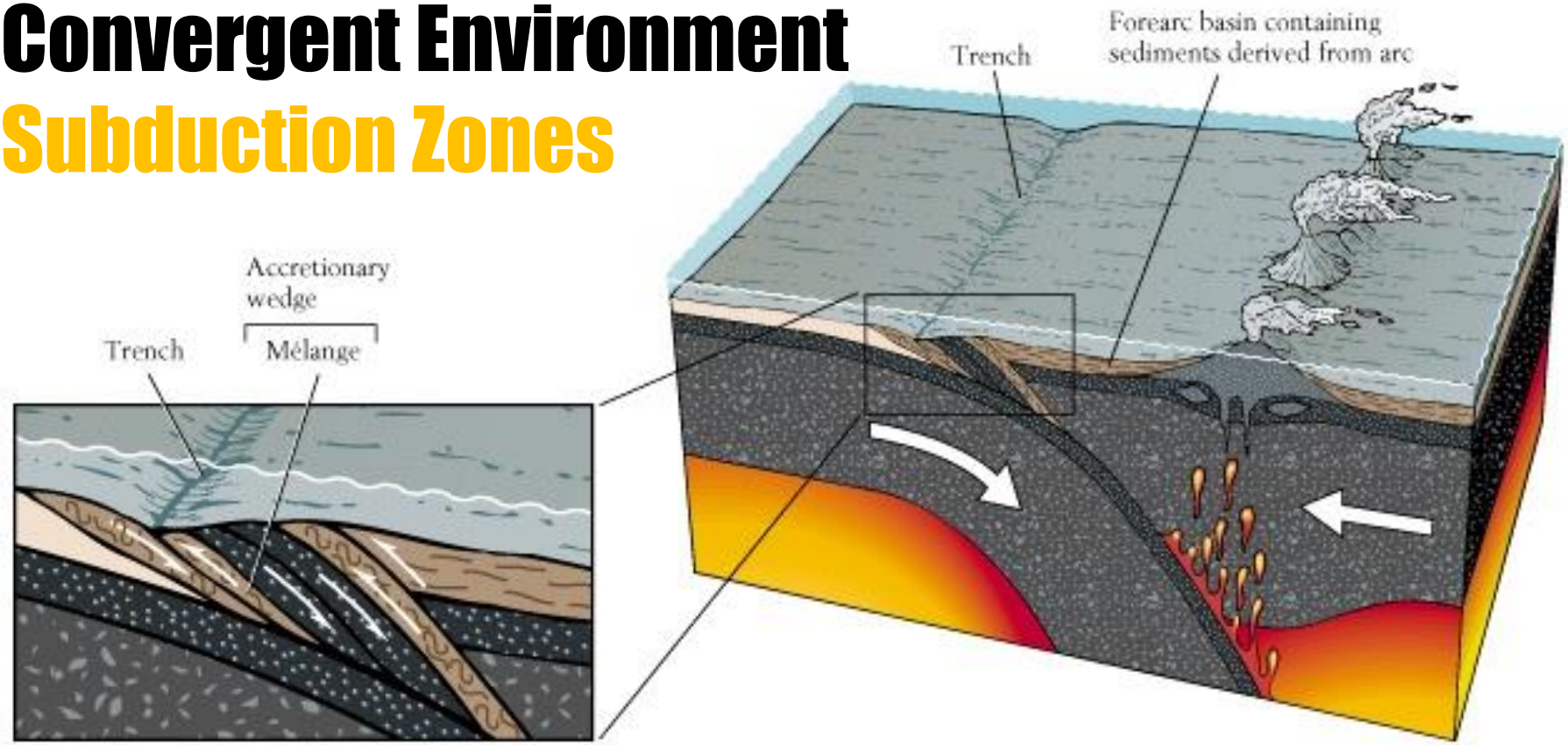
Pillow Lavas, Upper New St., Paterson, NJ

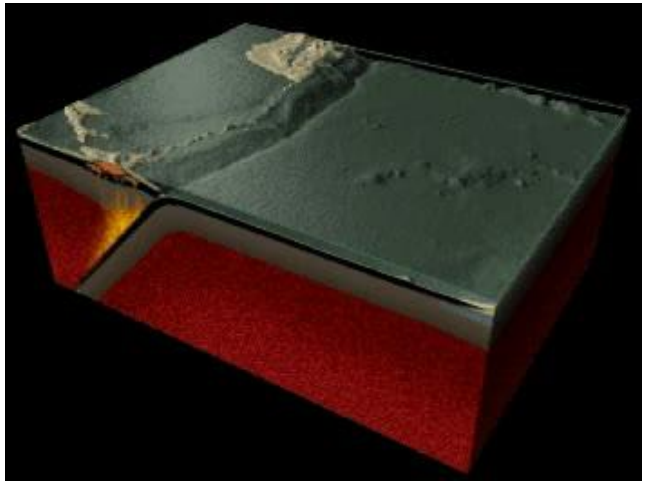
Hydrothermal activity at mid-ocean ridge



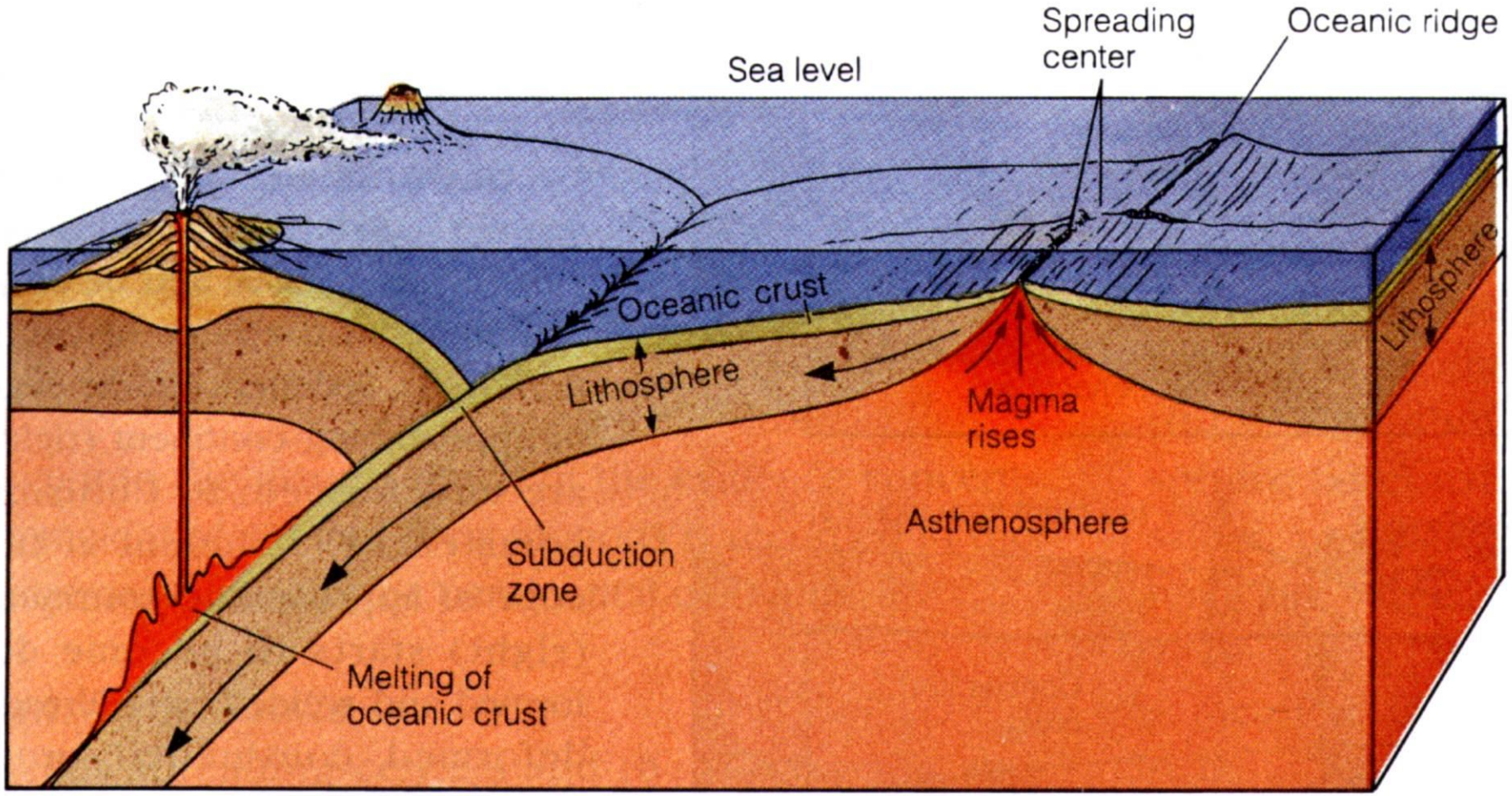
Convergent Environment

Subduction Zones

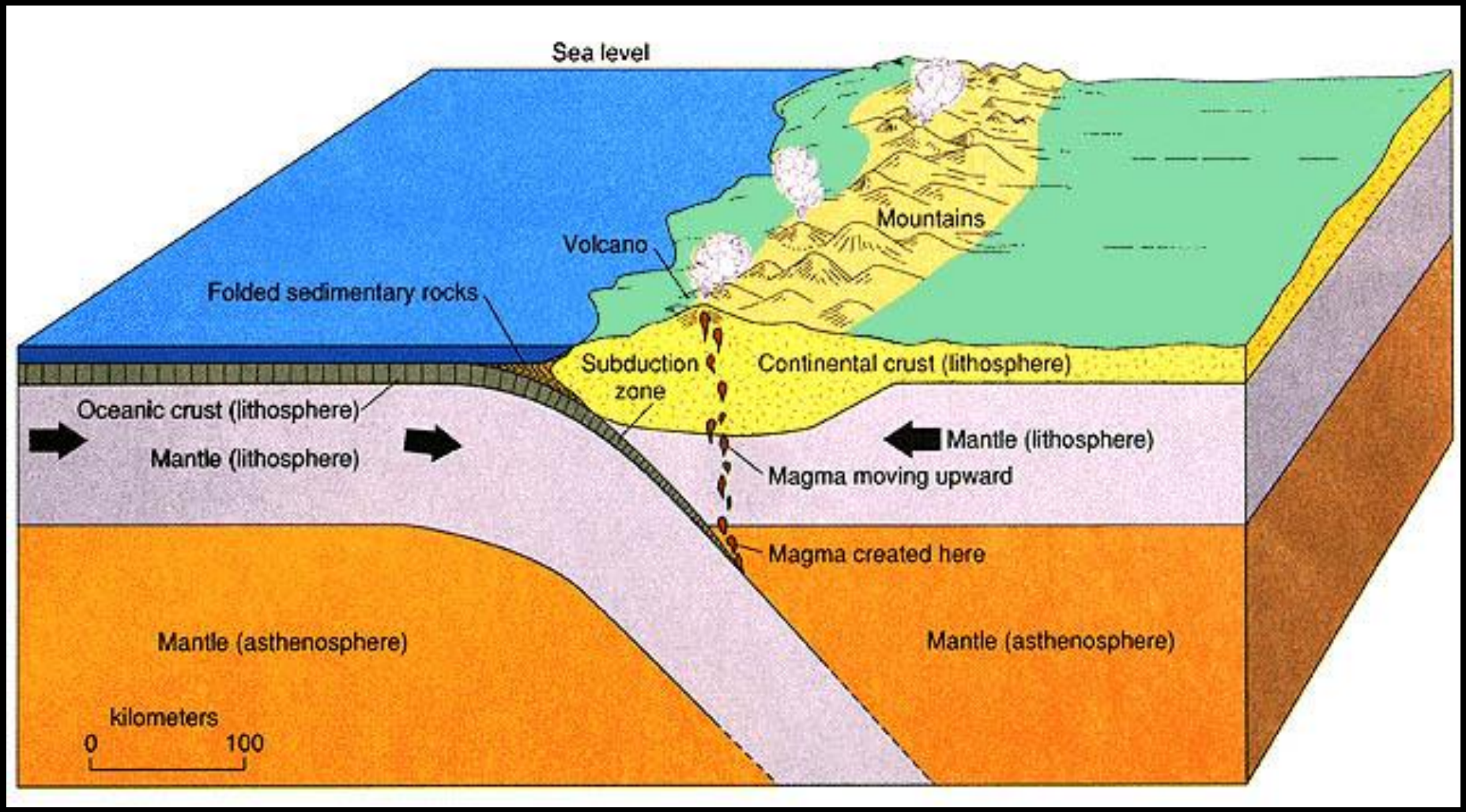




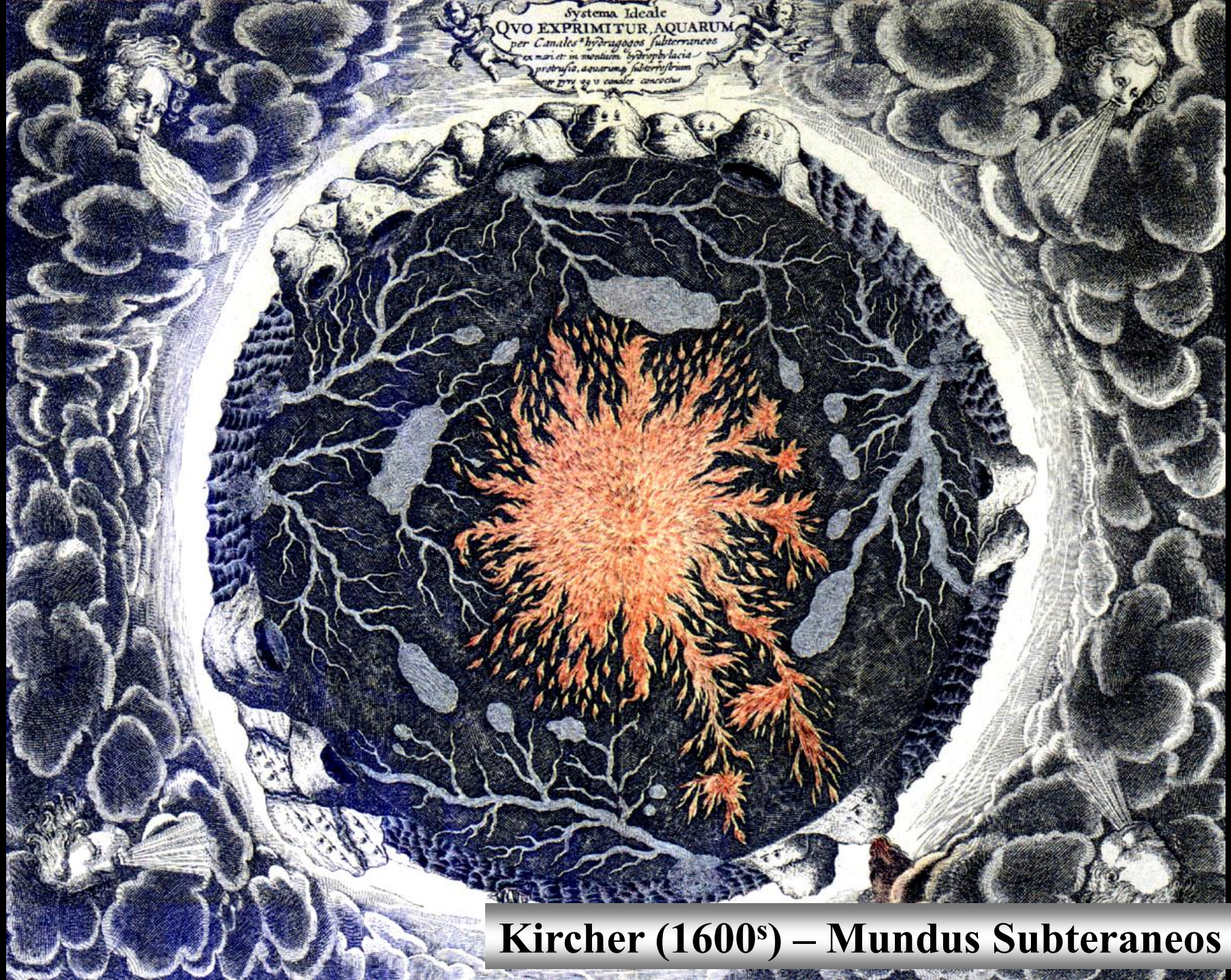
Japanese-Type Arc



Andean-Type Arc

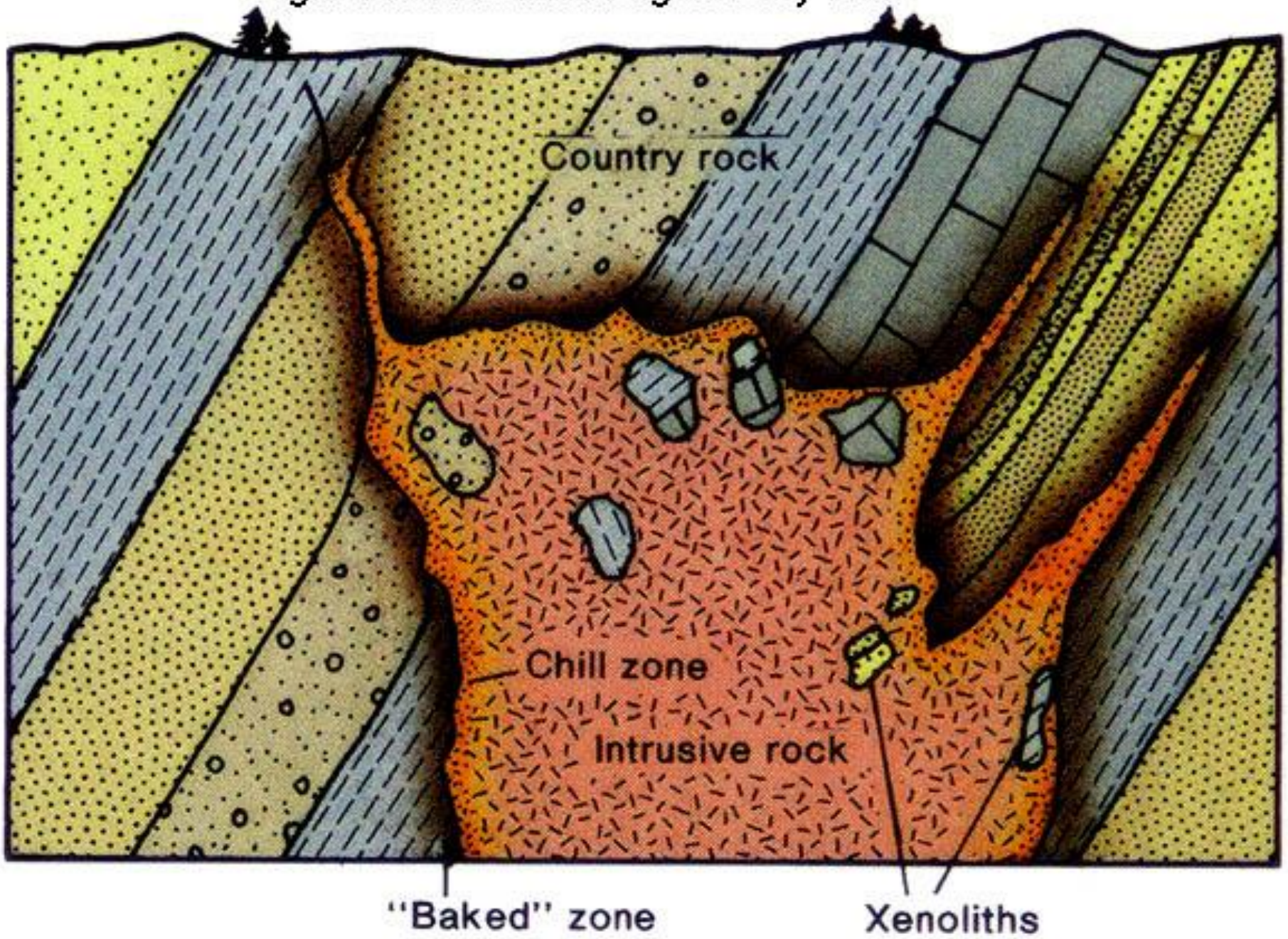


Franciscan Melange – Coast Range, CA

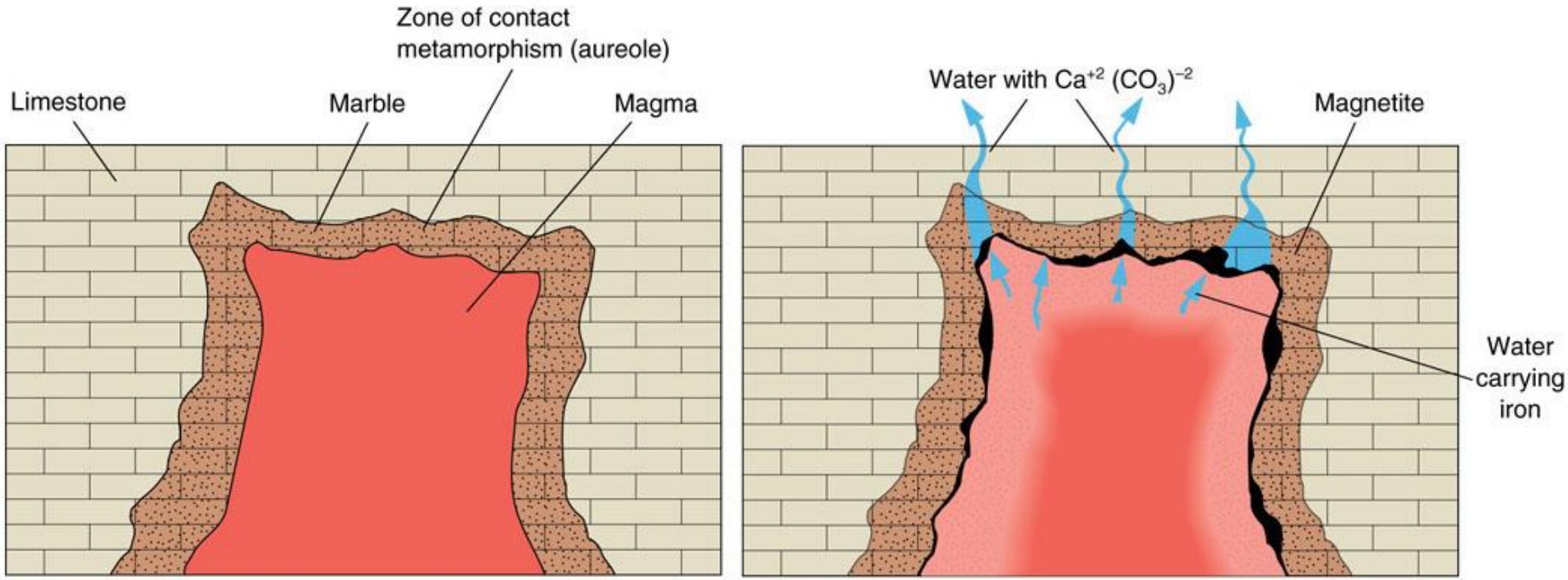


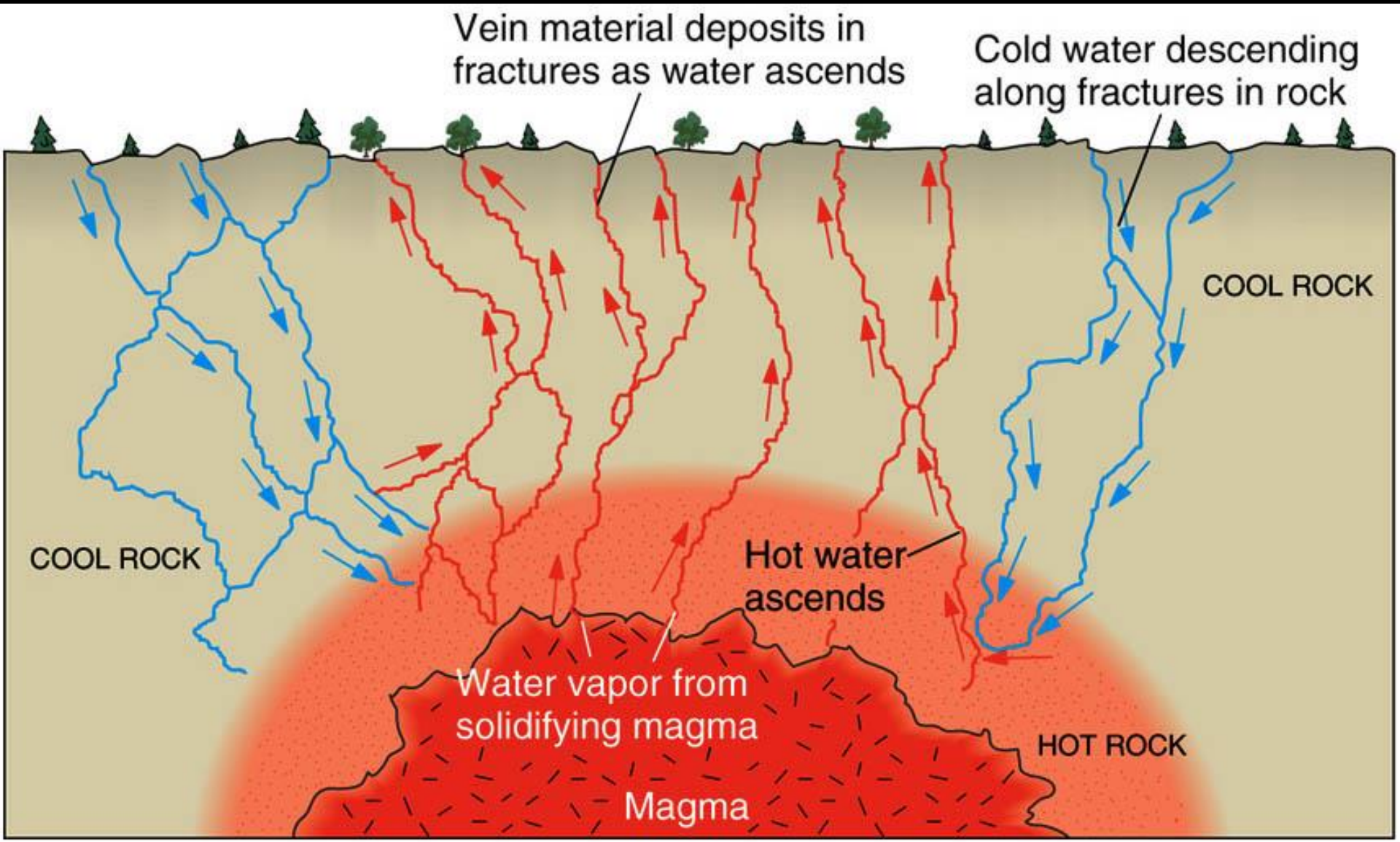
Kircher (1600s) – Mundus Subteraneos

Igneous Forms


Igneous rock intruding country rock
Country rock
Chill zone
Intrusive rock
"Baked" zone
Xenoliths

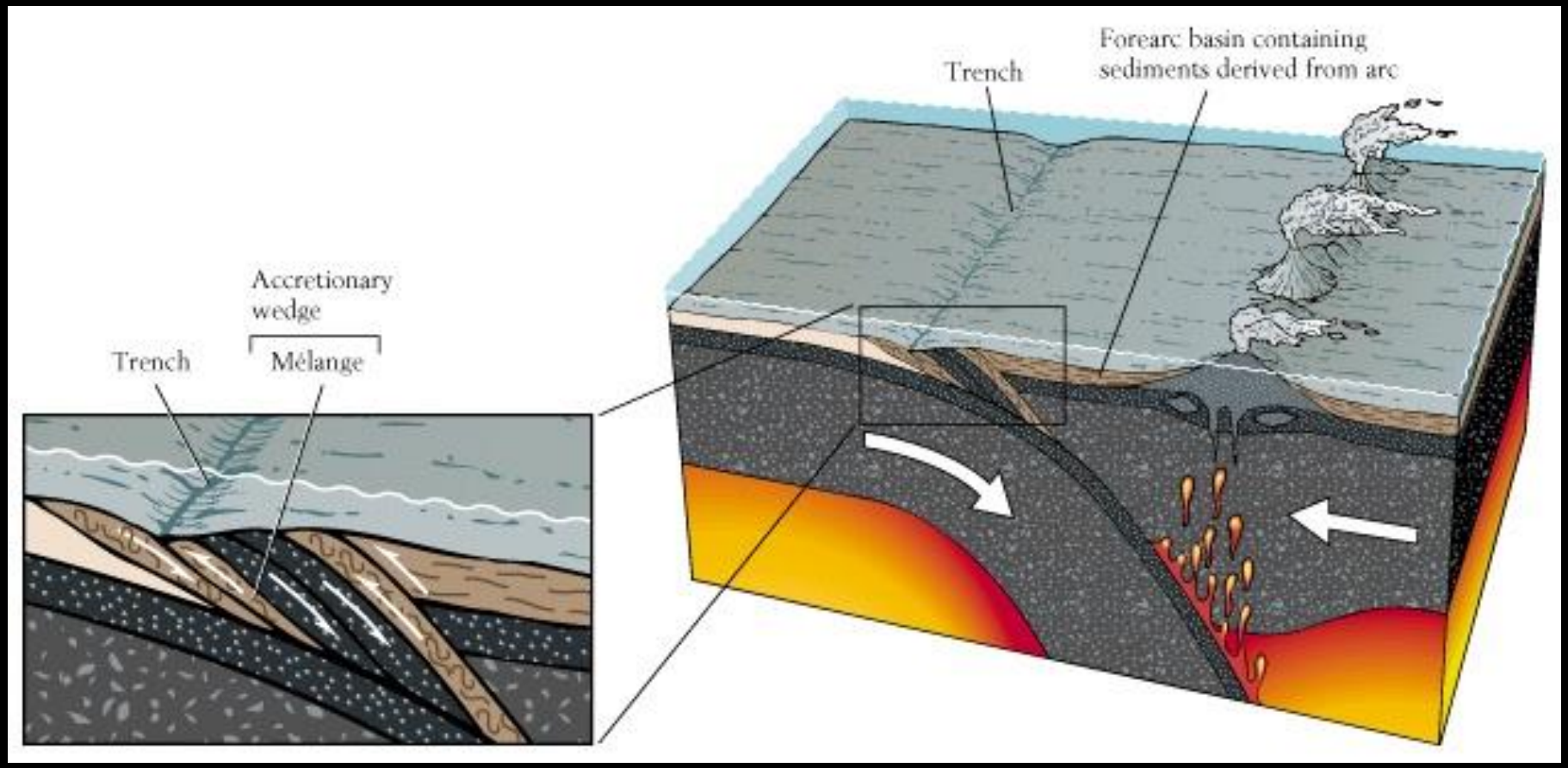
Metacarbonate Reactions

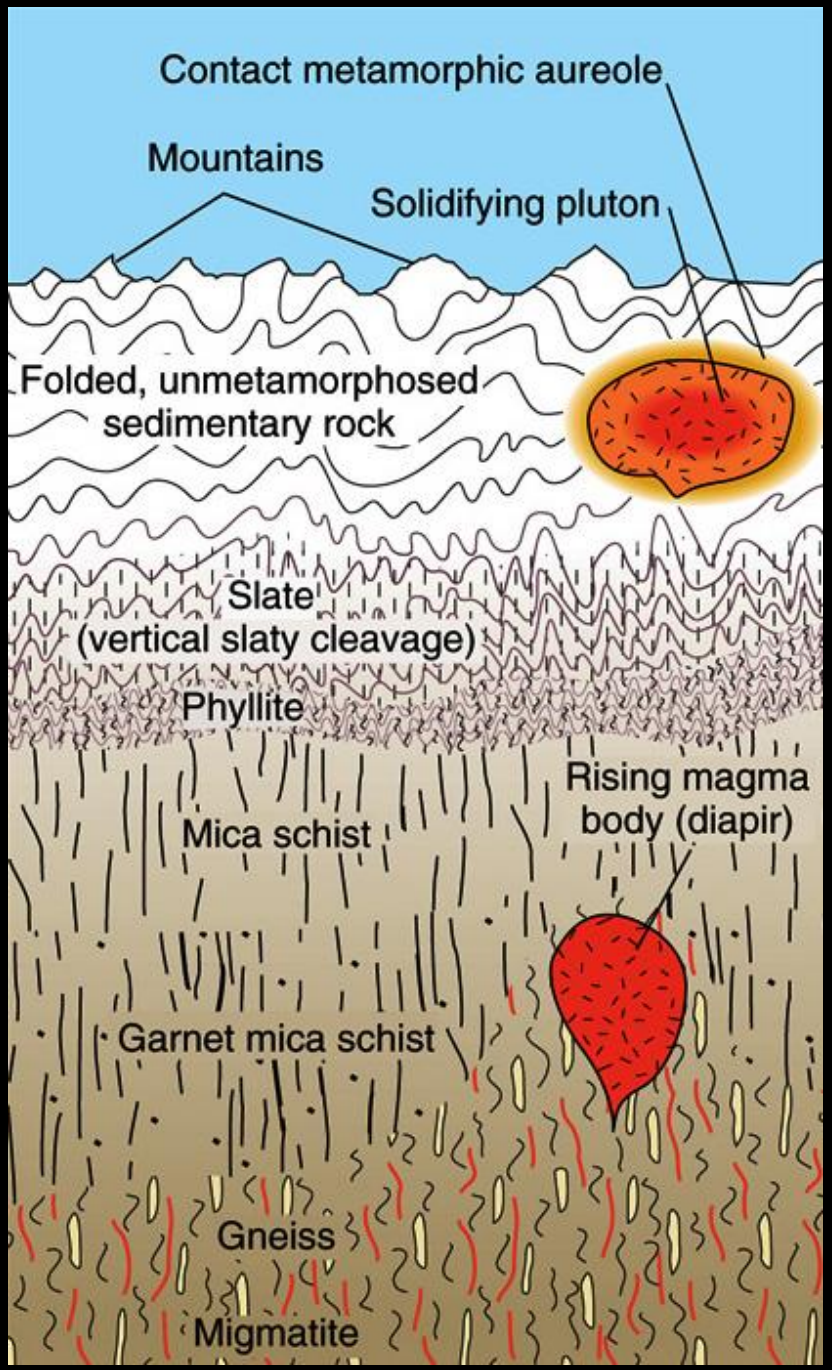



Vein material deposits in fractures as water ascends
Cold water descending along fractures in rock
COOL ROCK
COOL ROCK
Hot water ascends
Water vapor from solidifying magma
HOT ROCK
Magma

Trenchwall Accretionary Environment

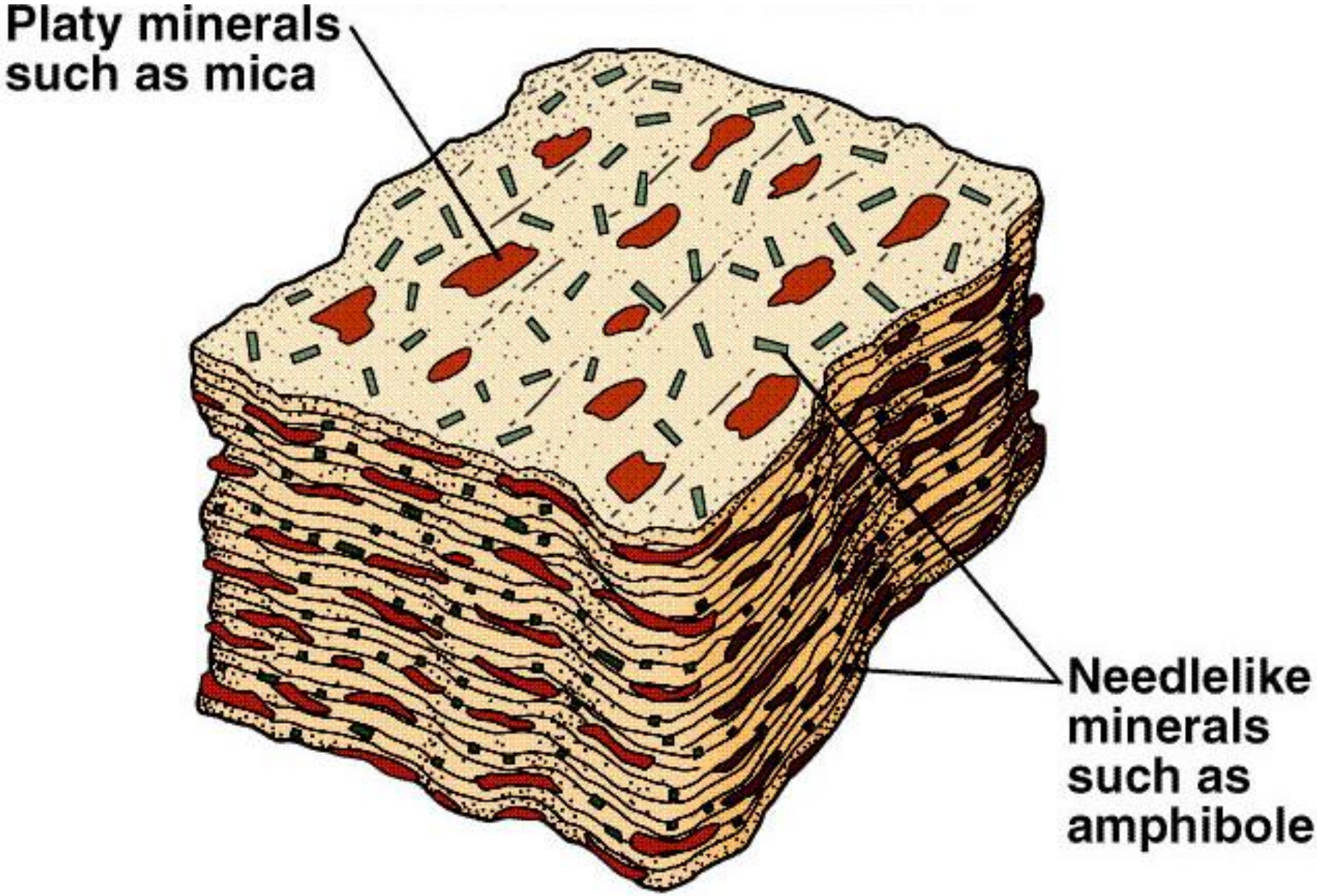
Womb of Metamorphism and Plate Suturing





Progressive Metamorphism

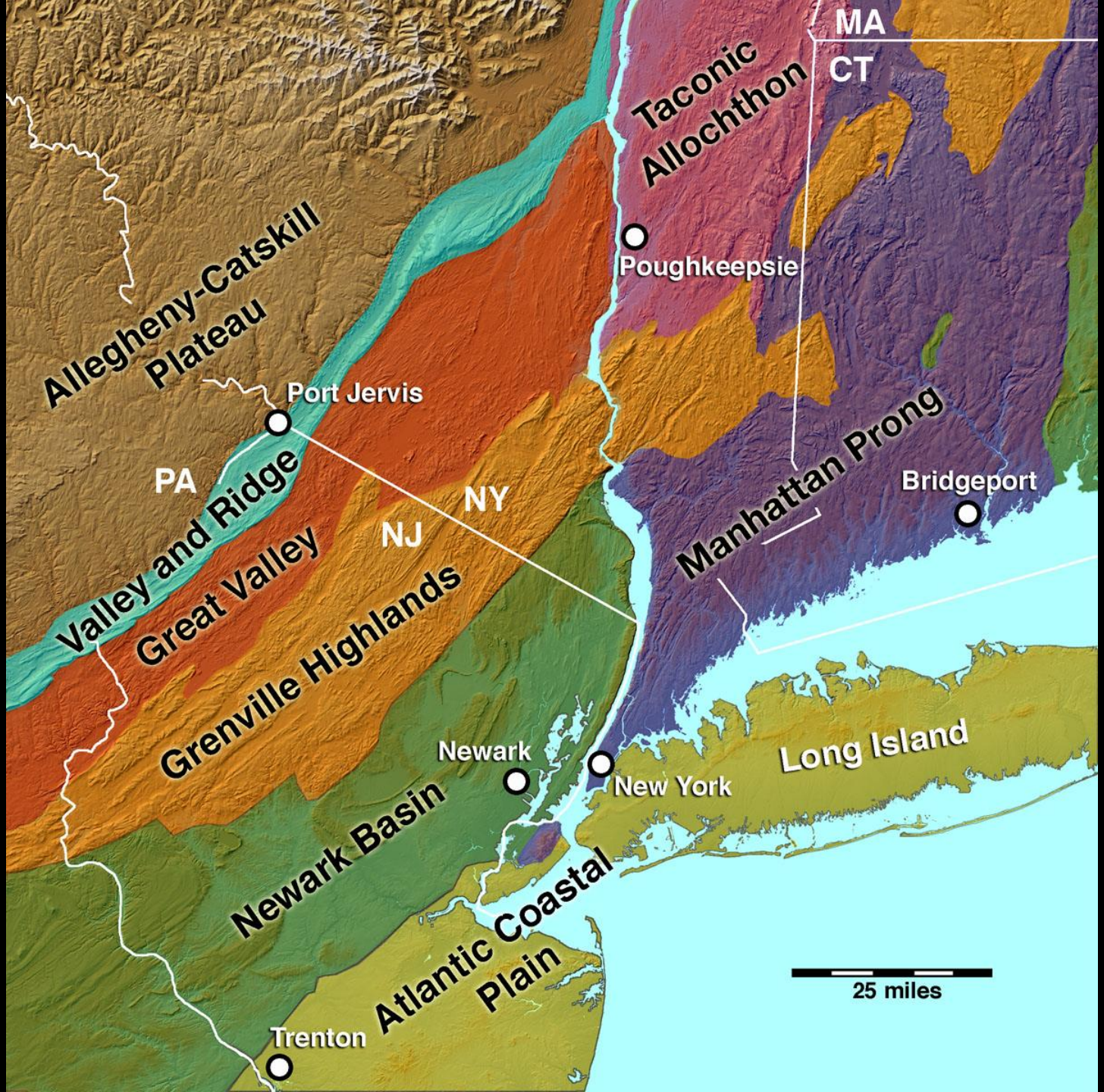
- Slate
- Phyllite
- Schist
- Gneiss
- Migmatite

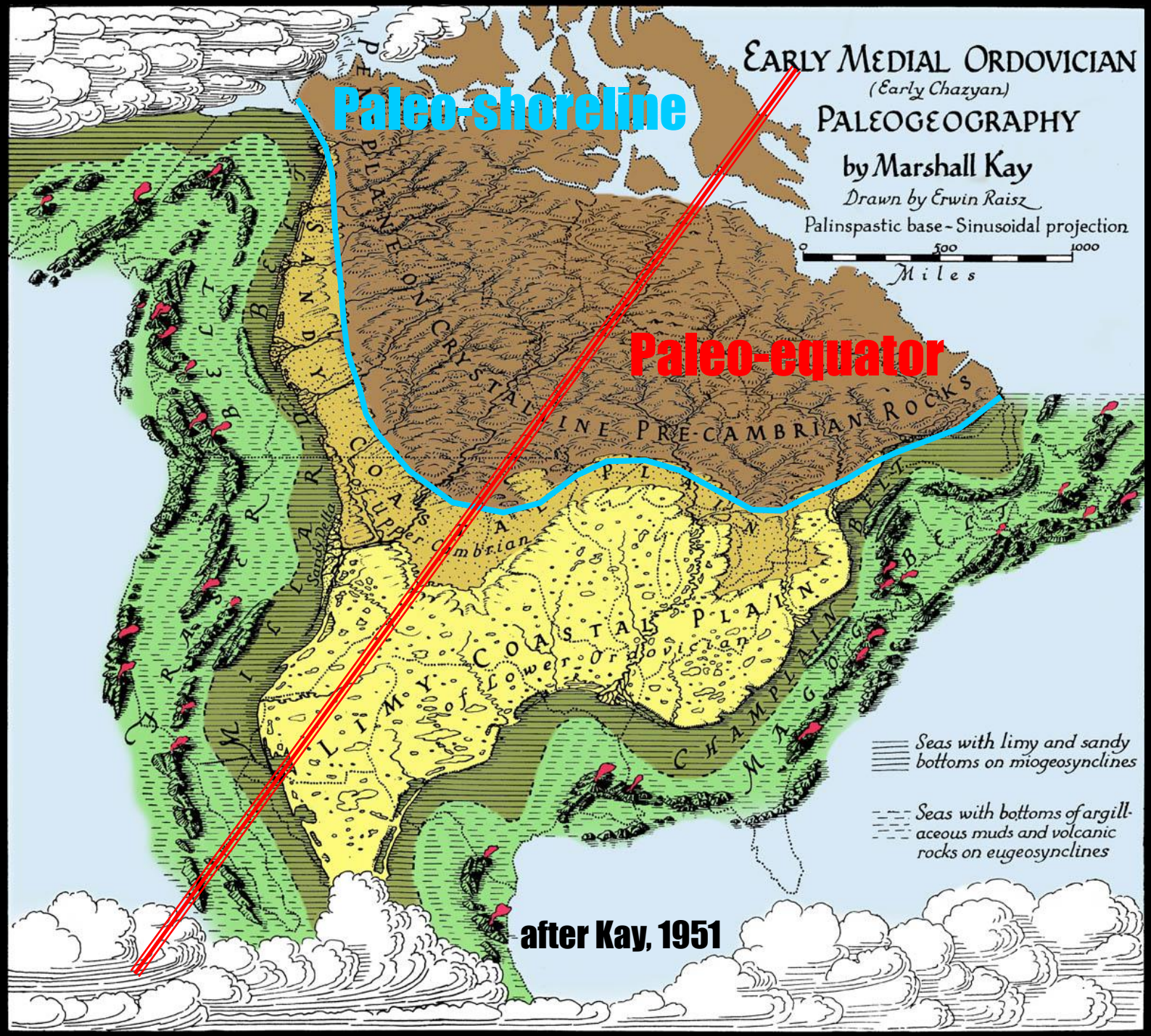

Platy minerals such as mica
Needlelike minerals such as amphibole

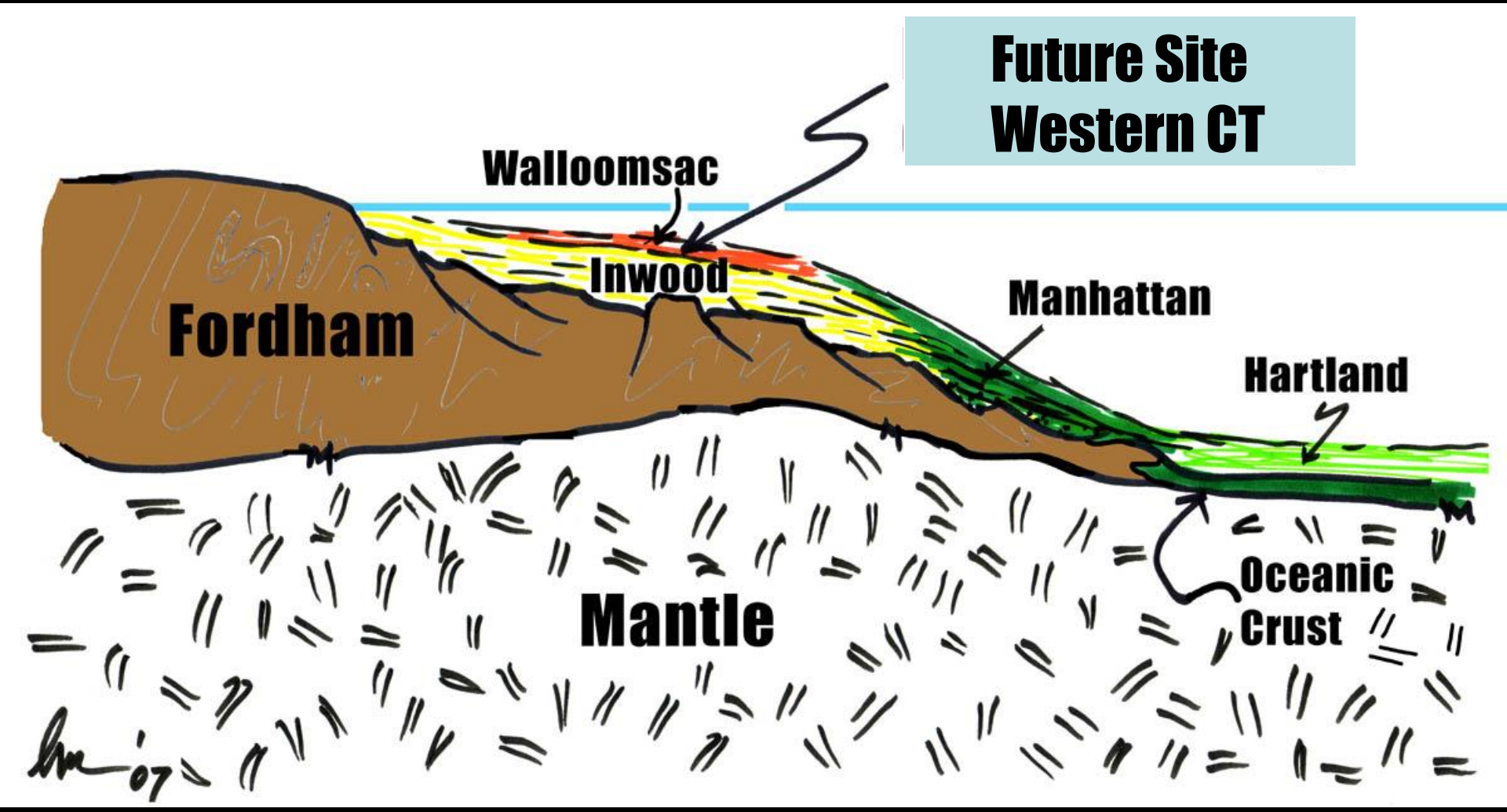
Garnet Amphibolite, So. Twin Island, NY

Garnet Schist

Is He Done Yet?
I'm Falling Asleep

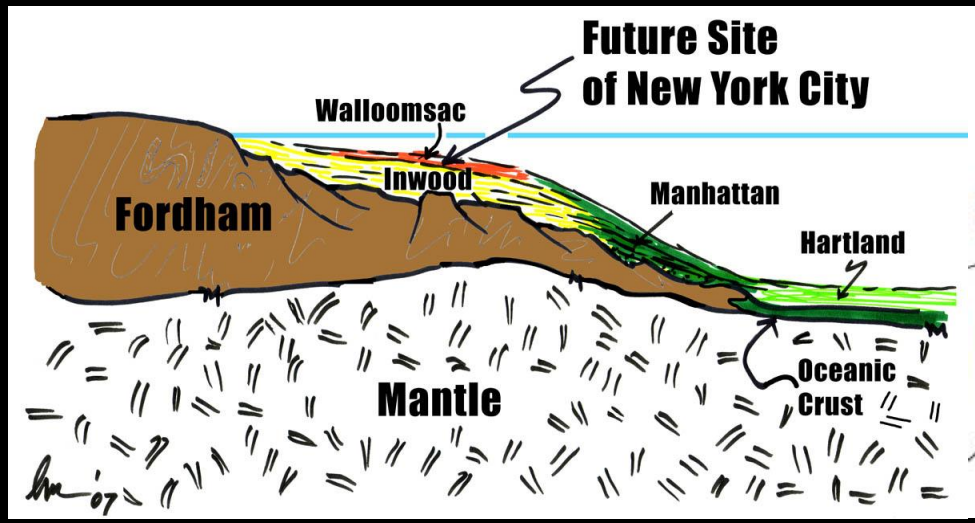

MA
CT
Taconic Allochthon
Poughkeepsie
Allegheny-Catskill Plateau
Port Jervis
PA
Valley and Ridge
NY
NJ
Great Valley
Grenville Highlands
Manhattan Prong
Bridgeport
Long Island
Newark
New York
Newark Basin
Atlantic Coastal Plain
Trenton
25 miles

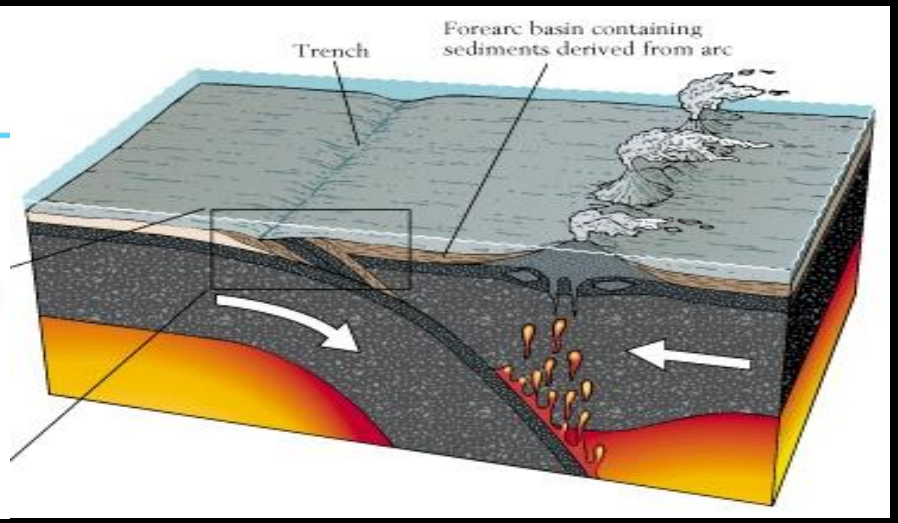

Early Medial Ordovician
(Early Chazyan)
Paleogeography
by Marshall Kay
Drawn by Erwin Raisz
Palinspastic base - Sinusoidal projection
0
500
1000
Miles
Paleo-shoreline
Paleo-equator
Peneplanation Crystalline Pre-Cambrian Rocks
Coastal Plain of Upper Cambrian
Coastal Plain of Lower Ordovician
Sandy Delta
Limy
Champlain Magnesian Belt
Seas with limy and sandy bottoms on miogeosynclines
Seas with bottoms of argillaceous muds and volcanic rocks on eugeosynclines
after Kay, 1951

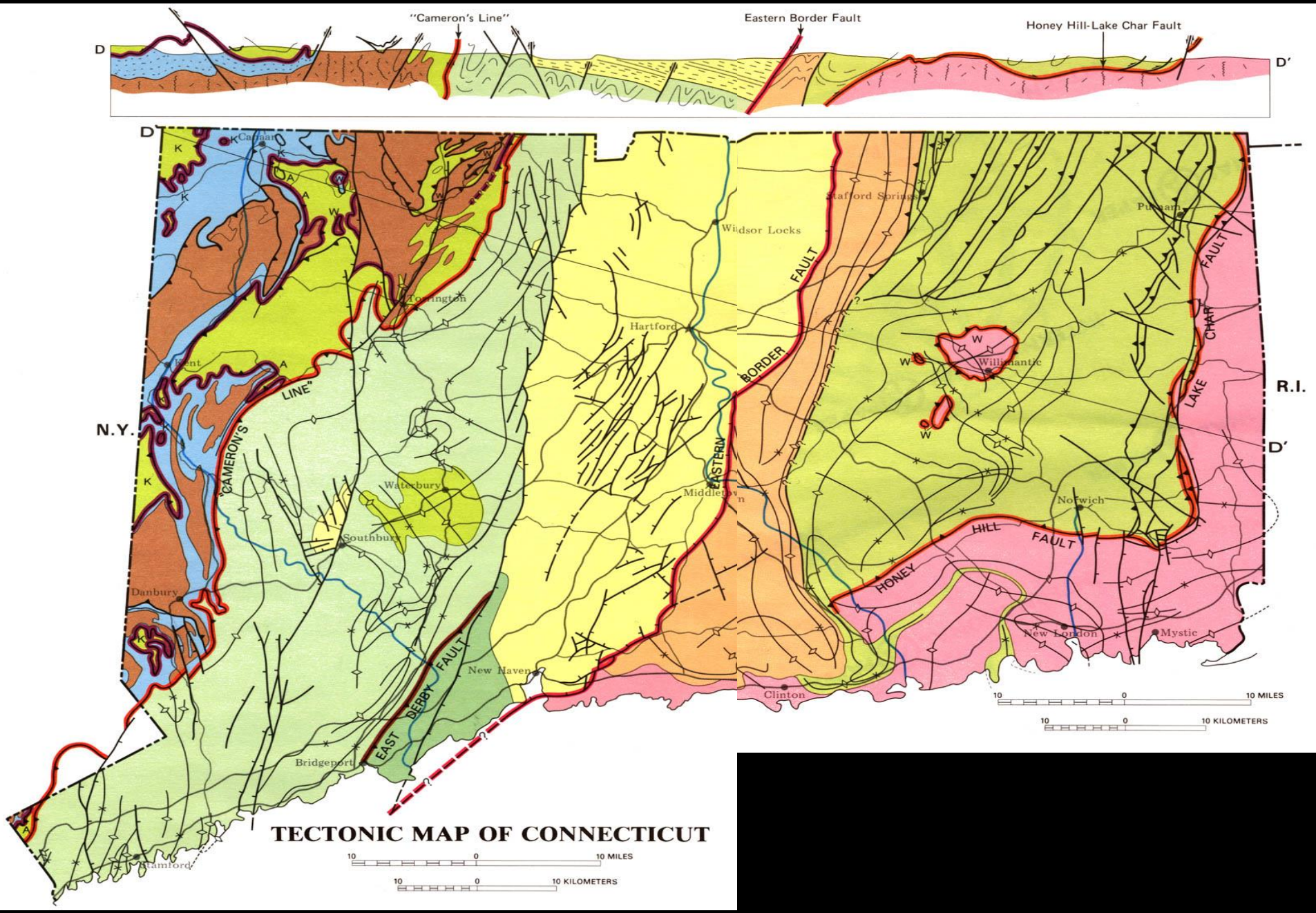

Future Site
Western CT
Walloomsac
Inwood
Fordham
Manhattan
Hartland
Oceanic
Crust
Mantle

Let's Go Back In Time From Today to the Cambrian!

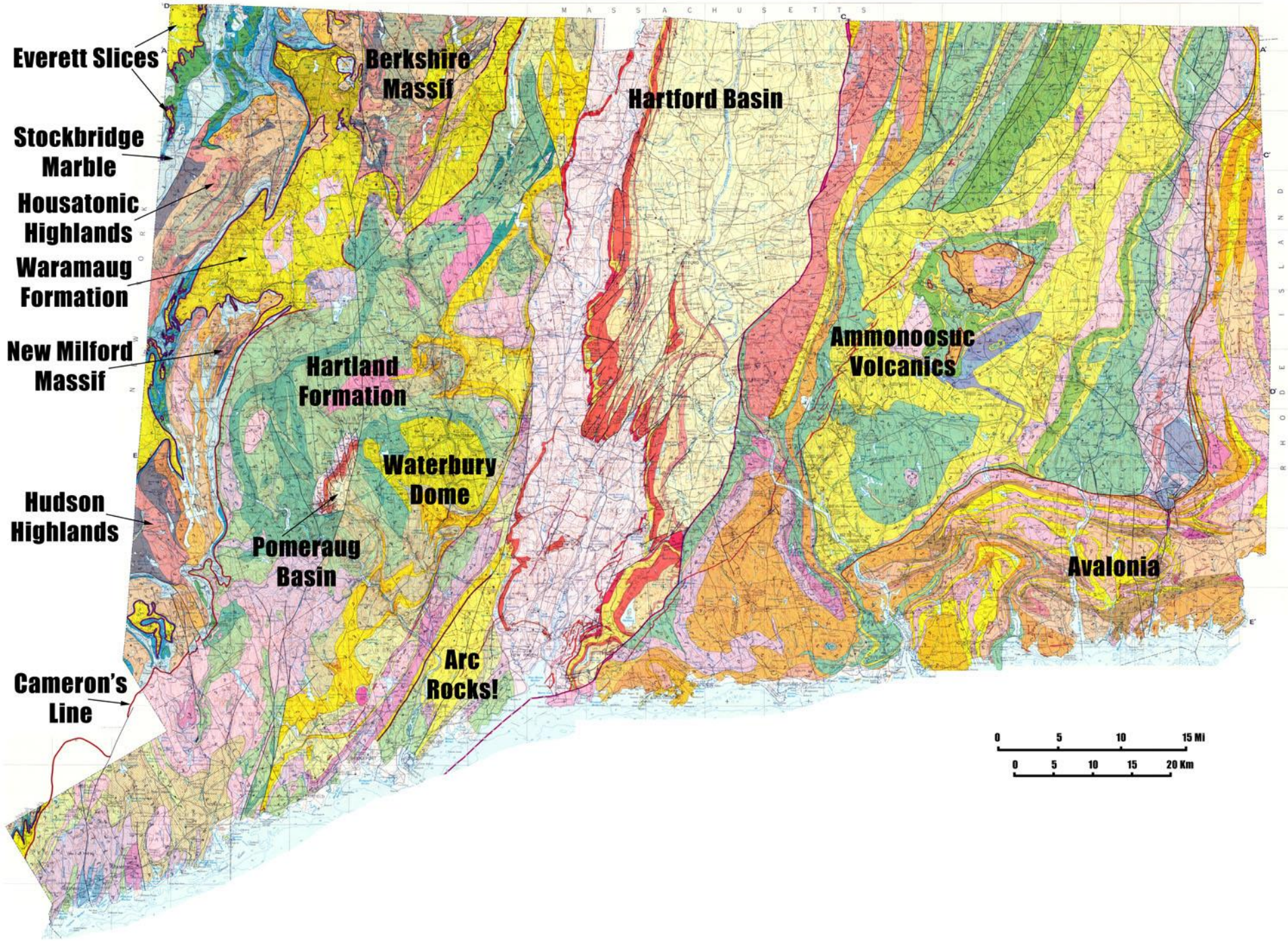
~ 450 Ma Taconian Arc – Passive Margin Collision





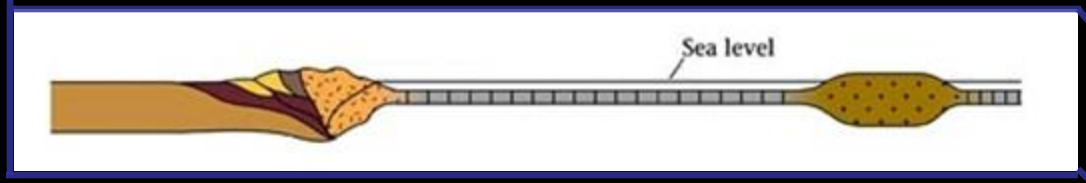


TECTONIC MAP OF CONNECTICUT


Everett Slices
Stockbridge Marble
Housatonic Highlands
Waramaug Formation
New Milford Massif
Hudson Highlands
Cameron's Line
Berkshire Massif
Hartford Basin
Hartland Formation
Waterbury Dome
Pomeraug Basin
Arc Rocks!
Ammonoosuc Volcanics
Avalonia
M A S S A C H U S E T T S
R H O D E I S L A N D
0 5 10 15 Mi
0 5 10 15 20 Km

Taconic Orogeny

2



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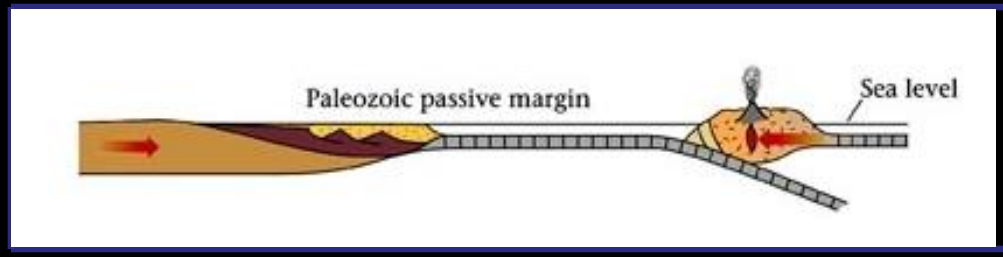
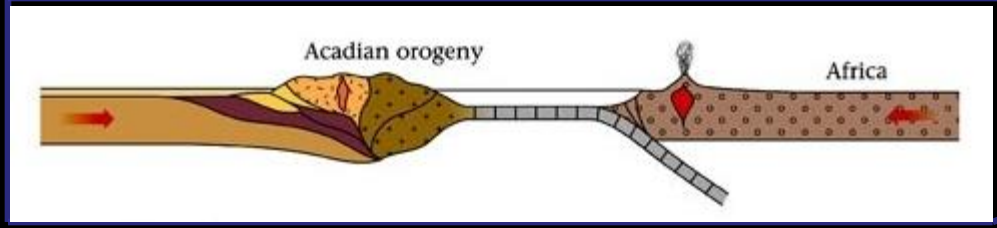
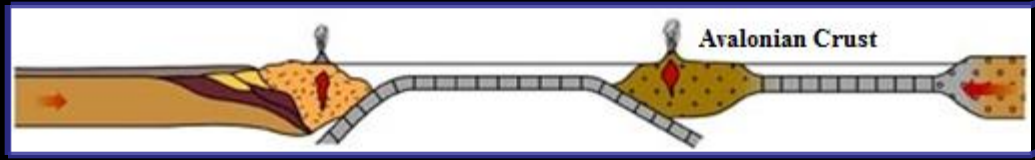


Permian	Late
	Early
Pennsylvanian	Late
	Middle
	Early
Mississippian	Late
	Early
Devonian	Late
	Middle
	Early
Silurian	Late
	Early
Ordovician	Late
	Middle
	Early
Cambrian	Late
	Middle
	Early

Acadian Orogeny

4





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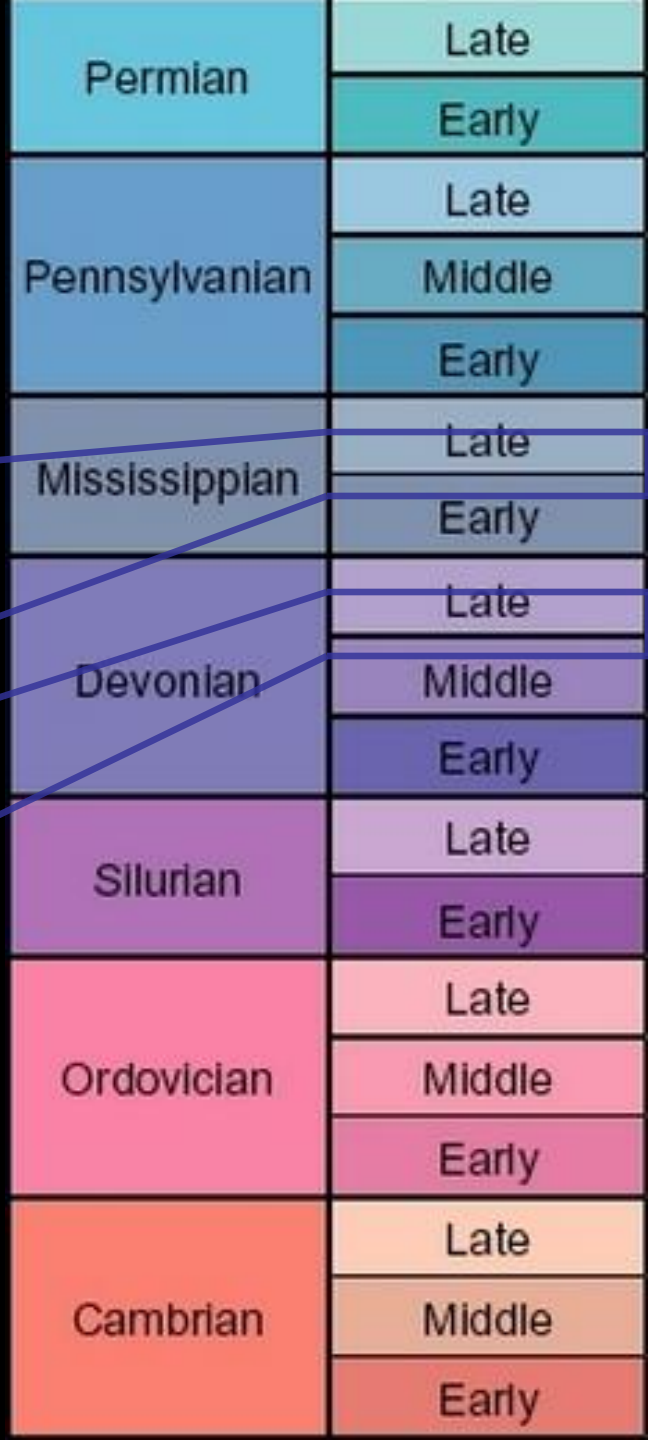
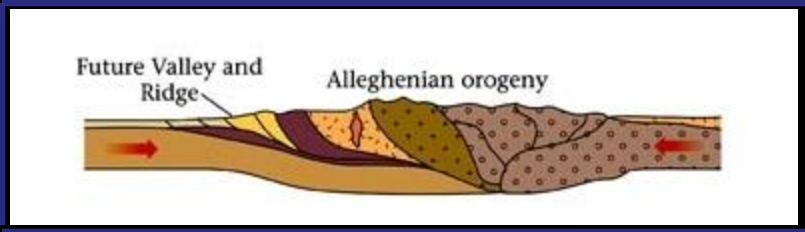


360 million
years ago
Kaskaskia Sea
Acadian highlands
Iapetus Ocean
future location
of Sideling Hill
Africa

Alleghanian Orogeny



5

Permian	Late
	Early
Pennsylvanian	Late
	Middle
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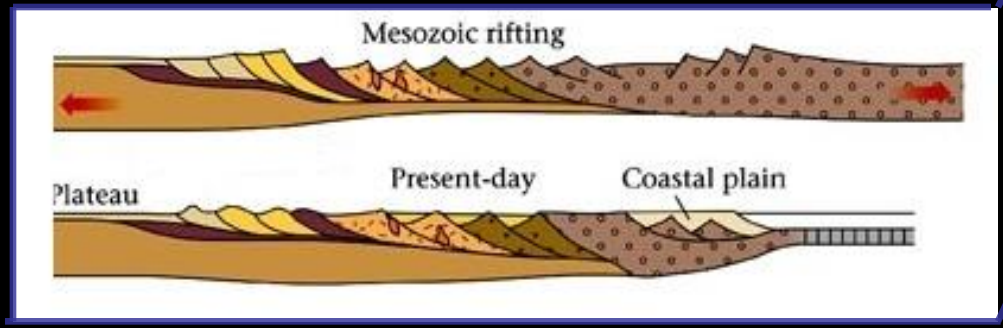
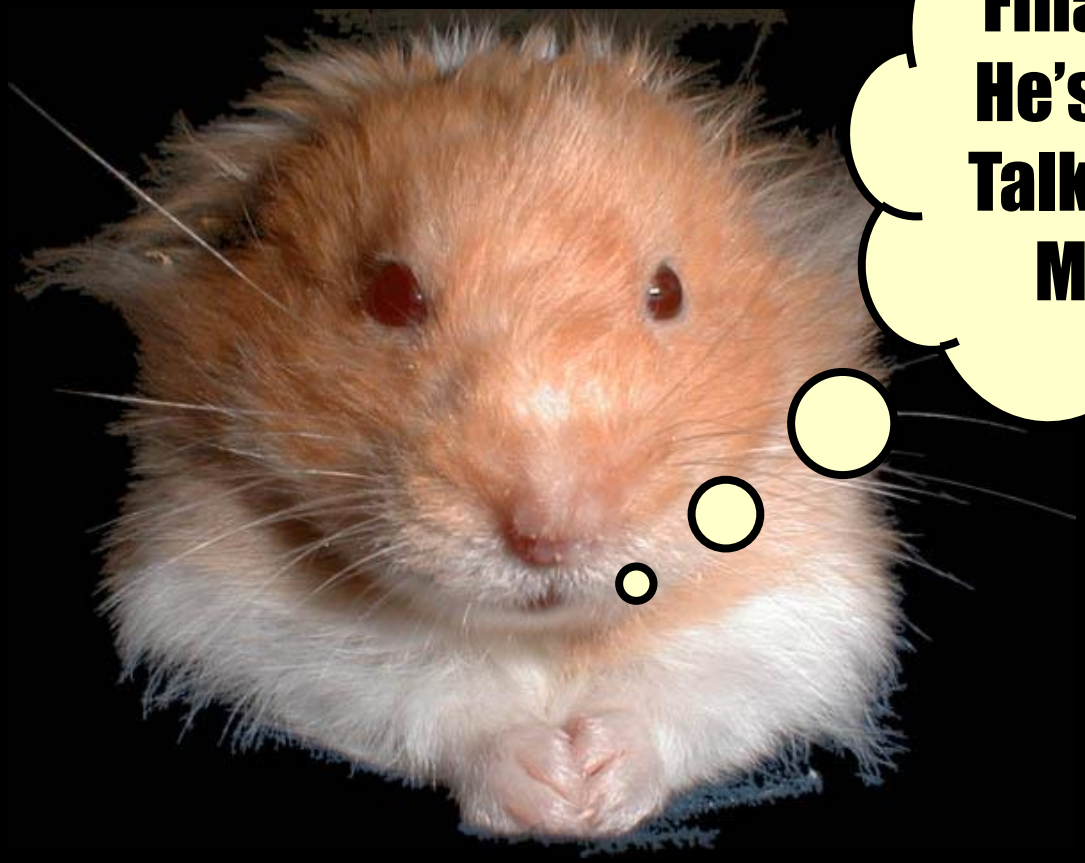
Mississippian	Late
	Early
Devonian	Late
	Middle
	Early
Silurian	Late
	Early
Ordovician	Late
	Middle
	Early
Cambrian	Late
	Middle
	Early

Mesozoic Rifting



6

Permian	Late
	Early
Pennsylvanian	Late
	Middle
	Early
Mississippian	Late
	Early
Devonian	Late
	Middle
	Early
Silurian	Late
	Early
Ordovician	Late
	Middle
	Early
Cambrian	Late
	Middle
	Early



Finally! Now He's Going to Talk About CT Minerals

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Bristol Copper Mine, Newgate Prison, New Britain

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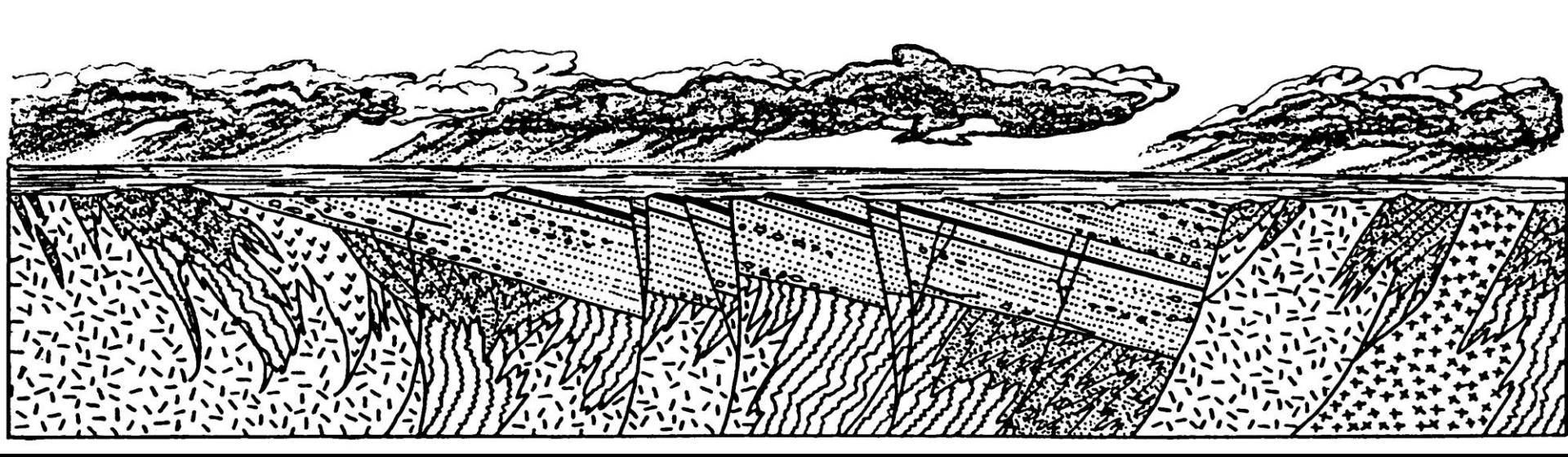
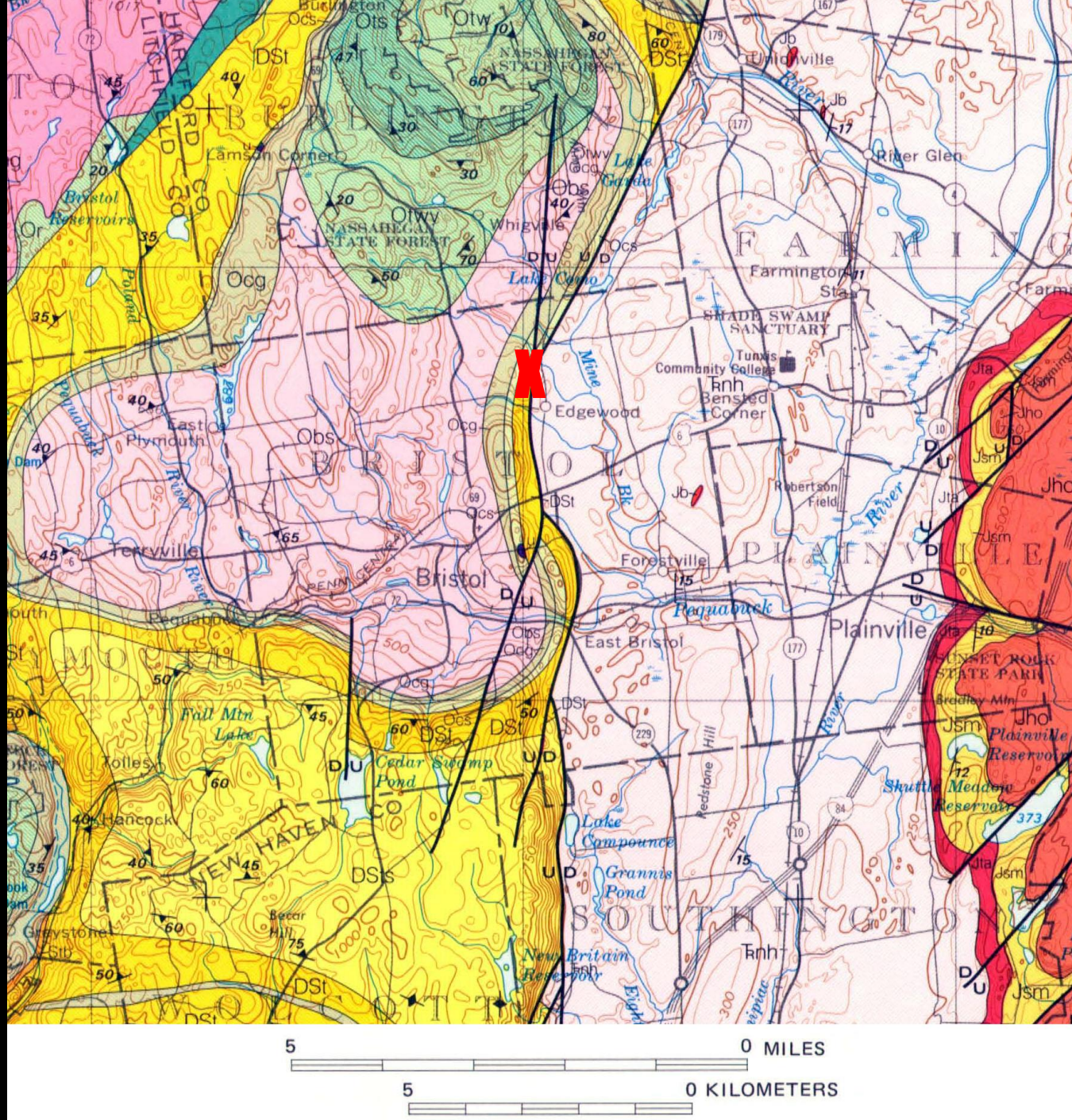


Connecticut Basin Strata (Barrell 1910)

Sedimentary
Host
Connecticut Basin Strata, Rte 9N, CT

Copper Mine
Bristol, CT



1709 – English colony of Simsbury - copper pits known

1798 – Theophilus Botsford investigates "greenish" water and dead vegetation at Zack's Mtn. Finds vein of copper ore <u>but does nothing</u>

1800 – Asa Hooker initiates mining on Yale family land

1805-1810 – Luke Gridley mined; Hooker smelted

1810 – Gridley dies and mine remains domant

1836 – E.N. Welch revives Yale lease employs George Bartholemew to bring workers for open cut

1837-1846 – Bristol Mining Co. sinks shaft; major production; 10'-wide vein with crystal pockets

First major copper producer in US!!!

Provided copper for CT Brass industry (Clockworks)

Mesozoic arkose sandstone host rock

Chalcocite and Bornite Ore Ran up to 10% Silver

28

Chalcocite, Bristol, CT

28

Chalcocite, Bristol, CT

28

2148 – Chalcocite, Bristol, CT

Simsbury Copper Mine
Newgate Prison, East Granby, CT

Simsbury Copper Mine
Newgate Prison, East Granby, CT

1705 – Mining by 64 residents to pay town expenses and hire schoolmaster (First chartered copper mining company in Colonial America)

Two shafts (25' and 67' depth)

1773 – Copper becomes harder to find (mined out)

1773 – Mine converted to prison. First prisoner (John Hinton) escapes by rope down a shaft

Various fences and guards were employed

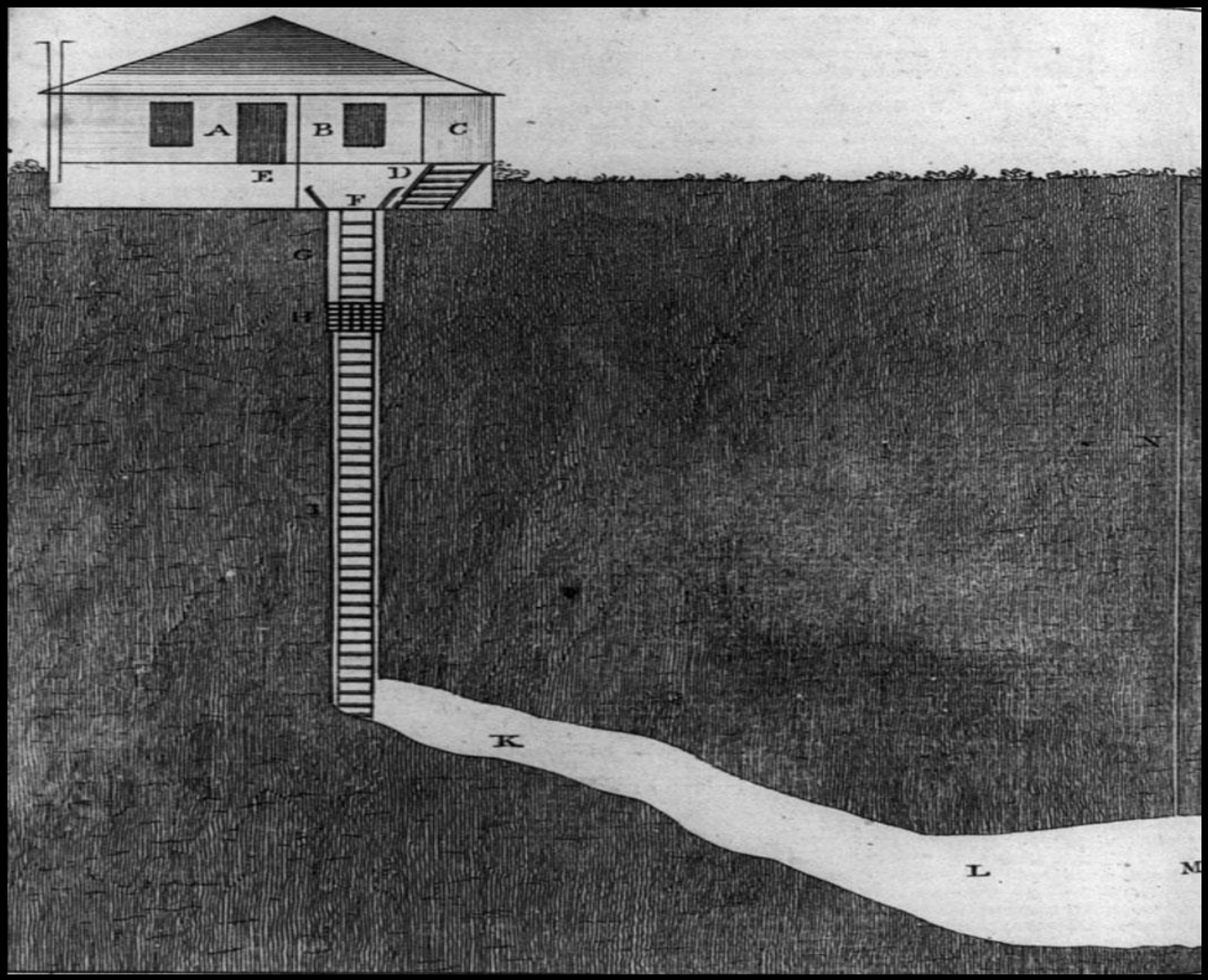
1802 – 12' high stone wall built around site

Prisoners used for mining at first, then shops

Malachite, Chrysocolla, Cuprite, Bornite

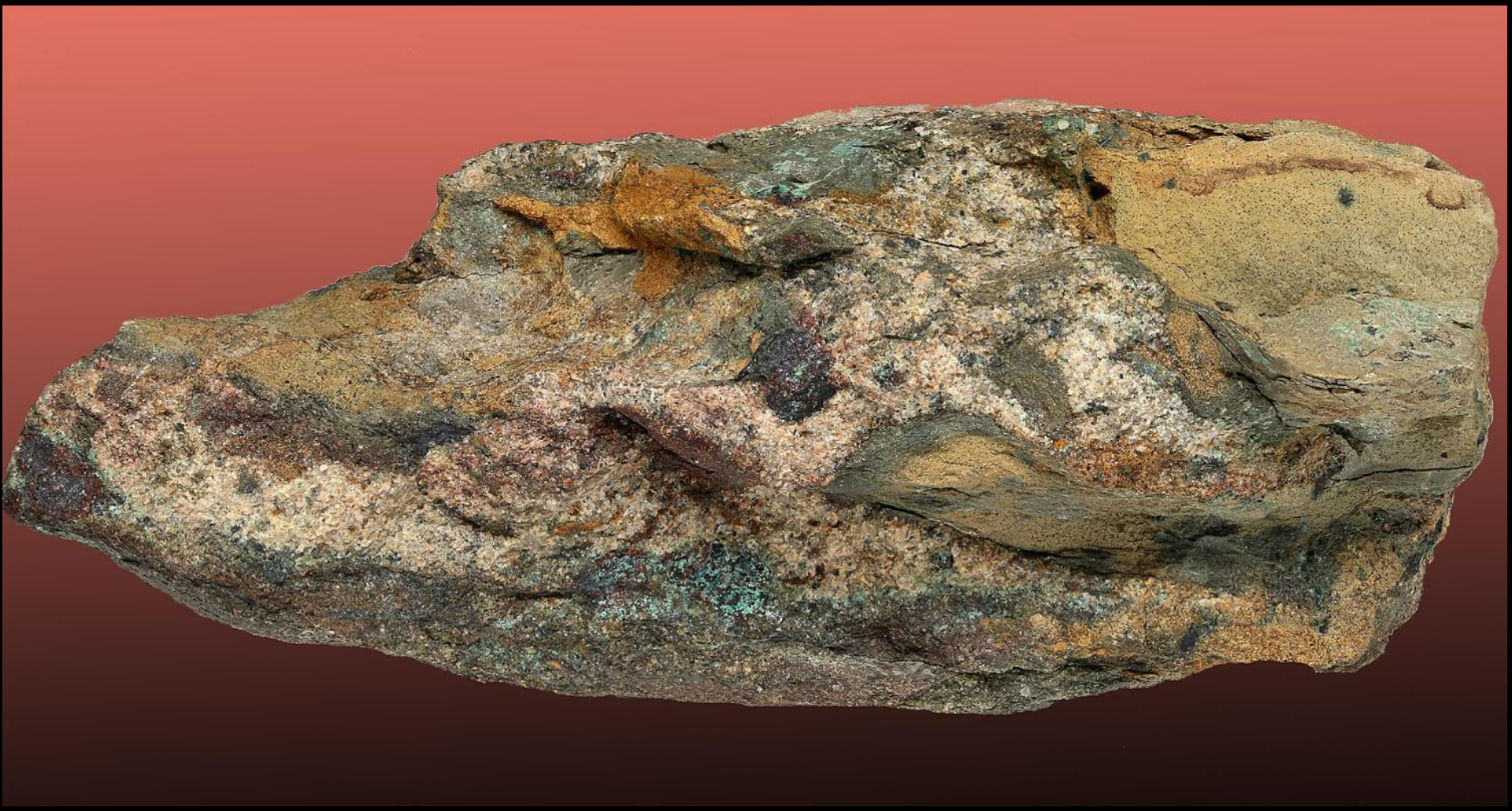
Copper Minerals

Newgate Prison
East Granby, CT



81 Malachite Chrysocolla - East Granby, CT

Malachite Chrysocolla Cuprite Bornite - East Granby, CT

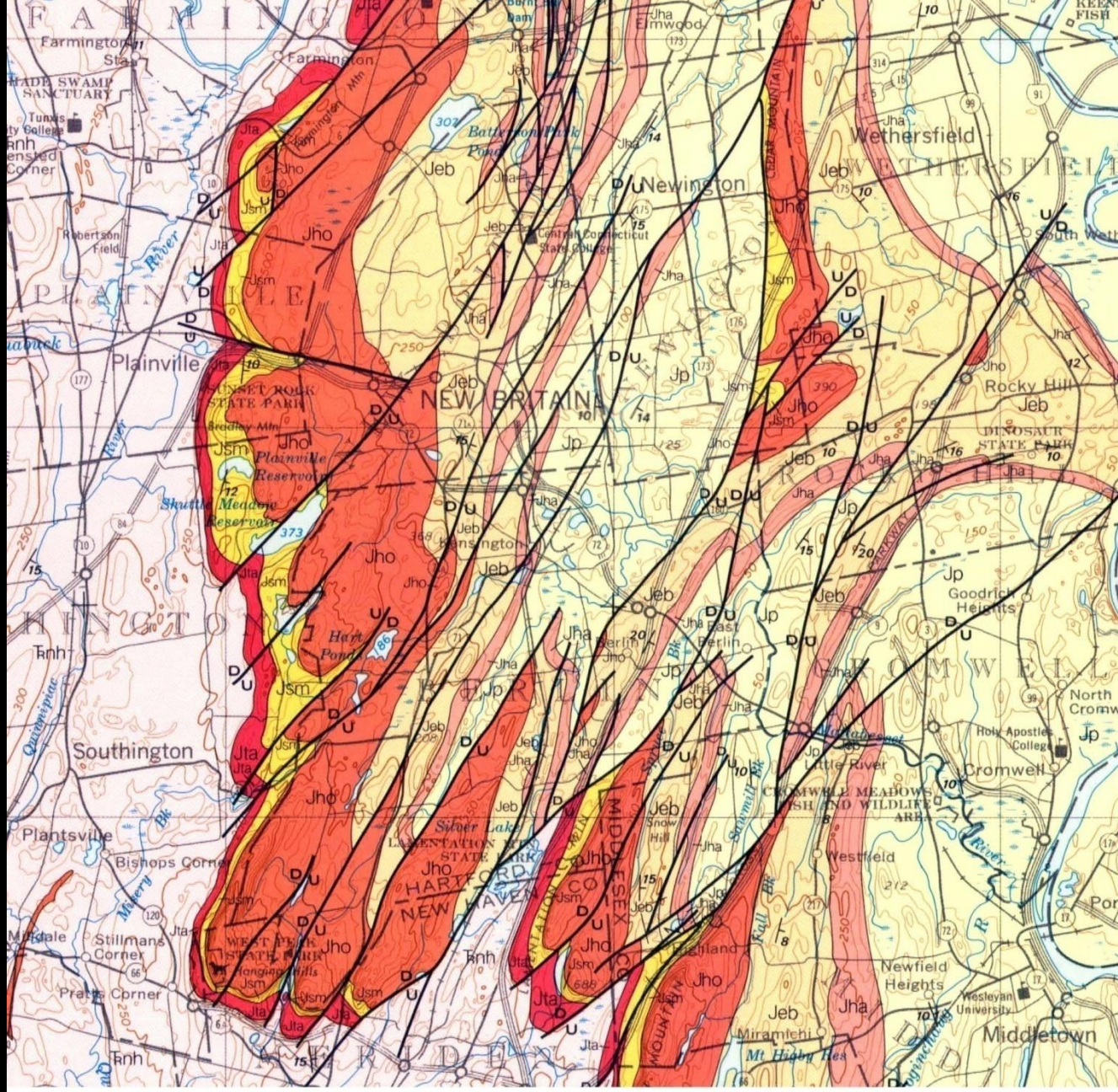


H. Moritz Image

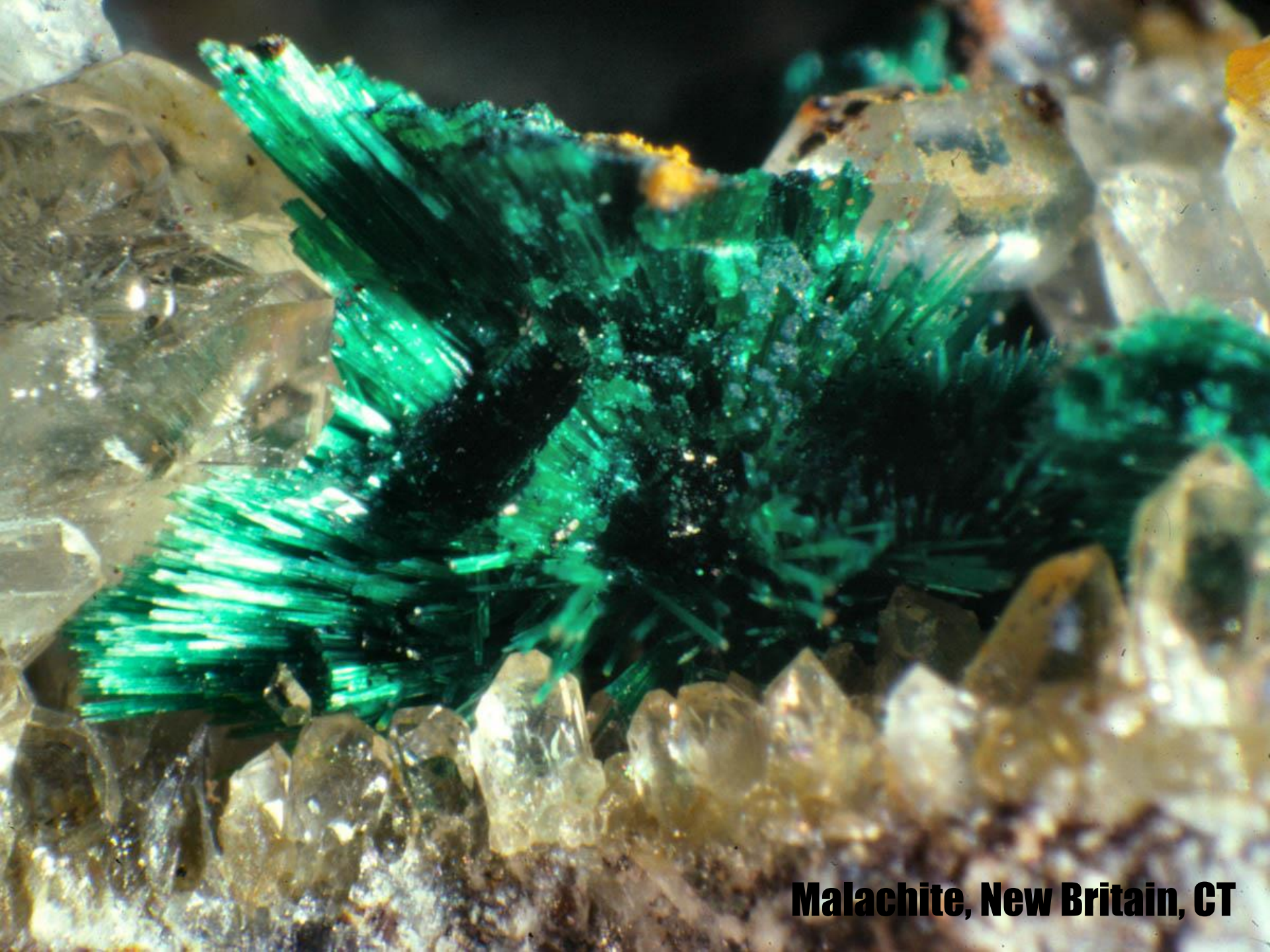
Malachite - East Granby, CT

H. Moritz Image

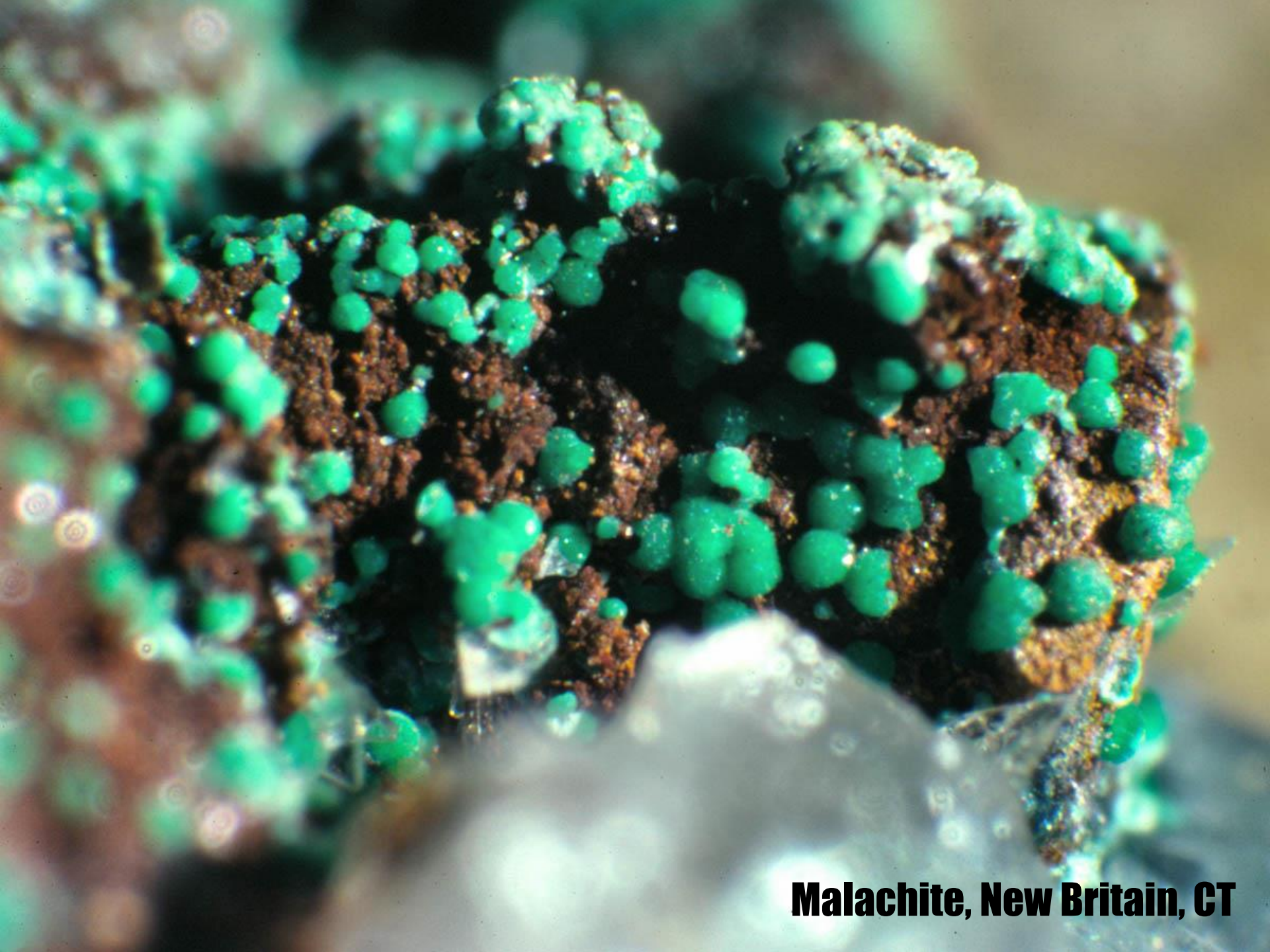
Copper Minerals
New Britain, CT



Barite Siderite, New Britain, CT


Malachite, New Britain, CT

Malachite Quartz, New Britain, CT


Malachite, New Britain, CT

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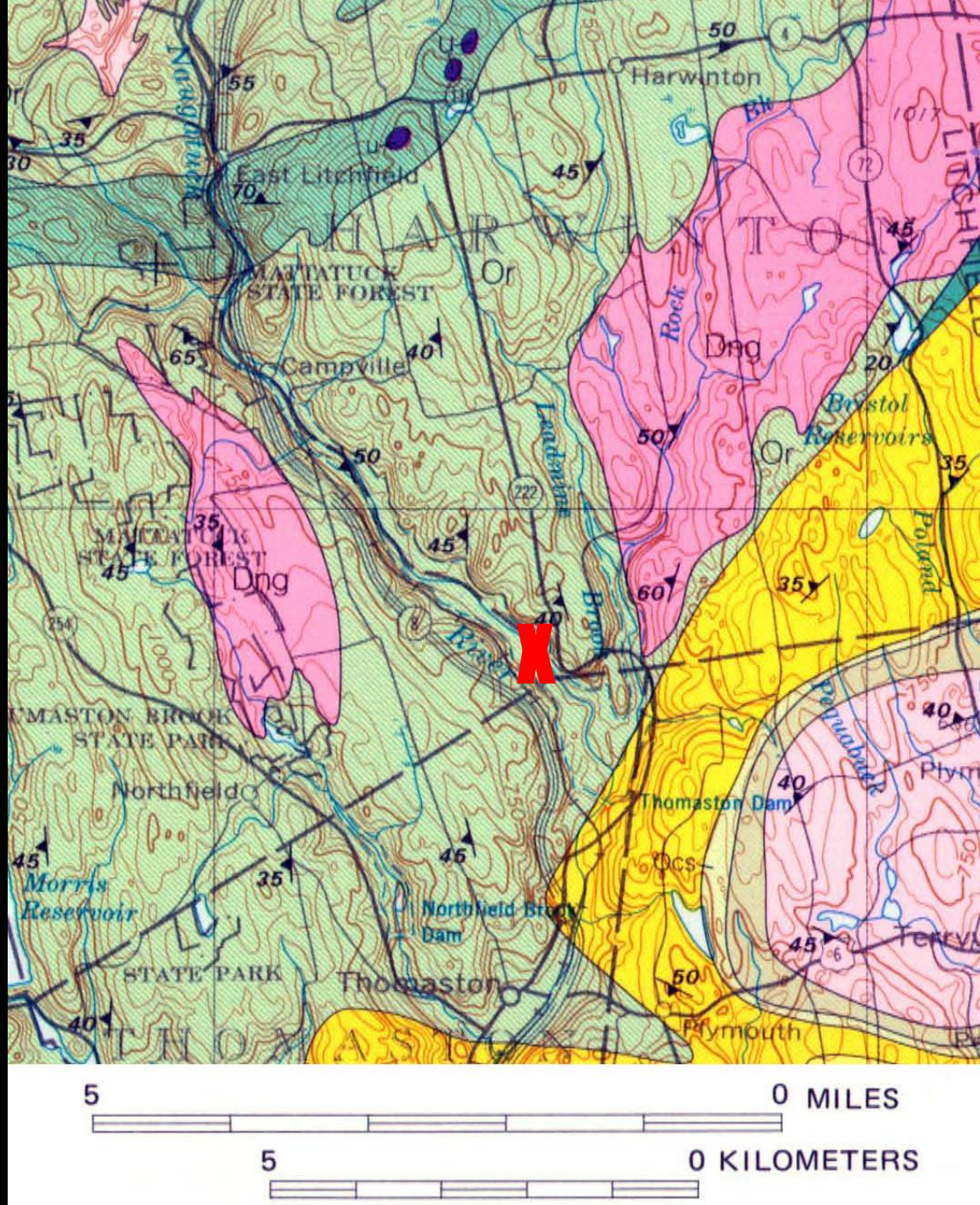
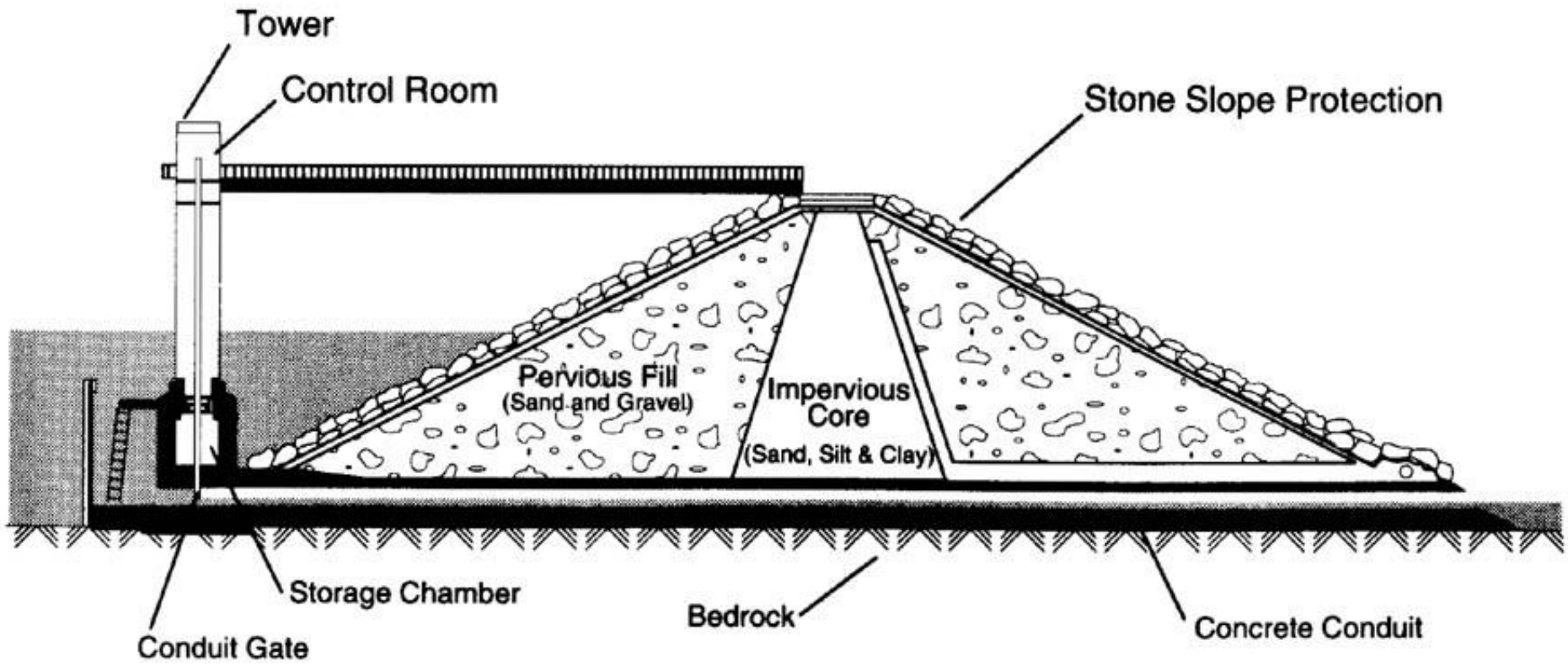
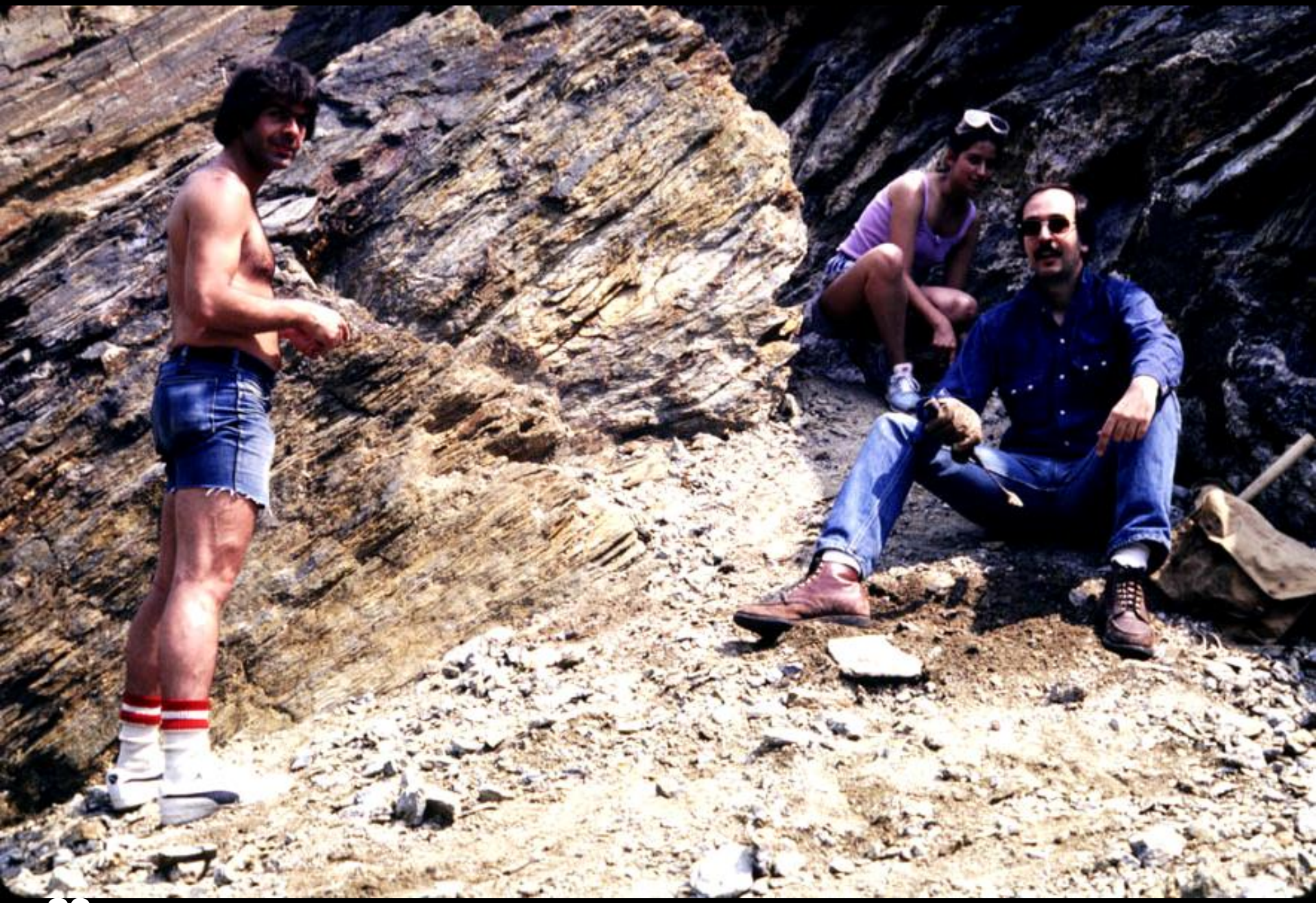
Thomaston Damsite
Thomsaton, CT



August 1955 City of Waterbury, Ct
Photo Courtesy Waterbury Republican American.



Thomaston Dry Dam



Thomaston Damsite Cut

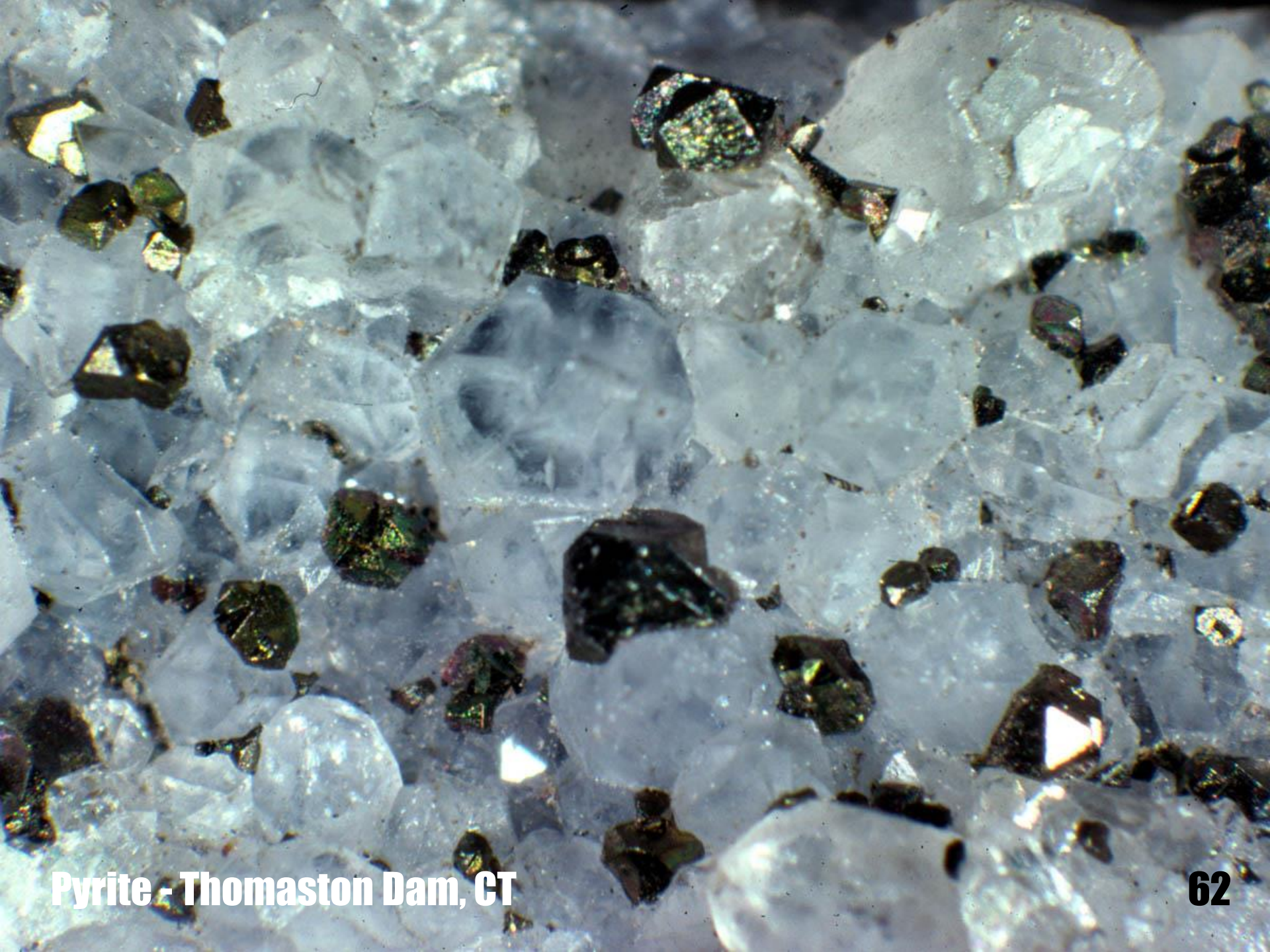
0432 – Fluorite, Thomaston Dam, CT

0407 – Quartz, Thomaston Dam, CT

Heulandite - Thomaston Dam, CT

Stilbite - Thomaston Dam, CT

Wurtzite - Thomaston Dam, CT



Pyrite - Thomaston Dam, CT

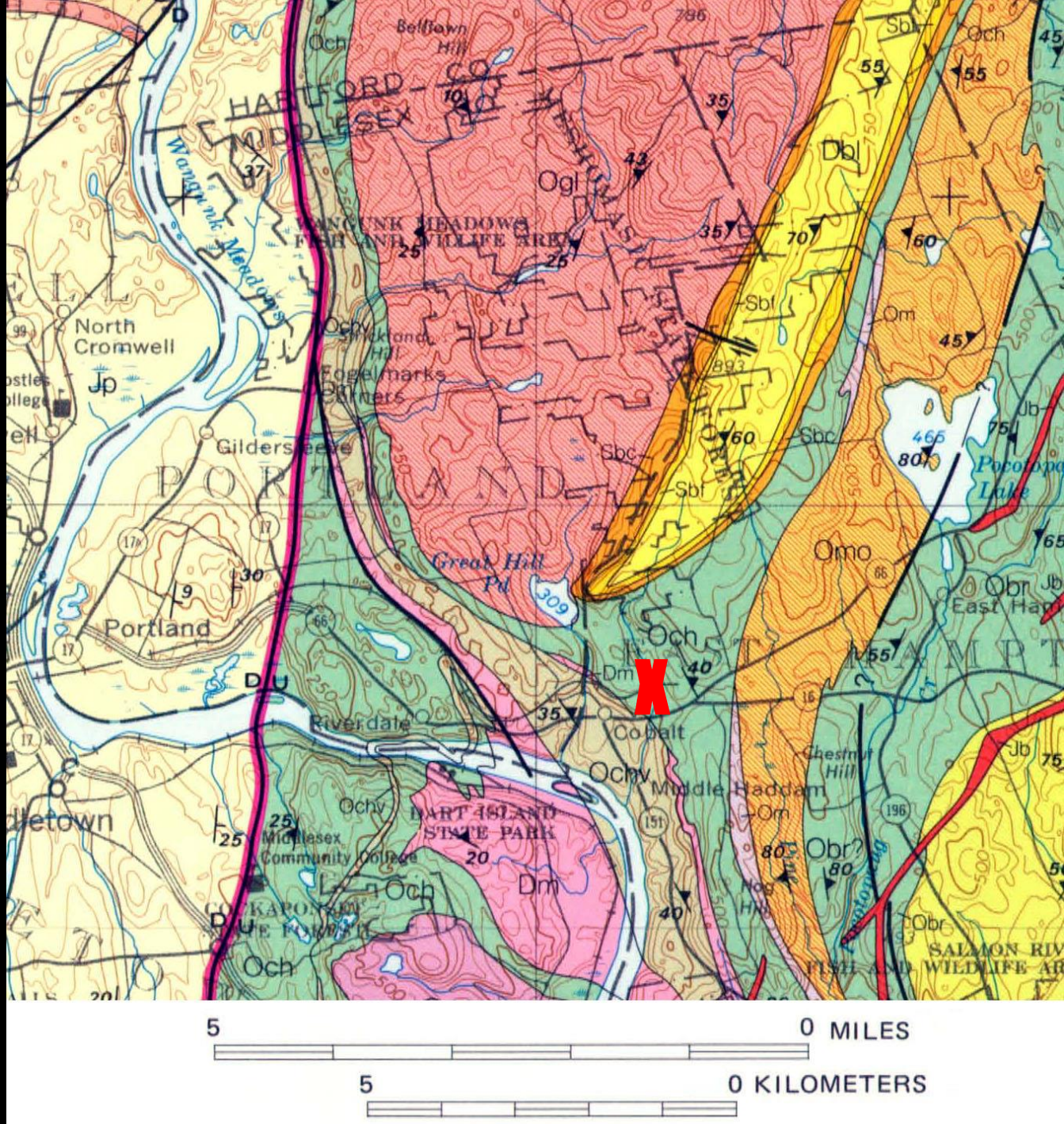
62

Fluorite + Wurtzite, Thomaston, CT

0614 – Galena, Thomaston, CT

0286 – Galena, Thomaston, CT

Cobalt Mine
Cobalt, CT



19

Arsenopyrite Mine, Cobalt, CT

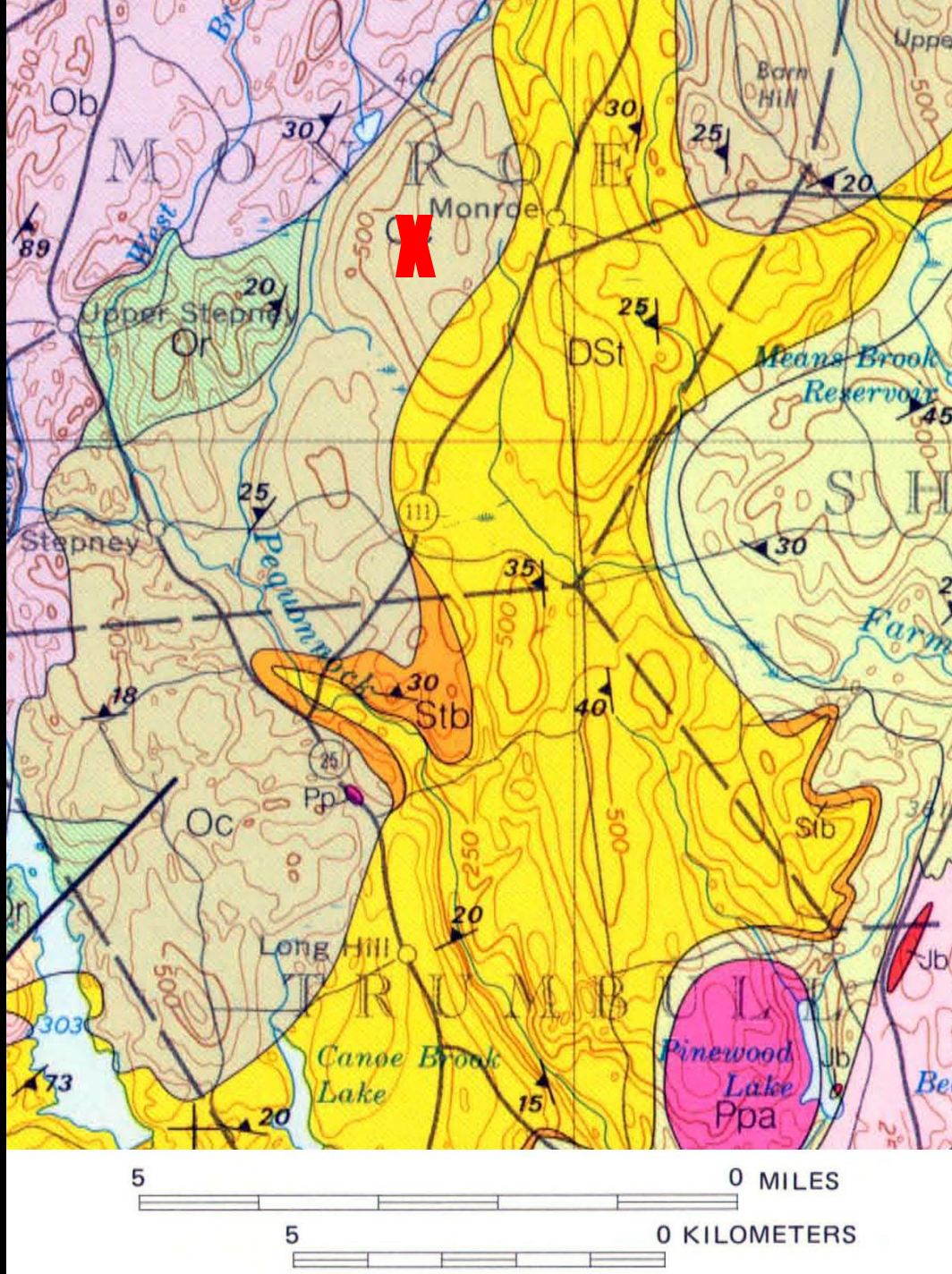
19

Arsenopyrite Mine, Cobalt, CT

Arsenopyrite, Cobalt, CT

Lane's Tungsten Mine
Monroe, CT

Collinsville Fm.



13

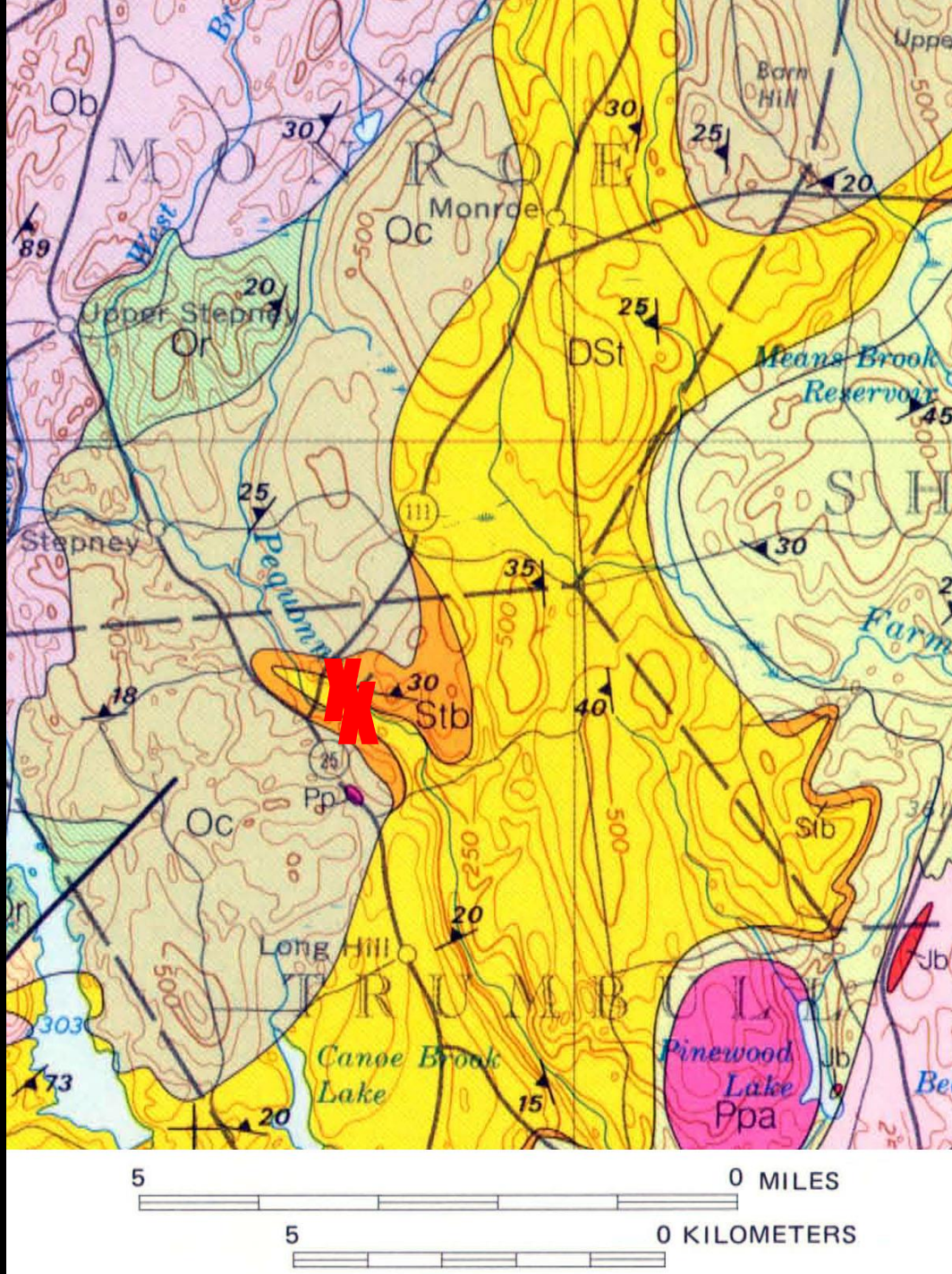
Ferberite pseudomorph after Scheelite, Lane's Mine, Monroe

13

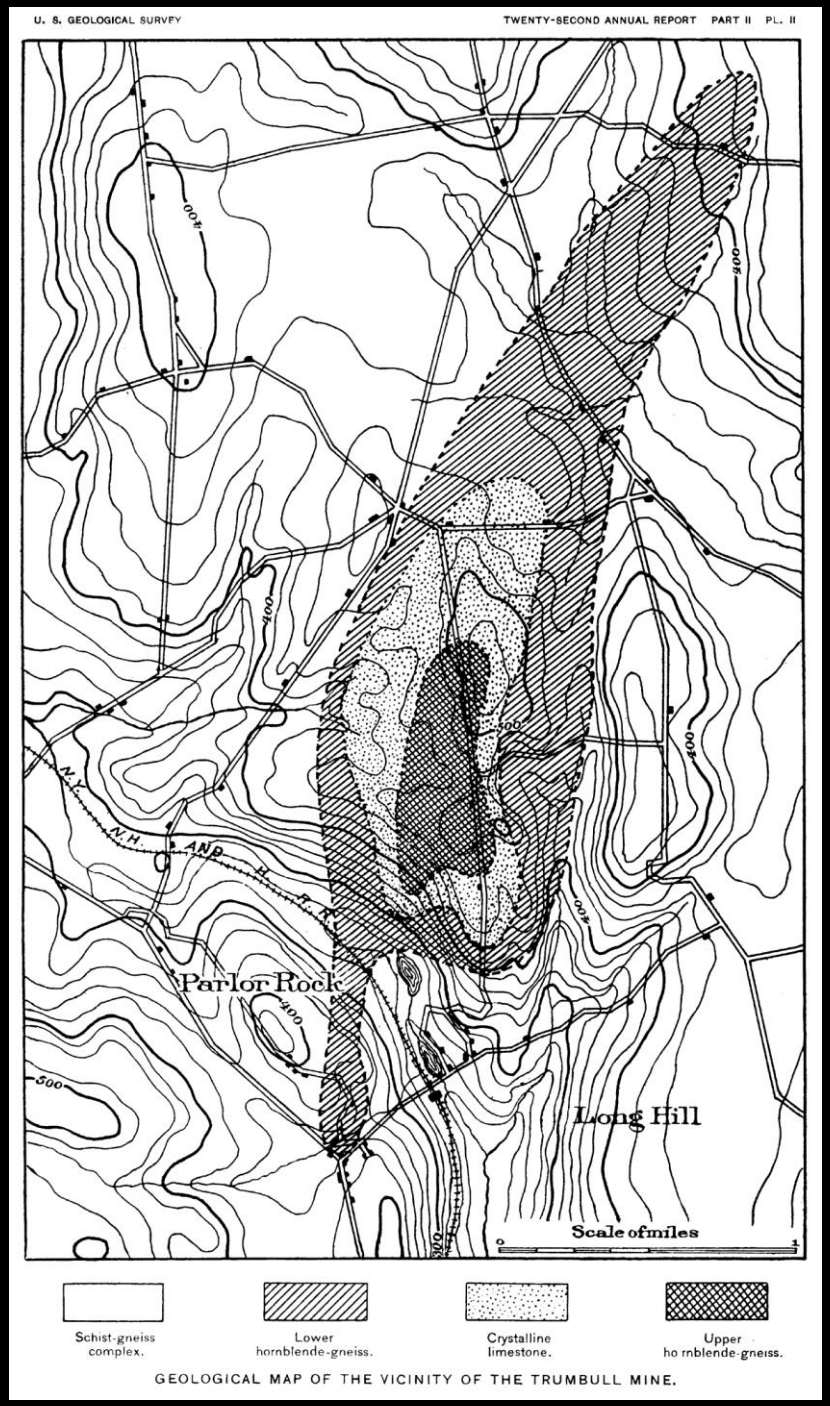
Ferberite pseudomorph after Scheelite, Lane's Mine, Monroe

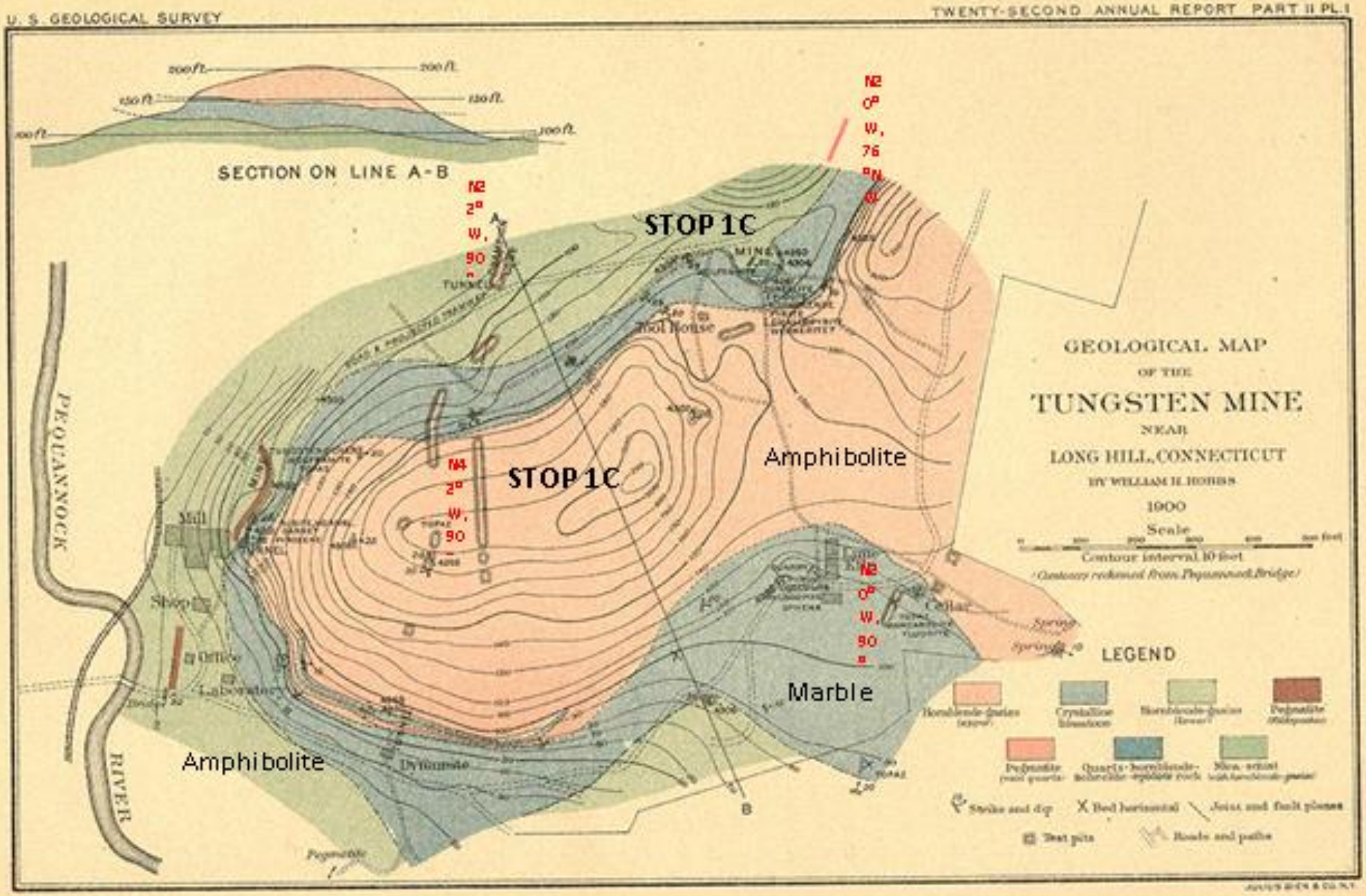
Long Hill Tungsten Mine
Trumbull, CT

Topaz
Scheelite
Pyrite
Collophane
Bismuth
Wolframite
Etc.



Long Hill Tungsten Mine
Trumbull, CT




U. S. GEOLOGICAL SURVEY
TWENTY-SECOND ANNUAL REPORT PART II PL. I
SECTION ON LINE A-B
STOP 1C
STOP 1C
Amphibolite
Amphibolite
Marble
PEQUANNOCK
RIVER
Mill
Shop
Office
Laboratory
Dynamite
Cellar
Spring
Hot House
MINE
TUNNEL
GEOLOGICAL MAP
OF THE
TUNGSTEN MINE
NEAR
LONG HILL, CONNECTICUT
BY WILLIAM H. HOBBS
1900
Scale
Contour interval 10 feet
LEGEND
Strike and dip
Bed horizontal
Joint and fault planes
Test pits
Roads and paths

Hobbs, 1901

Champion Lode
Trumbull, CT

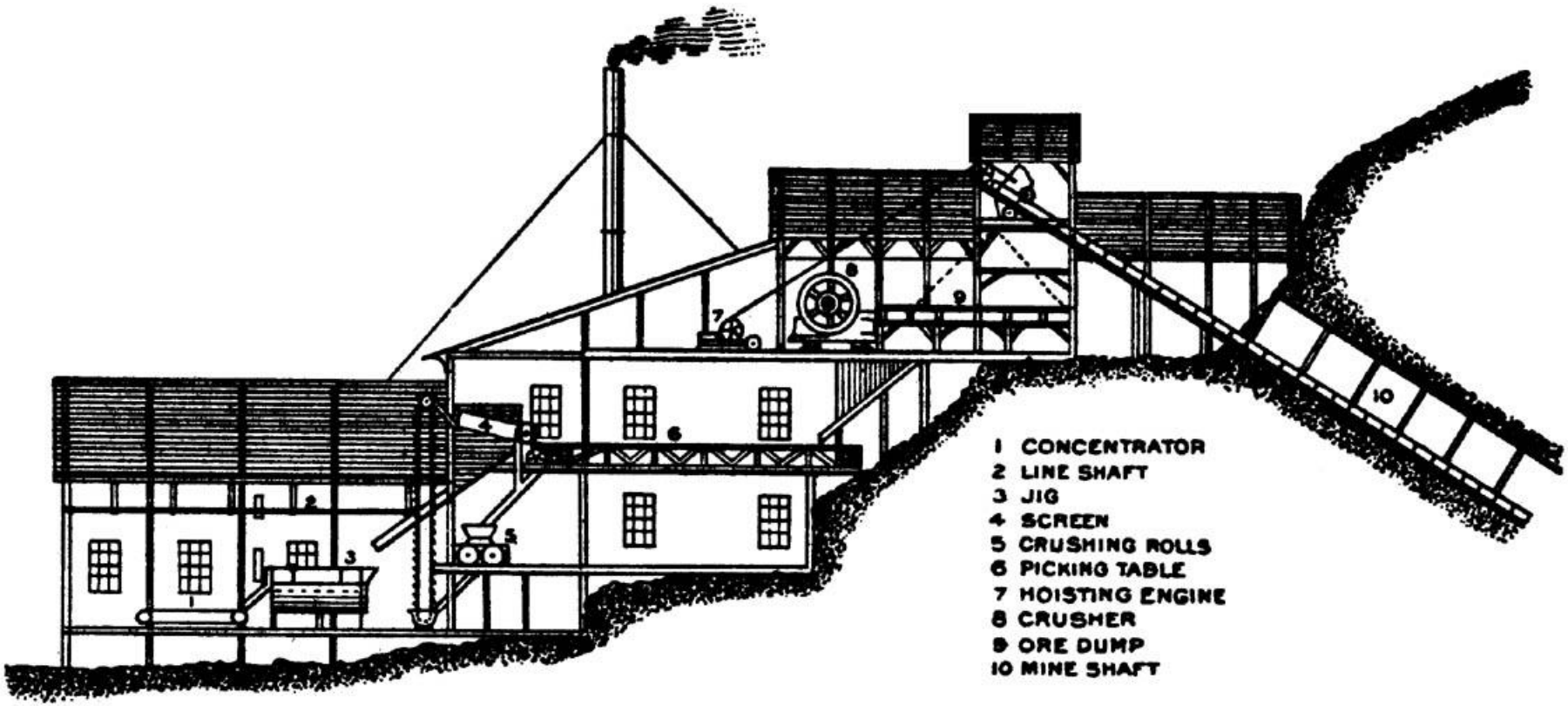


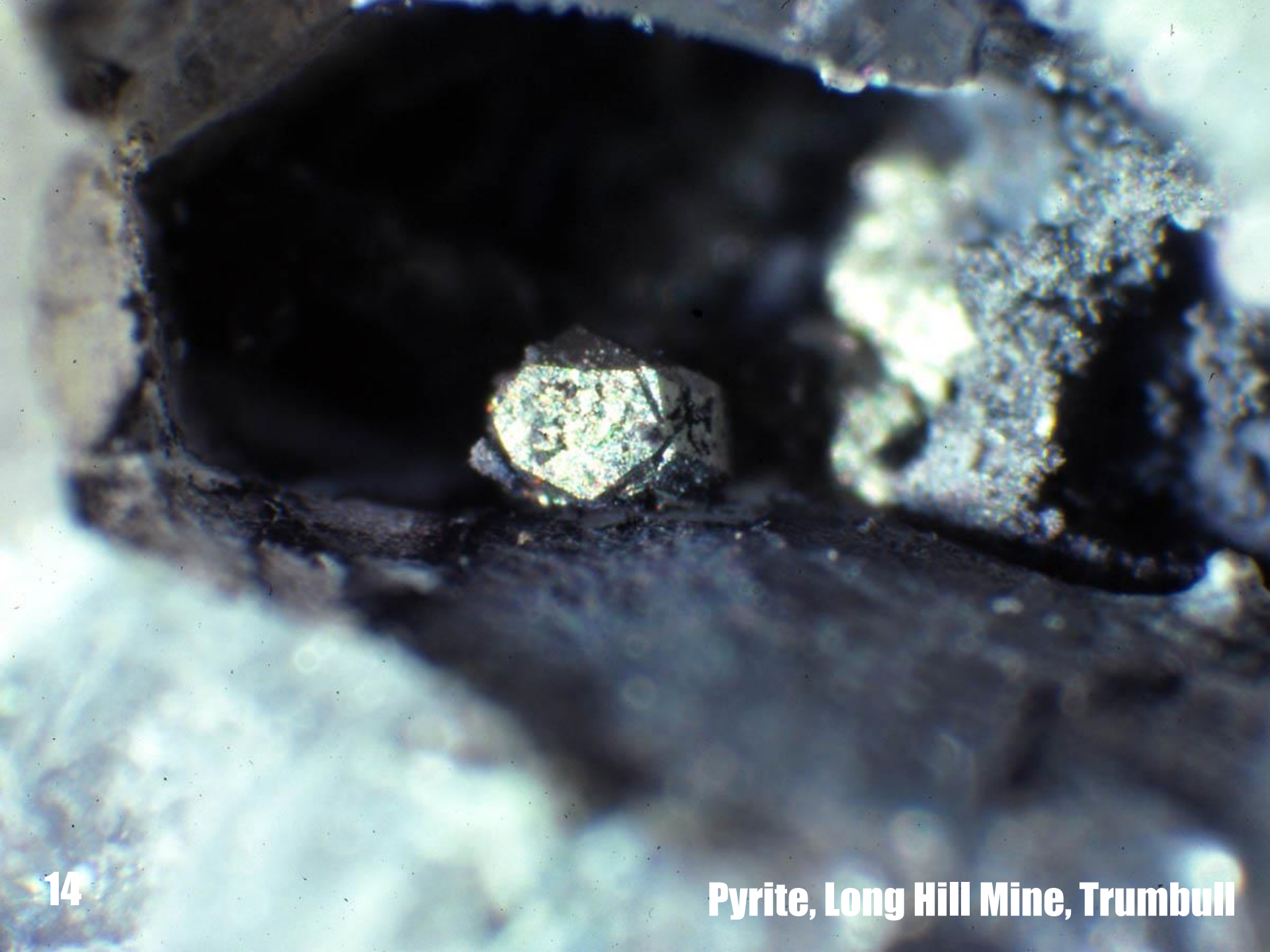
FIG. 1.—Diagram showing sectional elevation of mill.

14

Upper Pit, Long Hill Mine, Trumbull

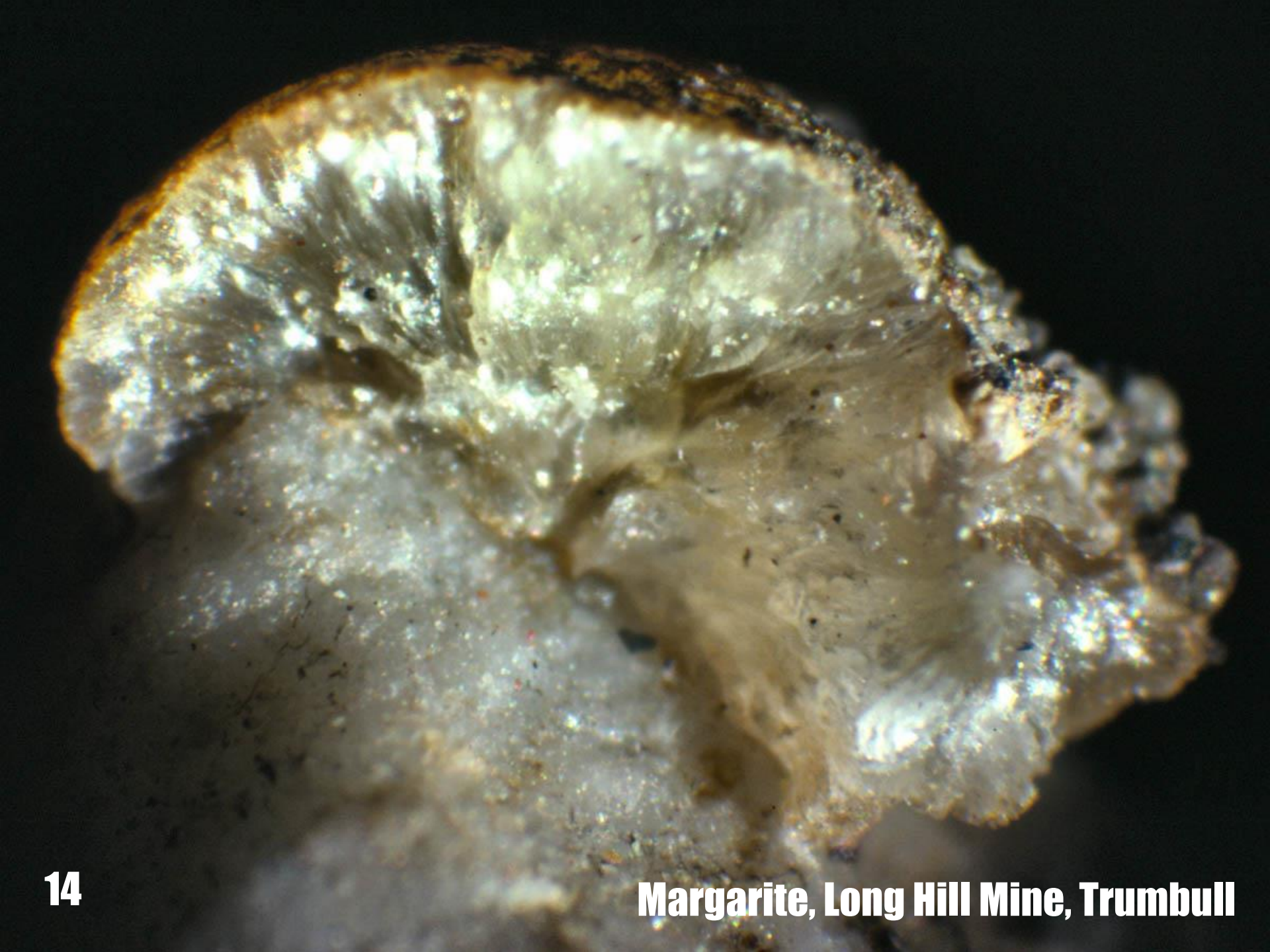
0601 - Collophane, Old Mine Park, Trumbull, CT

14 Collophane - Old Mine Park, Trumbull, CT



14

Pyrite, Long Hill Mine, Trumbull



14

Margarite, Long Hill Mine, Trumbull

0310 – Fluorite, Trumbull, CT

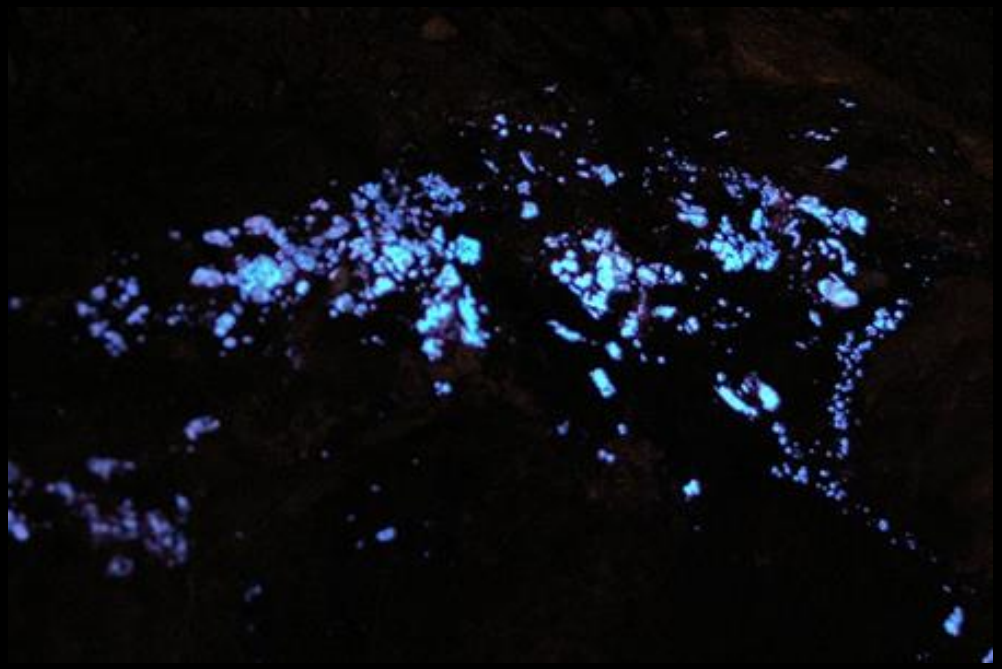
Beryl (var. Emerald), Trumbull, CT

David Busha Image

Beryl (var. Emerald), Trumbull, CT

Fluorite
Behind Home Depot,
Trumbull, CT

Scheelite in Amphibolite
Behind Home Depot,
Trumbull, CT



Mineralization – Western Connecticut

1) Volcanic- and shallow intrusive systems

Bristol Copper Mine, Newgate Prison, New Britain

2) Intermediate depth hydrothermal systems

Thomaston Dam, Cobalt Arsenopyrite, Lane's Mine, Long Hill Mine

3) Deep magmatic systems

Hodges, Mt. Prospect, Branchville, Merryall, Southbury, Middletown District

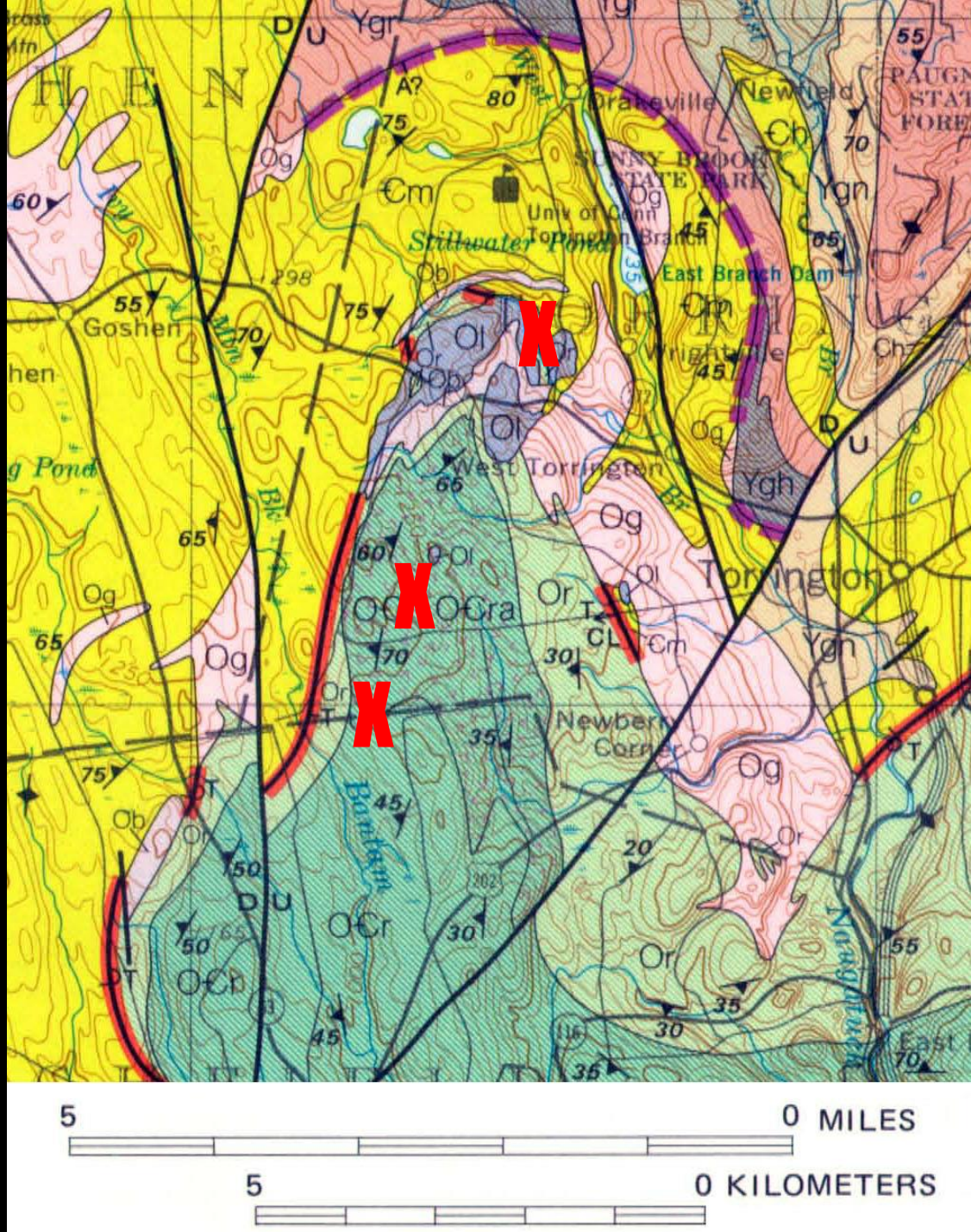
4) Intermediate- to deep metamorphic systems

Salisbury District, Roxbury, West Torrington, West Redding

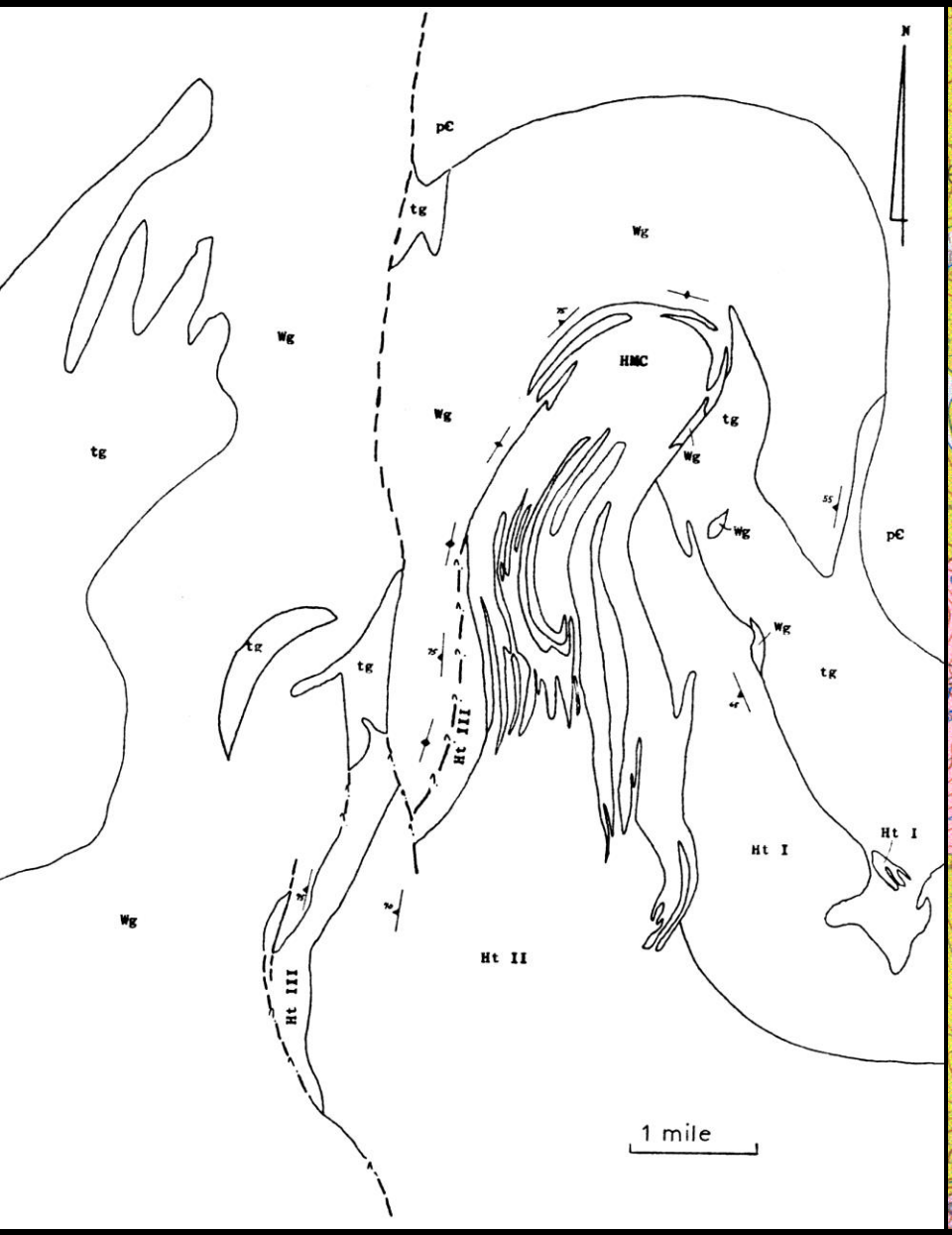
Hodges Nickel Mine

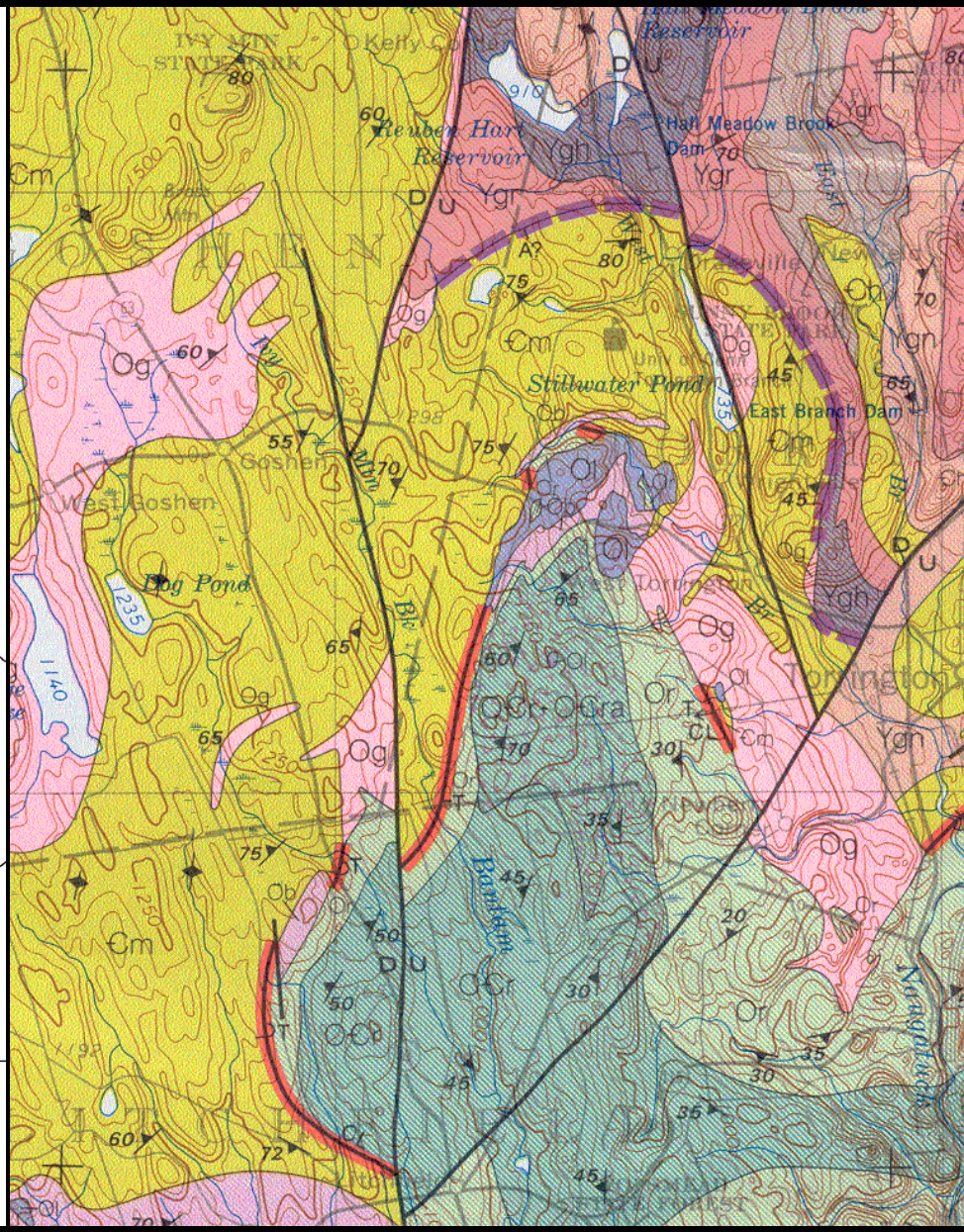
Magmatic Pentlandtite, Pyrite, Pyrrhotite + Staurolite, Kyanite, Ilmenite, Garnet, Beryl

West Torrington, CT



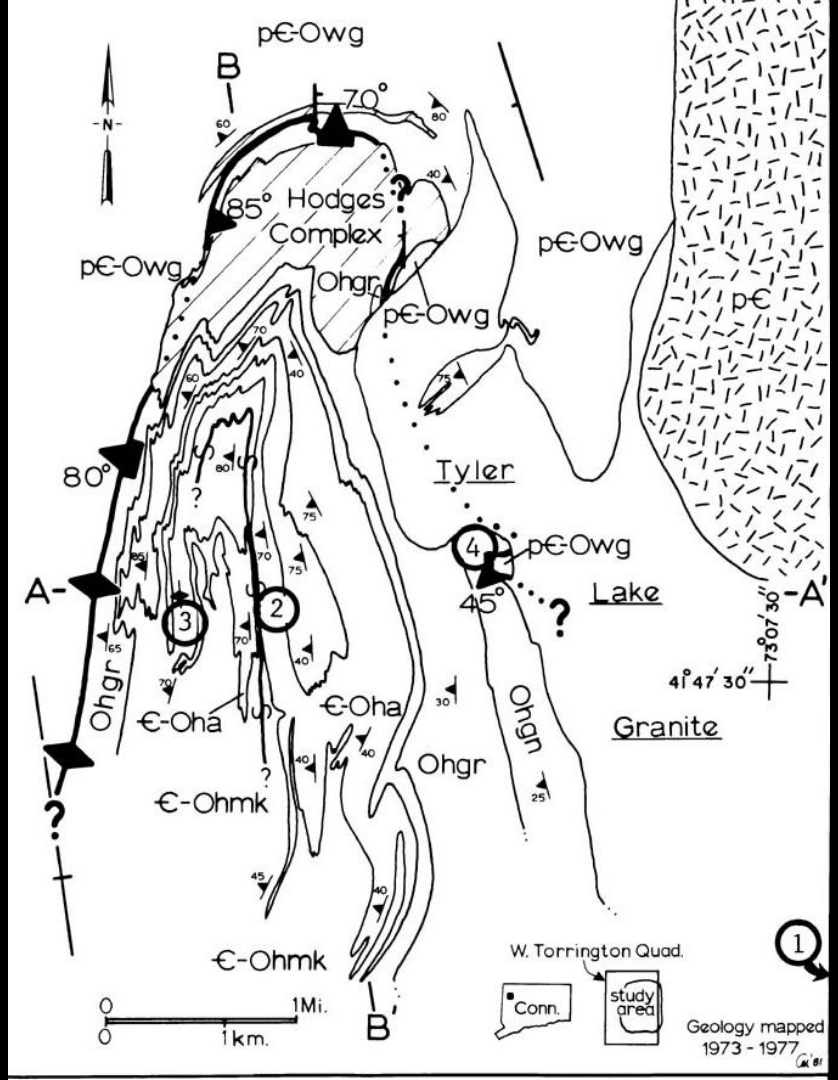
25, 75, 78

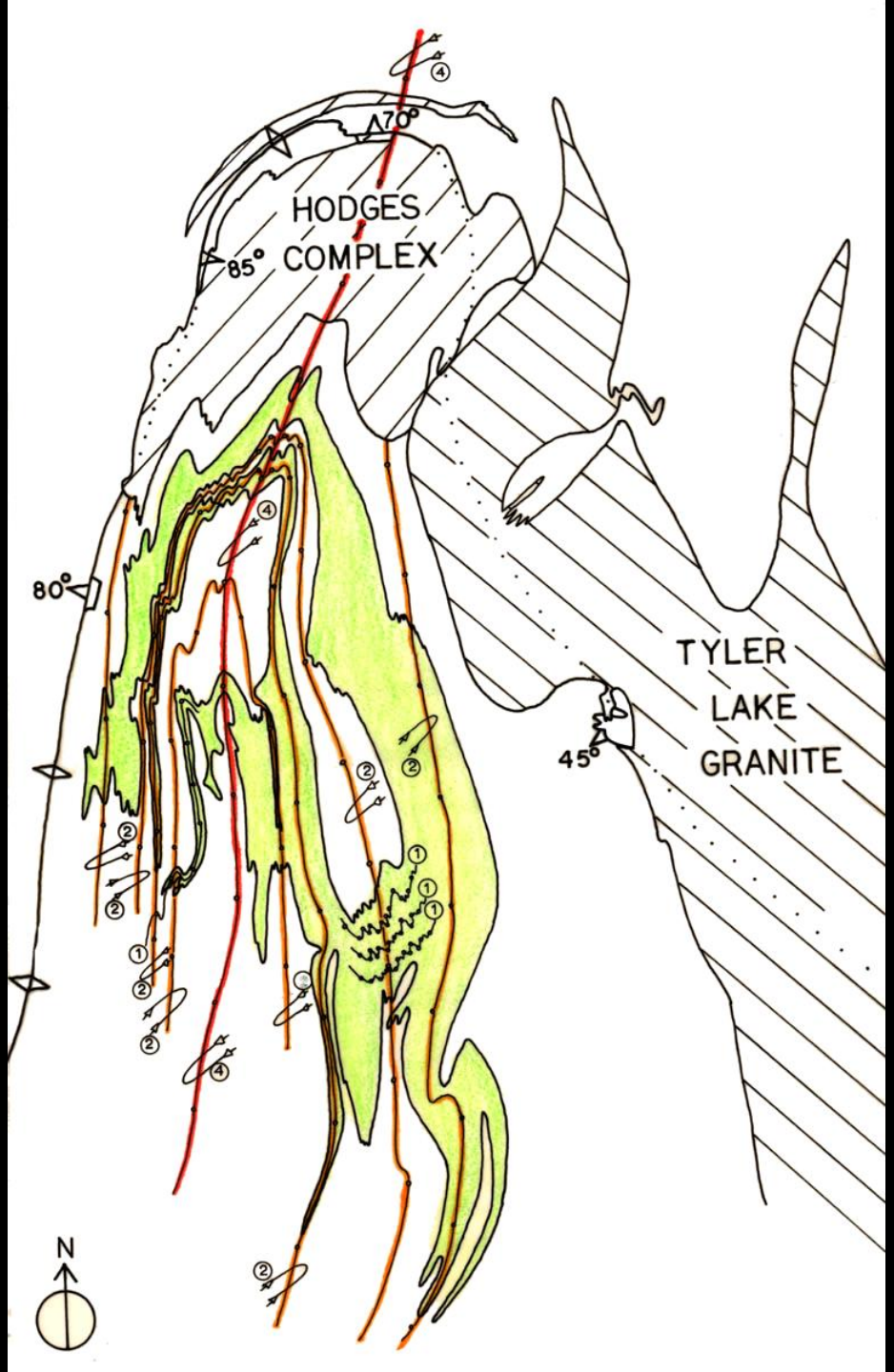




Gates and Christensen (1965)

Rodgers et al (1985)





overturned

vertical

Cameron's Line

subsidiary D_2 shear zone

fault showing dip direction

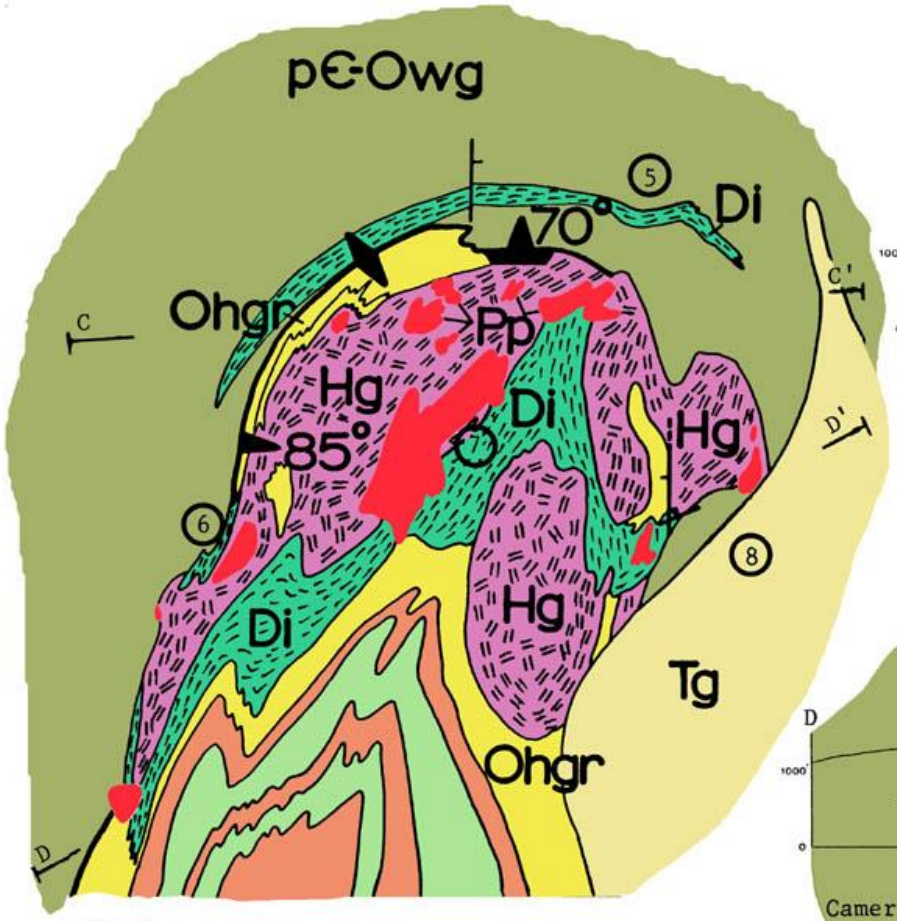
locality mentioned in text

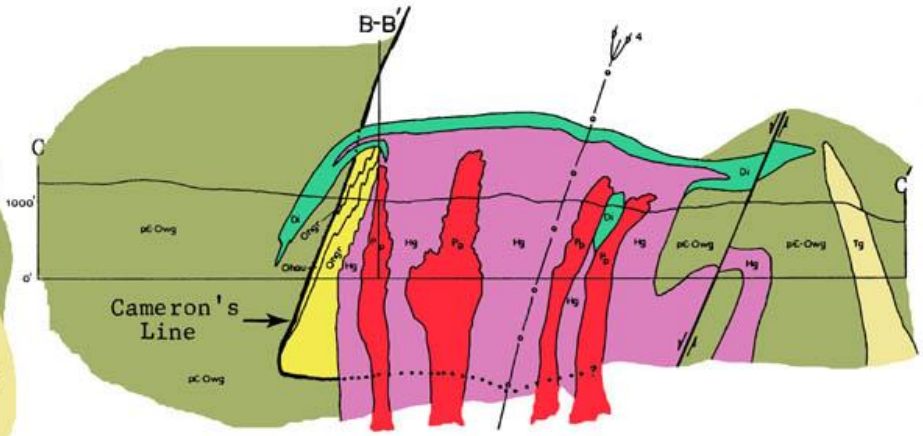
S_2 regional foliation

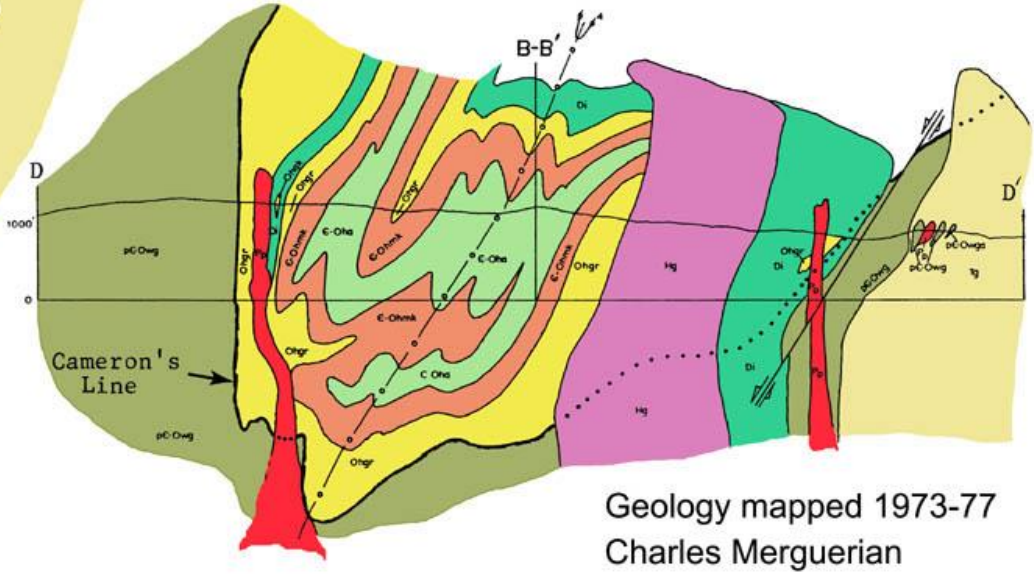
Aerial View from NW to SE, Hodges Nickel Mine

Hodges Mine (main pit) in West Torrington in 1800s (Cooper 2005, p. 26.)

Hodges Mine (main pit) in West Torrington in 1977





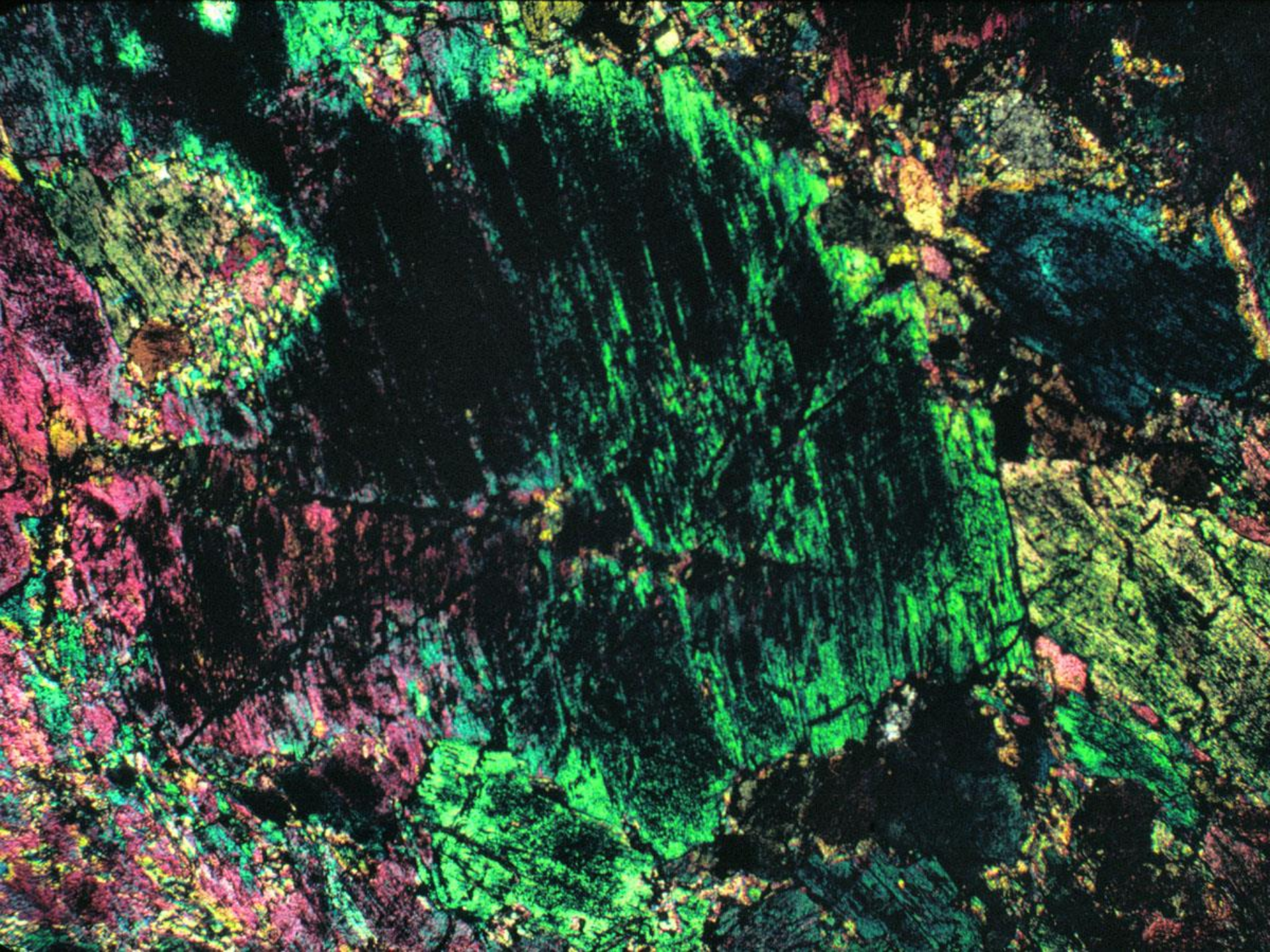


Pp Meta-pyroxenite, -hornblendite

Di Metadiorite

Hg Metagabbro

Geology mapped 1973-77
Charles Merguerian



Pentlandite, Pyrrhotite, Chalcopyrite in Pyroxenite

75

Staurolite, West Torrington

Kyanite + Staurolite, West Torrington, CT

0113a Beryl West Torrington, CT

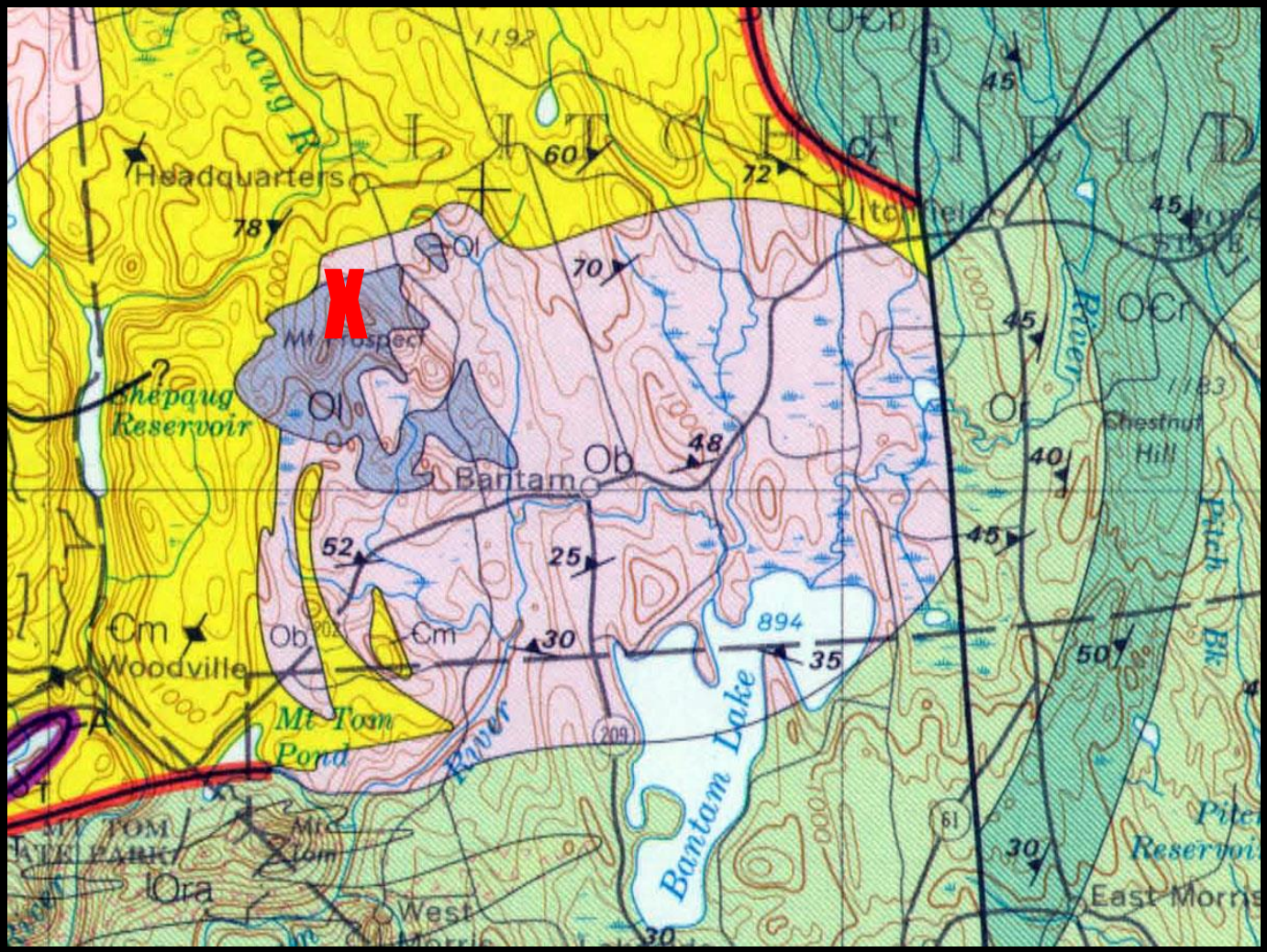
0063b Ilmenite West Torrington, CT

0067a Ilmenite West Torrington, CT

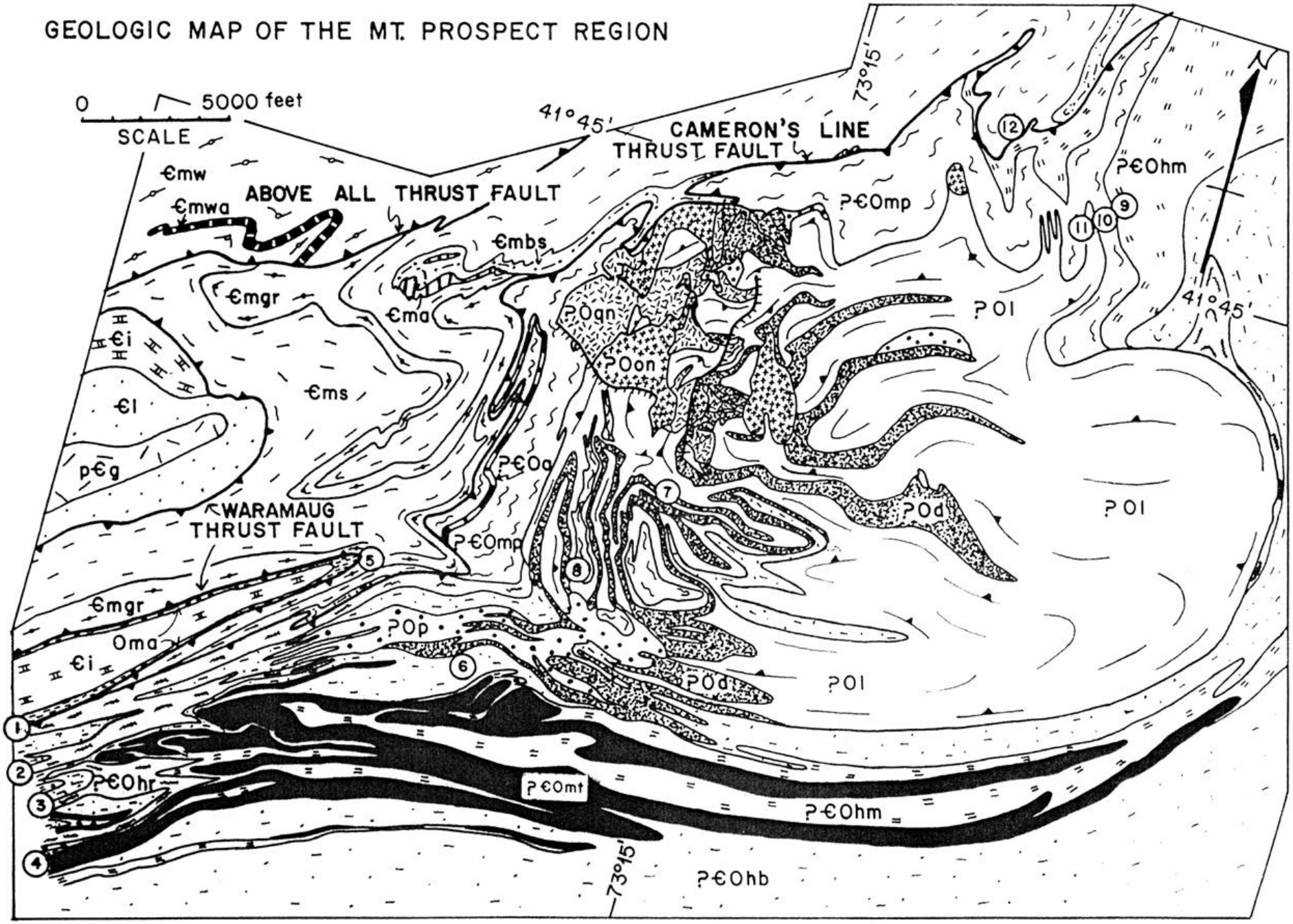
Mt. Prospect Mine

Pentlandtite, Pyrite,

Litchfield, CT



GEOLOGIC MAP OF THE MT. PROSPECT REGION



SHARES $2.50

No. 53

CONNECTICUT

Shares

Mining Company

CAPITAL $200,000

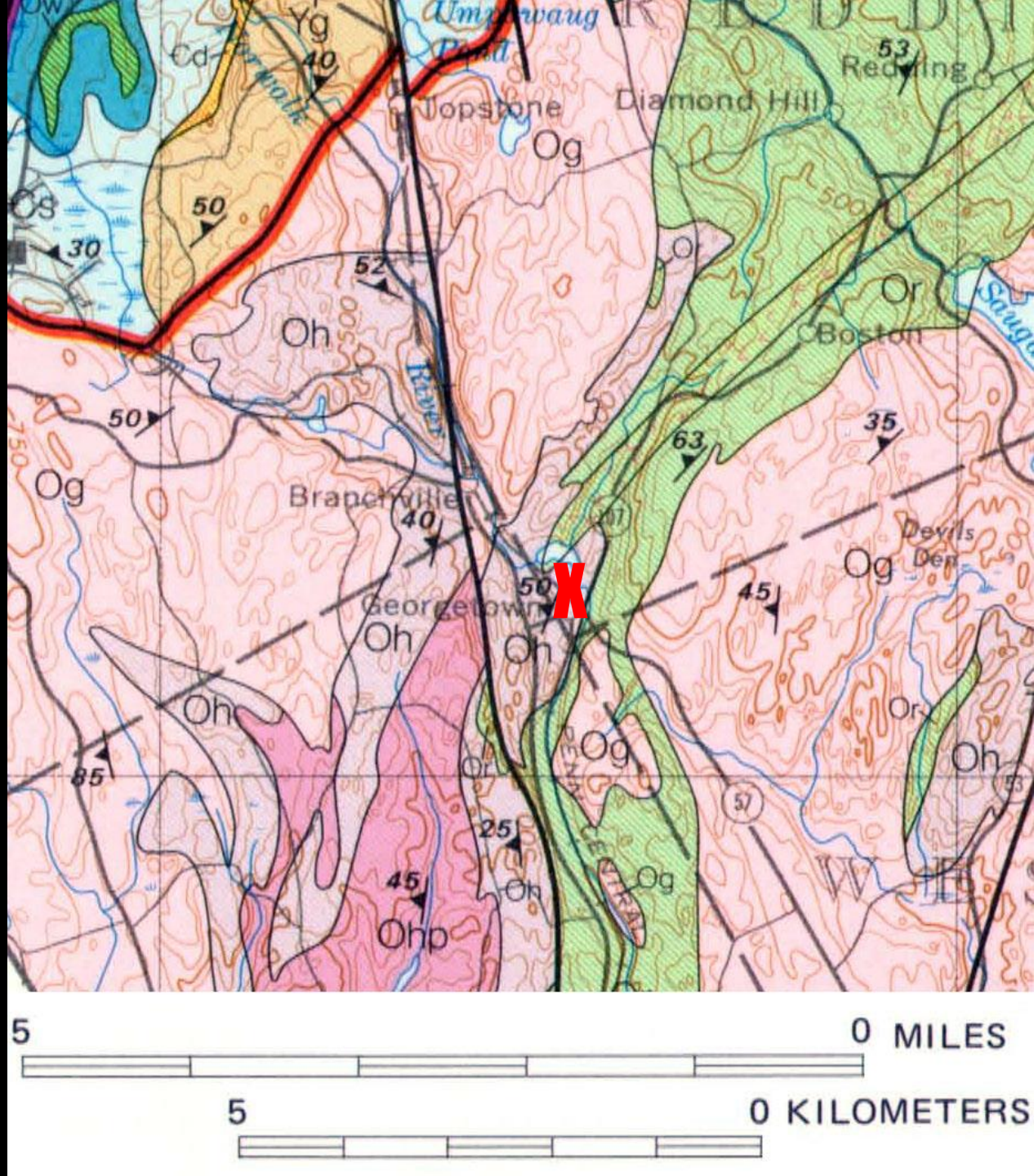
This Certifies that John M. Buell is entitled to Five Shares in the Capital Stock of the Connecticut Mining Company, transferable only in Person, or by Attorney, on the Books of the said Company, upon the surrender of this Certificate.

Witness the Corporate Seal of said Company and the Signatures of the President and Ass. Secretary at Philadelphia this 11th day of August 1825.

H. R. Elliott
Ass. Sec.

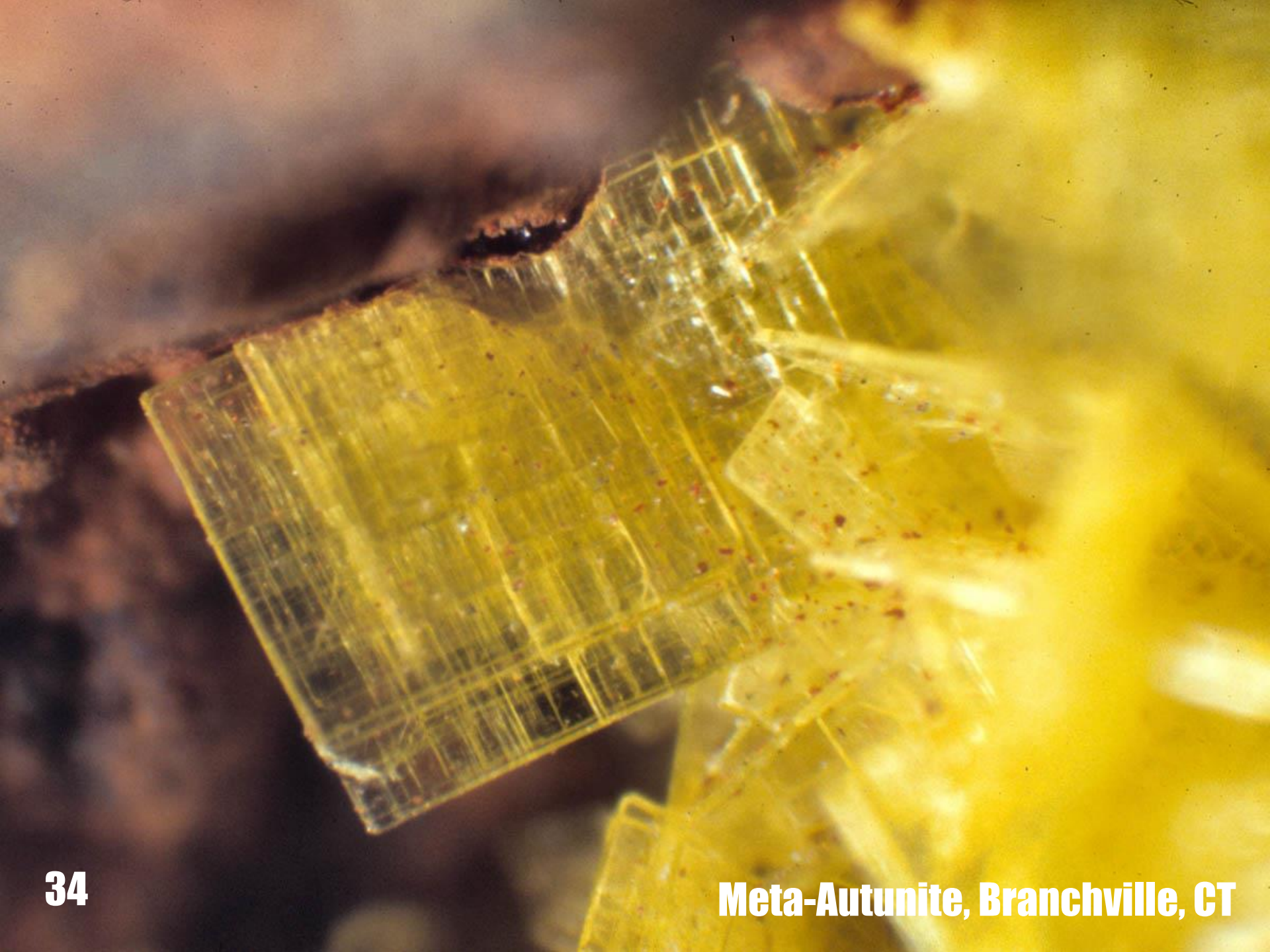
Geo. G. West
Pres.

Branchville Pegmatite Branchville, CT



34

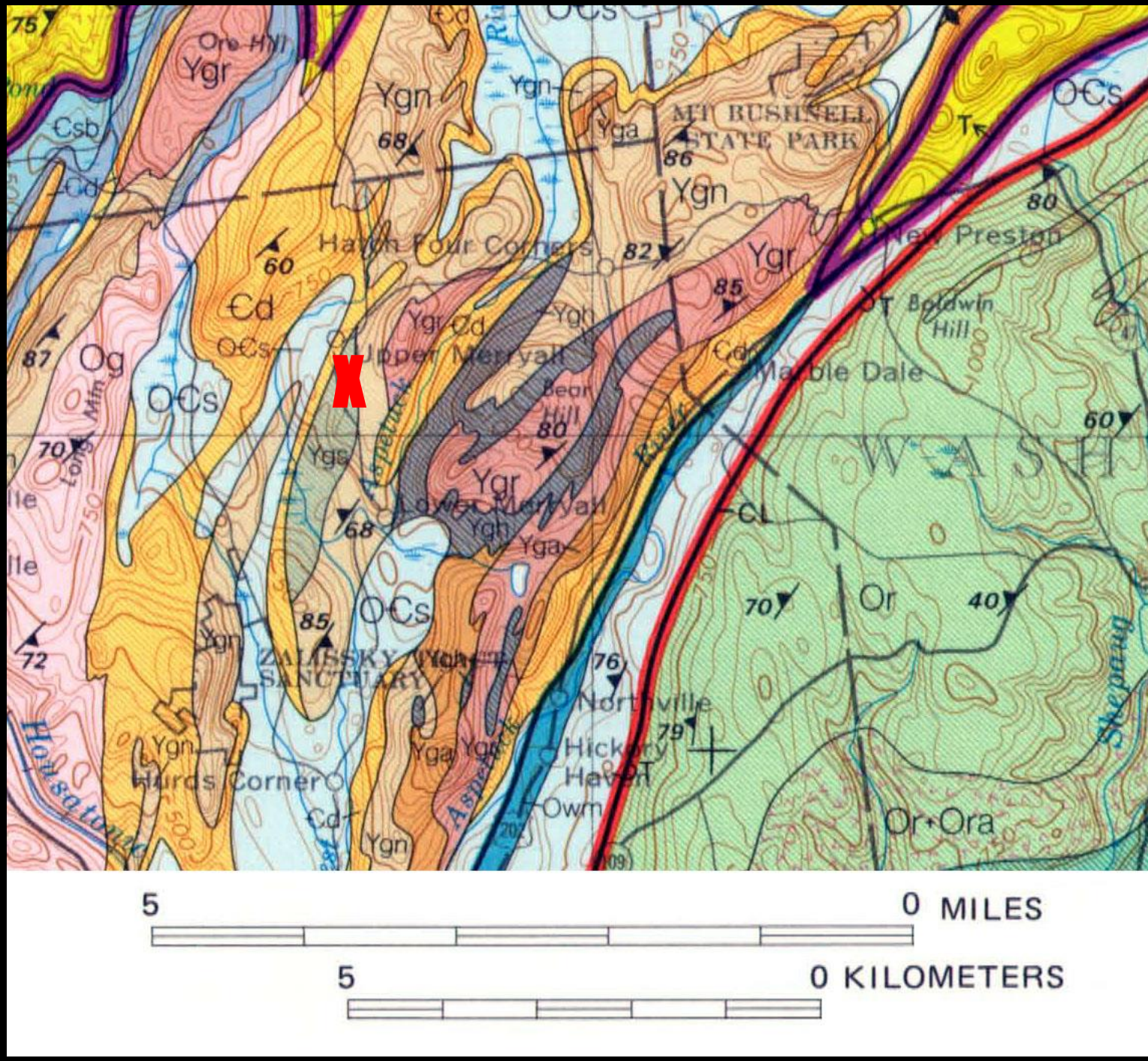
Meta-Autunite, Branchville, CT



34

Meta-Autunite, Branchville, CT

Merryall Quarry Upper Merryall CT



29

Garnet – Upper Merryall Q, CT

29

0064 – Beryl, Upper Merryall Q, CT

0064 – Beryl, Upper Merryall Q, CT

0054 – Beryl, Upper Merryall Q, CT

29

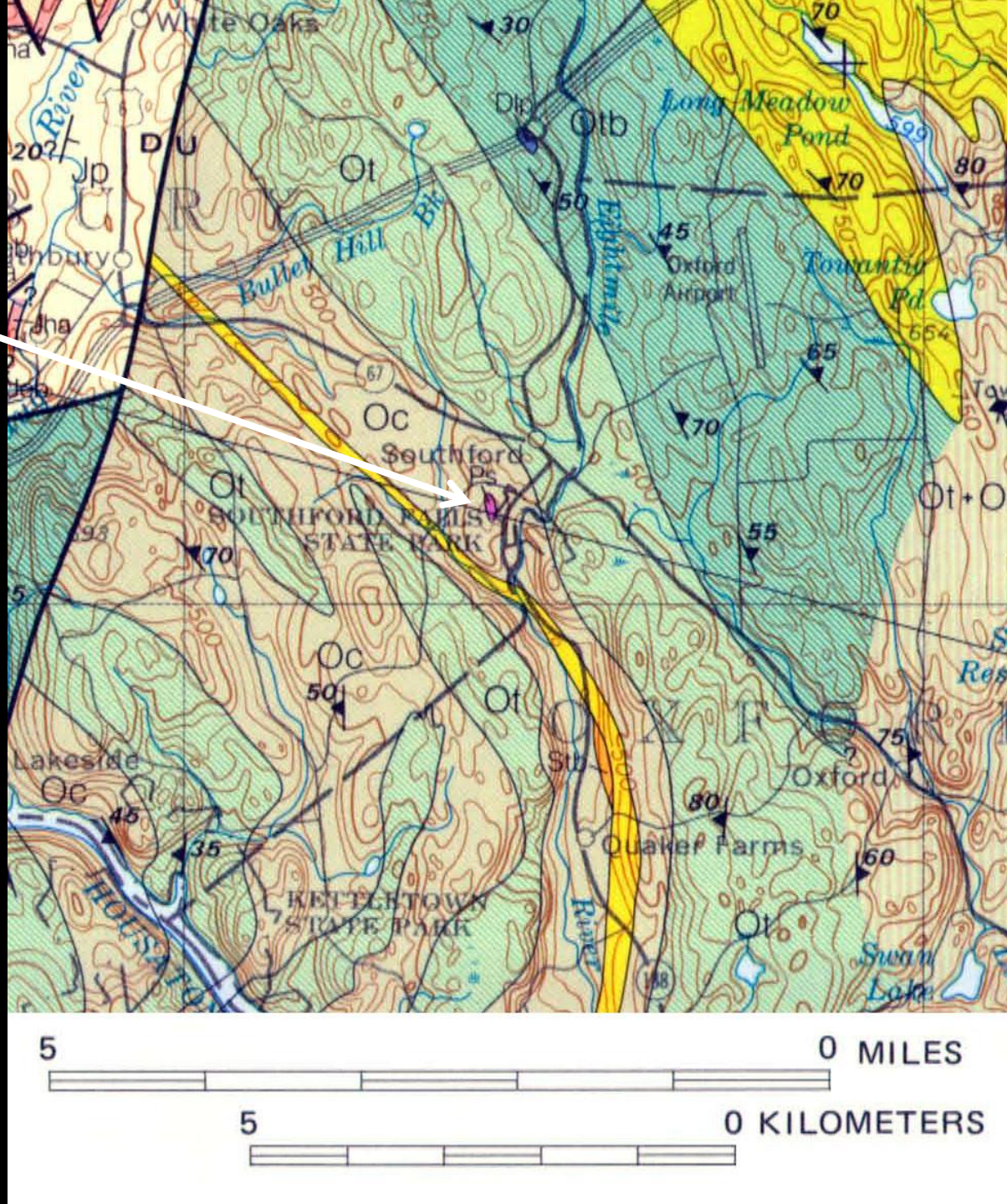
Gemmy Beryl, Merryall Quarry, CT

29

Gemmy Beryl, Merryall Quarry, CT

Southbury Pegmatite (Curtis Quarry) Southford, CT

H. Moritz Images



33

0439 – Beryl, Southford, CT

0440 – Beryl, Southford, CT

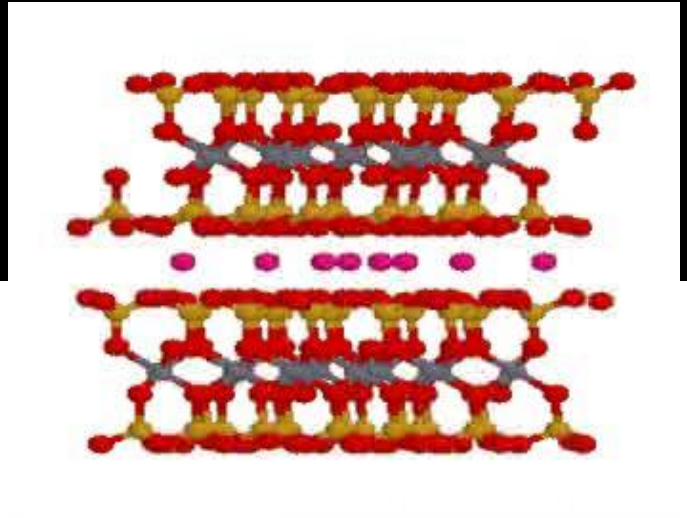
33

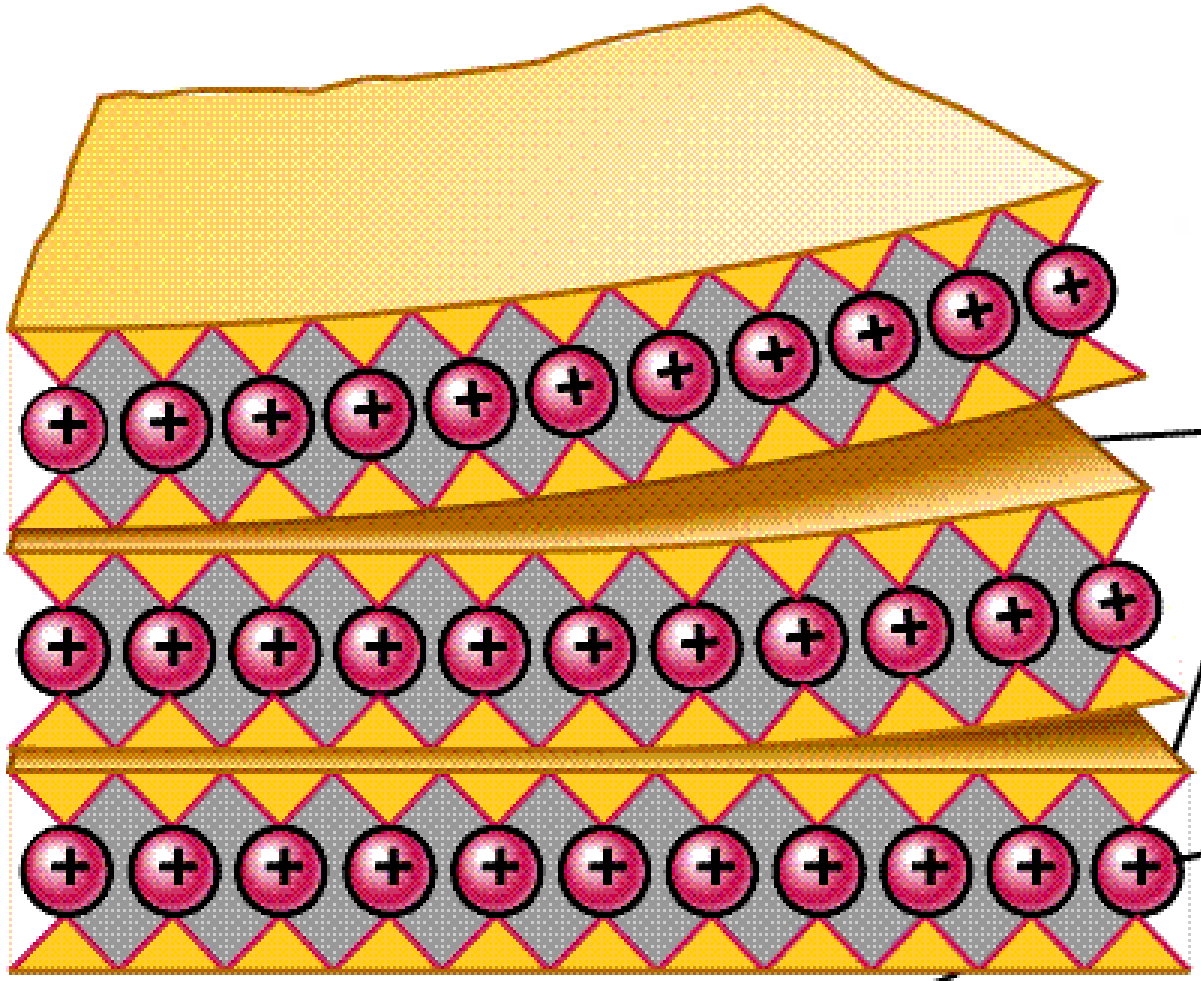
Beryl, Southford

0442 – Beryl, Southbury, CT

0443 – Beryl, Southbury, CT

Mica Structure





Because of weak bonds, mica splits easily between "sandwiches"

Positive ions, sandwiched between two sheet silicate layers

Sheet silicate layer

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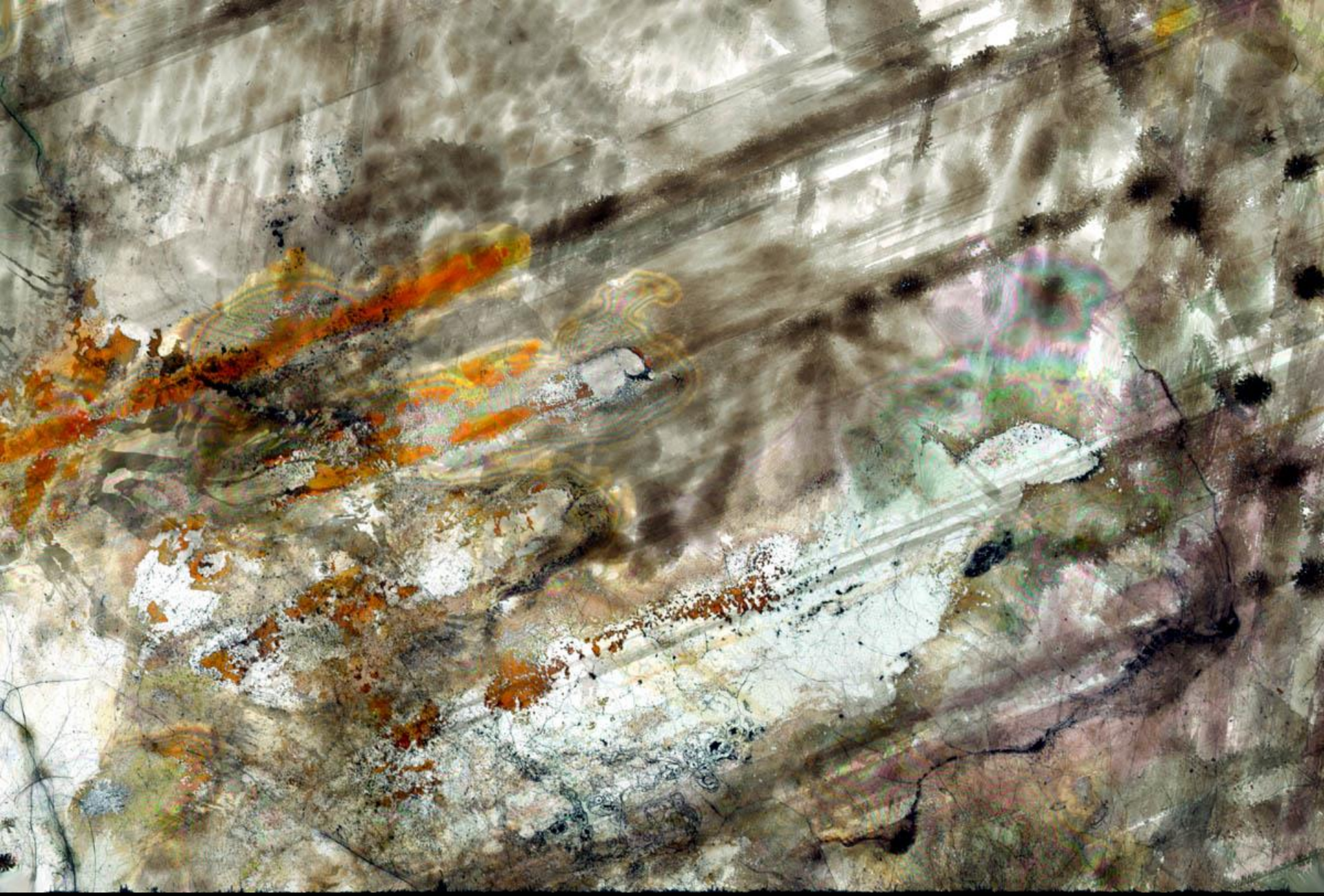

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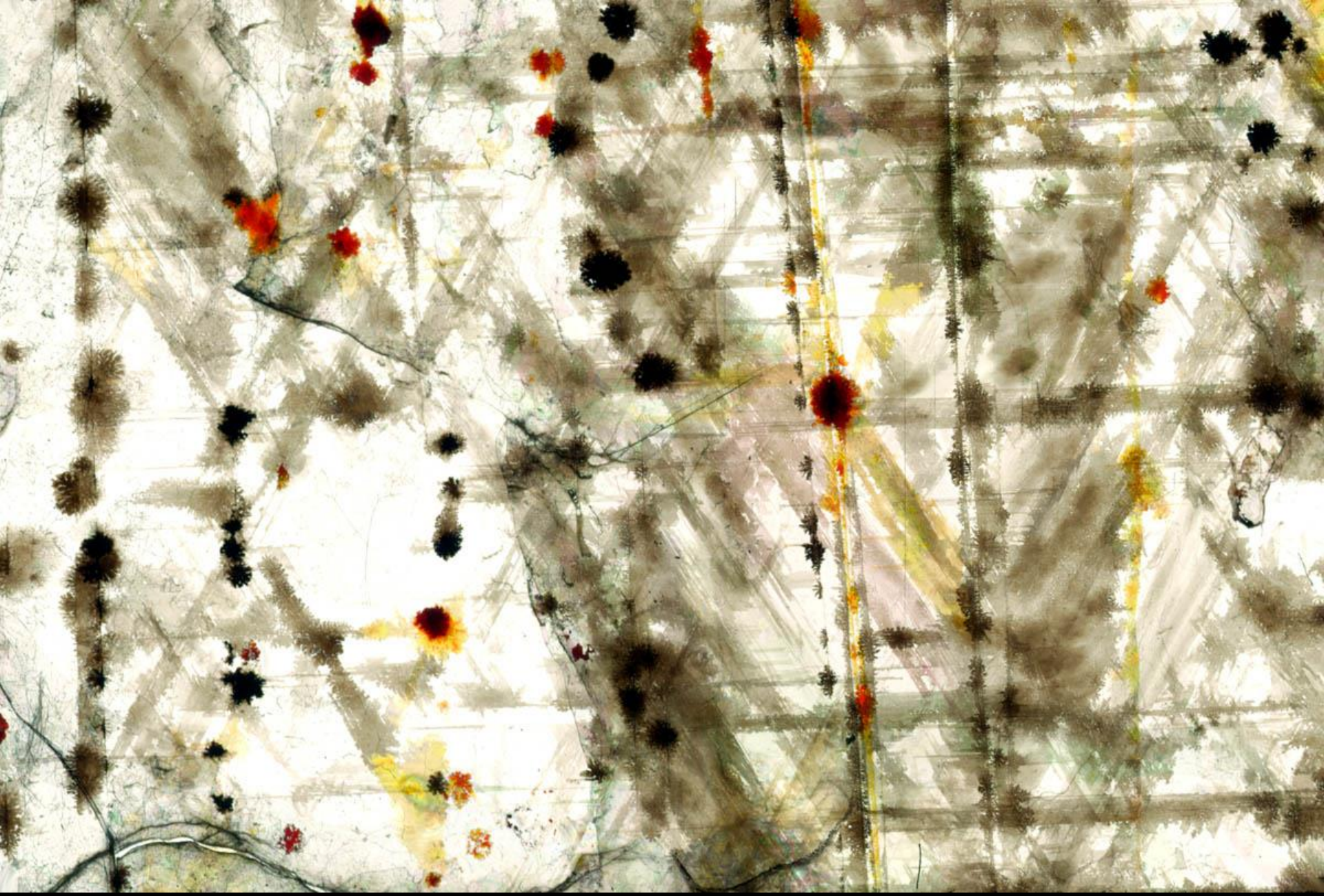

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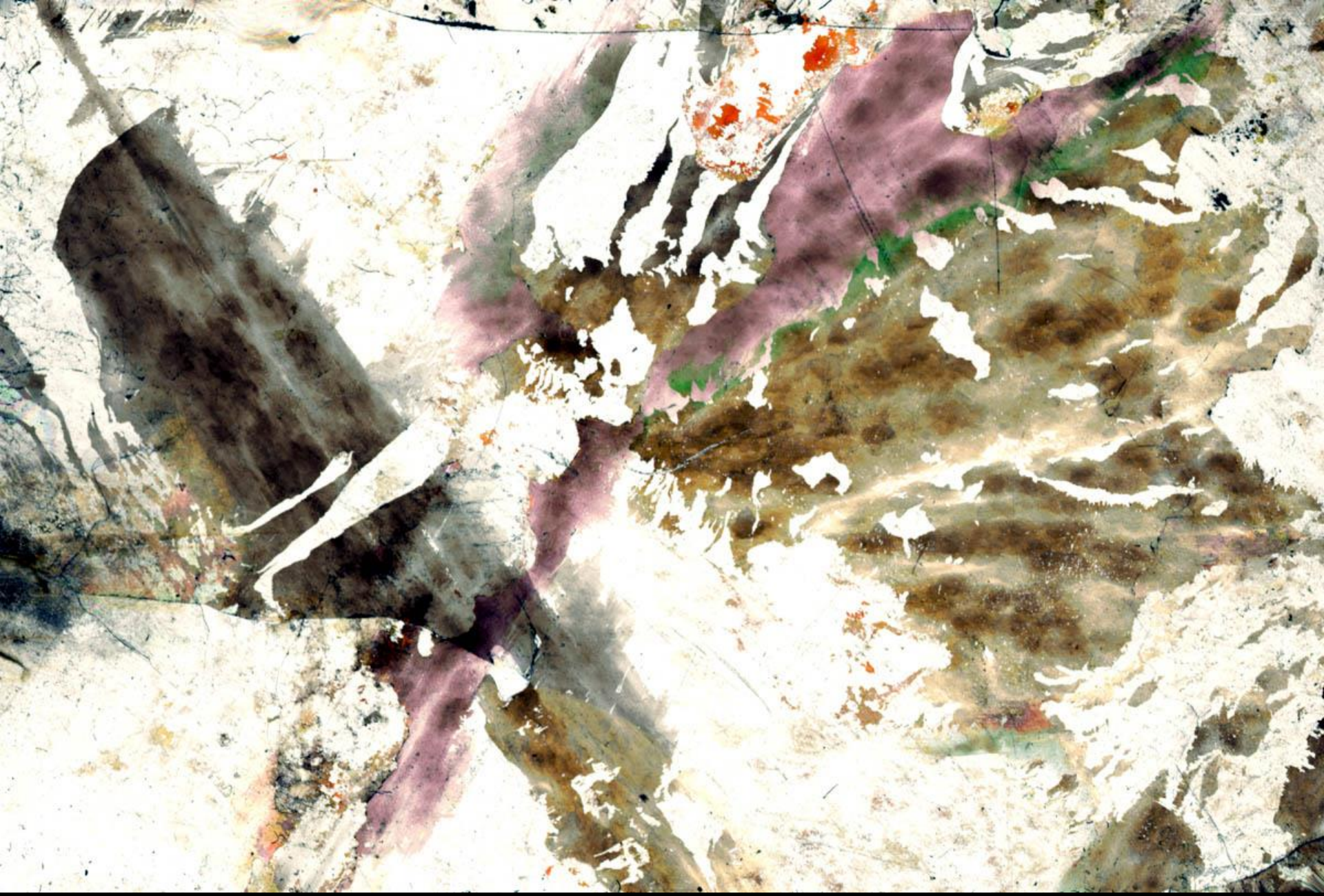

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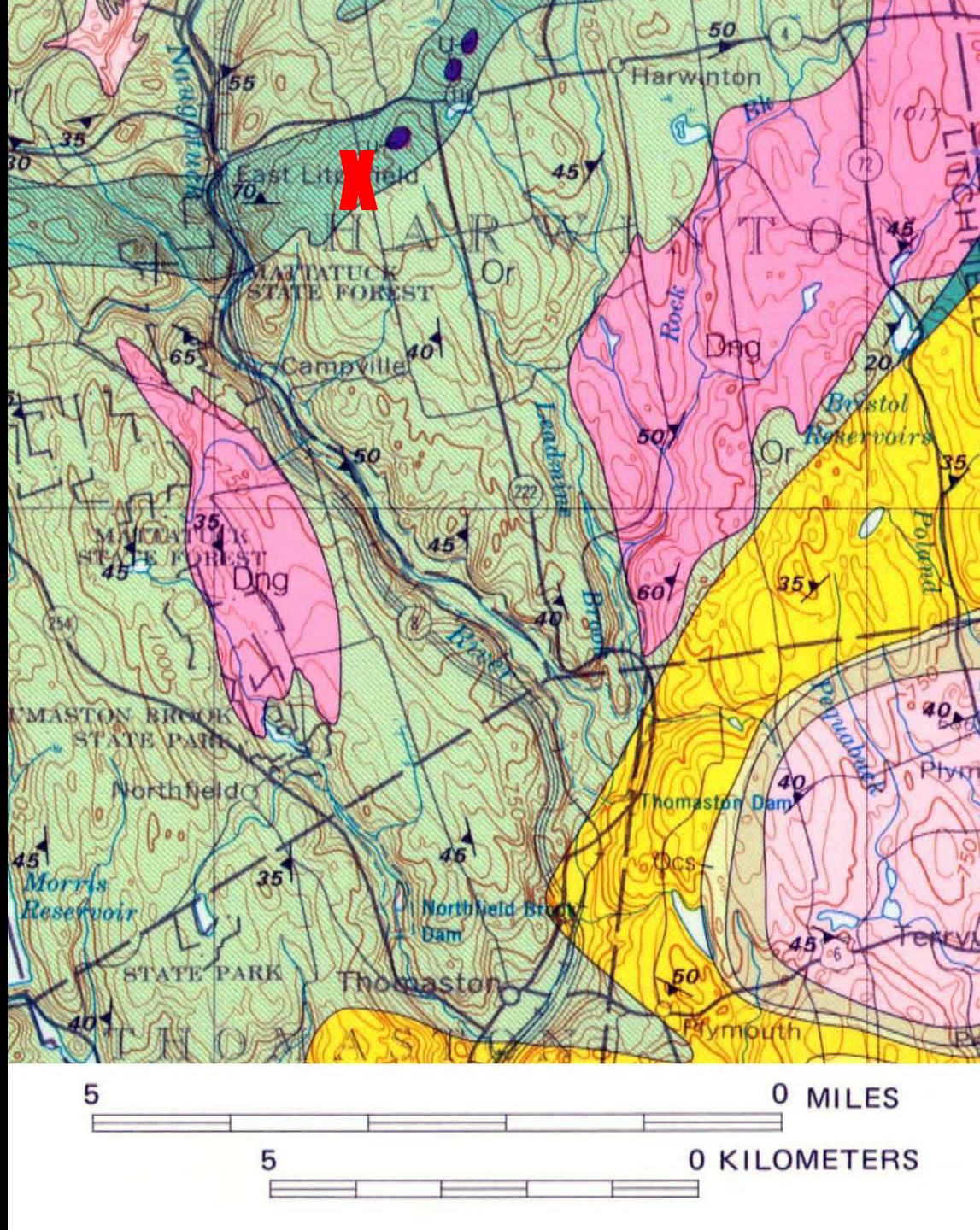
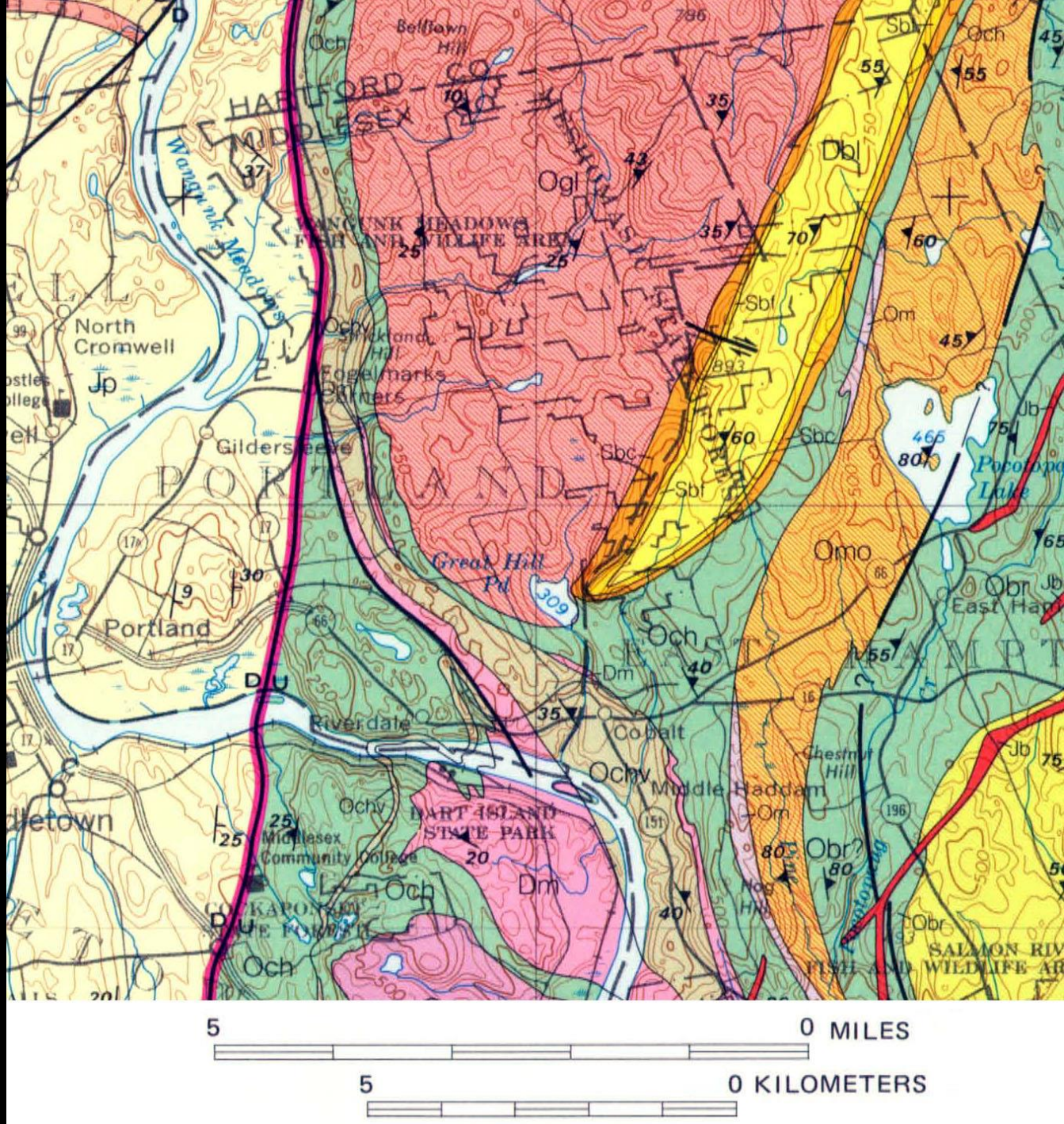
Beryl Prospect
Harwinton, CT



0004 – Beryl, Harwinton, CT

70 0111 - Orthoclase-Quartz, Powerline Q, Harwinton, CT

Middletown District, CT



68

Beryl – Simpson’s Quarry - South Glastonbury, CT

18

Spodumene, Strickland Quarry

18

0124 – Columbite, Strickland Q, Portland, CT

18

2099 - Columbite, Hale Q, Portland, CT

53

Case Quarry, Middletown, CT

0831 – Beryl, Case Quarry, Middletown, CT

36

Muscovite -Tollgate Mine
Middletown, CT

36 2164 – Beryl, Tollgate Mine, Middletown, CT

36

2164 – Beryl, Tollgate Mine, Middletown, CT

36 Amphibole, Tollgate Mine, Middletown, CT

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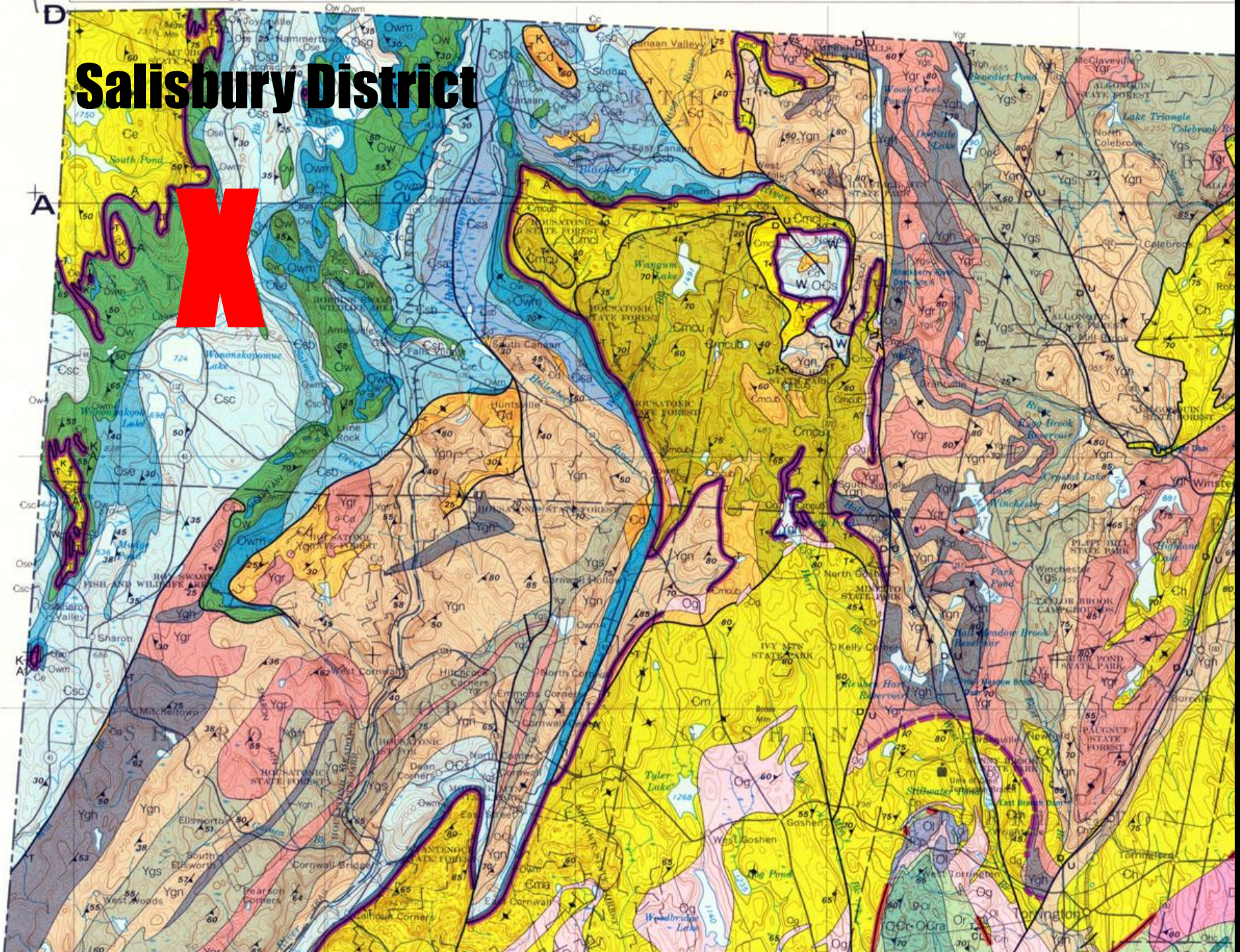
Salisbury District, Roxbury, West Torrington, West Redding

Salisbury District


D
A
Canaan Valley
Sodom
Canaan
East Canaan
Blackberry
South Canaan
Huntsville
Cornwall Hollow
North Cornwall
West Cornwall
Hitchcock Corners
Emmons Corners
Mitchelltown
Sharon
Sharon Valley
Ellsworth
South Ellsworth
West Woods
Cornwall Bridge
Pearson Corners
Calhoun Corners
Dean Corners
North Canaan
Wangum Lake
Wononskopomuc Lake
Tyler Lake
Woodbridge Lake
Goshen
West Goshen
Torrington
West Torrington
Winchester
Winchester Center
Colebrook
North Colebrook
Lake Winchester
Crystal Lake
Highland Lake
Park Pond
Lake Triangle
Benedict Pond
Indian Lake
Mill Brook Reservoir
Hall Meadow Brook Reservoir
Hogback Mtn
Bromley Mtn
Ivy Mtn
Kelly Corners
Stillwater
Burrville
Newfield
Paugnut State Forest
Taylor Brook Campground
Mill Pond State Park
Mohawk State Park
Ivy Mtn State Park
Housatonic State Forest
Algonquin State Forest
Platt Hill State Park
Bow Swamp Fish and Wildlife Area
Hollenbeck River
Blackberry River
Housatonic River
Mad River
Hunt River
Cobble Brook Reservoir
Hall Meadow Brook Reservoir
Stewart Hom Reservoir
Blackberry River Dam Site 6
Mill Brook Dam
Cobble Brook Dam
Hall Meadow Brook Dam
Stewart Hom Dam
Ce
Csc
Ow
Owm
Ose
Csb
Csa
Cd
Ygr
Ygn
Ygs
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Cmcub
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1728 – Surveyor's erratic compass behavior led to discovery of major massive iron ore deposits
1734 – Thomas Lamb ore processing Bloomery – a forge for iron ore smelting into wrought iron
1739 – Richard Seymour East Canaan Bloomery
1740 – Joseph Skinner Forge in Sharon
1744 – Kent iron forge
1748 – Twin Lakes Salisbury forge
1750 – John Gray's Sharon Mountain forge
1920s – Production ceases (191 years of iron making)

Production limit of 400#/day for Industrial Revolution
Nails, tools, rails, cannons, cannon balls, etc.

Limonite, goethite, hematite

Salisbury District

Beckley Furnace #2, Canaan, CT
1847-1919

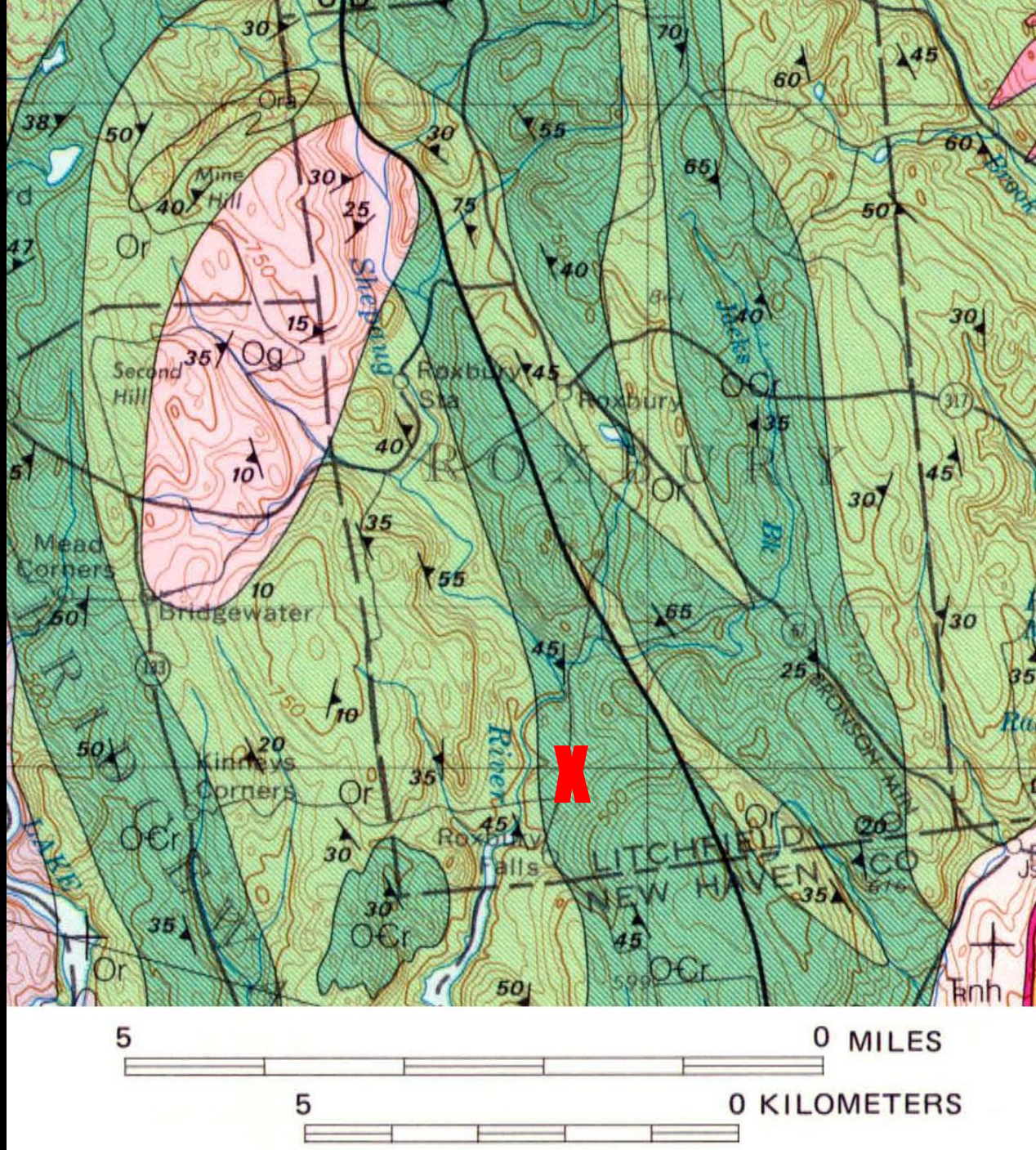
Salisbury District

Photograph taken ~1875 of Number 3 blast furnace in East Canaan, CT, one of three furnaces on the Blackberry River.

Salisbury District

Limonite/goethite ore from Salisbury, CT (Dukelabs specimen 0197)

Roxbury Garnet Mine Roxbury Falls, CT



Roxbury Garnet Mine

Roxbury Falls, CT

Roxbury Falls, CT

Garnet - Roxbury Falls, CT

32

Roxbury Falls, CT

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Roxbury Falls, CT

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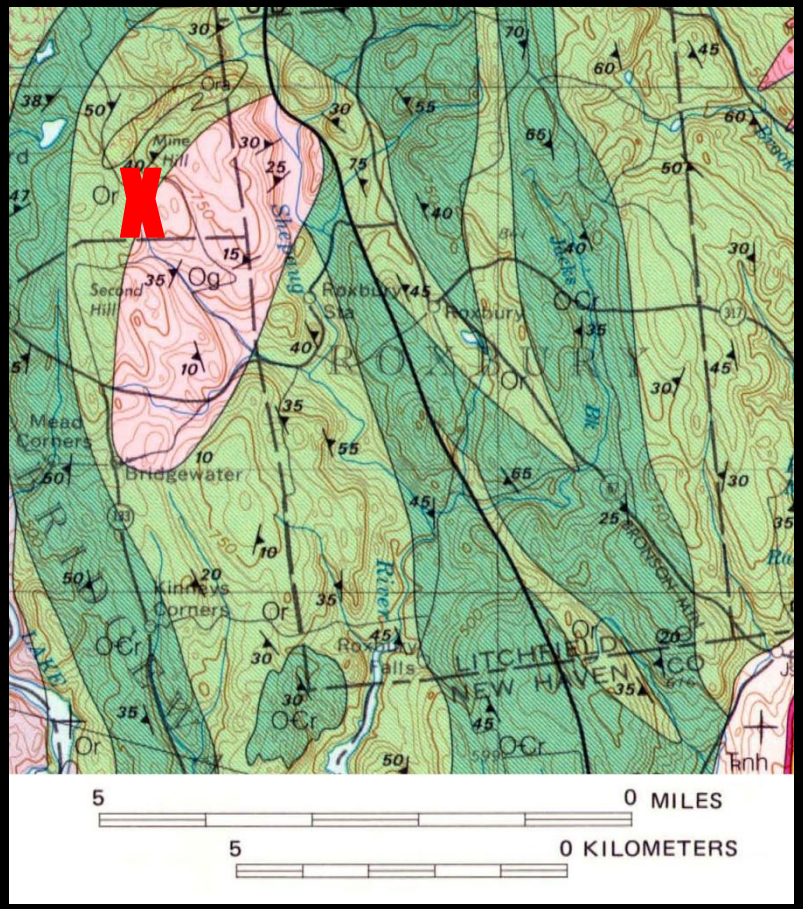
Roxbury Falls, CT

Roxbury Iron Mine



1750 – First confirmed mining for silver and lead
1760 – Brownson Brothers sink 175' shaft from top of hill
1816 – Silliman (Yale) and Shepard (1830) find mineable iron as siderite
1865 – Shepaug Spathic Iron and Steel Company begins commercial mining
1867 – American Silver Steel Co. expanded mining, built railbeds, furnaces, infrastructure
1868 - 1872 – Blast furnace produces pig iron until conversion to hot blast damaged furnace

Siderite, quartz and pyrite with minor sphalerite
Seven mineralized veins in Ordovician Walloomsac Schist
Pure quartz veins also mined

Roxbury, CT

30

Roxbury, CT

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Roxbury, CT

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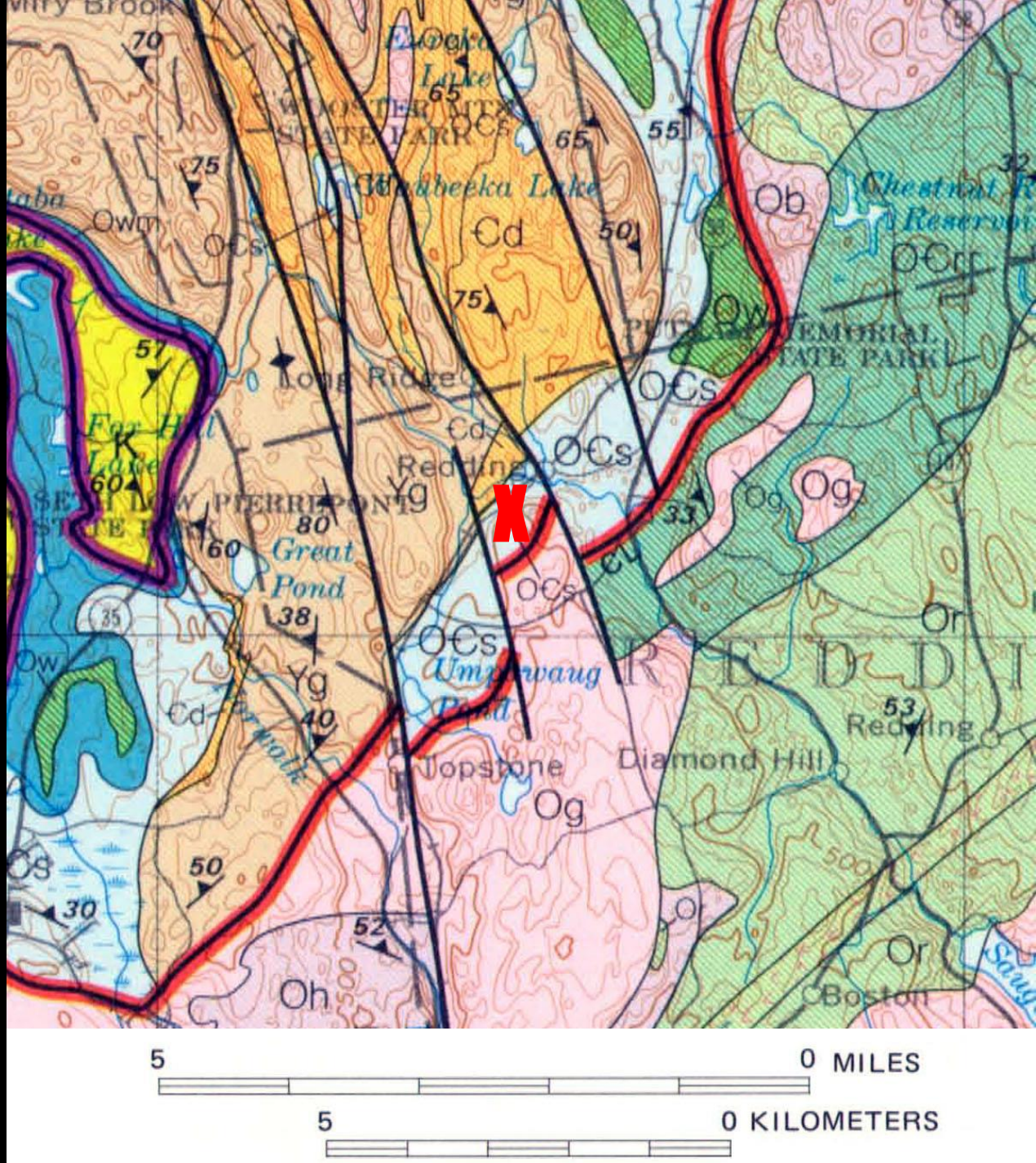
Pyrite + Sphalerite - Roxbury, CT

Opaline Quartz
Roxbury, CT

John Burnham Image

Garnet Locality
West Redding, CT



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Massive Hessonite Garnet Outcrop

Hessonite Garnet

Synonym: Essonite

74

Hessonite Garnet

Hessonite Garnet

Biting?
There's No
Biting in the
Hamster
Industry!
Thanks For Attending
Questions Please ??
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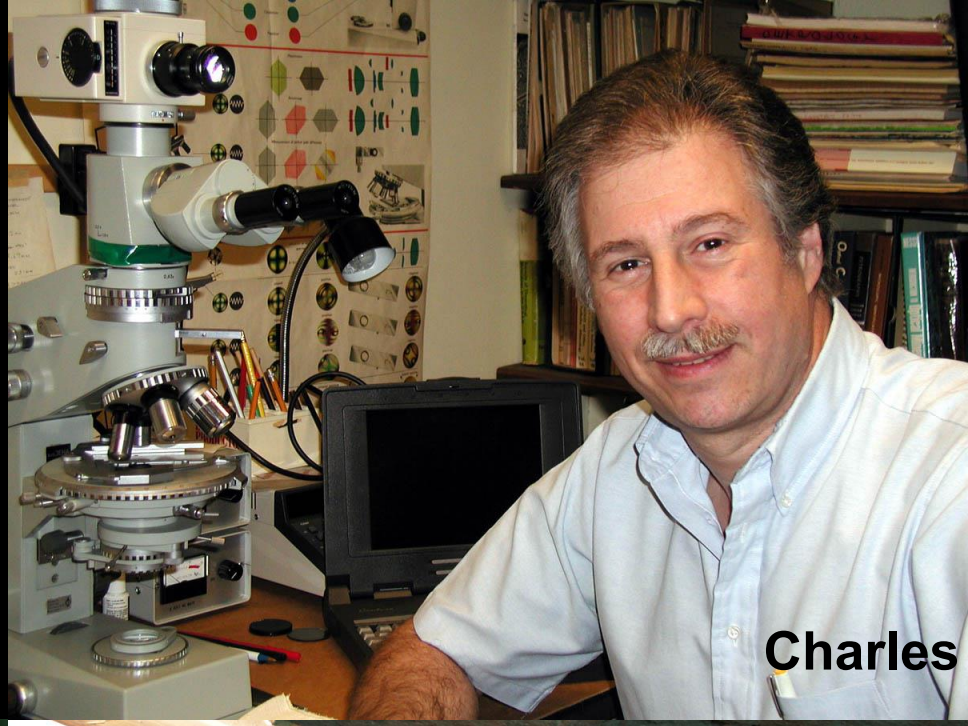
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