# NEW YORK GLACIOGRAM

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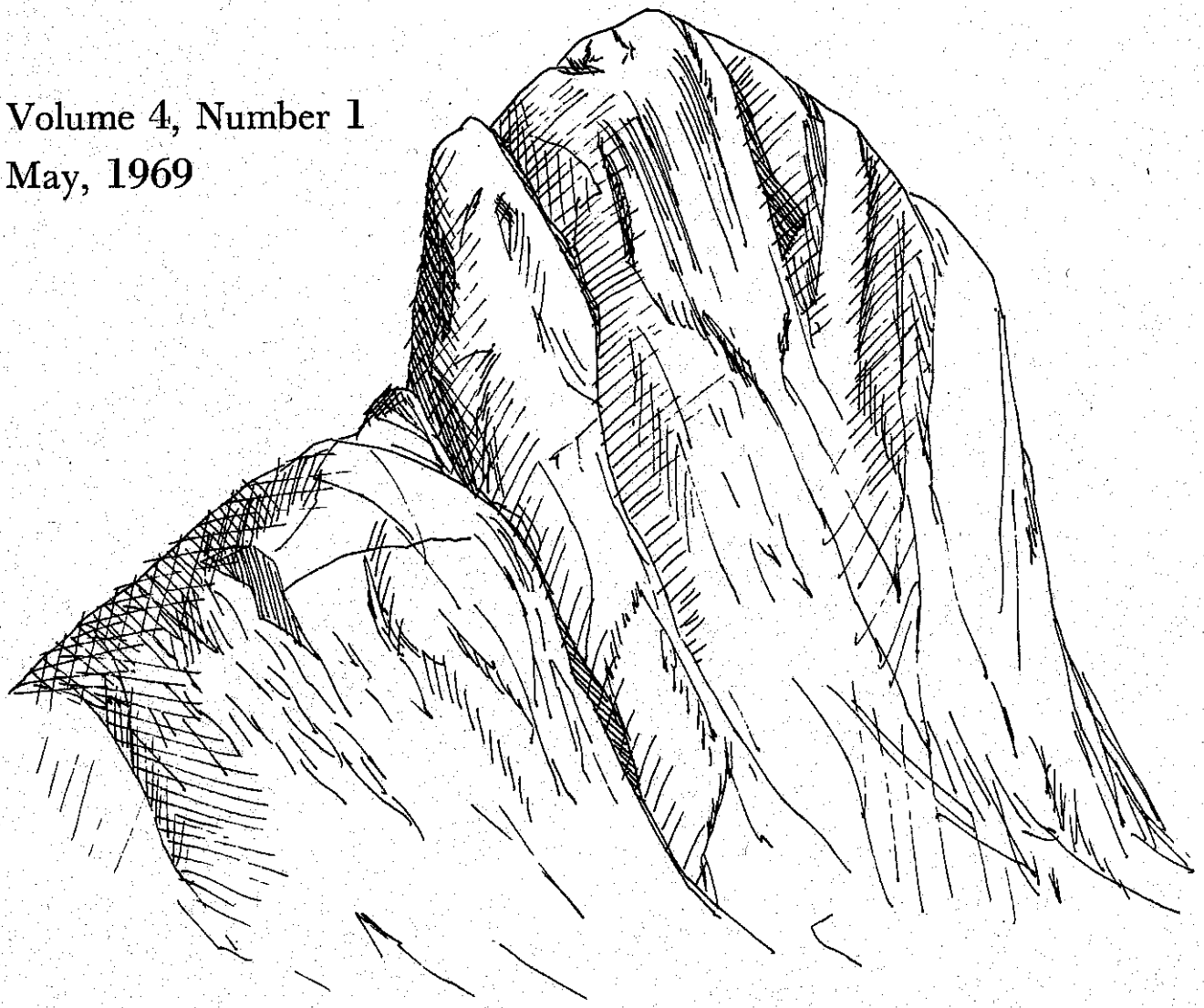

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## EDITOR'S PAGE

Thanks are due the contributors without whom this venture would prove futile. I wish more of you would respond to insure success. I am also appreciative of those who took the time to answer my questionnaire. Apparently, however, I am not getting through to a large number of those who have requested mailing list status, so it is probably time that I receive some communication of your status in order to continue on this listing. The mailing list for the November issue will be the reflection of those who have replied showing continuing interest in this service. This is the name of the game.

Nineteen replies were received as a result of the poll on the naming and status of New York Glaciogram. Eleven wished the name to remain, two suggested Glaciogram, one suggested Eastern Glaciogram, and one suggested Northeastern Glaciogram. In addition a variety of other comments and opinions were received. I have included a few of these in this issue. At least four people are very concerned with the form of New York Glaciogram, believe that it has expanded far too much, and would prefer a much smaller group and increased informality. Two of these feel the venture should be dropped and that it has outlived its usefulness. I wonder how many others share these views? In addition I talked to at least 20 glacial geologists at the New York State Geological Association Meeting in Plattsburgh on these matters and their comments were encouraging. Those of you who were not in attendance at the meeting missed four excellent glacial trips. You can still recoup part of this by purchasing the Guidebook of the 41st Meeting of NYSGA from Dr. Phil Hewitt, Department of Geology, State University College, Brockport, N.Y.

Talking about publications, is everyone aware of the new one published by the Arctic and Alpine Research Institute at Boulder? I also hear by the grapevine that Linc Washburn is very interested in starting a publication at Washington. Apparently a new center for Quaternary research may also develop at Maine with the addition of George Denton to Harold Born's staff.

In an attempt to resolve some criticisms of the current operation the reader can note a change in format. The contributions have been divided into two groups, those in the New York and adjacent region, and those in other regions. For those 20 original charter members of the defunct round robin that wish a complete "off-the-record" letter, I am willing to receive such communications and will xerox them and send them only to group members in the same mailing of New York Glaciogram. I would hope that you "old guard" would not stop the regular contributions, however.

As a reminder let me urge your direct responses to those questions posed by contributors when you have helpful information, viz. Holmes on diatoms and sponges, Faust on pollen, Oliver on Quaternary faulting, Coates on drumlin-like hills in southern New York, Calkin on circular patterns in drift etc.

The art work for the cover was done by Chris Neuzil, an undergraduate geology major.

SEE YOU AT PARIS INQUA !!!

PART I NEW YORK AND ADJACENT REGION



ROBERT G. LaFLEUR 11/18/68

Last summer was spent with the U.S.G.S. in the water resources investigation of the Mohawk Basin. I covered the Schoharie Basin and the Mohawk from Amsterdam to St. Johnsville.

A fairly consistent glacial history of this area can be worked out using data from about 400 water wells and surficial mapping of the Gilboa, Schoharie, and Fonda quads which I've largely completed. Some additional detail will modify the following tentative conclusions which seem valid now.

1. The Schoharie Basin was glaciated at least twice with lacustrine clays and silts separating two tills of comparable thickness. The younger till forms some, but not all of the abundant drumlins of the "Mohawk Lobe".

2. The Mohawk Lowland was weakly glaciated just prior to final ice withdrawal by ice which seems confined to the area along the present river. Yuri Yatsevitch calls this the Yosts readvance. (M.S. thesis 10/68, R.P.I.).

3. I still believe the main mass of surficial till south of the Mohawk is of Cary age but a pre-Cary deglacial episode reflected by lacustrines beneath the drumlin till may be quite widespread and even involve free drainage through the Mohawk.

4. Lake Schoharie is partly a lake dammed by withdrawing (Cary?) ice but lake waters were withheld in the Schoharie after deglaciation by a series of sills near Esperance.

5. Lake Amsterdam above 450 feet does not seem to have existed. If it ever did, the record of its presence may have been obliterated by the Yosts and other late readvances.

6. Lake Amsterdam at about 400 feet is an important water body, withheld by a limestone and till valley plug at Cranesville, where a sill coincided with bedrock relief along the Cranesville fault (2 miles east of Amsterdam). This lake is also in part post-glacial and its extinction may have been caused by Valley Heads melt waters flowing eastward.

Additional work remains in the area but this hypothesis is working for me at the moment. Hopefully the mapping, sponsored in part by the State Survey, will be concluded this year.

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PAUL F. KARROW 3/26/69

I completed the mapping (for G. S. C.) of the Stratford and Conestogo areas (about 850 square miles at one inch scale) in Southern Ontario. This area was overridden by ice of the Ontario, Erie, Huron and Georgian Bay lobes, resulting in a complex till stratigraphy. Surface tills are apparently mostly of Cary age with several subsurface tills of Tazewell age or older. Over 500 till samples have been analysed for size and carbonates; pebble counts, heavy minerals, and fabrics have been studied on many of these. Thin tills are common and much topography is palimpsest. Palynology of surface lake and bog sediments, and several deep test borings have also been carried out. Mapping occupied a four-man party each summer since 1965. A preliminary report is being prepared.

Continuing studies of the paleontology of glacial lake sediments has been focused on Lake Iroquois and Lake Algonquin. A paper nearing completion, coauthored by Karrow, A.H. Clarke (National Museum) and H.B. Herrington, describes mollusc assemblages from Ontario Lake Iroquois deposits. Molluscs, pollen, diatoms and ostracods from Lake Algonquin deposits near Kincardine and Alliston are being studied by Clarke, Herrington, T. Anderson, H.C. Duthie and L.D. Delorme. Wood from the Kincardine locality has been submitted for dating; this should yield the first dates directly on Lake Algonquin sediments.

Speaking of glacial lakes, recent issues of the Glaciogram have expressed doubt about the age of Lake Iroquois as being as old as 12,000 B.P. There are now four dates on Lake Iroquois and many on the Champlain Sea which follows it, all quite consistent in demonstrating an age of about 12,000 years. I do feel changes in detail may yet be made, and we need maybe a dozen dates on Lake Iroquois to evaluate these details, but I am quite satisfied about the absence of Valders ice in the Ontario basin. Several dates at the base of post-Iroquois bogs in Ontario go back beyond 11,000 years.

B.A. Sreenivasa, of our Biology Department, is making a comprehensive study of faunal and floral remains from bog and lake cores taken near Waterloo, Ontario. This is his Ph.D. thesis topic. Also in the Biology Department, T. Anderson is studying late and post-glacial plant assemblages in lakes and bogs between London and Georgian Bay. It is hoped to relate plant migrations to glacial retreat. R.G. Mannada Rani is nearing completion of her Ph.D. study of the extensive fossil diatom assemblages of the Don and Scarborough Formations (Sangamonian-Early Winconsinan) from Toronto. A nearly completed Ph.D. thesis by H.T. Hui concerns the molluscs of the interglacial Don Formation from Toronto. Through the cooperation of Art Bloom at Cornell, comparative collections were made in September, 1968, from the presumed Fernback locality near Ithaca.

My summer plans consist of travels to Europe, including Iceland, Britain, Netherlands and Germany. I will work for the Swedish Geological Survey in July and attend INQUA in August.

In case many are not aware of it, our National Research Council has an Associate Committee on Quaternary Research which now issues a newsletter covering Quaternary Research activity across Canada. Editor is J. Terasmae, Brock University, St. Catherines. Information may be obtained from Miss G. Minning, Geological Survey of Canada, Ottawa.

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My renewed study of the Quaker Basin Swamp (mentioned in the GLACIOGRAM last November) has payed good dividends at least in the coin of personal satisfaction. Sampling of a 36-foot section shows peat to a depth of about 25 feet, grading then somewhat abruptly through peaty clay and silt into pollen-bearing clay and silt resting upon an impenetrable base that "feels" like something other than bedrock, gravel, or till. (What else can it be?) The pollen record shows two intervals devoid of hemlock whereas I have been thinking that only one had occurred. One interval of absence is near the lower limit of peat and the other is in the upper part of the pollen-bearing clay-silt. As in my other localities, an abundance of diatoms begins at the base of the peat, and declines abruptly to near-zero at the time-level where hemlock becomes dominant over pine. The sponge spicules follow approximately this same pattern.

Hemlock is one of my 20-or-so favorite native trees, and I believe that the record of its comings and goings in the pollen diagrams tells us something significant about ecologic changes relating to our late-glacial history. Dr. Don Cox has presented his similar conclusion in the New York State Museum Bulletin 377 (1959).

In the coming summer, I hope to continue research into the local palynologic record although at this time my plans are incomplete.

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WALTER S. NEWMAN 3/28/69

The Ashley Falls Quadrangle (Massachusetts-Connecticut), completed by Bill Holmes and myself last summer, is now in the U.S. Geological Survey review mill and hopefully will be published in the GQ Series in the next year or two. This coming summer, Bill and I will drop down one tier to the South Canaan and Sharon Quadrangles, in extreme northwestern Connecticut (Including a very thin wedge of New York State), and hope to complete field mapping by the middle of August when I will fly to France and INQUA for a month.

Several of our students and myself hope to laboriously continue studies adjacent to and in the Hudson Highlands' Gorge and on the Montauk Peninsula. Being a Chairman of what has developed into a huge department (14 professors, 25 graduate students, 80 undergraduate majors) is terribly time-consuming and really cuts into one's time, but I guess everybody eats up time in their own way.

Just so my friends will know that I'm still interested in the New York Pleistocene, I'll file a brief report for your "Glaciogram". John McAndrews of the Royal Ontario Museum, Toronto, is well along on his analysis of the pollen and macrofossils of the "Fernbank" interglacial site near Ithaca. He has found an abrupt break in the pollen stratigraphy near the top of the section, with a change from oak, hickory, and beech pollen, to spruce and pine. An attempted radiocarbon date on the cool-pollen upper section gave another age of >50,000 years. The stratigraphy so closely parallels Karrows's descriptions of the Toronto section that I have trouble keeping the two separate in my mind.

A student at Cornell, Fred Goldstein, expects to start his doctoral dissertation research on the Pleistocene deposits of the Cayuga basin this summer. I am quite confident that we have a very old, and very complete, glacial, interglacial, stadial, and interstadial history to read in the vicinity of Ithaca.

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PHILIP WAGNER 4/1/69

Although the snow pack in this area is still growing, we are looking forward to another field season in the Champlain Valley. Our program this summer will include a variety of people and problems. Bill Parrott will map glacial deposits between the Lamoille River and International Border. Phil Johnson will finish his field study of raised shoreline features north of Burlington. Bob Switzer plans to study the evidence for late-glacial, multiple ice surface positions on the Green Mountains near Burlington. I hope to complete the picture of ice-margin and lake level relationships in the Champlain Valley; some of this information plus Bill Parrott's till clay mineralogy and Chet Howard's till fabric statistics will be presented at the N.Y.S.G.A. meetings this spring.

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GEORGE W. WHITE 4/9/69

I have no report for you of field work in progress or contemplated. You might want to note that there are papers in press on "History of Glaciation in the Allegheny Plateau in Ohio and

Pennsylvania" by George White in the Quarterly Journal of the Geological Society; on pre-Wisconsinan deposits in NE Ohio by Stanley Totten, David Gross and Stephen Moran in the Ohio Journal of Science; and by White, Totten and Gross Bulletin 55 of the Pennsylvania Geological Survey. The northcentral meeting in Columbus in May will have papers with published abstracts by White, by Moran, and by Gross on that area.

My summer plans do not include a trip to INQUA. I was in Prague last year and may attend a meeting in 1970 overseas, but this will not be on glacial geology.

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JAMES E. BUGH 4/11/69

Alluvial Fans of Cortland County, New York

Alluvial fans were deposited during and shortly after the waning of the Valley Heads glacier from central New York. Deposition of alluvium from the uplands into the wide, flat glacial troughs resulted in fan-shaped structures. Accumulation of alluvium in the shape of fans resulted from lateral spreading of runoff at the base of the uplands. The abrupt change in slope attributed to the lateral spreading of runoff but probably more important was the highly permeable nature of the outwash material flooring the glacial troughs.

The alluvial fans most easily identified are located on the outwash of the glacial troughs. The radii of the fans range from hundreds of feet to several miles. The alluvium thickness ranges from a featheredge at the base to as much as 40 feet at the apex.

The fan size was compared to the size of the source area. Denny (1965) showed that the area of fans in Death Valley to be about 1/4 to 1/3 the size of the source area. The area of alluvial fans of Cortland County appears to equal approximately 1/2 the area of the drainage basins providing the sediments.

Fans in the Cortland area appear to be of several varieties. The size of fans in comparison to drainage basin area is not consistent with what Denny (1967) reported for fan/drainage basin relations in Death Valley, Amargosa Valley, Rio Grande Valley, Henry Mountains, and Shenandoah Valley. This is most likely due to the processes in operation at the time of deposition.

The first variety of alluvial fan recognized is one deposited in a glacial trough by meltwater from local snowfields or from a melting glacier in an adjacent trough. These fans have a fan area/drainage basin ratio larger than reported for fans in arid and humid regions (Denny, 1967).

A second type of fan is generally small and the fan area/drainage basin area relationship has general agreement with reported values. These fans were deposited at the base of the uplands by runoff.

The shape and size of the fans are indicative of the processes acting upon them. Conditions during the waning of the Valley Heads glacier were different from the present as shown by the current erosion of the fans and a general lack of deposition. The fans exert significant control on the fluvial processes today. Surface runoff is low on the fans because of the permeable nature of the alluvium. Thus, fans deposited across valleys have diverted surface drainage to skirt the base of the fan.

Future work with the Cortland alluvial fans holds promise that the late-glacial hydrological conditions may soon be better understood.

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BRUCE E. RAEMSCH 4/18/69

Archaeology Studies in Central N.Y.

In surveying the central New York area some three and a half years ago for Indian sites of the Archaic Stage of culture, it was discovered that cherty material resembling very crude core tools was present in outcrops of Pleistocene gravels, subsequently identified by Bob LaFleur of RPI as being of Cary Substage age (his estimate about 14,000). A maximum of 30,000 years is possible for incorporation of the initial artifacts into the drift. With continued accumulation of this material it became quite apparent to me that many of the objects recovered were, indeed, crudely-made core tools of various descriptions the predominant features of which suggested a long-standing occupation of regions of the Northeast, including New York and Vermont at least, judging from the nature of lithologies. The culture (s) has both time and space dimensions of still unknown limits and the artifacts so far

found do not include any identified projectile points, though I feel these will eventually be found. Objects so far picked out of in situ positions as well as from excavated trenches and pits dug by builders and county highway crews have been of a kind that were easily manufactured, more common, and just as easily thrown away, by man, such as varieties of scraping tools, core knives, chopping stones, etc. The most numerous type object, for example, is the discarded flake-source core. The YAGER MUSEUM publication, Bulletin 1 (Winter, 1968) describes in some detail a particular group of these artifacts.

Then last summer we began digging the so-called Adequentaga Site, known for some eighty years to local amateurs but never methodically excavated. It is a flat area covering at least four acres at the junction of the Charlotte (Adequentaga meaning "source from many springs", roughly translated) Creek with the Susquehanna River. It has turned out to be a stratified site of rather marked complexity, the cultures represented being divided temporally by changing natural physiography, such as river flow, terrace development which, in the latter case, actually divides cultures by virtue of the presence of a channel of water below the terrace around 2,200 B.C. At any rate, deep within the ground at this site and in gravels believed by LaFleur to be post-Pleistocene deposits, as old as possibly as 8,000 B.C., we have taken seemingly new types of projectile points for this region, one resembling a Gypsum point because it is diamond-shaped and marked by having an unusually small little-worked stem similar to the Gypsum point (no culture relationship here intended). Other artifacts include ground stone hammerstones, many flakes showing retouching, net-sinkers, one each of an ax head and an ulu (flaked from chert and about two inches in length). There are four horizons of this kind of material in the gravels associated with broad deposits of $MnO_2$ which we have so far used as indicators for the presence of assemblages of tools and/or occupation sites, the depths from the surface of the ground running to seven feet where the presence of the water table stopped our excavations last fall. Other cultures present above the gravels include middle Archaic, Transitional, Steubenville (for which we have carbon dates ranging from A.D. 385 to A.D. 760), a single unfluted Clovis point component temporally

associated with the above radiocarbon dates and hence emphasizing A.L. Bryan's belief of the reality of persisting traditions beside stage development of cultures. A single Hell Gap point was also found just below the Lamoka component. This discovery extends the distribution of this point type to the Northeast where Agogino suggested it might be found.

But most important of all, it seems to me, is the fact that between the clear-cut culture horizons in the gravels we were able to demonstrate the presence of the kind of core tools we have been finding in the Wisconsin gravels elsewhere, besides other obvious tools in association, which so far appear to be transitional between the type core tools and a later thin flake tradition. In short the gravels, whether they be ice-contact or water deposited, seem to be a kind of stew of type rocks in which is incorporated, also in stew fashion, stone tools representing various ages of manufacture.

In any event, and all things considered, we feel that the American Indian, so-called, has an even stronger claim to this land than we heretofore thought. And we have been in sympathy with his views from the very beginning, anyway.

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ALEKSIS DREIMANIS 4/23/69

In the summer of 1969, I intend to continue Pleistocene mapping for G.S.C. along the N. shore of Lake Erie, S. of London, paying main attention to the stratigraphy in the type areas of the Port Stanley and the Catfish Creek Drifts, and the Mid-Wisconsin interstadial deposits (Plum Point and Port Talbot). I will be teaching also Glacial and Pleistocene Geology at the summer school of U.W.O. and hope to finish the summer season by going to INQUA conference in Paris.

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LESLIE A. SIRKIN 4/29/69

The first part of my letter involves the scope of the Glaciogram. It is my impression that this communication came into existence to meet the need of the Pleistocene geologists in this area (originally New York and, I expect, adjoining and related provinces) for a means of exchanging ideas, plans and information in the intervals between "Friends" meetings and the NEIGC, NYSGA and NE, GSA glacial field trips and formal sessions. The main themes have appeared as "last summer's work" (in the Fall issues) and "plans for this summer" (in the Spring issues). All of this correspondence, after the original form, could reach more than one cohort per mailing, and maintain the air of informality which has been traditional in this group. It is my feeling that going beyond informality and achieving gray area publication status would do a disservice to those who are stating their intentions, airing their ideas and looking for ideas, information exchange, interpretations or just community response to work in progress. It seems that more pertinent journals are available for the formal aspect of publication and data display. However, even with informality in a limited region, expansion encroaches in the mailing list, contributors, scope of contributions, regional extent, and so on, just as expansion in the geological sciences has built up the professional organizations and meeting attendance.

Perhaps the success of the Glaciogram will be in its ability (Don Coates and SUNY willing) to include those interested in regional problems, communication and twice yearly correspondence with Pleistocene co-workers and an opportunity to exchange ideas.

My current plan (to use the Glaciogram in its intended manner) after spending some time on the late-glacial in Alaska is to complete some of the work on the late-glacial in this region, which I have been accumulating over the past few years. The development of a pollen stratigraphic record associated with glacial recession in the Hudson Valley is gradually emerging. Portions of this record have been displayed in recent NYSGA and NE, GSA meetings, and most recently summarized by Gordon Connally (and myself) at the Albany meeting. In central Long Island several pollen stratigraphic sections indicate late Wisconsinan ages for the glacial surfaces on which the bogs formed. Thus, the evidence casts doubt on the existence of early Pleistocene surficial deposits in this area.

These results are in keeping with my previous work in western Long Island, Walt Newman in eastern Long Island, Gene Foord and Bill Parrott in central Long Island (mineral studies in lacustrine deposits) and my work (1967 and in MS) in Block Island.

Lastly, Don Coates and I recently attended the NSF Institute Directors Meeting in Washington and had a chance to discuss programs for teachers and our respective institutes. While not specifically related to Pleistocene studies, we have designed Institutes around coordinated laboratory and field experiences, in conjunction with the N.Y. State Earth Science Curriculum. Needless to say, on Long Island the participants are getting familiar with the various sedimentary deposits, in terms of glacial phenomena, as a source of laboratory materials and in studies of post-glacial erosion and deposition.

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JOSEPH A. CAGGIANO, JR. 4/29/69

Mapping the surficial geology of the Belchertown and/or another quadrangle on the east side of the Connecticut Valley will constitute this summer's field work. The project should expand into an investigation of drift petrography, dispersal, and stratigraphy.

The following summarizes the results of my M.S. thesis of the Vernon, N.Y. quadrangle:

"Marginally controlled meltwater drainage channels suggest ice retreat of undetermined extend below 1,000 feet followed by re-advance to the 1,100 foot level. Till overlying gravel exposed at several pits north of the Appalachian Plateau escarpment supports such oscillation. Cessation of marginal control of meltwater drainage over 200 feet above the Stockbridge valley floor suggests stagnation during deglaciation, but not of the order of magnitude proposed by Sissons (1960).

Lithologic and textural analysis of unleached till indicates: 1) control of these respective facies by regional rock types, 2) control of ice flow by underlying topography, and 3) resemblance to similar parameters reported for Olean drift. Textural means (arithmetic) for 43 samples are: sand 31.9%, silt 44.3%, and clay 23.8%." Lithologic means were reported in the last issue.

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JESSE L. CRAFT 5/5/69

Much of the material I report is contained in the 41st Annual Meeting Guidebook of the New York State Geological Association (1969). I conducted two Adirondack field trips: (1) Surficial geology and geomorphology of Whiteface Mountain and Keene Valley, and (2) Surficial geology of the International Lead Company McIntyre Development at Tahawas, N.Y.

Kemp, Alling, Ogilvie, Fairchild and others pictured Adirondack glaciation as being very local and constituting only a minor phase of rapid deglaciation of the mountainous region, leaving an ice-free island surrounded by the continental ice mass. I believe that the Adirondack glaciers were very active during continental deglaciation with valley glaciers extending as much as ten miles down valley from their cirques. Whiteface Mountain is one example and has a "horn" configuration in the peak area, with "cirque form" valleys and a very narrow "arete" ridge to the west of the peak.

A new theoretical model is proposed to explain the climatic situation of deglaciation in the St. Lawrence Lowland to the north and active glaciation in the Adirondack Highlands to the south.

The model is based on the relationship of large proglacial lakes formed at the margin of the continental glacier and the effects of local storms developing over the lakes and moving eastward into the Adirondack Mountains of New York. Glacial conditions were maintained locally by the high snow fall from these "lake effect storms". Ablation of the local snow would be retarded by low temperatures related to the cooling at higher elevations, effect of the continental glacier at the northern edge of the Adirondacks and the cloud cover that would develop over the High Peaks area due to orographic uplift of the eastward-moving moist air.

These local climatic conditions would cease to exist when the continental glacier retreated sufficiently to open the St. Lawrence Valley, lowering the proglacial lakes and decreasing their size considerably. Therefore, the existence of mountain glacial conditions was dependent on the existence of proglacial lakes and the time of mountain glaciation is directly related to the history of those lakes. Local accumulation of snow started after the development of the first large proglacial lake west of the Adirondack Mountains and ended when the lake system drained below its present level.

Muller (1966, INQUA Guidebook) described two tills at Tahawas, N.Y. with an age greater than 40,000 years for wood fragments. In 1966 I visited the pit of the International Lead Company, and a mapping of newly excavated surface exposures revealed a three-till sequence. The tills are interbedded with stratified deposits that range from clays to gravels and cobbles. The lower till is lodgment-type and contains rock fragments of the local bedrock now being mined. Associated wood fragments in laminated clays give a date >54,000 years. The middle till is also lodgment-type with no ore material or quartz, but with anorthosite fragments showing a source area from the north. The upper till is ablation-type with little anorthosite, no ore rock, but containing a high quartz content showing a source area from the south.

East of Tahawas position of moraines at Blue Ridge and lake deposits indicate eastward movement of valley glaciers. The lake levels are correlative with Connally's levels at Lake Lucerne.

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WILLIAM A. RITCHIE and ROBERT E. FUNK 5/5/69

Comments on "Archaeology Studies in Central New York"

On April 29, in the company of geologists Robert La Fleur and Donald R. Coates, and archeologist William D. Lipe, we met with Bruce E. Raemsch at Hartwick College for the purpose of examining his archeological specimens and visiting available sites. This was our second visit with Dr. Raemsch. On the previous occasion we had inspected with him the kame-delta gravel pit where he had collected most of the objects which he regarded as the tools of Early Man, and had given him the benefit of our opinion concerning these items.

At our latest meeting we were shown, in addition to the presumed older flints, again to be referred to, a series of artifacts excavated by Dr. Raemsch and his students at the Adequentaga site on the Susquehanna River. According to Raemsch, this is a well stratified site having some unusual and interesting aspects. Since we were not able to actually visit the site, partly because at this time the trenches are in poor condition for inspection due to deterioriation from winter weathering and flooding, we were dependent upon a profile sketch drawn for us by Raemsch. Consequently, our

judgment in this matter is tentative and subject to correction at a later date when we have seen the site under excavation. Professor Raemsch has kindly invited us to come again during the course of his summer excavations.

Our detailed examination of the artifacts from this site resulted in some disagreement with Raemsch's typological classification. However, his general sequence of cultural material accords very well with the firmly established succession for New York State (Ritchie 1965, 1969). Moreover, his radiocarbon dates for certain of these complexes are consistent with the absolute chronology which we have developed for the New York area. We attempted a reconstruction of the stratigraphic situation which we believe may explain some of the difficulties of interpretation and Raemsch will test this hypothesis during the coming field season.

Since a detailed examination of Raemsch's claims regarding this site is out of order here, it must suffice to state our firm conviction that no evidence has been found here to support an assertion of any occupation older than the established Late Archaic horizons. No trace of any Paleo-Indian component is present in this collection.

With regard to the alleged core tool assemblage from the glacial gravels at two sites, we defer to the consensus of the geologists that the deposits probably pertain to a late Cary phase, dating between approximately 16,000 and 14,000 years ago. We were further advised that the composition of the Otego Creek kame-delta which we examined (the kame locus of Raemsch's second site of this kind is now under a golf course) showed that the rock material was of regional origin, perhaps for the most part picked up by the moving ice within a range of only some 30 miles to the north. The numerous, well-worn pebbles of Onondaga flint were certainly derived from the Onondaga escarpment just south of the Mohawk Valley.

The geological data imply that, if the flints were indeed the tools of ancient man, either (1) he must have been a local resident in pre-Cary times, or (2) the objects would have to be part of a redeposited drift of even greater age. In either case, their antiquity would have to be very much in excess of any known for human remains in the New World. Furthermore, the environmental conditions which prevailed over the entire Northeast during either of these required periods of occupation were totally unfit for

human survival.

Concerning the evidence of the alleged artifacts themselves, we will be very brief and definite in declaring them to be unequivocally not the work of man, but the product of natural agencies, of erosion by rolling, battering, scouring and other forms of attrition. Such flakes as have been removed are purely random and show none of the characteristics resulting from human workmanship.

The geologists pointed out several important considerations from their analysis, to wit: the fracture planes on these flints resemble water-worn joints; opposing surfaces show bedding planes; Coates stated that he has seen hundreds of similar pebbles faceted by ice; La Fleur maintained that the flaking was structurally controlled as the result of the flint pebble striking other pebbles in random fashion. Lipe, citing Barnes (1939), pointed out that where flakes had been removed from flint pebbles in nature the angle made by the junction of the striking platform and scar was consistently greater than $90^{\circ}$, whereas, in human flint knapping this angle is nearly always less than $90^{\circ}$. The angles on Raemsch's specimens are generally greater than $90^{\circ}$.

Our group inspection of this gravel pit resulted in all members of the party finding many battered flint pebbles which in our opinion did not differ in any significant manner from the alleged ancient artifacts. Moreover, en route home in the vicinity of Cobleskill, well north of Oneonta, catching sight of a newly opened gravel pit in a kame formation, we stopped to investigate and immediately began to find, abundantly in the gravels, worn and battered pebbles of Onondaga flint, indistinguishable from those seen earlier in the Oneonta exposure.

Among the flints which we examined in Raemsch's collection from the area of the aforementioned present golf course, were two specimens which we regard as true Indian artifacts. Both appear to have been retouched flake scrapers of non-diagnostic form. These specimens were not found in situ, but were picked up by Raemsch from the soil and gravel dug up by a backhoe in the construction of a drainage ditch. Because there are sporadic occurrences of Indian occupation of all ages on the gravel terraces along the Susquehanna and its tributaries, we have no hesitation in attributing these artifacts to a relatively recent component of this kind.

References:

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DONALD R. COATES 5/5/69

I share the deep concern of such members as Gordon Connally and Dave Fullerton that when time is plotted against a Glaciogram contribution informality index, a significant negative correlation is produced. Thus, expansion of this service seems to have thwarted "off-the-cuff" presentation style. I will attempt to practice what I preach by filing this chatty summary of current and future activities.

This semester has been exceptionally busy becasuse of my agreement during weak moments to take course overloads...thus I am teaching undergraduate geomorphology, graduate glacial geology, and directing an NSF In-Service Institute for Earth Science Teachers. Chairmanship of the university's Committee on Committee demands equal time. I look forward to the summer with great glee and anticipation. I will probably be busier than ever, but it will be of a different variety.

I presented a paper at the Annual Meeting of the American Geophysical Union entitled "Hydraulic geometry in a glaciated terrain". If some of you feel that a preprint would really benefit you, I have a few copies left on a 'first come basis'. This was an investigation of 18 streams, not previously studied, ranging in basin size from 3 to 61 square miles. The ten largest streams are direct tributaries of the Susquehanna and the eight smaller streams are tributary to Owego Creek. As reported in Glaciogram vol. 3, no. 2, Owego Creek is being studied by our Environmental Research Group and studies will continue there during the coming summer. My paper presents some results of the 32 variables that were measured and statistically compared. The main focus was an attempt to determine factors that control the hydraulic geometry of the streams. During a two-year period we made more than 200 current

meter measurements, mostly during times of low streamflow, and width, depth, velocity and discharge equations were developed. The regional geometry does not match geometries of non-glacial regions. I concluded that glaciation imposed a set of geologic and geomorphic conditions in the central glaciated Appalachian Plateau that produce hydrogeologic statistical anomalies. Apparently there has been insufficient time during the postglacial period for normal hydraulic geometries to establish any sort of quasi-equilibrium state and thus overcome irregular drift deposits and stream derangements.

This summer I have four different projects that I will attempt to juggle and which should serve to keep me out of mischief:

1. Work will continue on the Owego Creek basin, and the ERG staff will attempt to combine their disciplines into the simulation model study and integrate the materials into a water resource decision-making procedure.

2. My geomorphology group of students has reached an almost unmanageable size and I will spend a lot of time trying to keep them on the track and visiting their field localities. Currently I have four Ph.D. candidates and three M.A. candidates. Very fortunately for us, and it gives me great pleasure to announce, that help is on the way since we will be adding in our Department, Dr. Marie Morisawa who will become a permanent member of the staff starting February, 1970. Dr. Richard Beerbower becomes our Department Chairman starting July 1, 1969.

a. Steve Kowall is comparing the hydrogeology of a folded area with a non-folded area in the Appalachians of Pennsylvania. We will then compare the glaciated and non-glaciated Appalachian Plateau.

b. Jean-Jacques Flint is experimenting with landform and stream models. Current plans call for the construction of an outdoor laboratory complete with controlled sprinkler system. Statistical and mathematical relations of fluvial systems will be studied.

c. James Kirkland will do the glacial geology of the western Catskills and attempt to relate moraines and tills with the central New York system. Some of Rich's work will be re-evaluated and emphasis will be placed on the effects of the Catskills on continental glaciation.

d. Don Cadwell, an M.S. student from Franklin and Marshall, will start his Ph.D. field work this summer. He will work in the eastern Susquehanna basin on analysis and mapping of planar morphologic features in the valleys.

e. John Conners has almost completed the manuscript of his M.A. thesis on the topographic anomalies produced by glaciation and periglacial features in the Gengantslet region. A report of these will be made in the November issue of Glaciogram.

f. Marilyn Ginsberg will do a masters thesis on a ground water problem that will relate subsurface stratigraphies.

g. Peter Rideg will do a masters thesis in hydrogeology with emphasis on the economics of water resources.

3. I will continue to do field work, statistical and computer-based analysis for the paper I will present at the INQUA Paris meeting in September, "Geomorphic geometry of the glaciated Appalachian Plateau". The November Glaciogram is probably more appropriate for a review, than now, but perhaps some brief comments are in order. I have obtained quantitative map data from more than fifty 15 minute topographic quadrangles in New York and Pennsylvania in the glaciated Plateau. The numerous drainage anomalies and valley forms prove the topography could only have been formed by repeated glaciations and interglacial periods thus documenting my multicyclic theory (Coates, 1966). The valleys and drainage networks are divided into sets and subsets and compared by statistical methods. After the meeting I hope to spend about two weeks in the British Isles looking at the glacial and periglacial features that have closest application to our New York region.

4. I hope that I have made a sufficient case to permit me to spend some time at our summer beach home at Cape Hatteras. Here I will continue some coastal and beach studies started two years ago. I will be happy to receive any visitors that coincide their visits with mine at Avon, North Carolina.

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JANICE M. WHIPPLE 5/6/69

Surficial geology of an area in and north of the Richfield Springs, New York 15-minute quadrangle has been mapped and interpreted. A field of east-trending well-defined drumlin forms is located on the limestone plateau north of Richfield Springs. Thick till, sometimes drumlinized, is found in the valleys of the siltstone uplands. The most massive gravels occur within the Mohawk

River valley, although some do occur under the Clinton excarpment. Gravels, sometimes silty, also occur in the through-valleys. Lacustrine deposits occur in the through-valleys, in Fulmer Creek and Ohisa-Nowadaga Creek areas in the Mohawk River valley.

Examination of the aeroradioactivity map including this area discloses a correlation between gamma-radiation and surficial geologic units.

In the uplands of the eastern Appalachian Plateau, ice and snow cover was probably continuous and lingering while ice advance, ice decay, and meltwater drainage took place mainly in the Hudson-Mohawk lowlands and plateau through-valleys. Heavy precipitation is favored by proximity to the cyclonic storm system developed at the confluence of cold, dry air with moist, warmer Atlantic maritime air. The orographic effect of topography also encourages additional precipitation and cooler temperatures. Compatible with this hypothesis is the concept of drumlin formation by reactivating downwasting ice by an advance remote from the terminus.

Moraine formation depends not only upon climatic conditions determining the extent of ice advance but also upon underlying morphology. The latter influences moraine location by the distribution of sediment traps and texture by the character of routes available for meltwater drainage. For this reason, and because of continuous upland ice cover, classical end moraines may be absent. The through-valley choker moraines may represent infillings of sediment against discontinuous valley ice blocks, and some lake sediments may have been deposited under floating ice.

The sequence of glacial events in the area is not clearly defined. There is evidence of an early ice flow over the area appearing locally to be from the northwest. Before this mass completely downwasted in the uplands, ice (the "Mohawk lobe") advanced from the east. Drumlins were formed, principally on the plateau, as active ice extended a short distance into the uplands. Active ice tongues extruded into the eastern through-valleys. Water impounded in the Mohawk lowlands discharged through a col to the west, probably at Cedarville. At some time probably partially coincident with this advance, ice advanced from the northwest to at least as far as Little Falls. Lowland events are less certain.

As the ice downwasted, most rapidly in the lowlands, probably first in the Mohawk-Hudson region, water may have been impounded by the constriction at the Little Falls fault block. At some time it appears that ice in the Mohawk Valley readvanced from the west but did not enter this area. Fluvial terraces along the Mohawk River resulted from flood discharges when the impoundment was terminated.

All events occurred prior to 12,500 B.P. It is possible that the Mohawk lobe advanced during Cary time, if it were the latest advance from the east, and if the latest advance from the west were Port Huron. The interpretations support more of the earlier views of Brigham than those of Fairchild.

As a separate project through the winter and spring, I installed a Stevens water-level recorder at an artifically ice-free shore position of Otsego Lake. The continuous record was legible without use of a stilling well throughout the winter, but when the lake became mainly ice-free, surface waves made the record unintelligible. This in turn suggests that shore features may not be well developed in proglacial lakes that are largely occupied by ice.

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NOTE: This is from my Ph.D. thesis abstract, R.P.I.

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PHILIP WAGNER 5/8/69

Here is the supplementary information to my letter of April 1, 1969, for the Glaciogram as you requested.

Field study of the surficial deposits has concentrated on the Champlain Valley in the Burlington-Middlebury area.

A variety of water planes are recognized: Coveville Lake Vermont with a 6.8 feet/mile tilt and N 85 W isobase* orientation; Fort Ann Lake Vermont with a 5.3 feet/mile tilt and N 70 E isobase trend; Lake New York levels, which drained into St. Lawrence; Champlain Sea with 5.3 feet/mile tilt on upper levels, lesser tilts on lower levels, and an isobase trend similar to Fort Ann isobases.

Studies of till sections provide evidence of glacial events. The Burlington till-Shelburne till type locality near Shelburne has been examined. The irregular contact between the brown and grey units suggests that the color difference is related to

*isobases drawn using C.S. Denny's data in New York and my data in Vermont.

secondary, post-till oxidation; brown till incorporates both small remnants of grey till near the contact and extends downward into grey till along joints. Clay mineralogy analyses of sixteen samples by Bill Parrott seem to support the above conclusions. Preliminary fabric analysis of the tills by Chet Howard and Bill Parrott suggest that there may be a general preferred NE trend in the upper part of the brown unit. Fabric data from the lower part of the brown unit show a considerable range of values and indicate that there may be a complication due to changes in the lithologic composition of the till.

A variety of relationships indicate the nature of ice retreat in the Champlain lowland. Deglaciation of the area was progressive from south to north during Coveville time. Retreat was by stagnation along the margin of the Champlain Valley; no evidence is, as yet, available on the condition of the ice margin (active vs. dead) along the central part of the lowland in the area studied. By Fort Ann time the ice front apparently was in northern Vermont, blocking the Missisquoi River.

As the ice retreated, it left behind masses of ice in places, such as at Starksboro, in the Winooski Valley, and along the flanks of Mt. Mansfield. Stagnation of these isolated masses resulted in dead ice hummocky terrain, outwash plains, and local drainage irregularities. Absence of a Coveville delta, distribution of a veneer of superglacial drift(?), and the Oak Hill channel-delta complex are the evidence for a Winooski Valley remnant.

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JAY FLEISHER and JOHN SALES 5/8/69

PLASTER MODELS OF GLACIER FLOW AND SURFACE STRUCTURES

Several recipients of the Glaciogram expressed an interest in the method of preparation of glacier models displayed in the Oneonta State booth at the recent GSA meeting in Albany. In an effort to make this information available as soon as possible and in briefest form, we have decided to use the Glaciogram as a means of communication.

The plaster models yielding the best simulation of glacier surface structures (mainly crevasse patterns) were formed by allowing a mixture of Red Top, No. 1, molding plaster and water (2:1 ratio by volume) to flow down a gently inclined valley made of

lacustrine clays coated with vinylite plastic.

The trough was constructed by lining a wooden box (three feet long, one foot wide, nine inches deep and closed at the up-valley end) with lacustrine clays to form a broad channel, similar in cross-section to a mature valley (not a U-shaped trough). The up-valley end was hollowed slightly in the form of a cirque, which acted as a reservoir for the plaster. The down-valley end was gradually widened in the lower one-third of the trough to allow the flowing plaster to spread in lobate form. The entire clay form was sprayed with a vinylite resin-acetone solution to produce a surface that would offer friction to the flowing plaster but at the same time be nonabsorbent. Without this spray coating the clay removed moisture from the base of the plaster changing its properties sufficiently to preclude the development of well-formed surface structures. The entire box was inclined so that the coated-clay valley floor was inclined four degrees.

Red Top No. 1 molding plaster may be obtained in 100 pound bags from most building supply firms. For a trough of the size described above, it is recommended that 1600 ml of plaster be mixed with 800 ml of water (an exact 2:1 ratio is important). It is very important to add the plaster to the water and not the water to the plaster. The mixing was done in a large plastic pail with a stirring tool in a 1/2" hand power-drill. Mixing was done immediately after combining the plaster powder with the water. A complete and thorough mix was obtained in 15 to 20 seconds of power stirring. Upon completing the power stirring, the mix was poured without hesitation, into the cirque-like form, pouring in the up-valley direction so that the plaster wouldn't surge down-valley.

Various types of surface markers can be used to indicate the nature of the surface deformation. One successful approach was to use a 3" x 5" index card dipped in a thick dye or tempra paste to mark a straight line across the flowing plaster just below the pour area. This mark was usually deformed into parabolic form showing the surface deformation pattern and distribution of velocities across the plaster flow.

The most common crevasse patterns to form were of the marginal type. However, a transverse pattern can be formed if an increase in valley gradient is built into the trough form. Radial and longitudinal patterns may develop in the distal end of the flow, where

the valley widens and the plaster has been allowed to spread. These various patterns will form in response to the stress environments produced as the plaster flows, which are very analogous with the actual crevasses found on flowing glaciers. Oblique lighting will emphasize these patterns for group viewing.

The model should be allowed to set for approximately one hour before it is removed from the valley. Care should be taken to prevent foreign material from staining the model surface. It is difficult to remove such stains without removing surface details of structure as well.

We would be very anxious to know how successful this method is in your laboratory. Let us know if we can be of any assistance.

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G. GORDON CONNALLY 5/14/69

I am sorry to have missed the November issue of Glaciogram, but did not accomplish as much as I had hoped last summer anyway. I managed to put in five weeks in the Glens Falls quadrangle and presumably will finish it up this summer, depending on finances from the State. Plans are to publish a Museum Bulletin with Allan Hills (Precambrian) and Don Fisher (Paleozoic). In addition to the Glens Falls project, I am going to be mapping the surficial geology in the Saylorsburg quadrangle here in Pennsylvania for Jack Epstein of USGS. This covers the area of the Terminal Moraine and hopefully Les will do some pollen with me. Pete Ogden already cored Saylors Lake this spring.

I cannot let the apparent disagreement I discovered in Volume 3, No. 1 go without comment. William A. White has proposed erosional drumlins while Bill Savage, through Ernie Muller, has proposed depositional drumlins. I am still playing with the analogy between channel bars and drumlins. Channel bars are also partly erosional and partly depositional. Does anyone have any additional comment?

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VICTOR SCHMIDT 5/14/69

One of my students, Robert Richert, has been working in the Brockport region and has written his conclusions as follows:

The Hilton, New York, 7.5 minute topographic quadrangle is situated on the south shore of Lake Ontario 15 miles northwest of Rochester. It comprises part of the undulating Lake Ontario Plain. The topography, largely of glacial origin, seems to have exerted considerable control upon drainage patterns.

Low elliptical hills trend northeast-southwest over the entire quadrangle. They seem to be responsible for a direction of stream flow generally oblique to the northward slope of the land. Their form, orientation, dimensions, till composition, and soil seem to support the hypothesis that these hills are drumlins which have been modified during lacustrine submergence.

A series of hills runs east-west through the middle of the quadrangle. These hills, which seem to have diverted West Creek to due easterly flow, have been preliminarily interpreted as water-laid end moraine but soil types, as previously mapped, fail to indicate an origin from stratified, water-laid drift.

Nickpoints on the tributaries to Salmon Creek may have originated from the lowering of base level accompanying the falling sequence of proglacial lakes during recession of the ice sheet. In any case, the weakness and general homogeneity of the underlying Queenston Formation seem to preclude a caprock nature for these waterfalls.

As a result of postglacial isostatic rebound base level has risen from a low at the St. Lawrence marine embayment level to that of Lake Ontario. With the continued rise of Ontarian waters the lower reaches of Salmon and West Creeks have been drowned.

Many features of the Hilton Quadrangle, especially the drumlinized surface, resulting oblique stream flow, and drowned valleys are typical of the entire Lake Ontario Plain in this region.

Probable Sequence of Glacial and Postglacial Events

1. A probable glacial advance from the north, till ridge built.
2. Glacial advance from northeast (Shift in direction of ice flow from north to northeast), ice molded surface, drumlins, localized ice flow up preglacial West Creek valley.
3. Ice retreat, proglacial Lake Iroquois (440 ft.), winnowing of till in drumlins, deposition of lake clays.
4. Lake Iroquois drains to form St Lawrence marine embayment (150 ft) oblique stream control, rejuvenation of streams - nickpoints.
5. Isostatic rebound creates Lake Ontario (246 ft.), drowned valleys.

PART II RELEVANT INFORMATION OF OTHER REGIONS

ROBERT K. FAHNESTOCK 4/9/69

I think the GLACIOGRAM is very useful as it is. It might be expanded to cover other geomorphic subjects that bear on the formation and modification of glacial deposits such as shoreline processes--stream studies--in modern outwash--glaciologic studies etc. that might shed some light on interpretations of the Pleistocene. These studies obviously would be world wide and not just limited to the states mentioned. This could include publishing such things as Mark Meier's summary of the St. Hillare Symposium on Surging Glaciers (as yet unpublished). If you are interested in such things you might request more information on them.

As another example with Bill Bradley of the University of Colorado, I have spent the last two summers studying the valley train of the Knik River of Alaska. It has been subject to the floods resulting from the breakout of Lake George. Lake George did not fill during either field season and may not for sometime to come as the Knik Glacier is thinning and perhaps slowing down and is no longer sealing the outlet completely.

We were surprised to find how stable the pattern of the Knik is when compared to the rapidly changing patterns of other glacial streams. The work has involved studies of bar and channel form, sorting and sedimentary structures and river flow characteristics.

A report of a similar but less extensive study on the Slims River, Yukon territory which drains the Kaskawulsh glacier will be published soon (this year?) in the Icefield Ranges Research Reports, Vol. I, of the American Geographical Society.

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TROY L. PÉWÉ 4/16/69

I have been involved in various geomorphological exercises. Research is continuing on the third year on the glacial and non-glacial geology of the San Francisco Peaks near Flagstaff in central Arizona. A very fine record of the middle and late Pleistocene as well as Neoglaciation is recorded and a potassium argon date has been obtained from one of the ash flows associated with an earlier advance. Mr. Randall Updike is the main field investigator and plans to wind up his Master's research this winter and continue it for a Ph.D. degree.

In the White Mountains of eastern Arizona the glacial geology as well as Plio-Pleistocene geology are under investigation by Mr. Robert Merill and Dr. Péwé. Here a very interesting glacial record is being unfolded and the type locality of the early glacial deposits, like many places, may be turning out to be nonglacial. The Plio-Pleistocene history here is extremely interesting including the building of the mountain and enormous colluvial deposits.

In Alaska, research is continuing on the altiplanation terraces of central and western Alaska, and it has become evident that these terraces are much more widespread, than heretofore thought, and at much lower elevations than previously known. Information on these terraces will be presented at INQUA in Paris this summer. I plan to study altiplanation terraces in Siberia prior to the INQUA Congress. Mr. Richard Reger is the principal field investigator on the terraces and is now planning to spend his third season on this problem.

Work is underway on the interpretation of the terraces in the middle Salt River in central Arizona with Mr. Peter Kokalis as principal field investigator.

In addition to research with the students, my research on the Quaternary geology of central Alaska is continuing with the U.S. Geological Survey.

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ERNEST H. MULLER 5/3/69

Here in Reykjavik, long daylight hours have returned. Already at the beginning of May there is a twilight afterglow in the northern sky even at midnight.

A wealth of information useful in New York glacial geology can be gained by analogy, but I suppose that very little Icelandic geology belongs in the Glaciogram. Nevertheless, scientific meetings here this winter merit at least a note.

A 2-week symposium focussed attention on the return of Arctic Sea ice after 4 decades during which it very infrequently entered Icelandic waters. Since 1965 the ice pack has threatened each year and 1968 developed as the worst ice year in half a century. In May and June, 1968, the pack ice had spread clockwise around the northern and eastern coasts of Iceland as far as Ingolfshofdi, west of Hornafjordur.

The consequences of such drift ice invasion include obstruction to navigation, lowering of average temperatures, shortening of the growing season in the north and east, and resulting loss in agricultural production. Spread of sea ice is accompanied in late spring and early summer by eastward enlargement of the Greenland anticyclone, which is in turn responsible for southeastward spreading of the sea ice.

It was the objective of the symposium to examine the causes of such sea ice invasions, to investigate the possibility of predicting occurrence of sea ice in Icelandic waters, and to consider its implications. Perhaps unfortunately, the focus was too much on the local problem to permit consideration of the broad heat transfer relationships involved in variable discharge of sea ice southward out of the Polar Basin, and in fluctuations of the East Greenland and North Atlantic Currents.

A review of the symposium will appear in the Record section of the Geographical Review for July. Papers presented during the symposium will be published in Icelandic by Almenna Bokafélagid, Reykjavik, and selected ones will appear in the 1969 issue of Jökull in English translation.

For those interested in Icelandic glacial geology, you should seek access to 1) Jökull, published annually and largely in English now by the Iceland Glaciological society, 2) Natturufraedingurinn, published periodically in Icelandic but with English summaries by the Icelandic Natural History Society, and 3) the occasional papers of Visindafélag Islendinga. Snaebjörn Jónsson (the English book-shop), Hafnarstraeti 9, Reykjavik is a good address to which to direct inquiries and purchase orders.

According to present plans, I expect to be working in Iceland through June and July, and shall hope to make at least brief stops in Scandinavia en route to INQUA in Paris. I am looking forward to returning to Syracuse in September, the more so because Max Gage of Canterbury University (New Zeland) will be with us as visiting professor at Syracuse University. I hope he will have opportunity to visit some of you in the field and on campus during his stay in the U.S.

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NICHOLAS K. COCH 5/6/69

Since the purpose of the letter is to let people in the region know what others are doing in both glacial and non-glacial Pleistocene, I think this is a good idea. I also think that reports on non-glacial Pleistocene geology (such as I have been submitting) should be encouraged because the mutual exchange of information across the glacial limit will be to our benefit. I also think that the Newsletter should be sent only to contributors; each recipient should be required to contribute at least once every two years. So much for the answers to your questions and now on to what I should be doing and plan to do this coming summer.

The results of my study of the Late Pleistocene Norfolk formation and shoreline features at the Suffolk Scarp in Southeastern Virginia have just been published as Report of Investigations No. 17 by the Virginia Division of Mineral Resources. The report contains a series of color geologic maps on which I have distinguished both the sedimentary facies and the time-stratigraphic units.

In May, I will be working on a detailed study of the Late Pleistocene Sand Bridge Lagoon complex, between the Dismal Swamp and the James River, for the Virginia Divison of Mineral Resources. I hope to compare stratigraphic relations and sedimentary structures of various facies with those in recent environments. In June, I will be back in the U.S. Virgin Islands teaching part of a Queens College undergraduate course in basic field oceanography and continuing the study of carbonate and clastic sedimentation I began last year. If time permits, I hope to look at the evidence for successive erosion surfaces on St. John and St. Thomas. In July, I am teaching the geology part of an experimental graduate course in the ecology, archaeology, geology of Northeast Yucatan. We plan to work across the Pleistocene carbonate facies and karst area from Merida east to the coast and spend a week on the coast of northeast Yucatan studying the nearshore carbonate facies.

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