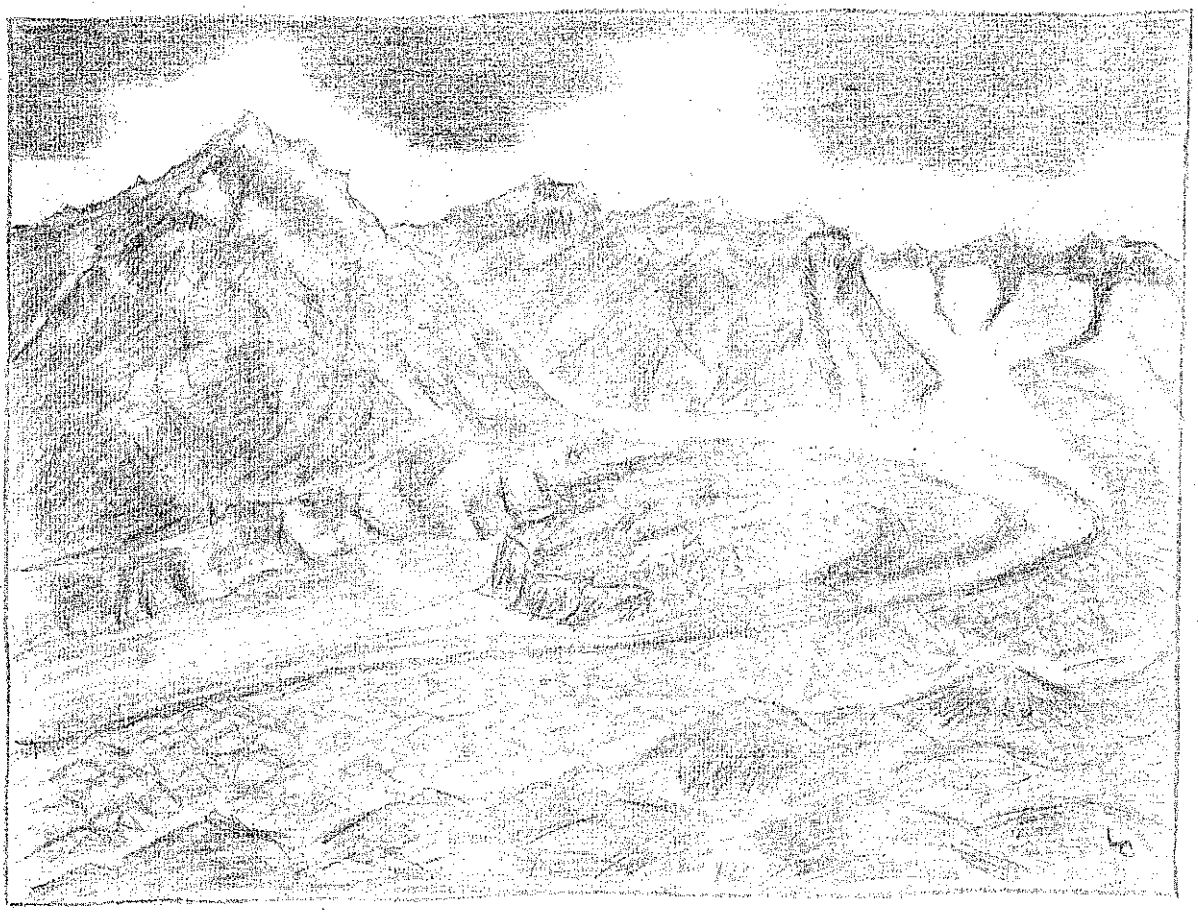
NEW YORK GLACIOGRAM



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EDITOR'S PAGE

One trouble with editors is that they often feel compelled to editorialize. I have resisted the urge until now, but feel it is time to break silence. My special thanks go to the contributors without whom, of course, Glaciogram would be defunct. I also appreciate the comments and letters of encouragement that several of you have written. The combination of these two ingredients help ease the burden of this effort.

As can be seen in the current issue, Glaciogram has continued its expansion, but the growth has probably nearly plateaued. The idea for some type of communication among Quaternary friends, started with a nucleus of 20 people but grew to 37 with the first issue, to 66 for the second issue, and is currently at 80. The number of contributors has increased from 20 to 26.

I wish to welcome the newcomers to New York. For example my good friend Jerry Parker has returned to the east and has facilitated several contributions from his staff. It is also good that Ken Fahnestock has returned, and I will be counting on him to supply us with new ideas in the near future. Note the change of address for Gordon Connally and how he is just barely in glacial terrain.

One of the greatest benefits that can emerge from the Glaciogram is to serve the function of a forum, sounding board, and request for ideas. Therefore, I call to your special attention such questions as raised by Holmes, Faust, Calkin, Coates, Oliver, etc. Here is the place where non-contributors can also cooperate by increasing our bank of knowledge and providing pertinent information whenever possible.

Suggestions for improvement of this service are earnestly solicited. Please tell me what you like, don't like, and how to make this more effective.....realizing that it is difficult to please all people all the time. The tightly-typed pages make for difficult reading, but the format was adopted owing to time restrictions for our secretaries. However, I hope to be able to experiment with style in the May issue, and your advice would be helpful.

DRC

Chauncey D. Holmes 9/30/67

By the time you will be reading this note, I hope to be working on a second set of peat-pollen samples from an upland swamp west of Norwich, N. Y. The first set, studied late last winter, shows the usual postglacial sequence of vegetation, and the basal sediments contain what I interpret as a poorly preserved record of nonglacial (interstadial?) time.

No doubt you all read the final paper by Bretz on the Calumet shorelines in the Lake Michigan basin (Jour. Geol., v. 74, pp. 78-79; also see his 1959 paper), and noted that his interpretation requires a Valders ice blockade of the St. Lawrence and Mohawk valleys. This is quite at variance with the view now prevailing in our area that the Valders limit lies north of the St. Lawrence. Who's right?

I suggest that all interested persons review carefully the evidence re the extent of Valders glaciation in our eastern region to determine whether it requires, or merely permits, us to place the Valders terminal boundary north of the St. Lawrence. This problem has an important bearing on interpreting any record of late-glacial vegetation hereabouts, and it's our problem. How can we best handle it?

George W. White 10/3/67

Bulletin G-55, Pennsylvania Geological Survey, "Pleistocene Stratigraphy of Northwestern Pennsylvania" by G. W. White (Illinois), S. M. Totten (Hanover), and D. M. Gross (Illinois) is now in press. It deals particularly with the Early Wisconsinan (Altonian) and pre-Wisconsinan (Illinoian (?) and "pre-Illinoian") tills. It includes over a score of longitudinal sections illustrating stratigraphic units exposed over long distances in strip mines or superhighways. One chapter is on the petrography of the tills and includes trend surface analyses of some of the characters.

I will be on sabbatical leave during the first semester 1967-68, and will spend part of that time in England and on the continent. I have been asked to talk on Pleistocene stratigraphy of the Allegheny Plateau at the Geological Society of London on November 22, and will also talk to the seminar of the Institute for Geological Sciences on November 21, but on a historical rather than on a glacial subject.

Mildred E. Faust 10/16/67

My Project, at present, is collecting and dispensing information concerning New York State Bogs. This is an expansion of work of many of my students before my retirement. At present, I have specific localities, separated by counties, of only some 60. It is hoped that this will save others many hours of searching. However, this can be expanded only with the help of people, such as you, who are working in or near bogs and have information concerning them. This includes some or all of the following:

1. Locality, detailed) name
2. Appearance: surface vegetation, closed or open, size, depth, etc.
3. Ownership
4. Method of contact (permissions etc.)
5. Person doing the research or reporting information
6. Type of study
7. Place of depository of materials: soil, plants, slides, etc.
8. Place of publication or available information

I will be looking forward to hearing from any of you who have information and will gladly reciprocate.

Walter S. Newman 10/16/67

I devoted last June to mapping on the Montauk Peninsula of eastern Long Island. The "Montauk Till" problem still remains obdurate in that I cannot divorce it from the Ronkonkoma end moraine. It seems clear to me that MacClintock and Richards (1936) and Suter, et al. (1949) quite properly questioned the validity of Fuller's (1914) separation of this till from "Ronkonkoma Till". I find I also must agree with Upson's (in press) contention that much of Fuller's (1914) "Gardiners Clay" exposed on the Montauk Peninsula is proglacial and/or ice-contact lacustrine sediment. One of our graduate students, Lillian Musich, is studying the palynology from these laminated silts and fine sands and comparing her suites with those isolated from the pre-Ronkonkoma ("interglacial") silts and clay found in water wells at depths of 60 feet or more below sea level in western Long Island.

"Loess-like" silt and fine sand ubiquitously overlays Ronkonkoma drift on the Montauk Peninsula. It is separated from the drift below by a "lag gravel or concentrate" whose clasts are occasionally ventifacted. The situation of this eolian material is analogous to that described by Schafer and Hartshorn (1965) in southeastern New England.

Les Sirkin, Dave Thurber and myself are working up a Long Island trip for the next NYSGA meeting here at Queens College and hope to give you some new perspectives on Long Island Geology.

With my colleagues, Pete Mattson and Jack and Jessie Donahue, I visited the Azores Archipelago for 16 days this past summer. Saw what I believe to be my first honest-to-goodness post-glacial three meter terrace. The terrace is partially covered with an encrusting algal limestone containing numerous littoral mollusks. I anxiously await the C-14 date. (Yes Arthur, I still believe in a Holocene higher stand of sea level.)

Dave Thurber C-14 dated a Crassostrea virginica valve from the lower midden at Montrose Point. The date (L-1038E) came in at 5650+200 years B.P. which indicates that salinities in the Haverstraw Bay section of the Hudson Estuary were appreciably higher at that time than they are today. Although the "thermal maximum" is probably real, the subsequent decline in salinities is due, I believe, to later Holocene sedimentation in the estuary which decreased the efficiency penetration into the estuary by marine waters.

Robert F. Black 10/18/67

During the summer on a CIC (Committee for Institutional Cooperation of the big ten schools and Chicago) project financed by the National Science Foundation a group of us from the Universities of Wisconsin and Illinois excavated part of the Two Creeks locality in Wisconsin. We took many thousand feet of motion picture film, hundreds of slides, and many specimens. Our goal is to prepare a variety of teaching aids including sample study kits for use in our CIC institutions. We have some 10,000 students each semester in the beginning courses in Geology. It is impossible to take them to a field locality such as Two Creeks so we must bring the field locality to the laboratory. In doing this excavation we put a sheet metal building over it and now have the nucleus of a permanent exhibit showing the Two Creeks forest horizon with in situ stumps and many driftwood logs. This will permit later on visitations by scientists and students at any time of the year. Right now facilities are primitive and a permanent caretaker is not available. Nonetheless, educational groups can make arrangements to see the exhibit by contacting the Chief Ranger at Point Beach State Forest at Two Rivers, Wisconsin.

Richard P. Goldthwait 10/18/67

In the summer Lon Drake (Ohio State) and Steve Forster (Syracuse) working under me did till analysis in the Wolfeboro-L. Winnipesaukee area, New Hampshire. They measured three pebble axes, shapes, mechanical analysis including cobbles, lithology, orientation and dip of 100 pebbles, bulk density, pH and so forth in detail study of 47 till cuts more than 6' deep. From the field study two end-types of till were very clear: (1) the ubiquitous loose, stony, angular, low in silt-clay, brown and (2) the deeper compact, silt-clay rich, solid, gray, with strong fabric. A few similar cuts are now done in Ohio for comparison - where loose till is rare or absent. All data will be processed statistically on the computer to seek information about effect of lithology on shape, comminution en route, means of ice deposition, and so on.

Milton Moos under my direction at Ohio State University has re-drilled some bridge sites along I 71 in west central Ohio. Pete Ogden at Ohio Wesleyan is dating these and looking at the plant remains. It was expected that these might reveal the conditions and time of the Reesville Moraine ice advance to the "silt line" (loess limit) in Ohio. It is possible that one organic bed found (17, 340 ± 390 BP) does just this.

Again in west central Ohio Jane Forsyth has brought together all the new information on Logan County, Ohio for map publication by Ohio Geological Survey and I am doing the same thing for Champaign County just south of that. This is the famous interlobate area where the tracing of amalgamated moraine crests and soils and the geophysical exploration of older overlapping drifts makes the picture complicated. The three greatest Wisconsin-age outwashes in Ohio stem from here.

Jane L. Forsyth 10/19/67

Since my move to Bowling Green, Ohio, I have begun new studies on the interpretation of the Ohio lake plains:

(1) Strongly defined Beaches (or bars) at 705' near Bradnor in eastern Wood County have always been called Warren, but stand too high. This is the same elevation as the strong U-shaped bars (beaches) of the Bowling Green area, classically called Warren. Are these Arkona, persisting as clearcut topographic features despite subsequent submergency by Whittlesey? - I still don't know the answer.

(2) Beaches at Leipsic, in Putnam County,on the north side of the Defiance Moraine, have classically (and according to Forsyth 1959) been called Maumee III. New evidence from Soils studies (S.C.S.) and the new detailed (7 1/2') topographic maps support the interpretation that these beaches are all Maumee II and that the beach of Maumee III lies well to the southeast, high up on what has always been accepted as end moraine. Studies are now in progress and a short note should be submitted for publication this winter.

(3) Distribution of plants in relation to geology is now my main topic of research. Tree distribution in Wood and adjacent counties seems to relate to scattered occurrences of sand bars on the clayey glacial till of the lake plains; distribution of all kinds of plants, in a continuing study being conducted by Dr. Ronald L. Stuckey of O.S.U. with cooperation by myself, seems to show relationships to origins in either the Mississippi Embayment, the eastern Appalachians, or more northern sources, actual occurrences of individual species being controlled also by the nature (pH, moisture, etc.) of the underlying geology.

John Nicholas 10/20/67

This is the abstract of my doctorate dissertation entitled: "Late Pleistocene Palynology of Southeastern New York and Northern New Jersey"

Pollen analyses are presented of eight bog and lake sections between the Wisconsin terminal moraine in northern New Jersey and Sterling Forest in southeastern New York. The localities were chosen so that they followed the direction of glacial recession in the area. Three sections were taken in Sterling Forest, three from the area of the terminal moraine near the towns of Budd Lake and Stanhope, New Jersey, and two intervening near the towns of Kitchell and Clinton, New Jersey.

Zone T (Herb or Tundra Zone) recognized in some sections from the northeastern United States is not manifest in the basal sediments. Initial clay and silts are extremely low in pollen content and apparently contain only the wind-blown grains of pine, spruce, oak, and birch from forests to the south. NAP constitute less than 5 percent of the total pollen in these sediments.

Zone A (Spruce Zone) exhibits a spruce maximum in which the spruce percentages rarely exceed 40 percent of the total pollen. Only sections from Sterling Forest appear to exhibit double spruce maxima, the first of which is always more prominent than the second. The highest NAP percentages in this zone, from 15 to 25 percent of the total pollen, are found immediately preceding the major spruce maximum. Sedges, rather than grasses as reported elsewhere by other workers, are the dominant NAP found in Zone A.

Zone B (Pine Zone) is a conspicuous feature of all eight pollen diagrams and can be recognized by high pine percentages (generally in excess of 60 percent of the total pollen) and maximum absolute pollen frequencies. The APF during the pine maximum is from three to four times as great as that recorded from the remainder of post-glacial time. Zone B-1 is characterized by maxima of birch and fir, while the upper Zone B-2 marks the pine maximum. Size-frequency data suggest that jack pine (Pinus banksiana) was the dominant pine during all of A and B-1 time. Zone B-2, however, is interpreted as a time during which white pine (P. strobus) gained control of the forest cover at the expense of birch (cf. Betula glandulosa or B. populifolia). Radio-carbon dates obtained on the pine maximum from Sterling Forest and the terminal moraine are in agreement with generally accepted Zone B dates from 7500 to 9500 years B. P. (Davis, 1965). This indicates that the pine maximum was attained at approximately the same time along the entire length of the terminal moraine.

Zone C, lying above Zone B, closely follows the original zonation of Deevey (1939, 1943). Zone C-1 is defined by maxima for oak and hemlock (which generally exhibits double maxima), Zone C-2 by oak and hickory, and Zone C-3 by oak and chestnut.

Initial (Zone A) vegetation following deglaciation of southeastern New York and northern New Jersey appears to have been a spruce-parkland indicative of a cool-moist climate.

Climatic amelioration is revealed by the rapid decline of spruce and fir and subsequent rise in birch (Zone B-1) and pine (Zone B-2). This change caused successional replacement of the boreal forest.

Zone C marks the beginning of the interval of deciduous forest. This is shown by the appearance of several deciduous genera in the pollen diagrams and the rapid decline of pine. Climatically, Zone C. commences with an early moist interval characterized by hemlock and

oak forests (C-1), proceeds to a relatively dry period in which hickory forests are prominent (C-2), and culminates with a return to moist conditions with the maximum development of chestnut (C-3).

Vegetational changes observed in the upper portions of several of the sections suggest that man, as well as climate, has been an important factor modifying the environment. The rapid decline of chestnut near the top appears to be attributed to Indian and white man's cutting and clearing activities as well as the more recent chestnut blight.

William D. Sevon 10/23/67

I spent much more time this summer on tilloids at the base of the Pocono than I did on the Illinoian(?) deposits of northeastern Pennsylvania, so there isn't much to report.

Field evidence gathered so far indicates that the Illinoian(?) glacial boundary shown on the current state geological map of Pennsylvania (Gray et al., 1960) requires modification in Carbon County. The Illinoian(?) ice apparently did not extend down the Lehigh River to Palmerton nor did it extend to the Lehigh River for at least 8 miles north of Jim Thorpe. It did project southward in the form of several fingers from the Pohopoco Creek valley towards Kunkletown and Little Gap, and did cross the Lehigh River at Lehighton. Till and outwash are the only materials recognized so far in these deposits.

The 32nd Annual Field Conference of Pennsylvania Geologists was held September 29th and 30th, 1967, under the leadership of Jack and Anita Epstein, both with the U. S. Geological Survey. The field conference covered the "Geology in the region of the Delaware to Lehigh Water Gaps", and included several interesting stops to see both Wisconsin and Illinoian(?) glacial deposits. There was also some discussion of the Pleistocene drainage modifications of the area.

Michael H. Frimpter 10/27/67

During the course of my study of ground-water resources of Orange and Ulster Counties for the U.S.G.S., our field party collected about 500 lithologic logs of glacial deposits and more than 1600 well records. These subsurface data reveal some interesting facts which might only be suspected from surface observations.

Most of the small elongate hills of the Ridge and Valley province west of Newburgh contain rock cores. A few, however, are drumlins composed entirely of lodgment till. These drumlins are oriented parallel to the rock-cored hills and ridges, and except for the lack of bedrock outcrops, are difficult to recognize without subsurface data.

Well drillers report extremely difficult drilling conditions on the southeastern slope of Shawangunk Mountain in the vicinity of Walker valley and Crawford. Frequently more than 200 feet of casing is required to penetrate the unconsolidated deposits. In one well 321 feet of casing was used. The lithology of the unconsolidated material seems to resemble best that of talus; and much of it is derived from the Shawangunk formation which lies at a higher elevation immediately to the northwest. The material is probably pre-Wisconsin talus formed at the base of the erosion-resistant Shawangunk formations. Some of the talus might possibly have been deposited by glacial ice crossing southeastward over Shawangunk mountain, but certainly this area was not scoured by a southwestward moving Wallkill Valley lobe.

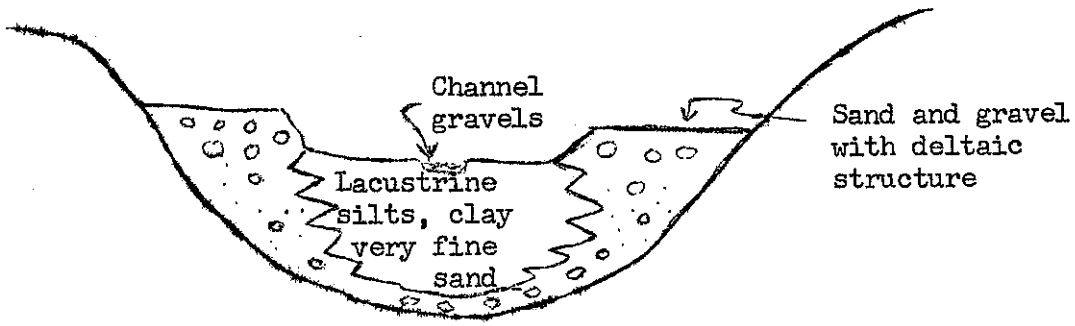
I found substantial thicknesses of lacustrine sediments in the Catskill mountain sections of Esopus and Rondout Creek valleys. This evidence supports J. S. Rich's conclusion that during Wisconsin deglaciation, the ice left these mountain valleys while it was still active in the lower Esopus valley (Rich, 1934, Glacial Geology of the Catskills; N.Y. State Mus. Bull. 299). The formation of lacustrine sediments in these valleys required a downstream dam, and glacial ice seems to be the most readily available dam.

William A. Hobba, Jr. 10/27/67

The summer of 1966 was spent doing reconnaissance mapping of the surficial geology and well inventory of the Lake Champlain drainage basin for the Water Resources Division of the U.S.G.S. May and June of this summer were spent doing the same thing in the adjacent Upper Hudson drainage basin.

I found the bedrock and surficial geology of this area very interesting. Of particular interest to me was the considerable thicknesses of stratified deposits penetrated by wells in the valleys of this mountainous region. Well data show that outwash and deltaic sand and gravel near Loon Lake are over 215 feet thick, silt and clay near Lake Champlain at Crown Point is over 260 feet thick, and one well along the Saranac River near Cadyville penetrates 246 feet of sand and clay. Seismic studies by the State Department of Public Works indicate the presence of a buried channel beneath more than 300 feet of stratified deposits near Glens Falls.

Robert D. MacNish 10/27/67



A year ago I gave the typical valley section shown above without explaining its origin other than to say it was related in some manner to active ice. This year I'll explain the genesis of the section. In the waning stages of glaciation in the Susquehanna River a debris plug at Binghamton formed a dam that created a lake in the over-deepened bedrock valley between the debris dam and the ice lobe in the valley upstream. As this active tongue of ice in the major valley wasted, the meltwater flowed along either or both lateral margins of the tongue, debouching into the lake at the glacial terminus. Kame-deltas formed at the mouths of these marginal streams, and as the ice front retreated the coalescence of kame deltas along each side formed kame-delta terraces. In places remnants of a true kame terrace are found above the kame-delta terrace. These true kame terraces were deposited in the same ice marginal drainage that was forming kame-delta terraces further down the valley. A slow retreat permitted extensive development of terraces; a fast retreat resulted in the deltas not even being

built up to the lake surface. A standstill, minor readvance, or very slow retreat either allowed deltas to coalesce or permitted single deltas to extend across the valley to form a deltaic moraine with a lobate form and ice contact features at the upstream end. The basal gravel in the section is deposited directly below the floating end of the ice tongue with the fines winnowed out as they fell through the lake water. In addition, some of this basal gravel may result from turbidity current activity off the deltas along the valley sides. Examples of these types of sections may be seen throughout the eastern Susquehanna basin. Very good examples of the delta moraines are found at Wells Bridge and Chenango Forks; good examples of the wide terraces are found between Afton and Nineveh; and examples of a rapid retreat with no terraces, at Sherburne.

The conviction somewhat hesitantly expressed last year of active ice tongues extending far down the major valleys in the retreat phase has been strengthened by the discovery of numerous examples of ice-push (folded gravel, the extreme example being a recumbent fold in a gravel pit southwest of Edmeston), which suggests active ice during the formation of the kame-delta terraces. Some evidence of stagnant blocks of ice (eskers, kettles, etc.) is found in the valleys, but only in east-west valleys, or in similarly oriented segments of otherwise north or northeast trending valleys. Because these stagnant blocks occurred only in east-west valleys, or in places in major valley where valley geometry created more than usual resistance to the flow of the thinning ice tongue, the presence of stagnant ice features in these valleys is not at all inconsistent with active ice tongues during deglaciation.

Roger M. Waller 10/27/67

I am completing the field work phase of a U.S.G.S. water-resources study of the Black River basin. In September our field party drilled about 20 auger holes in some of the upland east of the Black River sand areas. Very little coarse material was found. A couple of holes dug on the Camp Drum Military Base uncovered till beneath the delta. A thick deposit of lake clay was found near Constableville. Splits of samples can be made avaiable for any investigator that desires such.

The winter will be spent in writing up the geologic and ground-water investigations. The final report will be combined with a surface-water study and report by Gordon R. Ayer, U.S.G.S. hydraulic engineer.

Harold W. Borns, Jr. 10/27/67

The majority of the summer was spent gathering data necessary to complete my two year study of extensive end-moraine complex in eastern coastal Maine. Most of the problems raised during the 1967 meeting of the northeastern section of the Friends of Pleistocene in the area have been resolved. I owe the Friends a debt of gratitude for offering such good constructive criticism of my work.

The remainder of the summer was spent on the east coast of Baffin Island with Minze Stuiver, Yale Radiocarbon Lab, in an attempt to make isotopic studies of materials associated with late glacial sea-level changes. Unfortunately, logistics defeated the primary purpose of the trip. This work was supported in part by the Geographical Branch of the Dept. of Energy Mines and Resources of Canada and by the National Science Foundation. Late in September

two weeks were spent in a reconnaissance of the Pleistocene deposits of northwestern Maine in anticipation of possibly beginning intensive field work in this region next summer.

Prof. Bradford A. Hall and I have recently received a grant from the National Science Foundation - Antarctic Research Program to study the "Age and Origin of the Mawson Tillite(?), West Antarctica". The field work will begin in October 1968.

Dale F. Ritter 10/27/67

Although I have not been personally involved in much of the actual research, two of our seniors, Eugene Foord and William Parrott, have been keenly interested in various aspects of the Pleistocene geology of Long Island. Their work has resulted in many interesting problems and, unfortunately, a myriad of loose ends waiting to be tied. After putting our heads together, we felt that the most important contribution that they could make at this time would be a quite detailed analysis of one very deep core. As a result, they are presently trying to establish stratigraphic units in the post-Cretaceous sediments near Smithtown, Suffolk County, based on clay mineral assemblages, size analyses, heavy minerals, etc.

There is no way of knowing at the present time whether this core contains a complete record of the Pleistocene events -- probably not. We feel, however, that this type of study is a step in the right direction and hopefully can be used in correlations of subsurface units in other places on the Island.

Joseph A. Caggiano, Jr. 10/27/67

My summer was spent assisting Dr. Muller in tracing the Binghamton border eastward to the Genesee valley and beyond, and in moving from Elmira to Philadelphia where I joined the faculty of Temple University's Dept. of Geology. While some progress was made in mapping, topographic expression of the "Binghamton" moraine in the area of the Genesee River is extremely subdued and consequently newly mapped positions are hypothetical. Drift lithologically and topographically similar to "Binghamton" was mapped independently by me in the Tioga River valley. However, as is characteristic of Binghamton drift, the moraine could not be traced for any great distance onto the uplands. Reconnaissance mapping of the Borden and Woodhull 7 1/2' quadrangles suggests the presence of two recessional positions of Olean ice.

The rapid diminution of crystalline grade sizes observable in traverses normal to and across the Binghamton border (where well marked) is perplexing. Cobbles and pebbles of crystalline are relatively common in "Binghamton" drift, but decrease in number markedly in a short distance beyond the moraine. Only small pebbles of crystallines are observed (in notably reduced proportion) in Olean drift within a few hundred yards of the Binghamton border. The satisfactory explanation of such a phenomenon would perhaps shed new light on the "Binghamton" problem, or else further add to the confusion.

It seems strange residing in unglaciated territory for the first time in my life. I hope my interests do not become as polluted as the local air and water.

Allan D. Randall 10/30/67

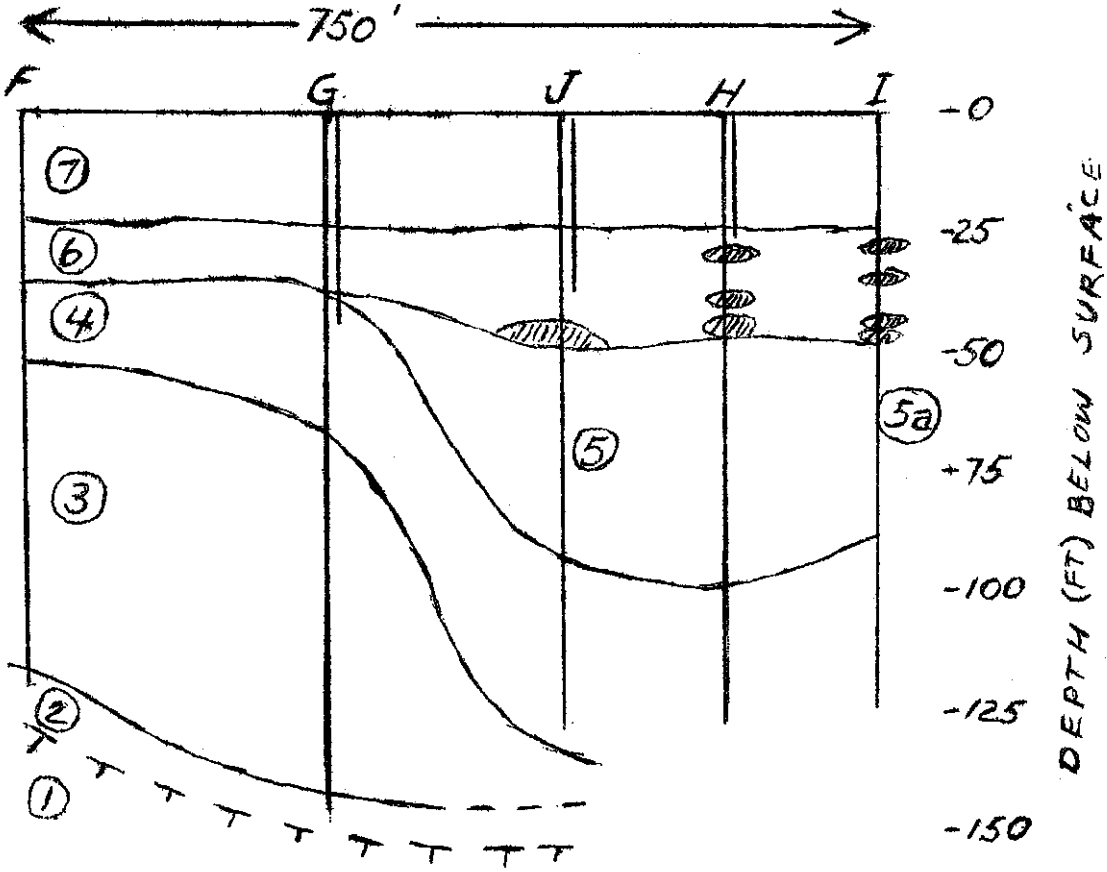
The Susquehanna basin water-resources team at Binghamton spent most of its time this summer measuring the flow of small streams, and mapping surficial deposits and stream nets in a few small upland basins. However, we also drilled several observation wells, and some of you might be interested in the wood-bearing section we found about a mile north of the junction of the Chenango and Susquehanna Rivers at Binghamton.

In the sketch, the numbered units are

1) shale bedrock
2) pebbly sand, drab, almost entirely fragments of local shale and siltstone
3) lake beds, chiefly silt to very fine sand
4) gravel and sand, bright, calcareous; numerous pebbles of limestone, chert, quartzites, gneiss, etc.
5) lake beds, chiefly silt to fine sand; some twigs and fine organic matter

5a) very fine to medium sand, in part silty, interbedded with a little coarse pebbly sand; possibly deltaic, possibly in part equivalent to (4)

6) gravel and sand, bright but leached free of limestone. Layers of woody peat - including walnuts, small hemlock-like cones, and innumerable twigs--present at wells H, J, and I (dark blobs on sketch)
7) Trash (much of Binghamton is built on its own garbage).



Unit (2) is equivalent to narrow kame terraces of "drab" gravel scattered along the sides of the Susquehanna River valley downstream from Binghamton. Unit 4 is equivalent to widespread terraces of "bright" gravel about 875 ft. altitude in Binghamton. A marked extension of the meltwater drainage system northward up the Chenango valley must have occurred between (2) and (4). The development of 2 lakes and the downwarping of intervening unit (4) reflect gradual melting of stagnant ice. Downwarping of unit (4) can be demonstrated by hydrology as well as lithology: water levels and temperature in a 30-ft. well at G respond far more rapidly to pumping of industrial wells in the deep part of unit (4) than do similar shallow wells at J and H. The younger lake unit (5) may well extend continuously 4 miles north to Chenango Bridge, where lake beds are overlain by coarse deltaic sediments heading at the Chenango Forks "moraine". If so, I suspect unit 6 represents much later Chenango River alluvium which gradually encroached on a long-continued kettlehole lake.

We have samples of cable-tool drillings collected every 5 ft. from 6 wells (one west of sketch) plus one or two pints of organic fragments from each highly woody layer. We will not be dating or otherwise studying the organic material, but I assume botanical-palynological-radiocarbon analysis might be worthwhile. After I've finished looking at these samples this winter, I'll leave them with Ye Glaciogram Editor unless someone else requests to study them immediately.

Parker E. Calkin 10/31/67

Most of the past field season was spent in the southern part of Erie County mapping the Gowanda and Lake Escarpment Valley Heads Moraines. Preliminary work of the Valley Heads at Springville by Jack Sweeney and on the area to the west by myself, suggests that the moraine here may be a composite of at least two advances separated by extensive lake formation in the Cattaraugus Creek area. With the exception of the Gowanda Hospital cut (described by Ernie Muller) no datable material was found in the moraines or in the County anywhere--most frustrating.

Continued search and correlation of beach ridges within the Erie Basin has turned up some well-formed shale shingle, beach ridges 30 feet below the Whittlesey ridge near North Collins (south of Buffalo). This is between the Lake Escarpment and the Hamburg Moraines. These beaches might be correlative with good beach ridges between Whittlesey and Warren strand lines found in northern Ohio (per Jane Forsyth). I was tempted to think in terms of a Lake Arkona origin which would, in turn, require that the Port Huron be correlated with the Hamburg Moraine instead of the Valley Heads. However, there is no good evidence that these were over-topped by a higher lake (Lake Whittlesey) and hence may simply represent a brief pause in the drop from Whittlesey to Warren level.

Some hasty study in the Alden - Batavia - Clarence area east of Buffalo seems to suggest the possibility of a three-fold division of Warren waters (to agree with evidence in Michigan) and the existence of a low water (Lake Wayne?) stage prior to lowest Lake Warren. The latter lake is apparently best correlated with the Batavia/Barre Moraine which truncates the Niagara Falls Moraine (which in turn has been modified by lowest Warren waters in the Niagara Falls area of Ontario). This is not really news as Fairchild came to a similar conclusion more than fifty years ago though others have not always agreed with this interpretation.

Question???? Has anyone run into nearly perfect circular patterns (as seen in aerial photographs) in thick drift over shale bedrock? Southwest of Springville along Cattaraugus Creek, within the Valley Heads Moraine complex, there ar numerous such patterns outlined by streams or more usually vegetation. Most are about 1500 feet in diameter, are raised very slightly (less than a few tens of feet) or even slightly depressed although they cannot be spotted from the ground by any lithologic/textural or topographic change from adjacent areas. They seem to occur largely in sandy till. They don't look like any kame/kettle or morainal feature I have ever encountered. Have a student studying them but wondered if anyone had seen anything similar.

Eugene Foord and William Parrott 10/30/67

We are presently Senior year geology majors at Franklin and Marshall College. We became interested in the glacial geology of Long Island two years ago in a sedimentation and stratigraphy course under Dr. John H. Moss. For a project we did a detailed study of the stratigraphy exposed in gravel pits located between the two moraines on the island, near the town of Smithtown. The deposits indicated the advance of the Harbor Hill ice following quiescent conditions. The following year we followed up the mention by Lubke (USGS WSP 1669-D) of a large buried lacustrine deposit beneath most of the area. With the cooperation of the U.S.G.S. at Mineola and the Suffolk County Water Authority, we obtained bailer samples from a well penetrating these deposits, in addition to about 160 well logs from the region. The samples were X-rayed (diffraction) to determine clay mineralogy; sand-silt-clay ratios were determined; and heavy mineral analyses were performed. From this detailed examination, a clear stratigraphic sequence emerged which appears to be indicative of the retreat of the Ronkonkoma ice, and formation of a glacio-lacustrine deposit, which became finer and then coarser with time. Lake deposition was terminated by the influx of pro-Harbor Hill sediments.

This year we have decided that the most important contribution we can make at this time is a quite detailed analysis of one deep core, with the aim of extablishing stratigraphic units in the post-Cretaceous sediments beneath Smithtown, Suffolk County. The analysis will be based on clay mineral assemblages, size analyses, etc. It should probably also be noted that our preliminary data indicates the existence of one or more lacustrine deposits below the one discussed above, in addition to other post-Cretaceous deposits.

There is no way of knowing at the present time whether this core is a complete record of the Pleistocene events--probably not. We feel, however, that this type of study is a step in the right direction and hopefully can be used in correlations of subsurface units in other places on the Island.

Janice M. Whipple 10/31/67

My summer work centered about the Richfield Springs quadrangle, south of the Mohawk River. Good fortune bestowed upon me a 10+ mile pipeline trench across the northern portion of the area. The 6-7 feet minimum depth provided much informaiton not evident in the generally highly eroded landscape.

Boulder gravels, sands, varved silts and clays appeared in some unexpected places. A fairly continuous feature throughout the line was the occurrence of 4-5 feet of quasi-sorted till overlying these other deposits. In sections with till over clays, the clays exhibited

an undulatory surface, with some shapes similar to breaking waves. No preferred orientation was noted along the trench axis. Undulations were independently reported by a well driller to occur in underlying clays northeast of Herkimer, north of the river. The sorting of the till over clay appeared to increase with depth. In lower portions of the trench one could observe a blue-grey silty till with limestone cobbles and clay balls. Of course, this information may take on an aspect of revealed knowledge since the line has long been backfilled. I hope that photographs provide evidence for skeptics.

Much time was spent on a water well inventory for the USGS. Drillers' logs indicated depth to bedrock but were usually incomplete in differentiating surficial material. Wells through limestone on the plateau are frequently reported to penetrate cavities, often clay-filled, but I still must devise a geologically accurate translation of this information.

Donald R. Coates 10/31/67

Since May of this year I have been involved in many projects, but most of them are either non-glacial or far removed from the New York area. For example I designed a summer house at Cape Hatteras, N. C. (near Avon) and construction was completed in June. Much of the summer was spent there writing on other manuscripts and setting up base stations for a beach morphology and sedimentology project that will develop over a period of several years.

One of my students, Douglas Cherkauer did a senior honors thesis entitled "Directional Orientation of Hydrogeological Features in Small Drainage Basins". He did a quantitative study of 50 basins (3rd and 4th orders) in the Binghamton area and analyzed his field and map measurements with a computer-based multiple regression program. Since there is strong topographic asymmetry in the area (north-facing slopes are about twice as steep as south slopes) and large difference in till thickness (eight times thicker on south than on north slopes) it was anticipated there would also be differences in stream regimen. The weatherman did not cooperate sufficiently, however, and although several discharge measurements were made in each of the 50 basins it was difficult to establish regional comparability and contemporaniety. Although some trends were observed their levels of significance were not very high. Cherkauer did document, what all good glacial hydrologists intuitively know, that channel fill in streams in a glaciated terrain does not necessarily correlate with present discharge properties.

I wrote an article on the Finger Lakes for Fairbridge's Encyclopedia of Geomorphology. To prepare the article I had to review my old field notes as well as make a few more field observations, and am now convinced more than ever that to explain the origin of features in this region one must resort to a multicyclic theory (see mine in Zeitschrift fur Geomorphologie 10, p. 469-474, 1966). Furthermore, it is becoming increasingly clear that ice sculpture by Wisconsinan glaciers (at least the late ones) did a minimum of bedrock erosion. For example, Valley Heads ice even failed to remove lake clays on the west side of Cayuga Lake or south of the lake in Sixmile Creek.

I am currently working on some special problem-solving modules that will be published by the Council on Education in the Geological Sciences. These materials are geared for the beginning geology course and some of the examples I use to illustrate streamflow are in our New York glaciated region.

Jean Jacques Flint has nearly finished field and laboratory work on his M.A. thesis and is now watching the correlations,or lack of same, as they roll out of the computer. His study was to compare 6 north-flowing with 6 south-flowing streams that discharge into the Susquehanna River, and involves quantitative geomorphology, hydrology, and sediment and till studies. One of his present problems is an attempt to explain > 100 drumlin-like hillocks that occur separately throughout the region and rarely are more than 50 feet high. Do any of you have thoughts on such hills this far south in New York and Pennsylvania? They can occur either in stream valleys or along valley-wall slopes, but never on tops of hills.

Jesse L. Craft 11/1/67

The Glacial Climate of the Adirondacks

A new theoretical model is proposed to explain mountain glaciation within the High Peaks Region of the Adirondack Mountains following continental glaciation. This model is based on the relationship of the large glacial lakes formed at the ice front of the continental glacier and the effects of local storms over the high mountains of New York State. Local glacial conditions were maintained by an extremely high snow fall and its accumulation related to local climatic conditions. Ablation of the local snow would have been retarded by low temperature related to the cooling effect of the continental glacier at the northern edge of the Adirondacks and the cloud cover that would have been developed over the High Peaks Region.

These local climatic conditions would have ceased to exist when the continental glacier had melted sufficiently to open the St. Lawrence Valley and drain the large glacial lakes. Therefore the time of local glaciation is determined by the life history of the proglacial lakes that were formed during the deglaciation of the Ontario and Erie basins and ended with the draining of Lake Iroquois and the development of the Champlain Sea.

Ernest H. Muller 11/2/67

Working with Joe Caggiano in July, I tried to shore up and clarify interpretations in Allegany and Cattaraugus Counties to afford more security in compilation of the Niagara sheet, 1:250,000 which continues in process. In connection with a site selection problem I spent a few days in reconnaissance in the sand plains east of the Black River Valley on the flanks of the Adirondacks. During the latter part of the summer I benefited from field conferences with William Shilts in the Megantic area of Quebec, with Jesse Craft and others in the central Adirondacks, and the two Pleistocene field trips of the Geological Association of Canada run in the upper St. Lawrence Valley by Ed. Mirynech and Eric Henderson.

Investigations continue in the drumlin field opened for residential development in southeast Syracuse. Longitudinal and transverse cuts have afforded unusually good opportunity for examination of drumlin anatomy. Till fabric analyses made by David Sauter, an earth science teacher in Liverpool High School, show a range of as much as 45 degrees on either side of the direction of drumlin elongation, suggesting markedly diverging and converging flow-lines around individual drumlins. A first effort at distinguishing possible shells of successive accretion on the drumlin core showed marked uniformity of pebble lithology within normal range of variation. Lodgment appears to have taken place on an intensely scoured and furrowed

dolomite surface which bears in subdued form a streamlining akin to that of the drumlin field. William Savage, a graduate student at Syracuse University, continues his efforts toward developing a model to account for the observed features in terms of plastic flow theory e.g. Prandtl's compressed cell.

In regard to the sporadic minor buckling in central New York to which Forrest Durham made reference in the previous volume of the Glaciogram, I wonder if he is acquainted with the superficial folds in the Onondaga on Route 5, 2.25 miles west of Caledonia (Le Roy 7 1/2' sheet). As I recall they are isoclinal folds with amplitude of 5 feet or so and width of 50 to 75 ft. They showed up at least schematically drawn on the topographic map as low ridges angling obliquely north-northwest across the highway. The trend of the ridges curves erratically making it unlikely that they are related directly to regional deformation prior to denudation.

William D. Lipe 11/2/67

Since July, a graduate student in anthropology, Mrs. Dolores Elliott, and I have been conducting archeological excavations at the Engelbert Site, Nichols, New York. After spending most of July and early August at this site, I have retired to the role of general supervisor, with Mrs. Elliott taking over most of the actual directing of the excavations. The Tioga County Historical Society has funded the work, and most of the labor has been volunteered by members of the Triple Cities Chapter of the New York State Archeological Association. The site covers the top of a large gravel knoll in the Susquehanna Valley just outside Nichols. Our excavations have exposed a lot of Pleistocene gravel, but the earliest Indian occupation was not until about 2500-2000 B.C. This early occupation can probably be assigned to the Lamoka culture, first defined by Ritchie (1932, 1936, see also 1965, pp. 36-79). These people lacked agriculture and pottery, and probably followed a seasonal cycle of hunting and collecting wild animal and plant foods, with each small band frequenting a number of camps during the year.

After the Lamoka occupation, there were occasional visits by small groups over a period of several thousand years, and then a heavy occupation in late prehistoric times, probably spanning parts of the Owasco and early Iroquois cultural periods, between about A.D. 1100 and 1450. Most of the large pit features common at the site probably belong to this late occupation, which was by agricultural, pottery-using people. Many of the pits, which average about three and a half feet wide and deep, were probably dug initially for storing food or other goods, but were used as garbage receptacles after the original contents had been removed. Also, a number of the pits served as burial places; we have recovered the remains of 38 individuals during the excavation of approximately 200 pits. An additional 500 to 600 pit features probably were present at the site originally. Of these, 35 to 40 were excavated in June by a crew from the Anthropology Department at SUNY-Buffalo, about 300 remain unexcavated, and about 200 have been destroyed by removal of gravel for use in construction of the new Southern Tier Expressway, which runs nearby.

Most of the features that were destroyed were lost this spring, when the highway contractor began to cut into the site. Since then, representatives of the State Department of Public Works and of the contractor, Perini Corporation, have rearranged the gravel removal

schedule so that salvage archeology could continue through the summer and fall, and perhaps next spring as well. Since the site is not on the highway right-of-way and is not state property, it is not subject to the state antiquities act; the excellent cooperation we have received from the Perini Corporation and the State D.P.W. people has stemmed entirely from their interest in seeing that the archeological remains are properly salvaged before the site is destroyed.

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Editor's Note

In October a new burial site was uncovered when quarry operations were started in a new area of the Barney Dickenson gravel pit in Vestal. Unfortunately the owners would not cease operations and sufficient manpower (student/staff power) could not be mustered to salvage this site, so it will be permanently destroyed. It seems that this is a general problem, the study of deposits before complete destruction, that should be reviewed by responsible, interested, and law-enacting groups.

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Jack Oliver 11/3/67

As a seismologist whose knowledge of the Quaternary is less than somewhat, to use the Damon Runyan scale, I feel a bit apprehensive about writing for Glaciogram, but as Glaciogram readers are likely to be the best source of information on a subject that has interested me for some time I feel I must. I am trying to assemble all available information, published or unpublished, positive or negative, on postglacial faulting in the bedrock of New York State and surrounding areas, and in this connection seek the help of Glaciogram readers. My chief goal is to make a study of the relation between such faulting and modern seismicity of the area.

Briefly, here is some background material. The relation between seismic activity and recent faulting has, of course, long been a topic of some interest, and the last few years have seen considerable emphasis on this subject in the more seismically active parts of the U.S., such as California, Nevada, Alaska and Montana, as well as foreign locations. In such studies, it nearly always turns out that there has been more recent movement along certain faults than was

formerly suspected. With the thought that this might also be true, on a smaller scale, for an area of moderate seismic activity such as New York, I have made a preliminary effort to learn of recent bedrock faulting in this area. So far, the only papers I have found are that of Woodworth in 1906 and earlier works referenced in Woodworth's paper. With Dr. James Dorman, I have visited some of the sites described by Woodworth and we have indeed found small-scale faulting with displacements of the order of an inch or a few inches offsetting glacial striations. The evidence for such faulting can hardly be denied.

Whether such faulting is in any way related to modern seismic activity is another question. One way to attack this problem is to attempt a spatial correlation of zones of recent faulting and seismic activity. Another way is to compare the earthquake focal mechanisms with field data on fault displacement. For both types of study we need more information from the field, information that can only come from the many field geologists who have tramped New York State and environs.

If anyone has any information bearing on this subject, I would appreciate hearing from him. I would like a detailed description of the site, directions on how to reach it, orientation of the fault, displacement, type and age of bedrock, evidence for postglacial age (e.g., offset striations), etc., but will accept gladly any bits or pieces of the above.

Peter P. Hudec 11/3/67

Sand and Gravel Resources of Long Island, N.Y.

James R. Dunn and Peter P. Hudec of James R. Dunn & Associates, Inc., have recently completed a study of the sand and gravel resources of Nassau and Suffolk Counties on Long Island. The study was made on behalf of the New York State Office of Planning Coordination and the New York State Geological Survey.

The purpose of the study was to determine the needs for sand and gravel for Long Island and the New York Metropolitan Area to the year 2000. The two counties produce from 9 to 13 million tons of sand and gravel annually. About half of the material produced goes into New York City markets. The average cost of sand and gravel at the plant is $1.00 and $1.50 per ton respectively; delivered dockside at New York, it is $2.65 and $3.20 per ton respectively. The distance and method of transport make up the greater part of the cost of these materials, and often determine whether a pit in a particular location can be economically operated.

The present reserves of sand and gravel on the lands of operating producers are approximately 162,000,000 tons. The estimated minimum need for sand and gravel for New York City and Nassau and Suffolk Counties to the year 2000 is 694,085,000 tons; the estimated maximum needs are 856,585,000 tons. The needs for sand and gravel will probably outstrip the present reserves by the year 1985. The above estimates were based on the projected population figures and the trends in per capita consumption of sand and gravel in this area.

The current trends in Nassau and Suffolk Counties are for increased adverse zoning. Permits to operate sand and gravel pits are often difficult to obtain. In some cases, the lands held as reserves by sand and gravel operators have been re-zoned and the reserves thus lost. Unless the towns set aside certain parcels of

land for extraction of sand and gravel, the towns, the county, and the New York Metropolitan Area will have to pay much higher prices for construction materials, which will have to be imported from other areas of the Northeast.

G. Gordon Connally 11/3/67

Hello Gang! The cheery salutation serves notice that Parker and I have decided that things should be less formal.

As indicated in the most recent Glaciograms, I continued my Lake Champlain - Lake George project from April until September. There was little to be mapped in Essex County and I am counting on Charlie Denny's results for Clinton County so most of my time was spent in Washington and Warren Counties.

Recessional sequences were mapped in the north-south valleys of the Taconics between the Hoosic River and the vicinity of Whitehall. These sequences can probably be correlated east-west and may represent three or four ice-marginal positions. No differences in tills have been mapped as yet.

Re-examination of the type locality(?) for the "Glens Falls Readvance" revealed new highway cuts. The "Readvance" was named on the basis of contorted lacustrine clays in the Hudson Gorge west of Glens Falls. The new cuts show contorted clays, overlying till (Glens Falls Readvance), outwash, and an upper till. It appears that the "Glens Falls Readvance" is related to an early advance and that readvance came later. As the early advance undoubtedly will relate to a previously named advance to the east or south I suggest that the term "Glens Falls Readvance" be abandoned.

The readvance demonstrated by the outwash and upper till is best displayed in the Luzerne Mountains and in the vicinity of Lake Luzerne to the northwest. Thus, I propose that the most recent readvance in the Lake George region be designated the"Luzerne Readvance."

Les Sirkin, Jim Davis and I cored an eight meter bog in the outwash near Lake Luzerne and hope to have a radiocarbon date (and pollen stratigraphy?) by this spring. Also, Les and I have a manuscript in progress enlarging on the New Hampton Bog that we visited on the New Paltz trip. In addition, I hope to have information on Lake Albany - Lake Vermont stages by this spring.

Robert G. LaFleur 11/6/67

My work with the USGS has been shifted from the Susquehanna to the Mohawk. Since mid-summer I've been mapping the Schoharie Basin and collecting groundwater data. The project should continue through next summer. The State Geological Survey is also partially supporting the work. A detailed surficial map should result. This is an interesting area with many inwash and lacustrine deposits associated with northward-draining "Lake Schoharie". Along Route 20 near the north end of the basin are several deep wells which suggest two major glaciations separated by a lacustrine interval. The last glaciation appears to be the one responsible for the E-W drumlins. Good well records are available throughout the Basin and further inventory should shed some light on eastern Mohawk conditions.

I am also working on sediment analysis of the turbidite beds at the Rensselaer kame delta. Janice Whipple has also encountered similar deposits along the sides of Fulmer Creek. It appears that turbidite sedimentation of ice-margin lake sands may be more common than previously realized. Comments from readers who have seen these elsewhere would be most welcome.

Kernan W. Davis 11/6/67

Field work this summer included rather quick reconnaissances of selected valleys scattered throughout New York State's southern tier. Remnants of glacial dams, which had consisted of ice and drift, frequently were observed blocking a valley. Many of these dams were breached by a cut into the rock wall of the valley rather than into the softer drift. An inventory of these glacial dams and their associated lake features would be an interesting academic study.

Field work will probably continue, moving into the Finger Lakes Region this winter.

Anyone who has been working in the Cattaraugus Creek Basin please contact me. I am interested in the accurate mapping of the lake-bed sediments in that area. This creek cuts across the topographic grain and apparently drained a large pro-glacial lake or chain of lakes. It cuts in and out of rock-walled canyons where its meanders are deeply incised. In the broad open valley reaches between the canyons, its meanders shift widely. It is a fertile ground for academic study.

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