President:
Daniel T. O'Connell

1947

Secretary
Cecil H. Kindle

FINAL PROGRAM OF 19th FIELD MEET

FRIDAY, MAY 9th

8 am to 1:30 pm - Registration at C.C.N.Y. in Finley Hall, Room 23. Park cars in the parking field directly in front of Finley Hall. Space available for all.

9am to 3 pm - Exhibition of the latest geological textbooks, equipment and supplies with company representatives in attendance. Faculty Room (room 200), Main Building, C.C.N.Y.

12 noon - Luncheon in the Webb Room (room 500), Main Building, C.C.N.Y.

1:30 pm - Assemble in front of Finley Hall equipped for field trip on foot to the Palisades via 125th Street Ferry. Leaders: Professor O'Connell and others.

6:00 pm - Dinner in Army Hall Dining Room, C.C.N.Y. (informal).

7:30 pm - Official welcome by Dr. Harry N. Wright, president of City College. General business meeting and seminar on the Palisades and on the field trips for Saturday. Faculty Room (room 200), Main Building. Speakers: Dr. Robert B. Sosman, "Temperature of the Palisades Intrusion" and Professor S. James Shand, "Petrology of the Palisades"....Color Sound Film: "The Story of an Ore Sample" courtesy of American Cyanamid Co.

9:00 pm - Dancing in the Student Lounge (ground floor), Main Building, under the auspices of the C.C.N.Y. Geological Society and the C.C.N.Y. Student Chapter of the A.I.M.E.

SATURDAY, MAY 10th

8:00 am - Breakfast in the Army Hall Dining Room. Pick up box lunches before leaving.

9:00 am - Group A cars will leave Finley Hall Parking Field for Bear Mountain Interstate Park via George Washington Bridge. Leaders: Dr. G. F. Adams and Dr. K. E. Lowe.

9:15 am - Group B cars leave Finley Hall Parking Field for Highland Mills (Pine Hill) fossil locality. Leaders: Dr. C.H. Kindle and Mr. P. Kent.

9:30 am - Group C cars will leave the Finley Hall Parking Field for Bear Mountain Interstate Park via George Washington Bridge. Leaders: Mr. J. Kalkow and Mr. M.B. Rosalsky (will join Group A at Bear Mountain).

12:30 pm - Box lunches in the field.

4:30 pm - approximately - Trips will end some 50 miles north of New York City on the west side of the Hudson River.

NEW YORK STATE GEOLOGICAL ASSOCIATION

Annual Field Meeting

City College, New York City

PALISADES FIELD TRIP

May 9, 1947

Itinerary

Note: Guides will meet parties going on the Palisades Field Trip at Finley Hall beginning 1:30 P.M. Car are to be parked in the parking field directly in front of Finley Hall. Participants in this field trip will proceed on foot from this starting point to the Ft. Lee ferry house at 125th Street and the Hudson River. Take the ferry (fare 5 cents each way) to Edgewater, N.J.

From the boat notice the even skyline of the Palisades and the difference in the slope of the eastern and the western walls of the Hudson Valley. At this point the Hudson is an estuary. The valley has subsided below sea level allowing the sea water to flow in flooding the valley for over 100 miles from its mouth. The gently sloping eastern valley wall is developed on the crystallines of the New York Series (Manhattan Schist, Inwood Marble, Fordham Gneiss). It marks an older peneplane surface called the pre-Triassic peneplane which now dips west, and upon which the Triassic sediments of the Newark Series were deposited. The steep western wall has resulted from a combination of columnar jointing, weathering, and erosion. The columns are caused by weathering on tensional master joints that extend at a high angle and normal to the contact of the palisades intrusive sill, of which you are seeing only a part of the thickness. The top portion of the sill has been removed by various agents of erosion, of which the last was the Pleistocene ice sheet. The badly weathered ledge in the face of the cliff was caused by the olivine-rich zone, a product of gravitational settling during the solidification of the sill. The mineral composition of this zone differs from the rest of the sill in the appreciably higher content of olivine which weathers readily upon exposure to the present moist climate. The decay, however is only superficial, and does not extend for any great distance into the rock.

Proceed straight through the ferry house past the police signal booth, cross street and turn right; walk north to sign stating, "NO ADMITANCE" -- enter here. Climb terrace stained red by the residual soil of the Stockton Shale of the Newark series. Interbedded with this red shale may be found layers of arkose sandstone. The rock cut terrace at this point is one of several that may be observed in this vicinity, one of which is under water. They indicate changes in level of the land with respect to the sea.

Follow the trolley-car right of way; note the rocks under the small bridge below the foot-path. Continue on the path. In the gutter near the cliff look for mud cracks in the shale. Note the dark color of the baked shale as the contact with the igneous sill is approached. Observe the lower contact; note the fine grain of the diabase ar this point. Observe the weathered zone (probably a fault) which appears to be connected with a normal fault although some have thought this to be an irregular contact surface at the base of the Palisades.

Continue up to the xenolith. Note that the shale of the inclusion has been partly altered to an incipient slate. Continue up the road to the horseshoe bend; note the dry retaining wall which here holds in the rotten zone. Just after making the turn you may observe some of the residual sand from the rotten zone. Notice the columnar jointing. After arrival at the top of the cliff near the Palisades Amusement Park note the glacial striae on an outcrop of the diabase indicating that the ice moved diagonally across the Hudson at this point. Observe the U-shaped cross valley on opposite shore. This is the 125th Street Manhattanville Valley which has ormed along a fault which was excavated by glacial scour to its present characteristic U-shape.

Follow the motor road down, noting the reticulated jointing at the rotten zone resulting in shperoidal weathering. Continue to the self-working quarry, where the auto road makes a sharp turn. A fault may be observed here and a calcite vein carrying chalcopyrite which weathers to red ochre. Observe the displacement of the rotten zone across the fault. Do not linger under the cliff as there is danger of rock slides.

19th Annual Field Meeting

City College of New York

FIELD EXCURSION: GROUPS A and C Saturday, May 10, 1947

GEOLOGY OF THE LOWER HUDSON VALLEY AND THE HUDSON HIGHLANDS (BEAR MT. PARK).

Itinerary and Summary:

Mileage	
	Leave Finley Hall Parking Field: Group A at 9:00 am shar Group C at 9:30 am shar
0	New York City end of the George Washington Bridge. Set speedometer to zero.
1.8 to 12.5	En Route: US-9W from the New Jersey End of Bridge to Point Lookout at Alpine, N.J. Road follows broad, undulating summit of Palisades Ridge, here interpreted as a remnant of the Fall Zone Peneplane. Elevations rise gradually from 300 to 500 feet in 7.5 miles. This is interpreted as an apparent dip of the Fall Zone surface to the southwest (Fig. 1B)
12.5	Stop 1: Point Lookout at Alpine, N.J. (Elevation 500+ The Lookout is located near the Fall Zone-Schooley intersection. Sparkill Gap lies immediately to the north. Pre-Newark Peneplane seen on the east bank of the Hudson River. Zone of intersection of three peneplanes in hills above Hastings. Hudson here relatively narrow and adjusted to weak Triassic sediments (Fig. 1B).
12.5 to 15.5	En Route: Alpine Lookout to the Floor of Sparkill Gap (Tallman Mt. State Park) The route descends south wall of Sparkill Gap to Gap floor (elev. 180-200 ft.), traverses length of Gap floor (about 2 miles) turning off on north side of Gap into Tallman Mt. State Park (Fig. 1B).
16.8	Stop 2: North Side of Sparkill Gap (Tallman Mt. State Park). The broad wind gap is here cut by a later stream developing a small water gap not to be confused with the wind gap itself. The north wall of the wind gap is seen rising about 700 feet above sea level Fig. 1A). The Palisades sill continues beyond this point, but has been dissected into rounded hills. In the distance, the point where the Palisades diabase changes from sill to dike can be seen. Hudson is here over two miles wide (Tappan Sea) (Fig. 1B).

Mileage	
	<u>En Route: Sparkill Gap to Long Clove</u> (US-9W)
18.1 to 21.2	From Sparkill Gap (Piermont, N.Y.) to Nyack, N.Y., along Piermont Ave., exposures of Newark sediments seen on left, north of Nyack, at Hook Mountain, the route crosses a pass near the beginning of the curved Palisades dike, and continues over glaciated Newark sediments overlying the intrusion (Fig. 1B).
28.5	<u>Stop 3:</u> <u>Long Clove Railroad Tunnel Portal</u> (US-9W) The cut near tunnel portal shows dike contact between Newark sediments and diabase. Contact dips steeply south, Newark rocks dip gently west. Gully on the east side is developed near but not on contact. Sediments show cross bedding and baking effects.
	<u>En Route: Long Clove to Doodletown Brook</u> (US-9W)
28.7	Excellent columnar lointing in the Palisades diabase at sharp road turn (right).
29.0 to 34.5	The route traverses a short stretch of Triassic sediments after passing through Long Clove (Haverstraw and Stony Point).
34.7	North of Stony Point, fanglomerates are exposed in road cuts (left) near Triassic border faults. Pebbles are Wappinger limestone (Cambro-Ord.)
35.3	which is explained ½ mile farther at Tomkins Cove (right side of road). Note large quarry in this dense, unfossiliferous limestone (right). Both Wappinger limestone and associated Annsville phyllite (Hudson River Series) here trend SW representing continuation of the Cambro-Ord. belt of sediments in Sprouts Brook (Peekskill) across the Hudson to NE Paleozoic sediments pinch out a short distance SW of US-9W against Highlands border fault (Ramapo fault).
36.3	One mile to the north (in rock garden of Inn at right) poorly exposed contact between Highland crystallines and Paleozoics. From this point on, the route continues in the Pre-Cambrian Highlands area and the emphasis shifts from the development of the Hudson Valley to a discussion of Highlands geology.
37.5 (appr.)	At Jones Point (opposite U.S.N. ship berthing site) glacial drift and delta deposits on flanks of Dunderberg Mountain (left). Road climbs sharply skirting Storm King granite mass of the Dunderberg (left). Note frequently dense fracturing interpreted as due to secondary deformation (regional faulting).
39.5	Fine view of SE gateway of Hudson River Gorge ahead. Bear Mountain at left and Anthonys Nose at right, connected by Bear Mountain Bridge (Fig. 2).
40.7	US-9W reaches river flats (right) opposite Iona Island, interpreted as an abandoned channel of the Hudson. At left directly past sharp right turn exposures of white, graphitic Grenville marble (Fig. 2).
41.0	<u>Stop 4:</u> Lower Doodletown Brook Gorge (off US-9W).

Mileage

Small gorge subsequent on Timp Pass-Hudson River fault, one of the major longitudinal thrust faults (to NW) in the Hudson Highlands. Grenville meta-sediments including intercalated marble lenses intensely disturbed. Faulting interpreted as pre-Cambrian with re-activation in Paleozoic time (possibly Appalachian).

41.0 to 42.2 — En Route: Doodletown Brook to Bear Mt. Inn.
Route climbs to top of bedrock river terrace (160 ft.) on which the Inn and playing field are located.

42.2 — Stop 5: Bear Mountain Inn

Lunch: 45 minutes
Please reassemble promptly at SE corner of Inn.

Stop 6: Half Mile Walk in the Vicinity of Bear Mt. Inn.
Discussion of rock terraces in Hudson Gorge. Glacial erosion features. Hessian Lake on rock terrace has largely subsurface inflow and outflow. Interpreted as a glacially scoured contact-line depression between the Storm King granite and the Grenville meta-sediments (Fig. 3). On east shore of lake, exposure of upper contact of Storm King granite intrusion (synclinal pluton)(Fig. 2).
Typical linear and platy flow structure of early hornblende crystals. Lineation parallel to regional fold axis of Bear Mountain syncline. Discussion of granite petrology. Characteristic "rubbly" weathering of granite due to kaolinization of the feldspars.
Farther north along lake shore pre-Storm King crystallines, viz. Grenville meta-sediments affected by intrusive Pochuck diorite and Canada Hill granite phases (Highlands Complex).

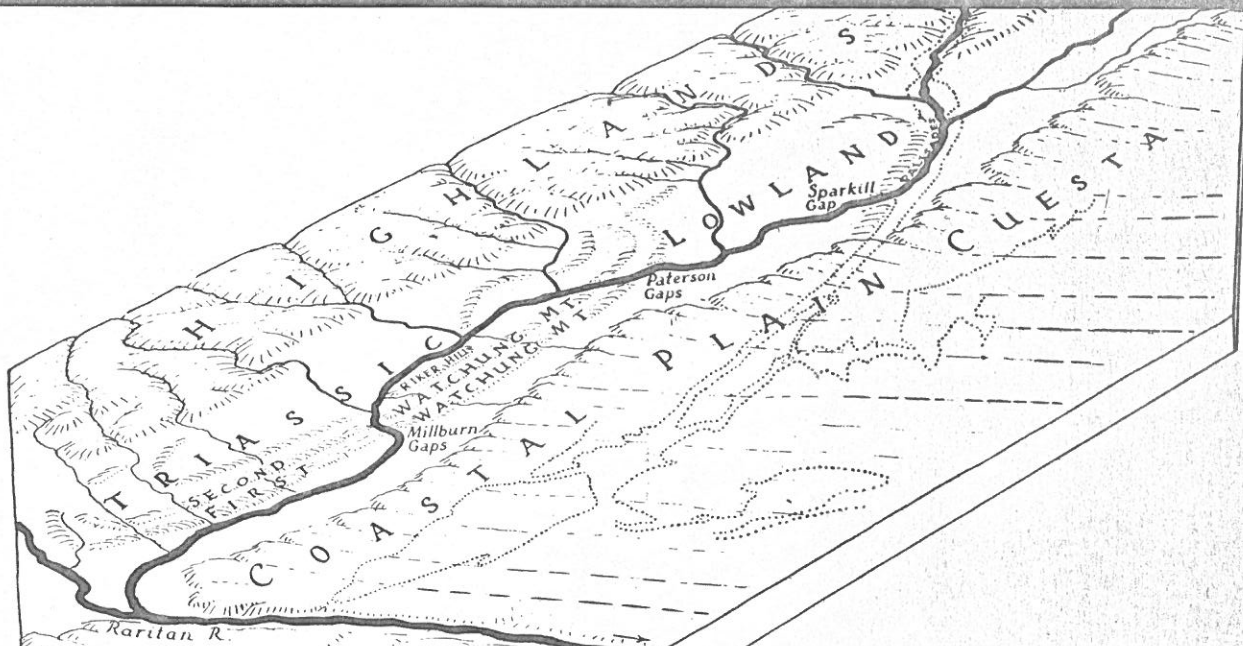
En Route: From Bear Mt. Inn via US-6 to Perkins Memorial Drive (to top of Bear Mt.)

42.3 to 42.7 — Heading north on US-9W between Inn and traffic circle note narrow, steep valley paralleling road at right. This is another contact-line depression developed on Grenville meta-sediments in contact with a sill-like offshoot of the main Storm King body (Fig. 2).

42.8 to 44.4 — From traffic circle west on US-6 along north flank of Bear Mt. to entrance of Perkins Memorial Drive. Deep gorge of Popolopen Creek (Hell Hole) at the right developed along prominent normal fault (down-dropped to N) cutting the Storm King intrusive. Bare rock summit of the Torne (right) is part of Bear Mt. intrusive which crosses Hell Hole gradually increasing in thickness and curving northeastward conformable with the west limb of Bear Mt. syncline (Fig. 2).

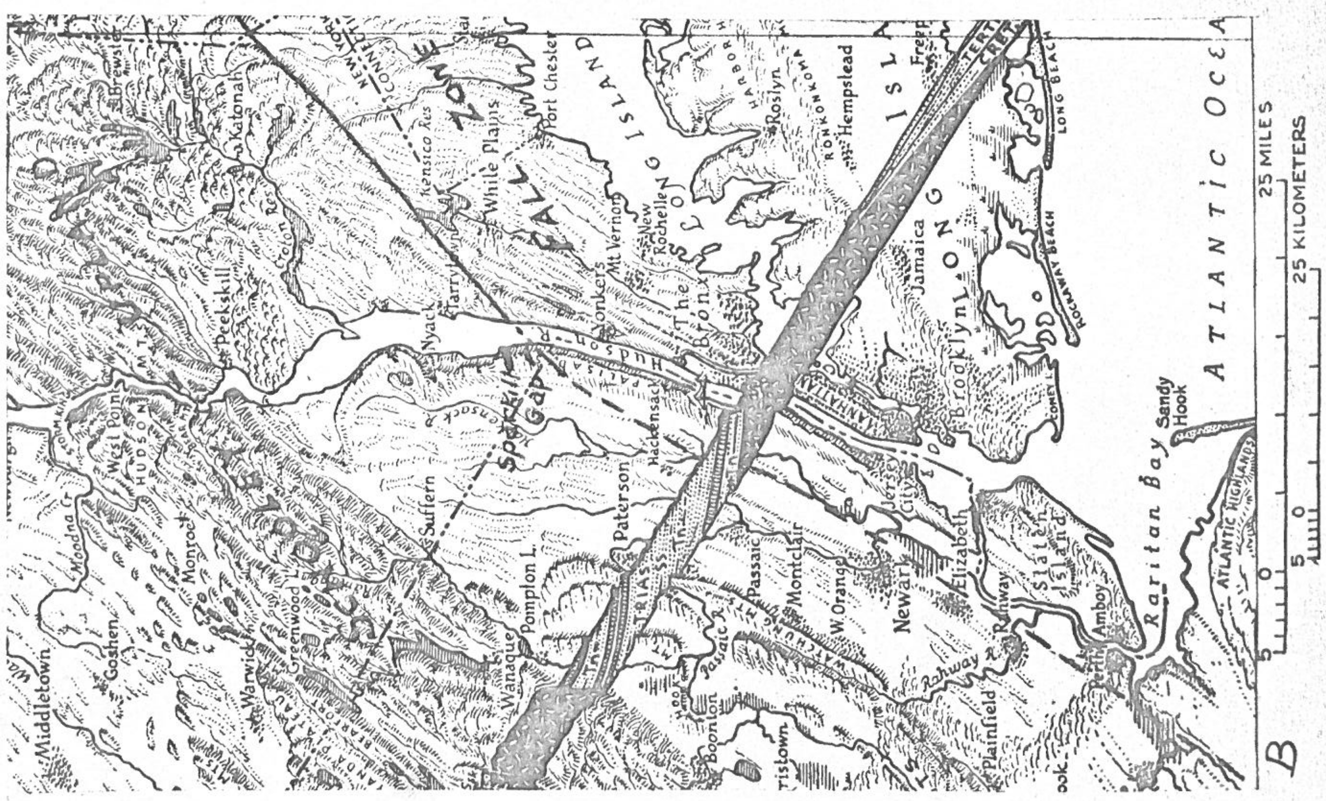
44.8 — On Perkins Memorial Drive (left) huge talus boulders of Storm King granite.

Mileage	
45.0	Stop 7: Eclogite in Highlands Complex (Perkins Memorial Drive) Coarse pyroxene (diallage)-garnet-graphite rock, occurring as band in Grenville meta-sediments, interpreted as product of thermo-chemical metamorphism in place.
45.3	Stop 8: Lower Contact of Storm King Granite Intrusive (Perkins Memorial Drive) Typical Grenville gneisses with evidence of sedimentary origin and subsequent granitization by Canada Hill granite phase. Conformable contact relations of the Storm King granite and marginal inclusions of the country rocks. Field relations support concept of magmatic emplacement of this granite (the most recent in the Highlands). Discussion of anamolous petrofabric relations between dimensional and space-lattice orientation of quartz in the Storm King granite. Regional joint systems (longitudinal, diagonal, and cross joints) and their probable origin. Prominent sheeting (exfoliation) in the granite interpreted as result of "unloading".
45.3 to 46.9	En Route: From this point to the top of Bear Mt. only Storm King granite is encountered in the road cuts. Occasional primary joints are filled with pinkish pegmatite and white aplite. Epidote, chlorite and sericite also occur filling fine fractures in the granite.
46.1	Stop 9: Regional Geology of Hudson Highlands (Perkins Memorial Drive). Magnificent panorama of the Hudson Highlands. Tracing of Storm King granite intrusive and major faults north of Bear Mt. with the help of geomorphic features Origin of Hudson Gorge through Highlands (superposition versus progressive stream piracy) (Fig. 2).
46.9	Stop 10: Top of Bear Mt. (Perkins Memorial Tower) View southward over entire field trip route and resumé of principal geological features seen. Southern extension of Hudson River fault (seen in Doodletown Brook gorge) crosses Dunderberg-West Mt. ridge at Timp Pass, a sharp fault-line notch. Solution pitting and chatter marks on glacially scoured granite.
50.0	Official end of trip. Party will return to entrance of Perkins Memorial Drive (US-6* under police escort and disband.



Hypothetical Course of the Hudson River in Schooley Time, According to the Theory of Superposed Subsequent Drainage

A. DIAGRAM TO ILLUSTRATE Professor Johnson's THEORY FOR THE ORIGIN OF THE GAPS IN THE WATCHUNG RIDGES. (Drawn by E. J. Raisz for Johnson: Atl. Slope)



B BLOCK DIAGRAM OF THE LOWER HUDSON RIVER REGION

FIG-1.

HUDSON HIGHLANDS IN VICINITY OF BEAR MT., N.Y.

← 1 mile →

HESSIAN LAKE, N.Y.

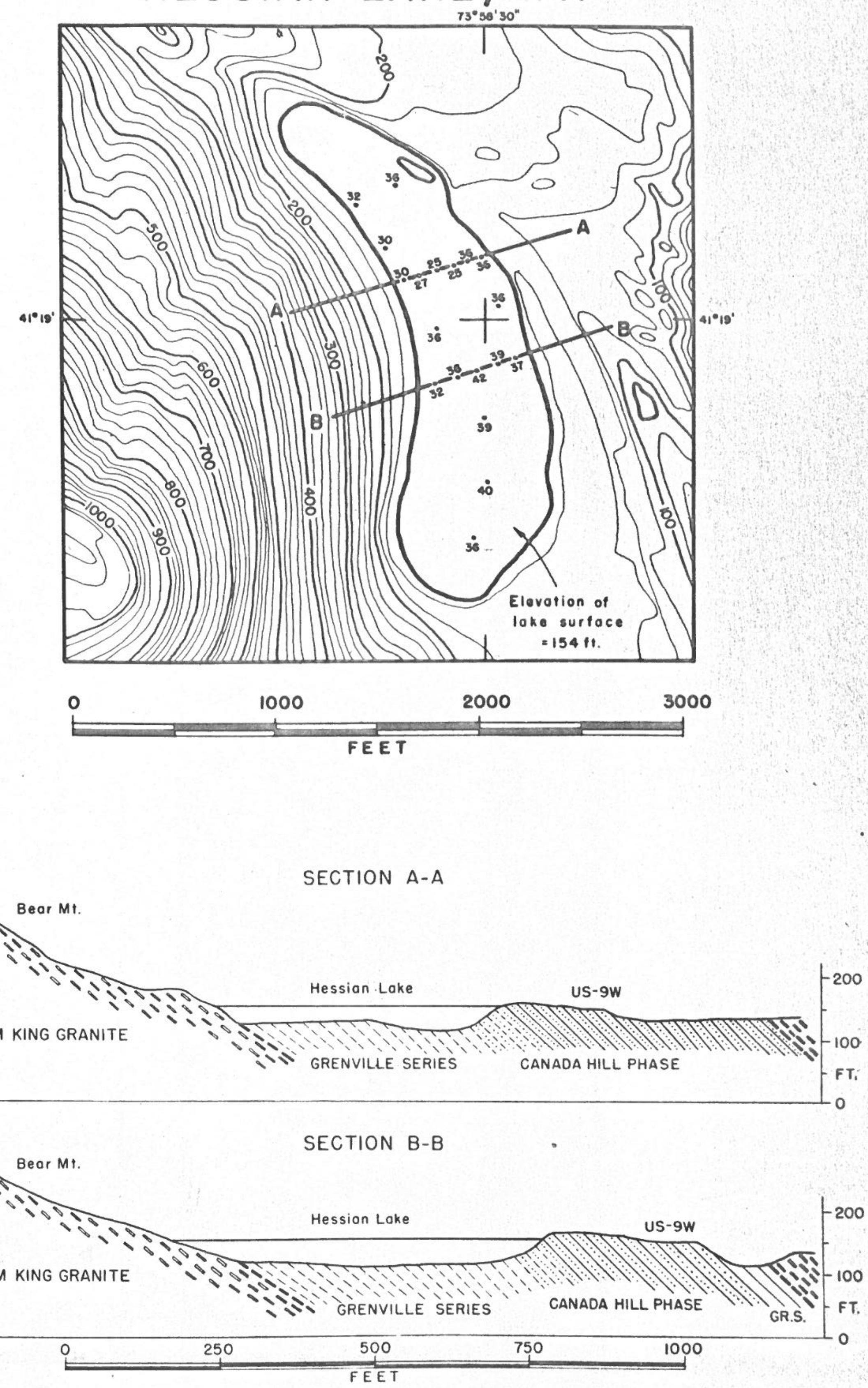
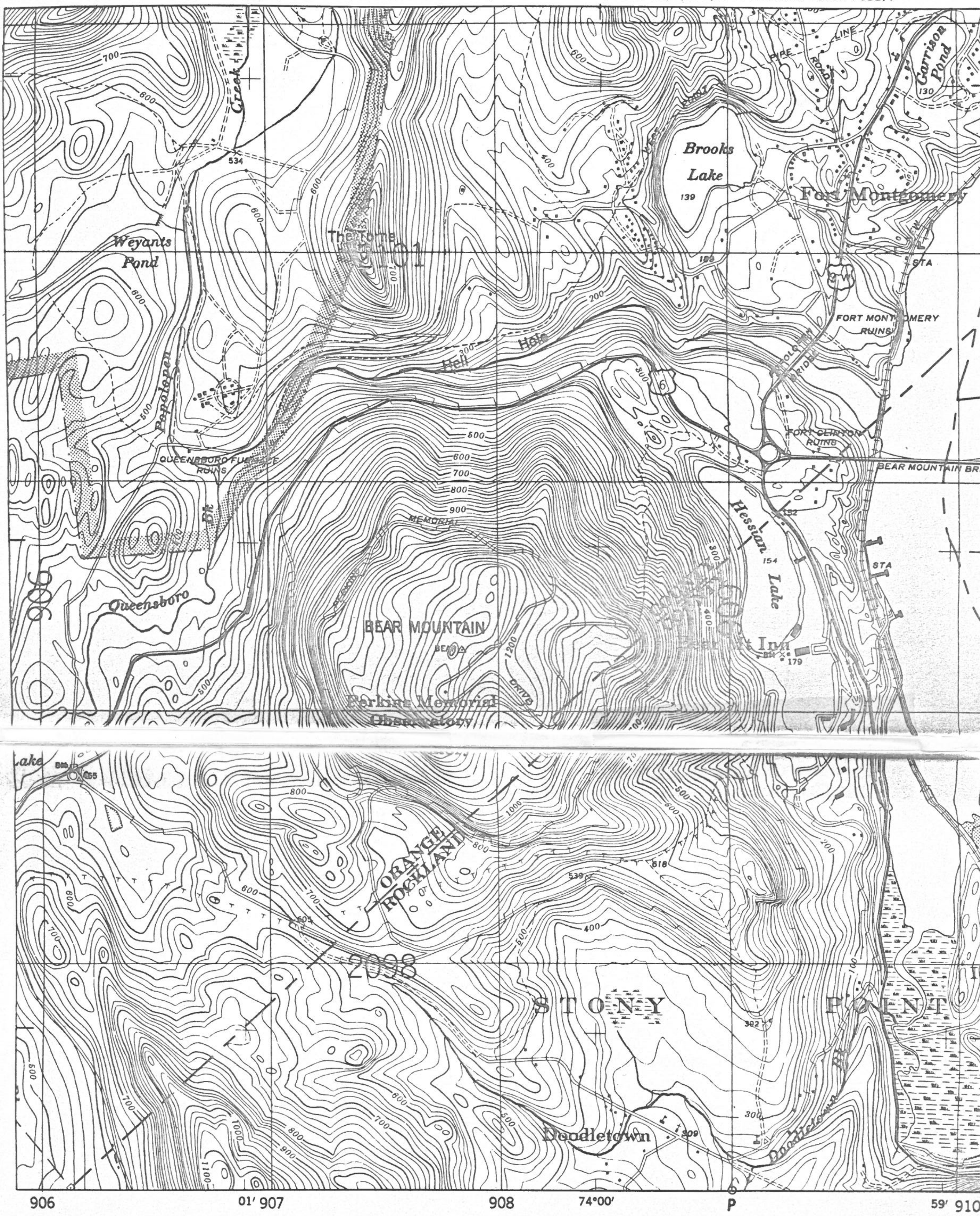


FIG-3.3.

BEAR MOUNTAIN, NEW YORK

FROM 'WEST POINT AND VICINITY, N.Y.' SHEET, CORPS OF ENGINEERS, U.S. ARMY SERIES, 1:25,000, AMS 4, 1944 (PARTIAL COLOR PULL).



CONTOUR INTERVAL 20 FT.

1000 0 1000 2000 3000
FEET

APPR. DECLINATION 11°15' (1944)

1000-YARD GRID, U.S. ZONE 'A'.

Summary

Group B: PALEOZOICS WEST OF THE PRE-CAMBRIAN HIGHLANDS

Note: Group B will leave at 9:15 AM from Finley Hall (which is behind Army Hall at 137th Street and Amsterdam Avenue, New York City)

Cross the George Washington Bridge to New Jersey, follow route 4 for a quarter of an hour then turn right on route 17. NOTE - for the New Jersey part of the trip we pass over the red Brunswick shale of the Newark seriws (Triassic), for the most part it is mantled with glacial deposits. Continue north on route 17 in New York State following the Ramapo valley through the Highlands of pre-Cambrian granite and gneiss.

Ten minute rest stop at the "Red Apple Rest", a well equipped bus stop in the Ramapo valley. The Erie Railroad follows this valley.

Continue north; leave route 17 and follow route 32 on the northwest side of the highlands. Observe Cambro-Ordovician limestone outcrops shortly after entering route 32 (south of the underpass under the Erie Railroad) and also in Central Valley opposite the fire station. (STOP) From here the strike of Pine Hill to the northeast suggests that this limestone occupies the valley southeast of Pine Hill. Leave route 32 at Central Valley, proceed northeast on the paved road which runs northeast up the limestone valley about three miles to where the outcrop of conglomerate which forms the more resistant strata of Pine Hill comes to the road. (STOP) Silurian conglomerate correlated with the Shawangunk conglomerate to the north-west and the Green Pond conglomerate to the southwest.

Turn around and retrace route one and one half miles, take road up the hill to the right(west) which cuts across the strike towards Highland Mills. STOP when on the strike of the conglomerate. Note - conglomerate has thinned out and is replaced by cross-bedded sandstone (quartzite). This will be better seen later when we climb the hill. It appears as though the disappearance of Pine Hill to the south is due to the disappearance of coarse sediments in that direction. The absence of these coarse sediments explains the non-appearance of this formation between here and Green Pond, New Jersey. Their presence here must represent an embayment of the Silurian sea at that time.

Proceed by underpass (note spring to left) to Highland Mills station. Park cars. Exposure of Oriskany, Esopus and Schoharie strata of Devonian age. In the lower strata may be observed poorly preserved specimens of sponges of the general type like Titusvillia which Caster described from the Upper Ordovician and Mississippian.

Leptocoelia flabellites is very abundant. The middle strata contain little but Spirophyton cauda-galli. The upper layers contain Grammysia (pelecypod), brachiopods, etc. One layer yields complete specimens of trilobites; Phacops and Dalmanites are the commonest.

After lunch and collecting Devonian fossils, we can walk across the strike from the north end of the cut to a quarry in the red shale (Silurian, Longwood shale) which stratigraphically overlies the basal quartzites and conglomerate. In the north end of this quarry may be seen some Silurian limestone with corals.

For those who must leave early, Highland Mills is as far as we go. Those desiring to see more of this synclinal area (Schunemunk Mt. north of Highland Mills has a synclinal structure) will continue westward across the strikefrom a point about 15 miles southwest.

Proceed (via Red Apple Rest at Southfields) on route 17A towards Greenwood Lake. STOP at the top of the long hill to see gneiss and on a clear day the towers of the George Washington Bridge, 33 miles away. Proceed down into the valley of Greenwood Lake, eroded in weaker Lower Paleozoic strata. Continue on route 17A up hill toward Warwick. STOP halfway up to see the Devonian shales and sandstone with plant trunks and stems (up to two feet across).

Continue up the hill around bend and park off road to see well preserved slickensides in sandstone and conglomerate (Devonian). Proceed to top of hill. STOP at good view of the Ordovician valley with Shawangunk ridge in the distance. Devonian strata extend in cut down road only a few hundred yards. Proceeding down hill we see the Devonian succeeded by the pre-Cambrian gneiss - obviously a fault. Down hill to Bellvale, gneiss all the way. TURN right just across the stream in Bellvale. Follow stream on road (gneiss still with us), but do not go across stream on next bridge; turn left. A couple of hundred yards further on, the lower part of the Paleozoic sequence may be seen with a low dip away from the gneiss. Here it is a limestone with coarse quartz grains scattered through it. This must be equivalent to the Poughquag quartzite which is so thick in some places in Dutchess County (lower Cambrian). Thus we see that this quartzite like the Silurian one is extremely variable in composition and thickness. Proceed on dirt road (left one) and a mile or so further is an outcrop of the Cambro-Ordovician limestone such as was seen at Central Valley. Proceed and turn right on paved road toward route 17 near Chester. On the way note the outcrops of slate (Ordovician) and some hills of pre-Cambrian gneiss such as that at Sugarloaf.

group F
cont.

Some References

Clarke, John M. - 1909 - Early Devonic History of New York and Eastern North America, Part 2, p. 136-153, plates 32-34.

Colony, R.J. - 1933 - Structural Geology between New York and Schunemunk Mountain, XVI International Geological Congress, Guidebook 9, p. 28 - 43.

U.S.G.S. - Topographic Maps, Schunemunk Quadrangle, Greenwood Lake Quadrangle.

Group B, concl.