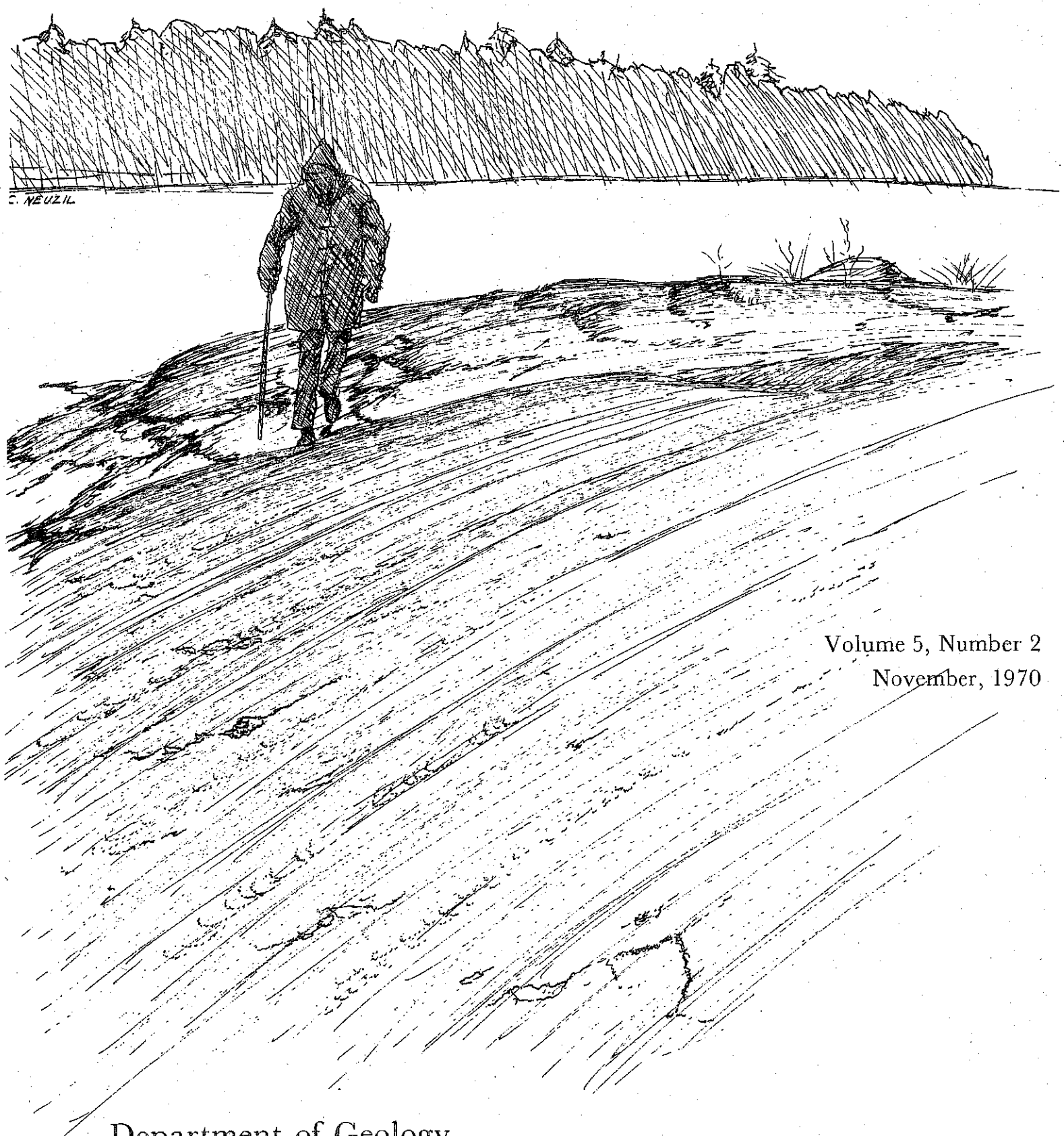
NEW YORK GLACIOGRAM



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EDITOR'S PAGE

As your editor throughout the five years existence of New York Glaciogram, I have constantly requested your suggestions on a number of questions and sought your advice on specific items. Of course, everyone likes assurance that he is receiving his money's worth from any service, and your advice is welcomed concerning how Glaciogram can be improved. I would like your response on the following idea: To provide with each issue listings of all newly published titles referring to glaciation in the region east of the 97° meridian in the United States as well as eastern Canada including the Maritime Provinces and Islands. The responsibility for compiling these publications would be from volunteers (hopefully). For example, we would certainly need a Canadian to collect the items from that country. For articles in the United States there are several ways the work could be allocated. Someone might volunteer to keep track of all State and Federal publications, and another to monitor professional journals. So that the burden does not fall too heavily on one person, he might assign the cataloging process to a class or for a project of independent study. Such an itemization should prove invaluable for workers in the area and students in glacial classes. This enumeration would not preempt authors of articles from describing significant features of the work in Glaciogram.

A final item concerns the name of this publication, New York Glaciogram. The original group of about 20 has now expanded to a mailing list of more than 200. This list is revised with each issue and names dropped when warranted by little interest. It does seem that the contributions are continuing to grow and are of such good quality that a review of the name is merited. Again I solicit your suggestions. It is impossible to please all the people all the time and although some "old guard" may be offended, the stage has very possibly been reached where a title such as Eastern Glaciogram, Northeastern Glaciogram (or some conbination of eastern North America or eastern United States and Canada) is more appropriate. How do you vote?

PART I NEW YORK AND ADJACENT REGION

PAUL F. KARROW 10/6/70

Several months were spent at Scripps in California studying raised marine terraces. Correlation of various terraces is greatly complicated by possible structural disturbance, removal or alteration of fossils in older deposits by weathering, deep burial of terraces under alluvium, and controversy over the validity of all known dating methods. Two of the youngest terraces with well preserved shells are being compared using several dating methods in the hope of establishing at least one basic relationship on which ages of other terraces may be based eventually.

Summer 1970 was spent in southwestern Saskatchewan, studying glacial stratigraphy along the South Saskatchewan River for the Geological Survey of Canada.

Thane Anderson's palynological study (Ph.D.) of Lake Algonquin sediments (on land) and related bogs is nearing completion. Several radiocarbon dates have been obtained on Lake Algonquin and levels in the pollen sequence.

Mrs. Sylvana Poplawski has nearly finished identification of the ostracod fauna of the Don Formation (Sangamonian?) at Toronto.

Dr. Ann Morgan is starting a study of the fossil beetles of the Port Talbot interstadial deposits and of the Don and Scarborough beds at Toronto. Dr. Alan Morgan is doing a study on glacial tills of the Huron lobe in Ontario. The Morgans have just arrived from Birmingham University and are being supported jointly by Aleksis Dreimanis (University of Western Ontario) and myself.

Dr. R. G. Mannada Rani Sreenivasa several months ago completed her study (Ph.D.) of the fossil diatoms of the Don and Scarborough

beds at Toronto. This work was supervised by Dr. H. C. Duthie of the Biology Department.

Our department has a new hydrogeologist Chairman, Dr. R. N. Farvolden, and several additional appointments are being made shortly. The new M.Sc. program in environmental geology is well underway with several graduate students enrolled.

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10/7/70

G. GORDON CONNALLY

By the time v. 5, No. 2 reaches you I will have presented a paper in Milwaukee, co-authored by Les Sirkin, entitled "The Wisconsinan History of the Hudson-Champlain Lobe" and will have submitted a summary paper for the symposium volume. Les and I have two other publications in press with G.S.A. - "Late Glacial History of the Upper Wallkill Valley, New York" (November) and "The Luzerne Readvance near Glens Falls, New York: A Port Huron Equivalent" (Hopefully, April)- and will be co-hosts for the 1971 Friends meeting at Glens Falls.

I also discussed the Wallkill Valley in an article on "The Glacial History of Dutchess Quarry Cave Site" in Pennsylvania Archeologist and in a discussion of another archeological paper in the October American Jour. Sci. In addition, my "Surficial Geology of the Brandon-Ticonderoga Quadrangles" should precede the Glaciogram as a Vermont Geol. Survey Bulletin. Those interested will find the documentation for my many philosophical and stratigraphic differences with Stewart and MacClintock's Bulletin 31.

Three other projects are in progress for the New York Geol. Survey. The Glens Falls Quadrangle should be printed in time for the Friends meeting and perhaps the text, co-authored with Don Fisher

also. In addition, I finished work in the Wallkill Valley this summer, defining one new moraine (Sussex moraine) between the Augusta and Pellets Island Moraines, abandoning the New Hampton moraine, and defining Glacial Lakes Fairchild (old "500 foot" lake) and Dyson (old "400 foot" lake). I hope to put the Wallkill Valley lakes and moraines into a Map & Chart Series publication. My most important new project is to compile the map of New York State moraines (ice margins). This project is in its final phase after the generous assistance of many of you. We hope to publish this, and a brief Map & Chart text, as a status-of-knowledge report but I don't know when it may be available.

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JESSE MILLER 10/9/70

"Drumlins in the Oswego, Weedsport, and Auburn, New York, Quadrangles"*

A north-south section across the central New York drumlin field reveals three distinct east-west belts of drumlins that differ from each other on the basis of crest elevation, elevation of inter-drumlin areas, size, steepness of steepest slope, drumlin density, and degree of streamlining. They did not, however, differ significantly in length/width ratio or orientation. Differences in composition seem readily explainable in terms of differences in the underlying bedrock. Investigation was by detailed map analysis with various statistical tests, and by extensive field survey. In addition to the differences between the east-west belts, other features demanding explanation include a remarkably well-developed though discontinuous upland surface

*Abstract of Dissertation, Department of Geography, Syracuse University, June 1970.

in the northern part of the study area, and an offset of crests and flaring toward the southeast of the drumlins in the northern belt.

The drumlins seem to be polygenetic, containing till, various types of outwash, and bedrock. There seems to be more outwash present in the drumlins than has been found by most previous investigators. The drumlins have probably been formed by a combination of depositional and erosional processes. There is a continuum of streamlined features in the study area from large hill masses to small, elongate rises a few feet across.

The explanation for the differences between the east-west belts involves the preglacial cuestaform topography and the effect of ice thickness and basal load (through viscosity) on the streamlining activities of a glacier sole. The offset of crests and flaring toward the southeast within the northern belt is believed to have resulted from an easterly shift in the direction of ice flow during the waning stages of the last ice advance. The broad upland remnants in the northern part of the study area are thought to represent either a wave-eroded surface or a plane of erosion along a shear zone within the glacier. The three east-west drumlin belts apparently extend across the central New York drumlin field, and the hypotheses suggested may have important implications for other areas of streamlined topography.

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ALEKSIS DREIMANIS 10/10/70

Most of last summer I was mapping stratigraphy of Late Wisconsin along the north shore of Lake Erie and the creek valleys south of London, Ontario for Geological Survey of Canada. J. S. Hancock, my

field assistant of last summer, is doing a stratigraphic investigation, with considerable amount of laboratory analyses planned, of the southwestern portion of the city of London, Ontario, as a B.Sc. thesis project. R. W. Dalrymple has begun a detailed field and laboratory investigation of the varved lake Maumee sands west of Port Stanley, Ontario, also as a B.Sc. thesis.

Dr. Alan Morgan, a N.R.C. postdoctoral fellow, will be working on the Huron lobe stratigraphy northwest of London, and Dr. Anne Morgan will study beetles of the Wisconsin deposits in southern Ontario on a joint project with Dr. P. F. Karrow and myself.

Eight Ph.D. and M.Sc. candidates are working on various Quaternary projects:

A. A. Berti's Ph.D. thesis "Palynology of the Mid-Wisconsin in the eastern Great Lakes Region" is near completion. J. L. Craft has completed field work for his Ph.D. thesis: "Late-Wisconsin glaciation in the Adirondack Mountains, N.Y.". B. H. Feenstra's M.Sc. thesis "Late Wisconsin till stratigraphy between Milverton and Elmira moraines, southwestern Ontario" is near completion. H. J. Gwyn is working on "Heavy minerals in till between Thunder Bay, Ontario, and Montreal, Quebec", as a Ph.D. thesis project. R. W. May is working on "Geochemical differentiation of tills in S. W. Ontario" as a Ph.D. thesis project. N. D. O'Donnel's M.Sc. thesis "Glacial indicator trains near Gullbridge, Newfoundland" is near completion. T. H. F. Reimchen last summer began field work on his Ph.D. thesis: "Quaternary geology of the Dawson Creek map-area (93P) B.C.", and M. M. Fenton on his Ph.D. thesis project on Quaternary geology of southeastern Manitoba.

Dr. N. A. Morner, a postdoctoral fellow from Stockholm has returned to Sweden, after having gathered interesting data on varved

sediments in southern Ontario and having discovered a new buried beach of the Erie Interstadial.

The Interdisciplinary Quaternary Discussion group met after Dr. R. P. Goldthwait's guest lecture on his work in Glacier Bay, Alaska, on October 6, and decided to hold meetings every second week on Thursday evenings, 7:30 p.m. If anyone is interested to receive the announcements of these meetings (the first one was attended also by visitors from Toronto, Guelph and Waterloo), please write me.

A review on "Late-Pleistocene lakes in the Ontario and the Erie basins" was published in the Proceedings of the 12th Conference on Great Lakes Research, 1969.

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WALTER S. NEWMAN 10/12/70

My work in northwestern Connecticut and southwestern Massachusetts disclosed, thanks to the suggestions of my colleagues Bob Melvin and Linc Page, a littoral deposit formed along the west shore of a 20-mile long, long-lived glacial lake in the upper Housatonic River valley that rises to the north in the order of 5'/mile. This figure contrasts with the 2-4'/mile figures previously reported from the Hudson River valley. Thus we have some confirmation of Taylor's (1903) contention (Lately, reconfirmed by Gordon Connally's work) that "...the (Hudson) valley was occupied at all stages of retreat by a great glacier lobe which projected far south from the general line of ice-front and spread away laterally over the country both to the east and west of the river." If ice lingered longer in the Hudson valley, isostatic rebound may have been further along before the strandline records of glacial lakes in the Hudson lowland impressed their records on the valley sides.

In the Housatonic valley, there is certain evidence of lobation as the 880' lake in the Blackberry east-striking River valley must have been dammed by ice still remaining in the Housatonic valley. On the other hand, further south where the Housatonic River valley narrows conspicuously, the evidence indicates minimal lobation at best.

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JOSEPH A. CAGGIANO, JR. 10/14/70

I wholeheartedly concur with your statements in the May Glaciogram. As suppliers of geologic information, we in the geologic profession must communicate much more effectively with the users of such information so that surficial geologic and hydrologic principles are duly integrated into planning studies. In so doing, we shall generate greater awareness of earth processes, increased respect among scientists, engineers, and lay people, and probably greater financial support for our research. We can only gain by such practices. I have read the McHenry County study and suggest the coordinated approach and publication as models for future investigations.

I spent the summer mapping the surficial geology of the Belchertown, Mass. quadrangle for the U.S.G.S. and my dissertation. The area straddles the Triassic border fault and includes problems of deposition of tills, glaciofluvial sequences, and lacustrine sediments.

Orientation of few striae and streamlined summits indicate advance of ice into the area from north 13° west. Only two exposures of the well-indurated lower till have been found to date in the area, one of which is in a drumlin. The upper till which is ubiquitous in the uplands is generally a moderately stony, slightly silty, very fine sand till. However, near the contact with glaciofluvial sediments, the stone size and content increases markedly, especially in topographically

expressed knobs or ridges. Silt content of the till also decreases near the glaciofluvial contact. This, along with other evidence, supports Pessl's interpretation of the upper till as partly an ablation deposit.

Glaciofluvial sediments are widespread in the Connecticut valley, but also occur in significant amounts in the uplands. In a large bedrock-rimmed, upland basin, extensive stratified drift, flowtill, and a well developed channel filling suggest stagnation of an ice block in the uplands. A well in this area reportedly went 110 feet without striking bedrock. At least two glaciofluvial sequences occur in the Connecticut valley, the lowest of which has been modified by littoral processes of Glacial Lake Hitchcock. Baselevels to which the glaciofluvial sequences were graded were controlled by stagnant ice blocks.

Local lakes which developed between melting ice and nunataks gradually increased in size, decreased in altitude, and merged with the waters of northward expanding Lake Hitchcock. Lacustrine sediments occur on the valley sides of kame terraces, as well as in a large embayment of Lake Hitchcock.

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GEORGE W. WHITE 10/15/70

Here are some notes on new publications:

As Chairman of the Executive Committee of the University of Illinois Water Resources Center, I am particularly pleased to call your attention to a publication just issued, "Hydraulic Geometry of Twelve Selected Stream Systems of the United States," by J.B. Stahl, and C.T. Yang, Research Report No. 32, University of Illinois Water Resources Center, 73 pages. It has maps, diagrams, charts, references,

photographs, formulas--something for everyone! Those with modest mathematics will find the concepts beautifully explained and those who want their mathematics undiluted will also find this in other parts of the book. The two-color maps and the graphs and charts will be widely copied. Be sure that both you and your library get a copy. Single copies are without charge from Dr. B.B. Ewing, Director, University of Illinois Water Resources Center, Urbana, Illinois 61801. After receiving your copy, an approving note of thanks to Dr. Ewing would help encourage further support of water-related geomorphic research by the Center, which has a budget of several hundred thousand dollars, but which has more applications than can be funded. The Center particularly aims to support research of high quality which is "relevant" to water resources.

If any readers of the "Glaciogram" may have missed U.S. Geological Survey Bulletin 1274-E, "Definition of Wisconsinan Stage," in which "The Wisconsinan Stage and its Altonian, Farmdalian, Woodfordian, Twocreekan, and Valderan Substages are described as time-stratigraphic units of the Pleistocene of Illinois and Wisconsin." by J.C. Frye, H.B. Willman, Meyer Rubin, and . . Black, 1968, 22 p., they should by all means secure a copy. This has also been issued as Reprint Series 1968-U by the Illinois Geological Survey, Urbana. Also watch for the Survey's very elaborate bulletin on Pleistocene classification, which all glacial geologists will want to secure. It is promised for the end of 1970.

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JOHN T. ANDREWS 10/21/70

During the 1970 summer season the Institute of Arctic and Alpine Research had seventeen people in the field in east Baffin Island, N.W.T., Canada. The research was supported by grants from the National Science Foundation and the Army Research Office, Durham. The projects involved a broad-scale attack on the inter-related problems of glacial chronology, glaciology, micro-meteorology and climatology. We were exceptionally fortunate in having the Air National Guard of Wyoming and Minnesota fly us to and from Baffin Island. Seven graduate students from the Department of Geological Sciences and six from the Department of Geography were involved, plus faculty from the two departments.

J. Jacobs carried out a detailed micro-meteorology program on the Boaz Glacier, a small mountain glacier immediately east of the Penny Ice Cap. R. Weaver conducted studies on the mass budget of the Boaz and L. Williams investigated the hydrology of the characteristics. R. Bradley determined velocities on the Boaz Glacier. Their studies will be combined to produce mass, energy and water balances. P. Carrara studied the mechanism of formation of shear moraines and did detailed lichenometric and weathering studies on a sequence of "old" and "young" moraines. R. Dugdale conducted an investigation of corrie moraine systems with a view to developing the paleo-glaciology of former corrie glaciers. G. Miller undertook a wide-ranging investigation of the age of moraines fronting the Penny Ice Cap and local mountain glaciers, using lichenometry as the principal discriminating factor. D. Pheasant continued studies on the chronology and isostatic rebound of the area, concentrating on Narpaing Fiord. Dr. R.G. Barry was in overall charge of the micro-meteorology and climatology

programs, and during the summer investigations were conducted on the relationahips between synoptic climatology and micro-meteorology. Dr. J.T. Andrews was in overall charge of the glaciology and glacial geology program. Several peat monoliths were sampled for pollen analysis and investigations were continued on the sequence of events on Broughton Island.

The glacial geology investigations can be summarized as follows:

1. Large areas have never been glaciated.
2. Stratigraphic evidence and uranium series dates indicate that the Wisconsin Ice was never very extensive in the fiords.
3. Radiocarbon dates indicate that there might have been a period of recession about 28,000 BP.
4. Retreat during the late Wisconsin was slow so that the fiord heads have only become ice free about 5,000 BP.
5. The outer coast is undergoing submergence.
6. Our development of a directly measured lichen growth rate curve indicates that we should be able to date the Neo-glaciation with considerable accuracy.

One final point: I wish people would drop the concept of a mid-Wisconsin interval with sea level at or above present. Such constructs ignore the known history of the Laurentide Ice Cap.

On the Colorado scene, D. Alford was in charge of a glaciological program that studied the mass balance of fourteen glaciers in the Front Range. The program is designed to investigate the local differences of mass and energy exchange.

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BLACK, ROBERT F. 10/22/70

I have no news to report on work in New York, but I think the profession will be interested in my move from Wisconsin to Connecticut. Last summer was spent in the field. The month of June was devoted to research in the Aleutians on Pleistocene problems related to the ancient Aleuts. During July and August, I took over the advanced summer geology field course for the University of Wisconsin. The group traveled the Alaska Highway into northern British Columbia and Yukon, covering a variety of geology. I expect next summer to spend a longer period in the Aleutians on the interdisciplinary project regarding the history of the Aleuts.

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WILLIAM D. SEVON 10/23/70

This summer has been active, enlightening and at time exciting. I continue to map quadrangles and this field season built on previous work to complete three 7½' quadrangles (Hickory Run, Blakeslee and Pohopoco Mountain). Tom Berg, who previously mapped in northwestern Pennsylvania, has been transferred to northeastern Pennsylvania and has mapped most of the Brodheadsville quadrangle this summer. A Transco pipeline trench across the Brodheadsville quadrangle gave us a short but informative view of the complexity of a Wisconsinan outwash plain. The trench also yielded a lake clay with organic debris which will be dated eventually.

The most exciting development of the summer has been the very recent recognition in the Blakeslee and Hickory Run quadrangles of glacial drift younger than the Illinoian (?) and older than the Wisconsinan delineated by the 'terminal moraine'. To date this drift

is known only from till and kame deposits occurring south of the Wisconsinan 'terminal moraine'. Original surface morphology is absent on the drift and it lacks the depth and intensity of weathering typical of the Illinoian (?) of the area. The fresh till appears identical to fresh till north of the 'terminal moraine', and at present separation of the two in a multiple till section (I should be so lucky as to find one) might be very difficult. Presumably the drift represents an early Wisconsinan advance, but how early and how extensive are open questions.

I enjoyed the AMQUA meeting in Bozeman and found stimulating the breadth of subjects discussed in relation to the central theme. However, after seeing some western surficial geology on the field trips, it was a shock to come back east where everything is covered with vegetation and seems much more subtle.

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DONALD R. COATES 10/28/70

My two principal projects during the summer were to continue field investigations of hills in southern New York and northern Pennsylvania, and to organize the first annual geomorphology symposium. In addition I shepherded through two thesis that were done under my direction. Jean Jacques Flint completed his Ph.D. thesis entitled "Fluvial Systems: A Reevaluation of Horton's Laws". He is now teaching at Brock University, St. Catherines, Canada. Peter Rideg completed his M.A. thesis entitled "Quantitative Fluvial Geomorphology of Catatonk Basin, New York". He is now working on his Ph.D. problem which is a combined study of the structure and geomorphology of Serro do Mar in Brazil.

I am intrigued with the problems involved in size, shape, orientation, and origin of hills in the northern Appalachins. They

form a rather continuous spectrum and can probably be placed into some type of an hierarchic system. The mechanics of emplacement of till hills in the valleys received special attention during the summer.

A brief report on the symposium might be in order. There were 176 registrants for the Environmental Geomorphology Symposium held at our campus on October 16-17. Although 14 papers cannot cover all aspects of the subject I believe there was enough variety to have pleased all of the people some of the time. I am currently starting the editorial job of reviewing the manuscripts which will be published in a book. Three publishers are interested in the final result. The paper I presented "Legal and Environmental Case Studies in Applied Geomorphology" was largely drawn from court actions taken in New York State. I provided somewhat detailed analysis of three court cases I was personally involved with concerning sand and gravel claims. Decisions in all cases directly reflected the importance of providing accurate geomorphic data on the origin, quality, and quantity of the deposits.

The 1971 symposium will also be held in October and will be on the theme of quantitative geomorphology and its applications.

I am directing Ph.D. theses work for three students who are involved with glaciation processes. They have all had at least two summer's work on their problems.

Donald Cadwell's topic is "Deglaciation Chronology of Valleys in South Central New York". He has given special emphasis to the Chenango River.

James Kirkland's topic is "Glacial Geology of the Western Catskill Catskill Mountains". His work overlaps some of John Rich's and

extends west through the Deposit area.

Steve Kowall is actually working south of the glacial border in Pennsylvania where he is comparing the hydrogeology of the plateau and the folded terrain. His area contains many block fields, stone stripes, and other periglacial features, which he is also studying and mapping.

The cover page was once again done by our geo-artist, Chris Nevzil.

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PETER RIDEG 10/29/70

QUANTITATIVE FLUVIAL GEOMORPHOLOGY OF CATATONK CREEK BASIN, NEW YORK*

The hydrologic and geomorphic characteristics of six stream basins in the glaciated Appalachian Plateau in southern New York State were evaluated. Catatonk Creek basin, 144 mi^2 in area, and five sub-basins, ranging in size from 3.5 to 20.3 mi^2, were studied in a detailed quantitative manner.

The focus of the study has been to aid to the sparse information of quantitative geomorphology in glaciated terrain. Methods included the use of water stage recorders to obtain continuous discharges, seepage measurements to determine alluvial fan infiltration characteristics, pebble analyses of channel materials, and statistical analysis of geomorphic parameters obtained from topographic maps.

Significant results were obtained in the hydrologic evaluation of steam basins: (1) Interpretation of flow duration curves indicate a greater capacity for infiltration and storage of water in basins with large flood plains, in contrast to those with small flood plains. (2) Seepage measurements made in a glaciated terrain for the first time indicate that alluvial fan materials have high percolation rates.

*Abstract of M.A. thesis at SUNY Binghamton, 1970

A perched water table may result in alluvial fan materials providing an increase, rather than a decrease, in discharge where tributary streams contribute significant volumes of water. (3) The variations of width, depth, and velocity of water at at-a-station and in a downstream direction yield hydraulic geometry exponents unlike those reported in the literature. The average at-a-station values obtained for streams in this study are .07 for width, .19 for depth, and .74 for velocity. The downstream values are .38 for width, .34 for depth, and .26 for velocity. All values reflect conditions of low flows at the 70 percent frequency duration or higher. These values indicate that at low flow conditions the average velocity of streams will increase rapidly with discharge at the expense of width and depth. (4) Factor analyses yield three factor groupings explaining 92.44 percent of the total variance between 29 geomorphic and hydrologic parameters: (a) variables which describe the regional geometric properties of basins and which are dependent on basin size, (b) variables which explain the drainage texture and relief of basins, (c) variables which describe the hydraulic geometry of streams. A significant result of this study is that hydraulic geometry of streams forms part of a system which is independent of the measured geomorphic characteristics. This result is based on factor analysis of 29 parameters of geomorphology and hydraulic geometry.

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CHAUNCEY D. HOLMES 10/28/70

Health conditions since last spring have curtailed my late-glacial pollen studies somewhat, but palynology itself here at Tully is in good health. Through the kindness of Dr. Jim Bugh and his co-workers at Cortland, their Department has loaned a fine A O microscope for use by our four young Junior High researchers. We all are grateful for this spirit of helpfulness. Through the coming months I shall be monitoring their work on the local late-glacial and postglacial record of climatic change. The prospect for worthwhile results are indeed bright.

I'm hoping that my next report will be more newsworth.

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JAMES BUGH 10/30/70

In August, I visited urban areas around Great Slave Lake in the Northwest Territories. Urban development there is hampered more by the 65° winter temperatures than the discontinuous occurrences of f permafrost.

Those of you who attended the field trip of Deglaciation of the Eastern Finger Lakes Region of the 1970 NYSGA saw at the last stop evidence of what was probably several minor advances before the Valley Heads advance. New cuts in the vicinity show at least three till layers separated by contorted stratified materials.

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ERNEST H. MULLER 10/31/70

Last June I returned to Iceland on the Glaciological Society Excursion, held at Skogafoss on the south coast. In addition to revisiting outlet glaciers of the southern ice-caps, we had the unexpected good fortune of witnessing the eruption of Hekla Volcano at close hand.

During July and August I worked for Acres Canadian Bechtel, Inc., the firm which is overseeing construction of the Churchill Falls Power Project in central Labrador. The headwaters of the Churchill and Naskaupi Rivers are being imponded in a reservoir complex with a thousand-foot head above the canyon of Churchill River at the power site near the new town of Churchill Falls, The work afforded insight into the nature of ripple moraine, eskers, drumlinized drift and the very bouldery ground moraine deposited during final recession of the inactive remnant ice sheet toward its demise northwest of Schefferville, Quebec. I enjoyed a brief but very fruitful and instructive visit at the McGill University Knob Lake Research Station during the last days before Bruce Thom left the station to return to Australia.

Two Ph.D. dissertation investigations under way at Syracuse University are of potential interest to readers of the Glaciogram. Stephen Forster reports that striae, drift constitution and till fabrics in the Carthage quadrangle in the middle Black River Valley indicate a till sheet deposited by ice from the north-northwest over an earlier till sheet from the north-northeast in sequence similar to that described by MacClintock and Stewart in the St. Lawrence lowlands. In the Housatonic Valley southwest of Cornwall, George Kelley is detailing glacial topographic series and deposits for insight as to the nature and chronology of deglaciation in that area on the New York-Connecticut border.

Connecticut border.

Two questions for the Editor: Has anything been done to recogniz recognize the inspiration which Paul MacClintock afforded in New York glacial investigations? A note of recognition would seem to be in order.

Have you had contact with or communication from Don Krall (working in the Richfield Springs area) or Dave Fullerton? I hope they will each have something to offer in this Glaciogram.

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DAVE FULLERTON 10/31/70

GLACIAL LAKE AMSTERDAM - EASTWARD OR WESTWARD DRAINAGE?

In all published discussions of Glacial Lake Amsterdam in the Mohawk River valley it has been assumed that the lake drained eastward. The work of A.P. Brigham, R.G. LaFleur, and the writer suggests that early Lake Amsterdam drained westward, across the Little Falls fault block.

LaFleur (1969) concluded that the ice of the Yosts glacial readvance covered the Delanson-Altamont channels and the Esperence sills and that a high-level phase of Lake Schoharie was maintained in the Schoharie Creek and Cobleskill Creek valleys during the Yosts readvance. The Yosts margin crosses the Mohawk River valley at the Noses escarpment, and Lake Amsterdam is postulated to have been present west of the ice margin in the Mohawk Lowland. LaFleur concluded that latest Lake Schoharie drained eastward and southward via the Delanson-Altamont channels and the Esperence sills during dissipation of the Yosts ice.

Brigham (1911, 1929, 1931) maintained that the Delanson-Altamont channels and the Esperence sills nearly everywhere are veneered by glacial till (the Yosts till of LaFleur?) and that little evidence of

stream erosion can be found on the till surfaces. He concluded that the channels and sills were not utilized by extensive lake drainage subsequent to dissipation of the latest (Yosts?) ice in the region. Lake Schoharie was a relatively large lake and it served as the catchment basin for meltwater from a large body of ice to the north. The drainage from the lake is expected to have efficiently eroded the Yosts drift, even if the channels were merely reoccupied by the post-Yosts Lake Schoharie waters.

Brigham (1908, 1929, 1931) found no evidence to support an hypothesis that any continuous static water body existed in the Mohawk River valley east of Little Falls at an altitude higher than 460 feet. My observations and those of Cushing (1905) are in agreement with the interpretations of Brigham. The "460-feet" lake of Brigham is the highest level of Fairchild's (1912) Lake Amsterdam that is recorded in the Little Falls-Canajoharie region.

Brigham (1929) concluded that early Lake Amsterdam (at 450-460 feet) extended westward only as far as Little Falls. Thick units of lake sediment between the Mohawk and Valley Heads tills are present in the Mohawk River valley between Little Falls and Frankfort, at and below an altitude of 460 feet. The altitude(s) of the lake surface(s) in this region cannot be determined, but it is concievable that Lake Amsterdam extended westward through the gap at Little Falls, at least as far west as Frankfort. Alternatively, early Lake Amsterdam may have drained westward across a drift fill or barrier at Little Falls. In the latter case a river may have flowed westward from Little Falls or a lower lake may have been present west of the fault block.

LaFleur (1969) found that Lake Schoharie was not present in the Schoharie Creek valley at altitudes lower than 620 feet, and that it did not extend into the Mohawk River valley. He suggested that latest

Lake Schoharie, in the Schoharie Creek valley, ay have been contemporaneous in part with Lake Amsterdam in the Mohawk River valley. Lake Amsterdam (altidude $\leq$ 460 feet) east of Little Falls was dammed on the east by the Yosts ice at the Noses escarpment. It could not have drained eastward into latest Lake Schoharie (altitude $\geq$ 620 feet) during the Yosts advance or during early stages of dissipation of the Yosts ice, at a time when (according to LaFleur) the Delanson-Altamont channels and the Esperence sills were utilized by Lake Schoharie drainage. If Brigham's observations and interpretations are correct, it is to be questioned whether the channels and sills were used at all by Lake Schoharie drainage during dissipation of the Yosts ice. It is concluded, on the basis of the above discussion, that early Lake Amsterdam drained westward during the Yosts readvance and at the time of extinction of Lake Schoharie. Is it not possible that latest Lake Schoharie also drained westward (into early Lake Amsterdam)?

Brigham (1898, 1908, 1929) assumed that early Lake Amsterdam (altitude $\leq$ 460 feet) drained eastward, but no definite lake outlets at altitudes between 460 and 440 feet were found. No satisfactory evidence has been cited by any author that indicates why early Lake Amsterdam "should have drained" eastward or that in fact it did drain eastward. Westward drainage of early Lake Amsterdam would have been terminated as a result of uncovering of a lower outlet to the east, during late stages of dissipation of the Yosts ice. This later and lowered Lake Amsterdam would have been the earliest and highest continuous lake in the axis of the Mohawk River valley to have drained eastward.

What, then, are the objections to an hypothesis of westward drainage? I know of no morphologic or stratigraphic evidence that precludes such drainage or that serves to argue against such drainage.

Westward drainage did occur during early stages of dissipation of the Mohawk (maximum Late Wisconsin) ice sheet in the western Mohawk Lowland (west of Little Falls), and there is no reason to believe that in that region the direction of drainage was reversed prior to disappearance of the Mohawk ice. The apparent absence of evidence of westward drainage in the Ontario Lowland is entirely negative in nature, because ancestral Great Lakes drainage eastward through the Mohawk Lowland followed extinction of Lake Amsterdam, Lake Albany, and Quaker Springs Lake Vermont (and probably also Coveville Lake Vermont) and the Great Lakes drainage was followed by readvance of Valley Heads ice from the Ontario Basin eastward in the Mohawk Lowland to a position east of Little Falls. The Valley Heads glaciation removed or obscured all morphologic evidence of pre-Valley Heads westward drainage.

If anyone can supply me with specific morphologic or stratigraphic evidence that bears upon the question of drainage of early Lake Amsterdam, the information will be greatly appreciated.

Brigham, A.P., 1898, Geol. Soc. Am. Bull., v. 9, p. 183-210.
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Report of Illinois State Geological Survey Activities for the

NEW YORK GLACIOGRAM

November 1, 1970

LEON FOLLMER 10/26/70

After completing his Ph.D. in Pedology, February, 1970, Leon accepted a position with the Illinois State Geological Survey to augment the Survey surficial mapping program. At the same time he also accepted an appointment with the Department of Geology for teaching agricultural geology during both spring and fall semesters.

During the summer of 1970, Robert Mason, a graduate student in the Department of Geology, joined the Survey summer staff. With combined efforts, Follmer and Mason mapped the surficial geology of Macon and Sangamon Counties. Presently they are tabulating grain size and clay mineral data from samples collected during the summer and are preparing final maps which will be completed during Spring, 1971.

Mason is tentatively planning to expand his portion of the Macon County study with a Ph.D. thesis problem by the addition of a deep drilling program that will allow him to penetrate the entire thickness of glacial drift.

JOHN C. FRYE and H.B. WILLMAN 10/20/70

Work on Illinois State Geological Survey Bulletin 94, "Pleistocene Stratigraphy of Illinois" was completed in midyear and galley proofs have been seen. Publication is expected during December. The report, which summarizes the results of many years of field work, formalizes classification based on time of deposition, rock characters, and buried soils, as well as the relationships of terraces and moraines.

The same authors also recently published a 1/500,000 scale map, "Woodfordian Moraines in Illinois, showing the location of 76 Moraines

in Illinois, 39 of which are newly named.

The map and bulletin together establish the first comprehensive rock stratigraphic and morphostratigraphic classification for Illinois and in addition expand and elaborate the previous soil and time stratigraphic classifications.

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DAVID L. GROSS 10/26/70

John Kempton and Dave recently had the pleasure of assisting I. Edgar Odom, Ronald C. Flemal (Northern Illinois University), and Kenneth C. Hinkley (Soil Conservation Service) with the leading of the Pleistocene portion of the Thirty-fourth Annual Tri-State Field Conference. The Tri-State is an annual affair hosted alternately by institutions in the states of Illinois, Wisconsin, and Iowa. This year eight bus loads of geologists and soil scientists were divided between two trips, one on the lower Paleozoic of northern Illinois and the other on the Pleistocene deposits of northeastern Illinois. The 94-page guidebook may be purchased for $4.00 from the Department of Geology, Northern Illinois University, DeKalb, Illinois, 60115. In addition to the road logs, the guidebook contains a number of short papers including:

Frye, J.C. and H.B. Willman -- Rock Stratigraphy in the Illinois Pleistocene

Kempton, J.P. and D.L. Gross -- Stratigraphy of the Pleistocene deposits of northeastern Illinois

Flemal, R.C., J.L. Hesler, and Kenneth C. Hinkley -- The DeKalb Mounds: Possible remnants of pingos

McGinnis, L.D. -- The bedrock surface in northeastern Illinois -- a Review

Hinkley, K.C. -- Soils in northeastern Illinois

In the last issue of the Glaciogram, G. Gordon Connally questioned the interpretations of the trend surfaces of compositional isopleths which were included in Pennsylvania Geological Survey Bulletin G-55 authored by White, Totten and Gross. Stephen Moran and Gross discussed these trend surfaces at some length in a paper which is now in press and are convinced that the surfaces can be used to locate the general source areas and to quantify the volume of glacial erosion. The paper will be published by the Ohio State University Press in "Till, A Symposium" which includes twenty papers from the May, 1969 North-Central Section meeting of the GSA (Symposium on Till) as well as a paper by Geoff Boulton of England and an introduction by Richard P. Goldthwait. The volume is being edited by Goldthwait, with assistance from Jane L. Forsyth, David L. Gross and Fred Pessl, Jr. It should be available on or before March, 1971.

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ALAN M. JACOBS 10/26/70

Alan's recollections of this year's AMQUA meetings include Meyer Rubin's expression "rubber band years" used to emphasize the variability of radiocarbon age determinations. There too, George Denton expounded the notion that because sea ice or water may be easier to traverse than land, the early migrants into the Western Hemisphere did not need land bridges (low sea level) or ice-free corridors to make the journey. Many registrants had their first opportunity to go to a pollen party at which pollen diagrams were doodled and swapped. Aside from such carryings-on, however, the first annual meeting of the American Quaternary Association was a good start for a long needed organization. Friends of the Pleistocene and allies of the Holocene now have an opportunity to exchange ideas on a regular basis.

W. HILTON JOHNSON 10/26/70

Hilton Johnson is on leave for the University of Illinois and is continuing work in Vermilion Co. from the State Geological Survey. Of particular interest is the recent discovery of an older till in the strip mine at Danville. It is the fourth pre-Illinoian till in the area and is either earliest Kansan or possibly Nebraskan. The till is not weathered but contains less than 1% total carbonate as well as highly degraded clay minerals. The composition is unlike that of any other tills in Illinois and suggests that bedrock conditions in northern Illinois and Indiana were quite different in the early Pleistocene. This till adds to what was already an exceptional Pleistocene record near Danville--three Wisconsinan tills, three Illinoian tills, and four Kansan tills. Current mapping indicates that there may be an additional one or two Wisconsinan tills in the northern part of the county.

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JOHN P. KEMPTON 10/26/70

JPK has several projects in various stages of completion. A study of the glacial deposits at the National Accelerator Laboratory Site, Batavis, Illinois, with Ronald A. Landon (senior author) is now in press. In final stage of preparation, are reports on glacial stratigraphy and ground-water conditions in the Champaign-Urbana well field (with Keros Cartwright and Frank B. Sherman) and on the geology, soils and hydrogeology of Volo Bog, Lake County, Illinois (with Murray R. McComas, senior author now at Kent State University, and Kenneth C. Hinkley, Soil Conservation Service). Studies providing stratigraphic information and surficial geologic maps for environmental planning include work on the glacial deposits in Coles County, east central Illinois being done with John P. Ford of Eastern Illinois

University. Ford and Kempton, along with Paul DuMontelle and Herb Glass plan to put together an initial paper on the area this winter.

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MARIE MORISAWA 11/1/70

Marie Morisawa of SUNY Binghamton has been working on methods of evaluation of the hydrologic, geologic, and cultural aspects of river basins. Robert Sager, graduate student is also taking part in this research. Another graduate student, Kenneth Ruzyla is working on sedimentation-erosion processes on Fire Island, New York.

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ROBERT K. FAHNESTOCK 11/4/70

I am still working on the buried topography and the Lake Erie shore. Gravity measurements appear not to work as there is no contrast between the bedrock and fills. Other geophysical methods will be attempted. Still working on processes in gravel bearing streams. Two graduate students are studying small streams in the glacial deposits.

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