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Especially when using older guidebooks in this collection, note that locations may have changed drastically. Likewise, geological interpretations may differ from current understandings.

Please respect any trip stops designated as “no hammers”, “no collecting” or the like.

Consider possible hazards and use appropriate caution and safety equipment.

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New York City

EXCURSION A - 2: A GEOLOGICAL TRAVERSE FROM THE HUDSON RIVER TO LONG ISLAND SOUND, to study the New York City formations in cross section. (Leaders: J. EDMUND WOODMAN and DANIEL T. O'CONNELL)

2:00 P. M. Leave Concourse Plaza Hotel.

One block south and one block east of the Hotel, view MANHATTAN SCHIST tightly folded and crushed in synclinal trough, the axis of which is the Grand Concourse.

Continue east and walk down granite paved incline into Railroad yard. Turn left over sandbox, to see MANHATTAN SCHIST interbedded within the INWOOD LIMESTONE.

ROUTE: Proceed north along Grand Concourse.

1.5 miles Note INWOOD LIMESTONE outcrop on left side.
2.3 FORDHAM GNEISS outcrop on left side at 181st Street.
2.7 At 188th Street enter right hand lande so as to be able to turn left on overpass (Fordham Road).
2.9 Turn left on Fordham Road.
3.9 Cross Harlem River on 207th Street Bridge.
4.6 Park cars at Athletic Field at end of 207th Street.

INWOOD HILL PARK:

a. The Palisades and the Newark series (Triassic) may be viewed forming the opposite side of the Hudson valley.
b. MANHATTAN SCHIST - the northern tip of Manhattan Island.
c. MANHATTAN SCHIST - INWOOD LIMESTONE contact. Limestone pitches south under the Manhattan schist.
d. Amphibolite intrusive. "The big basic dike" may be a sill.
e. FORDHAM GNEISS forms the opposite shore of Spuyten Duyvil.
f. Final straightening of the Harlem Ship Canal now being cut through FORDHAM GNEISS.
g. INWOOD LIMESTONE with some accessory minerals (malacolite and tremolite), in Isham Park.

Return to cars.

ROUTE: Proceed eastward on 207th Street.

5.3 Recross 207th Street Bridge. Continue uphill.
5.6 Turn right on Sedgwick Avenue (Triborough Bridge route).
6.0 Hall of Fame, New York University, on left. On right, Dyckman Street cross valley, formed along a fault, may be seen in the distance, with the Palisades beyond.
On left side of road, banded FORDHAM GNEISS.
6.8. Outcrop of FORDHAM GNEISS.
6.9 Observe MANHATTAN SCHIST with pegmatite dikes in cliff opposite, on other side of Harlem River.
7.2 Pass under old Washington Bridge.
7.5 High Bridge Aqueduct, part of old Croton Aqueduct, of New York City water supply.
7.6 Turn left on 167th Street, following the cross valley developed along a fault. This is one of several such cross valleys in New York City. Dyckman Street valley and Manhattan (125th Street) valley are similar in origin.
8.0 Turn right on Andersen Avenue.
8.1 FORDHAM GNEISS outcrop on right.
8.5 Turn left on Jerome Avenue; park cars facing north.
Examine outcrop of FORDHAM GNEISS. Note drag folds in the banded gneiss.
Proceed north on Jerome Avenue.
9.1 Turn right on 168th Street at elevated structure. Stop at vacant lot.
Examine INWOOD LIMESTONE in lot.
Continue east, uphill, on 168th Street, for one block.

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EXCURSION B - 2: (continued)

9.2 Turn left on Gerard Avenue. Continue for one block; then turn right on 169th Street.
9.4 Vacant lot at Grand Concourse
Examine MANHATTAN FORMATION.
Continue on 169th Street.
9.6 Turn left on Morris Avenue.
9.9 Turn right on 171st Street.
Note settling of building on left, built on fill in Black Swamp.
10.0 Turn left on Teller Avenue.
Small outcrop of FORDHAM GNEISS exposed in park facing head on.
10.3 Turn right on Mt. Eden Avenue.
10.4 Turn right into Park; then right behind house; go downhill.
10.7 Claremont Parkway. Continue straight ahead. Cross Webster Avenue.
11.0 Enter Crotona Park. Note MANHATTAN SCHIST outcrops.
Continue straight ahead, east, past traffic light.
Straight ahead to Wilkins Avenue; continue to Southern Boulevard, under elevated structure.
12.2 Continue straight ahead on Southern Boulevard, leaving elevated structure.
12.4 Turn left, following car tracks.
12.5 Turn left again, on to Whitlock Avenue.
12.7 Turn right, over Bridge, on to Eastern Boulevard.
12.9 Cross Bronx River.
13.1 Outcrop of Manhattan schist on left side of road.
13.3 MANHATTAN SCHIST outcrop.
13.5 Roadcut through large outcrop of MANHATTAN SCHIST. Obsefve recumbent folds, indicative of proximity to verthrust.
13.7 Turn right at traffic light, on Sound View Avenue.
14.6 Turn left at Lacomb Avenue.
14.8 Cross Pugsley Creek.
14.9 FORDHAM GNEISS outcrop on left. Note recumbent folding.

RETURN ROUTE:

15.2 Return on Sound View Avenue.
16.1 Turn left on EASTERN Boulevard.
17.0 Turn left on Whitlock Avenue.
17.2 Take left fork. Follow car tracks on 163rd Street Crosstown Trolley line, west to the Grand Concourse.

Field Excursion A-2
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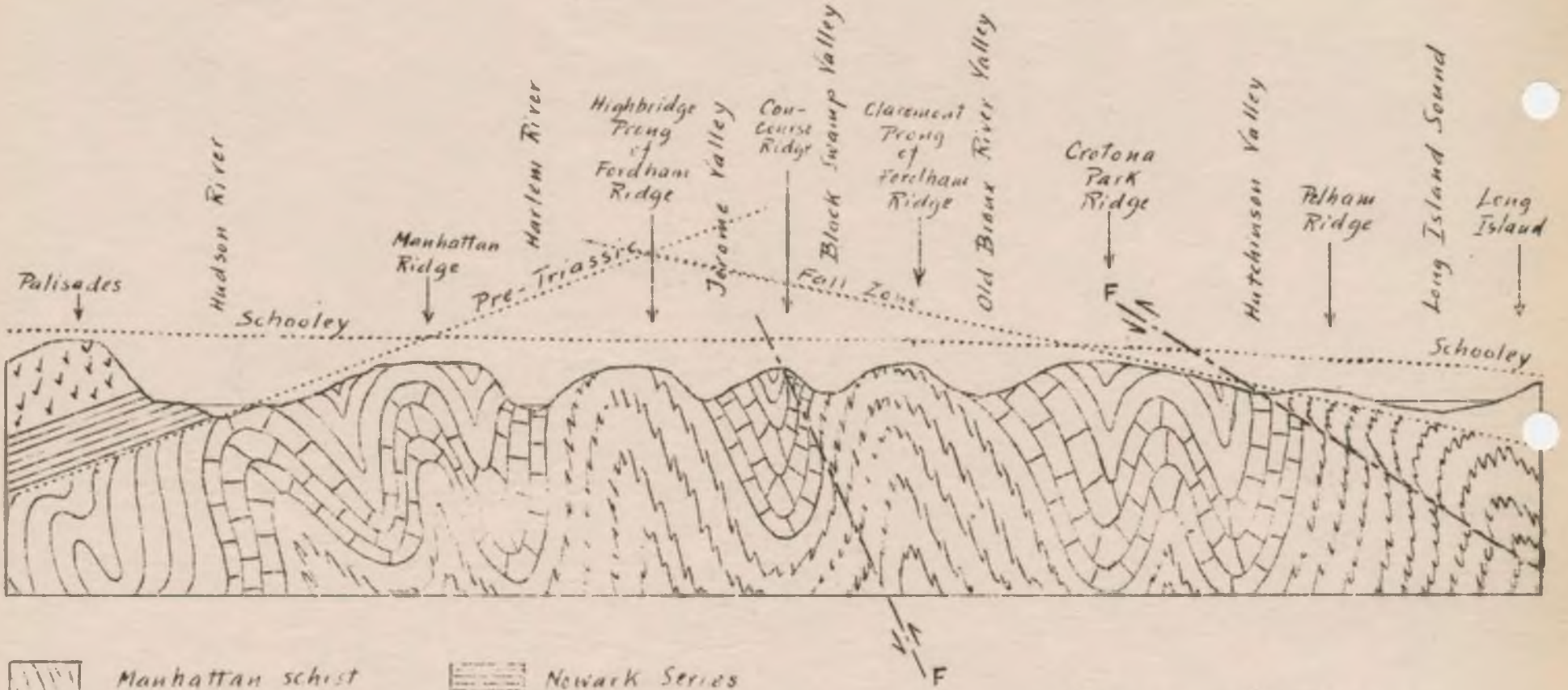

Manhattan schist
Inwood limestone
Fordham gneiss
Newark Series
Palisades diabase

Cross-Section of New York City along 170th Street.

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Excursion B-3: Paleontological Trip to the New Jersey Coastal Plain.
(Leader: Cecil Kindle)

Leave Concourse Plaza Hotel at 8 A.M. Proceed west on 161st St. and across the Harlem river, taking the right branch of the roadway at the west end of bridge. Continue on 155th St. to Broadway, turn left one block then right to Riverside Drive. Follow Riverside Drive south to 72nd St., turn right onto the Express Highway and follow it to its present termination at Canal St. Turn left here for four blocks to the entrance of the Holland Tunnel (on left); toll - 50 cents. If the cars have become separated they will reassemble on the left side of street one block from the exit in New Jersey.

Continue on Route U.S. 1 (most traffic). About 27 miles from the hotel the road runs between the storage tanks of the Esso refinery. Stop at the Esso service station to reassemble cars and fill up with gas. NOTE: The price of gasoline last week was 5¢ a gallon less than in New York. Continue on U.S.1 to the traffic circle at Penns Neck. Turn left and follow leader's car to the fossil localities near New Egypt.

LOCALITY 1: 3 miles north of New Egypt along Crosswicks Creek (Nutt's farm) Mt. Laurel and Navesink formations (Cretaceous) with Belemnitella, Gryphaea, Exogyra, etc. L.W.Stephenson, 1933, A.A.P.G., p.1351 - "Here 6 feet of the Mount Laurel sand is exposed above water level, and is unconformably overlain by the Navesink marl. In a bed 3-4 feet above water level the sand is replete with many shells of Gryphaea mutabilis Morton, and with vast numbers of the guards of the cuttle-fish-like cephalopod, Belemnitella americana (Morton). Here and there among the other fossils are shells of Anomia tellinoides Morton, a highly important index fossil, restricted to this zone, and a companion fossil, Exogyra cancellata .."

LOCALITY 2: 1 mile north of New Egypt along Crosswicks Creek (leave cars at the railroad station). The Hornerstown marl (Eocene) with Terebratula harlani and microfossils. Weller placed the Hornerstown, Vincentown and Manasquan formationsin the Cretaceous but Cooke and Stephenson ,1928, J.Geol., put them in the Eocene, some of their arguments being the following. In these formations there is a total absence of such characteristic Cretaceous genera as Inoceramus, Exogyra, Trigonia, Sphenodiscus, Scaphites, Belemnitella and Baculites. Terebratula harlani is known elsewhere only from the Eocene of Maryland, and similar Terebratulas occur in the lower Eocene of Alabama and in the Upper Eocene of North Carolina. At Mullica Hill (a good fossil locality) the Hornerstown rests on the Mount Laurel. The base of the Hornerstown there is a greensand two feet thick, containing great numbers of phosphatic casts of reworked Cretaceous molluscs. The Hornerstown (Eocene) therefore overlaps on the Cretaceous, resting on different formations in different parts of the state.

From New Egypt proceed east to Cassville, turn north and then east on gravel road toward Smithburg. STOP on gravel road in the "Pine Barrens". Scrub oak and pine grow here on the micaceous quartz sand of the Kirkwood formation. Proceed to Freehold, then to Red Bank. Leave Red Bank on route 35, but make right turn on second road beyond the Navesink river crossing. Take the Highlands Scenic Drive to see a good view of Sandy Hook etc. Park cars on First Ave. near the Atlantic Highlands pier and walk along the railroad.

LOCALITY 3: Bluff along railroad track east of Atlantic Highlands. A number of gullies here expose the Navesink formation and a variety of fossils are weathered out, mostly as casts.

From Atlantic Highlands proceed to Hazlet, and follow the road south to the cut in the top of Beers Hill.

LOCALITY 4: Beers Hill, a cut in the Tinton beds of the Red Bank Sand. (Cretaceous) A variety of pelecypods, etc. will be found here, in some cases the shell has been replaced by the mineral vivianite.

Proceed south down the hill and turn left at the crossroads. Crawfords Corner school on the left. A few hundred yards further a bluff is seen on the right across a cow pasture. stop.

LOCALITY 5: Crawfords Corner, Navesink formation (Cretaceous). It will probably be necessary to dig near the base of the bluff to expose the shell bed. Belemnitella, Terebratella, Ostrea and Gryphaea may be found.

Proceed to Matawan and take route U.S. 9 to left turn toward Ernston. Continue across the crossroads at Ernston to road at right angles , turn left, stop.

LOCALITY 6: Clay pit near Parlin. Raritan formation (Cretaceous). no fossils Operation of a clay pit may be seen. Above the clay and white sand of the Raritan formation may be seen the Pensauken gravel of Pleistocene age.

Return to route 9 and follow to join with U.S. 1. Follow to Holland Tunnel. In order to get on the express highway keep to the left when paying toll and keep to left in tunnel. On emerging from tunnel take the left hand lane and make a left turn at the first traffic light onto Canal street. Follow it west to the entrance to the elevated highway. Follow Riverside Drive north to 155th St. then turn right and follow 155th across the bridge over the Harlem. Turn right off viaduct and straight ahead to the hotel.

	Beacon Hill gravel
Miocene or Pliocene	Cohansey sand
Miocene	Kirkwood sand
Eocene	Shark River marl
	Manasquan marl
	Rancocas group:
	Vincentown sand
	Hornerstown marl
Upper Cretaceous	Monmouth group:
	Red Bank sand with Tinton sand at top
	Navesink marl
	Mount Laurel sand
	Matawan group:
	Wenonah sand
	Marshalltown formation
	Englishtown sand
	Woodbury clay
	Merchantville clay
	Magothy formation
	Raritan formation

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EXCURSION C - 1: PROGRESSIVE METAMORPHISM OF THE HUDSON RIVER SERIES .

Poughkeepsie and Clove Quadrangles, New York. (Leader R. BALK)

BRING LUNCH: No Gas Station is located along the excursion route, which is approximately 30 miles long (from Stop #1 to Stop #8).

8:00 A. M. Leave New York (the driver of each car will please secure an automobile map, and drive to the following point of assembling in the field.)

10:00 A. M. Leave point of assembling in the field: Intersection of highways #55 and #82, at Billings, New York, facing south on highway # 82 (Poughkeepsie Quadrangle). Car of leader will await the New York cars here.

Stops:

1. Road fork, ½ mile south of "C" of "Sprout Creek", which is 2½ miles W-SW of Lagrangeville (Poughkeepsie quadr.).
Ledge of black and greenish-gray Hudson River slate. Zigzag folds, fracture cleavage, lithology of unmetamorphosed pelite.

2, 3. North-northeastward past Billings, Moores Mill, and Verbank. One or two stops at large new highway cuts, to study folding of beds, fracture cleavage, and variations of rock types in the Hudson River formation.

4. Stop on country road, 2 miles W-SW of Camby (Clove quadr.). Examine black lustrous slate with calcareous interbeds. If time permits, climb to top 1000', ½ mile N of Clove Mountain. Here Hudson River pelite with impure, finely crystalline limestone lenses, isoclinally folded and sheared, and cherty layers in phyllitic pelite, showing small folds, fracture cleavage, shear zones, and "cleavage banding".

5. Road cut at Camby shows black phyllitic slate, with first (westernmost) crystalloblasts of biotite.

6. Side trip to hill 940', ½ mile SE of Camby. Folded siliceous phyllite. First appearance of almandite in crystalloblast-studded single layers, or along shear zones.
Continue southeastward on road past Chestnut Ridge hamlet. If time and road conditions permit, one or two short stops to examine character of argillaceous rocks along the road.

7. Side trip to lodge of Bald Mountain Hunting Club (N-S road, 1 mile due W of Sharparoon Pond, Clove quadr.). Recrytsallized quartz-sericite schist or phyllite, showing scores of westward dipping shear zones, studded with many coarse crystalloblasts of garnet and biotite.

8. Further stops along the road to Dover Furnace, to examine more highly metamorphosed phases of the argillaceous rock series. Westernmost staurolites 1 mile NW of Dover Furnace.

9. If time permits, a few additional stops in Harlem Valley, to see relations between schist and marble.

Excursion disbands in the field, on highway #22, at, or a few miles north of, Pawling, New York (Clove quadr.).

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EXCURSION C - 2: GLACIAL GEOLOGY of LONG ISLAND (Leader G. F. ADAMS)

Mileage	
0.0	ROUTE: Concourse Plaza Hotel; follow Grand Concourse south to E. 138th Street.
1.1	Turn left, going east along 138th Street.
2.1	Turn right at Cypress Avenue.
2.3	Bronx Entrance, Tri-Boro Bridge.
2.8	Queens Toll Gate; 25¢ per car.
3.2	Randall's Island Stadium to right; Hellgate R. R. Bridge to left.
4.2	Ward's Island
5.0	End of Tri-Boro Bridge. Beginning of Grand Central Parkway, L. I.
7.6	Turn right off Parkway into 94 Street. Turn left on first through street to 100th Street. Here turn left to end of street.
8.0	STOP # 1: MANHASSET sand. Lower Manhasset Plateau across Flushing Bay.
	ROUTE: Retrace route to Grand Central Parkway.
10.0	World's Fair Administration Building. Keep on Parkway.
.6.5	NOTE: Knob and Kettle topography on right. Harbor Hill (Wisconsin) moraine.
16.9	Kettle lake in terminal moraine.
17.2	Outwash plain to south.
17.4	STOP # 2: Turn right, off parkway. Harbor Hill moraine a thin capping on Manhasset sand. Note scarp between moraine and outwash plain.
20.6	ROUTE: Northern State Parkway. Road swings to Ronkonkoma moraine.
27.9	Turn left at end of Northern State Parkway.
28.1	Turn right into Jericho Turnpike, Route 25. Road continues on Ronkonkoma moraine.
33.2	At Jericho, turn right onto Route 106. Continue to Hicksville.
35.1	At Hicksville, turn left onto Route 107. Turn left onto road to Nassau County Sanatorium.
35.4	Cross R. R. tracks.
35.5	Turn right on Park Avenue.
35.7	Turn left at Plainview Avenue.
39.5	Straight ahead at Plainview.
39.6	STOP # 3: Gravels in road cut.
39.9	ROUTE: left turn.
40.4	Right turn on old country road.
41.0	STOP # 4: Manotto Hills. MANETTO GRAVEL.
41.6	STOP # 5: MANETTO or CRETACEOUS sand.
42.0	ROUTE: Turn left onto Huntington - Amityville road, Route 110. Proceed to South Huntington.
45.0	Turn left onto Route 25 to Jericho. Turn right at Jericho onto Route 106. Turn left onto Route 107 to Glen Cove. Turn left onto first road on north side of inlet. Continue to end.
66.5	STOP # 6: Hempstead Harbor Club. CRETACEOUS clays and sand. Walk toward Red Point; - possible Gardners Clay and Jacob sand.
67.6	ROUTE: Turn right on road leading south to Roslyn.
73.1	Turn right onto Route 25A at Roslyn.
76.8	Turn right onto Route 101 to Beacon Hill.
78.8	STOP # 7: MANHASSET formation.

Retrace Route 101 to 25A. Continue along Northern Boulevard to Grand Central Parkway. From there back to city.

Condensed from M. L. Fuller, GEOLOGY OF LONG ISLAND: U. S. G. S. Prof.Pap. 82, 1914.

MID-WEST CORRELATION	CLIMATE	FORMATION		DESCRIPTION	OCCURRENCE
Wisconsin	Glacial	Harbor Hill Moraine		15-20' of boulder clay on erosion surface	Queens to Roslyn
		Ronkonkoma moraine		sprawling knob and kettle	Northern State Pkwy. to Jericho
Peorian (?) Iowan (?) Sangamon (?)	Interglacial	Vineyard peat erosion interval and clay			Hudson Channel
Illinoian	Glacial	Manhasset	Hompstead gravel	similar to Herod; grades into it where Montauk till is absent	Hempstead Harbor
			Montauk till	Boulders in clay-filled sand are weathered biotite granite.	75' A. T. in gravel. Locally absent.
			Herod gravel	Sand & gravel; high qtz. content from Cret. or Manetto. Little folding.	Hempstead Harbor
Yarmouth	Transitional	Jacob sand		fossiliferous (?) qtz. flour grading into Gardiner's clay. Folded by advancing ice.	Red Spring Point
	Interglacial	Gardiner's clay		West. L.I. - gray (from Cretaceous) East L.I. - red (from Conn. Triassic) Folded by Manhasset ice.	Red Spring Point- "few feet of greenish clay with qtz. pebbles below Jacob sand."
Kansan	Glacial	Jameco gravel		Rounded pebbles & cobbles; where found always capped by Gardiner's clay.	No good exposures- -found by drilling in broad valleys cut in Manetto & Cretaceous
Aftonian	Interglacial	Valleys cut in Manetto and Cretaceous.			
Nebraskan	Glacial	Manetto gravel		stratified, cross-bedded gravel; qtz. pebbles 1" - 1½" diam.; few deeply weathered granite and crystalline boulders	West of Melville. Manetto Hills Sea Cliff Knolls on Manhasset Neck.
CRETACEOUS		White sand red clay		dated by fossil plants; oldest Cretaceous in Long Island	Glen Cove.

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EXCURSION C - 3: ENGINEERING PROJECTS in NEW YORK CITY (Leader T. W. FLUHR).

8.00 A. M.: Leave Concourse Plaza Hotel. Proceed over Washington Bridge to George Washington Bridge.

The Manhattan Pier and anchorage of this bridge rest on Manhattan Schist. The New Jersey pier rests on the Triassic shales and sandstones, while the anchorage is in the overlying diabase.

Cross George Washington Bridge; proceed south on Routhe 9W, along the edge of the Palisade ridge to Weehawken. At Weehawken, turn east on road to Weehawken - 42nd Street Ferry. Just before reaching ferry, at end of viaduct, turn south and follow road for one-fourth mile, crossing railroad spur. Parking space will be found near place where Lincoln Tunnel is under construction.

The Lincoln Tunnel (Midtown Hudson Tunnel) passes beneath Kings Bluff, a spur of the Palisades ridge described in detail in U. S. G. S. Folio # 83. A cut has been made in the cliff, and the contact of shale and diabase is exposed. A good section of the sedimentary strata and a thin diabase offshoot are exposed in the ventilation shaft. The bulkhead for the under-river section of the north tube is to be seen.

Proceeding around the end of Kings Bluff the shale-diabase contact can be examined in detail. Behind Kings Bluff is the Tunnel Plaza. This is in a small valley which has been eroded between the main Palisade ridge and the fault block of Kings Bluff. The area is extremely complex, the major fault being accompanied by small subsidiary and cross faults. These cause repetition of shale-sandstone and diabase blocks.

Take Weehawken - 42nd Street Ferry; on leaving ferry, proceed immediately south to 39th Street at the river, where the caisson for the north tube is now in process of being sunk.

Distance 10 miles. Estimated total time 4 hours.

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