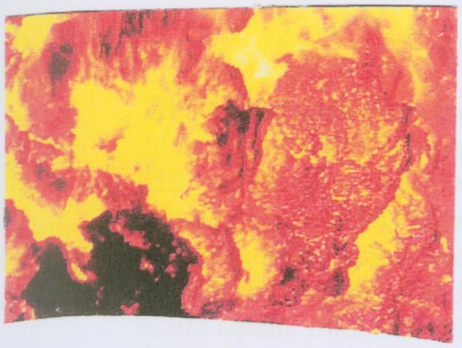
A BASIC REVUE OF THE GEOLOGY RELATING TO LAKE WINNIPESAUKEE FROM THE LAKE SHORE PARK PROSPECTIVE

BY Ed Grenke; assisted by Riley Rancourt

Rocks on the entrance road where children are know to play. The picture is facing south. The rock on the left could be the bed rock. The Lake Shore Park Country Rock is Winnipesaukee Quartz Diorite. The rock on the right may be a glacial "erratic," therefore something else.



PREFACE

This work could be heavily flawed, as the author, my knowledge and skills lie in the vegetation management area. In understanding the world around us, a starting point is needed. Therefore, I picked geology. We live in a beautiful and pristine environment. To begin to appreciate it, let us start with the basics, the ground and what makes up this ground. What is the lake's background? Geologists try to piece certain natural aspects together and draw some conclusions to what happen in the past. This is my attempt to take a brief look at this subject and interest my grandson as well.

Ed Grenke

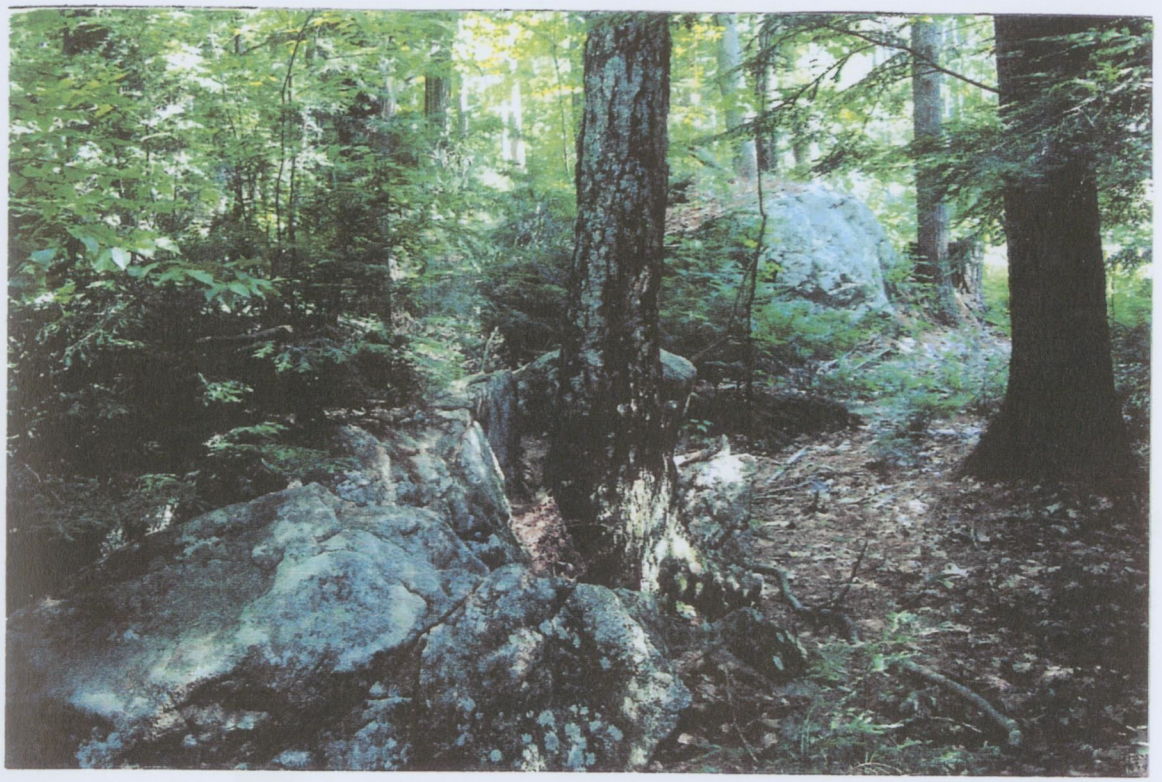
To begin to appreciate the pristine factors of Lake Winnipesaukee one can start at the basis with geology. Geology is the science dealing with the history of the earth and its life, especially as recorded in rocks. The lake has 183 miles of shoreline, an area of 71.8 square miles (54,952 acres), dimensions are 9 1/2 miles wide, by 21 miles long, altitude of 504 feet and a flotilla of islands often estimated at 356. The lake ranks very high among the world's inland waters. It is the largest of nearly 1,311 ponds and lakes in the 9,302 square mile New Hampshire. The depth of 169 feet of water lies beneath your boat South-East of Rattlesnake Island, with most of the lake resting between 200 and 100 feet deep. The elevation is changed by annual Spring runoff and by an occasioned drought(in 1941, the lake contained approximately 14,600,000 less cubic feet of water than normal and in 1836, it may have been even lowered). Before man dammed the falls at Lakeport over 150 years ago, the level was more than three to five feet below the present level. Prior to 1932, the Weirs Channel was "a shallow way and a short river," before the advent of down stream damming, of about a three foot drop over a possible width of 150 feet, until the 1803 bridge was built.

Lake Shore Park is in Gilford, New Hampshire, 128 acres in size with approximately 1,500 feet of shoreline. Off Route 11, Lake Shore Park is on the south, central side of Lake Winnipesaukee, below the Belknap Mountains.

Lakes differ in size, shape, age and geological origin. Rivers flow but lakes move only imperceptibly, Rivers can kill lakes with sediment. Lakes and rivers depend on the hydrological cycle for water; Groundwater, precipitation and evaporation are important factors. Any water bearing layer of rock, such as sandstone, limestone or gravel is an aquifer. This aquifer moves through pores in the rock formation and not channels. Wells release groundwater. When groundwater intersects with the surface, this is a spring... Groundwater seepage supplies lakes and precipitation runoff from neighboring lands is a source of water re-supply.

Many of the world's largest, deepest and oldest lakes developed from vertical and horizontal movement of tectonic plates that make up the earth's crust. Lake Winnipesaukee may not have existed prior to the last ice age. The quartz diorite, the primary rock of the Winnipesaukee basin, was decomposed (climatic and chemical weathering) in place, before and during the glacial age. The power of the ice, towards the end of the Pleitocene Epoch, gouged out the loosen rocks. This left hundreds of hills, which are our picturesque islands. Geologically, the water level has remained about the same. The Winnipesaukee River drainage has not changed much either.

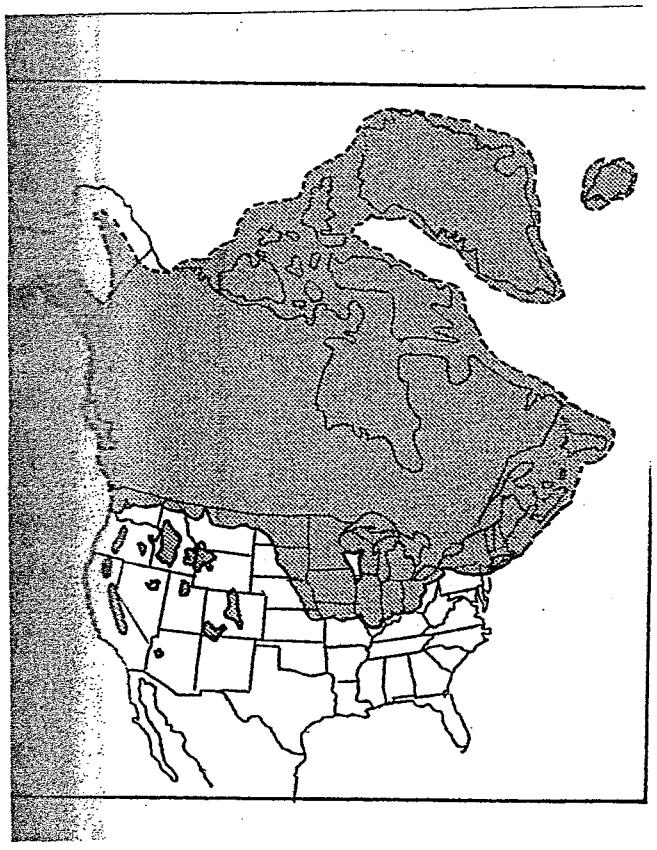
Oak Tree growing amongst glacial "erratics"



The Winnipesaukee Quartz Diortite or Tonalite cradles the lake and abuts the Belknap Mountains. It is younger than the Meredith Porpohyritic Granite, light gray, course to fine grain equigranular rock. It is composed of feldspar, quartz, biotite, mica and muscovite mica. Rattlesnake Island is a monument to rock durability. Rattlesnake Island is composed of lake quartz sienite penetrating the Winnipesaukee Quartz Diorite. These Devonian plutons were deep and have been preserved. Country rock, the most volcanic, and the White Mountain Magma pried apart and intruded the quartz diorite in some locations.

Diorite often has a salt and pepper appearance and texture is usually medium to fine to equinigranular. It is usually considered as a fairly rare rock and a limited portion of a pluton. Principle minerals are plagioclase, feldspar, hornblende and biotite mica Ilss like gabbo. Silica is the foundation for all these plutonic rocks. Conway Granite is the only acidic plutonic rock in the Belknap Mountains. Conway Granite was a source of quarried granite.

The Belknap area lies in Gilford, Gilmanton and Alton. It is 11 miles long and 6 miles at its greatest width and contains porphyritic gneiss. Some rock is similar to Quincy, MA. rock. Diamond Island is made up of a fined grained sienite and presumably Rattlesnake Island is composed of the same material.



MAP OF THE LAST ICE AGE

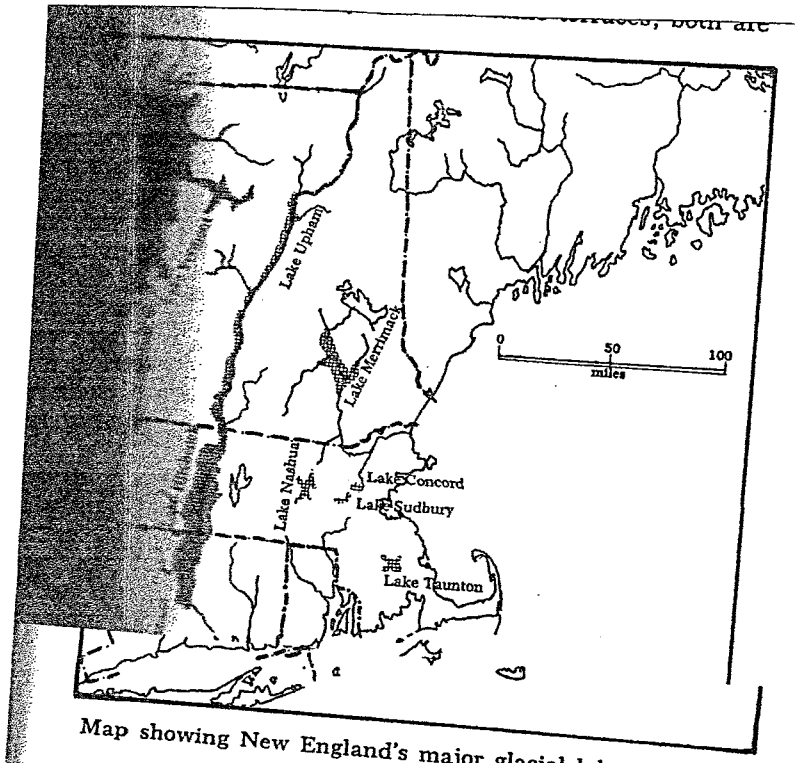
Geology involves the study of rocks. There are three major rock groups, igneous from lava, sedimentary from the basic crust and usually layered, and metamorphic from mechanical, chemical and climatic weathering of the first two. Rocks are made up of minerals from crystallization. Rocks can have historical factors through fossils involving the field of. Paleontology.

The upper most part of the earth's crust is called the regolith and that part of the regolith which can support rooted plants is the loose soil. Streams, as geological agents, move water from land to the sea, carrying sediments. Streams and mass wasting are the prime sculptures of lands. Open movement of water and sediments are sheet erosions, as opposed to gulley erosions. Streams flow between defined banks. Streams can be classified as to size and flow rate.

Groundwater has a role in the water cycle and there are various roles in the water table concerning permeability and porosity of various zones. Aquifers provide for underground water movement. Small mammals and other fauna provide for percolation and vegetation holds soil and sediment in place with roots. A spring is the flow of groundwater emerging naturally on the earth's surface. An artisian well causes water to rise above the aquifer. Recharge is the addition water of to the zone of saturation.

Glaciers and glaciation represent water in the solid state. They are usually in a steady state and depend on climate. They are a body of ice containing mostly recrystallized snow. Glaciers flow on a land mass. There are Crique, Valley and Piedmont Glaciers. Ice sheets are broad glaciers of irregular shape, generally blanketing a land form. A small ice sheet is an ice cap. Granite ledges split by a series of joints is a sheet joint. A ridge in glacial debris is a moraine. Glaciation is the alteration of a land surface by massive movement over it by glacier ice. Glacier boulders or glacial "erratics" are boulders carried many miles by the ice and set down in a region of different bedrock. There is evidence of this in Lake Shore Park. Some boulders dragged just a few miles may be from near by ledges. These boulders usually lay to the south or southeast of their parent rock. These erratic rock groups can be called boulder trains. Probably some huge upheaval in the Artic Ocean sent waters rushing southward across New England, resulting work of an ice sheet. These boulder trains give valuable information about glacial movement, some thing to consider at Lake Shore Park

Twenty nine percent of the entire land was covered by glaciers. Only ten percent of land is covered by glaciers presently, and 84 percent of the glaciers are in the Antarctic. Erosion is an important factor of glaciers. There are glacial depressions of the earth's crust and impacts on sea levels. There are large, extinct lakes in New England that are easy to spot. The lake sediments gradually smoothed out the irregularities on the lake bottoms, producing a very fine, flat area are distinctive.



Map showing New England's major glacial lakes.

ERA	PERIOD
AZIOC(?)	
PROTEROZOIC	**PRECAMBRIAN**630 MILLION YEARS AGO OTHER LIFE FORMS; PLANT-ALGAE AND ARCHAEOCYATHIDS
	CAMBRIAN570 MILLION YEARS AGOCNIDARIANS, LAPHOPHORATES; ARTHOPODS, MOLLUSKS, SEALILLIES, CEPHALOPODS, ECHINODERMS, VERTEBRATES, ALGAE, SPONGES, AECHACOCYATHIDS, STROMATOPPOROIDS, GRAPTOLITES, JAWLESS FISH, ANNELIDS, MONOPLACUPHORANS, CHITONS, GASTROPODS, RUSTROCONCHS. BIVALVES
	ORDOVICIAN 510 MILLION YEARS AGO ALL ABOVE WITH CORAL, SCAPHOPLODS, BIVALVES SESA CUCUMBERS, SEA URCHINS, SEA STARS, BRITTLE STARS,**ARCHAEOCYATHIDS GONE**
	SILURIAN439 MILLION YEARS AGO ALL ABOVE CHELICERATES NEW, PSILOPHYTES NEW
	DEVONIAN 409 MILLION YEAR AGO LYCOPODS NEW, FERNS HORSETAILS; INSECTS, SHARKS AND RAYS NEW, MAMMALS NEW **PSILOPHYTES GONE**
PALEZOIC	**CARBONIFEROUS**290 MILLION YEARS AGO MISSISSIPIAN AND PENNSYLVANIAN: CYCADS NEW, AMPHIBIANS AND REPTILES NEW
	PERMIAN 240 MILLION YEARS AGO **TRIBOLITES GONE, ROSTOCONCHS GONE BLASTOIDS GONE AND GRAPTOLITES GONE**
	TRISSAIC 208 MILLION YEARS AGO DINOSAURS NEW
	JURASSIC 195 MILLION YEARS AGO NO CHANGES

MESOZOIC	**CRETACEOUS** 146 MILLION YEARS AGO ANGIOSPERMS NEW, **STROMAPORIODS GONE** **DINOSAURS GONE**
CENOZOIC	**TERTIARY** 65 MILLION AGO NO CHANGE
	QUARTENARY

The Belknap Mountain area lies in Gilford, Gilmanton and Alton, New Hampshire. It is 11 miles long and 6 miles at its greatest width. It contains porphyritic gneiss and rock is similar to Quincy, MA rock. Diamond Island is made up of a fine grained sienite and it is presumed Rattlesnake Island is composed of the same materiel. Lake Winnipisogee (old name) Gneiss is suggestive of the Laurentian age or "Atlantic," between the Laurentian and the Huronian age. Eagle's Island is also composed of porphyritic gneiss and the same for the south end of Governor's or Davis Island. Red Hill in Moultonborough and Belknap Mountain are true sienite. The porphyritic gneiss is most beautiful near Meredith.

Rising magma eventually crystallized into plutonic rock, some of which now cradles Lake Winnipesaukee. Metamorphic rock, mostly mica schist, directly abuts the Belknap Mountains to the west. The Taconian, the Acadian and the Alleghenian ages are considered separate building phases resulting in the ultimate formation of the Appalachian Mountain chain. The igneous rock that intruded the metamorphic rocks are called plutons. The largest of these masses consists of a rock called the Winnipesaukee Quartz Diorite (wqd). It cradles the lake for which it is named, the country rock through which the future White Mountains would intrude. Blocks , most likely were large chunks of the roof, consisting of the Meredith porphyritic granite, the Winnipesaukee quartz diorite and a slab of the moat volcanics that fell inward and settled to their present position.

LSP has Winnipesaukee Quartz Diorite (Tonslite), median grained, light gray quartz diorite. It is 360 million years old, late Devonian, New Hampshire Plutonic series. Metamorphic and igneous rocks contain xenoliths. Plutonic rocks are created from igneous magma that crystallized below the surface.

Meredith porphyritic granite and the Winnipesaukee Quartz Diorite and Rangely metamorphic formations are wide spread and among the oldest rocks in central New Hampshire. The Winnipesaukee Quartz Diorite or Tonslite cradling the lake and abutting the Belknap Mountains, is younger that Meredith Porphyritic granite, light gray, course To fine grain, equigranular rock, composed of feldspar, quartz, biotite, mica and muscovite mica.

Structure describes deformational features in rock (massive indicates a lack of structure). Rattlesnake Island is a monument to rock's relative durability. Rattlesnake Island is composed of lake quartz syenite penetrating the Winnipesuakee Quartz Diorite. The Devonian plutons were deep and have preserved. Country rock, the moat volcanics and the White Mountains Magma series pried apart and intruded.

Diorite often has a salt and pepper appearance. Diorite texture is usually median to fine grain and equigranular, usually considered as fairly rare rock and a limited portion of a pluton. Principle minerals are plagioclase, feldspar, hornblende and some biotite, mica,. Ilss, like gabbo. Silica is the foundation for all mineral within these plutonic rocks. Conway granite is the only acidic plutonic rock in the Belknap Mountains. Conway granite was a source of quarried granite.

PHAMEROZIC ERA

ERA	PERIOD	EPOCH	PHYSICAL EVENTS(NORTH AMERICA)	LIFE
		RECENT	Past Glacial, Glacial melting, Shore erosion, water action	Rise of man, stone, bronze and iron ages; Living organisms to present distribution
CENOZOIC	QUATERNARY	PLEISTOCENE 2 my to 10,000 y	Four glacial and three interglacial warm climates, many lakes	Cro-magnon man, modern types of plants
	TERTIARY	PLIOCENE	Western mountain building through volcanism Climate cool but semiarid	are dominant; some extinction rise of present organism distribution
		MIOCENE	Climate with temperature fluctuations	Advances in mammals
		OLIGOCENE	rapid decline from old climate	Archiac mammal extinction, subtropical Widely distributed
		EOCENE	Lack maximum warm climate	Dominance of early mammals
		PALEOCENE	Continued cooling	Reptiles subordinate, modernization Of plants
MESOZOIC		UPPER CRETACEOUS	Climate more uniform and warmer eastern uplift And Appalachian Highlands arching	Great extinction of older groups, decrease of gymnosperms, eruption of flowering plants
		LOWER CRETACEOUS	Temperatures generally uniformly high, climatic Diversity and seasonal changes	Dinosaurs peak, but some extinction of ruling reptiles and earliest birds
		JURASSIC	Temperatures much like lower cretaceous, but generally Less climatic diversity	Dawn of birds, spread of archaic mammals marine, flying and giant reptiles common
		TRIASSIC	Temperature rise, more arid climate	Dawn of mammals, ruling reptiles dominant
		PERMIAN	Climate mystery, perhaps some glaciation in eastern US Third cycle of world wide uplift. Mountain building, Appalachian revolution	Wide spread extinction of older forms of life mammal-like reptiles and insects, vascular plants
		PENNSYLVANNIAN OR UPPER CARBONIFEROUS	Gradual temperature,. Climate very moist	Ancient forms of life rare, more coal forming plants
		MISSISSIPIAN OR LOWER CARBONIFEROUS	Uniformly warm and mild climate, topography low, shallow seas, active movement in southern Appalachians and Rockies, folding of New England Acadian mountains Start of eastern coal deposit	Dawn of reptiles, Amphibians numerous, Early coal forming plants dominant
		DEVONIAN	Temperature drop, then rise widespread sea cover 40% on North America. Acadian mountains form by volcanism and folding In second uplift cycle	Dawn of amphibians, Age of fishes, First know trees, First brown algae "moss"
		SILURIAN	Uniformly warm	First air breathing animals, First insects, Rise of fishes. Expansion of land plants
		ORDOVICIAN	Gradual temperature rise to Silurian, Greater North America Submerge(60%) Mountain formation along Northern Atlantic Coast of US	First vertebrate fossils(armored fish) corals, and trilobites abundant. First red algae fossils, Algae still dominant plant
		CAMBRIAN	Rapid temperatures from conditions like now, perhaps early Glaciation. Sea invades much continent and withdraws. Land Generally low	Most to all plant and animal phyla definitely present
CRPTOZOIC EON	ACTUALISTIC	PROTEROZOIC ERA	Climate of repeated glacial and warm moist interglacial periods. Dawn of Actualistic Period of geological history	Age of primitive life, marine algae the probably dominant life. Probably a time of the early Development of all phyla
PRECMABRIAN PERIOD	PREACTUALISTIC	ARCHEZOIC	Probably hot to very warm with dense cloud cover and Torrential rains to more moderate conditions. First great Mountain formation(volcanic). Like Proterozoic in many respects	Dawn of life, Photosynthesis
		AZOIC ERA	Birth of Solar System, earth, ocean; first erosion cycle	Inorganic materials to organic compounds that begin The basis of life

The Earth's oldest rocks are a grantic formation of western gneiss terrace in West Austrailia. The most common rock forming minerals include quartz, olivine, amphibole(hornblende), pryroxene(augite), muscovite and biotite. Humans need calcium iron sodium, potassium and phosphorus in their food. We get fuel from geological influence, such as wood, eoal, petroleum and natural gas. The metal we use, iron, Chromium, tungsten and platinum. Nonmetallic minerals are graphite(Chrysolde and selenite)

Rocks to consider for collection:

Igneous-Granite, Rhyolite, Obsidian, Andesite and Basalt

Sedimentary-Breccia, Conglomerate, Sandstone, Mudstone, Limestone, Chert, Flint and Evaporites

Metamorphic-Marble, Quartzites, Slate, Shist and Gneiss

More common rock forming minerals are Halite(sodium and chlorine), silicates, carbonites, oxides, sulfides, halides, sulfates and phosphates. Pegmatites were mined in New England. They are a course blend of feldspar, mica and quartz. Feldspars were used for porclain and scowing powder. Clear quartz was mined for optical use.

Winnipesaukee Quartz Diorite, the country rock of LSP, is in the granite types rocks. Igneous rocks are derived from magmas. WQD is similar to Gabbo and Conway Granite. WQD and Rangely metamorphic formations are wide spread and among oldest rocks in central New Hampshire.

Lakes can be classified by their origin and there are 11 categories. Six include types of lake basins, rare and highly saline. There are lakes caused by earthquakes, horizontal sliding of tectonic plates or tectonic uplift, limestone beds causing overlying rocks to collapse, groundwater dissolving great holes in the underground, erosion and sediment deposits by rivers, landslide sealing a basin and wind blown sand damming streams in a valley. Winnipesaukee could have derived from a glacier making basins, maybe less than 25,000 years ago or an ice sheet advance, during the same period, wiping out old lakes and creating ones.

The Huronian time of the Precambrian period could go back 2.7 to 2.3 billion years ago. There were two Precambrian glacial episodes, one over 2 billion years ago and the Snowball Earth, 650 million years ago. This was the late Paleozoic ERA or the Carboniferous and Permian Periods. The present ice age began 40 million years ago. It grew from an Antarctic Ice Sheet, intensified three million ago during the late Pliocene Epoch. It continued into the Pliestocene Epoch. There were recent cycles of glaciation 40,000 to 10,000 years ago. The most recent glacial period ended about 10,000 years ago. This may have impacted Lake Winnipesaukee, The power of ice had gouged out rock at the end of the Pleistocene Epoch.

Winnipesaukee refers to "Beautiful Water of the High Place." Winnipesaukee was also spelled Winnipisseoke or Winnipiseogee Pond. Prior to the last Ice Age, there was no Lake Winnipesaukee. The sites of large extinct glacial lakes are usually easy to spot by geologists.

Lake Shore Park appears to have a Boulder Train of Glacial "erratics." There are rocks at the dumpster, on the south side, indicating this, There is also a line of rocks heading to the ball field on the north side. This boulder train runs north to south. A north compass

point leads to the west side of the unit at 29 Railroad. However, boulders are more evident 50 feet to the east by the unit at 26 Railroad. The largest exposure of bedrock appears to be on the west side of 17 Railroad.

The **regolith** is the upper portion of the earth's crust. The area of regolith that can support plant life is called **soil**, usually with four profile zones. Factors affecting soil are referred as **edaphic** factors. Life in this area is called **terrestrial** life. Inorganic or geological materiel that contributes to soil is referred to as **parent materiel.**

GENERAL GEOLOGY TERMS

ABSOLUTE AGE Correct time in past history
ACADIAN Orgeny in Nova Scotia
ACID ROCK` pH lower than 7
AGGLOMERAMTE Rock composed of volcanic fragments
ALLEGHENIAN Appalachian orgeny
ANORTHOSITE Composed almost entirely of feldspar, in Adorondacks and Labrador(Labrorite)
ARKOSE Derived by mechanical alteration of a granitic rock
ATLANTIC Late Quaternary, Long island Plain
BRECCIATED Rock, sharp fragments held in fine grained materiel
BRECCIASimilar to conglomerate, except pebbles are more angular and pebbles not rounded by water
BRECCIA marbles often seen in decorative stonework
CATACLASTIC Violent change or upheaval
CAULDRA Mountainside depressions
COUNTRY ROCK Native to an area
CHILL ZONES Rocks cool in ground
CONGLOMERATE Rounded water worn pebbles, usually quartz
CRYSTAL Body form of a single element
COARSE GRAIN TEXTURE Rough texture
DIATOMITE Siliceous materiel derive from a diatom, filter like
DOLOMITE Resembles Limestone, except chemically richer in magnesia, maybe altered limestone
DIORITE Darker than granite, but similar occurrence, more plagioclase, less quartz than granite
EQUIGRANULAR Even grain consistency
EROSION Washed away surface materiel
EXOTIC TERRAIN Area not consistent with major surrounding
FINED GRAIN TEXTURE Smaller more plentiful grains
FOSSILS Characteristic of sedimentary rocks
ERRATIC BOULDERS Rocks different from bedrock
GNEISS AND SHIST Difference are hard to find
GABBO Granite like,,Lower in silica and darker color
GLACIAL DRIFT Movement of materiel from glaciers
HALF LIFE Wearing away of radioactive materiel
HYDROTHERMAL ACTICITY Warming from water below ground
HURONIAN GLACIATION 2400 million years ago
HORNFELS Compact fine grain black rock
HORNBLENDE Like granite
ISOTASY Equilibrium the earth's crust maintained by gravity flow of rock
ISOTOPES Different number neutrons in chemical elements
INORGANIC MATTER Once was living organism
IGNEOUS ROCK From lava or magma
KIMBERTITE So. Africa, pyroxene-olivine mixture matrix of diamond
LIME DIORITE More anorthite molecules
LAURENTIAN Precambian to late Ordovician, mass extinctioin, in Canada
LIMESTONE Calcium carbonate(calcite) very fined grain texture
LITHOSTATIC Related to the earth's crust
LABORITE Granite like, in Canada
MANTLE Cliff like, usually in the ocean
MINIMUM DEPTH
MOAT VOLCANOS
MASS WASTING Down slopes of the regolith, influence by gravity
MARBLE Like quartz, forms from limestone and dolomite
MAGMA GASES Carry metallic elements and silica in solution
MOUNTALBAN GROUPS Orgeny in Maine

MINERAL Pure substances of definite chemical composition
METAMORPHIC ROCK Heat, pressure, moisture, oxygen, carbon dioxide transformation
MICA silicate minerals, usually igneous rock
MUSCOVITE White mica
NUCLEATION Centralization of atoms in crystals
OXIDATION Chemical change, loss of charged particles in molecules
OVER SATURATED Excess of one materiel over another in a geological item
ORGENY Mountain developing or generating
PORPHYRIES Like a frozen rock mush with detached crystals(signs of growth over a long period of time-phenocryst)
PEGMATITE Course granite, (feldspar, quartz and mica)
PERIDOTITE OR PYROXENITE Mostly dark minerals, olivine and pyroxene; North Carolina Dunite
PYROXENITE Pure pyroxene
PLUTONIC ROCK Igneous rock, magma cooled and solidified deep in earth's crust, Example are Granite and Gabbo(Plutons)
QUARTZITE From sandstone and shows the same colors
QUARTZ MONZNITE Plagioclase, feldspar, albite feldspar, calcium feldspar and anorthite
RING DIKES Circular natural dams probably due to glacial activity
RELATIVE AGE Uncertain time in history, though to be close
ROTTENSTONE Decomposed siliceous limestone used for polishing
RADIOACTIVITY Spontaneous emission of charged particles by decay disintegration of certain, usually heavy elements
SILTSTONE Stone harden silt
SHALE Very fine grain particles of quartz and clay minerals; consolidated mud deposited in water bodies like lakes
STOPING A delay in a development, historical
SHIST Mixture of hydrated and oxidized minerals, predominately mica ,eleavage, garnet, staurolite and alsite(kyanite)
SILICA Contains silicon and oxygen
SPECIFIC GRAVITY is the relative weight of a materiel compared to the weight of an equal weight of water
SOLUTION Homogeneous mixture of 2 or more substances , one being a liquid and can be separate by simple processes
SLATE New mica particles are larger
SANDSTONE Sand grains cemented more or less firmly together, often stained with iron
STRATIFICATION Deposits become thicker and thicker and merge to become cemented masses
SODA DIORITE Albite molecules in the feldspar
SODA GRANITE Albite present
SYENITE Like granite, lacks silica quartz

In concluding these observations, general information tells us an ERA is one of five major geological divisions of time, a Period is portion of time in which something come to an end and is ready to begin again, an Epoch is an extended period and an Age is a period in history. Geological literature about Lake Winnipesaukee leads us to belief the lake is very young. It was gouged out 10,000 to 25,000 years ago, by glacial activity. Many mounds or hills were left and they became the islands of the lake. The glacial activity created a boulder train, running north to south, through Lake Shore Park. The boulder train is best viewed by the dumpster entrance road. However, when running a compass point straight north to the shoreline, the entrance appears to be a little northwest. This took place in the late Pliocene ERA, as we are now in the Quaternary period.

Arson traces in our aquifer could be due to geological rock formations. Conway Granite is an acidic rock and could be the source of the arson. There are many rocks in Lake Shore Park with different geological backgrounds and studying them could bring enjoyment to some members or their families.

LITERATURE CITED

"Physical Geology" by Richard Foster Flint and Brian J. Skinner, Dep't of Geology and Geophysics, Yale University, John Wiley & Sons Inc. New York-London- Sydney-Toronto

"Geology" A golden Science Guide by Frank H. T. Rhodes, Dean of the College of Literature, Science and the Arts, University of Michigan; Illustrated by Raymond Perlman, Professor of Art, University of Illinois, Under the general editorship of Vera R. Webster, Golden Press, New York Western Publishing Co. Inc. Racine, Wisconsin

The Nature's Company Guides, "Rocks and Fossils" Arthur B Busbey III, Robert Coenaads, Paul Willis, David Roots Consulting Editors, David Roots and Paul Willis, The Nature Company Time/ Life Books Copyright 1996 Machons Point Austrailia

"A Guide to New England Landscape" by Neil Jorgensen An East Woods Book, The Globe Pequot Press, Chester, Conn.06412

Online "Wikipedia, The Free Encylopedia

Online Infoplease

"Natural History" by Richard A. Pimentel Reinhold Publishing Corp. Chapman & Hall Ltd. London and New York

"Stepping Stones Across New Hampshire" Geological Story of the Belknap Mountains by Jay Long, Trail Maps by Dave Roberts, Peter E. Randall, Publisher Lee Portsmouth, New Hampshire 03802

"Rivers and Lakes;" Planet Earth by Laurence Pringle and the Editor of Time- Life Books Time. Life Books Alexendra, Virginia

The Peterson Field Guide Series "Rocks and Minerals" by Frederick H. Pough, Houghton Mifflin Co. Boston, The Riverside Press, Cambridge